Build something great™

Dunmore Lakes Sand Project Annual Review

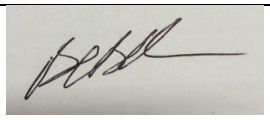
1 July 2023 – 30 June 2024

Name of operation	Boral Dunmore Lakes Sand Project
Name of operator	Boral Resources (NSW) Pty Ltd
Development consent	DA-195-8-2004
Name of holder of development consent	Boral Resources (NSW) Pty Ltd
Water licence number	WAL24477
Name of holder of water licence	Boral Resource (NSW) Pty Ltd
Name of holder of EPL	Boral Resources (NSW) Pty Ltd
Annual Review start date	1 July 2023
Annual Review end date	30 June 2024

I, Brodie Bolton , certify that this audit is a true and accurate record of the compliance statues of the Dunmore Lakes Sand Project for the period of the 2024 Financial Year and that I am authorised to make this statement on behalf of Boral Resources (NSW) Pty Ltd.

Note

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.

Name of authorised reporting officer	Brodie Bolton
Title of authorised reporting officer	Quarry Manager
Signature	
Date	30/09/2024

Document Control				
Ref	Prepared by	Approved by	Date	Distribution
V1.0	Matt Bray		30/09/2024	DPHI, Shellharbour Council, CCC members

Contents

Tables and Figures

List of Abbreviations

ANZECC	Australian and New Zealand Environment Conservation Council
AQMP	Air Quality Management Plan
AR	Annual Review
AS	Australian Standard
BFMP	Bushfire Management Plan
BMP	Blast Management Plan
BOS	Biodiversity Offset Strategy
CCC	Community Consultative Committee
DA 195-8-2004	The development application for the Dunmore Lakes Sand Project operated by Boral Resources (NSW) Pty Ltd
DLSP	Dunmore Lakes Sand Project
DO	Dissolved Oxygen
DPIE	Department of Planning, Industry and Environment
EPA	Environmental Protection Authority
EPA&A Act	Environmental Planning and Assessment Act 1979
EPL 11147	Environmental Protection Licence for the Dunmore Lakes Sand Project operated by Boral Resource (NSW) Pty Ltd
FFMP	Flora and Fauna Management Plan
FY24	Financial Year 2024 (1 July 2023 – 30 June 2024)
GMMP	Groundwater Monitoring Management Plan
HVAS	High Volume Air Sampler
IEA	Independent Environmental Audit
LOR	Limit of Reporting
MOD	Modifications
ML	Megalitres
NATA	National Association of Testing Authorities
NMP	Noise Management Plan
NRAR	Natural Resource Access Regulator
NTU	Nephelometric Turbidity Units
PASS	Potential Acid Sulphate Soil
PIRMP	Pollution Incident Response Management Plan
PM_{10}	Particulate Matter (10 microns in diameter)
$PM_{2.5}$	Particulate Matter (2.5 microns in diameter)
POEO Act	Protection of the Environment Operations Act 1997
RMP	Rehabilitation Management Plan

S5.C9	Used to refer to a particular condition in DA-195-8-2004 (in this case Schedule 5, Condition 9).
TSP	Total Suspended Particulates
TSS	Total Suspended Solids
VENM	Virgin Excavated Natural Materials
WMP	Water Management Plan
WQO	Water Quality Objectives
µg/m^3	Micrograms per cubic metre

1. Purpose and Scope

This Annual Review (AR) covers the operation of the Dunmore Lakes Sand Project for the period 1st July 2023 to 30th June 2024 and has been prepared in accordance with the latest Department of Planning, Housing and Infrastructure guidelines. In addition to determining the compliance of the development with the conditions of the consent, DA 195-8-2004 Schedule 5 Condition 9 (S5.C9) requires that the AR reports on specific components of the operation in regard to performance and compliance.

DA 195-8-2004 S5.C9 and all other relevant conditions required to be addressed as part of the AR are outlined in Table 1 with reference to the section of this report where each condition has been addressed. The timeframe for the annual review is the 2024 Financial Year which is 1 July 2023 – 30 June 2024.

Table 1 Consent Requirements for Annual Review

Condition	Condition Requirements	Where addressed in this report
5(9)	By the end of September each year, or other timing as may be agreed by the Planning Secretary, the Applicant must review the environmental performance of the development to the satisfaction of the Planning Secretary. This review must:	
	(a) Describe the development (including rehabilitation that was carried out in the previous financial year, and the development that is proposed to be carried out over the current financial year,	Section 4.8
	(b) Include a comprehensive review of the monitoring results and complaints records of the development 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 consent; • The monitoring results of previous years; and • The relevant predictions in the documents listed in condition 2(c) of Schedule 2;	Section 4
	(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 reoccurrence;	Section 1.1
	(d) evaluate and report on:	Section 4

	• the effectiveness of the noise and air quality management systems; and • compliance with the performance measures, criteria and operating conditions of this consent;	
	(e) Identify any trends in the monitoring data over the life of the development;	Section 4
	(f) Identify any discrepancies between the predicted and actual impacts of the development, 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 development.	Section 4
	The Applicant must ensure that copies of the Annual Review are submitted to the Planning Secretary and Council and are available to the Community Consultative Committee (see condition 6 of Schedule 5) and any interested person upon request.	
3(21)	The Applicant must report on water extracted from the site each year (direct and indirect) in the Annual Review, including water taken under each water licence.	Section 4.5
3(27)	The Applicant must ensure that the flood storage capacity of the site is no less than the pre-existing flood storage capacity at all stages of the development. Details of the available flood storage capacity must be reported in the Annual Review.	Section 4.6
3(57)	The Applicant must maximise the use of rail transport for delivery/despatch outside the Illawarra Region, to the satisfaction of the Secretary. Details of transportation modes and measures to assess and encourage rail transport must be provided in the Annual Review.	Section 2.5 and 2.6
3(64)	The Applicant must (a) manage on-site sewage treatment and disposal in accordance with the requirements of an applicable EPL, and to the satisfaction of EPA and Shellharbour Council; (b) minimise the waste generated by the development; (c) ensure that the waste generated by the development is appropriately stored, handled, and disposed of; and	Section 4.9

	(d) report on waste minimisation and management in the Annual Review.	
3(72)	The Applicant must: (e) Provide annual production data to the MEG using the standard form for that purpose; and (f) Include a copy of this data in the Annual Review.	Section 2.5

1.1. Statement of Compliance

The statement of compliance for the current reporting period (1 July 2023–30 June 2024) is contain in Table 2 below

Table 2 Statement of Compliance

Were all conditions of the relevant approval(s) complied with?	
DA-195-8-2004	No

Four non-compliances were identified in the reporting period arising from the Dunmore Lakes Sand Project (DLSP) development activities. A number of observations are recorded in Table 3, where certain external events led to impacts in the DLSP monitoring data. The DPIE Annual Review Guidelines Compliance Status key is outlined in Table 3.

Table 3 Annual Review Compliance Key

Relevant Approval	Condition #	Condition Description	Compliance Status	Comments	Section addressed
DA 195-8-2004	S3.C24	Applicant must ensure that water quality in the dredge ponds and groundwater comply with the water quality objectives (WQO) in Table 7 or other such levels as approved by the secretary.	Low Exceedances are attributed to external events not associated with the Development.	Turbidity, Salinity and Chloride at DW27 (Stage 5B) were outside the WQO described in S3.C24. The Salinity and Chloride exceedances were attributed to the permeation of saline water into the dredge pond that increases salts and conductivity.	Section 4.4 (see Surface Water). Section 4.7, Appendix D (see groundwater)

Relevant Approval	Condition #	Condition Description	Compliance Status	Comments	Section addressed
		Note: The Department acknowledges that short term exceedances of these objectives may occur during natural events such as heavy rainfall or tidal saline water inflow		The Turbidity exceedance was marginal. Short term exceedances are acknowledged in S3 C24 Table 5 Note and may occur. As described in the groundwater monitoring report and section 4.7 a number of exceedances of various analytes occur within the groundwater bores against Site specific trigger values These exceedances are considered natural occurrences, and /or related to tidal impacts.	
DA 195-8-2004	S3.C23	Except as may be expressly provided by an EPL, the Applicant must ensure that the discharges from any licenced discharge point/s do not cause additional exceedances of the criteria in Table 4 (6.5 < pH <	Low Exceedance is attributed to follow on effects of a major rain event. The discharge was uncontrolled and not associated with the operations of the Development .	An exceedance of the TSS limit of 50 was recorded in April 2024 at surface water sampling site DW16 during an uncontrolled discharge. This was a single occurrence, and can be attributed to continued runoff after a 251mm rainfall event in April from surrounding paddocks that contributed to the	Section 4.4.2.2

Relevant Approval	Condition #	Condition Description	Compliance Status	Comments	Section addressed
		8.5; TSS < 50).		uncontrolled discharge.	
DA 195-8-2004	S3.C24	Applicant must ensure that water quality in the dredge ponds and groundwater comply with the water quality objectives (WQO) in Table 7 or other such levels as approved by the secretary. Note: The Department acknowledges that short term exceedances of these objectives may occur during natural events such as heavy rainfall or tidal saline water inflow	Low Exceedances are attributed to external events not associated with the Development.	There were several minor exceedances of the Groundwater WQO's over the reporting period, all of which were short term and likely responses to rain events and tidal influences. Should any persistent exceedances be noted, they will be duly investigated.	Section 4.7.2
DA 195-8-2004	S3.C48	Within 6 months of the approval of Modification 2, the Applicant must lodge an updated Conservation and Rehabilitation Bond with the	Administrative	The Conservation and Rehabilitation Bond was not lodged within the prescribed time frame. A Show Cause was received followed by a PIN.	

Relevant Approval	Condition #	Condition Description	Compliance Status	Comments	Section addressed
		Department to ensure that the biodiversity offset, compensatory habitat and rehabilitation requirements of the site are implemented in accordance with the performance and 20 completion criteria set out in the Flora and Fauna Management Plan, Rehabilitation Management Plan and the relevant conditions of this consent. The sum of the bond must be an amount agreed by the Planning Secretary and determined by: a) calculating the full cost of implementing the biodiversity offset and			

Relevant Approval	Condition #	Condition Description	Compliance Status	Comments	Section addressed
		compensatory habitat requirements of the consent at third party rates (other than land acquisition costs); b) calculating the cost of rehabilitating all disturbed areas of the site, taking into account the likely surface disturbance over the next 3 years of quarrying operations; and c) employing a suitably qualified, independent and experienced person to verify the calculated costs.			

Risk Level	Colour Code	Description
High	Non-compliant	Non-compliance with potential for significant environmental consequences, regardless of the likelihood of occurrence

Medium	Non-compliant	Non-compliance with: • potential for serious environmental consequences, but is unlikely to occur; or • potential for moderate environmental consequences, but is likely to occur
Low	Non-compliant	Non-compliance with: • potential for moderate environmental consequences, but is unlikely to occur; or • potential for low environmental consequences, but is likely to occur
Administrative	Non-compliant	Only to be applied where the non-compliance does not result in any risk of environmental harm (e.g. submitting a report to government later than required under approval conditions)

Copies of the AR will be submitted to the DPHI, Shellharbour Council, members of the CCC and made available to the public at on the DLSP operations website:

https://www.boral.com.au/locations/boral-dunmore-operations

Key contacts associated with the management of the DLSP, environment, safety and stakeholder relationships are provided in Table 4.

Table 4 Key Contacts Associated with the Dunmore Lakes Sand Project

Contact	Position	Contact Details
Brodie Bolton	DSS Quarry Manager	(02) 4237 8414 Email: brodie.bolton@boral.com.au
Angus Shedden	Metropolitan Operations Manager NSW/ACT	(02) 4237 8414 Email: angus.shedden@boral.com.au
Matt Bray	Environmental Coordinator Dunmore	Tel: (02) 4237 8414 Email: matt.bray@boral.com.au
Kate Woodbridge	Stakeholder Relations Manager	Tel: (02) 4237 8414 Email: kate.woodbridge@boral.com.au

2. Site Operations

The Dunmore Lakes Sand Project (DLSP) is an established dredge sand extraction operation at Dunmore, in the Illawarra region of New South Wales. It is owned by Dunmore Sand & Soil Pty Ltd, which is a wholly owned subsidiary of Boral Resources (NSW) Pty Ltd (Boral).

The project is an integral part of the NSW construction industry, as it supplies high quality construction sand products to the Illawarra and Greater Sydney regions. The DLSP has a maximum approved production rate of up to 800,000 tonnes per annum and average historical production rate of 450,000 tonnes per annum. It has historically been capable of supplying around 7.5% of the sand required for Sydney's construction industry, however production during the 2023 reporting period was impacted by flooding and the transition to the new Stage 5 area.

Development Consent (DA 195-8-2004) was issued 29 June 2005 for stages 2, 3 and 4 by the Minister for Infrastructure and Planning and in November 2020 for Stage 5. It allows Boral to produce up to 800,000 tonnes of product per year, and transport it offsite by road and rail to local and regional markets.

The project is currently operating under development consent DA 195-8-2004, which has been modified three times as summarised below, and allows Boral to carry out sand extraction and processing operations until 2030.

- Modification 1 (granted in June 2016) which involved modifying S3.C10 of the consent to remove the requirement for the creek realignment to occur prior to commencing Stage 3 extraction. This allowed realignment to be carried out a later date, concurrent with extraction operations as per the private landowners request;
- Modification 2 (granted in November 2020) which involved establishing two new extraction areas, known as Stages 5A and 5B, within the existing approved life of the operations. These proposed extraction areas are situated on a private property located between the Princes Highway, Riverside Drive and the Minnamurra River;
- Modification 3 (granted in March 2020) which involved permitting the processing, blending and sale of up to 120,000 tonnes per annum of sand based VENM (known as excavation sand) from ongoing building projects within the surrounding regions.

The development consent DA 195-8-2004 as it currently stands allows Boral to:

- extract, process and transport sand products, including through the:
    - extraction of up to 800,000 tonnes of sand per annum until 2030;
    - development of extraction areas for dredging in Stages 2 to 5;
    - processing of extracted sand and up to 120,000 tonnes per annum of suitable imported Virgin Excavated Natural Material (VENM) to produce construction sand products;
    - road and rail transport of product sand, primarily to the Illawarra and Greater Sydney regions;
- construct and operate a range of ancillary infrastructure at the site, including:
    - a processing plant;
    - product stockpiles;

- access roads; and
- supporting administrative infrastructure.

- Undertake progressive rehabilitation via the importation of VENM material for the purposes of void reclamation and revegetate as per the approved Rehabilitation Management Plan.

A layout of the site is illustrated in Figure 1. Please note that Stage 1 operations have ceased and rehabilitation was signed off in 2014. Stages 2 and 3 are not currently undergoing extraction and rehabilitation is underway.

