

# Technical Memorandum

To:	Richmond Valley Council (Brad Willis)
From:	AWC – Adrian Leader, Will Dale
Date:	28 <sup>th</sup> June 2024
Pg/Attach.:	10 pages plus Attachments
Job ref:	1-201354_05_19a_NRLX_GW_SW_EFF_RVC

## Northern Rivers Livestock Exchange (NRLX): Environmental Monitoring Report (June 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 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, storage/irrigation ponds and monitoring of ground water field parameters are required. Table 1 provides details of the EPL and project.

Water | Ecology | Management

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Table 1 Site and project details

NRLX	
Site Identification	Lot 1 DP 1240949 Dargaville Drive, Casino NSW 2470
Current reporting period	June 2024 (Quarterly monitoring)
EPL	3878 (17-Apr-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 analyte concentrations are within the historical range of values
- Field parameters for groundwater typically exceeded relevant field monitoring WQOs
- Trigger event monitoring of surface water was not undertaken during the current reporting period

### 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	Analyte	WQO
pH	6.5 – 8.0	Total Nitrogen (TN) (mg/L)	0.35
EC (dS/m)	0.125 – 2.2	Oxidised Nitrogen (NOx) (mg/L)	0.04
Thermotolerant coliforms (cfu/100 mL)	1000	Ammonia (mg/L)	0.02
BOD <sub>5</sub> (mg/L)	15	Total Phosphorus (TP) (mg/L)	0.025
Total Suspended Solids (TSS) (mg/L)	40	Plant available Phosphorus (mg/L)	0.02
Chlorophyll 'a' (mg/L)	0.003		
Dissolved Oxygen (DO) (%)	85 - 110		

### 1.2 Weather Monitoring – Rainfall

Monthly rainfall totals recorded at the Casino Airport (BOM station 058208) for April (189.6 mm) and May (96.2 mm) were above their respective historic averages of 70.9 mm and 81.1 mm while March (135.2 mm) was below its historic average of 144.5 mm. (refer Figure 1). No wet weather monitoring of surface water was triggered during the quarterly monitoring period.

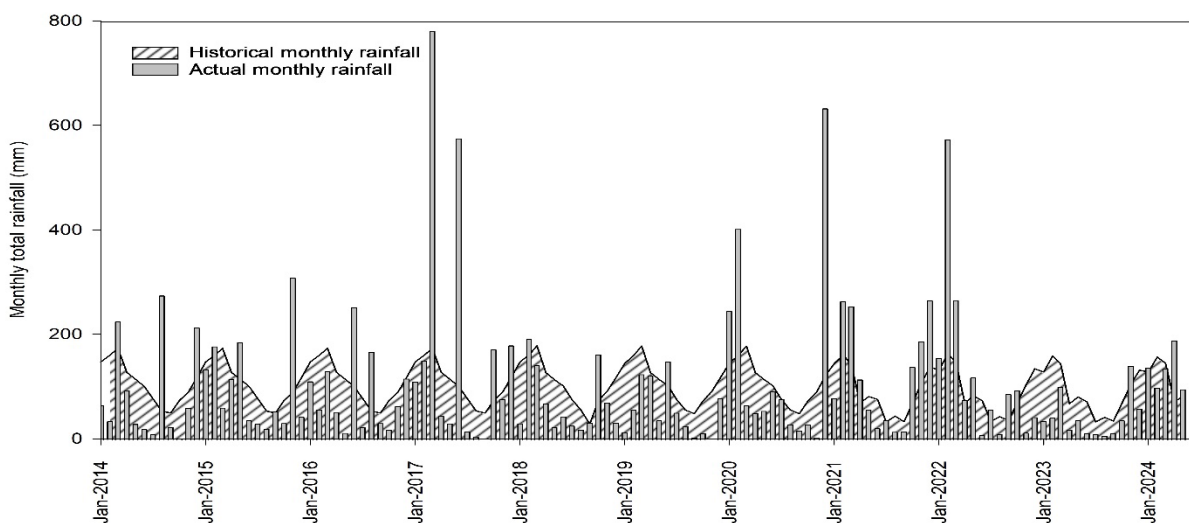


Figure 1 Monthly rainfall records and long-term averages Source: BOM station 058208 Casino Airport)

## 2.0 Surface Water Monitoring - Routine

Routine surface water sampling was undertaken by AWC on the 6<sup>th</sup> of June 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)**

- pH (8.25), Chlorophyll 'a' (0.033 mg/L), TN (1.29 mg/L) and TP (0.04 mg/L) recorded values above their respective WQOs.
- Ammonia and Nitrate which recorded values below their detection limits.
- Concentrations for TP (0.04 mg/L) recorded a new minimum value.
- pH (8.25) recorded a value above its 75<sup>th</sup> percentile.
- TN (1.29 mg/L), Phosphate (0.1 mg/L) and Suspended Solids (7 mg/L) recorded values below their respective 25<sup>th</sup> percentiles.

