GERROA SAND RESOURCE

ANNUAL REVIEW

Period 01 July 2024 – 30 June 2025

Title Block

Name of operation	Gerroa Sand Resource
Name of operator	Regional Quarries & Concrete Pty Ltd
Development consent #	05/0099
Name of holder of development consent	Regional Quarries & Concrete Pty Ltd
Annual Review start date	1/7/2024
Annual Review end date	30/6/2025

I, Mark Hammond, certify that this audit report is a true and accurate record of the compliance status of the Gerroa Sand Resource for the period 1 July 2024 to 30 June 2025 and that I am authorised to make this statement on behalf of Regional Quarries & Concrete Pty Ltd.

Note

a) The Annual Review is an 'environmental audit' for the purposes of section 122B(2) of the Environmental Planning and Assessment Act 1979. Section 122E provides that a person must not include false or misleading information (or provide information for inclusion in) an audit report produced to the Minister in connection with an environmental audit if the person knows that the information is false or misleading in a material respect. The maximum penalty is, in the case of a corporation, $1 million and for an individual, $250,000.

b) The Crimes Act 1900 contains other offences relating to false and misleading information: section 192G (Intention to defraud by false or misleading statement—maximum penalty 5 years imprisonment); sections 307A, 307B and 307C (False or misleading applications/information/documents—maximum penalty 2 years imprisonment or $22,000, or both).

Name of authorised reporting officer	Mark Hammond
Title of authorised reporting officer	Head of Sustainability
Signature of authorised reporting officer	
Date	8/8/2025

Contents

Abbreviations

CB	Regional Quarries & Concrete Pty Ltd trading as Cleary Bros
DC	Development Consent (PA 05/0099) Modification 1
EPA	Environmental Protection Authority
DP	Deposited Plan
DPHI	Department of Planning, Housing and Infrastructure (formerly Department of Planning and Environment)
EPL	Environmental Protection Licence
LEC	Land & Environment Court
MW	Monitoring Well
QEMP	Quarry Environmental Management Plan

Internal Document Control

Version	Description	Prepared By	Approved By	Prepared Date
1	Initial Draft	M Hammond		9/7/2025
2	Final for distribution	M Hammond	M Hammond	8/8/2025

1. Introduction

1.1. Statement of Compliance

Were all conditions of the relevant approvals complied with?	
Development consent #05/0099	Yes
Environmental Protection Licence #4146	Yes

1.2. Background

Sand has been extracted from Cleary Bros (CB) sand quarry at Gerroa for approximately 60 years. The works have been authorised by a succession of development approvals. On the 30th January 2025, the Gerroa Sand Resource and the Cleary Bros name were acquired by the Maas Group, a listed Australian company (ASX: MGL). Following the acquisition, the Gerroa Sand Resource is operated by Regional Quarries & Concrete Pty Ltd, a wholly owned subsidiary of the Maas Group, and continues to trade under the Cleary Bros name. Subject to the approval of a subdivision application with Kiama and Shoalhaven councils, parts of the Cleary Bros landholding, including all land used for sand quarrying and conservation areas associated with the Gerroa Sand Resource, will be transferred to the Maas Group.

On 10 June 2022 the Minister for Planning and Public Spaces approved Modification 1 (Development Consent) for the continuation of sand extraction from the Modification 1 area on the northwestern side of Blue Angle Creek. Modification 1 amends the original approval by the Land and Environment Court dated 2 September 2008 for the “Extension and Continuation of Gerroa Sand Quarry”. Sand extraction by dredging on the property is licensed by the Environment Protection Authority (EPA) under EPL4146. CB currently operates in accordance with the site’s Quarry Environmental Management Plan (QEMP) in accordance with the requirements of the EPL and Development Consent (DC) The QEMP was most recently approved by the then Department of Planning and Environment (DPE, now DPHI) on 29 June 2023. The location of the property is shown in Figure 1.

1.3. Objectives of the Annual Review

Condition 4 of Schedule 5 of the Development Consent (DC) requires CB to submit an Annual Review. The condition requires the Annual Review to:

a) describe the activities associated with the project (including rehabilitation) that was carried out in the previous financial year, and the activities that are proposed to be carried out over the current financial year.
b) include a comprehensive review of the monitoring results and complaints records of the project over the previous financial year, which includes a comparison of these results against:
   - the relevant statutory requirements, limits or performance measures/criteria;
   - requirements of any plan or program required under this approval;
   - the monitoring results of previous years; and
   - the relevant predictions in the documents listed in condition 2(a) of Schedule 2;
c) identify any non-compliance or incident which occurred in the previous financial year, and describe what actions were (or are being) taken to rectify the non-compliance and avoid recurrence;
d) evaluate and report on:
   - the effectiveness of the acid sulfate soils, noise amenity and water quality management and mitigation; and
   - compliance with the performance measures, criteria and operating conditions of this approval;
e) identify any trends in the monitoring data over the life of the project;
f) identify any discrepancies between the predicted and actual impacts of the project, and analyse the potential cause of any significant discrepancies; and
g) describe what measures will be implemented over the current financial year to improve the environmental performance of the project.

This Annual Review has been prepared to meet the requirements of Condition 4 of Schedule 5 of the Development Consent.

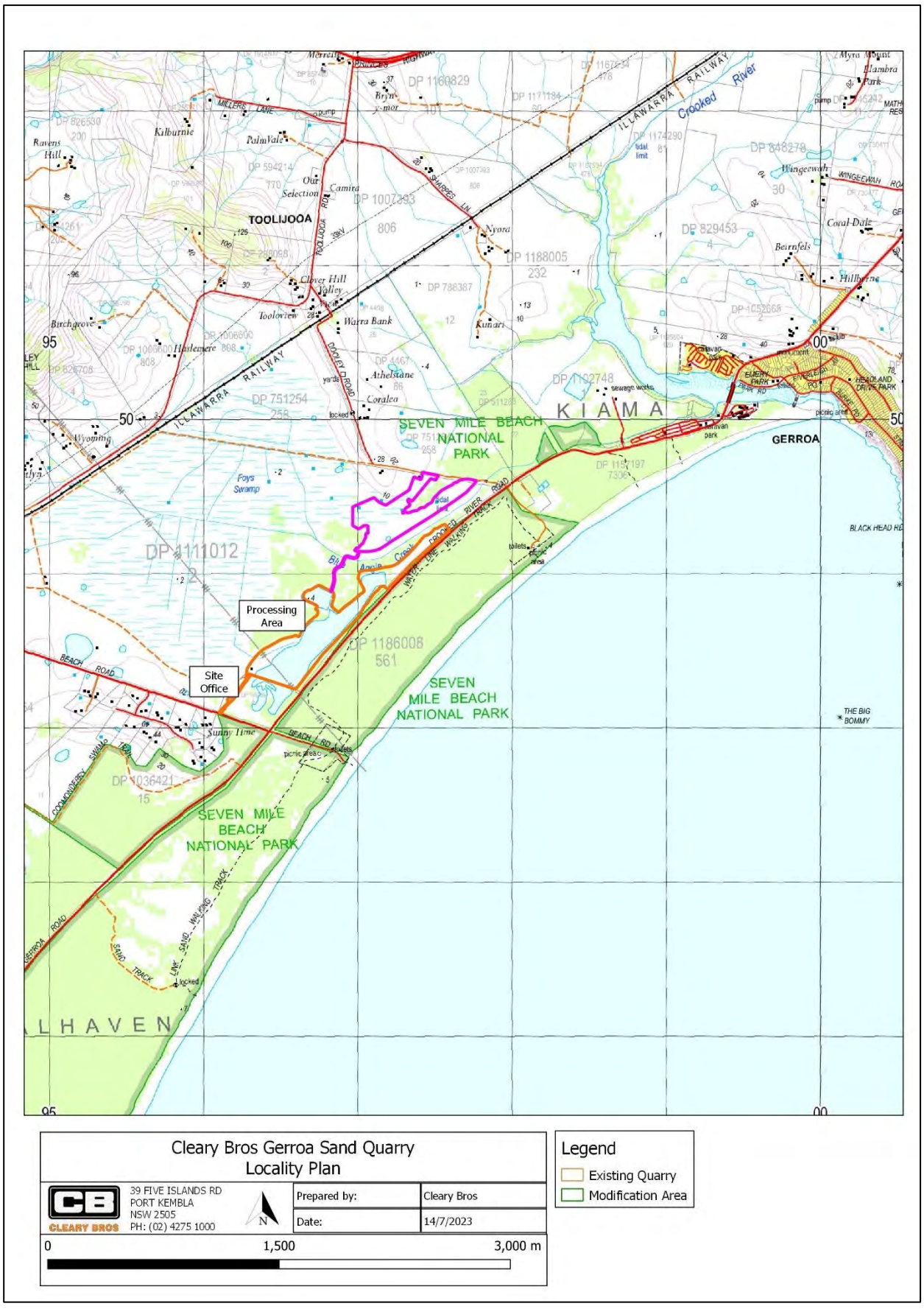


Figure 1 - Locality Plan

2. Site Description and Activities

2.1. Site Identification

The site comprises all of Lot A DP 185785 and part of Lot 2 DP 1111012. The property is currently owned by Bridon Pty Ltd.

The site straddles the boundary of the Kiama and Shoalhaven Local Government Areas. The operational area is contained within two portions of the site separated by Blue Angle Creek, with an area totalling approximately 42.5 hectares. The operational area fronts Crooked River Road and Berry Beach Road. The remainder of the property is used for agricultural activities.

The quarrying process involves dredging the sand mixed with water by suction based on a barge and piped back to the wet sorter located on the western edge of the existing dredge pond. In the wet sorter the gravel and larger materials such as shells are removed from the sand before the sand is sent to the cyclone which removes any remaining silt. From here the sand is deposited into a stockpile and the removed silt and excess water are returned to the existing dredge pond. When the sand stockpile is of sufficient size, it is re-stockpiled away from the wet sorter and cyclone systems to dry. The sand is then loaded on to road-going trucks for delivery to customers, primarily Cleary Bros concrete plants.

3. Key Licence Issues

3.1. Environmental Protection Licence Annual Reports

The Environment Protection Authority (EPA) has issued an Environmental Protection Licence (Licence No. 4146) for the dredging works on site, which was most recently amended on 31 January 2024, as part of the sale of the Gerroa Sand Resource to Maas Group.

The licence, issued under s55 of the Protection of the Environment Operations Act 1997, requires an annual return to be submitted to the EPA, for the reporting period of 1st February to 31st January.

The EPA Annual Returns for 2005 to 2025 reporting periods were reviewed to provide a background to this report. These Annual Returns are summarised in the following table.

Reporting Period	Pollution complaints	Concentration monitoring summary	Volume or mass monitoring summary	Compliance with licence conditions
1 Feb 2005 – 31 Jan 2006	Nil	None required	None required	All conditions complied with
1 Feb 2006 – 31 Jan 2007	Nil	None required	None required	All conditions complied with
1 Feb 2007 – 31 Jan 2008	Nil	None required	None required	All conditions complied with
1 Feb 2008 – 31 Jan 2009	Nil	None required	None required	All conditions complied with
1 Feb 2009 – 31 Jan 2010	Nil	None required	None required	All conditions complied with
1 Feb 2010 – 31 Jan 2011	Nil	None required	None required	All conditions complied with
1 Feb 2011 – 31 Jan 2012	Nil	None required	None required	All conditions complied with
1 Feb 2012 – 31 Jan 2013	Nil	None required	None required	All conditions complied with
1 Feb 2013 – 31 Jan 2014	Nil	None required	None required	All conditions complied with
1 Feb 2014 – 31 Jan 2015	Nil	None required	None required	All conditions complied with
1 Feb 2015 – 31 Jan 2016	Nil	None required	None required	All conditions complied with
1 Feb 2016 – 31 Jan 2017	Nil	None required	None required	All conditions complied with
1 Feb 2017 – 31 Jan 2018	Nil	None required	None required	All conditions complied with
1 Feb 2018 – 31 Jan 2019	Nil	None required	None required	All conditions complied with
1 Feb 2019 – 31 Jan 2020	Nil	None required	None required	All conditions complied with
1 Feb 2020 – 31 Jan 2021	Nil	None required	None required	All conditions complied with
1 Feb 2021 – 31 Jan 2022	Nil	None required	None required	All conditions complied with
1 Feb 2022 – 31 Jan 2023	Nil	None required	None required	All conditions complied with
1 Feb 2023 – 31 Jan 2024	Nil	None required	None required	All conditions complied with
1 Feb 2024 – 31 Jan 2025	Nil	None required	None required	All conditions complied with

3.2. Development Consent

The Development Consent (DC) was modified by the DPHI on 10 June 2022 and is the primary consent relevant to sand quarrying operations. As a requirement of the DC an Annual Review must be completed annually.

3.3. Standards and Performance Measures that apply

The Environmental Assessment dated February 2018 outlines the predicted impacts of the Project as modified. The Gerroa Sand Resource is also licenced by the Environmental Protection Authority under Environmental Protection License 4146. These documents contain the standards and performance measures for the Gerroa Sand Resource, which are identified separately in Section 4.

3.4. Works Carried Out in Reporting Period

The total sand transported from site during the 2024/2025 reporting year was 79,968 tonnes. In the current reporting period, sand was extracted from the northeastern part of the Modification 1 area ("CP" area). The previous year's return (2023/2024) to the Department of Regional NSW is included in Annexure A for 79,591 tonnes (ref: ROY0008568). The return for the 2024/2025 was submitted on 3 July 2025 (ref: ROY0008767), and has also been included in Annexure A.

In the past 12 months, dredging has continued in the CP area of the site, following on from the previous period. In addition, the following works have been undertaken:

- Maintenance of the tree screen along western boundary of site, including planting replacement tubestock to those lost to native herbivores, and the installation of compostable tree guards around seedlings to combat ongoing grazing pressures.
- Continuation of construction of flood bunds on later sections of site.
- Operation of environmental monitoring equipment including water monitoring stations, depositional dust gauges, and weather station.
- Completion of archaeological salvage works within the West area of the site.

3.5. Works to be Carried Out in the Next Period

The dredge will continue extracting sand from the CP area of the Modification 1 area slowly tracking towards the south. The approximate area planned for extraction in 2025/2026 is shown in Figure 2.

Other works planned for the 2025/2026 period include:

- Classification and interpretation of archaeological material recovered during salvage works.
- Installation of contour drains.
- Maintenance of tree screen including replacement of lost plants.
- Topsoil stripping and stockpiling.
- Construction of internal access road through the central section of the site.

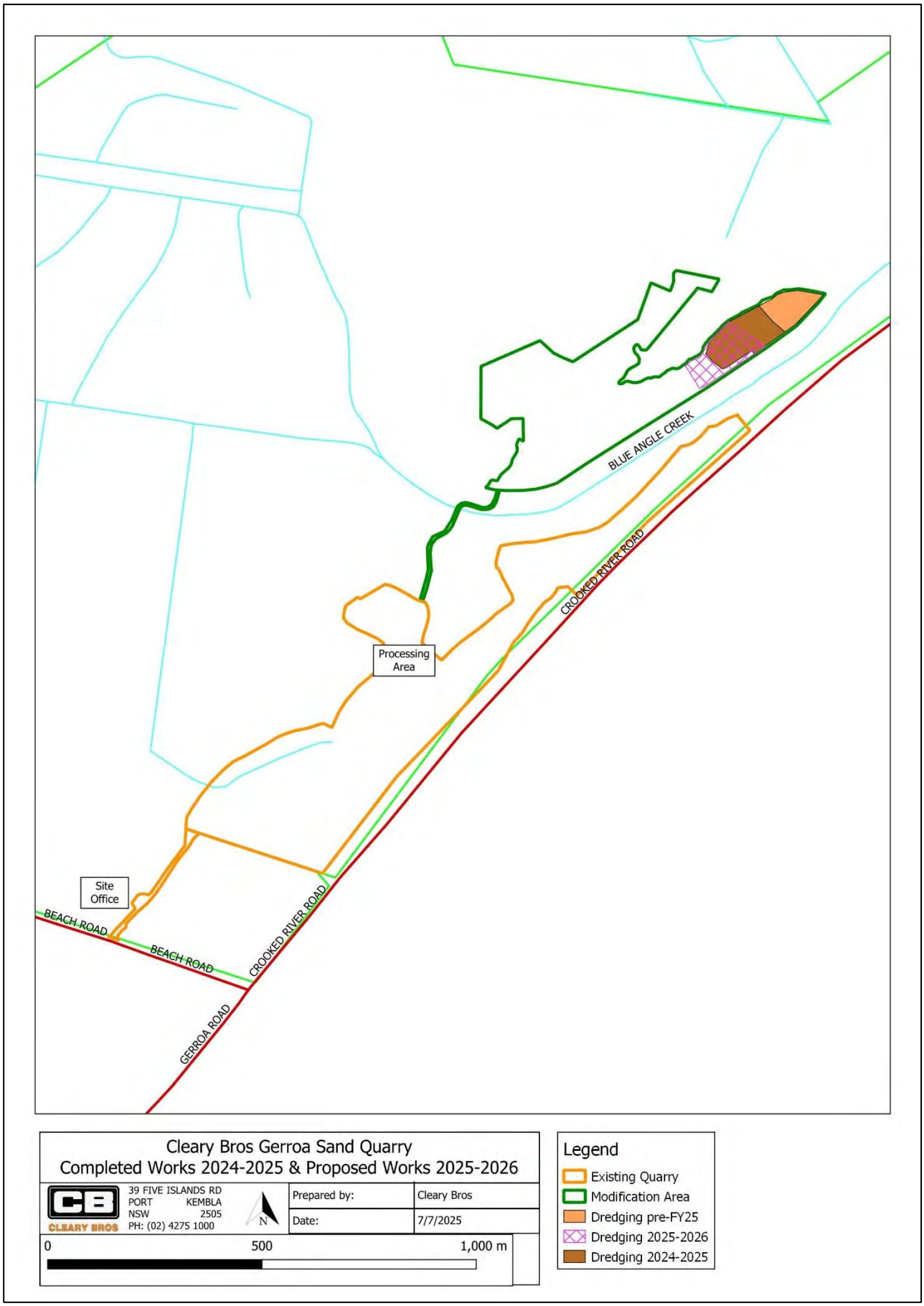


Figure 2 – Description of works

4. Review of Environmental Performance

4.1. Meteorological Monitoring

4.1.1. Licence Requirements

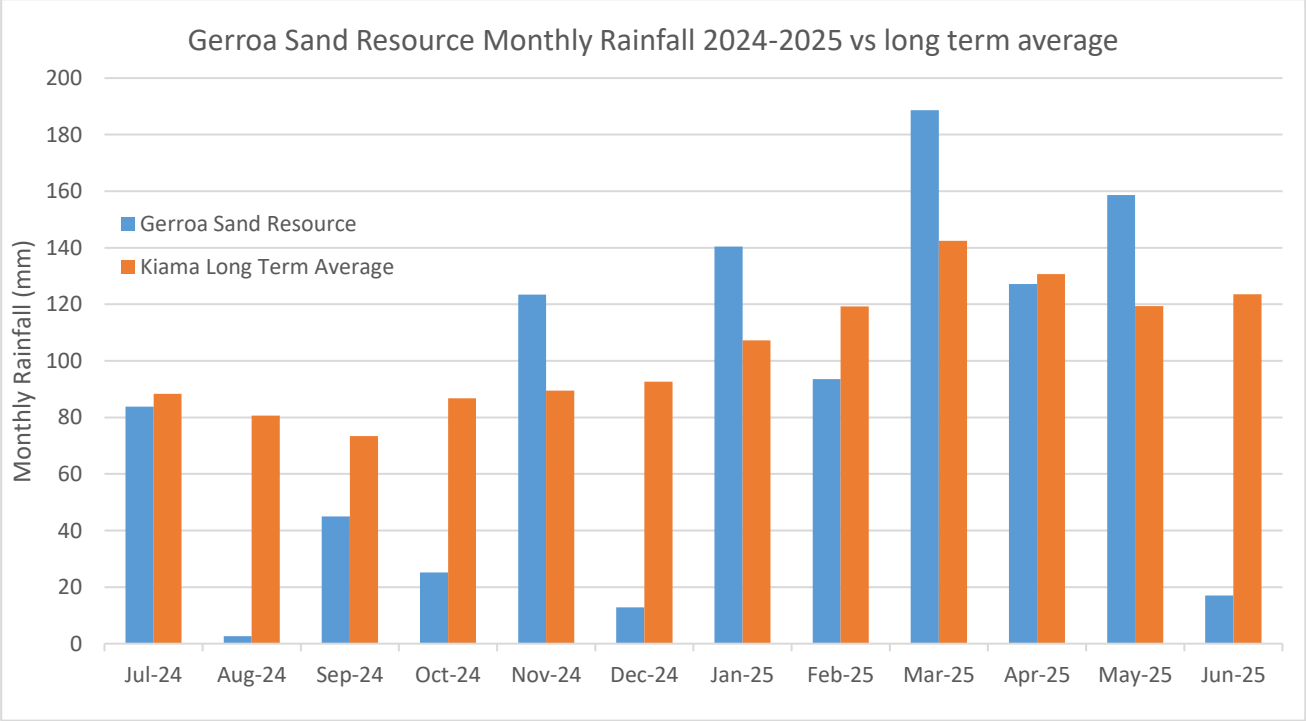
The DC requires Cleary Bros to maintain a meteorological station on site.

4.1.2. Compliance Assessment

A meteorological station is maintained onsite that provides information on rainfall, air temperature, solar radiation and wind speed and direction via mobile telemetry to an online portal. The current weather station was installed in September 2016. The station was most recently upgraded in early 2024 to ensure reliability, and has generally operated well throughout the reporting period, although some internal condensation issues have caused some data loss of the lower temperature and solar radiation sensors. Improvements have been made to the station to try and overcome these issues, with replacement sensors installed.

4.1.3. Meteorological Monitoring

Rainfall in the current reporting period has been above average, with 1018.2 mm recorded on the site compared with the long term average of 1254 mm (based on data sourced from the Kiama Bowling Club BOM station). Rainfall was relatively moderate throughout the reporting period, albeit the period from August 2024 to December 2025 was consistently dry. Outside of this drier period, rainfall in the 2025 Autumn was consistently above average. These rainfall patterns have come off a wetter past four years, which has meant an elevated water table for much of the surrounding floodplain coming into the reporting period.



4.2. Groundwater Management

4.2.1. Standards and Performance Measures

There are no specific criteria for groundwater quality in the sites EPL.

The current groundwater monitoring requirements from the DC are described in the QEMP. Section 8.6 of the current QEMP details the groundwater testing requirements and specifies that 9 boreholes on site require monthly water level readings and quarterly analyte testing. The tabulated results of groundwater monitoring are included in Annex B. The EA predicted that the project is not expected to result in variations in the range of

groundwater levels outside that previously experienced in the monitoring bores on the site. Furthermore, the EA identified that existing low pH levels in groundwater bores to be relatively benign, signifying natural impacts from naturally occurring pyrites and organic acids, with sand extraction not predicted to lead to any deterioration of the groundwater quality.

The groundwater quality objectives which CB should "aim to meet" from the DC (and adopted in the QEMP) are as follows:

Analyte	Units	Objective
pH	pH	6.0 – 8.5
Electrical Conductivity	µS/cm	<1,500
Total Phosphorus	µg/L	<30
Total Nitrogen	µg/L	<350
Chlorophyll-A	µg/L	<5
Faecal Coliforms	Median No./100 mL	<1,000
Enterococci	Median No./100 mL	<230
Sodium	mg/L	<400
Potassium Ion	mg/L	<50
Magnesium Ion	mg/L	<50
Chloride Ion	mg/L	<300
Sulphate Ion	mg/L	<250
Bicarbonate Ion	mg/L	<750
Soluble Iron Ion	mg/L	<6
Ammonium Ion	µg/L*	<20

* amended from mg/L to µg/L as part of Modification 1

The QEMP target for groundwater dependant ecosystems is for no discernible deterioration of ecosystems or vegetation, attributable to measured changes in groundwater levels or quality as a result of quarrying operations.

Additional monitoring of groundwater bores to assess potential impacts from acid sulphate soils are detailed in Section 4.4.

4.2.2.Environmental Performance

CB has implemented the Groundwater Monitoring Program to meet the requirements of the DC. ALS Laboratory Group were engaged during the reporting period to conduct quarterly sampling and testing of the groundwater monitoring sites and monthly monitoring of groundwater level.

4.2.3.Groundwater Monitoring

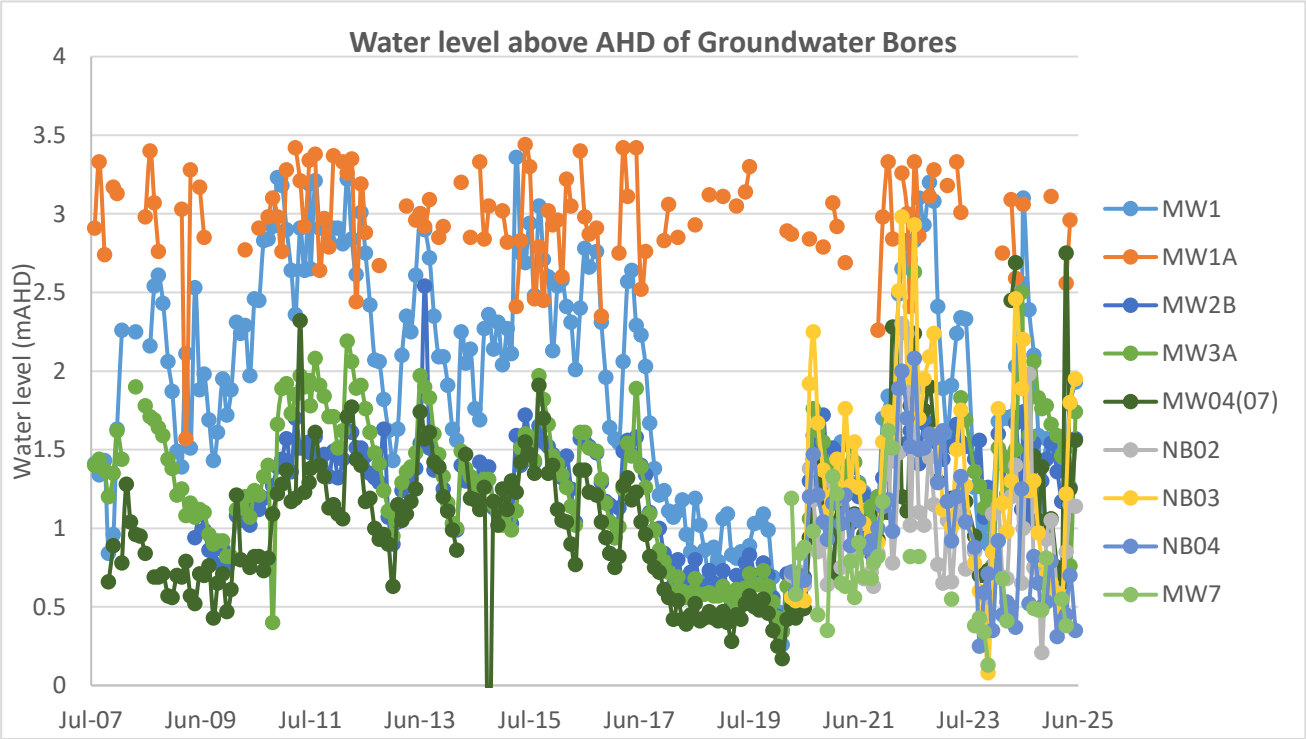
A summary of groundwater monitoring results for the period is displayed in this section, separated into the different analytes required to be monitored as per the DC. For each analyte, the range and average of the current period's monitoring are displayed, alongside the historical range and average, objectives as described in the DC, and any EA predictions. Where groundwater monitoring results trend outside of the historical range or DC objectives, these are identified in the summary with discussion into these results below. For each analyte, a historical graph is also included showing the variations in measurements for each groundwater bore throughout the historical monitoring period. Data captured from the new bores added to the monitoring program in the current reporting period has not been graphed due to the small dataset. It should also be noted that monitoring bore MW07 represents a reference site located approximately 1km west of the Modification 1 area in Foys Swamp and is outside the influence of any sand extraction activities. During wetter months, some bores could

not be safely accessed for monitoring (particularly MW07). Meanwhile, the shallow bore MW1A was recorded as dry for each of the quarterly monitoring rounds.