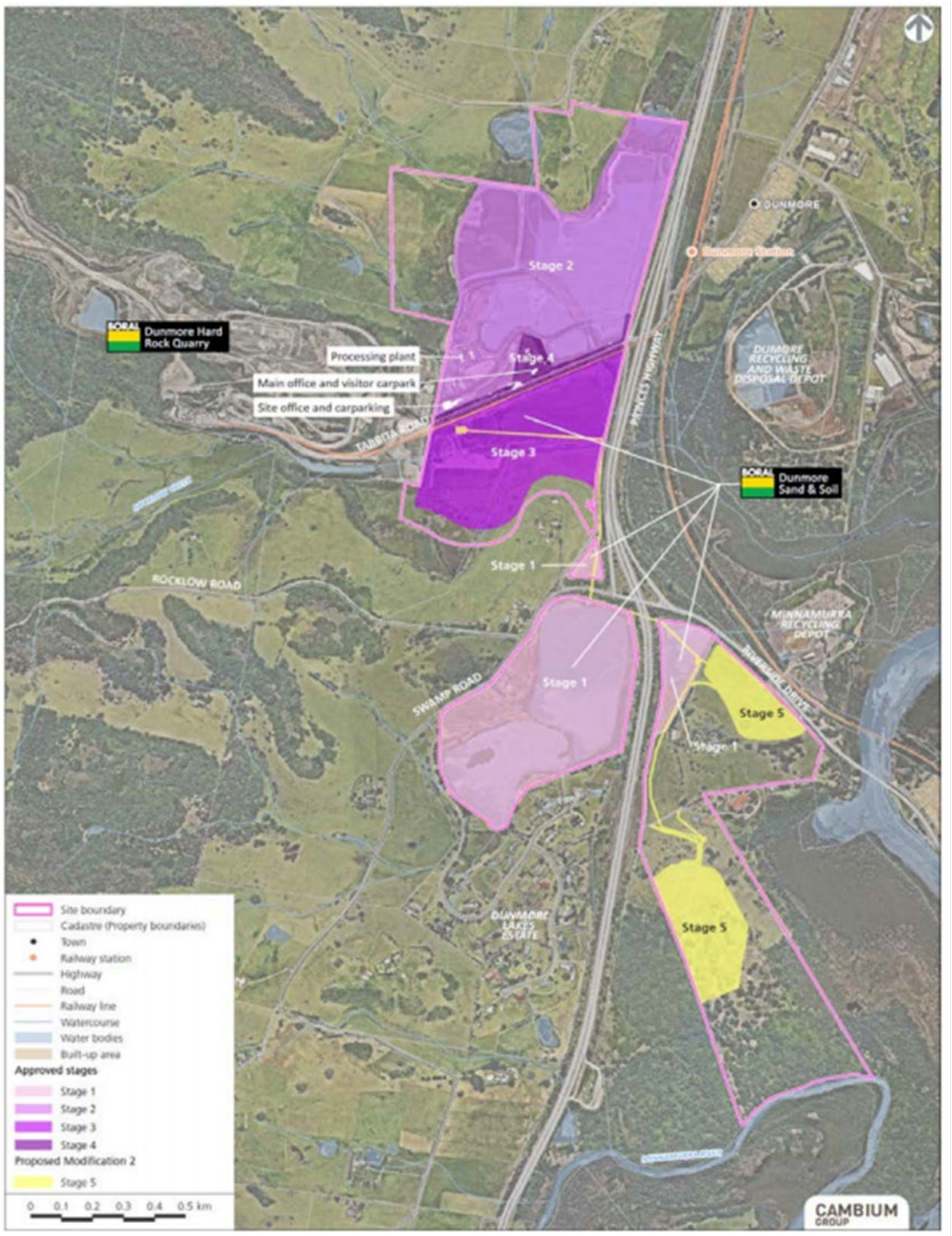


Figure 1 Dunmore Lakes Sand Project Site Layout

2.1. List of Relevant Approvals

A summary of all the relevant approvals relevant to DLSP are provided in Table 5.

Table 5 Dunmore Lakes Sand Project List of Relevant Approvals

Approval Type	Approval Authority	Approval No.	Date Granted
Development Consent	Department of Planning & Environment	195-8-2004 (as modified)	29/06/2005
Environment Protection Licence	Environment Protection Authority	11147	04/05/04
Water Extraction Licence	Natural Resource Access Regulator (NRAR)	WAL24477	01/02/2018
Controlled Activity Approval	Natural Resource Access Regulator (NRAR)	10CX123242 (10 ERM2010/1116) 10CX122266	5/08/2019 18/12/2018

2.2. Modifications Approved in the Last 12 Months

No additional modifications have been sought to the current approval over the 2024 reporting period. The current consent allows for an additional extraction area (Stage 5) to the south of the former Stage 1 extraction area which was commenced during the previous reporting period. Stage 5 encompasses an area of 38 hectares (ha) and includes two separate extraction areas, Stage 5A and Stage 5B. The sand resource to be extracted from Stage 5A is estimated at 234,000 t and approximately 1,123,000 t from Stage 5B. These resource volumes are the estimated sand resource only, and additional tonnage of soil material (known as overburden) will be extracted in addition to the sand resource.

An overland transfer pipeline has been established from the Stage 5 extraction areas to the existing Stage 2 processing area. This pipe was transferred from Stage 5A to Stage 5B once extraction activities commenced. At the Stage 2 processing area, the sand and water passes over an initial screen to separate oversize organic matter or debris and into a large wash tank to float out any fines. The sand is then be pumped through a cyclone and stockpiled for further dewatering. Water drains to an existing fines pond and a secondary settling pond before being pumped back to the Stage 5B dredge pond.

Dewatered sand is then loaded with a front-end loader for dispatch by road and rail. Water pumped from the Stage 5 extraction areas is returned to these extraction areas via the transfer pipeline. Mobile plant and equipment is operated across both extraction areas. Extraction methods are identical to those used in Stages 2 and 3.

Approved management plans are available on the Dunmore website https://www.boral.com.au/locations/boral-dunmore-operations

2.3. Operations last 12 months

Sand production has commenced from Stage 5B, during the last 12 months.

Rehabilitation of Stage 5A has continued with the backfilling of VENM as weather and market conditions have allowed.

Backfilling and rehabilitation has continued in Stages 2 and 3 and will continue during the coming reporting periods.

2.4. Operations next 12 months

The dredge will continue to excavate deeper in its current location at Stage 5B, and produce sand for our customers.

The backfilling and final rehabilitation of Stage 5A will be completed.

Rehabilitation of Stages 2 and 3 will continue.

There are no planned changes to plant operations, with sand continuing to be processed in the existing stage 2 processing area.

2.5. Production, Sales and Transport

A summary of production for the current reporting period is shown below in Table 6. The current reporting period production data as reported to the Department of Resources and Geoscience (DRG) is shown in Table 7.

Table 6 Current Reporting Period Production Data

Month	Production (t)	Sales (t)
July 23	9,800	10,386
Aug 23	16,300	10,395
Sept 23	27,734	10,000
Oct 23	34,068	17,464
Nov 23	36,004	19,603
Dec 23	27,141	13,984
Jan 24	29,227	11,577
Feb 24	35,071	14,991
Mar 24	34,109	21,016
Apr 24	29,657	14,899
May 24	35,278	17,560

Jun 24	36,868	13,797
Total	351,257	175,672

Table 7 Current Reporting Period Production Data as Reported to DRG

Product	Quantity Tonnes current reporting period
Virgin Materials Crushed Coarse Aggregates	
Over 75mm	
Over 30mm to 75mm	
5mm to 30mm	
Under 5mm	
Natural Sand	
Manufactured Sand	
Prepared Road Base & Sub Base	
Other Unprocessed Materials	
Construction Sand Excluding Industrial	**351,257**
Industrial Sand	
Foundry, Moulding	
Glass	
Other (Specify)	
TOTAL SITE PRODUCTION	**351,257**

2.6. Production Sales and Transport Next 12 Months

Production will continue in a similar trajectory over the next 12 months with extraction from Stage 5B continuing.

3. VENM intake will continue at both Stage 5A and at Stage 2.Actions to be completed from the Last Annual Review

Table 8 lists specific actions from the 2022/23 AR that were required to have been undertaken during the 2022/23 reporting period.

Table 8 Completed Actions (FY23 Annual Review)

Aspect	Actions Taken	Section Discussed
Continue rehabilitation monitoring of planted sections of Swamp Oak Forest and Freshwater Wetland EEC in Stage 2 and Re-aligned Western Tributary.	Rehabilitation and Maintenance of planted sections by licenced bush regenerators has continued. Progress photos are included in Appendix E.	Appendix E
Continue backfilling and landform construction in Stage 2 and 3.	Backfilling of Stage 3 Eastern edge has continued using VENM. Stage 2 has been backfilled with a combination of VENM and PASS.	Section 4.4.2.3 and 4.9
Continue Swamp Oak Forest planting along the edge of Stage 2.	Swamp Oak Forest planting and growth continues and further planting has been confirmed for October 2024.	
Plant out a further section of Swamp Oak forest on the eastern edge of Stage 2.	Planting of Swamp Oak Forest has been confirmed for October 2024. Delays until October were implemented to optimise establishment opportunities for the plants.	
Continue assessing salinity in the southern section of Stage 3 as per the recommendations in the DLSP EIS.	Salinity has been observed to decrease as dredging ceased in the southern section of Stage 3 and the saline section of Rocklow Creek.	Section 4.4.4, 4.13 and 4.14
Proceed with Stage 5 operations as per the associated management plans	Stage 5 Operations underway.	
Undertake Independent Environmental Audit as per condition of consent.	Independent Environmental Audit was completed.	
Update Stage 2-4 Water Management for the use of site specific trigger values as per the independent auditor recommendations and to align with Stage 5 Soil and Water Management Plan. The updated plans will be combined into a one Soil and Water Management Plan	Water Management Plan has been updated.	

Establish ecological assessment program in relation to the use of nest boxes as per Rehabilitation Management Plan. Expand Dunmore Quarry real time monitoring alert system once established to include DSS operations.	Ecological Assessment Program has been established – first round of Nest Box inspections confirmed for September 2024. Real time monitoring alert system currently under trial.	

4. Environmental Performance

DLSP has comprehensive management and monitoring programs, which collect information and data to enable the assessment of environmental impacts, regulatory compliance and performance against continual improvement objectives. Specific Management Plans define the framework for measuring environmental performance and compliance with statutory requirements for each relevant aspect of environmental performance

4.1. Meteorological Monitoring

An onsite weather station is located at DLSP which collects a range of meteorological parameters. This system was upgraded as part of the transition to real time air quality monitoring at Dunmore Quarry. The location of the weather station is shown in Appendix A.

There is currently no prescribed impact assessment criteria associated with the weather station monitoring data, with the meteorological monitoring used to provide background information for the management of the site. A detailed summary of the current reporting period and historical rainfall data can be found in Appendix A.

4.1.1. Meteorological Monitoring - Long Term Analysis and Trends

The current reporting period was wetter than average, with 1,616mm of rain falling over the reporting period. The highest volume month was May 2024, which experienced 296mm of rainfall.

Typically winds during the reporting period originated from the west and west-south-west for the majority of the year. In summer, prevailing winds were also from the north-east. These results are mostly consistent with historic trends and generally had a greater concentrations of winds from the west and north-east.

4.1.2. Meteorological Monitoring Summaries and Opportunities for Improvement

The weather station is now capable of providing real time data via download, which is an upgrade from the previous station. The next reporting period will focus on continuing the processes established during the current reporting period.

4.2. Air Quality Monitoring

Two methods of monitoring air quality are used at DLSP. Deposited dust gauges are used to measure the value of deposited dust every 30 days (+/- 2 days). A High Volume Air Sampler (HVAS) is used to measure fine particulate matter under 10 microns (PM_{10}) every 6 days.

The locations of the compliance air quality monitoring locations are shown below. As part of the Air Quality Monitoring Plan (AQMP) the site also monitors the following locations depicted in green in Figure 2 as background data for the Stage 1/Stage 5 operations.

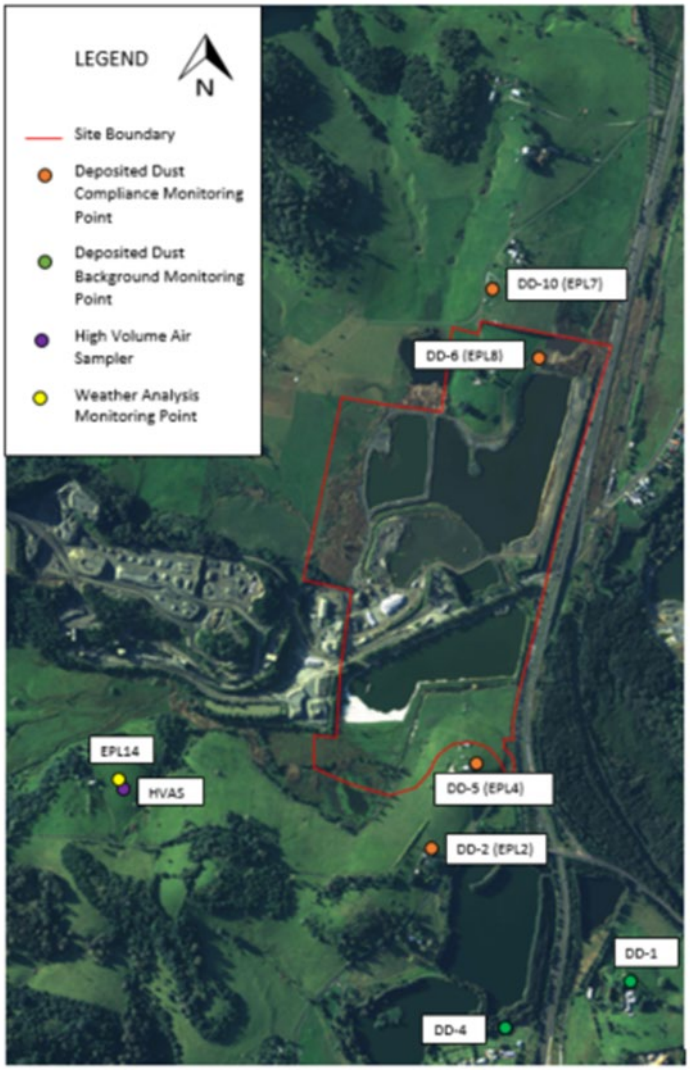


Figure 2 Air Quality Monitoring Locations

4.2.1. Deposited Dust Assessment Criteria

Deposited Dust impact criteria is assessed at a residence located on privately owned land. It is important to note that the assessment criteria refers to an annual averaging period (i.e. the rolling monthly average over the last 12 months).

The Impact Assessment Criteria is shown in Table 9.

Table 9 Deposited Dust Impact Assessment Criteria

Pollutant	Averaging Period	Criterion	
Deposited Dust[c]	Annual	2g/m^2/month[b]	4g/m^2/month[a,d]
[a] Cumulative impacts (i.e. increases in concentration due to development plus all other sources)			

[b] Incremental impact (i.e. increases in concentration alone, with zero allowable exceedances of criteria over the life of the development.

[c] Deposited dust is defined as insoluble solids

[d] Excludes extraordinary events such as bushfires, prescribed burning, dust storms, sea fog, fire incidents or any other activity as agreed by the Secretary.

4.2.2. Deposited Dust Monitoring Performance Review

All air emission monitoring sites were below the required assessment criteria for dust measured as insoluble solids over the annual averaging period. All sites were also below the 4g/m^2/month for the ash fraction, which excludes the organic (combustible) components of the dust sample such as vegetation, bird droppings and insects. These organic contaminants within the sample are typically representative of the surrounding wetlands and farmland areas within which the monitors are located.

A summary of deposited dust results measure at the gauge for the four compliance monitoring points is shown in Table 10 below. Additional dust monitoring is undertaken as background and shown in Table 11.