#### **SW2 (EPA8)**

- Ammonia as N (0.06 mg/L), Chlorophyll 'a' (0.022 mg/L), TN (1.51 mg/L), TP (0.391), Phosphate (0.032 mg/L), Suspended Solids (128 mg/L) and Thermotolerant Coliforms (1310 mg/L) recorded values above their respective WQOs.
- Nitrate recorded a value below its detection limit.
- BOD (2.4 mg/L) and Phosphate (0.032 mg/L) recorded values below their respective 25<sup>th</sup> percentiles.

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	25 <sup>th</sup> %ile	75 <sup>th</sup> %ile
pH	6.5-8.0	8.25	21	6.18	8.38	7.48	7.59	7.02	8.01
EC dS/m	0.125-2.2	1.27	20	0.015	5.082	1.20	1.145	0.42	1.43
TDS	-	862	18	110	1648	685.7	756	230.75	905
Ammonia (as N)	0.002	<0.005	21	0.005	8.69	0.60	0.075	0.019	0.326
(BOD-5 Day)	15	3.8	20	1	13.2	3.94	3.3	2.05	5
Chlorophyll 'a'	0.003	0.033	18	0.005	7.5	0.74	0.03	0.015	0.097
Dissolved Organic Carbon	-	21.5	18	14	43.8	24.21	21.6	17.82	29.08
Nitrate & Nitrite (as N)	-	0.022	21	0.01	13.34	1.42	0.141	0.021	1.717
Nitrate (as N)	-	<0.005	21	0.005	12.97	1.35	0.105	0.008	1.64
Nitrite (as N)	-	0.017	21	0.005	0.374	0.07	0.02	0.012	0.087
Total Kjeldahl Nitrogen (as N)	-	1.28	20	0.80	9.52	2.27	1.6	1.145	2.79
Total Nitrogen (as N)	0.35	1.29	20	0.8	17.322	3.77	2.365	1.58	3.605
Total Phosphorus (mg/L P)	0.025	0.04	20	0.04	1.26	0.18	0.09	0.055	0.155
Phosphate (mg/L P)	0.02	0.01	20	0.005	0.208	0.06	0.025	0.0115	0.089
Suspended Solids	40	7	20	4	527	49.18	22.5	8.975	37.5
Thermotolerant Coliforms	1000	480	19	10	65000	5497.7	1560	200	3900
# 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	25 <sup>th</sup> %ile	75 <sup>th</sup> %ile
pH	6.5-8.0	7.27	21	6.24	8.85	7.15	7.02	6.59	7.59
EC dS/m	0.125-2.2	0.681	20	0.20	1.24	0.60	0.58	0.39	0.71
TDS	-	463	18	160	841	449.6	419	334.50	548
Ammonia (as N)	0.002	0.06	21	0.01	1.30	0.16	0.06	0.03	0.13
(BOD-5 Day)	15	2.4	20	2.40	175	14.66	5.00	3.30	8.80
Chlorophyll 'a'	0.003	0.022	19	0.00	5.00	0.62	0.08	0.01	0.18
Dissolved Organic Carbon	-	18.2	19	16.00	53.60	28.85	24.20	18.20	42.80
Nitrate & Nitrite (as N)	-	0.023	21	0.01	1.57	0.28	0.04	0.02	0.54
Nitrate (as N)	-	<0.005	21	0.01	1.49	0.22	0.02	0.01	0.39
Nitrite (as N)	-	0.018	21	0.01	0.47	0.06	0.02	0.01	0.06
Total Kjeldahl Nitrogen (as N)	-	1.49	19	1	57.20	5.28	2.12	1.24	3.54
Total Nitrogen (as N)	0.35	1.51	20	1.13	57.20	5.38	2.33	1.37	3.85
Total Phosphorus (mg/L P)	0.025	0.391	19	0.28	31.70	2.94	0.66	0.34	2.43
Phosphate (mg/L P)	0.02	0.032	21	0.01	3.74	0.56	0.14	0.09	0.56
Suspended Solids	40	128	20	8.00	30540	1666.1	54.00	21.25	247.75
Thermotolerant Coliforms	1000	1310	19	100	188000	15582	2900	290	12000