Depth (m)

The depths of the borehole are reported as metres above the Australian Height Datum

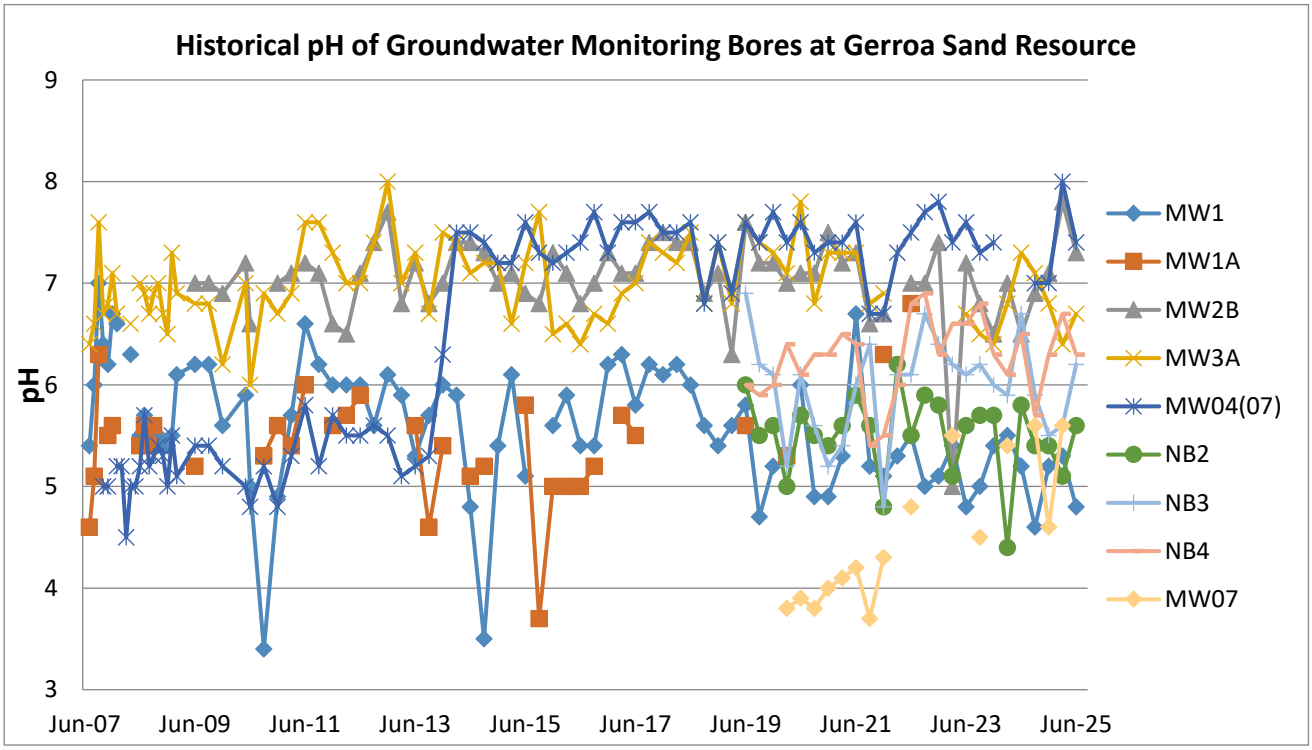
BORE HOLE	2024/25 Reporting Period			Historical Results			DC Objectives	EA Predictions
	Min	Ave	Max	Min	Ave	Max		
MW1	1.06	1.79	3.10	0.26	1.94	3.36	N/A	N/A
MW1A	2.56	2.92	3.11	1.57	2.97	3.44	N/A	N/A
MW2B	1.04	1.38	1.74	0.35	1.22	2.54	N/A	N/A
MW3A	0.76	1.64	2.06	0.34	1.27	2.63	N/A	N/A
MW04(07)	0.65	1.29	2.75	-0.69	1.01	2.69	N/A	N/A
NB2	0.21	0.91	1.98	0.39	0.99	2.3	N/A	N/A
NB3	0.48	1.16	2.20	0.08	1.43	2.98	N/A	N/A
NB4	0.31	0.55	0.82	0.25	1.08	2.08	N/A	N/A
MW7	0.38	0.53	0.81	0.13	0.77	1.62	N/A	N/A



Groundwater levels have varied consistently with significant rainfall events during the current reporting period. While some bores experienced greater fluctuations than others, all bores recorded a declining trend early in the reporting period, followed by an increase in early 2025 due to the above average rainfall at this time. These changes reflect the significant natural variability of the local groundwater regime, suggesting weather patterns are the predominant driver of groundwater levels within each bore across the monitoring network. All measurements were within the historical ranges for the respective bores with the exception of one of the newer bores, which recorded levels below the historical ranges prior to the onset of the wetter period, as well as one result for MW04(07) which was marginally above the historical levels for this bore.

pH (pH units)

BORE HOLE	2024/25 Reporting Period			Historical Results			DC Objectives	EA Predictions
	Min	Ave	Max	Min	Ave	Max		
MW1	4.6	5.0	5.3	3.4	5.6	7.0	6.0 - 8.5	N/A
MW1A	dry			3.7	5.4	6.8	6.0 - 8.5	N/A
MW2B	6.9	7.3	7.8	5.0	7.0	7.7	6.0 - 8.5	N/A
MW3A	6.4	6.8	7.1	6.0	7.0	8.0	6.0 - 8.5	N/A
MW04(07)	7.0	7.4	8.0	4.5	6.4	7.8	6.0 - 8.5	N/A
NB2	5.1	5.4	5.6	4.4	5.5	6	6.0 - 8.5	N/A
NB3	5.5	5.8	6.2	4.8	6.0	6.9	6.0 - 8.5	N/A
NB4	5.7	6.3	6.7	5.4	6.3	6.9	6.0 - 8.5	N/A
MW07	4.6	5.3	5.6	3.7	4.3	5.5	6.0 - 8.5	N/A



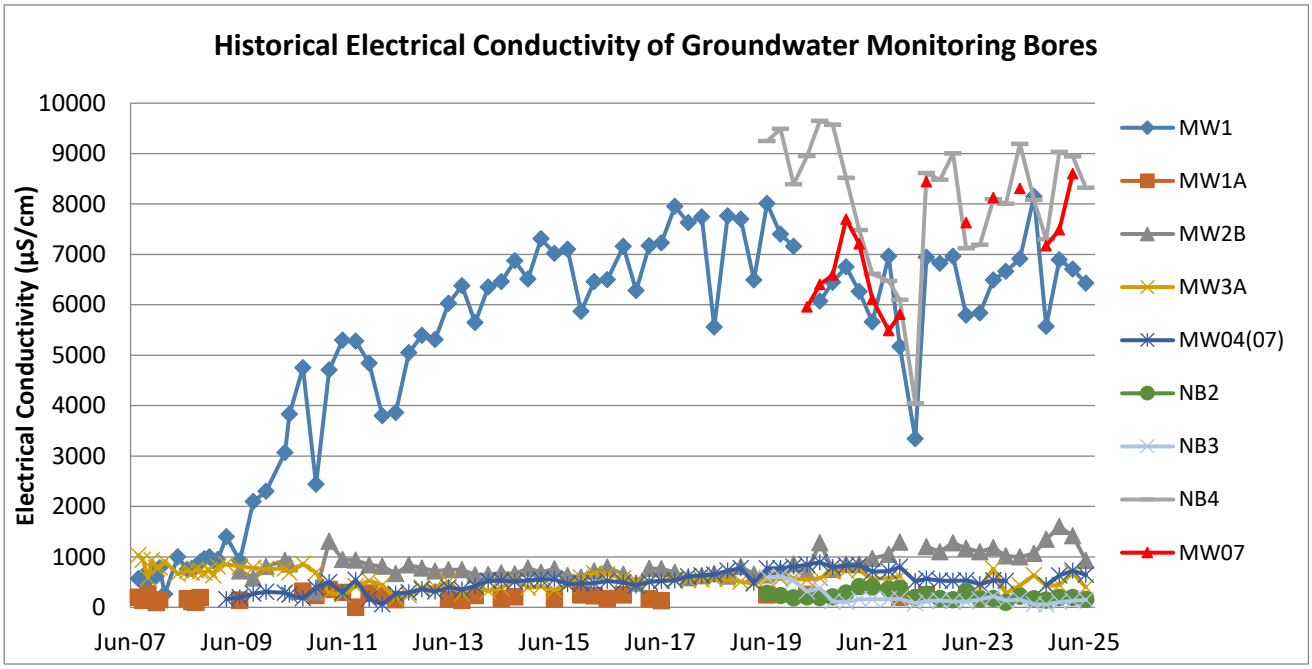
The pH values over the past 12 months have exhibited variability similar to that observed across the historical record. All groundwater bores recorded pH levels in line with historical ranges, although bores MW2B and MW3A exhibited single results slightly above the historical range, albeit consistent with recent results.

The monitoring results suggest pH is close to neutral in the close vicinity of the dredge pond and in the lower reach of Blue Angle Creek (such as around NB4), with pH declining further from these moderating influences, including for bores MW1, MW7, and to a lesser extent NB2.

Electrical Conductivity (µS/cm)

BORE HOLE	2024/25 Reporting Period			Historical Results			DC Objectives	EA Predictions
	Min	Ave	Max	Min	Ave	Max		
MW1	5570	6400	6890	260	4797	8150	< 1,500	n/a
MW1A	dry			90	200	350	< 1500	n/a
MW2B	931	1325	1600	300	823	1310	< 1,500	n/a

BORE HOLE	2024/25 Reporting Period			Historical Results			DC Objectives	EA Predictions
	Min	Ave	Max	Min	Ave	Max		
MW3A	398	487	682	176	586	1030	< 1,500	n/a
MW04(07)	440	610	723	60	508	892	< 1,500	n/a
NB2	144	172	195	97	239	408	< 1,500	n/a
NB3	56	109	150	62	218	613	< 1,500	n/a
NB4	7300	8398	9030	4040	8013	9650	< 1,500	n/a
MW07	7170	7753	8600	5490	6981	8440	< 1,500	n/a

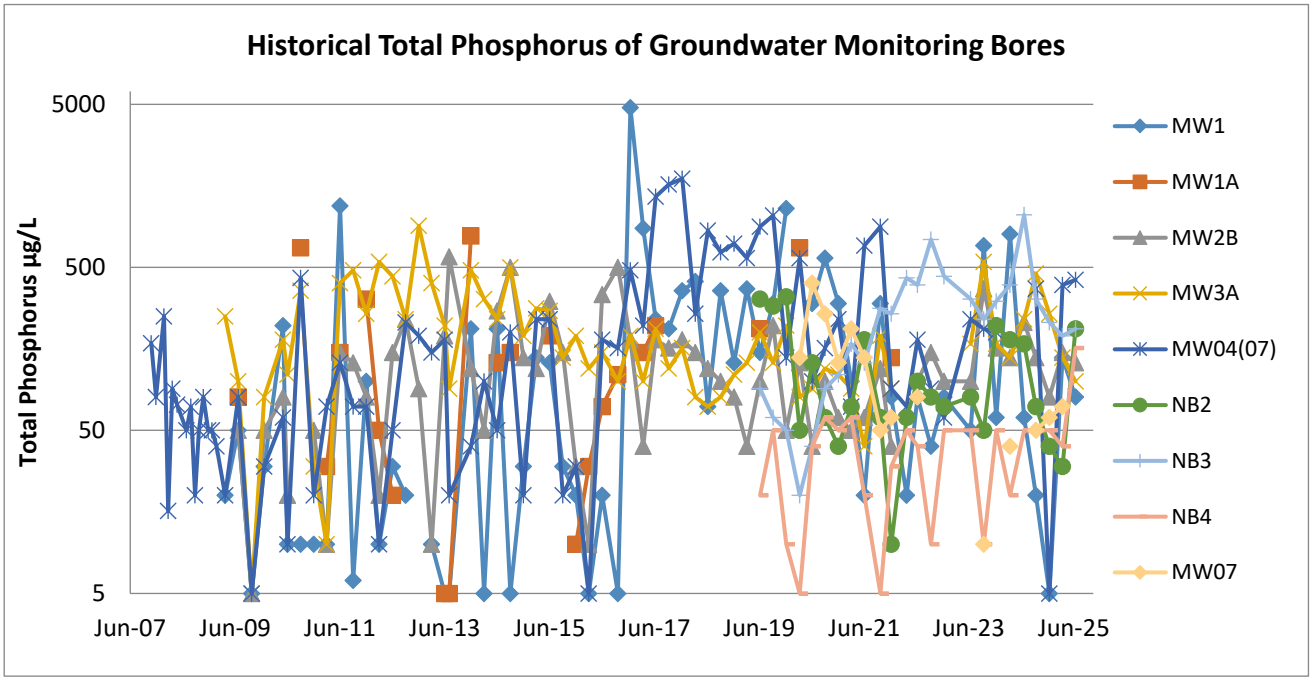


The results over the 12-month period show variability in the Electrical Conductivity (EC) of the groundwater in the boreholes which is consistent with the long term patten. Brackish groundwater in MW1 has been attributed to the Berry Siltstone aquifer to the southwest which continues to influence the groundwater quality in this bore. Meanwhile, brackish groundwater in bores NB4 and MW07 are influenced by tidal exchanges with the Crooked River estuary. With the exception of these three bores, and a short-lived increase in bore MW2B during a dry period, the EC of all bores have remained with the objective levels, and are consistent with the historical ranges for the bores.

Total Phosphorus (µg/L)

BORE HOLE	2024/2025 Reporting Period			Historical Results			DC Objectives	EA Predictions
	Min	Ave	Max	Min	Ave	Max		
MW1	<10	61	140	<10	263	4780	< 30	n/a
MW1A	dry			<10	190	780	< 30	n/a
MW2B	80	125	150	<10	138	580	< 30	n/a
MW3A	100	240	460	<10	210	900	< 30	n/a
MW04(07)	<10	296	420	<10	254	1750	< 30	n/a
NB2	30	88	210	10	128	330	< 30	n/a
NB3	190	238	320	20	281	1050	< 30	n/a
NB4	40	75	160	<10	34	60	< 30	n/a

BORE HOLE	2024/2025 Reporting Period			Historical Results			DC Objectives	EA Predictions
	Min	Ave	Max	Min	Ave	Max		
MW07	50	60	70	10	138	400	< 30	n/a



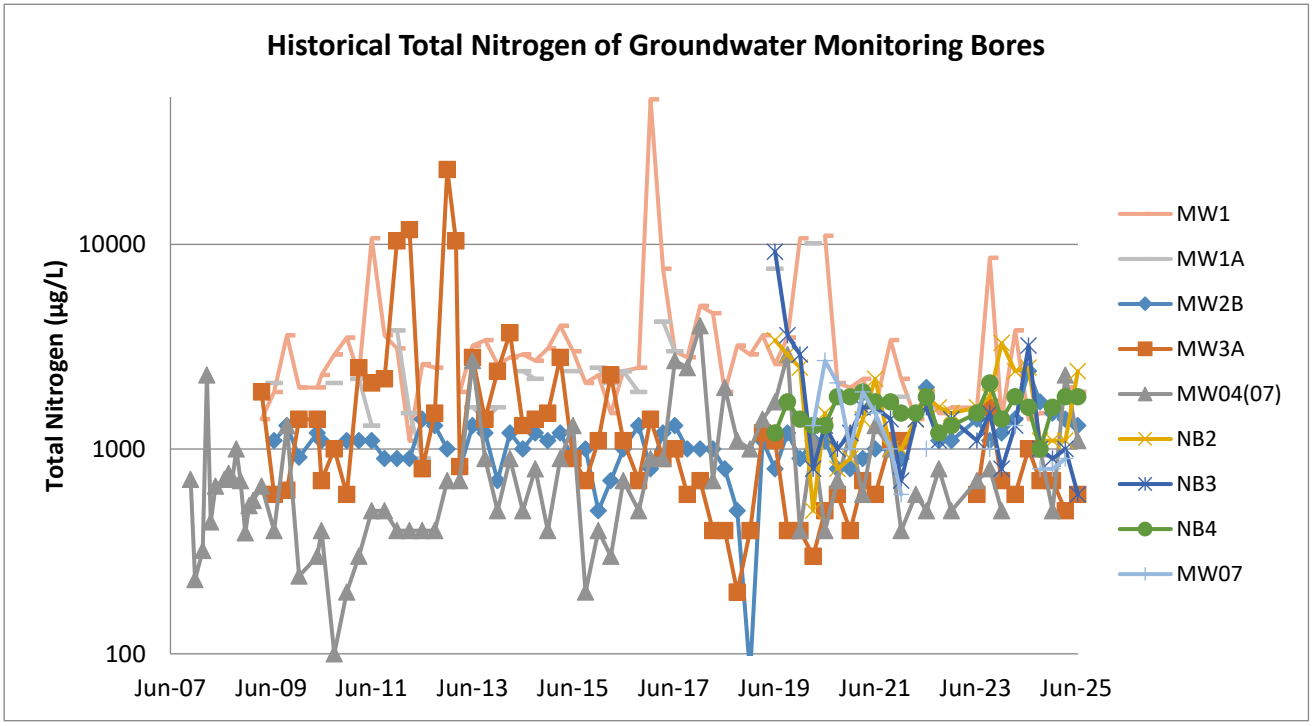
Concentrations of total phosphorus in the boreholes were generally above the groundwater quality objective, however they were all within the historical range for their respective bores with the exception of a single result for bore NB4 which has a limited period of monitoring. During the reporting period, the concentration of total phosphorus in the existing dredge pond was generally less than that measured in all bores, suggesting the agricultural land uses surrounding the Gerroa Sand Resource have contributed to the levels of phosphorus in the groundwater monitoring network. Note a logarithmic scale has been applied to the graph above to improve interpretation.

Total Nitrogen (µg/L)

BORE HOLE	2024/25 Reporting Period			Historical Results			DC Objectives	EA Predictions
	Min	Ave	Max	Min	Ave	Max		
MW1	1500	1725	2000	1100	4002	51100	< 350	n/a
MW1A	dry			900	2777	10100	< 350	n/a
MW2B	1300	1475	1700	80	1058	2400	< 350	n/a
MW3A	500	625	700	200	2016	23200	< 350	n/a
MW04(07)	500	1225	2300	100	854	4000	< 350	n/a
NB2	1100	1425	2400	500	1800	3400	< 350	n/a
NB3	600	875	1000	700	1935	9200	< 350	n/a
NB4	1000	1550	1800	1200	1575	2100	< 350	n/a
MW07	800	833	900	600	1400	2700	< 350	n/a

The concentrations of Total Nitrogen in all groundwater monitoring bores have consistently exceeded the objective level since monitoring of groundwater quality began. In the current reporting period, nitrogen concentrations were recorded within the historical range in all bores with the exception of single results for NB3 and NB4, which were less than the historical ranges for these bores. The recorded levels of total nitrogen in the groundwater monitoring network are likely related to the presence of agricultural activities in the area

surrounding the Gerroa Sand Resource. This is supported by an analysis of water quality within the existing dredge pond, which shows that nitrogen concentrations in the pond are consistently lower than that recorded across the groundwater monitoring network. Note a logarithmic scale has been applied to the graph below to improve interpretation.

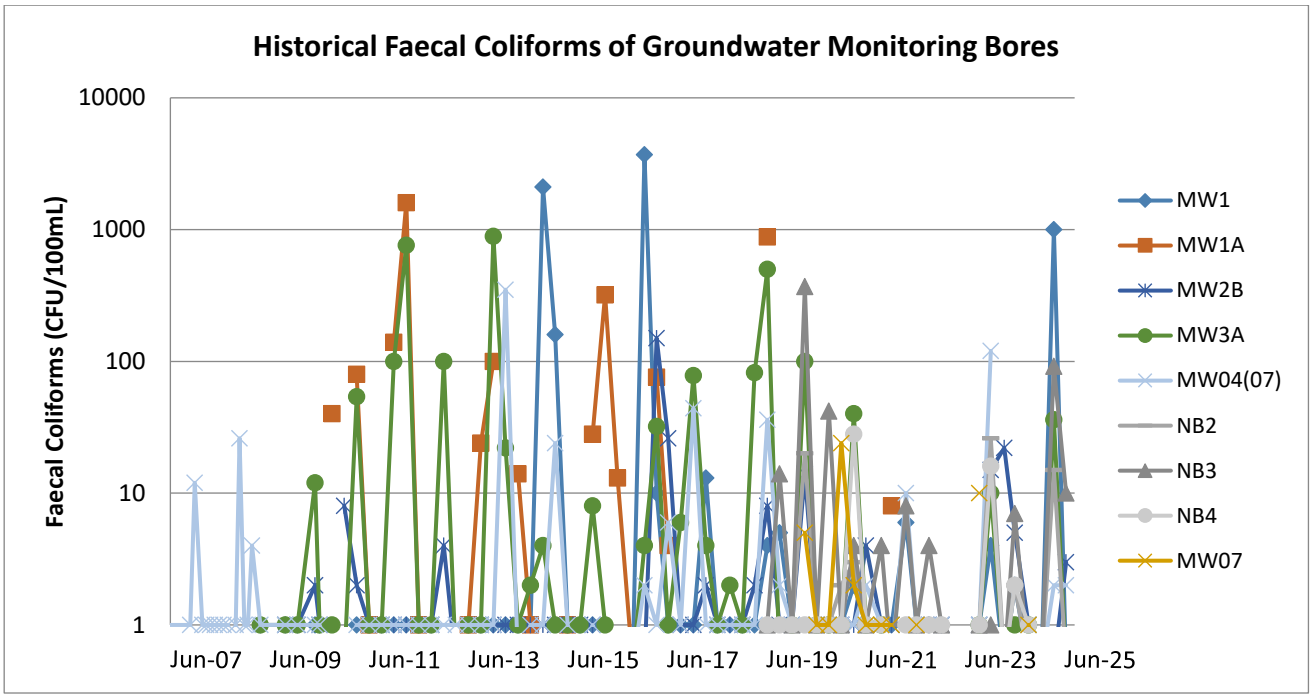


Chlorophyll A (µg/L)

Chlorophyll A concentrations were below the laboratory limit of reporting and objective level in all samples across all monitoring bores this reporting period. As such, this data cannot be meaningfully graphed.

Faecal Coliforms (median number/100mL)

BORE HOLE	2024/25 Reporting Period			Historical Results			DC Objectives	EA Predictions
	Min	Ave	Max	Min	Ave	Max		
MW1	<1	334	1000	<1	103	3700	<1000	n/a
MW1A	dry			<1	159	1600	<1000	n/a
MW2B	<1	1	1	<1	5	150	<1000	n/a
MW3A	<1	13	36	<1	50	890	<1000	n/a
MW04(07)	<1	1	2	<1	9	350	<1000	n/a
NB2	<1	5	15	<1	3	26	<1000	n/a
NB3	<1	31	92	<1	23	370	<1000	n/a
NB4	<1	<1	1	<1	3	28	<1000	n/a
MW07	<1	<1	1	<1	4	24	<1000	n/a

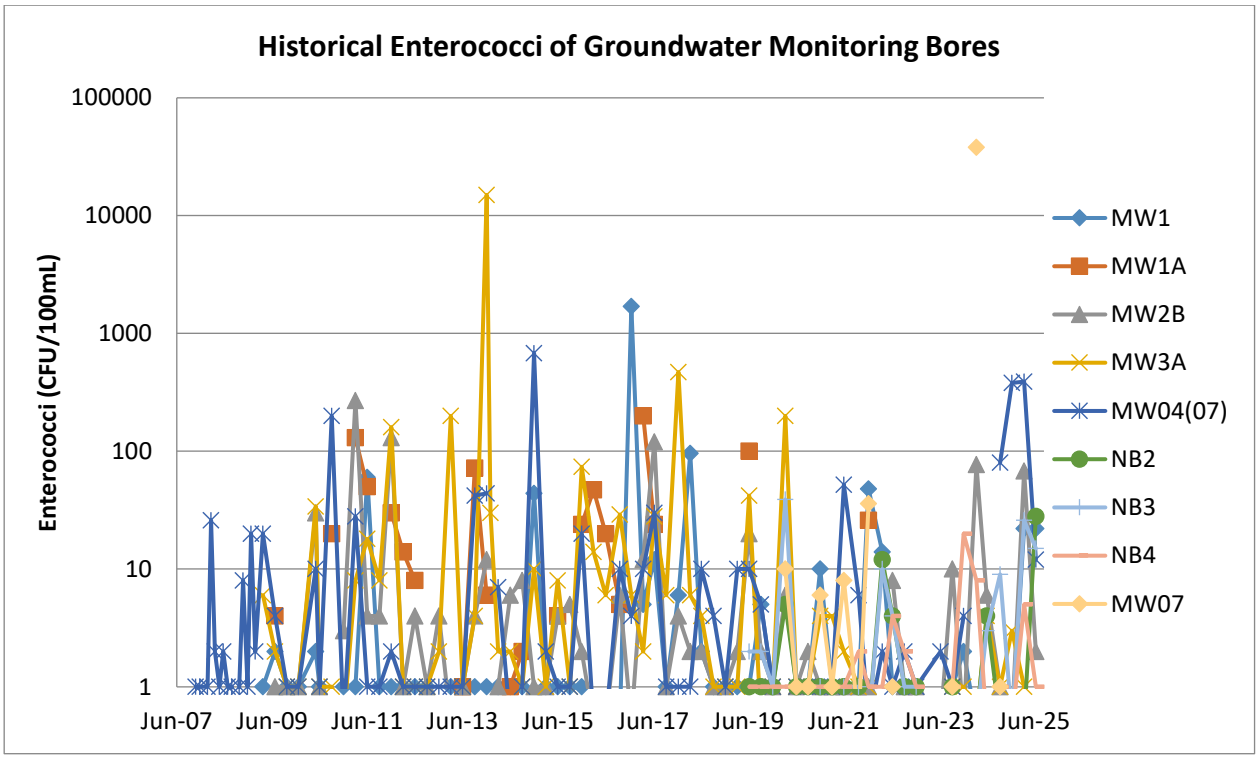


Faecal coliforms were within the objective levels and historical ranges for the respective bores during the reporting period.

Enterococci (median number/100mL)

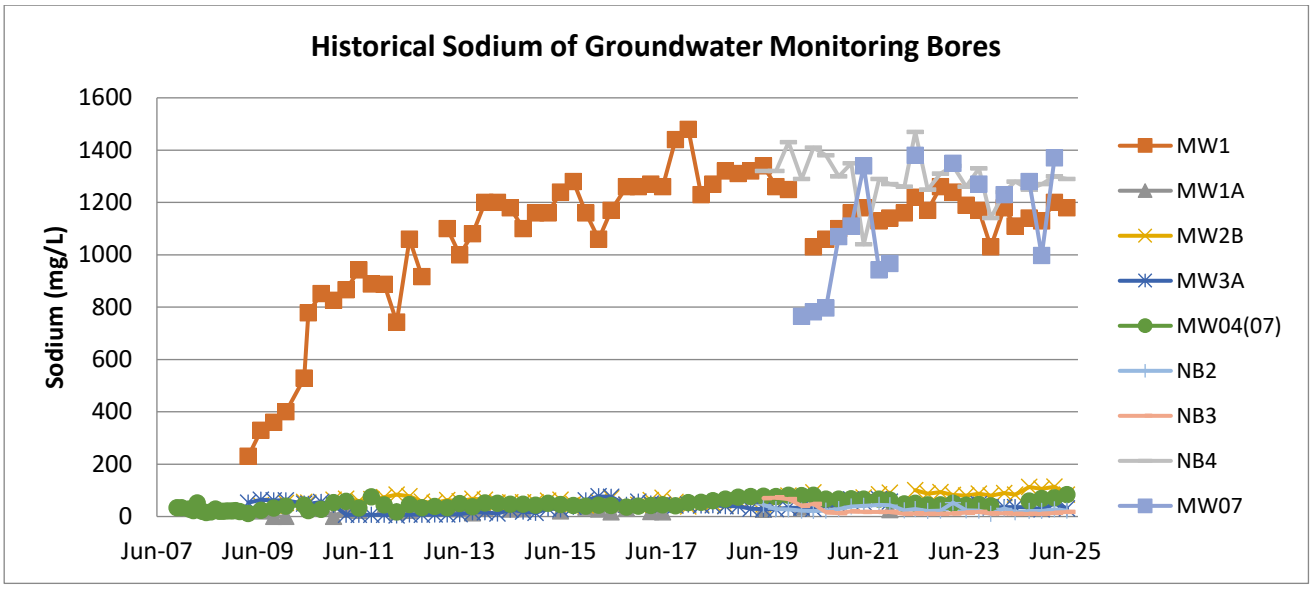
BORE HOLE	2024/25 Reporting Period			Historical Results			DC Objectives	EA Predictions
	Min	Ave	Max	Min	Ave	Max		
MW1	<1	8	22	<1	35	1,700	<230	n/a
MW1A	dry			1	38	200	<230	n/a
MW2B	<1	18	68	<1	14	270	<230	n/a
MW3A	<1	<1	1	<1	283	15,000	<230	n/a
MW04(07)	12	216	390	<1	18	680	<230	n/a
NB2	<1	7	28	<1	2	12	<230	n/a
NB3	<1	13	26	<1	4	39	<230	n/a
NB4	<1	2	5	<1	3	20	<230	n/a
MW07	<1	<1	<2	<1	3461	38,000	<230	n/a

Enterococci concentrations were within the objective levels during the reporting period, with the exception of two results for MW04(07) during the warmer period of the year, which remaining within the historical range for this bore. One result for NB2 was above the historical range for this bore, which has a limited period of monitoring, and remained relatively low. Note a logarithmic scale has been applied to the graph below to improve interpretation.



Sodium (mg/L)

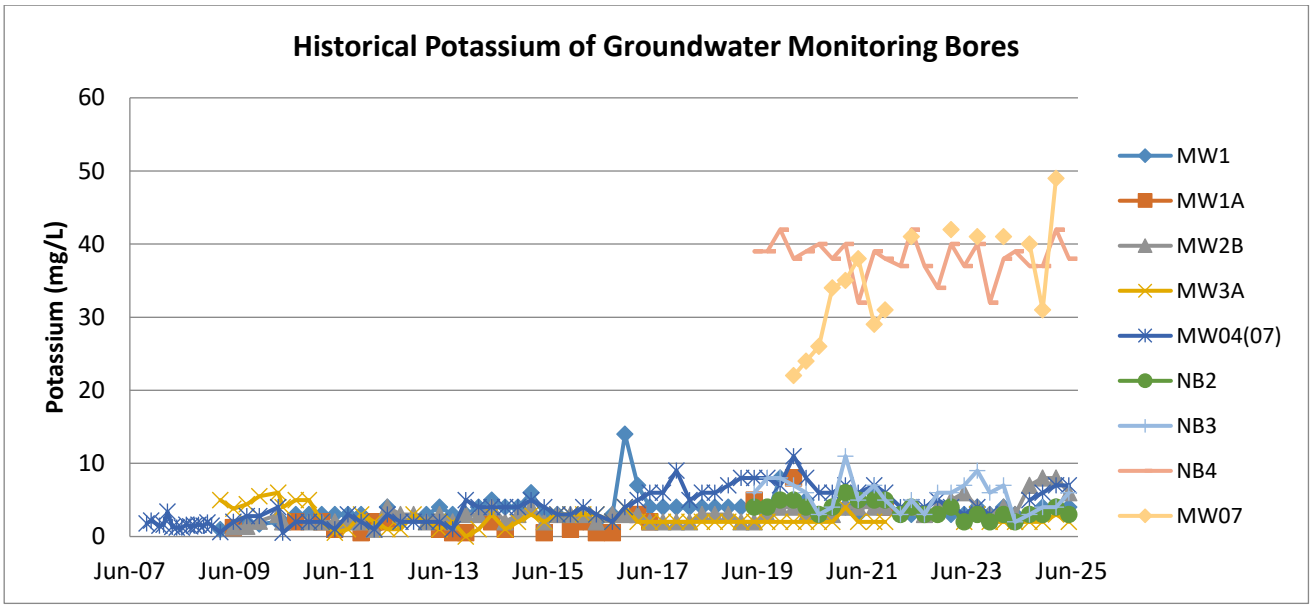
BORE HOLE	2024/25 Reporting Period			Historical Results			DC Objectives	EA Predictions
	Min	Ave	Max	Min	Ave	Max		
MW1	1130	1163	1200	230	1075	1480	< 400	n/a
MW1A	dry			14	27	36	< 400	n/a
MW2B	84	104	114	38	64	101	< 400	n/a
MW3A	27	36	51	4	36	77	< 400	n/a
MW04(07)	59	71	84	11	45	81	< 400	n/a
NB2	21	23	27	10	29	53	< 400	n/a
NB3	10	13	17	10	25	72	< 400	n/a
NB4	1250	1278	1300	1040	1299	1470	< 400	n/a
MW07	997	1216	1370	765	1084	1380	< 400	n/a



With the exception of boreholes MW1, NB4 and MW07, sodium concentrations recorded in the monitoring network were within the DC objective, and consistently at low levels. Concentrations in the new bores NB4 and MW7 were recorded significantly above the DC objective, however, represent background levels for these sites due to the brackish influence from the Crooked River estuary. All sodium concentrations during the reporting period were consistent with the historical averages for the respective bores, with the exception of some results from bores MW2B and MW04(07) which recorded higher sodium concentrations following the drier Spring.