Table 10 Deposited Dust Compliance Monitoring Summary

Month	DD-2 (EPL2) grams/m^2/month		DD-5 (EPL4) grams/m^2/month		DD-6 (EPL8) grams/m^2/month		DD-10 (EPL7) grams/m^2/month	
	Insoluble Solids	Ash	Insoluble Solids	Ash	Insoluble Solids	Ash	Insoluble Solids	Ash
FY24 average	1.87	0.76	2.50	1.48	1.54	1.03	1.94	0.73
Criteria	4	-	4	-	4	-	4	-

Table 11 Deposited Dust Background Monitoring Summary

Month	DD-1 grams/m^2/month		DD-4 grams/m^2/month	
	Insoluble Solids	Ash	Insoluble Solids	Ash
FY24 average	1.45	0.80	2.04	0.82
Criteria	4	-	4	-

Monitoring sites recorded similar values for insoluble solids, indicating that regional conditions are the largest contributors to measured dust levels rather than development operations at DLSP. These findings are within expectations as resource extraction at DLSP is a wet process.

The DD-4 monitoring location was observed to be significantly higher for insoluble solids than for ash. This is within expectation as the DD-4 monitor is located in the immediate vicinity of the constructed wetlands as part of the Stage 1 rehabilitation at Swamp Road. Often DD-4 has more insects and vegetation within the dust sample, which is reflective of the surrounding land use rather than the DLSP operations.

The DD-1 and DD-4 monitoring locations are not compliance monitoring points, however measured dust as insoluble solids are still below the impact assessment criteria of 4g/m^2/month.

Minor elevated readings were recorded in the month of December 2023 at DD-2, September 2023 at DD-4, December 2023 and January 2024 at DD-5. The wind direction was predominantly from the West in September and December and from the North East in January (see Figure 26 and 27 in Appendix A). These wind directions are not from the direction of DLSP operations at these monitoring locations and are likely reflective of ambient conditions rather than operations. Despite these elevated readings, monitoring results were well below impact assessment criteria and compliance thresholds.

Additionally, there was a very elevated reading in February 2024 at DD-4 of 57.02 g/m^2/month and 29.34 g/m^2/month for Insoluble Solids and Ash respectively. There were no other exceedances recorded for the month of February, and there were no other discernible trends in concentrations between sites. Additionally, this monitor had been previously tampered with, so this was regarded to be an erroneous incident likely related to interference with the monitor.

The rolling 12 month average for insoluble solids at each monitoring location was below 4g/m^2/month, as shown by the green line in Figure 3 to 8. This demonstrates that operations were compliant during most stages of the reporting period despite the external influences.