# Bold denotes exceedance of WQO

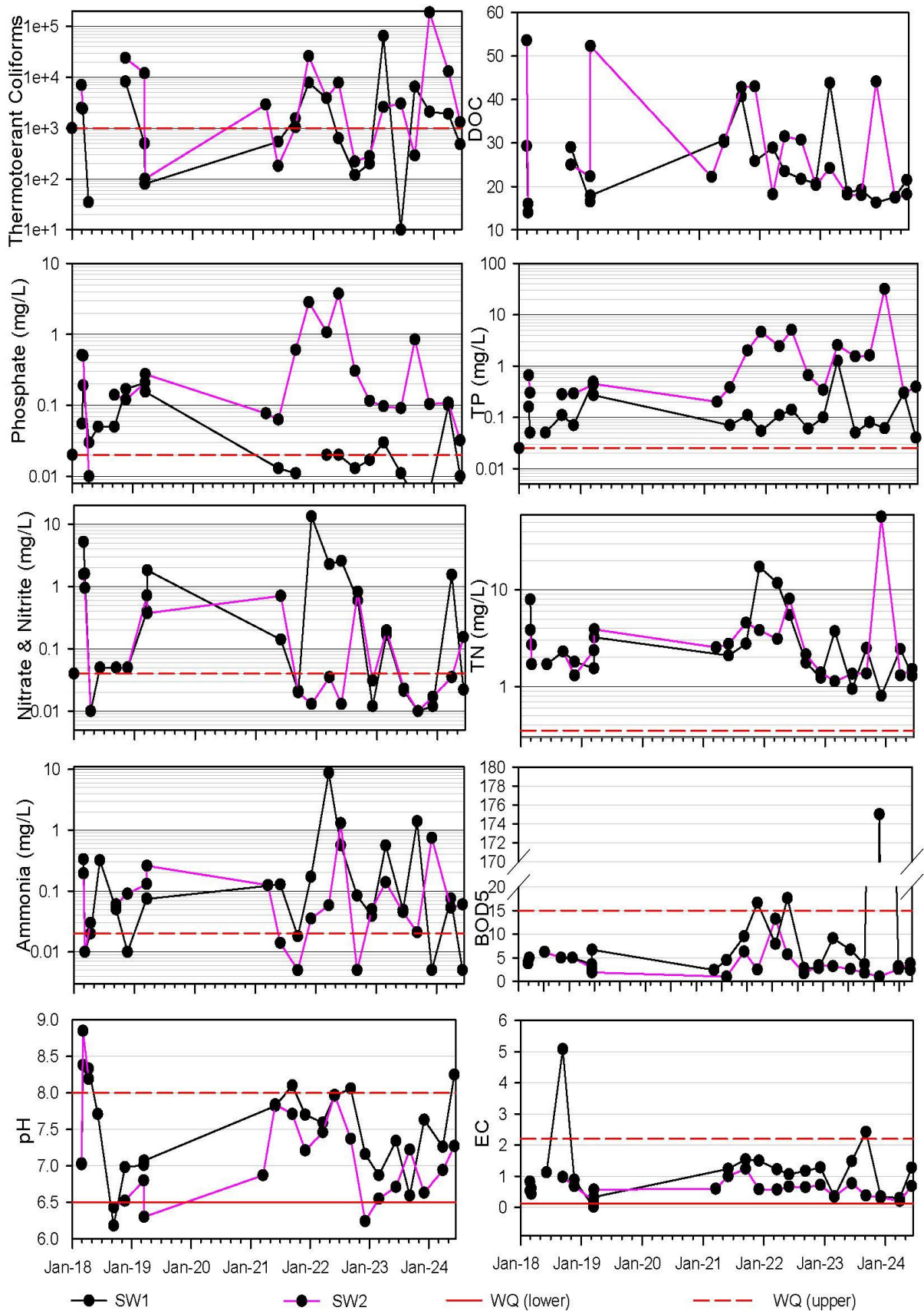


Figure 2 Surface water quality graphs – routine monitoring only (select parameters)

### 3.0 Treated Effluent 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	6/06/2024
Sampled by	Will Dale (AWC)
Sample time	15:30
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 Quality Results

Treated effluent results indicate the quality of water that is disposed via irrigation. Historic data is included in graph form and statistical summary. Table 6 shows the current monitoring results along with 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	75 <sup>th</sup> %ile	Median	25 <sup>th</sup> %ile
Electrical Conductivity	(dS/m)	1.07	42	0.42	2.21	1.40	1.69	1.45	1.20
pH		8.96	42	7.62	9.53	8.63	9.1	8.6	8.1
Reactive Phosphorus	(mg/L)	1.13	41	0.43	10.70	3.79	4.5	2.9	1.9
Total Phosphorus	(mg/L)	1.49	42	1.30	13	5.27	5.8	4.7	3.1
Suspended Solids	(mg/L)	35	42	11.00	1500	135.07	137.5	83.5	34.0
Total Dissolved Solids	(mg/L)	768	16	323	1503	791.29	959.3	792	529.3
Total Nitrogen	(mg/L)	5.38	42	1.90	14	6.69	8.9	6.3	4.0
Alkalinity as calcium carbonate	(mg/L)	380	26	112	620	397.62	490	409	325
Sodium	(mg/L)	125	26	38.70	1100	311.97	533.8	126	101.8
Sodium Adsorption Ratio		4.22	16	1.90	5.40	3.53	4.20	3.6	2.5
Thermotolerant Coliforms	(cfu / 100ml)	NR	7	80.00	6700	2255.7	2600	1960	610

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
- Sodium Adsorption Ratio (4.22 mg/L) recorded a value above its 75<sup>th</sup> percentile.