Potassium Ion (mg/L)

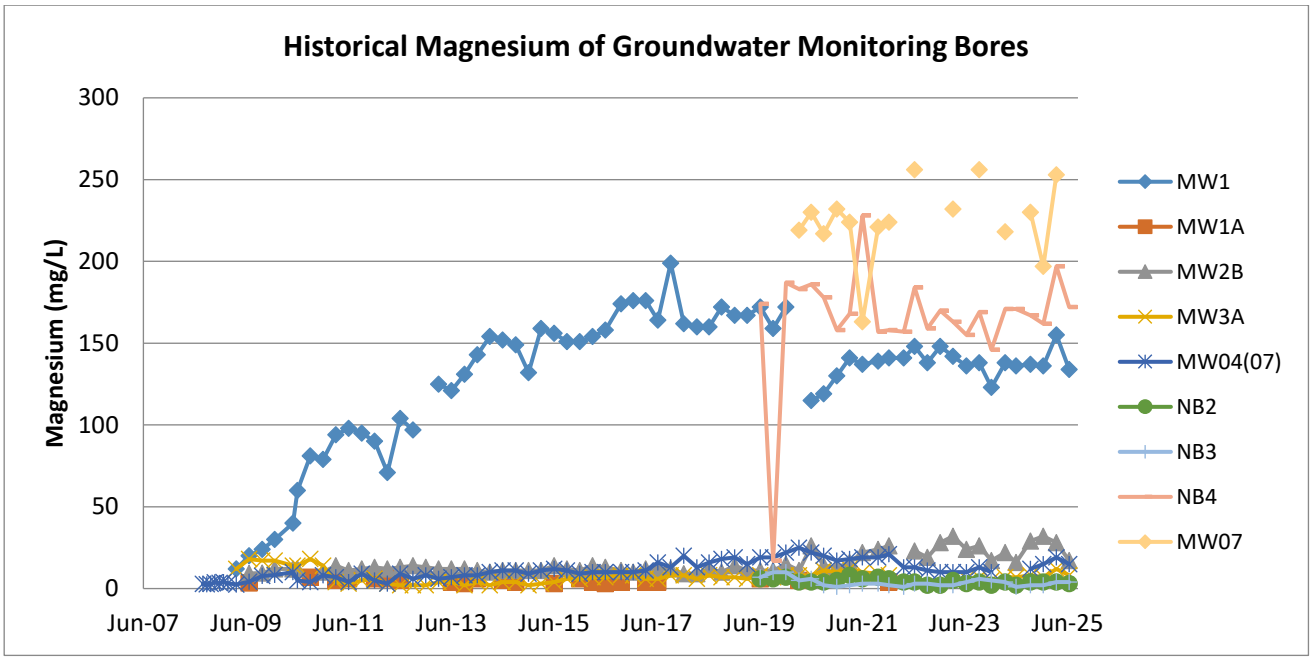
BORE HOLE	2024/25 Reporting Period			Historical Results			DC Objectives	EA Predictions
	Min	Ave	Max	Min	Ave	Max		
MW1	3	4	4	<1	4	14	< 50	n/a
MW1A	dry			<1	2	8	< 50	n/a
MW2B	6	7	8	1	3	6	< 50	n/a
MW3A	2	2	3	<1	3	6	< 50	n/a
MW04(07)	5	6	7	<1	4	11	< 50	n/a
NB2	3	3	4	2	4	6	< 50	n/a
NB3	3	4	6	2	6	11	< 50	n/a
NB4	37	39	42	32	38	42	< 50	n/a
MW07	31	40	49	22	34	42	< 50	n/a



Potassium ion concentrations in the original monitoring network have remained well below the DC objective levels and were generally consistent with historical concentrations in the current reporting period. Concentrations in the newer monitoring bores NB4 and MW7 were recorded higher than the other sites however represent background levels for these sites due to the brackish influence from the Crooked River estuary.

Magnesium Ion (mg/L)

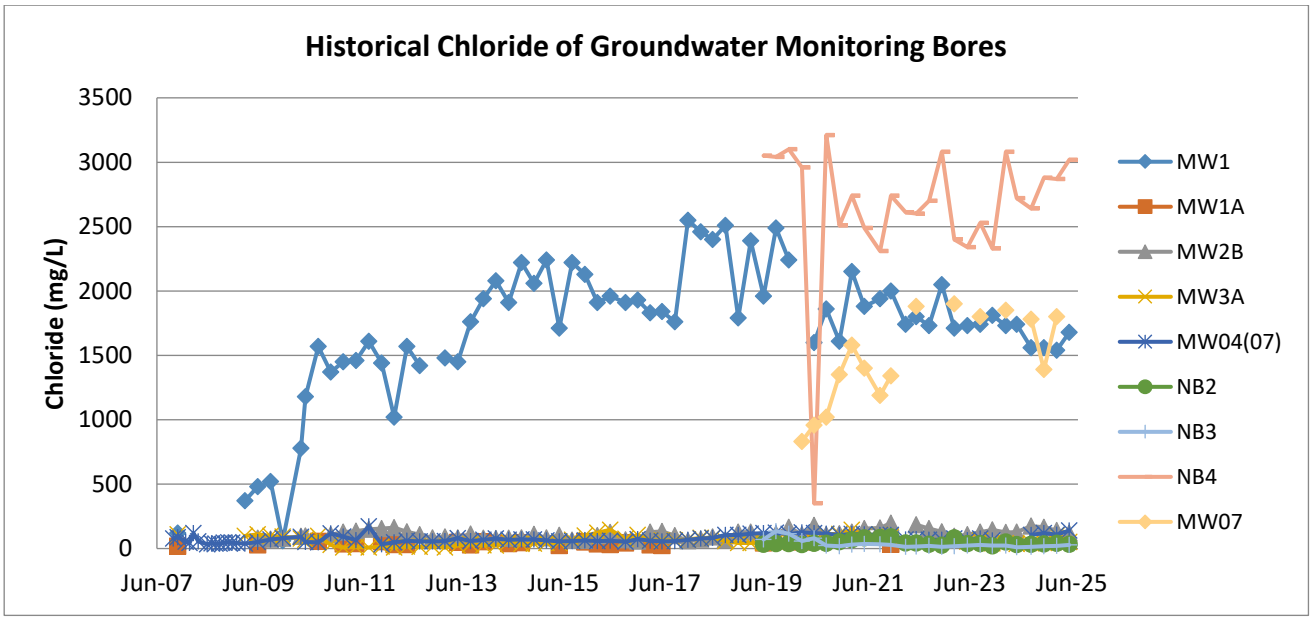
BORE HOLE	2024/25 Reporting Period			Historical Results			DC Objectives	EA Predictions
	Min	Ave	Max	Min	Ave	Max		
MW1	134	141	155	12	129	199	< 50	n/a
MW1A	dry			3	5	7	< 50	n/a
MW2B	17	27	32	9	14	32	< 50	n/a
MW3A	7	9	12	2	7	18	< 50	n/a
MW04(07)	12	15	19	3	11	25	< 50	n/a
NB2	3	4	4	2	5	8	< 50	n/a
NB3	2	3	4	1	4	10	< 50	n/a
NB4	162	175	197	17	164	228	< 50	n/a
MW07	197	227	253	163	224	256	< 50	n/a



Magnesium ion concentrations were within the DC objective level with the exception of MW1, NB4, and MW07, which have followed similar trends as for conductivity and sodium. All samples were within the historical ranges for the respective sites.

Chloride Ion (mg/L)

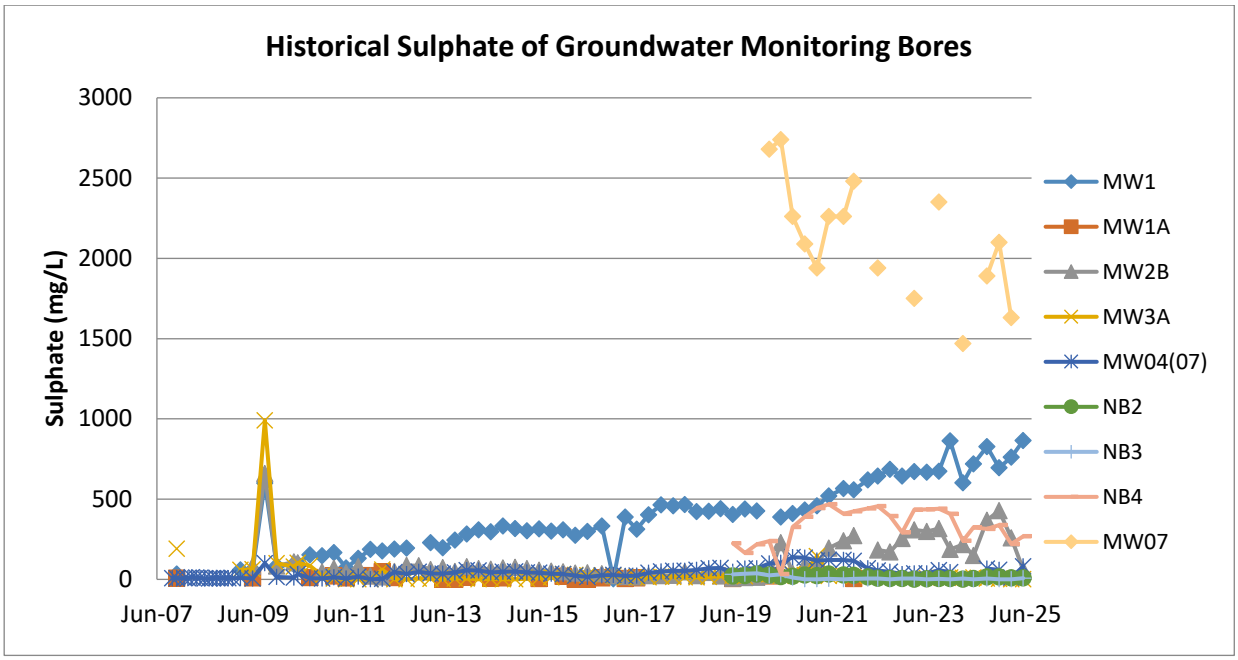
BORE HOLE	2024/25 Reporting Period			Historical Results			DC Objectives	EA Predictions
	Min	Ave	Max	Min	Ave	Max		
MW1	1540	1585	1680	60	1711	2550	< 300	n/a
MW1A	dry			18	38	56	< 300	n/a
MW2B	120	150	174	57	111	198	< 300	n/a
MW3A	41	60	103	8	61	146	< 300	n/a
MW04(07)	104	118	140	33	74	172	< 300	n/a
NB2	33	36	41	21	48	90	< 300	n/a
NB3	13	20	28	10	39	135	< 300	n/a
NB4	2640	2853	3020	351	2614	3210	< 300	n/a
MW07	1390	1657	1800	832	1425	1900	< 300	n/a



All chloride ion concentrations were within the DC objective level with the exception of MW1, NB4, and MW07, which have followed similar trends as for conductivity and sodium. All samples were within the historical ranges for the respective sites. Site MW1 continues to be affected by brackish water from the Berry Siltstone, while bores NB4 and MW07 have been influenced by brackish water from the Crooked River estuary.

Sulphate Ion (mg/L)

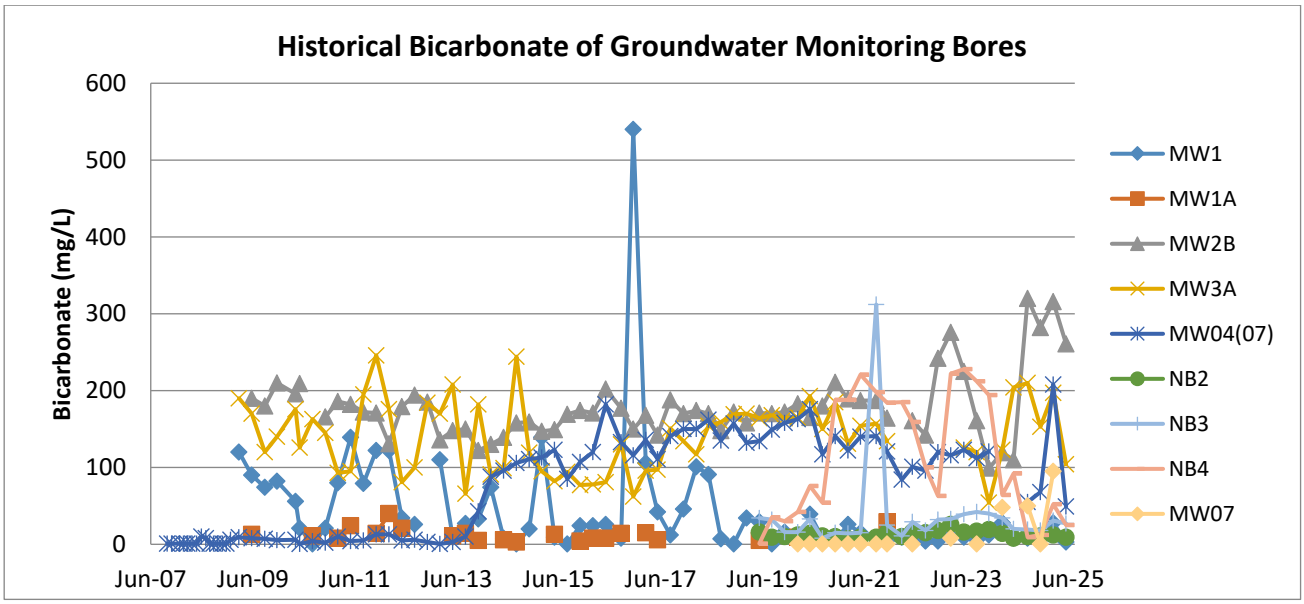
BORE HOLE	2023/24 Reporting Period			Historical Results			DC Objectives	EA Predictions
	Min	Ave	Max	Min	Ave	Max		
MW1	696	787	865	4	360	863	< 250	n/a
MW1A	dry			<1	11	48	< 250	n/a
MW2B	59	278	428	8	102	660	< 250	n/a
MW3A	<1	3	6	<1	44	990	< 250	n/a
MW04(07)	12	55	81	<1	41	138	< 250	n/a
NB2	9	13	16	<1	16	34	< 250	n/a
NB3	<1	3	7	<1	10	38	< 250	n/a
NB4	221	285	338	34	343	468	< 250	n/a
MW07	1630	1873	2100	1470	2185	2740	< 250	n/a



All results were generally within the historical ranges for the respective bores. The concentration of sulphate in bores MW1, MW2B, NB4 and MW7 were outside of the DC objectives for one or more of the samples during the reporting period, consistent with recent years. Bore MW1 has shown an increasing trend in sulphate ion concentration over the past five years, generally replacing the chloride ions which has shown a decreasing trend over the same period.

Bicarbonate Ion (mg/L)

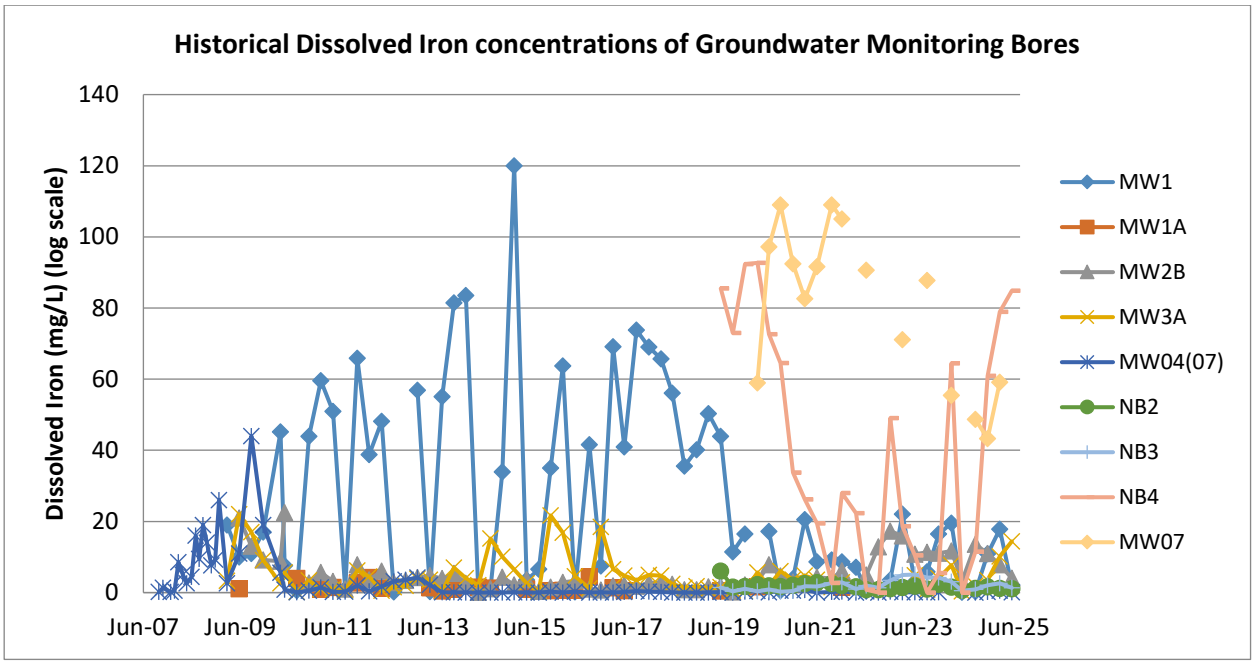
BORE HOLE	2024/25 Reporting Period			Historical Results			DC Objectives	EA Predictions
	Min	Ave	Max	Min	Ave	Max		
MW1	3	11	28	<1	47	540	< 750	n/a
MW1A	dry			3	13	40	< 750	n/a
MW2B	261	295	320	99	170	276	< 750	n/a
MW3A	104	166	210	54	139	246	< 750	n/a
MW04(07)	49	95	208	<1	70	182	< 750	n/a
NB2	9	11	12	7	13	26	< 750	n/a
NB3	18	24	31	8	39	312	< 750	n/a
NB4	9	25	52	1	130	228	< 750	n/a
MW07	50	73	95	<1	5	48	< 750	n/a



Bicarbonate concentrations remained below the objective level in all groundwater bores during the current reporting period. All bores have continued to show some inherent variability, and generally within the historical ranges. Bore MW2B experienced higher bicarbonate concentrations during the reporting period, while bore MW04(07) also recorded one higher than typical result but subsequently returned to the historical range for this bore in the following sample.

Dissolved Iron (mg/L)

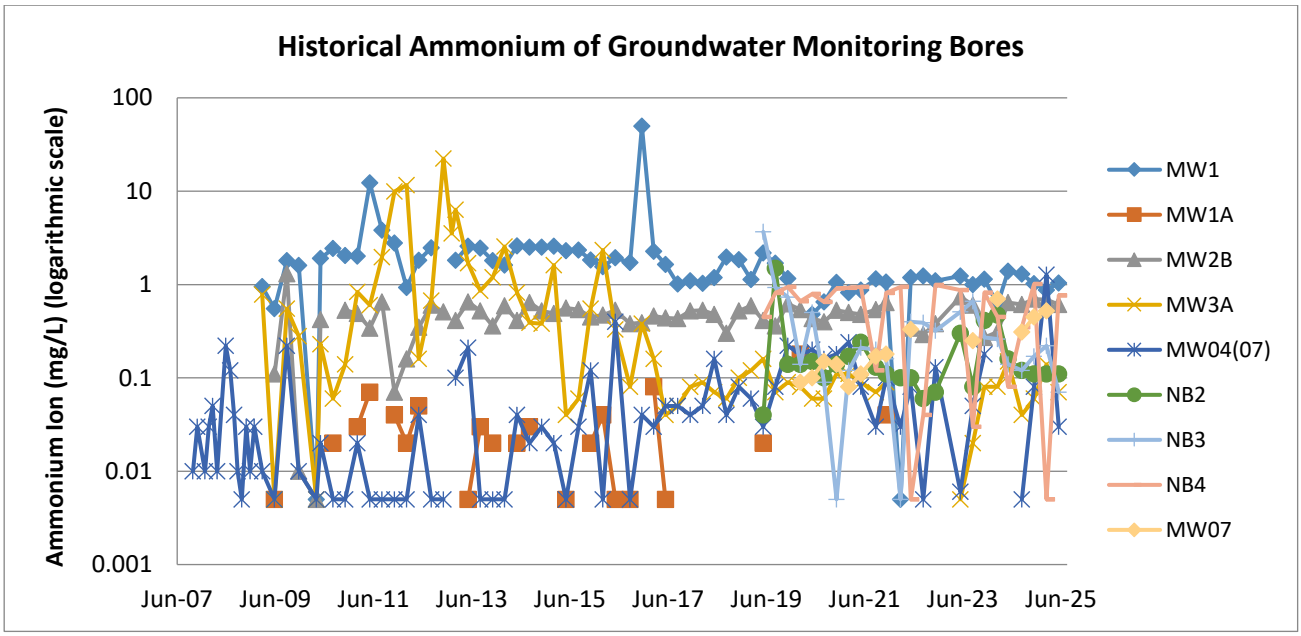
BORE HOLE	2024/25 Reporting Period			Historical Results			DC Objectives	EA Predictions
	Min	Ave	Max	Min	Ave	Max		
MW1	0.2	7.8	17.8	0.1	28.8	120	< 6	0.07
MW1A	dry			0.4	1.5	4	< 6	n/a
MW2B	4.0	9.1	13.6	0.1	5.2	23	< 6	n/a
MW3A	2.0	7.5	14.4	0.2	4.9	22	< 6	n/a
MW04(07)	<0.05	0.19	0.49	<0.05	3.1	44	< 6	n/a
NB2	1.1	1.3	1.6	0.6	1.9	6	< 6	n/a
NB3	0.9	1.7	2.6	0.3	2.1	5	< 6	n/a
NB4	11.5	59.1	84.9	<0.05	36.3	93	< 6	n/a
MW07	43.3	50.4	59.1	55.4	87.5	109	< 6	n/a



The dissolved iron concentrations were above the objective level for several bores at times during the current reporting period. This is a common phenomenon, with the graph above showing significant fluctuations throughout the historical period of monitoring for all bores. This historical trend has continued in the current reporting period. The concentrations of dissolved iron in all bores for the reporting period were generally within the historical range for the respective bores, with the exception of two dissolved iron concentrations in MW07 which were lower than the limited historical range for this bore.

Ammonium Ion (mg/L)

BORE HOLE	2024/25 Reporting Period			Historical Results			DC Objectives	EA Predictions
	Min	Ave	Max	Min	Ave	Max		
MW1	0.87	1.06	1.29	<0.01	2.58	49.50	< 0.02	n/a
MW1A	dry			<0.01	0.03	0.18	< 0.02	n/a
MW2B	0.61	0.65	0.70	<0.01	0.46	1.30	< 0.02	n/a
MW3A	0.04	0.08	0.14	<0.01	1.30	22.30	< 0.02	n/a
MW04(07)	<0.01	0.35	1.27	<0.01	0.06	0.40	< 0.02	n/a
NB2	0.11	0.11	0.12	0.04	0.23	1.49	< 0.02	n/a
NB3	0.07	0.15	0.22	<0.01	0.49	3.67	< 0.02	n/a
NB4	<0.01	0.53	1.01	<0.01	0.61	0.99	< 0.02	n/a
MW07	0.31	0.43	0.52	0.08	0.21	0.70	< 0.02	n/a



Ammonium ion concentrations were consistently above the objective level during the current reporting period, however within historical levels for all bores in the original monitoring network with the exception of one sample from MW04(07) and one sample from NB4. This indicates that there is no deterioration in groundwater quality as a result of dredging operations. Note a logarithmic scale has been applied to the graph above to improve interpretation.

4.2.4.Groundwater Monitoring Results Interpretation

From the data gathered as part of the groundwater monitoring program for the Gerroa Sand Resource, groundwater quality has for the most part remained relatively stable during the current reporting period. Higher concentrations of major ions were observed in bores close to Blue Angle Creek, which is likely attributable to the effect of tidal influence from the Crooked River estuary and reflecting the background variability of the environment.

Monitoring bore MW1 is connected to the Berry Siltstone aquifer, which forms the topographical high to the southwest of the project area. The Berry Siltstone aquifer is a slightly brackish groundwater system, with a relative deficiency of potassium, which is reflected in the monitoring results of MW1. Results in recent years show electrical conductivity in this bore declining, which appears to be led by a reduction in the chloride ion concentration, albeit offset to a lesser degree by an increase in sulphate ion concentration. Historical monitoring from this bore shows that higher salinity and major ion concentrations have been observed at various times since 1993. These records show that many of the water quality objectives in the Development Consent are not appropriate for this bore, given the inherent natural variability at the interface of the Berry Siltstone aquifer and alluvial aquifer. Nevertheless, the current monitoring program is well placed to both monitor any variations in groundwater quality over time, as well as monitoring the spatial distribution of any brackish influence in the vicinity of the dredging operation. Two of the newer monitoring bores (NB4 and MW7) also show brackish influences, however with commensurate elevated concentrations of potassium, which suggest influences from the tidal Crooked River estuary at these sites.

One of the key observations made during previous annual reviews revolved around the shortcomings of the current groundwater quality objectives and their applicability to the natural groundwater regime of the site. The objectives are derived from previous surface water quality objectives for NSW, and are not directly relevant to groundwater. This is highlighted by the presence of iron sulphides in the local geology, which has contributed to a number of bores regularly and naturally recording pH levels below the objective range, and soluble iron concentrations above the objective level. Similarly, concentrations of nitrogen and phosphorus in the groundwater are regularly higher than the objective levels, despite no forms of these substances used or artificially generated on site as part of extraction activities. Nitrogen and phosphorus concentrations in the surface water of the dredge pond are typically far lower than that recorded in the groundwater monitoring

network, supporting determinations that extraction activities are not contributing to the observed concentrations of these analytes in the groundwater. For these reasons, the objective levels of these analytes do not suitably reflect the natural groundwater regime, and comparison with historical results provides a far better method of detecting any changes to groundwater quality as a result of dredging and associated activities.

The current groundwater monitoring program is suitable for monitoring any spatial or temporal changes in the groundwater quality and quantity in the local environment. Current procedures allow for an accurate representation of any longer term trends in groundwater quality and availability.

There were no non-compliances with conditions of the Development Consent or Environmental Protection Licence 4146 related to groundwater in the 2024-2025 reporting period.

4.3. Surface Water Management

4.3.1. Standards and Performance Measures

There are no specific requirements for surface water quality in the sites EPL other than with regard to discharges from the site, as detailed below:

Water and land

EPA Identification no.	Type of Monitoring Point	Type of Discharge Point	Location Description
1		Discharge to waters	The end of the "Overflow Pipe" from the dredge pond as labelled on the map titled "Gerroa Sand Resource" dated 7/12/11 and held on EPA file 281283A8.

The overflow pipe indicated is licenced in case of extreme wet weather in which flood water would be allowed to drain to the adjacent Foy's Swamp. To date the dredge pond water has never required use of the overflow pipe.

The surface water monitoring requirements from the DC are realised by the sites QEMP. Section 8.5 of the QEMP details the surface water monitoring requirements and specifies that the dredge ponds and Blue Angle Creek require daily water level and pH measurements, as well as monthly monitoring for various analytes in both dredge ponds, Blue Angle Creek, and the processing returns line. The EA predicted that the project is not predicted to lead to any deterioration of the water quality of the dredge pond, or the surrounding area.

The surface water quality objectives for the dredge ponds which CB should "aim to meet" from the DC (and adopted in the QEMP) are as follows:

Analyte	Units	Objective
Turbidity	NTU	5 - 20
pH	pH	6.0 – 8.5
Salinity	µS/cm	<1,500
Dissolved Oxygen	mg/L	>6
Total Phosphorus	µg/L	<30
Total Nitrogen	µg/L	<350
Chlorophyll-A	µg/L	<5
Faecal Coliforms	Median No./100 mL	<1,000
Enterococci	Median No./100 mL	<230
Algae & BGA	No. Cells/mL	<15,000
Sodium	mg/L	<400
Potassium	mg/L	<50

Analyte	Units	Objective
Magnesium	mg/L	<50
Chloride	mg/L	<300
Sulphate	mg/L	<250
Bicarbonate	mg/L	<750
Soluble Iron	mg/L	<6
Ammonium	mg/L*	<0.02

* objective amended from 20 mg/L to 20 µg/L (0.02 mg/L) as part of Modification 1

4.3.2. Environmental Performance

CB has implemented the Surface Water Monitoring Program to meet the requirements of the DC. ALS Laboratory Group were engaged during the reporting period to conduct monthly and quarterly sampling and testing of the surface water monitoring sites. Automatic monitoring stations recording water level and pH were also operating in both dredge ponds and the downstream site on Blue Angle Creek. Additional management and monitoring of surface water resources to assess potential impact from acid sulphate soils are detailed in Section 4.4.

4.3.3. Surface Water Monitoring

A summary of surface water monitoring results for the period is tabulated in this section, with the range and average of each analyte displayed alongside the historical range and average, objectives as described in the DC, and any EA predictions. Units of reporting are listed in the table in Section 4.3.1. Graphs are also included to show trends in all analytes over the historical period of monitoring in the dredge pond. Where surface water monitoring results trend outside of the historical range or DC objectives, these are discussed after each graph.

Existing Dredge Pond

Existing Dredge Pond Analyte	2024/2025 Reporting Period			Historical Results			DC Objectives	EA Predictions
	Min	Ave	Max	Min	Ave	Max		
Conductivity	288	589	733	376	649	1,040	< 1,500	N/A
pH	6.6	7.6	8.1	6.4	7.8	8.8	6 - 8.5	N/A
Total Algae	700	16,560	47,000	525	127,640	2,070,000	< 15,000	N/A
Cyanophyta	<5	13,456	43,200	<5	101,475	2,070,000	< 15,000	N/A
Total phosphorus	50	95	150	<10	47	790	< 30	N/A
Total nitrogen	500	775	1,100	40	661	6,900	< 350	N/A
Chlorophyll-a	<1	9	23	<1	7	49	< 5	N/A
Faecal coliforms	7	22	32	<2	102	2,100	< 1,000	N/A
Enterococci	7	46	100	<2	37	690	< 230	N/A
Sodium	61	79	97	33	55	91	< 400	N/A
Potassium ion	5	7	8	1	5	8	< 50	N/A
Magnesium ion	13	16	18	9	14	22	< 50	N/A
Calcium ion	24	26	28	23	34	43	N/A	N/A
Chloride	81	127	144	16	84	140	< 300	N/A
Sulphate ion	63	83	93	25	104	1,300	< 250	N/A
Bicarbonate ion	42	51	56	1	97	313	< 750	N/A

Existing Dredge Pond Analyte	2024/2025 Reporting Period			Historical Results			DC Objectives	EA Predictions
	Min	Ave	Max	Min	Ave	Max		
Soluble iron ion	<0.05	<0.05	<0.05	<0.05	0.065	0.770	< 6	N/A
Ammonium ion	<0.01	0.01	0.02	<0.01	0.03	0.36	< 0.02	N/A
Turbidity	59	186	288	1	28	184	1 - 20	N/A
DO (mg/L)	6.25	8.57	10.50	2.21	8.76	13.20	> 6	N/A
DO (%)	64	94	115	26	96	170	80-110	N/A

All the above surface water quality analytes were generally consistent with historical monitoring, and met the objective levels, with the exception of turbidity, dissolved oxygen %, algae and chlorophyll-A, and the nutrient species. The nutrient species are likely elevated due to the historical and present agricultural land use of the surrounding area, with nitrogen and phosphorus elevated in the groundwater due to these land uses. Turbidity is elevated due to the increased fines generation associated with extraction from the new dredge pond, however with the flood bunds preventing any overflows, does not pose a risk to the surrounding surface water resources. Lower dissolved oxygen concentrations were recorded in a single month only, and have otherwise remained within the objective levels throughout the monitoring period. Concentrations of algae and chlorophyll-A have followed typical patterns, with higher concentrations above objective levels during the warmer periods, dropping to low levels during the Winter and Spring monitoring periods.