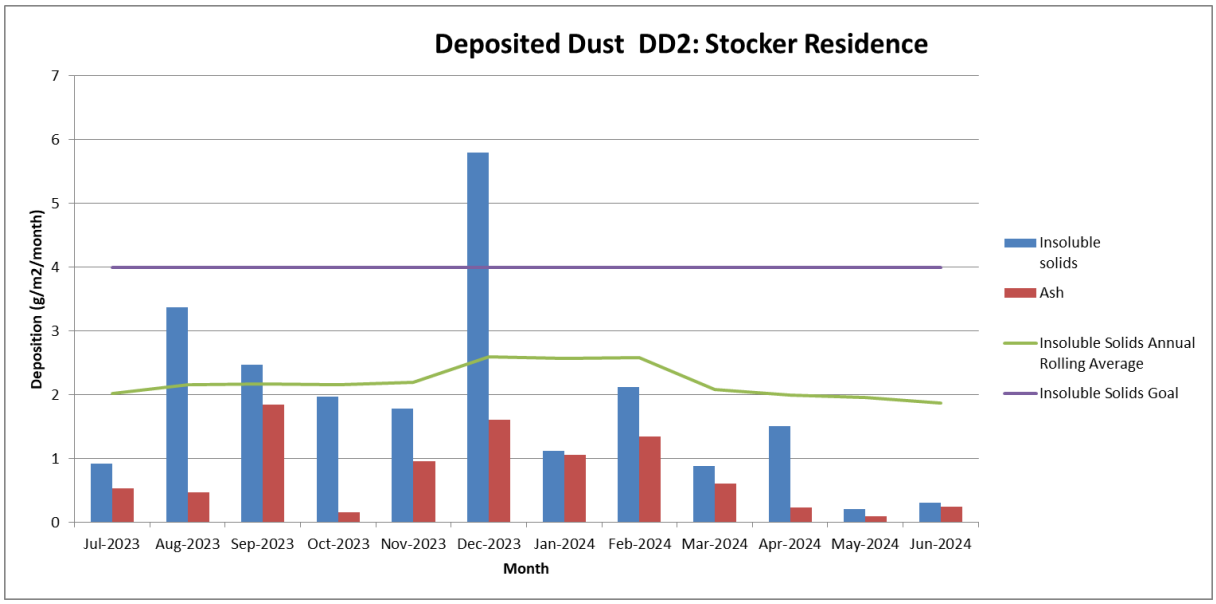


Figure 3 DD-2 Deposited Dust Monitoring Summary

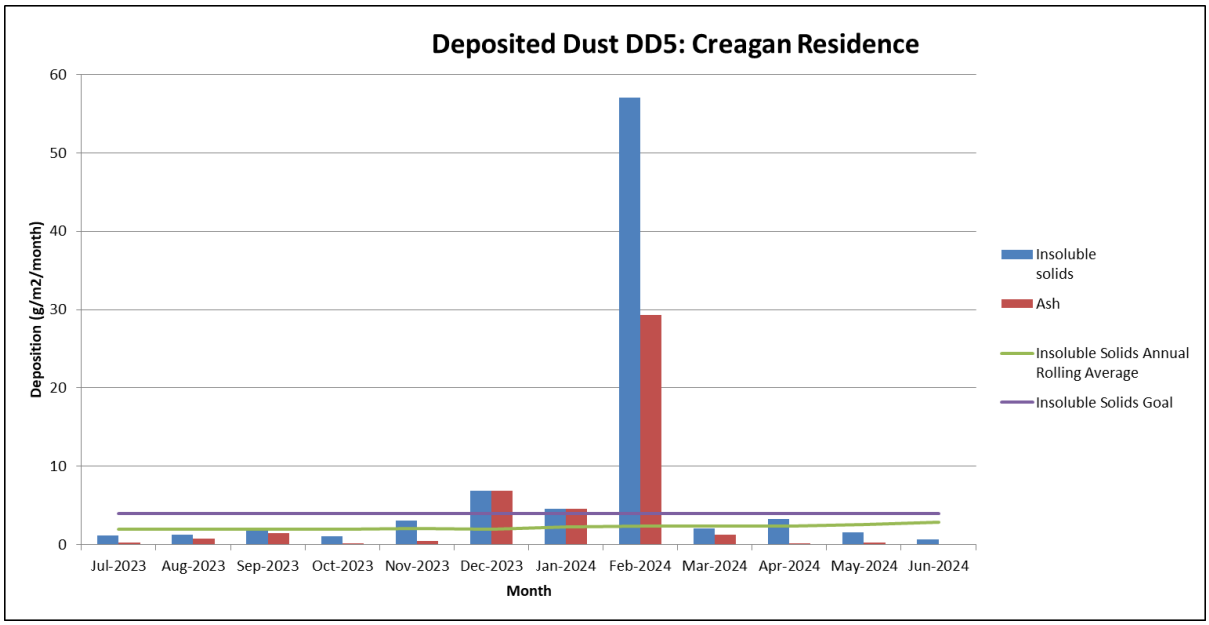


Figure 4 DD-5 Deposited Dust Monitoring Summary

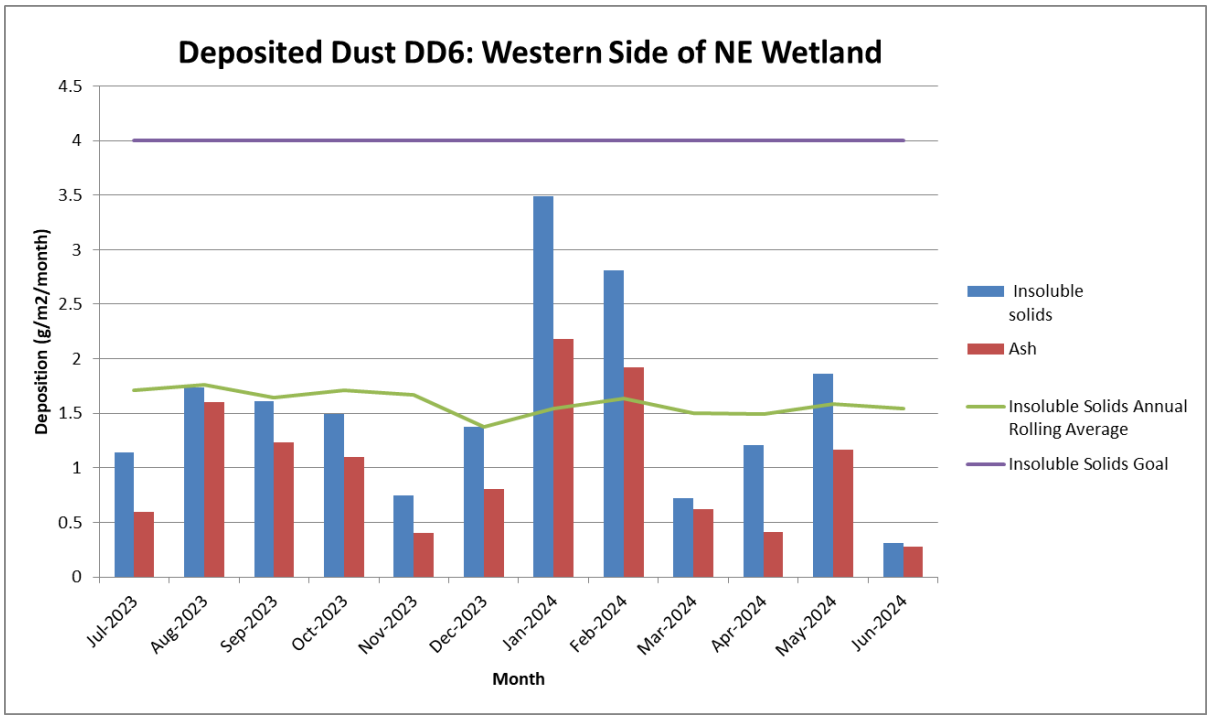


Figure 5 DD-6 Deposited Dust Monitoring Summary

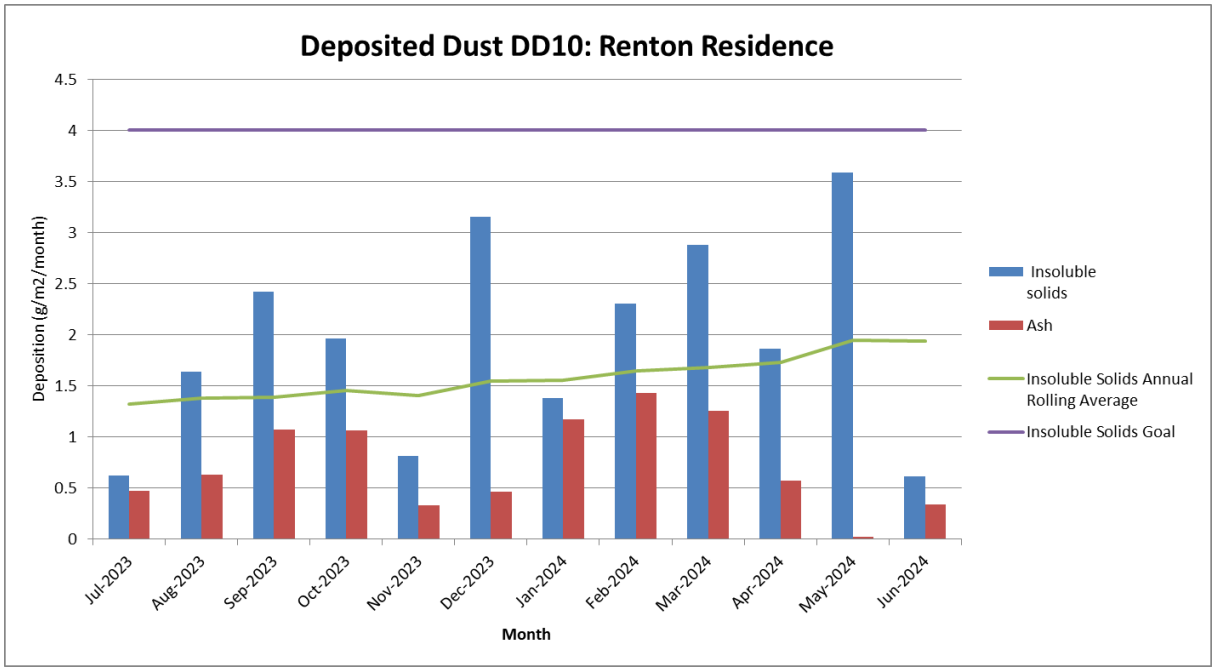


Figure 6 DD-10 Deposited Dust Monitoring Summary

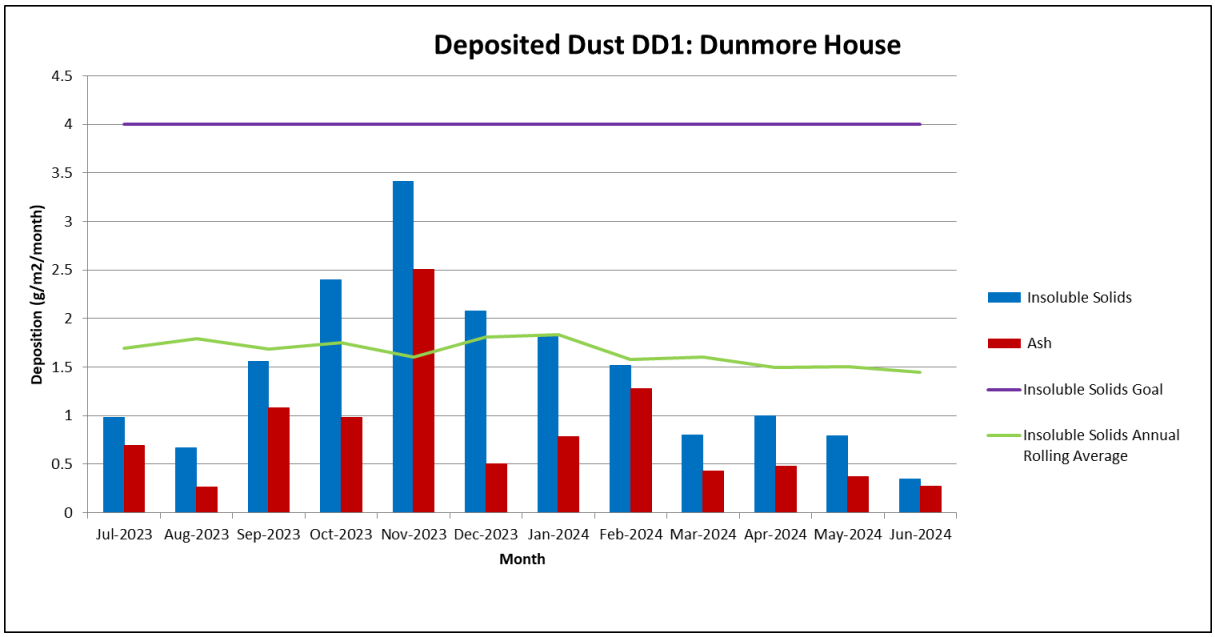


Figure 7 DD-1 Deposited Dust Monitoring Summary

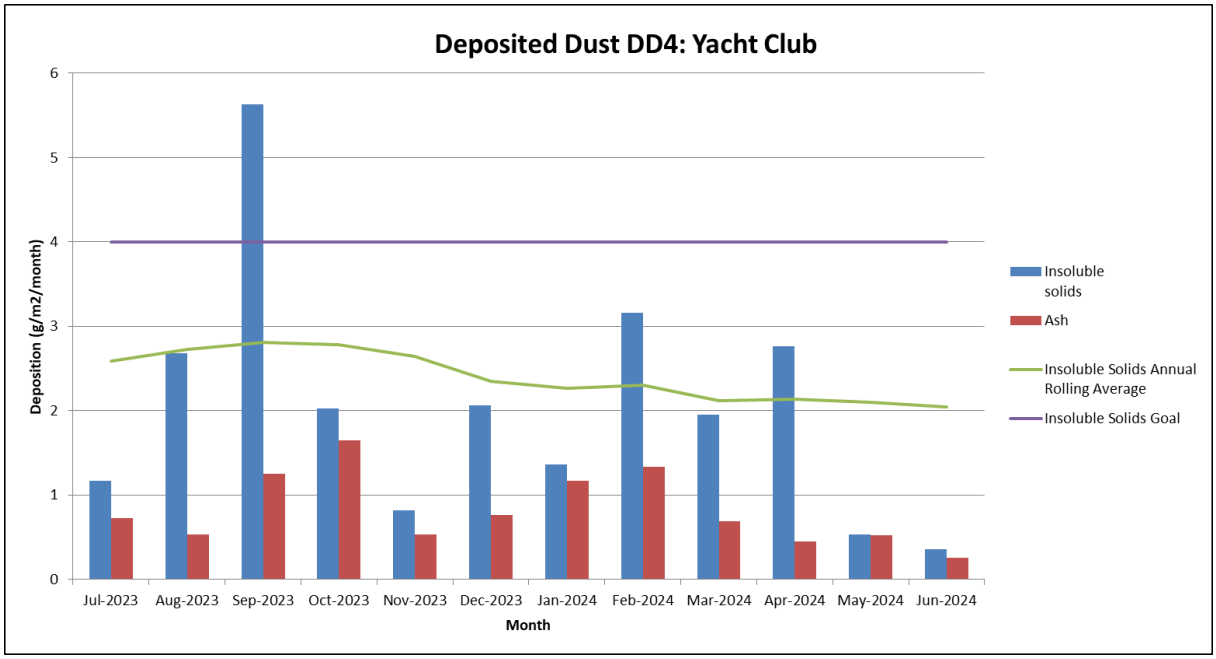


Figure 8 DD-4 Deposited Dust Monitoring Summary

4.2.3. Particulate Monitoring Assessment Criteria

The impact assessment criteria for Particulate Monitoring as per Condition S3.C19 of the consent is shown below in Table 12.

Table 12 Particulate Monitoring Assessment Criteria

Pollutant	Averaging Period	Criterion
PM_{10}	Annual	[a,d] 30 µg/m³
PM_{10}	24 hour	[b] 50 µg/m³
TSP	Annual	[a,d] 90 µg/m³

a Cumulative impacts (ie increases in concentration due to development plus all other sources) b Incremental impact (ie increases in concentration alone, with zero allowable exceedances of criteria over the life of the development. d Excludes extraordinary events such as bushfires, prescribed burning, dust storms, sea fog, fire incidents or any other activity as agreed by the Secretary

4.2.4. Particulate Monitoring Performance Review

PM_{10} readings from the current reporting period can be seen in Figure 9 below.

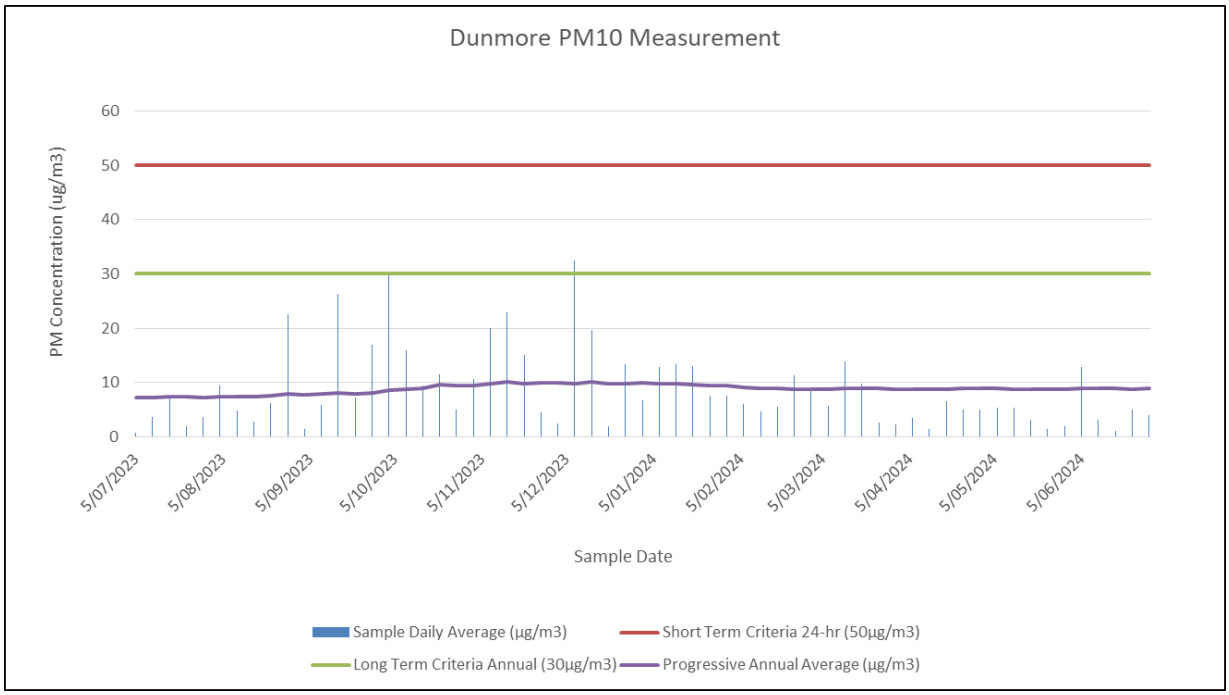


Figure 9 Dunmore PM_{10} Monitoring Summary

The annual average PM_{10} measurement for the reporting period was below the long term impact assessment criteria of 30 µg/m³ for PM_{10} and 90 µg/m³ for TSP. The PM_{10} measurements were also similar to the Albion Park South air quality monitoring station's annual averages.

There were no readings above the short term criteria for PM_{10} of 50 µg/m³.

TSP concentrations are not measured in the vicinity of the quarry, however annual average TSP concentrations can be derived based on typical ratios of PM_{10}:TSP. Rural areas (such as DLSP), typically experience a PM_{10}:TSP ratio of 0.4. This ratio has been applied to the annual average PM_{10} concentrations to derive a representative TSP background concentration in µg/m³. This methodology is in-line with the method used by Ramboll in the MOD 9 Environmental Assessment for the Dunmore Quarry.

Table 13 Summary of Particulate Matter Monitoring Data

Pollutant	Dunmore Quarry current reporting period average (µg/m³)	Albion Park current reporting period average(µg/m³)	Dunmore Quarry Long Term average (µg/m³)
Measured HVAS PM_{10}	8.88	13.4	12.08
Derived TSP	22.2	33.5	30.2

4.2.5. Air Quality Monitoring Long Term Analysis and Trends

A graph of long term trends can be found in Figure 10 below and typically shows that deposited dust observed at the site has decreased over time.

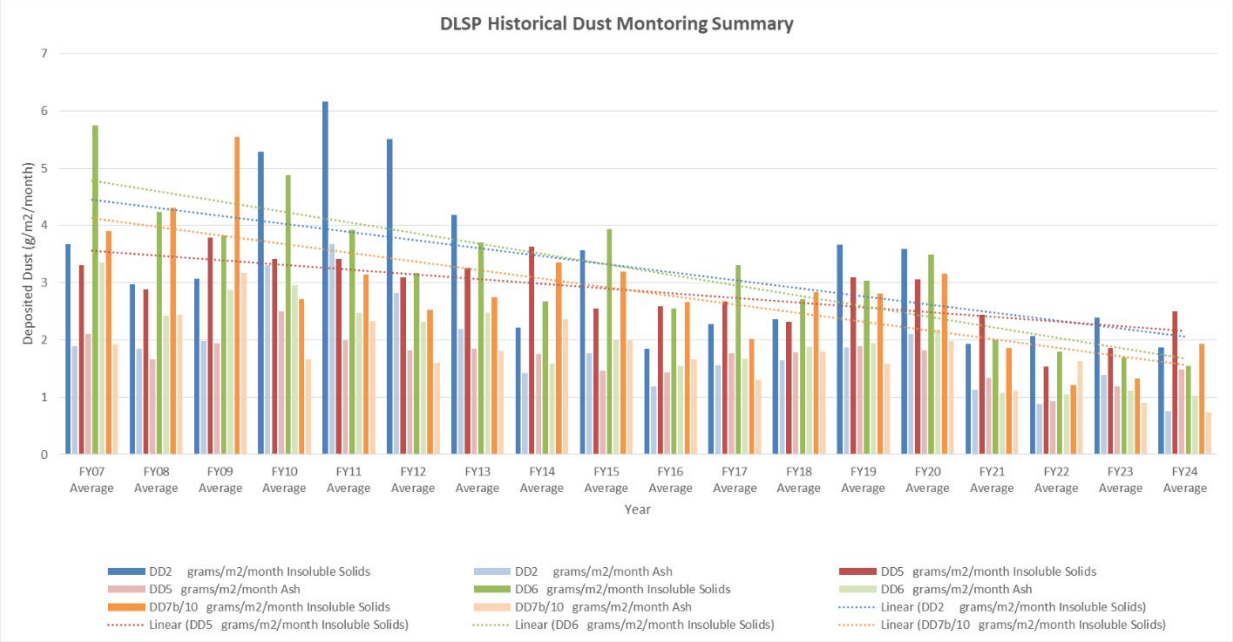


Figure 10 Historical Deposited Dust Trends

A general trend that has been observed, is that measured deposited dust is typically higher in dry summer months than winter months, which is to be expected. This trend is also confirmed by the PM_{10} measurements and is generally reflective of regional conditions as a whole.

Figure 11 shows a 90 day average in black, which illustrates a seasonal fluctuation of measured PM_{10} values. A trend can be observed whereby PM_{10} values are typically higher during summer dry periods and are lower during the winter periods.

This fluctuation is mirrored in the OEH Albion Park PM_{10} monitor available on the OEH website (https://www.dpie.nsw.gov.au/air-quality/air-quality-data-services/data-download-facility).

These trends indicate the measured PM_{10} and deposited dust values are typically influenced by ambient local conditions rather than development operations at DLSP.

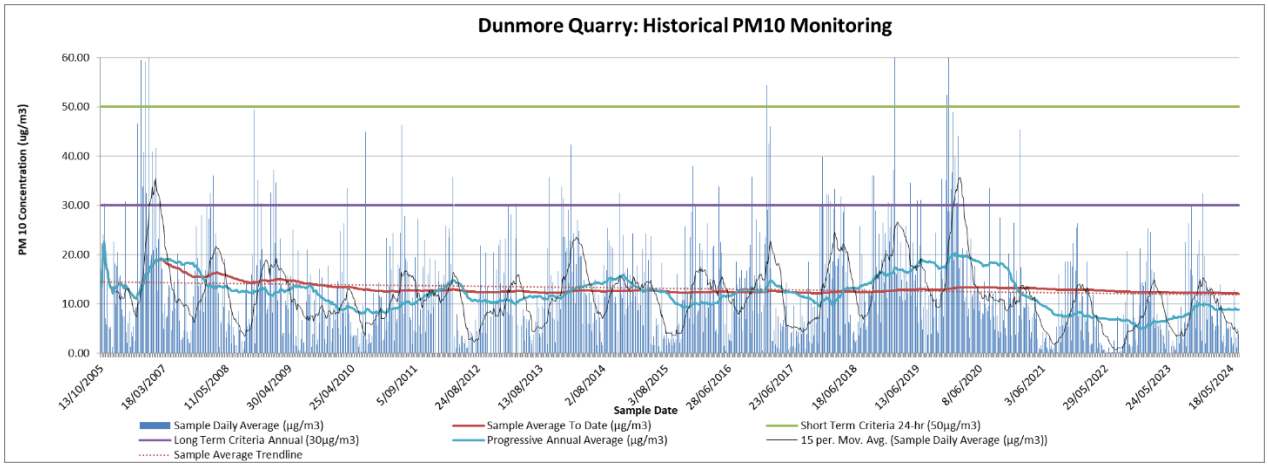


Figure 11 PM_{10} Historical Monitoring Trends

4.2.6. Air Quality Monitoring Summary and Opportunities for Improvement

Deposited dust measurements were observed to occur below the impact assessment criteria for all compliance monitoring points. Derived TSP and PM_{10} measurements were generally observed to be below the impact assessment criteria for all time periods. Analysis of long term monitoring trends typically suggest that local ambient regional conditions have a greater impact on air quality results than DLSP operations.

Resource extraction at DLSP occurs as a wet operation via dredging with an associated low risk of mobilising dust or particulate matter. Dust mitigation methods and controls on site have been effective at minimising any generated dust or particulate matter.

As part of the updated AQMP, DLSP will utilise the real time dust monitoring network from the adjacent Boral Dunmore Quarry operations. A monitor has been located adjacent to the Stage 5 extraction area. This will allow a proactive approach in identifying and reacting to adverse meteorological and air quality conditions as per the approved trigger action response plan which forms part of the Air Quality Management Plan.

4.3. Noise Monitoring

Annual Noise Monitoring is undertaken during winter each year to determine the contribution by DLSP to noise impacts experienced at nearby private residences. The annual noise monitoring undertaken during the current reporting period indicated compliance with the relevant noise limits.

4.3.1. Noise Monitoring Impact Assessment Criteria

Associate noise limits extracted from L3.1 in EPL 11147 and S3.C13 from DA 195-8-2004 are reproduced below in Table 14.

Table 14 Summary of Noise Monitoring Data

Table 4 Attended Monitoring Locations and Consent Criteria

ID[2]	Description[3]	Day[1]	Evening[1]	Night[1]	Morning Shoulder[1]
		dB LAeq(15min)	dB LAeq(15min)	dB LAeq(15min)	dB LAeq(15min)
DN-6	Renton	46	43	37	46
DN-7	Dunmore Village	49	44	41	47
DN-8	Stocker (R20)	49	44	38	47
DN-9	R17	48	43	38	48
DN-10	R14	48	43	38	48
DN-11	R11	48	43	38	48
DN-12	R3	48	43	38	48
DN-13	R4	47	43	38	43

Note 1: Day - the period from 7am to 6pm Monday to Saturday or 8am to 6pm on Sundays and public holidays; Evening - the period from 6pm to 10pm; Night - the remaining periods and the morning shoulder period is from 6am to 7am.

Note 2: Referenced from DLSP NMPv7 Figure 3 and Figure 4.

Note 3: Referenced from DLSP NMPv7 Table 7.