- EC (1.07 mg/L), Reactive Phosphorus (1.13 mg/L) and TP (1.49 mg/L) recorded values below their respective 25<sup>th</sup> percentiles
- The SAR value of 4.22 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.

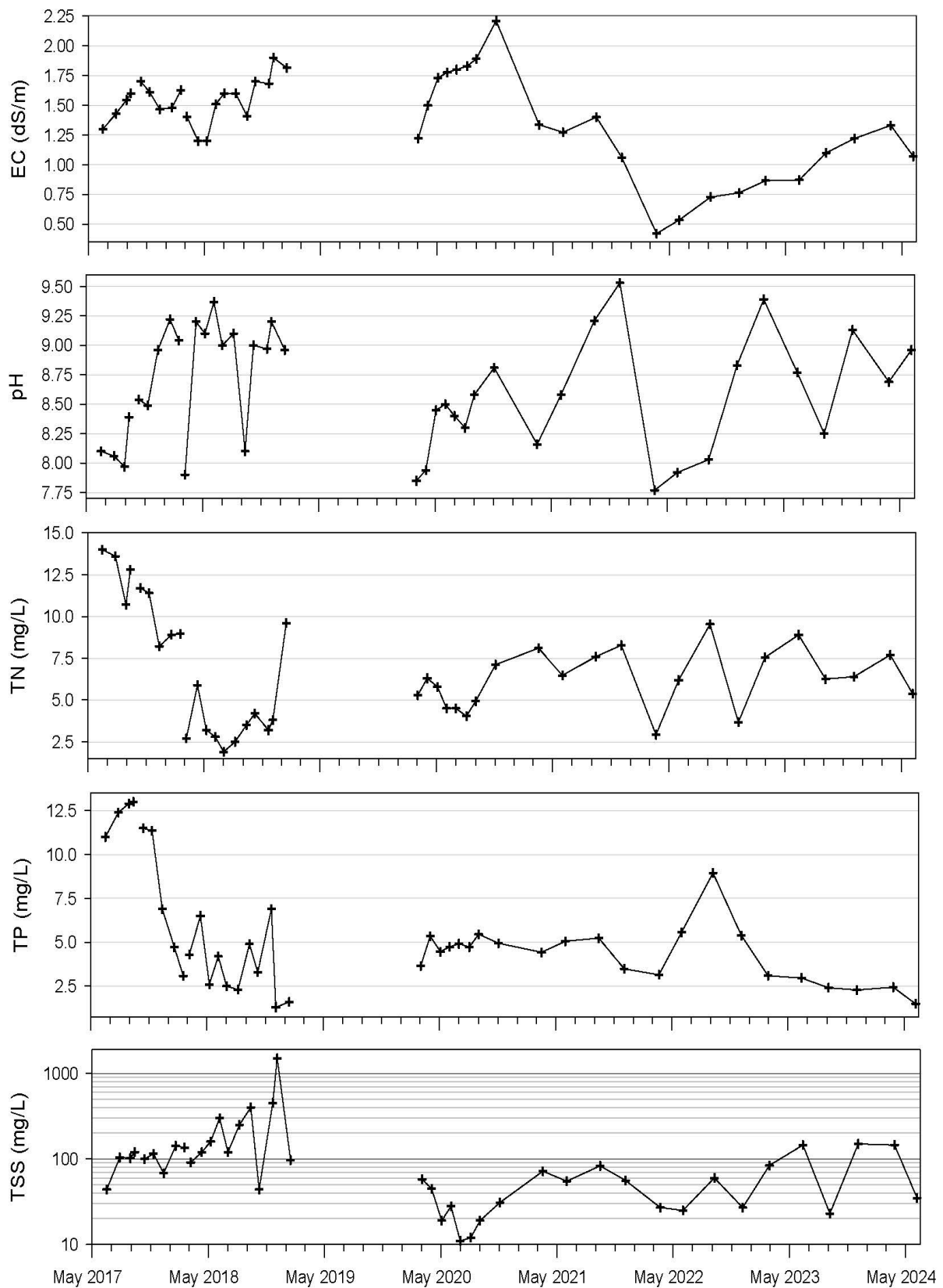


Figure 3 Historic treated effluent quality (EPA1) monitoring, select parameters (AWC commenced monitoring in March 2021)



## 4.0 Groundwater Quality Monitoring

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	6/06/2024		
Sampled by	Will Dale (AWC)		
Sample time	GW1 (EPA4) 15:45	GW2 (EPA5) 15:10	GW3 (EPA6) 16:30
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 <i>et al.</i> (2009); briefly, at least three times the volume of the bore ( $3 \times \pi r^2 \times$ 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		15:45	15:10	16:30
<b>Parameters</b>	<b>WQO</b>			
Purge Volume (L)		32	45	44
EC (ds/m)	0.25-2.2	0.647	<b>5.221</b>	<b>3.792</b>
pH	6.5-8.0	6.72	<b>6.14</b>	6.68
ORP		102.47	135.7	189.2
DO (%)	85-110	<b>71.57</b>	<b>70</b>	<b>20.99</b>
Temp		20.31	21.28	20.19
Odour		None	None	None
Colour		Cloudy Brown	Pale Brown	Pale Brown
<b>Bold and shaded</b> cell denotes outside WQO value range				