New Dredge Pond

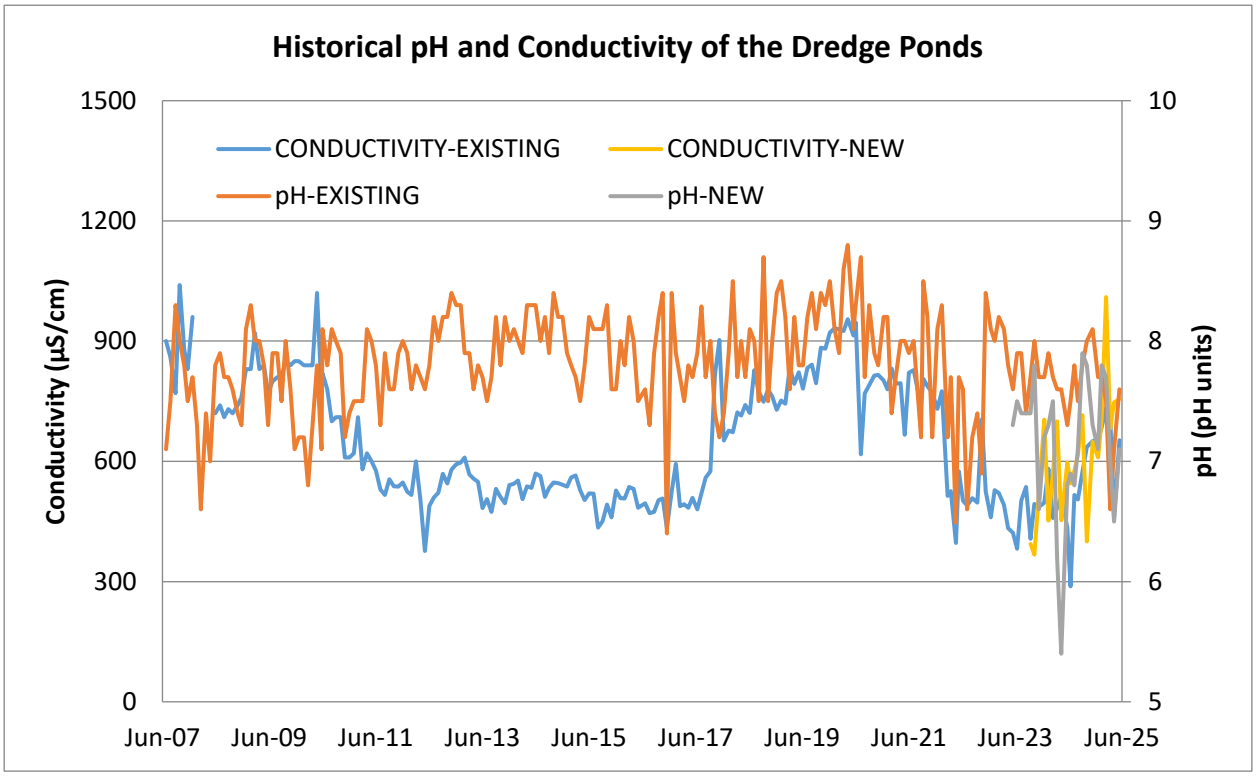
New Dredge Pond Analyte	2024/2025 Reporting Period			Historical Results			DC Objectives	EA Predictions
	Min	Ave	Max	Min	Ave	Max		
Conductivity	400	744	1010	367	555	715	< 1,500	N/A
pH	6.5	7.3	7.9	5.4	7.1	7.8	6 - 8.5	N/A
Total Algae	4920	12320	22600	750	7414	24300	< 15,000	N/A
Cyanophyta	<5	8201	15600	<5	2631	8550	< 15,000	N/A
Total phosphorus	<10	106	160	25	187	510	< 30	N/A
Total nitrogen	1000	1050	1200	600	1160	1700	< 350	N/A
Chlorophyll-a	1	17	26	<1	2	2	< 5	N/A
Faecal coliforms	12	46	68	1	126	560	< 1,000	N/A
Enterococci	17	37	60	1	12	48	< 230	N/A
Sodium	75	95	119	45	66	103	< 400	N/A
Potassium ion	6	8	9	3	5	7	< 50	N/A
Magnesium ion	14	18	20	10	14	17	< 50	N/A
Calcium ion	26	30	33	32	41	68	N/A	N/A
Chloride	111	162	233	63	106	164	< 300	N/A
Sulphate ion	67	93	114	57	103	195	< 250	N/A
Bicarbonate ion	42	49	53	28	57	86	< 750	N/A
Soluble iron ion	<0.05	0.05	0.17	<0.05	0.27	2.72	< 6	N/A
Ammonium ion	0.01	0.02	0.04	0.01	0.03	0.07	< 0.02	N/A
Turbidity	60	178	280	55	189	351	1 - 20	N/A
DO (mg/L)	5.61	7.77	9.52	4.27	8.52	11.50	> 6	N/A

New Dredge Pond	2024/2025 Reporting Period			Historical Results			DC Objectives	EA Predictions
Analyte	Min	Ave	Max	Min	Ave	Max		
DO (%)	57	85	123	44	88	128	80-110	N/A

Water quality of the new dredge pond was generally consistent with that of the old dredge pond, which is as expected due to the regular return of water from the old dredge pond to the new dredge pond to maintain stable water levels. Similarly to the old dredge pond, all the water quality analytes met the objective levels, with the exception of the nutrient species, turbidity, algae, and DO.

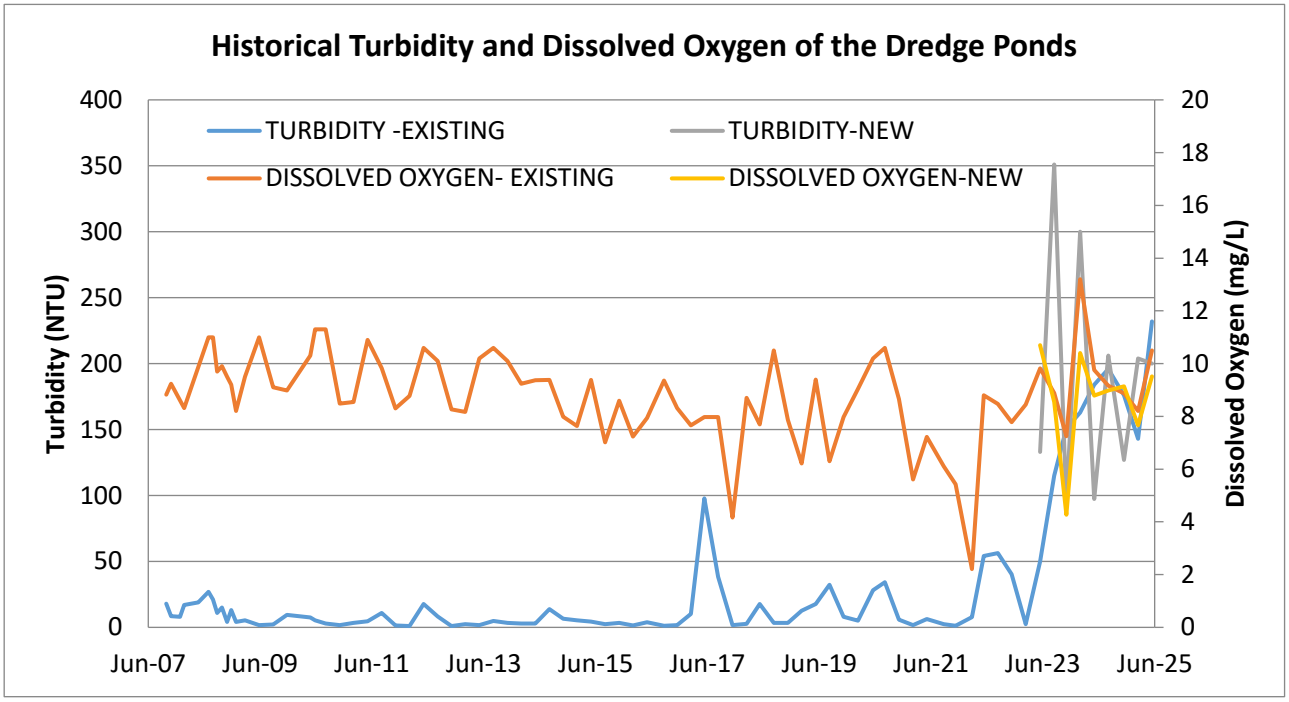
Graphs of the historical trends of each of the analytes for both dredge ponds are included below.

pH and Electrical Conductivity



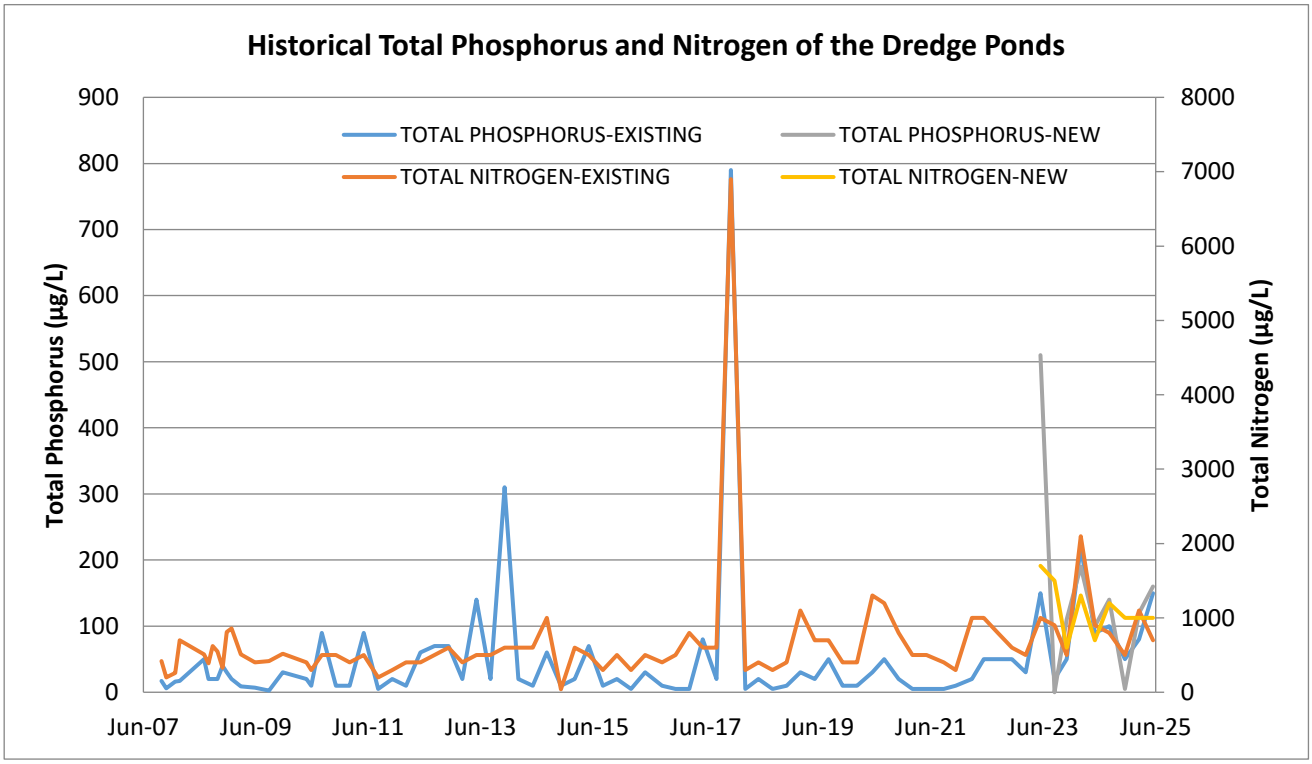
In the current reporting period, the pH of the both dredge ponds have shown some variability consistent with the longer term patterns, however within a narrower range than in recent years, reflecting stabilisation following initial extraction from the new dredge pond. EC has also some variability, largely linked to rainfall patterns, with increases during drier periods and decreases during wetter periods as may be expected. All pH and conductivity measurements were within the surface water quality objectives and the historical ranges for the existing dredge pond during the reporting period.

Turbidity and Dissolved Oxygen



The turbidity of both dredge ponds has stabilised from previous years but remained high due to extraction within the new dredge pond with a higher proportion of fines. The sampling point is close to the outflow of the existing dredge pond, and also the active area of the new dredge pond which has also influenced these measurements. Dissolved Oxygen also continued to record variations in concentrations during the reporting period, albeit in a narrower range than in previous years, and generally consistent with historical patterns in the old dredge pond.

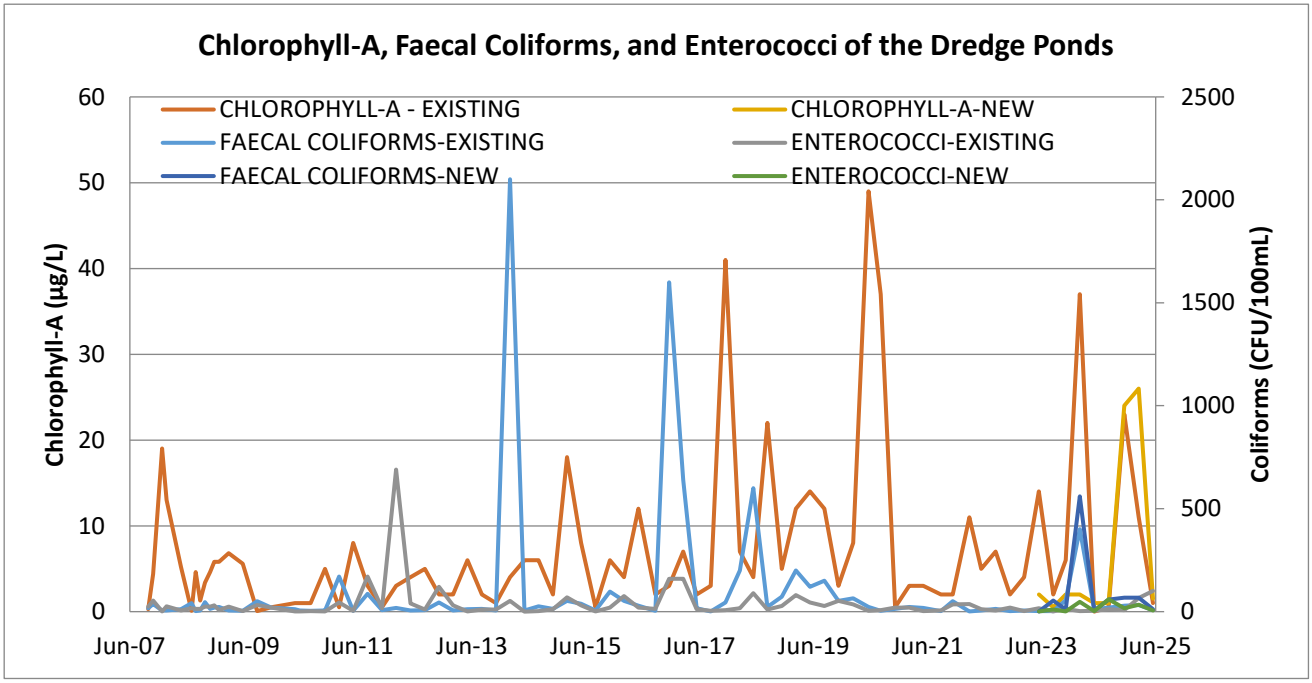
Total Phosphorus and Nitrogen



All nitrogen and phosphorus samples remained within the historical ranges for these analytes in the current reporting period, while concentrations of nitrogen and phosphorus were both above their respective objective

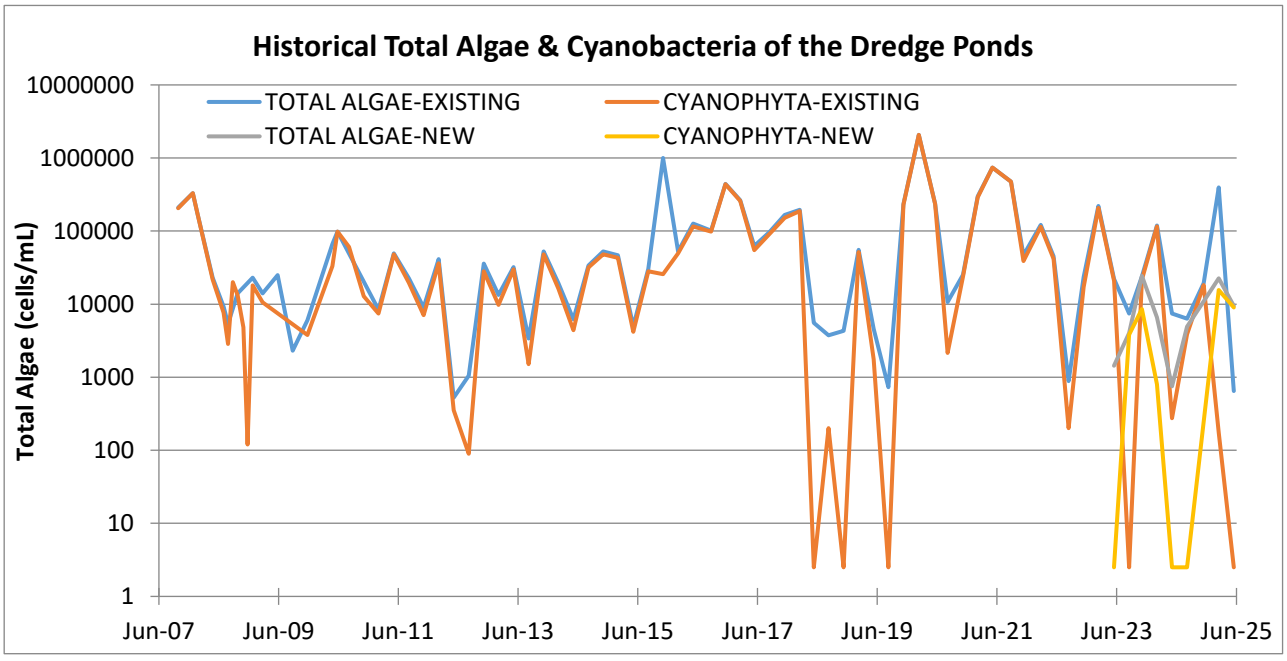
levels at times during the reporting period. Concentrations in the existing dredge pond are slightly above the longer term trends, likely related to the historical use of the current extraction area for nutrient-intensive agricultural activities. This is reflective of the agricultural land use prevalent in the district, and unrelated to dredging operations.

Chlorophyll-A, Faecal Coliforms, and Enterococci



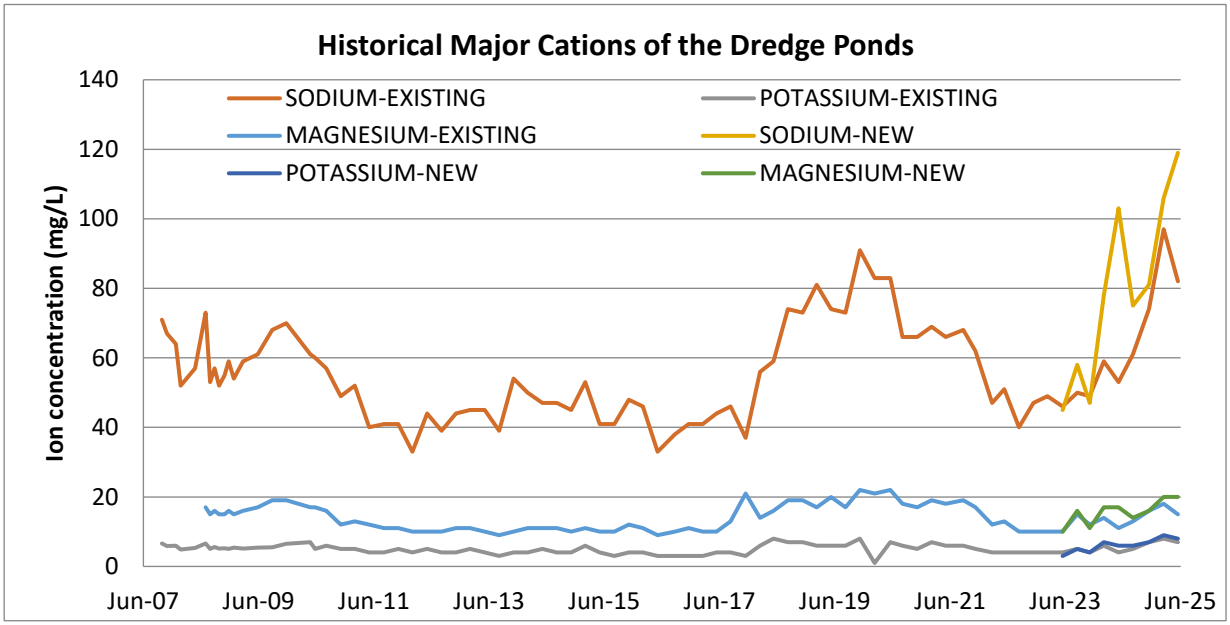
Chlorophyll-A, faecal coliform, and enterococci results for both dredge ponds were within the historical ranges for the respective analytes of the existing dredge pond during the reporting period. Faecal coliforms and enterococci remained within the objective levels, while chlorophyll-A showed some seasonal variation, consistent with previous years, with concentrations higher during the warmer months, and associated with increased inflows to the dredge pond with the higher rainfall during these periods.

Algae and Cyanobacteria



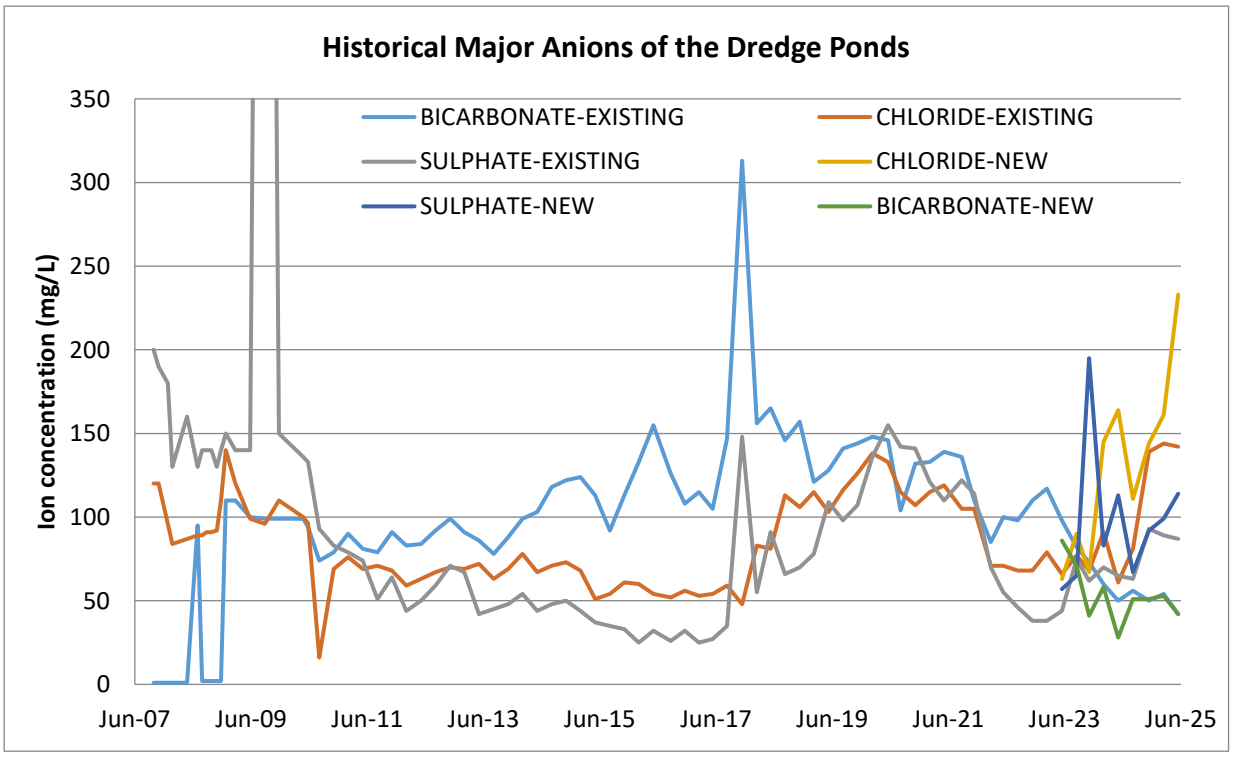
Total algae and cyanobacteria concentrations followed historical patterns, with seasonal fluctuations in concentrations of these microorganisms, although concentrations during the cooler months were lower than in recent years. Concentrations of both analytes were recorded above the objective levels during the year, which is consistent with historical results and does not reflect a decline in the water quality of the dredge ponds. Note a logarithmic scale has been applied to the graph above to improve interpretation.

Major Cations



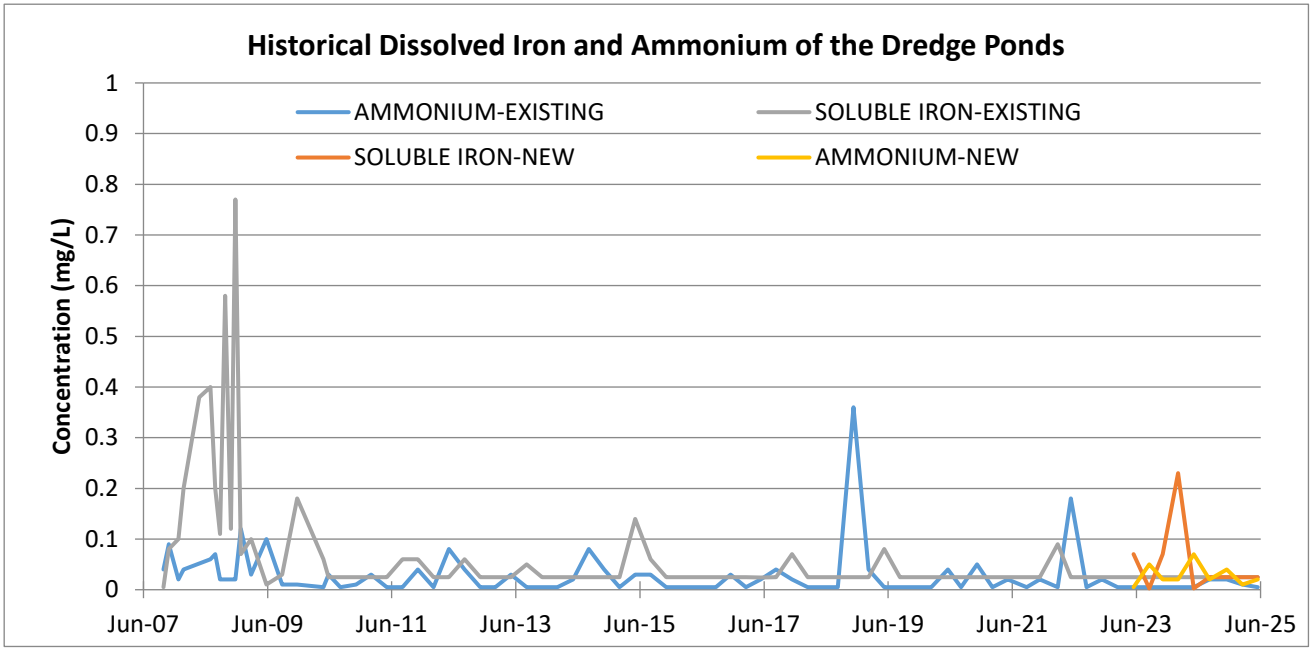
Major cation concentrations have shown an increase in recent years, which is likely related to brackish influence from Blue Angle Creek to the new dredge pond during periods of low rainfall. Nevertheless, concentrations of all analytes remained within objective levels during the reporting period.

Major Anions



Concentrations of chloride, sulphate, and bicarbonate within the dredge ponds have remained well below the objective levels during the current reporting period and are consistent with historical levels for the old dredge pond, with the exception of chloride ions in the new dredge pond. The concentration of chloride ions have mirrored the increase in sodium ions in the reporting period.

Soluble Iron and Ammonium



Soluble iron and ammonium ion concentrations in the existing dredge pond have remained relatively stable and at low levels during the current reporting period, consistent with historical values, and within the objective levels with the exception of a single ammonium result for the new dredge pond in December 2024. Concentrations of both analytes were consistently at or below the standard laboratory limit of reporting during the reporting period.

4.3.4.Surface Water Monitoring Results Interpretation

Surface water quality and water levels within the new dredge pond and the existing dredge pond continue to be driven by rainfall patterns. During the current reporting period this has included considerable variability in water levels in the existing dredge pond, coupled with the stabilisation of certain major ion concentrations, while sodium and chloride concentrations in the new dredge pond showed an increasing trend, likely attributable to a brackish influence from Blue Angle Creek. While the nutrient concentrations remained above the objective levels during the reporting period, there has been no unseasonal change observed in any biological parameters, including algae, bacteria, or chlorophyll-a, all of which have remained relatively unchanged or simply followed their typical seasonal fluctuations.

While parameters were at times outside the water quality objectives for the site, all results were generally within the respective historical ranges for the existing dredge pond. The existing dredge pond continues to represent a surface water body of excellent water quality, with no observable impacts to water quality or levels as a result of dredging with the exception of the expected increase in turbidity.

The current surface water monitoring program is sufficient for monitoring any changes to the water quality of the dredge ponds. Current procedures allow for an accurate representation of any longer term trends in surface water quality and any potential impacts on surface and groundwater quality of the wider area.

There were no non-compliances with conditions of the Development Consent or Environmental Protection Licence 4146 related to surface water in the 2024-2025 reporting period.

4.4. Acid Sulphate Soils Management

4.4.1. Standards and Performance Measures

There are no requirements for acid sulphate soils monitoring in the sites EPL.

The DC for the site requires an Acid Sulphate Management Plan to be prepared. This plan has been prepared and is included in the Water Management Plan (which forms part of the QEMP), and which requires a range of management and monitoring measures including:

- Lime treatment of stockpile base and dredge pond batters
- Lime treatment of excavated material and verification testing
- Direct piping of processing fines into deep sections of dredge pond
- Continuous monitoring of the pH of both dredge ponds and Blue Angle Creek.
- pH monitoring of stockpile leachate.
- Monitoring of groundwater and surface water for various parameters, which may influence, or be influenced by acid sulphate soils.

4.4.2. Environmental Performance

Cleary Bros has implemented the Acid Sulphate Soils Management Plan in the current reporting period to meet the requirements of the DC. Prior to commencing dredging in the modification area, a layer of lime was spread across the stockpile area and subsequently covered with processed sand. In addition, the processing fines outlet was upgraded at this time from the original surface runoff to a piped system that allowed for burial of fines in the dredge pond below the permanent water table. Continuous monitoring stations measuring water level and pH are installed in both dredge ponds and on Blue Angle Creek immediately above the floodgates. The monitoring station in the existing dredge pond includes two pH sensors to allow the measurement of pH near the surface as well as in the deeper water of the pond. These monitoring stations report data in real time to a central server and provide email alerts if pre-determined trigger levels are reached. No excavation or stockpiling of potential acid sulphate soils were undertaken during the reporting period, with all extraction via wet dredging only. The processed sand stockpile continued to be sampled monthly and tested for oxidisable sulphur.

Following the collection of sufficient surface water samples in the previous reporting period to prepare site specific surface water trigger values, an updated Acid Sulphate Soil Management Plan incorporating these site specific trigger values was submitted to the Planning Secretary during the reporting period for approval. This Plan is yet to be approved, and as such this section considers only the interim trigger values from the approved Plan at this time.