Table 5 Attended Monitoring Locations and Maximum Noise Trigger Levels

ID[2]	Description[3]	Night (10pm - 12am)	Morning Shoulder (6am - 7am)
		dB LAmax	dB LAmax
DN-9, DN-10, DN-11 and DN-12	R1, R2, R3, R11, R12, R13, R14, R15, R16, R17 and R18	61	
DN-13	R4, R5, R6, R7, R8, R9, R10	53	
DN6, DN7 and DN-8	Renton, Dunmore Village and Stocker	N/A	

Note 1: Referenced from DLSP NMPv7 Table 8.

Note 2: Referenced from DLSP NMPv7 Figure 1, Figure 2, Figure 3 and Figure 4.

Note 3: Referenced from DLSP NMPv7 Table 7.

4.3.2. Noise Monitoring Performance Review

Noise monitoring was conducted in accordance with the Noise Management Plan (V5) and in general accordance with the NSW Environment Protection Authority (EPA), Noise Policy for

Industry (NPfI). The results of the monitoring are summarised within the Annual Noise Monitoring Assessment 2023, prepared by Muller Acoustic Consulting Pty Ltd and included in Appendix C.

The report includes a compliance assessment summary for each monitoring location (refer table 14) which is excerpted in Table 15. It illustrates that annual noise monitoring data complied with project noise limits described all times.

Table 15 Annual Compliance Noise Monitoring Report

Table 14 Noise Compliance Assessment Summary

Location	Estimated Noise Contribution dB $LA_{eq(15min)}$			Criteria dB $LA_{eq(15min)}$		Compliant		
	Day (Round 1)	Day (Round 2)	Evening	Day	Evening	Day (Round 1)	Day (Round 2)	Evening
DN-6	<46	<46	<43	46	43	✓	✓	✓
DN-7	<40	<42	<44	49	44	✓	✓	✓
DN-8	<37	<36	<40	49	44	✓	✓	✓
DN-9	<34	<35	<38	48	43	✓	✓	✓
DN-10	<31	<31	<32	48	43	✓	✓	✓
DN-11	<37	<38	<34	48	43	✓	✓	✓
DN-12	<45	<43	<34	48	43	✓	✓	✓
DN-13	<41	<43	<37	47	43	✓	✓	✓

Note: Day - the period from 7am to 6pm Monday to Saturday or 8am to 6pm on Sundays and public holidays; Evening - the period from 6pm to 10pm; Night - the remaining periods and the morning shoulder period is from 6am to 7am.

Table 15 Noise Compliance Assessment Summary

Location	Estimated Noise Contribution				Criteria				Compliant			
	Night		Morning Shoulder		Night		Morning Shoulder		Night		Morning Shoulder	
	dB $LA_{eq(15min)}$	dB LA_{max}	dB $LA_{eq(15min)}$	dB LA_{max}	dB $LA_{eq(15min)}$	dB LA_{max}	dB $LA_{eq(15min)}$	dB LA_{max}	dB $LA_{eq(15min)}$	dB LA_{max}	dB $LA_{eq(15min)}$	dB LA_{max}
DN-6	<33	n/a	<46	n/a	37	n/a	46	n/a	✓	n/a	✓	n/a
DN-7	<40	n/a	<47	n/a	41	n/a	47	n/a	✓	n/a	✓	n/a
DN-8	<33	n/a	<30	n/a	38	n/a	47	n/a	✓	n/a	✓	n/a
DN-9	<29	<29	<42	<42	38	61	48	61	✓	✓	✓	✓
DN-10	<33	<33	<48	<48	38	61	48	61	✓	✓	✓	✓
DN-11	<34	<34	<44	<44	38	61	48	61	✓	✓	✓	✓
DN-12	<31	<31	<42	<42	38	61	48	61	✓	✓	✓	✓
DN-13	<33	<33	<42	<42	38	53	43	53	✓	✓	✓	✓

Note: Day - the period from 7am to 6pm Monday to Saturday or 8am to 6pm on Sundays and public holidays; Evening - the period from 6pm to 10pm; Night - the remaining periods and the morning shoulder period is from 6am to 7am.

4.3.3. Noise Monitoring Long Term Analysis and Assessment

Attended noise readings have typically remained stable or decreased slightly in the last 10+ years as seen in Figure 12 below. Noise monitoring results were generally higher in the current reporting period, despite lower production volumes and operations compared to the previous reporting period. It is important to note that noise monitoring was still within the compliance limits prescribed.

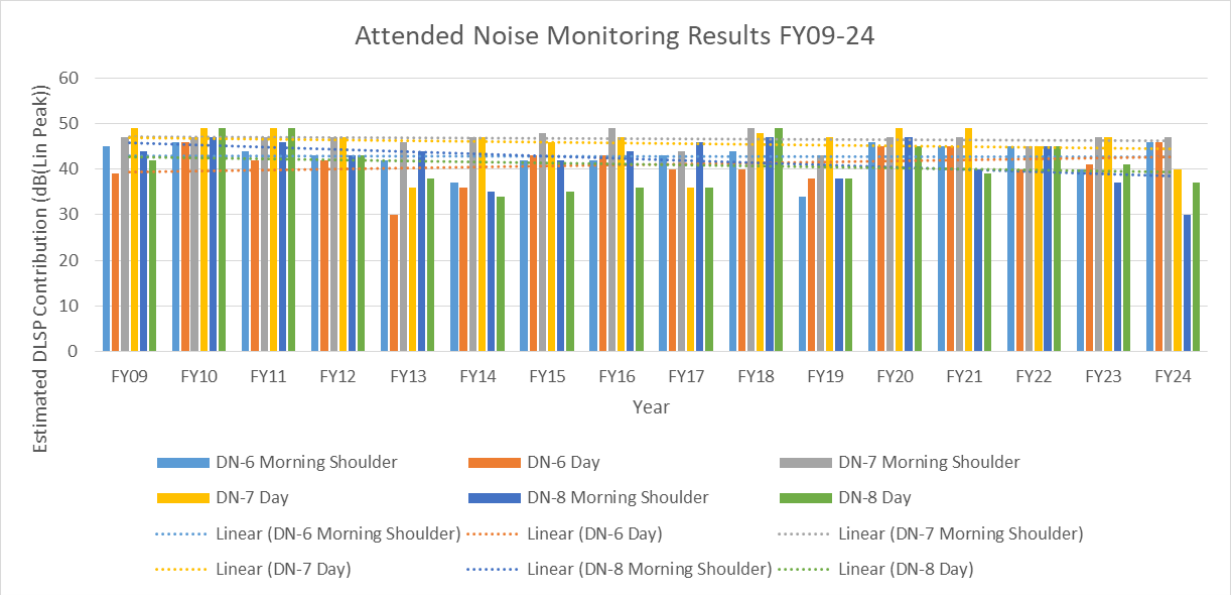


Figure 12 Noise Monitoring Historical Noise Monitoring Trends

4.3.4. Noise Monitoring Summary and Opportunities for Improvement

The noise monitoring results were within compliance limits during the current reporting period.

Immediate access to weather data facilitated by the weather station has allowed the site to improve their processes in reacting to adverse meteorological conditions, which may affect noise impacts on nearby sensitive receptors, such as temperature inversions.

4.4. Surface Water Monitoring

Project related water monitoring locations are shown in shown in Figure 13. Monitoring locations denoted by "*" have a variable location due to dredging operations. Monitoring is undertaken on a monthly basis, consistent with EPL 11147 requirements.

Monitoring is also undertaken in the Stage 2 dredge pond during the placement of Potential Acid Sulphide Soils (PASS) for rehabilitation. The required frequency described in condition E1-E11 in EPL 11147 is daily for a period of 30 days for surface waters. Monitoring then reverts back to weekly frequency until PASS is received again. To date, PASS has only been placed in the Stage 2 pond so this is the only monitoring location that has been activated for this frequency.

Discharge water quality monitoring indicated compliance with the impact criteria at the licenced discharge point of the site at DW16 (EPL9), during all periods except for one day (11 April 2024), when an exceedance for TSS was recorded. It was concluded that this was due to flooding and no further action was taken by the EPA. Additionally, monthly monitoring results for the dredge ponds were observed to align with predicted EIS results.

The WQO for most parameters within the dredge ponds were met within the reporting period. Typically, water quality within the operational ponds and discharge points were of better quality

than those at upstream locations with the exception of salinity and associated parameters.

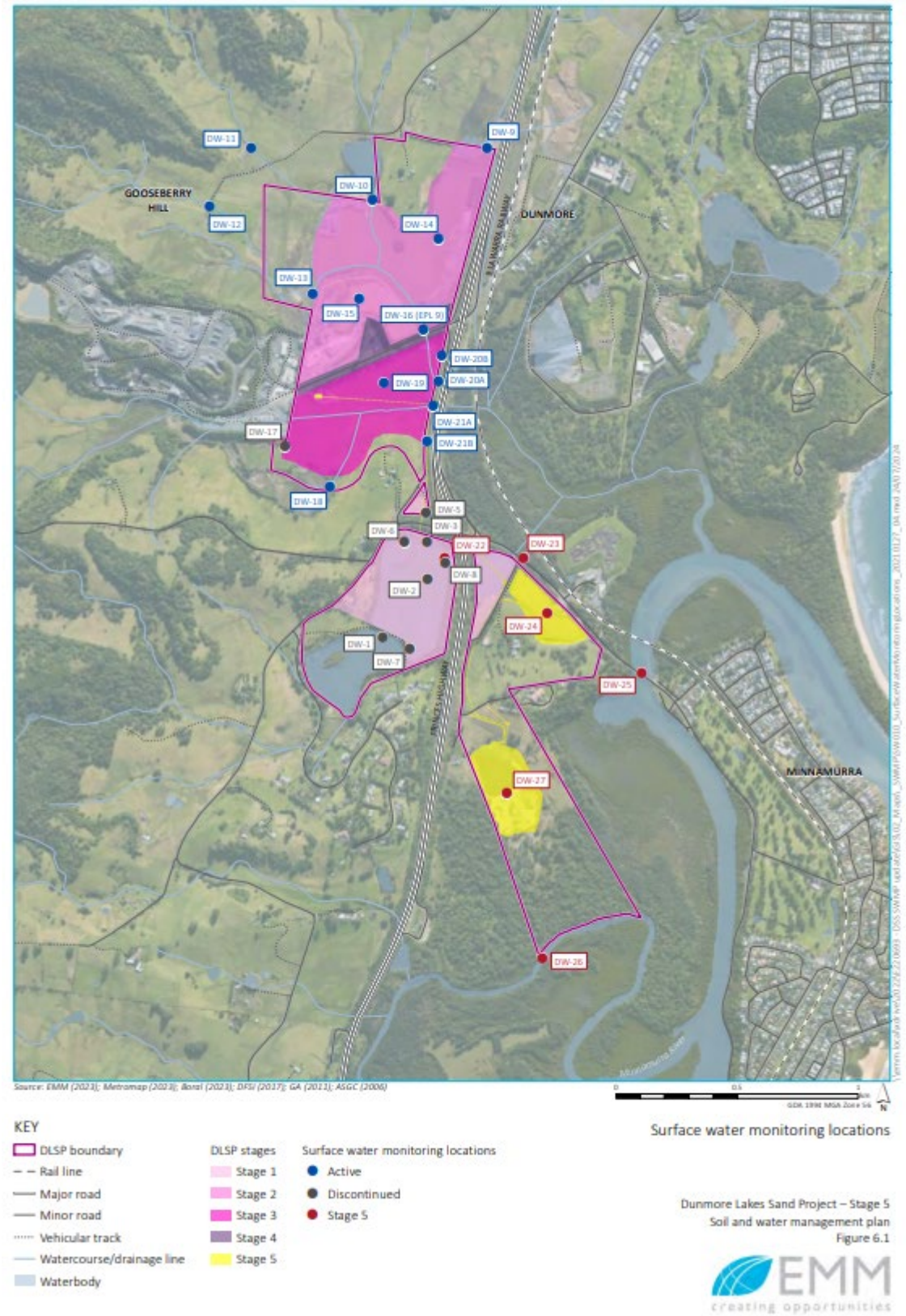


Figure 13 Surface Water Monitoring Locations

4.4.1. Surface Water Quality Impact Criteria

Prior to FY24, 5 EPL water monitoring points were in place.

Discussions with the EPA saw monitoring limited to only 1 EPL location as listed below. This location monitors water discharged from operations.

The other 4 monitoring points were background samples outside of the operations. Boral continues to monitor these locations but no longer as EPL discharge points.

There is 1 compliance monitoring point listed in EPL 11147

- DW 16 (EPL9) – Discharge of waters from Stage 2 pond.

Discharge water quality criteria for DW16 is detailed in S3.C23 of DA-195-8-2004 and is reproduced below in Table 16.

Table 16 Water Discharge Impact Assessment Criteria

Pollutant	Unit of measure	Total Suspended Solids (mg/L)
Total Suspended Solids	mg/L	50
pH	pH	+/- 1.0 of background (6.6-8.6)

With the commencement of Stage 5B operations, there are two water quality compliance operational monitoring points at DLSP. These are the dredge pond in Stage 5B (DW27) and the Stage 2 Discharge (DW16). The Water Quality Objectives (WQO) associated with the dredge ponds is detailed below in Table 17.

Table 17 Dunmore Lakes Sand Project Water Quality Objectives

Pollutant	Unit of Measure	Water Quality Objective
Turbidity	NTU	5-20
pH	pH	6.5 – 8.5
Salinity	µS/cm	<1,500
Dissolved oxygen	mg/L	>6
Total phosphorus	µg/L	5-50
Total nitrogen	µg/L	100-500
Chorophyll-a	µg/L	2-10
Faecal coliforms	Median No./100mL	<1000
Enterococci	Median No./100mL	<230
Algae and blue-green algae	No.cells/mL	<15,000
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	mg/L	20

DPIE has acknowledged that short term exceedances of these objective may occur during natural events such as heavy rainfall or tidal saline water flow. This notation is important in consideration of the tidal inflow that occurs at the DLSP development, which subsequently impacts the water quality results for the site.

Additional monitoring points are collected as part of the approved Water Management Plan, to provide additional background water quality data for water entering the DLSP operational area and are summarised below:

- DW-9 Upstream of Stage 2 Eastern Tributary
- DW-10 Upstream of Stage 2 Northern Tributary
- DW-11 Background monitoring for Stage 2 tributary – Holcim discharge
- DW-12 Background monitoring for Western Tributary
- DW-13 Background monitoring for Upstream of Stage 2 Western Tributary
- DW-14 Stage 2 Pond
- DW 15a Fines Pond
- DW-18 Rocklow Creek downstream
- DW-19 Stage 3 Pond
- DW-20b Background monitoring for runoff from Stage 2 under the culvert
- DW-21a Background monitoring for the man-made Rocklow Creek channel
- DW-22 Background monitoring for Stage 1
- DW-23 Background monitoring for Rocklow Creek Tributary – Ruth Devenney Reserve
- DW-24 Stage 5A Pond
- DW25 Background monitoring for Minnamurra River upstream of Stage 5
- DW26 Background monitoring for Minnamurra River downstream of Stage 5
- DW27 Stage 5B Pond

4.4.2. Surface Water Monitoring Performance Review

4.4.2.1. Ambient Monthly Monitoring

A summary of the water quality monitoring points is shown below in Table 18. These are average values to reflect the overall compliance for the reporting period.

The dredge pond (DW-27) and discharge point (DW16) are shown in grey. Parameters outside of the water quality objectives for compliance monitoring sites are shown in **red**. Monitoring sites in white are upstream monitoring locations and are monitored for background purposes only.