## 5.0 Wet Weather Surface Water Monitoring

Should rainfall exceed 50mm over 24 hrs, surface water sampling is required in accordance with the EP Licence and undertaken by Richmond Valley Council (RVC). No daily rainfall totals exceeded 50mm over the quarterly monitoring period. The total data set (2013-2024) for surface sample collection is provided in Attachment 3 *Historic monitoring results for SW1 (EPA7) trigger event* Attachment 4 *Historic monitoring results for SW2 (EPA8) trigger event*

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												
1/08/2019												
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1/10/2019												
1/11/2019												
1/12/2019												
1/01/2020												
1/02/2020												
3/03/2020	EES											
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

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)
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
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

##=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)

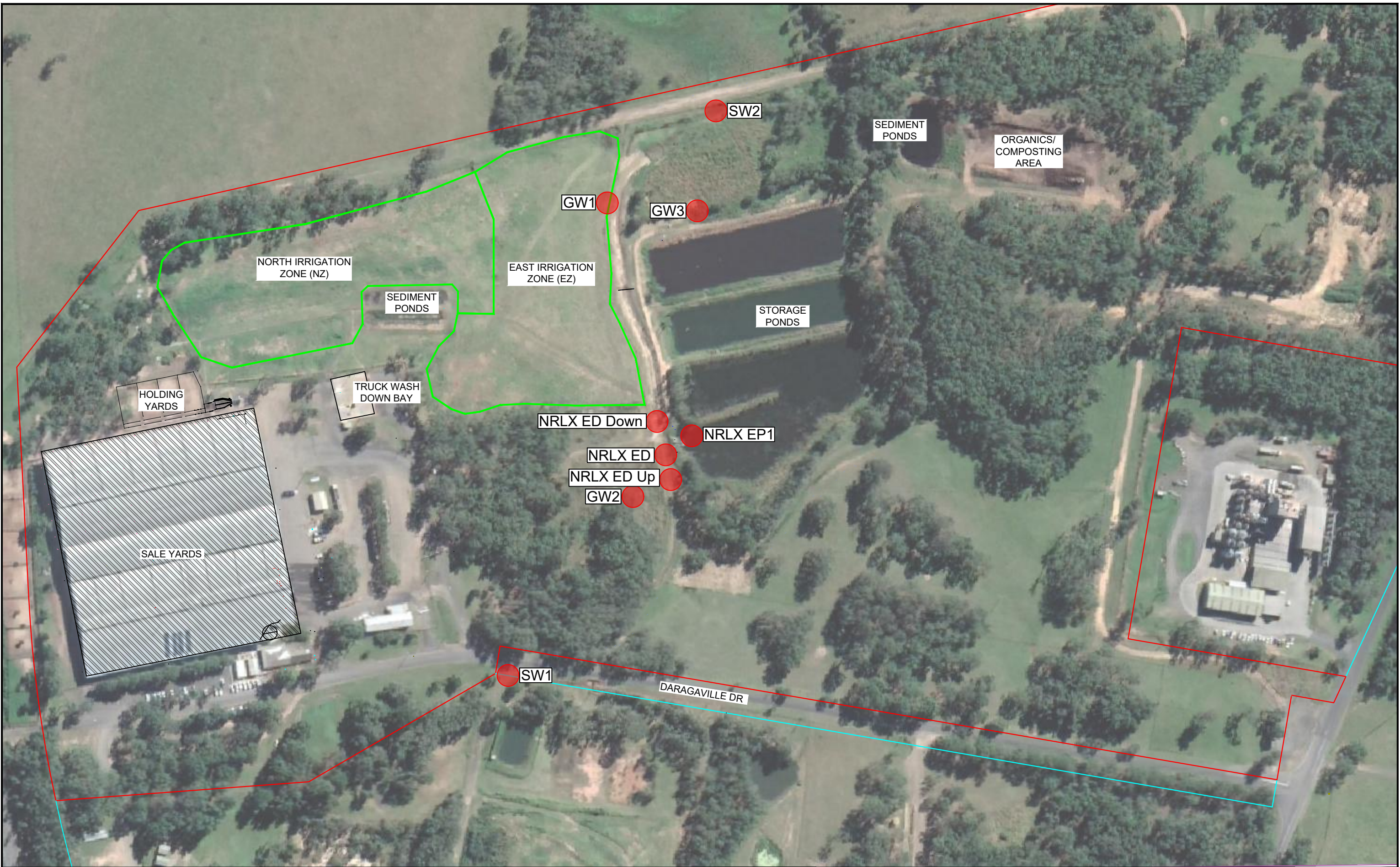
Sampler	Date	Time	Purge Volume (L)	EC (dS/m)	pH	ORP	DO	Temp	Odour	Colour
<b>GW1 (EPA4) Field Parameters</b>										
<b>Trigger values</b>				<b>0.25-2.2</b>	<b>6.5-8.0</b>		<b>85-110</b>			
Michael K - EES	3/03/2020		12	<b>3.21</b>	<b>6.21</b>	-88.00		24.30	none	Cloudy brown
Amy Whitley - EES	2/06/2020		13	<b>3.52</b>	6.73	60.80		20.30	none	Milky brown
Daniel White - EES	1/09/2020		14	<b>2.85</b>	7.44	-64.00		20.40	none	Brown turbid
Daniel White- EES	3/11/2020		10	<b>3.23</b>	<b>5.49</b>	85.00		20.50	none	Brown turbid
AWC (AL)	18/03/2021	12:00	49	<b>2.54</b>	<b>6.39</b>	128.90	<b>51.0</b>	26.70	none	cloudy/milky
AWC (AL)	1/06/2021	12:30	35	2.03	<b>6.17</b>	179.80	<b>53.2</b>	20.30	none	Milky brown
AWC (JM)	*21/06/2021	14:20	30	<b>2.39</b>	<b>4.28</b>	405.00	<b>47.2</b>	-	none	Yellow/brown
AWC (AL)	14/09/2021	10:20	27	<b>3.6</b>	<b>6.01</b>	105.80	<b>55.0</b>	21.20	none	Milky brown