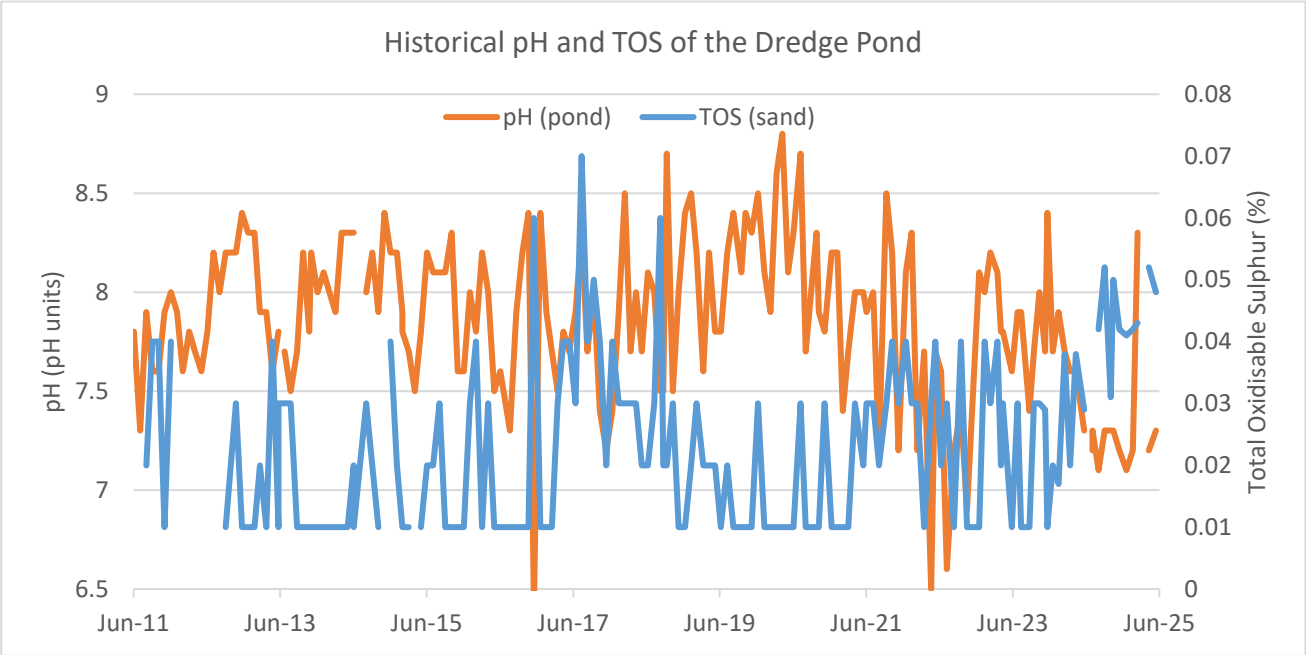
4.4.3. Acid Sulphate Soils Monitoring

Sand Stockpile and monthly water monitoring

Progressive pH testing of water in the existing dredge pond has not yet identified any results outside the desired range of 6.5 – 9 pH units in the current reporting period. During the year, the constituency of the sand has shown minor variability, as dredging continues in the modification area, however all testing of total oxidisable sulphur (TOS) returned low levels with a maximum of 0.05% recorded. Furthermore, real time monitoring of pH in the existing dredge pond adjacent to the washed sand stockpile has shown stability in pH levels. A summary of the results of TOS of the extracted sand and pH of the dredge pond water is shown in the table below, with a graphical representation of historical trends also shown.

Parameter	2024/25 Reporting Period			Historical Results		
	Min	Average	Max	Min	Average	Max
pH (pH units)	6.9	7.3	8.8	6.4	7.9	8.8

Parameter	2024/25 Reporting Period			Historical Results		
	Min	Average	Max	Min	Average	Max
TOS (%)	0.031	0.044	0.052	0.01	0.02	0.07
DC Criteria	N/A					
EA Predictions	N/A					



Continuous Monitoring

During the current reporting period, continuous water monitoring stations were in operation in the existing and new dredge ponds, and in Blue Angle Creek immediately above the floodgates. Each station recorded water level and pH, with the existing dredge pond monitoring station featuring two pH sensors, one near the surface and the 2nd at depth. The site on Blue Angle Creek is immediately downstream of the new dredge pond, and monitors water flowing out from Foys Swamp, as well as tidal influences from the Crooked River estuary in between rain events. These stations have provided a mechanism to ensure the existing environmental controls are effective in minimising the risk of acid sulphate soils associated with dredging and processing activities.

Following learnings in the previous reporting period, triggers for both pH and water level were utilised for the new dredge pond, to ensure the water level was maintained at a level which would have minimal risk of oxidation of soils around the pond.

A review of data from the dredge pond stations show a relatively stable pH concentration, whereas water levels vary due to water transfers and rainfall events. The water level in the existing dredge pond is minimally affected by water transfers, with rainfall having a far greater impact on the level of water in this pond. The water level in the new dredge pond is similarly influenced by water transfers and rainfall due to its much smaller size.

The Blue Angle Creek water monitoring site similarly shows significant fluctuations in water levels associated with significant rainfall events, while during drier periods diurnal fluctuations can be attributable to tidal patterns within the Crooked River estuary. pH levels at this site also show influences from rainfall and tides, with lower pH levels observed following heavy rainfall in Autumn 2025, following the dry Spring and early Summer.

Cleary Bros observed some reliability issues with the pH sensors for all stations, with the small replaceable batteries powering these sensors not achieving their intended lifespan and as these manufacturer supplied batteries are not stocked locally, there were often delays in securing replacements. To overcome this issue, all stations have been upgraded with DC converters which power the sensors directly from the larger (lead-acid)

battery which is recharged with the existing solar panels. Cleary Bros expects the reliability of the pH sensors to improve following this upgrade.

Surface Water Monitoring

Cleary Bros has monitored the pH and EC of the existing dredge pond weekly for over 15 years. In February 2023, the surface water monitoring program was updated to include a broader range of analytes to identify the precursors of, and potential impacts of acid sulphate soils, as well as expanded to include the new dredge pond, two sites on Blue Angle Creek (upstream and downstream of the new dredge pond), as well as the processing plant return water. The below table presents a summary of the data collected from monthly sampling of each site under the acid sulphate soil surface water monitoring program, with the interim trigger level included for reference.

Analyte	Interim trigger level	Existing Dredge Pond			New Dredge Pond			Processing Returns		
		Min	Ave	Max	Min	Ave	Max	Min	Ave	Max
pH (pH units)	<6.5	6.6	7.6	8.1	6.5	7.3	7.9	6.8	7.6	8.3
EC (µS/cm)	N/A	288	589	733	400	744	1010	556	715	940
Turbidity (NTU)	N/A	59	186	288	60	178	280	2.8	951	7,820
DO (mg/L)	<3.0	6.25	8.57	10.50	5.61	7.77	9.52	0.36	7.55	11.00
DO (% saturation)	<50	64	94	115	60	178	280	4	83	103
Alkalinity (mg/L)	N/A	42	50	56	34	48	78	48	84	250
Acidity (mg/L)	N/A	2	3	5	2	4	6	2	11	86
Surplus Alkalinity (mg/L)	<0	39	47	53	28	44	76	46	73	164
Dissolved Al (mg/L)	0.055	<0.01	<0.01	<0.01	<0.01	0.02	0.06	<0.01	0.02	0.07
Dissolved As (mg/L)	0.024	<0.001	0.001	0.002	<0.001	0.002	0.003	<0.001	<0.001	0.002
Dissolved Bo (mg/L)	0.370	0.080	0.152	0.200	<0.05	0.17	0.38	<0.05	0.17	0.38
Dissolved Ba (mg/L)	0.137	0.017	0.076	0.104	0.018	0.068	0.100	0.017	0.062	0.137
Dissolved Be (mg/L)	0.0013	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Dissolved Cd (mg/L)	0.0008	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Dissolved Co (mg/L)	0.0028	<0.001	<0.001	0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Dissolved Cr (mg/L)	0.013	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Dissolved Cu (mg/L)	0.006	<0.001	0.001	0.002	<0.001	0.001	0.002	<0.001	<0.001	0.002
Dissolved Mn (mg/L)	1.900	0.002	0.005	0.010	0.010	0.022	0.041	0.004	0.012	0.034
Dissolved Ni (mg/L)	0.044	<0.001	<0.001	0.001	<0.001	0.001	0.004	<0.001	0.001	0.004
Dissolved Pb (mg/L)	0.020	<0.001	<0.001	<0.001	<0.001	<0.001	0.001	<0.001	<0.001	<0.001
Dissolved Se (mg/L)	0.011	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Dissolved Va (mg/L)	0.012	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Dissolved Zn (mg/L)	0.152	0.003	0.029	0.063	<0.005	0.059	0.091	<0.005	0.022	0.062
Dissolved Fe (mg/L)	0.326^	<0.05	<0.05	<0.05	<0.05	0.05	0.17	<0.05	<0.05	0.080
Dissolved Hg (mg/L)	N/A	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001

^ For existing dredge pond only - triggers to be developed for other sites.

Analyte	Interim trigger level	Blue Angle Creek U/S			Blue Angle Creek D/S		
		Min	Ave	Max	Min	Ave	Max
pH (pH units)	<6.5	6.2	6.9	8.1	6.3	6.9	7.6
EC (µS/cm)	N/A	240	3457	8870	198	6,366	22,300
Turbidity (NTU)	N/A	4	22	59	7	36	225
DO (mg/L)	<3.0	0.77	2.89	4.94	1.13	3.53	5.69
DO (% saturation)	<50	8	30	51	11	37	61
Alkalinity (mg/L)	N/A	18	72	136	30	87	175
Acidity (mg/L)	N/A	6	11	19	6	12	23
Surplus Alkalinity (mg/L)	<0	9	62	124	18	75	157
Dissolved Al (mg/L)	0.055	0.03	0.09	0.20	0.03	0.08	0.16
Dissolved As (mg/L)	0.024	<0.001	0.001	0.001	<0.001	<0.001	<0.001
Dissolved Bo (mg/L)	0.370	<0.05	0.28	0.76	<0.05	0.49	1.33
Dissolved Ba (mg/L)	0.137	0.007	0.063	0.095	0.020	0.060	0.113
Dissolved Be (mg/L)	0.0013	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Dissolved Cd (mg/L)	0.0008	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Dissolved Co (mg/L)	0.0028	<0.001	<0.001	0.002	<0.001	<0.001	0.003
Dissolved Cr (mg/L)	0.013	<0.001	<0.001	0.001	<0.001	<0.001	0.001
Dissolved Cu (mg/L)	0.006	<0.001	<0.001	0.002	<0.001	<0.001	0.001
Dissolved Mn (mg/L)	1.900	0.024	0.176	0.474	0.021	0.144	0.418
Dissolved Ni (mg/L)	0.044	<0.001	<0.001	0.002	<0.001	<0.001	0.002
Dissolved Pb (mg/L)	0.020	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Dissolved Se (mg/L)	0.011	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Dissolved Va (mg/L)	0.012	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Dissolved Zn (mg/L)	0.152	<0.005	0.048	0.087	0.007	0.055	0.090
Dissolved Fe (mg/L)	N/A	0.19	1.71	5.88	0.20	1.29	4.78
Dissolved Hg (mg/L)	N/A	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001

The results show few exceedances of the ASS interim trigger values, which were subject to further review in line with the Water Management Plan. These exceedances included:

- In the new dredge pond, dissolved aluminium and boron were recorded once each above the interim criteria in different sampling periods. Due to the once-off nature of these results, no further action was required.
- The processing returns sample recorded two triggers of aluminium and one for boron, generally consistent with concentrations in the new dredge pond. Additional triggers for dissolved oxygen were observed in two months, however further consideration of this analyte isn't appropriate for the leachate return water as it has been affected by the processing plant and is unlikely to impact DO concentrations of the dredge ponds. Due to the infrequent nature of the triggers, no further action was required.
- Both Blue Angle Creek monitoring sites (upstream and downstream) regularly recorded triggers for dissolved aluminium, boron, and oxygen, as well as two minor triggers each for pH in Autumn 2025. Triggers were generally recorded in both monitoring sites, reflecting the natural background environment. As these triggers reflect background conditions, no further action was required.

- No exceedances of the ASS interim trigger values were recorded for the existing dredge pond.

Groundwater Monitoring

Cleary Bros has monitored the pH, EC, major ions, alkalinity, and dissolved iron of the various groundwater monitoring bores on a quarterly basis for between four and 16 years. In February 2023, the groundwater monitoring program was updated to include additional quarterly testing of dissolved metals and ions, and the total acidity or groundwater monitoring bores. The below table presents a summary of the data collected under the revised acid sulphate soil groundwater monitoring program in the current reporting period.

Analyte	Interim trigger level	MW1		MW1A		MW2B		MW3A		MW04(07)	
		Min	Max	Min	Max	Min	Max	Min	Max	Min	Max
pH (pH units)	N/A	4.6	5.3	dry	dry	6.9	7.8	6.4	7.1	7.0	8.0
EC (µS/cm)	N/A	5570	6890	dry	dry	931	1600	398	682	440	723
Alkalinity (mg/L)	N/A	3	28	dry	dry	261	320	104	210	49	208
Acidity (mg/L)	N/A	18	127	dry	dry	13	32	6	38	3	14
Net Acidity (mg/L)	N/A	-99	-10	dry	dry	248	297	86	204	44	194
Dissolved Al (mg/L)	2.70	<0.01	0.06	dry	dry	0.02	0.04	0.03	0.08	<0.01	<0.01
Dissolved As (mg/L)	0.024	<0.001	<0.001	dry	dry	<0.001	<0.001	0.007	0.021	0.001	0.006
Dissolved Ba (mg/L)	0.137	0.049	0.096	dry	dry	0.035	0.049	0.091	0.107	0.071	0.230
Dissolved Cd (mg/L)	0.002	0.0001	0.0002	dry	dry	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Dissolved Cr (mg/L)	0.03	<0.001	<0.001	dry	dry	0.002	0.003	<0.001	0.002	<0.001	<0.001
Dissolved Co (mg/L)	0.0028	0.012	0.014	dry	dry	<0.001	<0.001	<0.001	<0.001	<0.001	0.001
Dissolved Cu (mg/L)	0.013	<0.001	<0.001	dry	dry	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Dissolved Pb (mg/L)	0.048	<0.001	<0.001	dry	dry	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Dissolved Mn (mg/L)	1.90	0.290	0.366	dry	dry	0.045	0.097	0.084	0.123	0.006	0.104
Dissolved Ni (mg/L)	0.105	0.010	0.012	dry	dry	<0.001	<0.001	<0.001	<0.001	<0.001	0.001
Dissolved Se (mg/L)	0.011	<0.01	<0.01	dry	dry	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Dissolved Va (mg/L)	0.012	<0.01	<0.01	dry	dry	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Dissolved Zn (mg/L)	0.152	0.092	0.300	dry	dry	0.060	0.083	0.044	0.086	0.049	0.166
Dissolved Bo (mg/L)	0.37	0.05	0.32	dry	dry	0.11	0.22	0.06	0.10	0.11	0.20
Dissolved Fe (mg/L)	varies	0.2	17.8	dry	dry	4.0	13.6	2.0	14.4	0.0	0.5
Dissolved Hg (mg/L)	N/A	<0.0001	<0.0001	dry	dry	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001

Analyte	Interim trigger level	NB2		NB3		NB4		MW7	
		Min	Max	Min	Max	Min	Max	Min	Max
pH (pH units)	N/A	5.1	5.6	5.5	6.2	5.7	6.7	4.6	5.6
EC (µS/cm)	N/A	144	195	56	150	7300	9030	7170	8600
Alkalinity (mg/L)	N/A	9	12	18	31	9	52	1	95
Acidity (mg/L)	N/A	16	36	9	26	26	186	148	279
Alkalinity balance (mg/L)	N/A	-24	-6	-4	16	-136	-17	-279	-98
Dissolved Al (mg/L)	2.70	0.94	1.21	0.10	0.24	<0.01	<0.01	0.08	13.00

Analyte	Interim trigger level	NB2		NB3		NB4		MW7	
		Min	Max	Min	Max	Min	Max	Min	Max
Dissolved As (mg/L)	0.024	0.004	0.007	<0.001	0.001	0.001	0.024	0.002	0.007
Dissolved Ba (mg/L)	0.137	0.095	0.146	0.106	0.128	0.070	0.121	0.030	0.039
Dissolved Cd (mg/L)	0.002	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Dissolved Cr (mg/L)	0.03	0.002	0.002	<0.001	<0.001	<0.001	<0.001	<0.001	0.001
Dissolved Co (mg/L)	0.0028	<0.001	<0.001	<0.001	0.001	0.001	0.001	0.017	0.051
Dissolved Cu (mg/L)	0.013	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Dissolved Pb (mg/L)	0.048	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Dissolved Mn (mg/L)	1.90	0.004	0.011	0.101	0.189	0.381	0.551	0.678	0.958
Dissolved Ni (mg/L)	0.105	<0.001	<0.001	<0.001	0.001	0.003	0.007	0.012	0.039
Dissolved Se (mg/L)	0.011	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Dissolved Va (mg/L)	0.012	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Dissolved Zn (mg/L)	0.152	0.058	0.134	0.034	0.080	0.066	0.101	0.174	0.274
Dissolved Bo (mg/L)	0.37	0.05	0.11	0.03	0.06	0.19	0.32	0.57	0.81
Dissolved Fe (mg/L)	varies	1.1	1.6	0.9	2.6	11.5	84.9	43.3	59.1
Dissolved Hg (mg/L)	N/A	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001

The results show a varied groundwater environment, with varied pH, high alkalinity and high acidity bores, considerable variations in salinity and major ion composition, and significant variability in dissolved metals, especially the major metal species including iron, manganese, and aluminium. Furthermore, there is no clear correlation between pH and any dissolved metal species (including aluminium). This reflects the complex groundwater environment, with various competing influences, including the saline inflows from the Berry Siltstone, the low pH and reducing contributions from the clay-rich Foys Swamp in the west, tidal influences from the Crooked River estuaries and fresh water contributions from local rainfall and the dune network.

During the current reporting period, the following triggers of the groundwater criteria were noted:

- MW1 regularly recorded higher concentrations of dissolved cobalt and zinc, consistent with previous years monitoring.
- MW2B regularly recorded higher concentrations of dissolved iron, consistent with previous years monitoring.
- MW3A recorded higher concentrations of dissolved iron, consistent with previous years monitoring.
- MW04(07) recorded higher concentrations of dissolved barium and zinc.
- NB2 occasionally recorded higher concentrations of dissolved barium, consistent with previous years monitoring.
- NB4 regularly recorded higher concentrations of dissolved iron, consistent with previous years monitoring.
- MW07 regularly recorded higher concentrations of dissolved boron, cobalt, and iron, and zinc, and once off higher concentration of aluminium, consistent with previous years monitoring.

These widely varied triggers reflect the varied nature of the groundwater environment across the monitoring network, and the diversity of the background environment of the site.

The Acid Sulphate Soil Management Plan requires the refinement of the dissolved metals trigger values once 8 samples have been collected for each site. This has now been achieved for all sites except MW1A and MW7, and as such site specific trigger values can be determined for the remaining sites.

4.4.4. Acid Sulphate Soils Monitoring Results Interpretation

The acid sulphate soil monitoring program is a comprehensive monitoring program spanning local waterways, dredge ponds, and the surrounding aquifer, and through the use of real time monitoring stations, allows for the early detection of any changes in water chemistry associated with acid sulphate soils in the vicinity of the dredge ponds. Triggers recorded in surface and groundwater monitoring sites during the current reporting period were consistent with triggers recorded throughout the period of monitoring, signalling no deterioration in groundwater quality since the commencement of the expanded acid sulphate soil monitoring program.

The monitoring undertaken to date shows that the interim triggers are not necessarily appropriate, with the background monitoring site on Blue Angle Creek regularly recording measurements above the interim triggers for multiple analytes. Furthermore, monitoring conducted at the primary background monitoring bore (MW7) typically records concentrations of various dissolved metals above the interim triggers. An update of the Acid Sulphate Soil Management Plan can now be undertaken to derive site-specific trigger values for each all surface water monitoring sites and 7 of the 9 groundwater monitoring sites.

There were no non-compliances with conditions of the Development Consent or Environmental Protection Licence 4146 related to acid sulphate soils in the 2024-2025 reporting period.

4.5. Water Use

4.5.1. Standards and Performance Measures

Cleary Bros holds a Water Access Licence which permits the “take” of water from the environment for site operations. WAL43272 includes a share component of 56 units of the Metropolitan Coastal Sands Groundwater Source of the Greater Metropolitan Region Groundwater Sources Water Sharing Plan. Cleary Bros also holds WAL43271, which comprises an additional 50 units of the Metropolitan Coastal Sands Groundwater Source in the event water take exceeds the permitted take under WAL43272. The Gerroa Sand Resource is required to adjust site operations where appropriate to ensure it has sufficient shares to meet its take of water. For the 2024-2025 reporting year, the 106 units allowed the Gerroa Sand Resource to take up to 106 ML from the coastal sands aquifer.

4.5.2. Environmental Performance

The two dredge ponds provide the means for the take of groundwater from the coastal sands aquifer and are listed as works in WAL43272.

Inflows to the dredge ponds include the following:

- Rainfall landing on the dredge pond surface.
- Runoff from the sand slurry back into the dredge pond.
- Water pumped in to the dredge pond as part of transfers between ponds.

Outflows from the dredge ponds include the following:

- Evaporation from the pond surface.
- Water pumped out for dust suppression, watering plants, or to transfer water between ponds.
- Water pumped out of the pond as part of the sand slurry.
- Water entrained in sand exported from the site.

In addition, the sand removed from the dredge pond that was below the water table creates a void which is rapidly infilled with water.

Where water inflows to the aquifer exceed the outflows from the aquifer, which is predicted to be the case in an average rainfall year, groundwater will flow from the dredge ponds into the surrounding aquifer, such that there will be no take of water from the aquifer. Where water outflows in any dredge pond exceed the inflows, which is predicted to be the case in a dry year, water from the aquifer will flow into one or both dredge ponds to balance the local groundwater table, leading to a take of water.

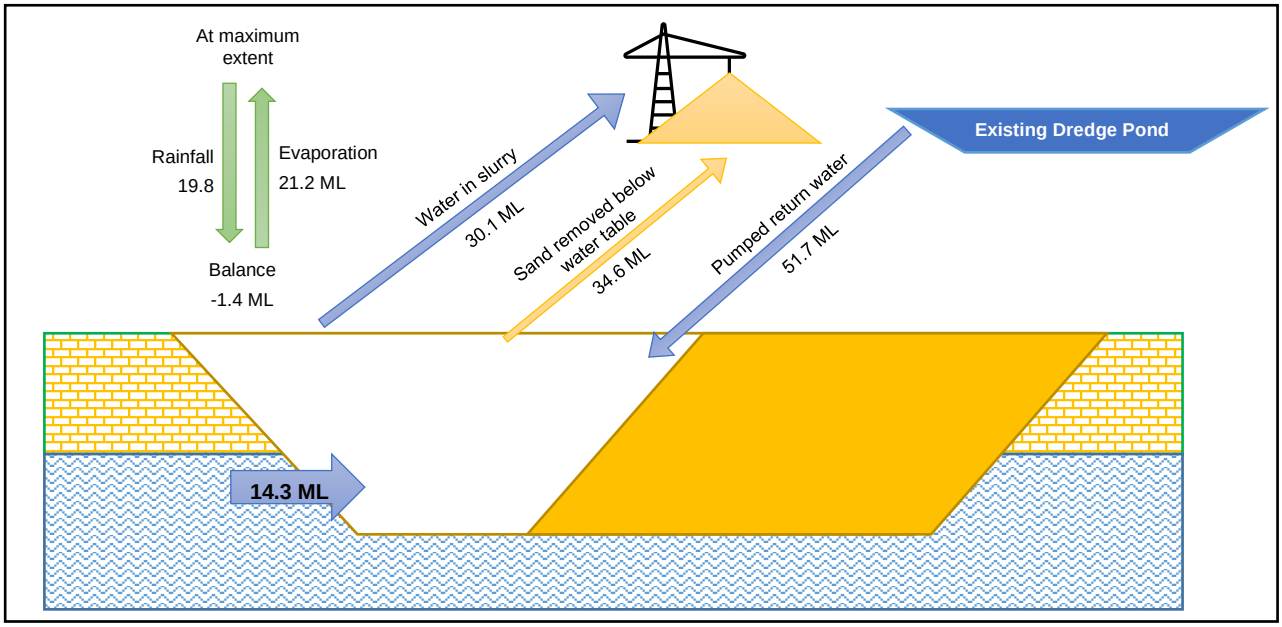
Cleary Bros monitor or record all inflows and outflows of water as follows:

- Rainfall and evaporation (Morton evaporation over shallow lakes) sourced from SILO point data (-34.78 150.78) for the reporting period. SILO rainfall data is selected over rainfall data from the site weather station to ensure consistency when compared to the evaporation data.
- Volume of sand pumped based on cumulative density of sand slurry recorded daily.
- Water in exported sand based on site sales data and measured moisture of sand recorded monthly.
- Engine hours and discharge rates record all pumped water (dust suppression as well as internal transfers).
- Local water table estimated monthly from site observations and groundwater monitoring.
- Changes in dredge pond surface area estimated monthly with regular checks from mapping data.

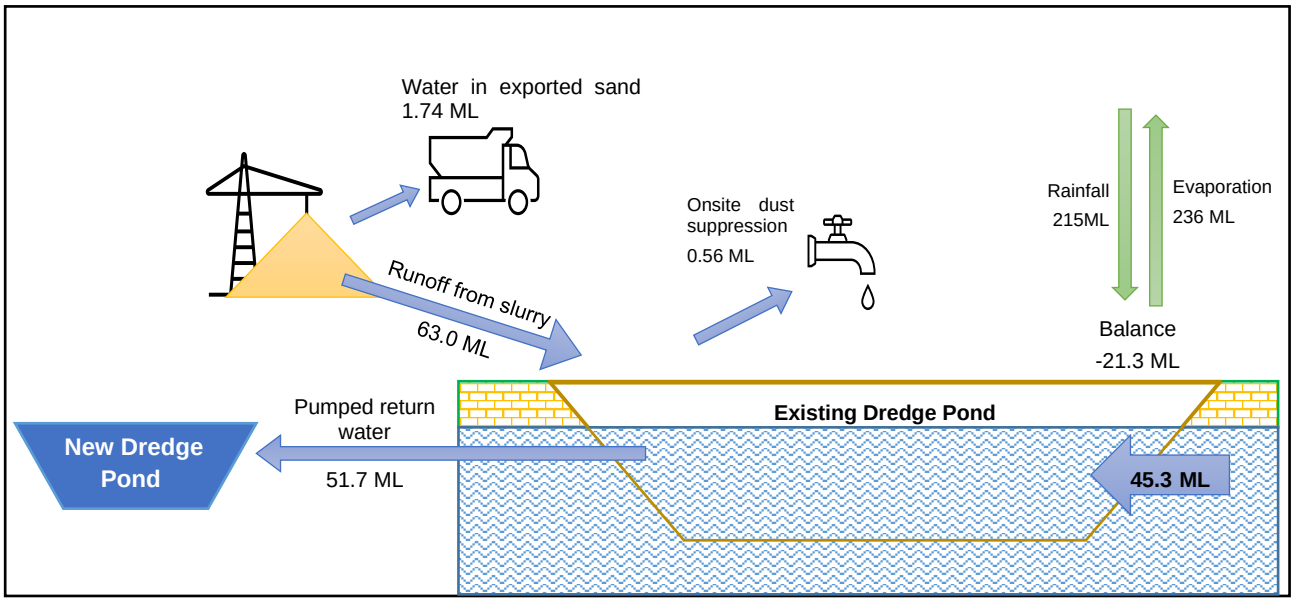
4.5.3.Water Take and Compliance Assessment

The following schematics show the water transfers during the 2024-2025 reporting period.

New Dredge Pond



Old Dredge Pond



During the 2024-2025 reporting period the combined take of water from the coastal sands aquifer was 59.6ML, comprising of a take of 14.3ML associated with the new dredge pond, and 45.3ML from the old dredge pond. Cleary Bros take of water during the reporting period is within the 106 ML permitted under the water licences.

4.6. Air Quality

4.6.1. Standards and Performance Measures

There are no specific requirements for air quality in the sites EPL.

The air quality monitoring requirements from the Development Consent are realised by the QEMP. Section 8.4 of the QEMP details the air quality testing requirements and specifies that 3 dust gauges are to be tested on site. The contribution from site operations to annual average dust deposition must not cause additional exceedances of the following criteria at any residence on privately owned land or on more than 25% of any privately owned land:

- 2g/m^2/month, maximum increase in deposited dust level; and
- 4g/m^2/month, maximum annual average deposited dust level.

4.6.2. Environmental Performance

CB has implemented the Air Quality Monitoring Program to meet the requirements of the DC. ALS Laboratory Group were engaged during the reporting period to service the three depositional dust gauges on a monthly basis, in line with *AS/NZS 3580.10.1-2003: Methods for Sampling and Analysis of Ambient Air – Determination of Particulates – Deposited Matter – Gravimetric Method*. In addition, Cleary Bros has sealed the first 200 metres of the site entrance and utilised a water truck when required on the unsealed sections to minimise the generation of dust from unsealed roads.

4.6.3. Air Quality Monitoring

The following table provides Total Insoluble Solids concentrations (in g/m^2/month) recorded in the three dust depositional gauges at the Gerroa Sand Resource.

Dust Gauge	2024/25 Reporting Period			Historical Results		
Units: g/m^2/month	Min	Average	Max	Min	Average	Max
1A	0.6	1.2	2.9	0.1	2.1	20.1

Dust Gauge Units: g/m²/month	2024/25 Reporting Period			Historical Results		
	Min	Average	Max	Min	Average	Max
2A	0.1	1.5	7.6	0.1	1.9	49.7
4A	0.1	0.3	0.9	0.1	0.4	1.5
DC Criteria / EA Predictions		< 4			< 4	

4.6.4. Air Quality Monitoring Results Interpretation

The results indicate that the activities associated with the Gerroa Sand Resource are having very little impact on local dust deposition, with levels consistent with the historical performance and well below the total annual average deposition criteria. Dredging operations at the site commenced in the 1960's, well before depositional dust monitoring commenced, and as such the incremental impact of the project cannot be accurately determined. Therefore, monitoring will continue to focus on measuring compliance with the total annual average deposition criteria.

The depositional dust monitoring results demonstrate that the measures to control dust generation associated with the Gerroa Sand Resource are effective in minimising any dust impacts from activities on site, and in maintaining a high standard of air quality in the local area. The air quality monitoring program currently in place is sufficient to monitor any potential impacts on air quality to surrounding receivers.

There were no non-compliances with conditions of the Development Consent or Environmental Protection Licence 4146 related to air quality in the 2024-2025 reporting period.

4.7. Noise Monitoring

4.7.1. Standards and Performance Measures

There are no specific requirements for noise monitoring in the sites EPL.

The noise monitoring requirements from the Development Consent are realised by the QEMP. Section 8.3 of the QEMP details the noise testing requirements and specifies that noise testing is required annually in winter. Operator attended measurements are to be taken to quantify the maximum (LA_{max}) and the average ($LA_{eq\ 15min}$) intrusive noise from site activities over a 15 minute measuring period. Measurements are to be taken during the daytime while the site is in normal operation.

4.7.2. Environmental Performance

CB has constructed the visual and acoustic bund along the northern, eastern, and southern boundaries of the dredging operation. A preventative maintenance program is in place to ensure all equipment employed at the site is maintained in accordance with manufacturers' specifications, with no changes to equipment in operation at the site during the current reporting period. Dredging operations were restricted to the approved hours during the current reporting period.

4.7.3. Noise Monitoring

The annual winter noise monitoring was undertaken in June 2025 with normal dredging activities, topsoil stripping, and transport of sand in operation throughout the period of noise monitoring.