Table 18 Surface Monitoring Summary (red denotes an exceedance of the relevant criteria)

Sample ID	pH	Turbidity (NTU)	TSS (mg/L)	EC (µS/cm)	Sulfate (mg/L)	Chloride (mg/L)	Iron (mg/L)	Potassium (mg/L)	Magnesium (mg/L)	Sodium (mg/L)	Total Phosphorus (µg/L)	Ammonia -N (mg/L)	Bicarbonate Alkalinity (mg/L)	Total Nitrogen (mg/L)	Dissolved Oxygen (mg/L)	Faecal Coliforms (CFU/100mL)	Enterococci (CFU/100mL)	Total Algae (cells/ml)	Chlorophyll-a (mg/m3)*
DW9	7.7	13.2	15.3	362.0	22.8	52.6	0.5	3.1	8.0	33.2	0.1	0.0	72.6	0.5	8.1	59	1.6	3467	16
DW10	7.1	9.4	20.3	317.0	15.0	52.2	0.7	2.5	8.2	31.2	0.1	0.0	67.2	0.5	8.0	25138	4.5	1330	25
DW11	7.5	13.1	20.5	667.5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
DW12	6.5	11	15	294	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
DW13	7.2	17.9	31.0	529.5	30.7	53.4	1.0	2.6	12.5	55.8	0.2	0.0	155.2	0.3	7.8	51	5.5	1235	12
DW14	7.9	15.1	13.5	502.2	76.2	48.7	1.3	3.3	11.8	46.1	0.1	0.0	105.2	0.4	8.2	82	0.7	2524	7
DW15a	7.8	80.6	63.8	831.8	110.8	123.5	1.2	6.6	14.1	77.7	0.1	0.0	138.7	0.5	8.2	51	3.3	1084	12
DW16	7.7	12.0	20.5	613.8	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
DW18	7.3	29.3	32.8	512.0	2.1	6.8	0.0	0.2	1.2	3.8	0.0	0.0	9.3	0.0	0.7	8	0.0	360	0
DW19	8.1	13.1	11.0	592.3	61.1	95.7	0.8	6.1	10.8	59.7	0.1	0.0	99.7	0.5	8.0	23	0.9	2893	8
DW20b	7.6	25.7	17.2	500.8	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
DW21a	7.3	13.5	11.6	1701.4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
DW22	7.9	6.2	10	198	20	27	0.7	3	4	16	0.0	0.0	45	0.7	7.9	212	0.0	17613	10.3
DW23	7.1	3.9	23	22861	1216	9115	0.8	144	333	4862	0.1	0.0	139	13.6	7.8	95	0.0	1878	8.5
DW24	8.1	20.2	12	396	59	54	1.3	8	16	97	0.0	0.0	82	0.8	8.0	203	0.0	35530	4.5
DW25	7.7	3.8	43	41875	1573	17618	1.2	287	656	7900	0.0	0.0	107	19.1	8.1	6	0.3	178	2.6
DW26	7.5	5.0	19	15897	859	6169	0.3	161	464	2772	0.1	0.2	93	7.1	8.2	111	0.0	588	75.8
DW27	7.5	**26.4**	26	**3067**	224	**960**	2.8	25	35	172	0.1	0.0	103	1.0	8.1	157	0.3	592	7.1

Stage 2 and Stage 3 ponds (DW-14 and DW-19 sampling points respectively) are no longer operational dredge ponds however the Water Quality Objectives are still applied as part of ongoing water management of the site.

There was only one active dredge pond (Stage 5B) monitoring site (DW27) within the reporting period.

Upstream drainage channels (DW-9, DW- 10, DW-11, DW-12, and DW-13) are ephemeral and are generally impacted by upstream agriculture land uses with cattle grazing often observed in the immediate vicinity of monitoring locations. These streams flow directly into the Stage 2 dredge pond and subsequently impact the ponds water quality.

Upstream monitoring points are located away from the tidal zone at Rocklow Creek and are typically fed by springs and run-off following rainfall events. Typically, water quality within operational ponds and discharge points are of higher quality than the upstream conditions.

As recommended during the EIS process, water quality monitoring of the Stage 3 pond area has continued in order to determine if there are any long term salinity issues arising. The concern related to the dredge ponds intersecting with saline tidal groundwater aquifers which could result in surface water quality deterioration and potential risk to rehabilitation sustainability.

Data from the previous reports exhibits that Stage 3 has not caused a direct linkage with saline groundwater and that salinity levels have tended to vary in accordance with prevailing climatic conditions.

4.4.2.2. Discharge Water Quality Monitoring

Discharge water quality monitoring undertaken during the reporting period was within limits prescribed in condition S3.C23 of the consent during all instances of sampling except for the discharge event sampled on 11/04/2024, when a TSS reading of 109mg/L was recorded in the lab. A breakdown of discharge water quality monitoring results at DW16 is summarised below in Table 19.

Table 19 Discharge Surface Water Monitoring Results

Date	pH [6.6 – 8.6]	TSS (mg/L) [<50 mg/L]
11/09/2023	8	10
12/09/2023	8.1	11
13/09/2023	8.2	7
14/09/2023	8.3	19
15/09/2023	8	9
16/09/2023	8	17
29/11/2023	8.3	13
30/11/2023	8.2	25
1/12/2023	8.1	21
2/12/2023	8.2	4.0
3/12/2023	8.1	6.0
4/12/2023	8.3	3.0
5/12/2023	8.3	1.0
15/12/2023	7.9	15
18/12/2023	7.8	14
20/12/2023	7.7	17.0

Date	pH [6.6 – 8.6]	TSS (mg/L) [<50 mg/L]
21/12/2023	7.7	18.0
22/12/2023	7.7	4.0
23/12/2023	7.7	11.0
24/12/2023	7.8	5.0
25/12/2023	7.8	18.0
27/12/2023	7.5	11.0
29/12/2023	7.3	6.0
1/01/2024	7.2	11
2/01/2024	7.5	7.0
3/01/2024	7.2	8.0
4/01/2024	7.1	6.0
5/01/2024	7.3	16
6/01/2024	7.4	17
7/01/2024	7.3	14
8/01/2024	7.4	18
9/01/2024	7.5	13
10/01/2024	7.8	17
11/01/2024	7.5	7.0
12/01/2024	7.5	9.0
13/01/2024	7.7	15
14/01/2024	7.5	8.0
15/01/2024	7.5	14
16/01/2024	7.6	18
17/01/2024	7.6	11
18/01/2024	8	11
19/01/2024	7.5	14
20/01/2024	8.1	15
22/01/2024	7.7	28
23/01/2024	7.9	14
24/01/2024	7.9	14
25/01/2024	8	5.0
26/01/2024	7.9	6.0
27/01/2024	7.7	5.0
28/01/2024	7.8	11
29/01/2024	8	5.0
30/01/2024	7.8	11
31/01/2024	8	19
1/02/2024	8.1	16
3/02/2024	8	28
4/02/2024	8	27
6/02/2024	7.7	29
7/02/2024	7.6	28
8/02/2024	7.8	30
9/02/2024	7.9	18
8/04/2024	7.1	19
9/04/2024	7.1	37
10/04/2024	7.1	24

Date	pH [6.6 – 8.6]	TSS (mg/L) [<50 mg/L]
11/04/2024	7.2	109
12/04/2024	7.4	15
3/05/2024	7.2	13
4/05/2024	7.4	25
5/05/2024	7.4	25
6/05/2024	7.2	23
7/05/2024	7.2	17
8/05/2024	7.4	13
9/05/2024	7.3	38
10/05/2024	7.4	26
13/05/2024	7.4	33
14/05/2024	7.4	28
15/05/2024	7.4	27
16/05/2024	7.4	26
17/05/2024	7.4	20
18/05/2024	7.4	9.0
19/05/2024	7.5	16
20/05/2024	7.4	14
21/05/2024	7.4	48
22/05/2024	7.5	21
23/05/2024	7.5	5.0
24/05/2024	7.6	8.0
25/05/2024	7.6	10
26/05/2024	7.7	11
27/05/2024	7.7	12
28/05/2024	7.6	14
30/05/2024	7.6	12
31/05/2024	7.6	6.0
1/06/2024	7.6	9.0
2/06/2024	7.6	23
3/06/2024	7.6	13
4/06/2024	7.6	15
5/06/2024	7.5	18
6/06/2024	7.6	47
11/06/2024	7.4	29
12/06/2024	7.3	27
13/06/2024	7.5	14
14/06/2024	7.5	21
15/06/2024	7.5	25
16/06/2024	7.5	17
17/06/2024	7.5	20
18/06/2024	7.4	18
19/06/2024	7.5	18
20/06/2024	7.4	18
21/06/2024	7.4	16
22/06/2024	7.4	10
23/06/2024	7.4	21

Date	pH [6.6 – 8.6]	TSS (mg/L) [<50 mg/L]
24/06/2024	7.5	13
25/06/2024	7.5	14
27/06/2024	7.5	21
28/06/2024	7.5	18
30/06/2024	7.6	20

Seven (7) discharge events throughout the reporting period triggered Special Frequency 1 water monitoring to be undertaken as per EPL 11147. Special Frequency 1 requires sampling to be undertaken daily during discharge. These events were:

- 11 to 14 September 2023;
- 29 November to 5 December 2023;
- 15 December 2023;
- 18 December 2023;
- 20 December 2023 to 9 February 2024;
- 8 to 12 April 2024; and
- 3 May to 30 June 2024.

4.4.2.3. Water Monitoring after Placement of PASS

Special Frequency 2 water monitoring is required in ponds where Potential Acid Sulphate Soils (PASS) has been placed as per E1.8 note of EPL 11147. Special Frequency 2 is required to be conducted daily during the PASS placement into water and thereafter daily during operational hours for a period of one month from the date the last load of PASS was placed under water. The pH of the water must be monitored weekly at all other times.

During the reporting period, PASS was placed in the Stage 2 pond DW 14 (placement commenced 26 June 2018) and the Fines Pond 2 DW15a (placement commenced 13 February 2020). No PASS has been placed in Stage 3.

PASS material is typically received in “campaigns” and there were two periods where PASS importation had ceased for 30 days and monitoring reverted back to the weekly sampling regime.

Campaigns for FY24 were as follows:

- 1-23 August 2023;
- 26 September – 21 October 2023;
- 22 January – 13 February 2024; and
- 16 March – 29 June 2024.

A summary of the water quality monitoring after placement of PASS in the Stage 2 dredge pond is shown below in Figure 14 and 15.