AWC (AL)	3/12/2021	13:25	32	1.56	<b>6.24</b>	43.6	<b>38.91</b>	26.23	None	Milky/Brown
AWC (AL)	21/03/2022	12:00	35	1.62	<b>6.35</b>	86.00	<b>36.0</b>	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	<b>34.1</b>	21.8	None	Cloudy Brown/ Turbid
AWC (AL)	28/02/2023	10:30	28	<b>2.504</b>	<b>6.25</b>	33.00	<b>19.01</b>	26.10	None	Cloudy Brown/ Turbid
AWC (AL)	13/06/2023	12:30	29	<b>2.95</b>	<b>6.15</b>	24.1	<b>18.35</b>	24.5	None	Cloudy Brown/ Turbid
AWC (AL)	06/09/2023	12:00	27	<b>3.6</b>	<b>5.83</b>	-69.8	<b>41.9</b>	23.7	None	Cloudy Brown/ Turbid
AWC (WD)	4/12/2023	16:40	25	<b>2.7</b>	<b>6.18</b>	74	<b>32.08</b>	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
<b>GW2 (EPA5) Field Parameters</b>										
Michael K - EES	3/03/2020		22	<b>3.89</b>	6.06	-81.40		24.80	none	Cloudy
Amy Whitley - EES	2/06/2020		15	<b>3.75</b>	6.73	20.00		20.70	none	Cloudy brown
Daniel White - EES	1/09/2020		17	<b>3.23</b>	7.07	64.00		21.70	none	Cloudy brown
Daniel White- EES	3/11/2020		-	<b>22.5</b>	6.54	86.00		20.80	none	Brown
AWC (AL)	17/03/2021	12:25	47	<b>5.78</b>	<b>5.71</b>	162	<b>30.08</b>	22.3	none	Milky / cloudy
AWC (AL)	1/06/2021	11:45	47	<b>7.57</b>	<b>5.61</b>	421	<b>45.5</b>	21.6	none	Cloudy/Reddish/Brown
AWC (JM)	*21/06/2021	14:40	42	<b>5.39</b>	<b>6.31</b>	150	<b>54.9</b>	-	none	Brownish yellow
AWC (AL)	14/09/2021	9:50	39	<b>5.24</b>	<b>6.1</b>	73.9	<b>55</b>	20.1	none	Brownish yellow
AWC (AL)	3/12/2021	13:00	42	<b>4.64</b>	<b>6.09</b>	31.3	<b>36.06</b>	24.66	None	Cloudy/Reddish/Brown
AWC (AL)	21/03/2022	11:00	50	<b>6.71</b>	<b>5.01</b>	71	<b>32.1</b>	23.4	none	Cloudy brown
AWC (AL)	2/06/2022	12:00	46	<b>6.15</b>	<b>4.61</b>	341	<b>65.59</b>	21.2	none	Cloudy brown
AWC (AL)	8/09/2022	13:30	45	<b>5.98</b>	<b>5.98</b>	107	<b>60</b>	22.1	none	Cloudy brown/yellow
AWC (AL)	28/02/2023	11:00	42	<b>4.581</b>	<b>6.19</b>	25	<b>59</b>	26.88	None	Cloudy brown
AWC (AL)	13/06/2023	12:00	41	<b>4.75</b>	<b>5.93</b>	104	<b>23.9</b>	22.6	None	Cloudy brown
AWC (AL)	06/09/2023	11:40	40	<b>4.24</b>	<b>6.2</b>	-143.04	<b>44.8</b>	28.8	None	Clear