Noise from on-site quarry related activities was inaudible at each of the monitoring sites during the period of monitoring. The dominant noise source at most sites was attributable to wind blowing in adjacent trees and non-quarry road noise at sites R1, R2, and R3, which are close to the road. Other minor noise contributions included bird noise and aircraft noise. Trucks carrying sand from the quarry on public roads were audible at two of the locations (R1 and R3), however these were of very short duration, did not impact the LA_{max} (ie. Were not the loudest source of noise recorded during any period), and did not significantly impact the overall noise level ($LA_{eq\ 15min}$ contributions were less than the background (LA_{90}) levels in each instance). With the exception of trucks on the public road and at the entrance to the quarry, the Gerroa Sand Quarry was inaudible at all receivers for

the duration of monitoring. A summary of noise levels recorded at each site and the compliance status of the Gerroa Sand Quarry is included in the table below.

ID	Location	Measured Noise Levels				Criteria	Compliant
		Background L_{A90}	Average L_{Aeq}	Maximum L_{Amax}	Quarry contribution	$dBA_{eq\text{-}15\ min}$	Yes/No
R1	670 Beach Road	44.8	58.5	77.1	Inaudible#	41	Yes
R2	11 Banggarai St	39.9	49.3	68.3	Inaudible	40	Yes
R3	Caravan Park	46.4	52.7	70.8	Inaudible#	36	Yes
R4	Athelstane*	41.8	51.8	68.0	Inaudible	40	Yes
R5	Picnic Area 1	45.9	47.8	55.6	Inaudible	40	Yes
R6	Picnic Area 2	48.5	52.0	62.1	Inaudible	40	Yes

* monitored at Coralea, which is a project-related residence adjacent to Athelstane and closer to the site.
# Quarry trucks on public roads were audible, however these 15-min contributions were less than the background noise level in each instance.

4.7.4.Noise Findings

Current strategies described above to minimise noise impacts on surrounding receivers have been effective during the current reporting year, which is supported by the noise monitoring program and continued absence of any noise related complaints related to the site.

There were no non-compliances with conditions of the Development Consent or Environmental Protection Licence 4146 related to noise in the 2024-2025 reporting period.

4.8. Rehabilitation & Vegetation Management

4.8.1.Standards and Performance Measures

There are no specific requirements for rehabilitation or vegetation management in the sites EPL.

The DC and QEMP set out long and short term requirements and objectives regarding rehabilitation and vegetation management. These objectives are included in the Landscape and Rehabilitation Management Plan, which was most recently updated in December 2022, and includes priorities to be implemented over the following five years. For the purposes of this Annual Review, only those works identified for implementation during the current five year period will be reviewed. The current management priorities include weed control, maintenance of existing fencing, and pest animal control in all areas. Additional specific activities are required in some zones, including the replacement of any dead plants in Zones 2 and 3, some further infill planting in Zone 2 (2A2, 2A3, 2B2, 2C1) and Zone 5C1, and the stabilisation and re-creation of habitat along completed sections of the dredge pond foreshore. Furthermore, works required in the Modification 1 area include the planting of a tree screen along the northwestern boundary of the proposed new dredge pond. The QEMP requires that Cleary Bros inspect the planting and conservation works quarterly and that a qualified ecologist monitors the entire area annually. Quarterly inspections of the plantings and the conservation works are carried out by site personnel. An ecologist from Niche Environment and Heritage carried out the annual survey in May 2025 with the subsequent report attached as Annexure D.

4.8.2.Summary of Quarterly Inspections and Key Works

Quarterly inspections were carried out in September 2024, December 2024, March 2025 and June 2025.

Primary planting has been completed for all areas of revegetation. Approximately 600 *Casuarina glauca* plants consisting of 580 tubestock and 20 mature stock (200mm pots) were planted in the tree screen during Spring 2024 to replace lost plants. Plants were observed to be subject to heavy grazing, with a trail camera installed noting native macropods to be the dominant cause. Following this observation, biodegradable tree guards were installed around each plant in March 2025 to reduce these grazing pressures (see below figure). Since this time, plants have shown rapid growth within the tree guard, although continue to be grazed above the guard. It is expected that the tree guards will continue to provide the support needed to outcompete these grazing pressures in time, as has been observed in other sites where a similar strategy was successfully employed.

No clearing of any trees or shrubs were undertaken during the current reporting period.

The batters of the existing dredge pond foreshore are stable on both the east and west sides with minimal erosion evident. The sections of the batter that were planted in earlier years have established very well with significant growth and cover now evident.

Weed control during the current reporting period has focused on the establishing tree screen in the modification area, as well as zones 1.2 and 2A1. Annual weeds were largely targeted in the tree screen area, while lantana was the principle focus in the conservation area. Cleary Bros engaged professional bush regeneration contractors to undertake approximately 330 hours of weed control works during the reporting period.

4.8.3.Success of the Northern Corridor

The flora and fauna surveys over the first six years of this project, that is since the habitat establishment began in the Northern Corridor, found that the indigenous biota that inhabits and that traverses the corridor is equal to or greater than that recorded in the East-West Link. The successful establishment of the Northern Corridor has been described extensively in previous reports.

4.8.4.Findings and Recommendations from Annual Inspection

Niche Environment and Heritage were engaged to undertake the Annual Inspection of the Conservation Areas in May 2025. Niche made the following observations as part of the report associated with the annual inspection, which is included as Annexure D.

Most of the plantings were completed at each zone early in the monitoring program and are now in the maintenance phase. The most recent plantings have occurred in Zone 2B.1, 2D, 2C.2 and Zone 2C.1 to expand the vegetation buffer along Blue Angle Creek, creating suitable habitat for local fauna. These zones are now similarly in the maintenance phase and will require further plantings to replace any lost in the past 3 years.

Weed maintenance has been carried out at each of the planting areas since the early stages of the project and are now considered to be under control. An updated description and condition of each of the zones and the planting areas has been provided.

Over the previous year, all zones were inspected by Cleary Bros staff and assessed during quarterly inspections. Due to the weather and the subsequent inundation over the previous months, access to some zones near Blue Angle Creek, including zones 5, 5C.1, 2C.2, 2D, 2E and 1.4, was difficult. Maintenance work and inspections in these zones was unable to be completed at the required timing interval and were therefore only conducted when access was safe and achievable. This year, the scheduled weed assessment was postponed multiple times due to poor weather conditions. Favourably, this allowed access to most subzones; only 5 and 5C were not accessible.

The recommendations for the rehabilitation zones detailed in Table 1 were made following the site inspection. A priority weeds list for the Site was also created and provides further detail on control methods.

The 17th annual monitoring report for the Gerroa Sand Quarry continues to show progress in revegetation and weed management across the Site. The inner sections of the subzones are less affected by disturbance, has a better representation of the native vegetation and has less areas that contain weeds. The consistent effort by Cleary Bros staff to document changes, has allowed for targeted management of invasive species such as Blackberry Bush (Rubus fruticosus spp. aggregate) and Lantana (Lantana camara). The management and revegetation completed throughout most subzones has increased the condition of these zones to good, and with regular monitoring, the Site will continue to improve.

The past few months have experienced wet weather and as a result, some subzones were difficult to access, while others were observed to have multiple areas of weed infestations. The previous year's report noted that zone 1.4 and subzone 2E could not be accessed due to the wet conditions, and while despite being wet, subzone 2C.2 was accessed and noted to be very overgrown and weedy. This year, although all these zones exhibited wet conditions, they were able to be accessed. Observations of these areas noted that they were predominantly in good conditions, with tall stands of Swamp Oak (Casuarina glauca). Few weeds such as Moth Vine (Araujia sericifera) found in 2C.2 and 2E, and one Blackberry Bush (Rubus fruticosus spp. aggregate) was found in subzone 1.4. Management of these zones should be undertaken to ensure their continued health. Subzones 5 and 5C.1 were too wet to access this year, which is in accordance with last year's report. Though subzone 5C.1 could be seen from across the creek, a thorough examination of its' health could not be completed.

To build on the success of native revegetation, particularly in areas that exhibit high condition, control of priority weeds such as Lantana (Lantana camara) (found in most zones) and Wild Tobacco Bush (Solanum mauritianum) (found in 2A.2, 2B.2 2D, 4 & 7) should be intensified. Weed removal should be undertaken using cut and paint methods for these woody weeds since it offers a higher kill rate and avoids indirect poisoning of adjacent native species.

Given the widespread presence of Lantana (Lantana camara) across the Site, a mosaic pattern removal strategy, targeting areas of up to 1000 m2 at a time, will allow for fauna to disperse through adjacent habitat whilst promoting native revegetation.

Last year's report signified that there was no deer grazing and rubbing present. This year, deer or kangaroo grazing was observed in the southern end of subzone 2C.1 where some plantings have been grazed. Therefore, on-site deer/kangaroo control methods may need to be implemented. In addition, revegetation maintenance, such as mowing and weeding, in less mature and established areas (subzone 2C.1 & 2C.2) is required to ensure successful revegetation.

Ongoing weed management across the Site, in conjunction with consistent monitoring will ensure that each zone continues to improve in condition. As younger areas develop and acquire the management they need, they

will improve the ecosystem functionality. Whilst mature native species continue to reproduce and limit weed species, the Site's vegetation will continue to improve in becoming a self-sustaining community in the future.

4.8.5. Priorities for the following reporting period

The following are the priority activities for the 2025-2026 reporting period, subject to suitable weather and ground conditions:

- Control of isolated blackberry individual to prevent establishment.
- Control of annual weeds in screen planting zone and along bunds and tracks of the site.
- Lantana control, targeting the eastern side of the existing dredge pond, including the northern corridor to particularly prevent lantana establishing in Zone 2A.1.
- Continued removal of tree guards around plants no longer requiring protection, particularly Zone 2C.1.
- Control of Tobacco Bush, Moth Vine, Arundo Grass, and other invasive non-natives encountered during targeted control of lantana.

4.9. Traffic Management

4.9.1. Licence Requirements

The DC requires Cleary Bros to ensure that no truck associated with the project uses Gerroa Road, except where the destination lies along or adjacent to that road.

4.9.2. Compliance Assessment

Cleary Bros Site Induction and Work Instructions for the site indicates which roads are to be used when entering and exiting the site and further prohibits incidental use of Gerroa road. Staff are trained in these Work Instructions regularly.

4.10. Community

4.10.1. Licence Requirement

Licence condition M4 of the site's EPL provides that Cleary Bros must keep records of all complaints received for the site including any action taken regarding the complaint.

The Development Consent has no direct requirements for complaint handling however, the QEMP dedicates chapter 7 to Complaints Management, which describes the process for recording and responding to community complaints. Furthermore, Cleary Bros held two Community Consultative Committee meetings during the reporting period in August 2024 and February 2025, with the February 2025 meeting including a site visit. Minutes of these meetings are available on Cleary Bros website.

4.10.2. Tabulated Results

No complaints were received in relation to the Gerroa Sand Resource in 2024/2025, which is in line with number of complaints received in previous years.

Year	Environmental Complaints
2005/2006	0
2006/2007	0
2007/2008	0
2008/2009	0

Year	Environmental Complaints
2016/2017	0
2017/2018	0
2018/2019	0
2019/2020	0

Year	Environmental Complaints
2009/2010	0*
2010/2011	0
2012/2013	0
2013/2014	0
2014/2015	0
2015/2016	0

Year	Environmental Complaints
2020/2021	0
2021/2022	0
2022/2023	0
2023/2024	0
2024/2025	0

*One complaint was reported to Cleary Bros from DoP as a letter dated 2 December 2009 relating to the extent of clearing. This was investigated and found not to be factual (refer Cleary Bros letter to DoP dated 15 December 2009).

4.10.3. Environmental Complaints Results Interpretation

The absence of any environmental complaints since 2005 reinforces the low environmental and amenity impact of the Gerroa Sand Resource and demonstrates that the site is functioning in harmony with the community.

4.11. General Environmental Management & Reporting

4.11.1. Licence Requirements

The EPL has various conditions regarding general environmental performance including reporting requirements for complaints, environmental harm and lodgement of an annual return.

The DC includes various environmental management and reporting procedural requirements that are implemented in the sites QEMP. The conditions that required attention beyond implementation of the QEMP are assessed below.

4.11.2. Performance Criteria and Compliance Assessment

Cleary Bros employs an authorised Environmental Officer to manage all compliance activities at the site, in association with the Quarry Manager.

4.11.3. Review of Environmental Management Plans

Noise Management Plan

The Noise Management Plan was most recently revised and approved by DPHI on the 5 December 2022. This Noise Management Plan remains current and relevant to the site, and will continue to guide management practices on the site.

Air Quality Management Plan

The Air Quality Management Plan was most recently revised and approved by DPHI on the 5 December 2022. This Air Quality Management Plan remains current and relevant to the site, and will continue to guide management practices on the site.

Water Management Plan

The approved Water Management Plan (Ver 2, Rev 3), incorporating the Acid Sulphate Soils Management Plan (ASSMP), was most recently revised in February 2023 and approved by DPHI on the 10 March 2023. Since this time additional monitoring data has been recorded for the site which now allows for the derivation of groundwater quality criteria for some monitoring bores to support the ASSMP. The Water Management Plan was revised in September 2024 to incorporate the site specific trigger values for surface water and submitted to the Planning

Secretary for approval. The Planning Secretary requested additional detail in their response in July 2025, which will be addressed and resubmitted for approval. Furthermore, additional groundwater site specific trigger levels can now be included in the revision of the Water Management Plan and ASSMP.

Landscape and Rehabilitation Management Plan

The Landscape and Rehabilitation Management Plan was most recently revised and approved by DPHI on the 7 December 2022. This Landscape and Rehabilitation Management Plan remains current and relevant to the site, and will continue to guide management practices on the site.

Cultural Heritage Management Plans

The Cultural Heritage Management Plan for the original extraction area was approved by the Department of Planning on the 5 February 2009. This management plan remains current and appropriate for the management of cultural heritage in the vicinity of the existing extraction area.

The Aboriginal Cultural Heritage Management Plan for the Modification 1 area was most recently approved by DPHI on the 25 November 2024. This management plan remains current and appropriate for the management of cultural heritage across the modification area.

Quarry Environmental Management Plan

The Quarry Environmental Management Plan (QEMP) was most recently revised and approved by DPHI on the 29 June 2023. This QEMP remains current and relevant to the site, however updates to Water Management Plan as described above may lead to the need for a revision of the QEMP. In this event, the QEMP will be revised and submitted to the Planning Secretary for approval. Until such time however, the QEMP remains appropriate for guiding management practices on the site.

4.12. Independent Environmental Audit

4.12.1. Licence Requirements

The DC requires Cleary Bros to commission and carry out an Independent Environmental Audit within 12 months of the commencement of the Project and every three years thereafter.

4.12.2. Compliance Assessment

Cleary Bros commissioned ERM to carry out the most recent Independent Environmental Audit in November 2022. No “high” or “medium” non-compliances with the Site’s Environmental Protection Licence or Development Consent were identified in the audit. A copy of the audit was sent to the EPA, Kiama Council, Shoalhaven Council and the CCC members. A copy of the audit was also posted on Cleary Bros website.

The below table summarises the progress of the corrective actions undertaken to address the non-conformances identified in the 2022 Independent Environmental Audit. The next audit is scheduled for late 2025.

Condition Number	Auditor Comment	Auditor Recommendation	Progress of Corrective Actions
Sch 2 Cond 1	There is an opportunity to improve housekeeping by cleaning up the areas affected by minor oil spill from dripping outlet. - Incidental diesel spill around the booster pump near the dredge pond, visible floating on a puddle. Spill volume appeared <1L. No sheen was visible on the nearby dredge pond.	Auditor recommended that a tool box talk for on-site staff is undertaken which discusses spill and hydrocarbon impacted water management. Workers are to be reminded that bund water may be impacted with fuels and should not be discharged is any sheen or odours are visible.	Completed All workers on site attended a toolbox on spill response and water management. Residual hydrocarbons were removed and disposed of at

Condition Number	Auditor Comment	Auditor Recommendation	Progress of Corrective Actions
	- Soil beneath the bund water drainage tap near the sand cleaning plant and stockpile had a faint hydrocarbon odour. Both spills appeared minor in nature and no evidence of environmental harm was observed.	Workers should be reminded that even minor spills of fuels should be cleaned up immediately and impacted soils should be disposed of by a suitably licenced waste contractor.	licenced waste facility.
Sch 3 Cond 16 Sch 3 Cond 16A	CB submitted a draft planning agreement on 1 December 2008, which was agreed by the Department in principle. A final agreement was never executed with the department, despite CB raising the issue in 2009 and 2013. Since Modification 1 of the Planning Agreement (10/06/2022), the Site has resubmitted a draft Planning Agreement. CB management advised that the Department has provided feedback in October 2022. The Site will now move forward with incorporating feedback provided, mostly in relation to bond recalculation. CB are working with their legal counsel to provide a response to the Department. The Site is engaged with ongoing discussions with the Department and therefore no agreement has been formally entered into. Therefore this requirement has not been formally met.	Nil	In progress – following advice from DPHI on the preferred pathway to prepare a PA, CB has lodged an application for a Voluntary Planning Agreement via the Planning Portal. Currently waiting on DPHI to progress

5. Conclusion

The Annual Review continued to note the departure of the surface and ground water quality of the site from the objective levels listed in the development consent. However monitoring undertaken in the current reporting period demonstrates that the water quality is generally consistent with historical levels, with no deterioration in groundwater or surface water quality related to dredging operations with the exception of localised increases to turbidity, and a minor increase in two major ion concentrations in the new dredge pond.

Site conditions during the current reporting period were characterised by a drier first half of the year followed by a wet Autumn, with annual rainfall slightly under the long term average. Water levels and quality across the site were heavily dictated by these climate patterns. Water take from the coastal sands aquifer during the reporting period was within the allocations permitted by the Water Access Licences held for this Water Source.

Dust deposition levels have remained at relatively low levels, despite the variable rainfall patterns observed throughout the reporting period. Plantings during the year have been limited to the replacement of seedlings lost to grazing in the screen planting area, with tree guards now in place to prevent further losses. Following several consecutive years of above or near-average rainfall, weeds have been difficult to control in some areas of the site, despite hundreds of hours of control works throughout the reporting period. Cleary Bros will continue to focus on lantana control in the next reporting period, particularly in those areas without significant weed establishment.

Overall the site is performing well within the individual criteria and limits assigned to it in regard to environmental performance. No non-compliances with the development consent or Environmental Protection Licence in the current reporting period. There have been no community complaints in the reporting period, with the site continuing to have no unexpected impacts on the local environment.

Annexure A – Extractive Materials Returns

2023-2024

Request Number	Mineral Description	Mineral Category	Quarry	Period ▲	Employee Count	LGA	Tonnes	Cnr Golden Dr Location	ABS Division
Search	Search	Search	cleary	=fy24	Search	Search	Search	Search	Search
ROY0008568	Washed Sand	Construction Sand	Cleary Bros - Gerroa Sand Mine	FY24	6	Kiama	79,591	Crooked River Rd, 3 kms SW of, GERROA NS	Illawarra Shoalhaven

2024-2025

S1 Return for Extractive Materials

Submit this form for Extractive Minerals Returns

If completion of the return is unavoidably delayed, an application for extension of time should be requested **before** the due date. If no work was done during the year, a **NIL** return must be forwarded. The return should relate to the below quarrying establishment and should cover the operations of quarrying and treatment (such as crushing, screening, washing etc.) carried out at or near the quarry. A return is required even if the operations are solely of a developmental nature and whether the area being worked is held under a mining title or otherwise.

* Indicates required

Return Period: FY25

Name: Mark Hammond

* Quarry: Gerroa Sand Mine

Email: [redacted]

Quarry Address: Crooked River Rd, 3 kms SW of, GERROA NSW 2534

Address:

Local Government Area: Kiama

Updated Local Government Area:

Deposited Plan: DP185785, DP1111012

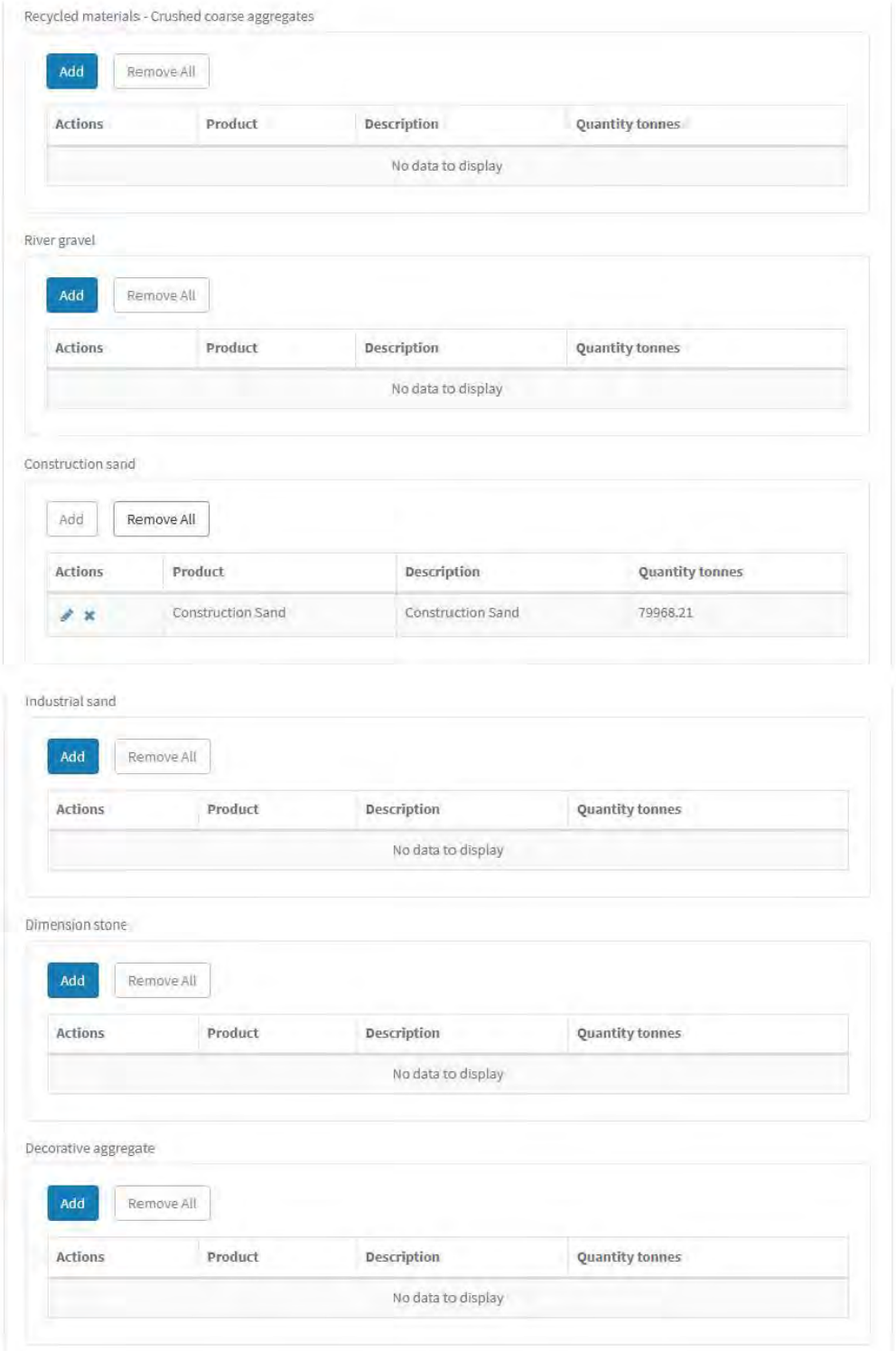
Lot Number/s: Lot A, Lot 2

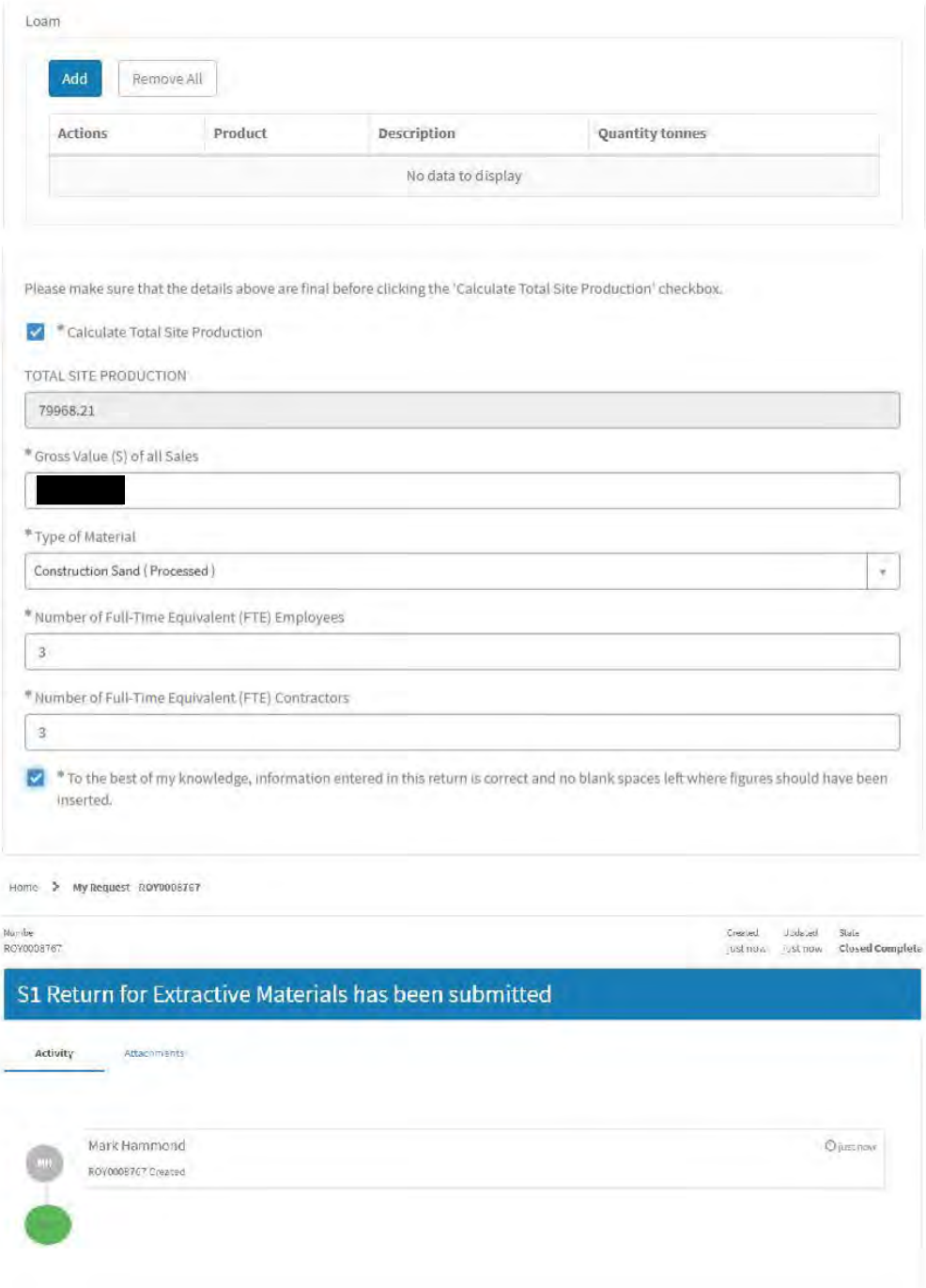
Production information may be published in aggregated form for statistical reporting. However, production data for individual operations is kept strictly confidential.