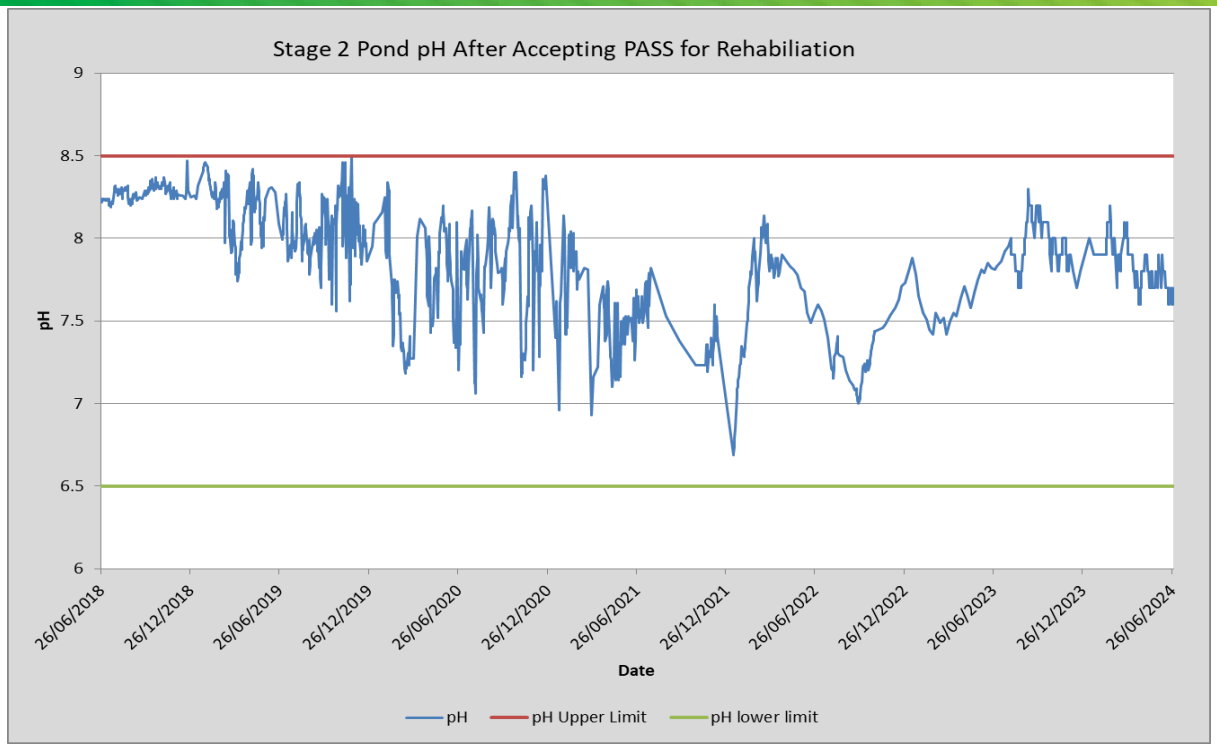


Figure 14 Stage 2 Pond pH After Accepting PASS

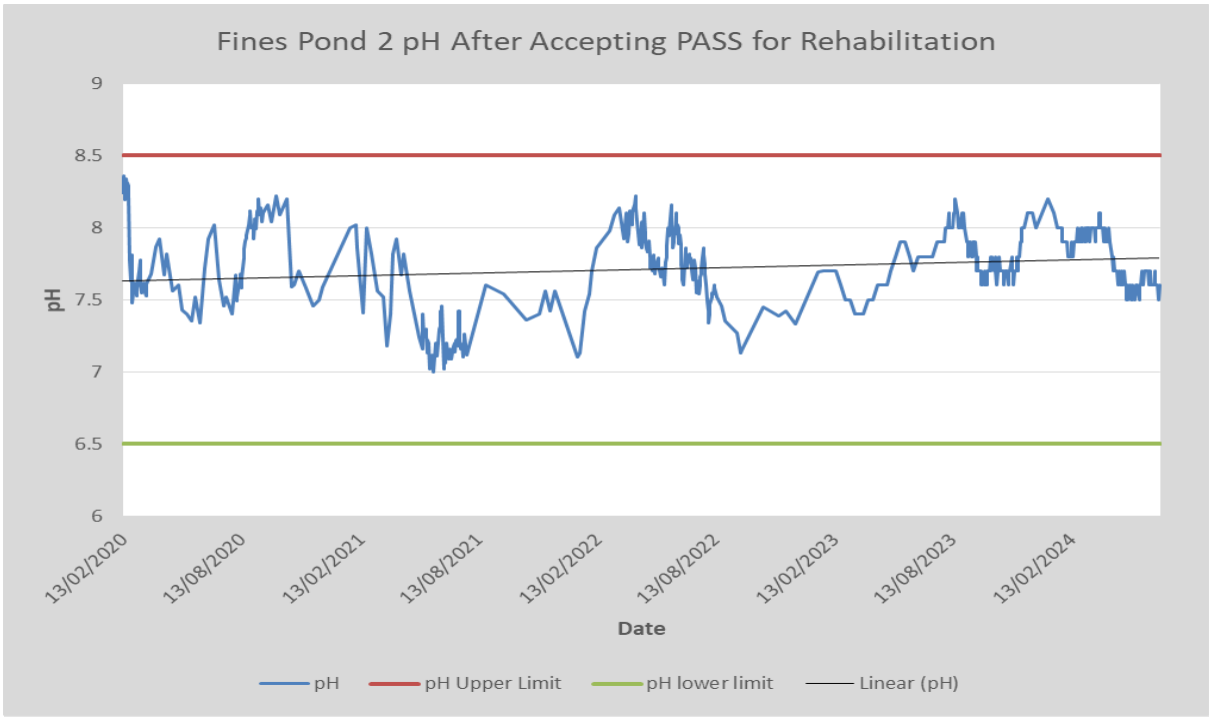


Figure 15 Fines Pond 2 After Accepting PASS for Rehabilitation

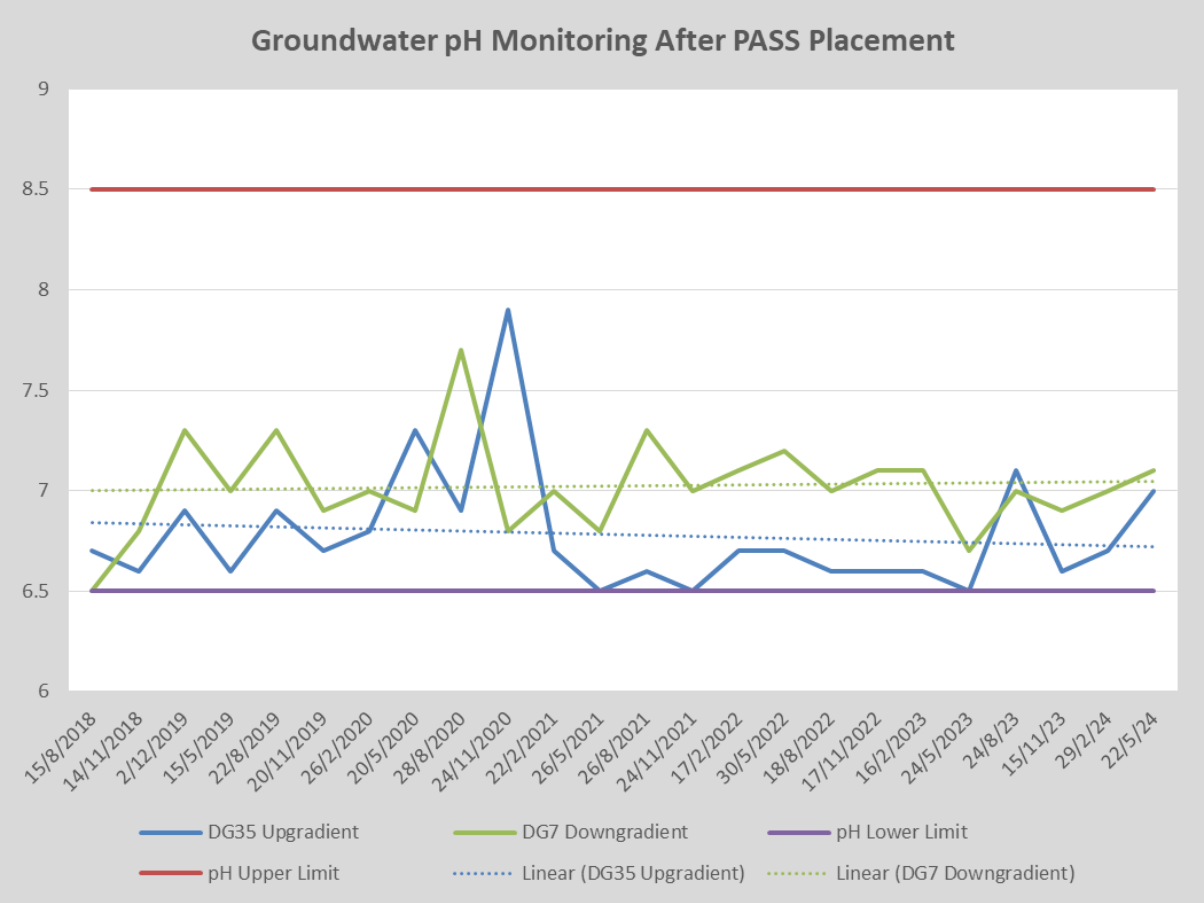


Figure 16 Groundwater pH After Accepting PASS for Rehabilitation

4.4.2.4. Pollution Reduction Program

In June 2023, DSS commenced a Pollution Reduction Program (PRP) to monitor the discharge of waters from Stage 2 through the Ruth Devenney Reserve in accordance with U1.1-U1.5 of EPL11147. A broad suite of analytes were collected during discharge events, and the EPA was notified of all of the results. It was concluded that the results over the discharge events show that water quality results are considered acceptable for discharge into a recreational area, particularly considering that these occurred during high rainfall events which often result in localised flooding. Data was collected for one year, and the recommendations from the PRP are as follows:

- The water pollutants to be monitored during dis harge events should include pH, Conductivity, Dissolved Oxygen, Turbidity, Total Suspended Solids, Phosphorus, Total Phosphorus, as well as key metals (Lead, Iron, Manganese and Aluminium). This is based on the results obtained over the discharge events. These results will be measured against the ANZECC Guidelines for Recreational Water Quality and Aesthetics. It is recommended that these analytes be monitored for a year and reviewed at the end of this period. The ongoing monthly monitoring program should include the same suite of analytes.
- Limitations on discharge volume would not be appropriate given the pond location within flood prone land and the lack of possible controls on incoming water during storm events.

- Full chemical analysis on a daily basis is not considered necessary during controlled discharges. In-situ testing of pH, Conductivity and Turbidity should be undertaken just prior to commencing the controlled discharge to ensure the water is not turbid or salty and within pH limits. Once discharge occurs, a grab sample should be taken for laboratory analysis on the first day of discharge followed by weekly sampling for the first 4 weeks. If the laboratory results are in line with historic levels, meet guideline values and do not show deteriorating trends, laboratory sampling should be reduced to monthly. In-situ probe testing should occur every second day for the first month to ensure that general water quality parameters remain within acceptable limits, followed by weekly testing for the duration of the controlled discharge.
- A more accurate system is needed to determine water discharge volume. It is recommended that a water flow metering system or similar be investigated and installed to better understand controlled and uncontrolled discharge volumes.

4.4.3. Historical Surface Water Monitoring Long Term Assessment and Analysis

Graphs of Water Quality over time can be seen below in Figure 17 to Figure 20. 2024 is shown in