AWC (WD)	4/12/2023	16:00	40	<b>3.57</b>	<b>6.61</b>	134	<b>86.77</b>	24.64	none	Cloudy brown
AWC (WD)	27/03/2024	7:45	43	<b>5.038</b>	<b>5.75</b>	42.36	<b>37.27</b>	22.1	none	cloudy grey, turbid
AWC (WD)	6/06/2024	15:10	45	5.221	6.14	135.7	<b>70</b>	21.28	none	Pale brown, turbid
<b>GW3 (EPA6) Field Parameters</b>										
Michael K - EES	3/03/2020		12	<b>19</b>	<b>6.47</b>	-83.00		24.90	none	Milky
Amy Whitley - EES	2/06/2020		20	<b>18.6</b>	6.86	2.60		19.30	slight anoxic odour	Dark brown (black sediment)
Daniel White - EES	1/09/2020		15	<b>21.6</b>	8.19	78.00		19.90	None	Cloudy brown
Daniel White- EES	3/11/2020		-	<b>22</b>	6.54	86.00		20.80	None	Brown
AWC (AL)	17/03/2021	12:50	35	<b>2.2</b>	6.51	166	<b>48.5</b>	23.7	none	milky / cloudy
AWC (AL)	1/06/2021	13:00	43	<b>3.467</b>	6.73	199	<b>21.8</b>	19.9		
AWC (JM)	*21/06/2021	13:50	40	<b>3.77</b>	<b>5.49</b>	77	<b>68.7</b>	-	none	Yellowish/brown
AWC (AL)	14/09/2021	10:45	40	<b>3.46</b>	6.68	11.3	<b>56.8</b>	21.1	none	milky / cloudy
AWC (AL)	3/12/2021	14:15	43	<b>3.76</b>	6.85	14.14	<b>68.3</b>	22.58	None	Milky
AWC (AL)	21/03/2022	11:35	45	<b>3.5</b>	6.66	29.0	<b>41.0</b>	23.1	none	Milky
AWC (AL)	2/06/2022	13:30	45	<b>4.28</b>	<b>6.49</b>	92.8	<b>24.13</b>	21.7	none	Milky
AWC (AL)	8/09/2022	14:50	43	<b>3.77</b>	6.52	60	<b>33.2</b>	20.9	none	Milky brown
AWC (AL)	28/02/2023	12:00	44	<b>4.01</b>	6.58	100	<b>53.36</b>	26.1	none	Cloudy
AWC (AL)	13/06/2023	13:00	42	<b>4.52</b>	6.46	31.3	<b>27.5</b>	21.96	none	Cloudy
AWC (AL)	6/09/2023	12:30	40	<b>3.84</b>	6.52	-33.8	<b>35.5</b>	22.3	none	Cloudy
AWC (WD)	4/12/2023	17:10	40	<b>4.24</b>	<b>6.29</b>	141.2	<b>47.7</b>	22.87	none	Cloudy
AWC (WD)	27/03/2024	8:40	43	<b>3.881</b>	<b>6.23</b>	14.52	<b>42.02</b>	21.2	none	pale brown turbid
AWC (WD)	6/06/2024	16:30	44	<b>3.7917</b>	6.68	189.2	<b>20.99</b>	20.19	no	pale brown turbid
* Additional analysis run undertaken as full suite not collected on 18/03/2021										
<b>Bold and shaded</b> 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