Virgin materials - Crushed coarse aggregates

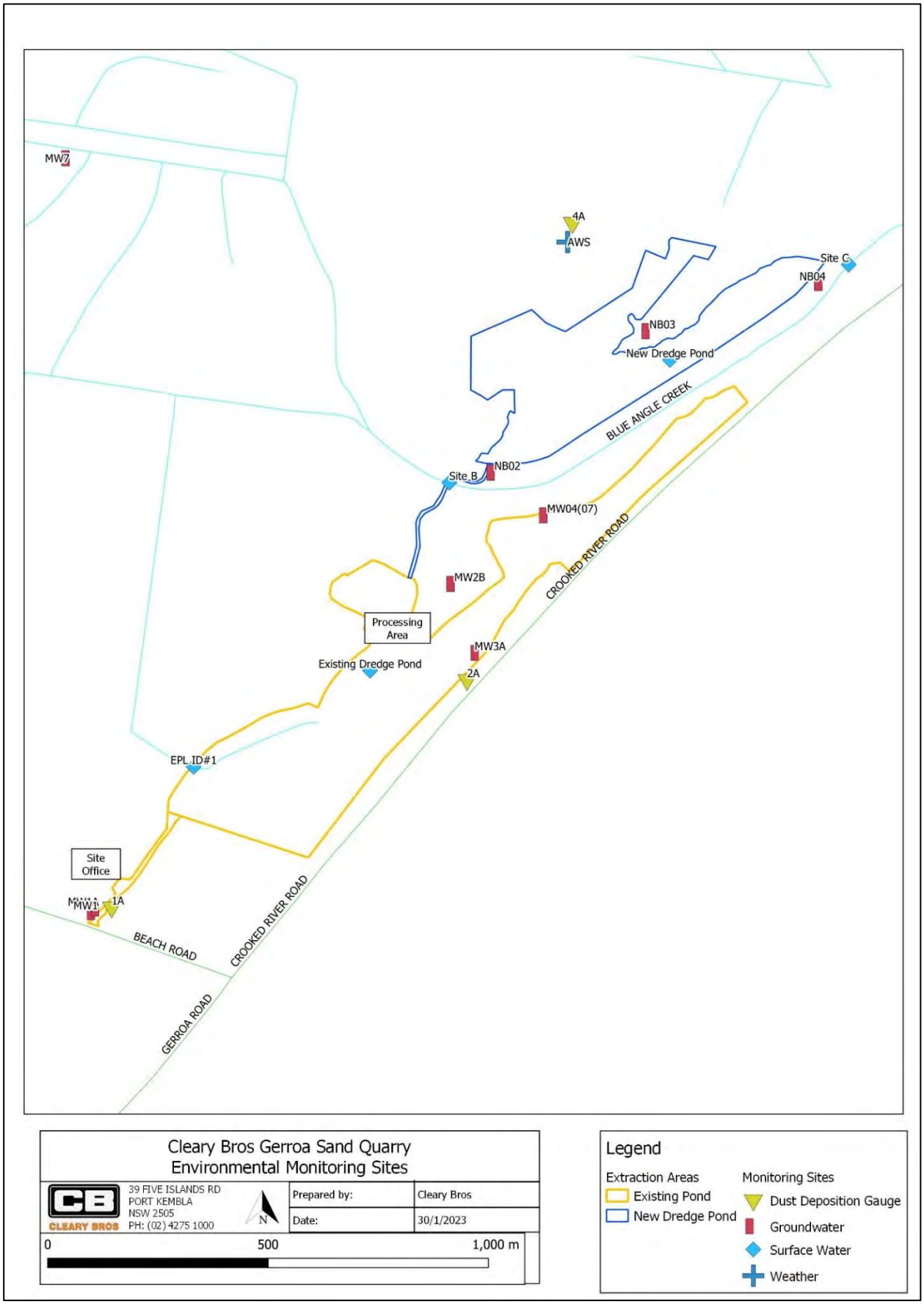
Add | Remove All

Actions	Product	Description	Quantity tonnes
No data to display			


Recycled materials - Crushed coarse aggregates
Add
Remove All
Actions
Product
Description
Quantity tonnes
No data to display
River gravel
Add
Remove All
Actions
Product
Description
Quantity tonnes
No data to display
Construction sand
Add
Remove All
Actions
Product
Description
Quantity tonnes
Construction Sand
Construction Sand
79968.21
Industrial sand
Add
Remove All
Actions
Product
Description
Quantity tonnes
No data to display
Dimension stone
Add
Remove All
Actions
Product
Description
Quantity tonnes
No data to display
Decorative aggregate
Add
Remove All
Actions
Product
Description
Quantity tonnes
No data to display


Loam
Add
Remove All
Actions
Product
Description
Quantity tonnes
No data to display
Please make sure that the details above are final before clicking the 'Calculate Total Site Production' checkbox.
* Calculate Total Site Production
TOTAL SITE PRODUCTION
79968.21
* Gross Value ($) of all Sales
[redacted]
* Type of Material
Construction Sand (Processed)
* Number of Full-Time Equivalent (FTE) Employees
3
* Number of Full-Time Equivalent (FTE) Contractors
3
* To the best of my knowledge, information entered in this return is correct and no blank spaces left where figures should have been inserted.
Home > My Request ROY0008767
Closed Complete
S1 Return for Extractive Materials has been submitted
Activity
Mark Hammond
ROY0008767 Created

Annexure B – Environmental Monitoring Locations



Annexure C – 2024/25 Environmental Monitoring Results

Groundwater Monitoring Results

	pH (pH units)				EC (µS/cm)				Total Phosphorus (µg/L)				Total Nitrogen (µg/L)			
	Sep-24	Dec-24	Mar-25	Jun-25	Sep-24	Dec-24	Mar-25	Jun-25	Sep-24	Dec-24	Mar-25	Jun-25	Sep-24	Dec-24	Mar-25	Jun-25
MW 1	4.6	5.2	5.3	4.8	5570	6890	6710	6430	20	<10	140	80	1500	<3000	2000	1900
MW 1A	dry	dry	dry	dry	dry	dry	dry	dry	dry	dry	dry	dry	dry	dry	dry	dry
MW 2B	6.9	7.1	7.8	7.3	1350	1600	1420	931	140	80	150	130	1700	1500	1400	1300
MW 3A	7.1	6.8	6.4	6.7	427	439	682	398	460	260	140	100	700	700	500	600
MW04(07)	7	7	8	7.4	440	630	723	646	370	<10	390	420	1000	<1000	2300	1100
NB02	5.4	5.4	5.1	5.6	144	1985	192	157	70	40	30	210	1100	1100	1100	2400
NB03	5.9	5.5	5.6	6.2	56	1.3	128	150	320	230	190	210	1000	900	1000	600
NB04	5.7	6.3	6.7	6.3	7300	9030	8940	8320	50	50	40	160	1000	1600	1800	1800
MW7	5.6	4.6	5.6	*	7170	7490	8600	*	50	60	70	*	800	800	900	*
	Sodium (mg/L)				Potassium (mg/L)				Magnesium (mg/L)				Chloride (mg/L)			
	Sep-24	Dec-24	Mar-25	Jun-25	Sep-24	Dec-24	Mar-25	Jun-25	Sep-24	Dec-24	Mar-25	Jun-25	Sep-24	Dec-24	Mar-25	Jun-25
MW 1	1140	1130	1200	1180	3	4	4	4	137	136	155	134	1560	1560	1540	1680
MW 1A	dry	dry	dry	dry	dry	dry	dry	dry	dry	dry	dry	dry	dry	dry	dry	dry
MW 2B	113	106	114	84	7	8	8	6	29	32	28	17	174	165	140	120
MW 3A	36	27	51	31	2	2	3	2	8	7	12	8	41	44	103	51
MW04(07)	59	69	71	84	5	6	7	7	12	15	19	15	104	121	107	140
NB02	21	21	27	23	3	3	4	3	4	4	4	3	34	36	41	33
NB03	10	10	14	17	3	4	4	6	2	2	4	4	13	17	20	28
NB04	1250	1270	1300	1290	37	37	42	38	167	162	197	172	2640	2880	2870	3020
MW7	1280	997	1370	*	40	31	49	*	230	197	253	*	1780	1390	1800	*
	Sulphate (mg/L)				Bicarbonate (mg/L)				Soluble Iron (mg/L)				Chlorophyll-a			
	Sep-24	Dec-24	Mar-25	Jun-25	Sep-24	Dec-24	Mar-25	Jun-25	Sep-24	Dec-24	Mar-25	Jun-25	Sep-24	Dec-24	Mar-25	Jun-25
MW 1	826	696	762	865	8	6	28	3	0.24	10.9	17.8	2.1	<1	<1	1	<1
MW 1A	dry	dry	dry	dry	dry	dry	dry	dry	dry	dry	dry	dry	dry	dry	dry	dry
MW 2B	368	428	258	59	320	282	316	261	13.6	11	7.85	4	<1	<1	<1	<1
MW 3A	6	4	<1	1	210	153	197	104	1.95	3.51	10.2	14.4	<1	<1	<1	<1
MW04(07)	67	60	12	81	55	68	208	49	<0.05	0.16	0.49	0.08	<1	<1	<2	<5
NB02	16	15	10	9	10	11	12	9	1.18	1.61	1.15	1.08	<1	<1	<1	<2
NB03	<10	<1	<1	7	19	18	31	27	0.92	2.04	2.59	1.31	<1	<1	<1	<1
NB04	314	338	221	268	9	12	52	25	11.5	60.9	78.9	84.9	<1	<1	<1	<2
MW7	1890	2100	1630	*	50	<1	95	*	48.7	43.3	59.1	*	<1	<1	<2	*
	Faecal Coliforms (CFU/100mL)				Entercocci (CFU/100mL)				Ammonium (mg/L)							
	Sep-24	Dec-24	Mar-25	Jun-25	Sep-24	Dec-24	Mar-25	Jun-25	Sep-24	Dec-24	Mar-25	Jun-25				
MW 1	<1	<1	1000	<1	<1	<1	22	22	1.29	1.02	0.87	1.04				
MW 1A	dry	dry	dry	dry	dry	dry	dry	dry	dry	dry	dry	dry				
MW 2B	<2	<1	<1	~3	<2	<1	68	~2	0.61	0.7	0.69	0.61				
MW 3A	<2	<1	36	<1	<2	~3	~1	<1	0.04	0.06	0.14	0.07				
MW04(07)	<2	<1	~2	~2	80	380	390	12	<0.01	0.08	1.27	0.03				
NB02	<1	<1	15.00	<1	<1	<1	<1	28	0.12	0.11	0.11	0.11				
NB03	<1	<1	92	10	9	<1	26	15	0.12	0.17	0.22	0.07				
NB04	<2	<1	<1	<1	<2	<1	~5	~1	0.35	1.01	<0.01	0.76				
MW7	<2	<1	<1	*	<2	<1	<1	*	0.31	0.45	0.52	*				
* inaccessible																

Groundwater Depth Results

(mAHD)	Jul-24	Aug-24	Sep-24	Oct-24	Nov-24	Dec-24	Jan-25	Feb-25	Mar-25	Apr-25	May-25	Jun-25
MW1	0.81	1.52	1.81	2.32	2.85	2.34	2.42	2.39	2.49	2.4	2.12	1.98
MW1A	0.85	dry	dry	dry	dry	dry	0.8	dry	dry	1.35	0.95	dry
MW2B	1.38	2.08	1.58	1.7	1.82	1.68	1.58	1.76	1.95	1.89	1.86	1.55
MW3A	1.26	1.62	1.15	1.38	1.45	1.43	1.55	1.62	1.75	1.69	2.45	1.47
MW04(07)	*	*	2.94	3.35	3.01	3.45	3.34	3.65	3.75	1.65	3.15	2.84
NB02	2.1	1.12	2.35	2.36	2.89	2.17	2.05	2.51	2.53	2.25	1.95	1.96
NB03	5.9	6.86	6.8	7.13	7.3	7.4	7.45	7.52	7.62	6.88	6.3	6.15
NB04	3.14	1.68	1.38	1.55	1.7	1.67	1.41	1.89	1.79	1.75	1.5	1.85
MW7	*	*	1.54	1.55	1.55	1.22	*	*	1.48	1.65	*	*

* inaccessible

Existing Dredge Pond Surface Water Monitoring Results

	Jul-24	Aug-24	Sep-24	Oct-24	Nov-24	Dec-24	Jan-25	Feb-25	Mar-25	Apr-25	May-25	Jun-25
EC (µS/cm)	288	516	505	573	636	650	655	684	733	710	459	653
pH (pH units)	7.5	7.8	7.5	7.8	8	8.1	7.7	7.7	7.5	6.6	7.1	7.6
Total Algae (cells/mL)			700			15800			47000			2740
Cyanophyta (cells/mL)			<5			10500			43200			120
Total Phosphorus (µg/L)			100			50			80			150
Total Nitrogen (µg/L)			800			500			1100			700
Chlorophyll-a (µg/L)			<1			23			11			<2
Faecal Coliforms (CFU/100mL)			20			29			~32			~7
Enterococci (CFU/100mL)			12			7			66			100
Sodium (mg/L)			61			74			97			82
Potassium (mg/L)			5			7			8			7
Magnesium (mg/L)			13			16			18			15
Calcium (mg/L)			25			26			28			24
Chloride (mg/L)			81			139			144			142
Sulphate (mg/L)			63			93			89			87
Bicarbonate (mg/L)			56			50			54			42
Soluble Iron (mg/L)	<0.05	<0.05	<0.05	<0.06	<0.05	<0.05	<0.05	<0.5	<0.5	<0.05	<0.05	<0.05
Ammonium (mg/L)			0.02			0.02			0.01			<0.01
Turbidity (NTU)	195	288	196	122	59.4	176	256	205	143	220	135	232
Dissolved Oxygen (mg/L)	9.76	9.25	9.17	9.59	6.25	8.87	7.34	7.37	8.21	8.11	8.42	10.5
Dissolved Oxygen (%)	92.3	90.2	101	110	64.1	115	84.1	89.8	98.7	93.8	87.8	96
Temperature (deg C)	12.3	14.9	20.9	22.9	23.1	27.9	21.3	25.1	26.9	23.6	18.2	11.7
Total Alkalinity (mg/L)	50	56	56	55	53	50	50	50	54	44	45	42
Total Acidity (mg/L)	4	5	3	2	4	2	2	5	2	4	2	3
Dissolved Aluminium (mg/L)	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Dissolved Arsenic (mg/L)	<0.001	<0.001	0.001	<0.001	0.001	0.001	<0.001	<0.001	0.002	0.002	0.001	0.001
Dissolved Boron (mg/L)	0.08	0.16	0.12	0.12	0.1	0.18	0.15	0.17	0.2	0.2	0.15	0.19
Dissolved Barium (mg/L)	0.049	0.09	0.085	0.054	0.09	0.1	0.104	0.077	0.089	0.088	0.017	0.068
Dissolved Beryllium (mg/L)	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Dissolved Cadmium (mg/L)	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Dissolved Cobalt (mg/L)	0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Dissolved Chromium (mg/L)	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Dissolved Copper (mg/L)	<0.001	<0.001	0.001	0.002	0.002	0.001	0.001	0.001	0.001	0.002	<0.001	<0.001
Dissolved Manganese (mg/L)	0.01	0.008	0.006	0.004	0.005	0.005	0.005	0.004	0.003	0.005	0.002	0.008
Dissolved Nickel (mg/L)	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	0.001	<0.001	<0.001	<0.001
Dissolved Lead (mg/L)	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Dissolved Selenium (mg/L)	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Dissolved Vanadium (mg/L)	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Dissolved Zinc (mg/L)	0.04	0.022	<0.01	0.012	0.049	0.016	0.03	0.024	0.034	0.051	<0.005	0.063
Dissolved Mercury (mg/L)	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001

Processing Returns Water Monitoring Results

	Jul-24	Aug-24	Sep-24	Oct-24	Nov-24	Dec-24	Jan-25	Feb-25	Mar-25	Apr-25	May-25	Jun-25
pH (pH units)	8.3	8	7.5	7.6	8.1	7.6	7.6	7.8	7.1	6.9	6.8	7.7
EC (µS/cm)	556	683	578	695	758	652	661	714	793	940	889	660
Turbidity (NTU)	5.8	7	1650	2.8	14.7	192	271	1120	7820	5.8	2.8	316
Temperature (deg C)	11.7	14.4	23.3	21.1	24.2	30.2	24.8	26.9	27	25.7	18.6	11.8
Total Alkalinity (mg/L)	64	81	60	78	79	56	48	50	250	92	92	52
Total Acidity (mg/L)	4	4	5	2	3	2	2	3	86	6	6	3
Dissolved Aluminium (mg/L)	0.02	0.01	<0.01	0.04	0.04	<0.01	<0.01	<0.01	<0.1	0.06	0.07	<0.01
Dissolved Arsenic (mg/L)	<0.001	<0.001	0.002	<0.01	<0.001	<0.001	<0.001	<0.001	<0.01	<0.001	<0.001	0.001
Dissolved Boron (mg/L)	0.017	0.039	0.081	0.018	0.047	0.137	0.121	0.099	0.033	0.053	0.027	0.074
Dissolved Barium (mg/L)	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Dissolved Beryllium (mg/L)	<0.05	0.09	0.23	0.11	0.08	0.18	0.18	0.28	0.38	0.16	0.12	0.22
Dissolved Cadmium (mg/L)	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Dissolved Cobalt (mg/L)	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.01	<0.001	<0.001	<0.001
Dissolved Chromium (mg/L)	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.01	<0.001	<0.001	<0.001
Dissolved Copper (mg/L)	<0.001	<0.001	0.001	<0.001	<0.001	<0.001	0.002	0.002	<0.01	0.001	<0.001	<0.001
Dissolved Manganese (mg/L)	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.1	0.05	0.08	<0.05
Dissolved Nickel (mg/L)	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.01	<0.001	<0.001	<0.001
Dissolved Lead (mg/L)	0.004	0.006	0.007	0.021	0.008	0.004	0.007	0.013	0.017	0.034	0.014	0.009
Dissolved Selenium (mg/L)	0.002	0.001	<0.001	0.004	0.002	<0.001	0.001	0.001	<0.01	0.002	0.002	<0.001
Dissolved Vanadium (mg/L)	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.1	<0.01	<0.01	<0.01
Dissolved Zinc (mg/L)	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.1	<0.01	<0.01	<0.01
Dissolved Iron (mg/L)	<0.005	0.037	0.007	<0.005	0.035	0.025	0.027	0.008	<0.05	0.057	<0.005	0.062
Dissolved Mercury (mg/L)	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.001	<0.0001	<0.0001	<0.0001
Dissolved Oxygen (mg/L)	11	9.79	8.47	8.22	3.59	7.22	7.29	7.7	0.36	7.94	8.43	10.6
Dissolved Oxygen (%)	103	94.7	97.9	91.7	37	97.6	89.1	97.2	4.1	95.8	89.2	97.4

New Dredge Pond Surface Water Monitoring Results

	Jul-24	Aug-24	Sep-24	Oct-24	Nov-24	Dec-24	Jan-25	Feb-25	Mar-25	Apr-25	May-25	Jun-25
pH (pH units)	6.9	6.8	7.1	7.9	7.8	7.3	7.1	7.8	7.7	7	6.5	7.1
EC (µS/cm)	400	649	610	701	1010	682	747	756	801	839	841	889
Turbidity (NTU)	84.2	138	206	280	59.6	127	262	205	204	225	148	200
Temperature (deg C)	12.2	13.4	21	21.1	24.5	29.8	21.2	24.6	27.6	23.3	18.3	12.7
Bicarbonate (mg/L)			51			51			53			42
Total Alkalinity (mg/L)	34	35	51	78	56	51	42	44	53	42	42	42
Total Acidity (mg/L)	6	5	3	2	3	2	2	4	2	4	5	4
Sulphate (mg/L)			67			92			99			114
Chloride (mg/L)			111			144			161			233
Calcium (mg/L)			26			28			32			33
Magnesium (mg/L)			14			16			20			20
Potassium (mg/L)			6			7			9			8
Sodium (mg/L)			75			81			106			119
Dissolved Aluminium (mg/L)	0.05	0.06	0.01	0.04	<0.01	0.01	<0.01	<0.01	<0.10	<0.01	0.01	0.01
Dissolved Arsenic (mg/L)	0.001	0.001	0.001	<0.001	0.001	0.002	0.003	0.003	<0.010	0.002	0.002	0.003
Dissolved Barium (mg/L)	0.052	0.062	0.075	0.018	0.09	0.1	0.093	0.092	0.033	0.095	0.024	0.076
Dissolved Beryllium (mg/L)	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.010	<0.001	<0.001	<0.001
Dissolved Boron (mg/L)	<0.05	0.15	0.11	0.11	0.15	0.16	0.2	0.2	0.38	0.22	0.16	0.190
Dissolved Cadmium (mg/L)	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0010	<0.0001	<0.0001	<0.0001
Dissolved Chromium (mg/L)	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.010	<0.001	<0.001	<0.001
Dissolved Cobalt (mg/L)	0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.010	<0.001	<0.001	<0.001
Dissolved Copper (mg/L)	<0.001	<0.001	<0.001	<0.001	0.002	0.001	0.001	0.002	<0.010	0.002	0.001	0.001
Dissolved Iron (mg/L)	<0.05	0.14	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.10	<0.05	0.06	<0.05
Dissolved Lead (mg/L)	<0.001	<0.001	0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.010	<0.001	<0.001	<0.001
Dissolved Manganese (mg/L)	0.041	0.028	0.015	0.021	0.01	0.013	0.016	0.016	0.017	0.023	0.027	0.036
Dissolved Nickel (mg/L)	0.003	0.002	<0.001	0.004	<0.001	<0.001	<0.001	<0.001	<0.010	0.001	<0.001	0.001
Dissolved Selenium (mg/L)	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.10	<0.01	<0.01	<0.01
Dissolved Vanadium (mg/L)	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.10	<0.01	<0.01	<0.01
Dissolved Zinc (mg/L)	0.07	0.088	0.044	<0.005	0.067	0.032	0.062	0.054	<0.050	0.084	<0.005	0.091
Dissolved Mercury (mg/L)	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Ammonium (mg/L)			0.02			0.04			0.01			0.02
Total Nitrogen (µg/L)			1200			1000			1000			1000
Total Phosphorus (µg/L)			140			<10			120			160
Chlorophyll-a (µg/L)			1			24			26			<3
Dissolved Oxygen (mg/L)	8.57	8.3	8.98	8.22	5.61	9.14	6.07	6.71	7.66	7.32	7.64	9.52
Dissolved Oxygen (%)	81.2	78.5	99	91.7	57.3	123	69.3	81.3	94.7	84.5	79.2	88.8
Faecal Coliforms (CFU/100mL)			58			68			~68			12
Enterococci (CFU/100mL)			60			17			33			~6
Cyanophyta (cells/mL)			<5						15600			9000
Total Algae (cells/mL)			4920						22600			9440

Blue Angle Creek Upstream (Site B) Surface Water Monitoring Results

	Jul-24	Aug-24	Sep-24	Oct-24	Nov-24	Dec-24	Jan-25	Feb-25	Mar-25	Apr-25	May-25	Jun-25
pH (pH units)	7.2	6.7	7.00	6.60	7.00	6.70	6.80	7.10	8.10	6.30	6.2	6.5
EC (µS/cm)	240	8870	1550.00	12700	6620.00	2230.00	3270.00	7740.00	5790.00	759.00	363	593
Turbidity (NTU)	8.3	31.1	13.70	86.3	38.80	16.30	27.30	59.00	4.00	13.60	14.1	11.3
Temperature (deg C)	11.5	13.9	17.20	19.0	22.20	21.80	19.20	23.40	24.00	17.70	16.5	10.3
Total Alkalinity (mg/L)	18	92	40.00	96	114.00	80.00	82.00	134.00	136.00	35.00	29	28
Total Acidity (mg/L)	9	9	6.00	17	11.00	13.00	9.00	15.00	12.00	14.00	19	8
Dissolved Aluminium (mg/L)	0.12	0.09	0.03	0.06	0.1	0.05	0.1	0.04	0.04	0.2	0.16	0.1
Dissolved Arsenic (mg/L)	<0.001	<0.001	<0.001	<0.001	0.001	<0.001	<0.001	<0.001	<0.001	0.001	<0.001	<0.001
Dissolved Boron (mg/L)	0.007	0.014	0.06	0.042	0.051	0.09	0.063	0.06	0.082	0.092	0.095	0.074
Dissolved Barium (mg/L)	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Dissolved Beryllium (mg/L)	<0.05	0.09	0.23	0.76	0.5	0.2	0.27	0.53	0.46	0.1	0.06	0.1
Dissolved Cadmium (mg/L)	<0.0001	<0.0001	0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Dissolved Cobalt (mg/L)	<0.001	<0.001	<0.001	<0.001	0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Dissolved Chromium (mg/L)	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	0.001	0.002	<0.001
Dissolved Copper (mg/L)	0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	0.002	0.002	<0.001
Dissolved Manganese (mg/L)	1.04	1.5	1.12	1.12	0.89	0.47	0.92	0.41	0.19	5.88	5.3	1.1
Dissolved Nickel (mg/L)	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Dissolved Lead (mg/L)	0.024	0.088	0.208	0.153	0.077	0.205	0.076	0.248	0.166	0.474	0.245	0.13
Dissolved Selenium (mg/L)	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	0.002	0.002	<0.001
Dissolved Vanadium (mg/L)	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Dissolved Zinc (mg/L)	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Dissolved Iron (mg/L)	<0.005	<0.005	0.046	<0.005	0.052	0.061	0.059	0.037	0.066	0.071	0.087	0.086
Dissolved Mercury (mg/L)	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Dissolved Oxygen (mg/L)	4.77	0.87	4.94	3.11	4.64	3.83	2.65	1.93	0.77	2.36	1.13	3.9
Dissolved Oxygen (%)	43.5	8.4	50.9	33.5	47.3	44.6	29.3	23.3	9.0	24.6	11.4	34.1

Blue Angle Creek Downstream (Site C) Surface Water Monitoring Results

	Jul-24	Aug-24	Sep-24	Oct-24	Nov-24	Dec-24	Jan-25	Feb-25	Mar-25	Apr-25	May-25	Jun-25
pH (pH units)	7	6.4	7	6.6	7.6	7	7	7	7.4	6.4	6.3	6.7
EC (µS/cm)	198	7020	1050	22300	6620	3200	9440	17500	7150	846	417	650
Turbidity (NTU)	12.8	35	20.5	21.5	38.8	7.3	25.3	9.3	10	225	10.1	11.4
Temperature (deg C)	12.2	12.6	16	17.6	22.2	22.6	19.6	22.5	26.8	18.6	26	11.9
Total Alkalinity (mg/L)	30	52	50	93	153	87	97	175	168	42	35	60
Total Acidity (mg/L)	9	10	6	12	12	8	10	23	11	13	17	9
Dissolved Aluminium (mg/L)	0.12	0.1	0.07	0.03	0.07	0.03	0.09	0.06	0.03	0.14	0.16	0.1
Dissolved Arsenic (mg/L)	<0.001	<0.001	<0.001	<0.001	0.001	<0.001	<0.001	0.007	0.004	0.001	<0.001	<0.001
Dissolved Boron (mg/L)	0.035	0.055	0.079	0.056	0.043	0.085	0.02	0.03	0.066	0.075	0.113	0.063
Dissolved Barium (mg/L)	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Dissolved Beryllium (mg/L)	<0.05	0.36	0.18	1.33	0.78	0.29	0.65	1.33	0.67	0.1	0.06	0.11
Dissolved Cadmium (mg/L)	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Dissolved Cobalt (mg/L)	<0.001	<0.001	<0.001	<0.001	0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Dissolved Chromium (mg/L)	<0.001	0.003	<0.001	0.001	<0.001	<0.001	<0.001	<0.001	<0.001	0.001	0.002	<0.001
Dissolved Copper (mg/L)	0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	0.001	0.001	<0.001
Dissolved Manganese (mg/L)	1.03	1.44	0.57	0.2	0.76	0.43	0.53	0.72	0.24	3.83	4.78	0.98
Dissolved Nickel (mg/L)	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Dissolved Lead (mg/L)	0.021	0.267	0.066	0.179	0.049	0.148	0.097	0.092	0.054	0.418	0.245	0.094
Dissolved Selenium (mg/L)	<0.001	0.001	<0.001	0.001	<0.001	<0.001	0.001	0.001	0.001	<0.001	0.002	<0.001
Dissolved Vanadium (mg/L)	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Dissolved Zinc (mg/L)	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Dissolved Iron (mg/L)	0.047	0.065	0.052	0.007	0.04	0.056	0.059	0.022	0.064	0.075	0.087	0.09
Dissolved Mercury (mg/L)	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Dissolved Oxygen (mg/L)	4.21	4.25	3.15	5.69	3.95	5.12	4.54	1.92	2.86	2.48	1.13	3.04
Dissolved Oxygen (%)	39.7	40	31.6	60.2	41.2	61.3	51.7	23.6	34.9	25	11.4	27.9

Air Quality Monitoring Results – Depositional Dust Gauges

TIS (g/m2/month)	1A	2A	4A
Jul-24	0.6	0.9	0.2
Aug-24	1.0	5.0	0.1
Sep-24	2.9	7.6	0.2
Oct-24	1.1	0.9	0.1
Nov-24	0.7	0.4	0.4
Dec-24	0.9	1.2	0.9
Jan-25	0.8	0.4	0.7
Feb-25	0.7	0.2	0.1
Mar-25	1.0	0.1	0.2
Apr-25	1.0	0.1	0.1
May-25	2.1	0.3	0.3
Jun-25	1.6	1.0	0.2

Acid Sulphate Sand Monitoring

	TOS (%)
Jul-24	0.048
Aug-24	0.042
Sep-24	0.052
Oct-24	0.031
Nov-24	0.05
Dec-24	0.042
Jan-25	0.041
Feb-25	0.042
Mar-25	0.043
Apr-25	0.042
May-25	0.042
Jun-25	0.048

Annexure D - Annual Review of the Landscape and Rehabilitation Management Plan

2025 Annual Review of the Landscape and Rehabilitation Management Plan

Niche Environment and Heritage

20 June 2025

Niche

Gerroa Sand Quarry 2025 Annual Review

Vegetation Management Plan

Prepared for Cleary Bros (Bombo) Pty Ltd | 20/06/2025

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Document control

Document control

Project number	Client	Project manager	LGA
9190	Cleary Bros (Bombo) Pty Ltd	Jesse Paton	Kiama

Version	Author	Review	Status	Comments	Date
D1	Jesse Paton	Stephen Bloomfield	Draft		20 June 2025

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1 Vegetation Management Plan: Annual Monitoring Report

1.1 Introduction

Niche was commissioned by Cleary Bros (Bombo) Pty Limited (Cleary Bros) to complete the Gerroa Sand Quarry annual rehabilitation monitoring (the Project), located at the corner of Beach Road and Crooked River Road, Gerroa (the Site). A map of Gerroa Sand Quarry Vegetation Management Zones i provided in Figure 1.

The primary objective of this report is to update any necessary control measures required with regards to priority weed management within the designated management zones across the Site and provide advice on any management actions that can be implemented to encourage the rehabilitation of the Site.

Primarily, this report aims to meet the Conditions of Approval granted by the NSW Land and Environment Court for the extension of the Gerroa Sand Quarry, operated by Cleary Bros (Bombo) Pty Limited (see Appendix 1). This report satisfies the condition requiring an annual report on the progress of the revegetation project.

This report is the 17th such annual report covering the Site at Gerroa prepared since 2009. This report is based on an inspection of the Site that was undertaken on the 29th of May 2025.

1.2 Background

Cleary Bros have undertaken annual monitoring of the Gerroa Sand Quarry since 2009. As of December 2022, the sites mentioned in this report are consistent with the revised version of "Landscape and Rehabilitation Management Plan, Extension and Continuation of Gerroa Sand Quarry, Municipality of Kiama, City of Shoalhaven" Kevin Mills & Associates (KMA) (2008). This version is "Gerroa Sand Resource – Landscape and Rehabilitation Management Plan" which was revised by Mark Hammond from Cleary Bros and the DPE and is the Court approved management plan for the Site.

This report is the annual inspection for the year 2024/2025; a similar report has been prepared annually by Niche since 2018. Prior to this, the report was prepared by Kevin Mills & Associates. In the 10th Annual Report (KMA 2018) it was documented "the following has occurred at the Site in recent years:

- The 'Northern Corridor' has been shown to be successful in terms of creating habitat and use by native animals, as compared to the 'East-West Link'.
- The quarry has moved northwards and the forest in the East-West Link has been removed, the quarry subsequently reaching its most northern limit."

Quarterly inspections (by Cleary Bros) and reporting has continued to be undertaken during 2019-24, providing regular updates of the progress of the revegetation/rehabilitation zones. Nearly all plantings within the designated revegetation zones have been completed and these areas are now in maintenance phase. Significant effort has been made to reduce the extent of Lantana (*Lantana camara*) on the Site through herbicide spraying.

Recent annual reports have detailed inspections of the revegetation zones with a focus of analysing the progress towards native dominant forest and making relevant recommendations to improve management outcomes if required. There have been no wildlife surveys since 2016 as this was deemed no longer necessary by KMA (2018).

Note: the background information, detailed description of survey methods and the extensive survey information from the first nine years of reporting are contained in the earlier reports KMA (2018); this information is not repeated here.

Figure 1: Map of Gerroa Sand Quarry Vegetation Management Zones

2 Assessment of Individual Zones

An inspection of the Site was conducted by Niche ecologist Jesse Paton on the 29th of May, 2025.

Most of the plantings were completed at each zone early in the monitoring program and are now in the maintenance phase. The most recent plantings have occurred in Zone 2B.1, 2D, 2C.2 and Zone 2C.1 (see Figure 1) to expand the vegetation buffer along Blue Angle Creek, creating suitable habitat for local fauna. These zones are now similarly in the maintenance phase and will require further plantings to replace any lost in the past 3 years.

Weed maintenance has been carried out at each of the planting areas since the early stages of the project and are now considered to be under control. An updated description and condition of each of the zones and the planting areas has been provided in Table 1.

Over the previous year, all zones were inspected by Cleary Bros staff and assessed during quarterly inspections. Due to the weather and the subsequent inundation over the previous months, access to some zones near Blue Angle Creek, including zones 5, 5C.1, 2C.2, 2D, 2E and 1.4, was difficult. Maintenance work and inspections in these zones was unable to be completed at the required timing interval and were therefore only conducted when access was safe and achievable. This year, the scheduled weed assessment was postponed multiple times due to poor weather conditions. Favourably, this allowed access to most subzones; only 5 and 5C were not accessible.

The recommendations for the rehabilitation zones detailed in Table 1 were made following the site inspection. A priority weeds list for the Site was also created and provides further detail on control methods (Appendix 2).

Table 1: Recommendations for the management zones

Zone	Location / description	Recommendations for ongoing works 2025/2026	Reference Images
Zone 1: Forest Enhancement Zone Objectives (41.95 ha) - Improve the quality of the forest by removal of weeds. - Restrict access to grazing stock. - Monitor the health of the forest. - Strengthen tree cover south of previous dredge pond. Work in the past has included Lantana (*Lantana camara*) control and removal of selected weeds such as Bitou Bush (*Chrysanthemoides monilifera)*. Weed management is ongoing and is guided by the Weed Management Plan for the Site (KMA 2008).			

Zone	Location / description	Recommendations for ongoing works 2025/2026	Reference Images
Subzone 1.1	This is the main area of existing forest, extending from the southern to northern end of the property boundary.	Both the northern and southern areas appear to be in high condition, with Lantana (*Lantana camara*) being observed throughout. Rhodes Grass (*Chloris gayana*) and Tobacco Bush (*Solanum mauritianum)* were prominent in sections of the southern area. Giant Reed (*Arundo donax*) was found in the eastern section where it was more wet underfoot. Fireweed (*Senecio madagascariensis)* and Cobbler's Pegs (*Bidens pilosa*) were recorded in both the northern and southern areas along the roadside.	

Zone	Location / description	Recommendations for ongoing works 2025/2026	Reference Images
Subzone 1.2	This subzone covers the forest around the eastern and southern sides of the old dredge pond.	Rhodes Grass (*Chloris gayana*), Fireweed (*Senecio madagascariensis)*, Spear Thistle were prevalent along the access roadsides. Lantana (*Lantana camara*) was the most dominant, observed throughout the zone. The inner zone exhibited better health and condition than the outer zone. Cassia (*Senna pendula* var. *glabrata*) was present close to the roadside and main office in this zone.	

Zone	Location / description	Recommendations for ongoing works 2025/2026	Reference Images
Subzone 1.3	Covers the old bund wall. This subzone is located behind the site office and towards the front gate.	In this small zone, there were stands of Lantana (*Lantana camara*), and vines of Moth Vine (*Araujia sericifera)* which can be controlled using the cut and paint method. The zone was in good condition, except for the weeds, Cobbler's Pegs (*Bidens pilosa*) and Fireweed (*Senecio madagascariensis*), being observed along the roadside.	

Zone	Location / description	Recommendations for ongoing works 2025/2026	Reference Images
Subzone 1.4	A fenced patch of Swamp Oak (*Casuarina glauca*) within grazing land, which now has a planted link to the east (planting zone 2E). Vegetation is well established and requires very little ongoing work.	This area was accessible as opposed to last year. The overall health of this area was great; stands of Swamp Oak (*Casuarina glauca*) are present, with minimal Lantana (*Lantana camara*) being observed. Moth Vine (*Araujia sericifera)* was recorded in multiple areas of the woodland while an isolated Blackberry Bush (*Rubus fruticosus spp. aggregate*) was identified. Continuous monitoring and efforts to eradicate the Blackberry Bush (*Rubus fruticosus spp. aggregate*) and Moth Vine (*Araujia sericifera)* via cut and paint is required.	
Zone 2: Broad scale planting zone Objectives (25.39 ha)			

Zone	Location / description	Recommendations for ongoing works 2025/2026	Reference Images
- Develop habitat by planting forest communities in accordance with the Landscape and Rehabilitation Management Plan (KMA 2008). - Establish stronger habitat corridors to the north and south of the existing forest. - Monitor plantings and complete maintenance, including the removal of unused plant guards. - Strengthen east-west and north-south links between the established forest and Seven Mile Beach National Park.			

Zone	Location / description	Recommendations for ongoing works 2025/2026	Reference Images
Subzone 2A.1	This is the main area that has been used to develop the forested link in the northeast corner of the Site. Extensive work was carried out in the early years to develop this area as habitat for native fauna.	This zone is in relatively good condition, however, there are patches of dense Rhodes Grass (*Chloris gayana*) along the access roadside as well as the northeast entrance. There are areas of Lantana (*Lantana camara*) throughout, and Giant Reed (*Arundo donax*) was recorded towards the south.	

Zone	Location / description	Recommendations for ongoing works 2025/2026	Reference Images
Subzone 2A.2	This area is important for the forest link to the south and into Seven Mile Beach National Park on the southern side of Beach Road. Planted trees are becoming well established in most places.	This zone needs to be managed and controlled via cut and paint methods to prevent further infestation of weeds over native vegetation. As well as exhibiting a significant amount of weed cover, this zone also had a large variety of species, with Rhodes Grass (*Chloris gayana*), Moth Vine (*Araujia sericifera)* and Lantana (*Lantana camara*) being the most dominant. Other weeds included: Cobbler's Pegs (*Bidens pilosa*), Fireweed (*Senecio madagascariensis*) and Tobacco Bush (*Solanum mauritianum*).	

Zone	Location / description	Recommendations for ongoing works 2025/2026	Reference Images
Subzone 2A.3	This area was revegetated early in the re-planting program. The plantings that have survived in this area have become well established despite previous impacts from grazing native fauna.	Scattered Lantana (*Lantana camara*) was present throughout the zone. Cobbler's Pegs (*Bidens pilosa*) and Spear Thistle (*Cirsium vulgare*) were observed growing along the roadside.	

Subzone 2B.1	This subzone is a narrow area that was regenerated to link the creek-side forest to that within Zone 4. The subzone was spread with topsoil and timber debris, and plantings were undertaken. Considerable growth of the plantings has since been noted.	Significant doses of Moth Vine (*Araujia sericifera)* and Giant Reed (*Arundo donax*) were recorded throughout this zone, particularly near the roadside and along the creek line. Cobbler's Pegs (*Bidens pilosa*), Spear Thistle (*Cirsium vulgare*) and Pigeon Grass (*Setaria pumlia*) were also observed along the roadside. The overall condition of this zone will continue to increase with the adoption of management techniques, such as cut and paint.	

Zone	Location / description	Recommendations for ongoing works 2025/2026	Reference Images
Subzone 2B.2	This area is located in a low-lying swamp and is being colonised by Swamp Oak. Some planting was carried out on a higher part of the subzone in the south and west in previous years (KMA 2018). The natural regeneration occurring in this subzone is adequate.	This vegetation within this zone appears to be in good condition. Although, both Lantana (*Lantana camara*) and Tobacco Bush (*Solanum mauritianum*) were prominent in this zone. Lantana (*Lantana camara*) was observed in patches throughout, and the Tobacco Bush (*Solanum mauritianum*) was recorded along the access roadside. Management of these weeds via the cut and paint method is recommended to continue to preserve the vegetation integrity of this zone.	

Zone	Location / description	Recommendations for ongoing works 2025/2026	Reference Images
Subzone 2C.1 (southern end)	Small revegetation patch that was completed recently to link the forest with Zone 4, located on roadside adjacent to subzone 1.1.	Some Swamp Oak (*Casuarina glauca*) plantings are maturing well, while others seem to have been grazed by deer or kangaroos. The area is still quite overgrown and weedy with Fireweed (*Senecio madagascariensis*), Rhodes Grass (*Chloris gayana*), Pigeon Grass (*Setaria pumila*), and Cobblers Peg (*Bidens pilosa*) being present. Mowing and weed management are needed to ensure plantings can continue to grow.	

Zone	Location / description	Recommendations for ongoing works 2025/2026	Reference Images
Subzone 2C.1 (northern end)	This subzone is known as 'The Garden' and is a planted area adjacent to more established vegetation located in subzone 1.1.	'The Garden' is in good condition, with the area having minimal disturbance from weeds. It is necessary that this area is regularly monitored to prevent weed reinvasion. If weeds start to invade, removal methods such as the cut and paint method will need to be enacted as soon as possible. Most of the weeds that were found in this area were observed along the bank of the dredge pond (pictured); species include Fireweed (*Senecio madagascariensis*) and Spear Thistle (*Cirsium vulgare*).	

Zone	Location / description	Recommendations for ongoing works 2025/2026	Reference Images
Subzone 2C.2	A long narrow area supporting some well-established plantings.	The western section of this zone was not accessible as it was too wet. From last year's report, the maintenance of the Swamp Oak (*Casuarina glauca*) plantings should continue to prevent weeds becoming prevalent. Lantana (*Lantana camara*) was observed in patches in the northeastern section of this zone, while Fireweed (*Senecio madagascariensis*) and Pigeon Grass (*Setaria pumlia*) were more prominent in the southeast section.	

Zone	Location / description	Recommendations for ongoing works 2025/2026	Reference Images
Subzone 2D	Modified some time ago to a triangular area between subzones 2E and 2D. This area was originally sprayed and partly spread with timber mulch prior to plantings. This area is prone to water inundation during wetter months, limiting some access to areas.	The centre of the zone appeared to exhibit good health with a wet underground, whereas the outskirts exhibited multiple weeds. Tobacco Bush (*Solanum mauritianum)* and Purpletop Vervain (*Verbena bonariensis*) were recorded throughout the outskirts of this zone – particularly on the western boundary near the access road. Paddy's Lucerne (*Sida rhombifolia*) was observed near the roadside.	

Zone	Location / description	Recommendations for ongoing works 2025/2026	Reference Images
Subzone 2E	Plantings in this area have become well established and tree growth continues to be progressing well. This narrow strip of trees extends into subzone 1.4, an established area of trees.	Despite being wet, this zone was accessible this year. Tall canopies of Swamp Oak (*Casuarina glauca*) were observed on the western boundary of the zone. Moth vine (*Araujia sericifera)* was recorded in multiple areas which will need to be managed and controlled when necessary.	

Zone 3: Screen Planting Zone Objectives (0.42 ha)

- Establish a screen of native vegetation along the eastern edge of pond extension.

Zone	Location / description	Recommendations for ongoing works 2025/2026	Reference Images
- Maintain existing trees on south-eastern boundary, remove Lantana (*Lantana camara*) and replace with native plantings.			

Zone	Location / description	Recommendations for ongoing works 2025/2026	Reference Images
Zone 3	This zone includes the bund wall which reached its final height early in 2015. A screen of native vegetation was established along the eastern edge of the pond extension. The sand bund is currently stabilised by growth of plants, the majority of which are weeds.	Lantana (*Lantana camara*) was extensive along the bund wall and should be prioritised for management. To maintain the structural integrity of the bund wall, it is recommended that care is taken when enhancing the native vegetation and removing the areas of Lantana (*Lantana camara)*. Rhodes Grass (*Chloris gayana*), Bidens Pilosa and Fireweed (*Senecio madagascariensis)* were also prevalent along the boundaries of this zone.	 *

Zone	Location / description	Recommendations for ongoing works 2025/2026	Reference Images
Zone 4: Bangalay Sand Forest (3.32 ha) - Restrict access to grazing stock. - Establish a forest link to nearby larger area through plantings. - Monitor the health of the forest. - Remove weeds when required.			

Zone	Location / description	Recommendations for ongoing works 2025/2026	Reference Images
Zone 4	This zone is remnant Bangalay Sand Forest vegetation. This area has an intact Bangalay and Blackbutt canopy and is of high habitat value. Lantana has been heavily targeted in this zone and continued maintenance has been completed.	Small areas of Lantana (*Lantana camara*) were recorded, particularly on the boundary of the woodland. Pigeon Grass (*Setaria pumlia*), Fireweed (*Senecio madagascariensis*) and a couple of individual Tobacco Bush (*Solanum mauritianum)* plants were observed in areas near the roadside. Overall, the vegetation is of a high condition and the areas of Lantana (*Lantana camara)* should be closely monitored and managed via the cut and paint method to prevent further encroachment.	

Zone	Location / description	Recommendations for ongoing works 2025/2026	Reference Images
Zone 5: Swamp Oak Forest Objectives (1.82 ha) - Restrict access to grazing stock. - Establish a forest link to nearby larger area through plantings. - Monitor the health of the forest. - Remove weeds when required.			
Zone 5	This zone includes remnant Swamp Oak Forest. Area is in good condition overall with a relatively open mid/understorey.	This zone was too wet to access, but the zone appeared to be in relatively good condition from a distance, only with a few patchy areas of Lantana (*Lantana camara*). The Lantana (*Lantana camara*) can be controlled via the cut and paint method.	N/A

Zone	Location / description	Recommendations for ongoing works 2025/2026	Reference Images
Zone 5C.1	Occurs between the Swamp Oak Forest in zone 5 and the creek that has been planted. The area is dominated by Kikuyu Grass (*Cenchrus clandestinus*). The shrub *Melaleuca ericifolia* is continuing to expand from the creek-side.	This area is located across a creek which made it difficult to access. The photo taken in this area was from the other side of the creek and illustrates the presence of consistent ground layer species. Management considerations should remain consistent as per previous years' reports. Planting of native species such as Swamp Oak (*Casuarina glauca*) is recommended.	

Zone	Location / description	Recommendations for ongoing works 2025/2026	Reference Images
Zone 6: Dredge Pond Foreshore Objectives Dredge Pond Foreshore (includes 5 m setback from pond and batter slopes on both the existing and extension pond).		- Stabilise the batters on the edges of the dredge pond. - Undertake plantings within the 5 m set back area along the edge of the retained Littoral Rainforest (Zone 7) as soon as practical after dredging is completed in this area. - Continue rehabilitation of previous dredge pond areas.	

Zone	Location / description	Recommendations for ongoing works 2025/2026	Reference Images
Zone 6	This zone occurs within the foreshore areas of the Dredge Pond. The foreshore has been previously shaped, had topsoil spread and planted as the dredge pond has expanded northwards. Overall, the pond bank is stable with little to no erosion evident. Natural regeneration and pre-existing native growth have helped to stabilise area.	Lantana (*Lantana camara*) and Giant Reed (*Arundo donax*) were the dominant weeds in this zone; with Lantana (*Lantana camara*) being found in small patches and the Giant Reed (*Arundo donax*) found alongside the road and creek. As this is the case, spraying should be avoided, and both species should be managed with the cut and paint method. Encouragement of further native planting in conjunction with targeted weed control will help increase the spread of native species.	

Zone	Location / description	Recommendations for ongoing works 2025/2026	Reference Images
Zone 7: Littoral Rainforest Objectives (0.95 ha) - Control weeds, particularly Lantana (*Lantana camara*). - Monitor the health of the forest. - Protect the western edges of the zone from quarrying. - Ensure that the felling of trees does not impact the vegetation in this area.			

Zone	Location / description	Recommendations for ongoing works 2025/2026	Reference Images
Zone 7	This zone occurs along the eastern edge of the Site between zones 3 and 1.2. This zone has cultural significance, therefore only minor control of Lantana (*Lantana camara*) has been conducted over time.	Lantana (*Lantana camara*) and Tobacco Bush (*Solanum mauritianum)* were again prominent, with thickets of Lantana (*Lantana camara*) found in several parts of the zone. Removal is encouraged by the cut and paint method to encourage natural regeneration of native flora.	

3 Discussion and recommendations

The 17th annual monitoring report for the Gerroa Sand Quarry continues to show progress in revegetation and weed management across the Site. The inner sections of the subzones are less affected by disturbance, has a better representation of the native vegetation and has less areas that contain weeds. The consistent effort by Cleary Bros staff to document changes, has allowed for targeted management of invasive species such as Blackberry Bush (*Rubus fruticosus spp. aggregate*) (Plate 1) and Lantana (*Lantana camara*) (Plate 7). The management and revegetation completed throughout most subzones has increased the condition of these zones to good, and with regular monitoring, the Site will continue to improve.

The past few months have experienced wet weather and as a result, some subzones were difficult to access, while others were observed to have multiple areas of weed infestations. The previous year's report noted that zone 1.4 and subzone 2E could not be accessed due to the wet conditions, and while despite being wet, subzone 2C.2 was accessed and noted to be very overgrown and weedy. This year, although all these zones exhibited wet conditions, they were able to be accessed. Observations of these areas noted that they were predominantly in good conditions, with tall stands of Swamp Oak (*Casuarina glauca*). Few weeds such as Moth Vine (*Araujia sericifera*) found in 2C.2 and 2E (Plate 2), and one Blackberry Bush (*Rubus fruticosus spp. aggregate*) was found in subzone 1.4 (Plate 1). Management of these zones should be undertaken to ensure their continued health. Subzones 5 and 5C.1 were too wet to access this year, which is in accordance with last year's report. Though subzone 5C.1 could be seen from across the creek, a thorough examination of its' health could not be completed.

To build on the success of native revegetation, particularly in areas that exhibit high condition, control of priority weeds such as Lantana (*Lantana camara*) (found in most zones) (Plate 7) and Wild Tobacco Bush (*Solanum mauritianum*) (found in 2A.2, 2B.2 2D, 4 & 7) (Plate 3) should be intensified. Weed removal should be undertaken using cut and paint methods for these woody weeds since it offers a higher kill rate and avoids indirect poisoning of adjacent native species.

Given the widespread presence of Lantana (*Lantana camara*) across the Site, a mosaic pattern removal strategy, targeting areas of up to 1000 m^2 at a time, will allow for fauna to disperse through adjacent habitat whilst promoting native revegetation.

Last year's report signified that there was no deer grazing and rubbing present. This year, deer or kangaroo grazing was observed in the southern end of subzone 2C.1 (Plate 4) where some plantings have been grazed. Therefore, on-site deer/kangaroo control methods may need to be implemented. In addition, revegetation maintenance, such as mowing and weeding, in less mature and established areas (subzone 2C.1 & 2C.2) is required to ensure successful revegetation.

Ongoing weed management across the Site, in conjunction with consistent monitoring will ensure that each zone continues to improve in condition. As younger areas develop and acquire the management they need, they will improve the ecosystem functionality. Whilst mature native species continue to reproduce and limit weed species, the Site's vegetation will continue to improve in becoming a self-sustaining community in the future. Additional information on maintenance actions for priority weeds is provided in Appendix 2.

References

Kevin Mills & Associates Mills (2008). Landscape and Rehabilitation Management Plan, Extension and continuation of Gerroa Sand Quarry, Prepared for Municipality of Kiama, City of Shoalhaven, Cleary Bros (Bombo) Pty Limited. Cleary Bros (Bombo), Port Kembla, October.

Kevin Mills & Associates (2018). Tenth Annual Report, Flora and Fauna Monitoring Surveys, Gerroa Sand Quarry, Municipality of Kiama. Report prepared for Cleary Bros. (Bombo) Pty Ltd, June.

Department of Primary Industries (2023). NSW WeedWise, June.

Plates

Plate 1: Blackberry Bush (*Rubus fruticosus* spp. *aggregate*) growing within Subzone 1.4

Plate 2: Moth Vine (*Araujia sericifera*) growing on a Swamp Oak (*Casuarina glauca*) tree, found within Subzone 1.4

Plate 3: Wild Tobacco Bush (*Solanum mauritianum*) found within Subzone 2A.2

Plate 4: Swamp Oak (*Casuarina glauca*) planting that has been grazed, with the tree guard still in place, Subzone 2C.1

Plate 5: Giant Reed (*Arundo donax*) growing along the trackside within Zone 1.1 and 2C.1

Plate 6: Fireweed (*Senecio madagascariensis*) growing along the roadside within Zone 4

Plate 7: Lantana (*Lantana camara*) found within Zone 7

Appendix 1: Selected Conditions of Approvals

Condition 17

The Proponent shall:

(b) ensure that within four years of the date of this approval, the additional plantings in the Northern Corridor and Southern Rehabilitation Area are comprised of at least 60% of the plant species recorded for the representative plant communities in the quarry extension area, such as Bangalay Sand Forest and Littoral Rainforest.

Condition 20

The proponent shall:

(a) commence Compensatory Planting and the vegetation screen along the Crooked River Road frontage north of the east-west link within 12 months of the date of this approval or when sufficient propagation material has been collected; and

(b) not sever the east-west link until it can be demonstrated to the satisfaction of the director-general that the established communities represented in the northern corridor comprise at least 60% of the native flora species as set out in Appendix 6 and the Northern Corridor is successful according to the criteria in Condition 25 to the satisfaction of the director-general."

Condition 23

Successful establishment of the Northern Corridor shall be measured by the following criteria:

(a) presence of native flora species;

(b) a majority of the flora species recorded from the removed forest occur in the area (e.g. 60% of flora species recorded in removed forest are present);

(c) species from all four layers have been planted and at least 50% of the projected cover has been achieved for each of the shrub and ground cover layers;

(d) self-sustaining native plant populations (e.g. regeneration of a second generation);

(e) no dominance by single flora species (e.g. Bracken);

(f) weeds are not significantly impacting on the native vegetation;

(g) weeds do not represent a majority of the flora species or a higher percentage cover than the native flora species; and

(h) impacts such as grazing are excluded from the area.

Condition 24

Successful establishment of fauna habitat in the Northern Corridor would be measured by:

(a) presence of species;

(b) a majority of the resident species recorded from the removed forest occur in the area;

(c) fauna populations are resident in the area;

(d) pest animals are controlled and not impacting upon the fauna or its habitat; and

(e) impacts such as grazing are excluded from the area.

Condition 25

Prior to the severance of the East-West Link the Proponent shall:

(a) determine the presence of species in both the East-West Link and Northern Corridor by conducting standard animal survey techniques at least twice in the first year (e.g. Elliot trapping for small mammals, pitfall trapping for reptiles, observational surveys for frogs and birds, and spotlighting transects for arboreal animals);

(b) determine whether a majority of animal species (particularly those determined to be likely to be impacted by fragmentation) utilising the corridor in the East-West Link are present in the conservation area and the Northern Corridor and the re-created link at the northern boundary.

Appendix 2: Priority weeds for the South East region

Note: the South East region includes the local council areas of Bega Valley, Eurobodalla, Goulburn, Mulwaree, Hilltops (eastern), Kiama, Queanbeyan-Palerang Regional, Shellharbour, Shoalhaven, Snowy Monaro Regional, Upper Lachlan, Wingecarribee, Wollongong and Yass Valley.

WARNING: ALWAYS READ THE LABEL

Users of agricultural or veterinary chemical products must always read the label and any permit, before using the product, and strictly comply with the directions on the label and the conditions of any permit. Users are not absolved from compliance with the directions on the label or the conditions of the permit by reason of any statement made or not made in this information. To view permits or product labels go to the Australian Pesticides and Veterinary Medicines Authority website www.apvma.gov.au

Common name	Scientific name	Duty under *Biosecurity Act* 2015	Action
African Lovegrass	*Eragrostis curvula*	Regional Recommended Measure Land managers reduce impacts from the plant on priority assets.	Spot spray new growth if any arise with a 360g/L Glyphosate based herbicide at a diluted rate of 10ml/Litre of water.
Asparagus fern	*Asparagus aethiopicus*	General Biosecurity Duty All plants are regulated with a general biosecurity duty to prevent, eliminate or minimise any biosecurity risk they may pose. Any person who deals with any plant, who knows (or ought to know) of any biosecurity risk, has a duty to ensure the risk is prevented, eliminated or minimised, so far as is reasonably practicable. Prohibition on certain dealings Must not be imported into the state, sold, bartered, exchanged or offered for sale.	Main methods of control include excluding plants from uninfested areas, physical removal of all plants parts, and herbicide application. Spot spraying is most successful when completed between flowering and berries forming. Spot spray using 360g/L Glyphosate based herbicide at a rate 1 part glyphosate to 50 parts water.

Common name	Scientific name	Duty under *Biosecurity Act* 2015	Action
Bitou bush	*Chrysanthemoides monilifera* subsp. *rotundata*	**Biosecurity Zone** The Bitou Bush Biosecurity Zone is established for all land within the State except land within 10 kilometres of the mean high water mark of the Pacific Ocean between Cape Byron in the north and Point Perpendicular in the south. Within the Biosecurity Zone this weed must be eradicated where practicable, or as much of the weed destroyed as practicable, and any remaining weed suppressed. The local control authority must be notified of any new infestations of this weed within the Biosecurity Zone.	Mature bitou bush plants can be slashed, whilst seedlings can be hand-pulled to remove the entire root system. Plants are liable to resprout after slashing alone, but applying herbicide to stems immediately after cutting should prevent regrowth. Use cut and paint methods or spot spray using 360g/L Glyphosate based herbicide at a diluted rate of 5 or 10ml/Litre of water.
Blackberry	*Rubus fruticosus* species aggregate	**Prohibition on dealings** Must not be imported into the State or sold, bartered, exchanged or offered for sale. *All species in the Rubus fruiticosus species aggregate have this requirement, except for the varietals Black Satin, Chehalem, Chester Thornless, Dirksen Thornless, Loch Ness, Murrindindi, Silvan, Smooth Stem, and Thornfree.*	Not to be mulched with native species to reduce spread. A combination of slashing or hand removal and spot spraying with a 360g/L Glyphosate based herbicide at a diluted rate of 10ml/Litre of water.
Cassia	*Senna pendula* var. *glabrata*	**General Biosecurity Duty** All plants are regulated with a **general biosecurity duty** to prevent, eliminate or minimise any biosecurity risk they may pose. Any person who deals with any plant, who knows (or ought to know) of any biosecurity risk, has a duty to ensure the risk is prevented, eliminated or minimised, so far as is reasonably practicable.	Spot spraying is recommended for seedlings and plants less than 2 m tall in dense infestations. Cut and paint methods should be used on taller or individual plants. Dried seed pods can be burnt in a hot fire. Contact your local council for further advice on how to dispose of seed pods. For spot spray and cut and paint methods use 360g/L Glyphosate at a diluted rate of 20 ml/Litre of water.

Common name	Scientific name	Duty under *Biosecurity Act* 2015	Action
Common thornapple	*Datura stramonium*	General Biosecurity Duty All pest plants are regulated with a **general biosecurity duty** to prevent, eliminate or minimise any biosecurity risk they may pose. Any person who deals with any plant, who knows (or ought to know) of any biosecurity risk, has a duty to ensure the risk is prevented, eliminated or minimised, so far as is reasonably practicable.	Common thornapple can be controlled by herbicides, mulching, slashing, hand-pulling or chipping. Preventing plants from seeding is the most effective way to control it. For chemical control of small infestations use Glyphosate 450 g/L in a handgun spray at a rate of 400 to 560 mL per 100 L of water.
Coral tree	*Erythrina crista-galli*	General Biosecurity Duty All plants are regulated with a **general biosecurity duty** to prevent, eliminate or minimise any biosecurity risk they may pose. Any person who deals with any plant, who knows (or ought to know) of any biosecurity risk, has a duty to ensure the risk is prevented, eliminated or minimised, so far as is reasonably practicable.	Seedlings can be removed by hand or be dug out. Cut stump method or stem injection is recommended for mature plants. This involves cutting the trunk or making an injection into the trunk and applying herbicide within 15 seconds. For chemical control use 360g/L Glyphosate at a rate of 1 part glyphosate and 1.5 parts water.
Crofton weed	*Ageratina adenophora*	General Biosecurity Duty All plants are regulated with a **general biosecurity duty** to prevent, eliminate or minimise any biosecurity risk they may pose. Any person who deals with any plant, who knows (or ought to know) of any biosecurity risk, has a duty to ensure the risk is prevented, eliminated or minimised, so far as is reasonably practicable.	Crofton weed can be controlled using a combination of methods, in conjunction with pasture and grazing management practices, aimed at creating an unfavourable environment for weed invasion. Small infestations can be manually removed. For larger infestations a combination of slashing and chemical application is used. When spraying Crofton weed use 360g/L Glyphosate based herbicide at a rate of 5 ml/Litre of water.
Fireweed	*Senecio madagascariensis*	Regional Recommended Measure **Exclusion zone:** whole of region except the core infestation area of Wollongong, Kiama, Shellharbour,	Herbicides are most effective in combination with healthy, competitive pastures. The best time to treat

Common name	Scientific name	Duty under *Biosecurity Act* 2015	Action
		Eurobodalla, Shoalhaven, Bega Valley and Wingecaribee councils. **Whole region**: Land managers should mitigate the risk of new weeds being introduced to their land. The plant should not be bought, sold, grown, carried or released into the environment. **Exclusion zone:** The plant should be eradicated from the land and the land kept free of the plant. **Core area:** Land managers reduce impacts from the plant on priority assets.	fireweed with herbicide is late autumn. This controls the peak numbers of seedlings and young plants. Spot spray with a 600g/kg Metsulfuron-methyl (Brush off), a broad leaf selective herbicide to avoid harming native grasses, at a diluted rate of 1g/10L of water.
Giant Reed	*Arundo donax*	**General Biosecurity Duty** All plants are regulated with a **general biosecurity duty** to prevent, eliminate or minimise any biosecurity risk they may pose. Any person who deals with any plant, who knows (or ought to know) of any biosecurity risk, has a duty to ensure the risk is prevented, eliminated or minimised, so far as is reasonably practicable.	Cut and paint using 360g/L Glyphosate at a diluted rate of 1 part glyphosate to 1.5 parts of water.
Lantana	*Lantana camara*	**Regional Recommended Measure** **Exclusion zone**: whole region excluding the core infestation area of Eurobodalla, Kiama, Shellharbour, Wollongong and the Shoalhaven local government area north of the Lantana Containment Line at 35'11"42 S **Whole region**: Land managers should mitigate the risk of new weeds being introduced to their land. The plant should not be bought, sold, grown, carried or released into the environment.	Gradually control sections of large infestations, starting at the edges. Dry or frosty periods are good times to work on mature lantana plants, treat regrowth or seedlings before they are 1 m high and control young plants before they are a year old to prevent new fruit and seeds. **Chemical control:** Cut stems off at about 15 cm from the ground. Apply herbicide to the cut surface of the stump within 15

Common name	Scientific name	Duty under *Biosecurity Act* 2015	Action
		Exclusion zone: The plant should be eradicated from the land and the land kept free of the plant. Core area: Land managers reduce impacts from the plant on priority assets.	seconds. Treat every cut stem because lantana regrows vigorously from untreated stems or a variety of spot spray especially on new growth if any arise with a 360g/L Glyphosate based herbicide at a diluted rate of 10ml/Litre of water.
Maderia Vine	*Anredera cordifolia*	General Biosecurity Duty All plants are regulated with a **general biosecurity duty** to prevent, eliminate or minimise any biosecurity risk they may pose. Any person who deals with any plant, who knows (or ought to know) of any biosecurity risk, has a duty to ensure the risk is prevented, eliminated or minimised, so far as is reasonably practicable. Prohibition on dealings Must not be imported into the State or sold.	Successful control of Madeira vine requires all the tubers and bulbils to be removed or killed. Control activities are long-term, and require regular follow-up for many years. Single control activities generally cause disturbance that results in vigorous regrowth and can lead to worse infestation levels unless dedicated follow-up occurs.
Moth Vine	*Araujia sericifera*	General Biosecurity Duty All plants are regulated with a **general biosecurity duty** to prevent, eliminate or minimise any biosecurity risk they may pose. Any person who deals with any plant, who knows (or ought to know) of any biosecurity risk, has a duty to ensure the risk is prevented, eliminated or minimised, so far as is reasonably practicable.	Cut and paint using 360g/L Glyphosate at a diluted rate of 20 ml/Litre of water.
Tobacco Bush	*Solanum mauritianum*	General Biosecurity Duty All plants are regulated with a **general biosecurity duty** to prevent, eliminate or minimise any biosecurity risk they may pose. Any person who deals with any plant, who knows (or ought to know) of any biosecurity risk, has a duty	Cut and paint using 360g/L Glyphosate at a diluted rate of 20 ml/Litre of water.

Common name	Scientific name	Duty under *Biosecurity Act* 2015	Action
		to ensure the risk is prevented, eliminated or minimised, so far as is reasonably practicable.	

Contact us

info@niche-eh.com
niche-eh.com

NSW Office

Sydney: Dharug Country
02 9630 5658
L3, 93 George St
Parramatta NSW 2150

QLD Office

Brisbane:
Turrbal and Jagera Country
07 2104 8594 Ground Floor,
Suite 3 North Tower
527 Gregory Terrace
Fortitude Valley QLD 4006

VIC Office

Melbourne:
Wurundjeri Country
0488 224 036
Level 3, 162 Collins Street
Melbourne VIC 3000

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