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CLIENT:



**Richmond Valley Council**



**NRLX**

REV.	ISSUE / AMENDMENTS	DATE
A	FIGURE ONLY	08/05/2021

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

DESIGNED	JM
DRAWN	JM
CHECKED	MB



PROJECT	<b>NRLX</b> ENVIRONMENTAL MONITORING
SCALE	1:2500 at A3 0m 50m 100m

DRAWING	<b>FIGURE 1-2</b> MONITORING LOCATIONS
DRAWING CREATED	10/12/2020

DWG No.	1-201335_NRLX_EnvMon_01
CAD FILE No.	1-201335_NRLX_EIMP
REV.	<b>A</b>

## RESULTS OF EFFLUENT ANALYSIS

1 sample supplied by Australian Wetlands Consulting Pty Ltd on 7/06/2024. Lab Job No. R5149.

Samples submitted by Jesse Munro. Your Job: RVC Landfill- NRLX

25 Leslie Street BANGALOW NSW 2479

Parameter	Methods reference	Sample 1
		<b>NRLX-EPA1 06/06/24</b>
	Job No.	R5149/1
pH	APHA 4500-H <sup>+</sup> -B	8.96
Conductivity (EC) (dS/m)	APHA 2510-B	1.07
Total Dissolved Salts (mg/L)	** Calculation using EC x 680	726
Total Dissolved Solids (mg/L)	** APHA 2540C - Evaporation of filtrate	768
Total Suspended Solids (mg/L)	GFC equiv. filter - APHA 2540-D	35
Total Alkalinity (mg/L CaCO <sub>3</sub> equivalent)	** Total Alkalinity - APHA 2320	380
Carbonate (mg/L CaCO <sub>3</sub> equivalent)	** Residual Alkalinity - APHA 2320	106
Total Phosphorus (mg/L P)	In house method W4	1.49
Phosphate (mg/L P)	APHA 4500 P-G	1.13
Total Nitrogen (mg/L N)	In house method W4	5.38
Nitrate (mg/L N)	APHA 4500 NO <sub>3</sub> <sup>-</sup> -F	<0.005
Nitrite (mg/L N)	APHA 4500 NO <sub>2</sub> <sup>-</sup> -I	0.023
Ammonia (mg/L N)	APHA 4500 NH <sub>3</sub> -H	0.035
Sodium (mg/L)	APHA 3125 ICPMS <sup>note 1&amp;2</sup>	125
Potassium (mg/L)	APHA 3125 ICPMS <sup>note 1&amp;2</sup>	147
Calcium (mg/L)	APHA 3125 ICPMS <sup>note 1&amp;2</sup>	28.2
Magnesium (mg/L)	APHA 3125 ICPMS <sup>note 1&amp;2</sup>	23.3
Sodium Absorption Ratio (SAR)	** By calculation	4.22
Chloride (mg/L)	APHA 3125 ICPMS <sup>note 1&amp;2</sup>	154
Sulfate (mg/L SO <sub>4</sub> <sup>2-</sup> )	APHA 3125 ICPMS <sup>note 1&amp;2</sup>	28.4
Chloride/Sulfate Ratio	** Calculation	5.43

### Notes:

- 1 mg/L (milligram per litre) = 1 ppm (part per million) = 1000 µg/L (micrograms per litre) = 1000 ppb (part per billion).
- For conductivity 1 dS/m = 1 mS/cm = 1000 µS/cm.
- Analysis performed according to APHA (2017) 'Standard Methods for the Examination of Water & Wastewater', 23rd Edition, except where stated otherwise.
- Analysis conducted between sample arrival date and reporting date.
- \*\* NATA accreditation does not cover the performance of this service.
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- Results relate only to the samples tested.
- This report was issued on 19/06/2024.





## RESULTS OF WATER ANALYSIS

2 samples supplied by Australian Wetlands Consulting Pty Ltd on 7/06/2024. Lab Job No. R5150.

Samples submitted by Jesse Munro. Your Job: RVC Landfill - NRLX-SW1& NRLX-SW2

25 Leslie Street BANGALOW NSW 2479

Parameter	Methods reference	Sample 1	Sample 2
		NRLX-SW1 06/06/24	NRLX-SW2 06/06/24
	<i>Job No.</i>	<i>R5150/1</i>	<i>R5150/2</i>
pH	APHA 4500-H <sup>+</sup> -B	8.25	7.27
Conductivity (EC) (dS/m)	APHA 2510-B	1.27	0.681
Total Dissolved Salts (mg/L)	** Calculation using EC x 680	862	463
Total Dissolved Solids (mg/L)	** APHA 2540C - Evaporation of filtrate	670	383
Total Suspended Solids (mg/L)	GFC equiv. filter - APHA 2540-D	7	128
Biochemical Oxygen Demand <sub>5</sub> (mg/L O <sub>2</sub> )	APHA 5210-B	3.80	2.40
Total Phosphorus (mg/L P)	In house method W4	0.040	0.391
Phosphate (mg/L P)	APHA 4500 P-G	0.010	0.032
Total Nitrogen (mg/L N)	In house method W4	1.29	1.51
Nitrate (mg/L N)	APHA 4500 NO <sub>3</sub> <sup>-</sup> -F	<0.005	<0.005
Nitrite (mg/L N)	APHA 4500 NO <sub>2</sub> <sup>-</sup> -I	0.017	0.018
Ammonia (mg/L N)	APHA 4500 NH <sub>3</sub> -H	<0.005	0.060
Faecal Coliforms (cfu/100 ml)	APHA 9222-D	480	1,310
Dissolved Organic Carbon (mg/L)	APHA 5310-B	21.5	18.2
Chlorophyll 'a' (mg/L)	** APHA 10200-H	0.033	0.022
Algal Biomass (mg/L)	** Inhouse	2.22	1.44

### Notes:

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- For conductivity 1 dS/m = 1 mS/cm = 1000 µS/cm.
- Analysis performed according to APHA (2017) 'Standard Methods for the Examination of Water & Wastewater', 23rd Edition, except where stated otherwise.
- Analysis conducted between sample arrival date and reporting date.
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- This report was issued on 13/06/2024.