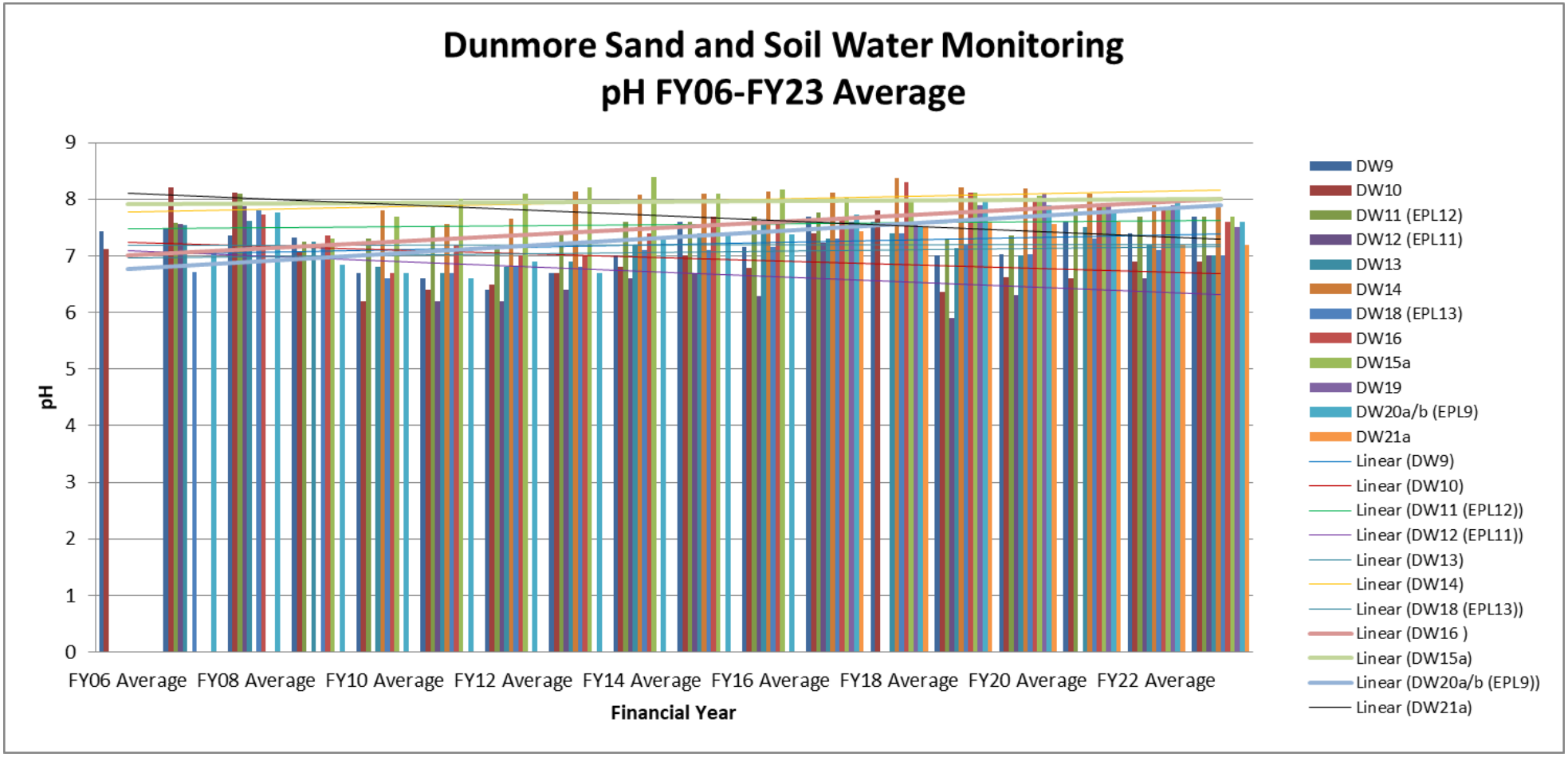


Figure 17 Surface Water pH Historical Monitoring Trends

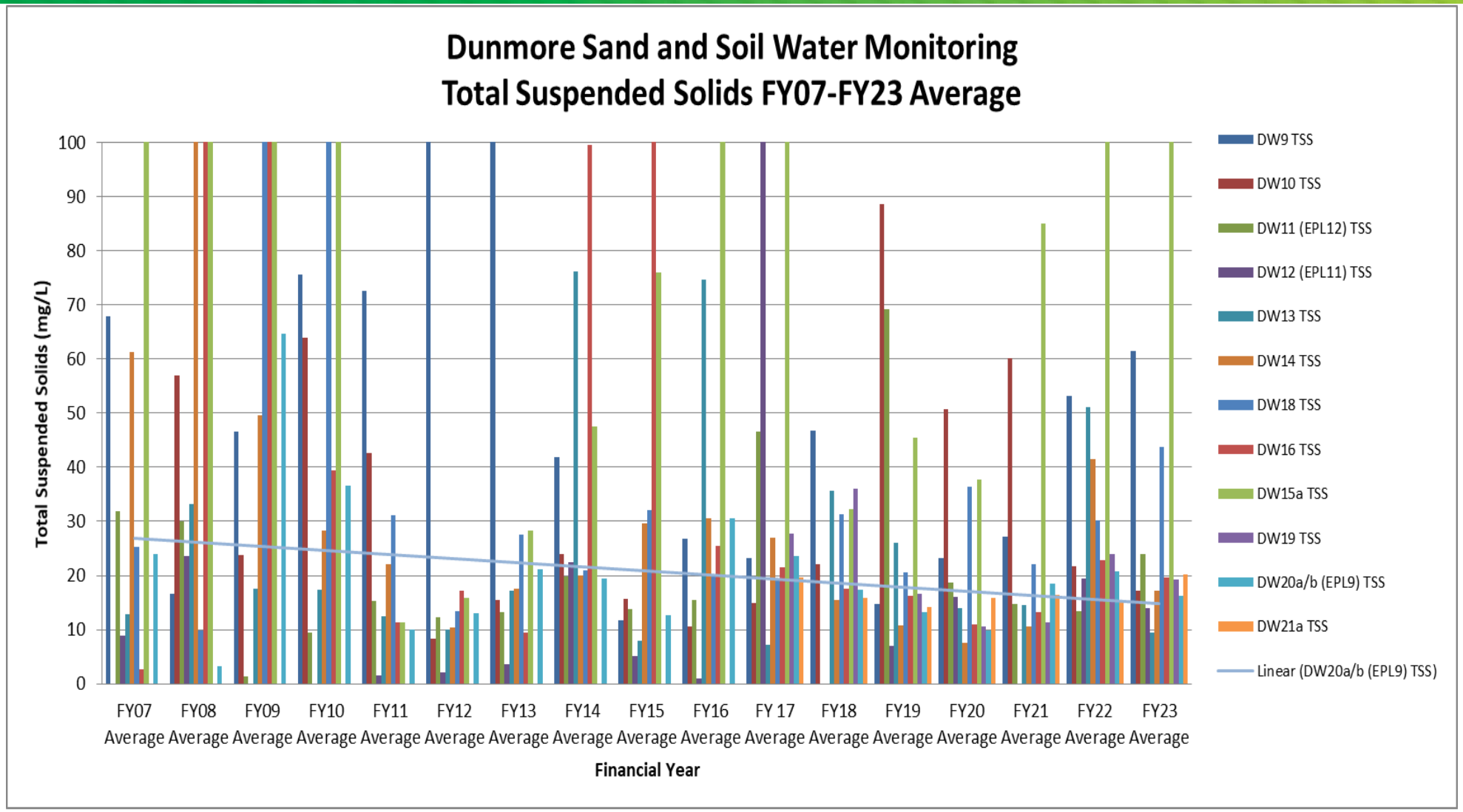


Figure 18 Surface Water TSS Historical Monitoring Trends

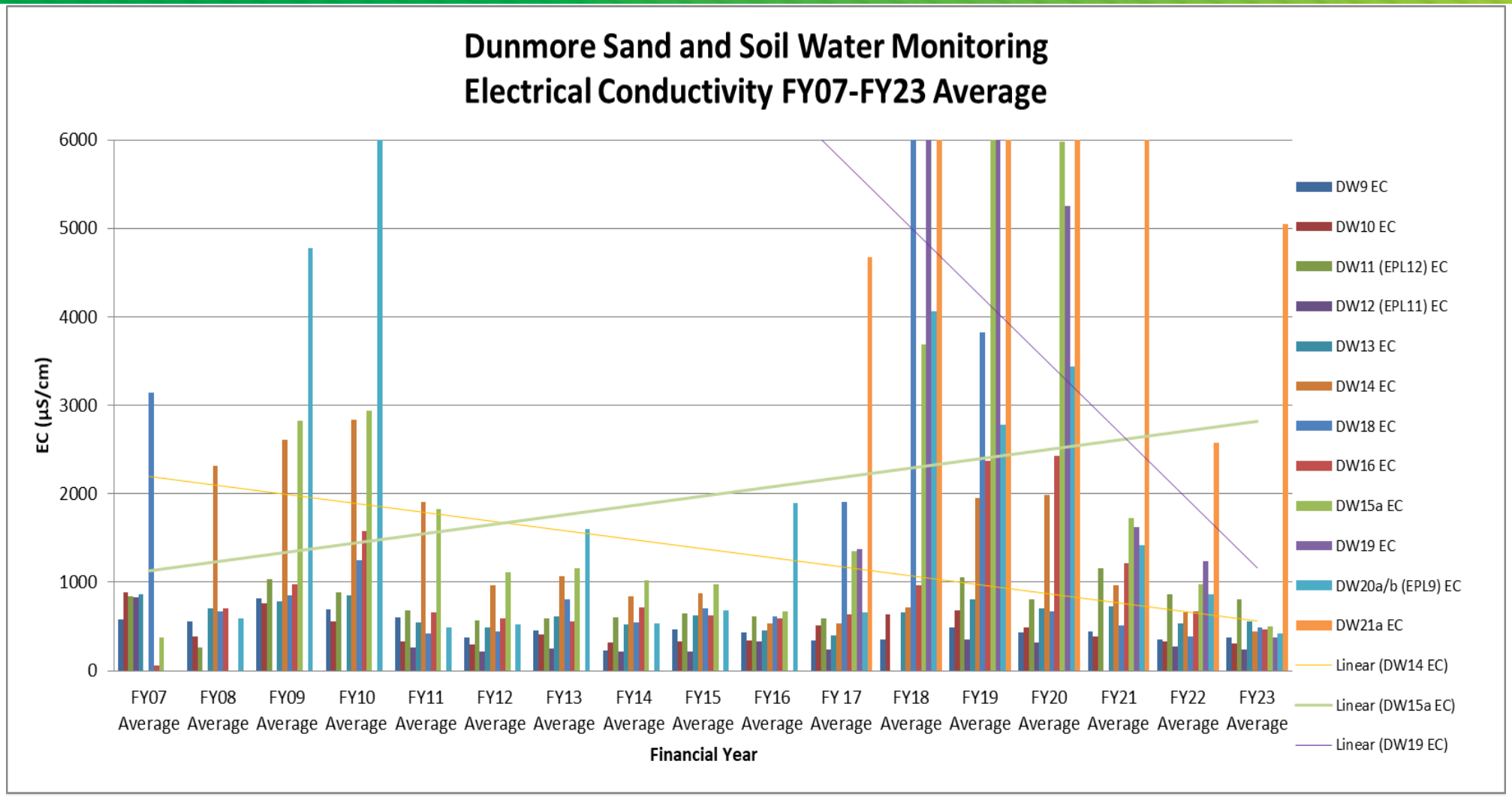


Figure 19 Surface Water Conductivity Historical Monitoring Trends

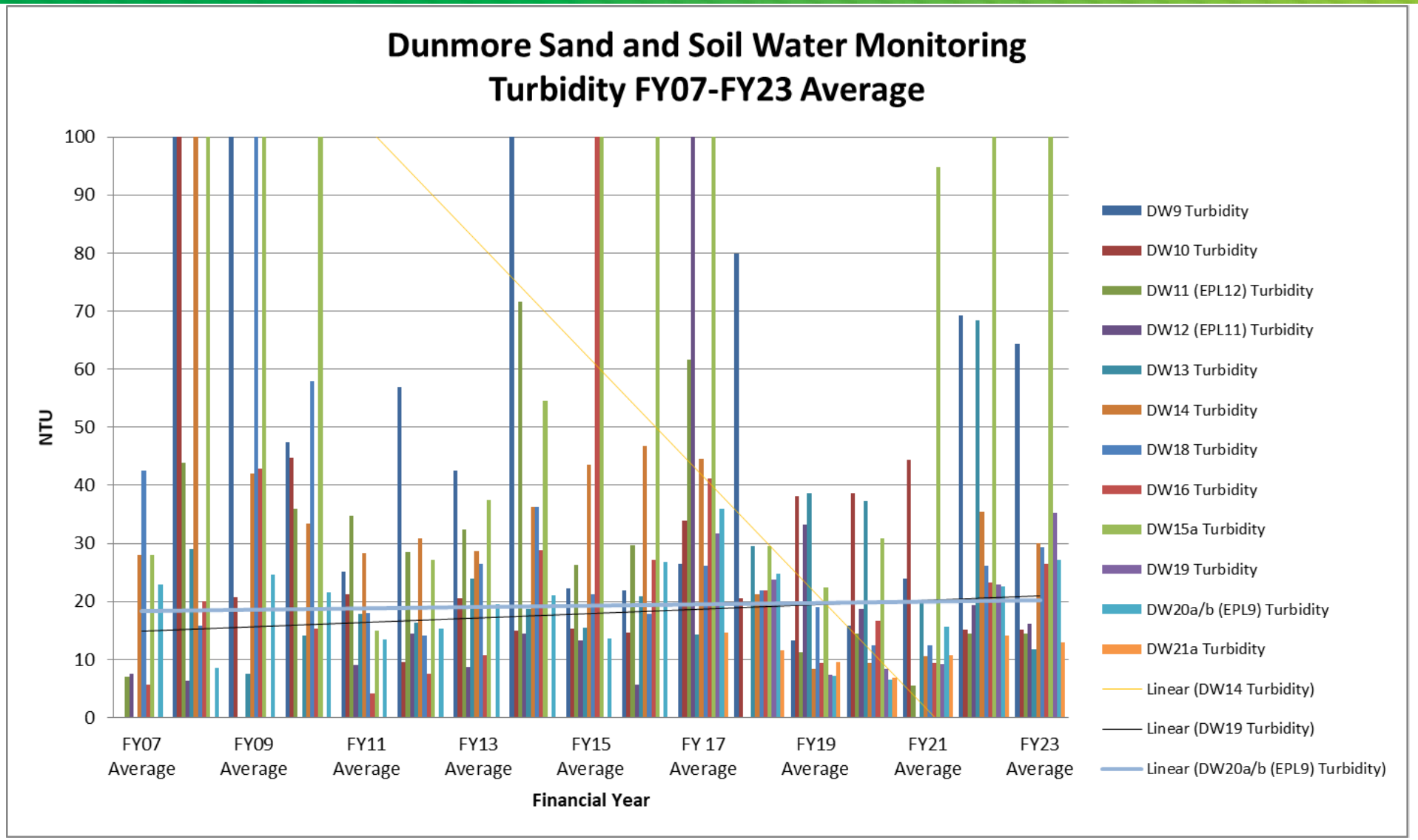


Figure 20 Surface Water Turbidity Monitoring Historical Trends

The following general trends can be observed from the above data:

- Typically upstream pH, DO and conductivity is lower when compared to the compliance monitoring locations, which aligns with observations that upstream drainage channels are ephemeral and generally only flow during periods of rainfall. These upstream sites are also impacted by upstream agriculture with cattle grazing.
- Upstream turbidity, TSS faecal coliforms and enterococci are higher at the upstream monitoring locations when compared to the compliance monitoring locations due to the impacts of cattle grazing and defecation. These inputs also contribute to increased nitrogen in the upstream water flows. The operational dredge ponds typically have lower turbidity than upstream conditions, whereby the dredge ponds act as large settling basins, which allow a reduction in turbidity and sediment load downstream of the ponds during periods of high rainfall.
- Typically the fines pond has a higher turbidity and TSS than the dredge pond, which is to be expected due to its function. The fines pond is kept offline and protected by a 3.7m AHD bund designed for protection in the event of a 1 in 100 year flood event.
- Salinity is generally higher in the southern sections of Stage 3 (DW-19) and Rocklow Creek (DW21a), which is located in close proximity to the tidal zone at Rocklow Creek. This is a predicted outcome from the EIS based on the natural conditions of the site and is discussed below.

Initial investigations from the original DLSP EIS commissioned by R.W Corkery described that the groundwater within the southern section of Stage 3 contains slightly brackish water (TDS >2,500), which corresponds to a salinity far greater than the 1,500µS/cm threshold described in the WQO detailed in condition S3.C24 of the consent. As the dredging progresses south in Stage 3 near Rocklow Creek, the infiltration of this tidal brackish water into the Stage 3 dredge pond will be unavoidable and is to be expected based on the natural conditions present in Stage 3.

The department acknowledges in condition S3.C24 of the consent, as per the note, that short term exceedance of the WQO may occur due to natural events such as tidal saline inflow, such as those identified in the south of Stage 3.

4.4.4. Surface Water Monitoring Summary and Opportunity for Improvements

Monitoring will continue for all water quality parameters in the next reporting period. Backfilling of Stage 5A has commenced, which will allow the site to move toward its final landform in accordance with the progressive rehabilitation requirements.

The recommendations of the PRP will be implemented.

4.5. Water Balance

Water extracted from the DLSP ponds is measured and considered in relation to the applicable groundwater licence. Water is used for dust suppression and sand processing and is sourced from the fines pond and dredge pond under a groundwater Water Access Licence (WAL24477) issued under the *Water Management Act 2000*. The licence permits the groundwater take of 77ML of water from the Sydney Basin South Groundwater Source.

4.5.1. Surface Water Flows

Surface runoff from three upstream catchments is generally captured in farm dams and bunding around the Stage 2 area. High flow events and floodwaters however enter Stage 2 and ultimately flow into the Stage 3 area. The main channel of Rocklow Creek has been diverted around the Stage 3 area which is joined by controlled discharge waters from the Stage 3 pond spillway. The system allows for the return of environmental flows into the Rocklow Creek catchment below the site. During flood events, sand extraction ceases. During the reporting period, flooding occurred a number of times. Inflows are assumed to be the same as outflows during overflow events. The influence of surface water on the site water balance is therefore considered to be neutral.

4.5.2. Water Use for Dust Suppression

Water contained within the extraction ponds is used for all raw water demand, including processing and dust control. A 30,000 L water cart operates on site on all operational days when there is no precipitation to reduce dust from unsealed roads, particularly the roads used by trucks delivering VENM. During the reporting period, the number of rain-days increased from 124 to 134 which, coupled with the days when the site was flooded, decreased the volume used for dust suppression to approximately 19.17ML.

4.5.3. Water Use from Production

- Water is extracted with the sand during dredging operations, with additional water added to this during processing.
- Pumping rates and volumes of added water is shown in Table 20.
- The extracted water returns via overland flow to the fines return pond (i.e. flows back into the system) so is excluded from the water balance calculations and reported for information only.

Table 20 Dredge and Spray Pump Rates

Processing Steps	Pumping Rate (L/s)	Water Required (ML/8hr day)
Dredge pump (combined water and sand)	250	7.2
Pump to sand wash bin for dust washing	150	4.33
Pump for oversize screen sprayers	50	1.47
Total	N/A	12.96
This 12.96 ML is returned to the Stage 3 pond via the fines return pond and is therefore excluded from the water balance calculation.		

- However, some residual water is exported from the site along with the sold sand product (approximately 8% of exported sand product by weight is water).
- Current reporting period sales was 175,672 tonnes.
- Water loss from sand sales is calculated as 14.10 ML.

Total water use is therefore calculated as water use for dust suppression (19.17ML) plus water loss from sand production (14.1ML).

The calculated total water use volume is 33.27ML, which is within the volumes of groundwater take of WAL24477 of 77ML/year.

4.6. Flood Storage Capacity

The site is located at the confluence of three tributaries of the Minnamurra River. Given the proximity of groundwater to the surface there is potential for flooding. Water backing up along Rocklow Creek from the Minnamurra River is also a major contributor to on-site flooding.

4.6.1. Stages 2-4:

The EIS noted that the RTA designed and constructed the North Kiama by-pass to "match the openings of the downstream railway embankment which was designed and constructed following a flood study completed by Webb McKeown (1989) – predicting a 100 year average recurrence interval (ARI) flood level of up to 3.3m on Rocklow Creek". The EMP went on to state that: "The culvert system would, therefore, not impact on local flooding regimes, which based on previous flood studies of Rocklow Creek, (including Webb McKeown 1989), are considered to approximate the following:

- 100 year Average Recurrence Interval (ARI): 3.6m AHD
- 20 year Average Recurrence Interval (ARI): 3.3m AHD
- 10 year Average Recurrence Interval (ARI): 3.2m AHD.

To protect the site from floods, up to and including the 1 in 100 year event, the processing and stockpile area have been constructed above 3.6m AHD and site bunds are generally at 3.7 metres AHD. The fines pond is bunded to a minimum 3.7m AHD as shown in the surveyed points in Figure 21 below.

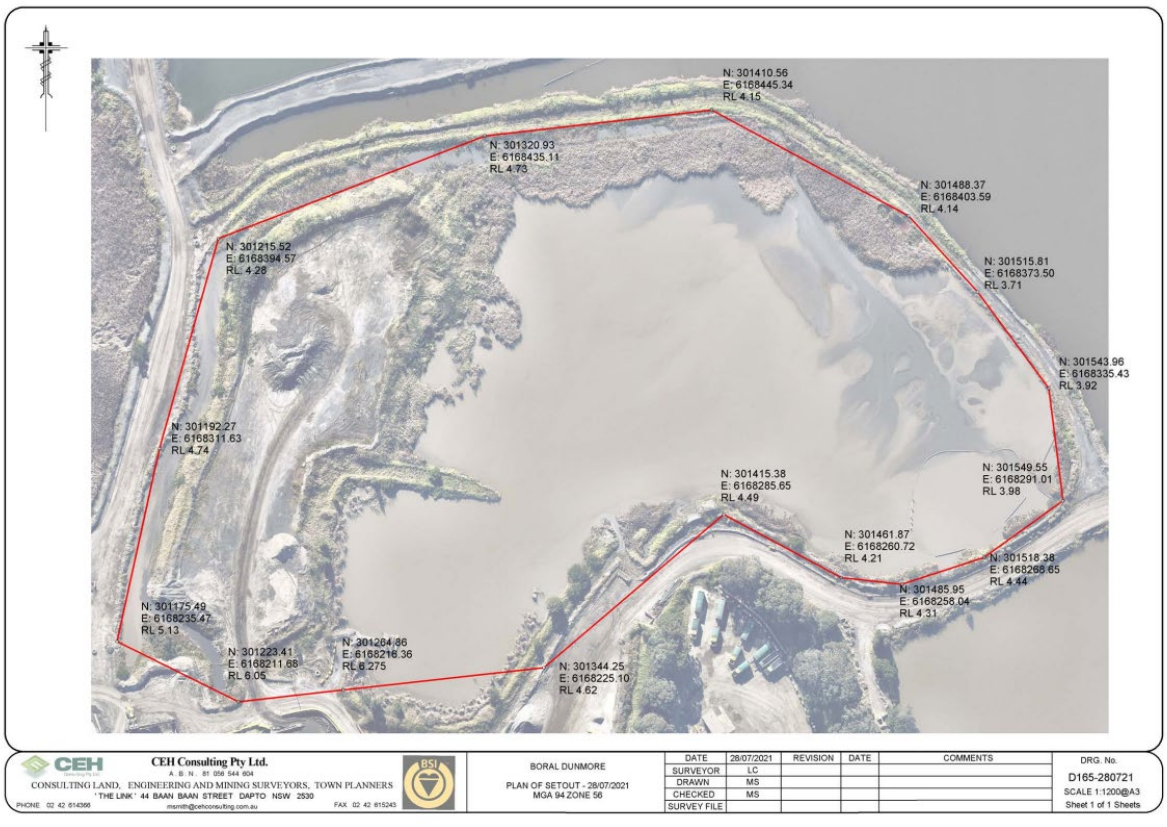


Figure 21 Surveyed Fines Pond Bund

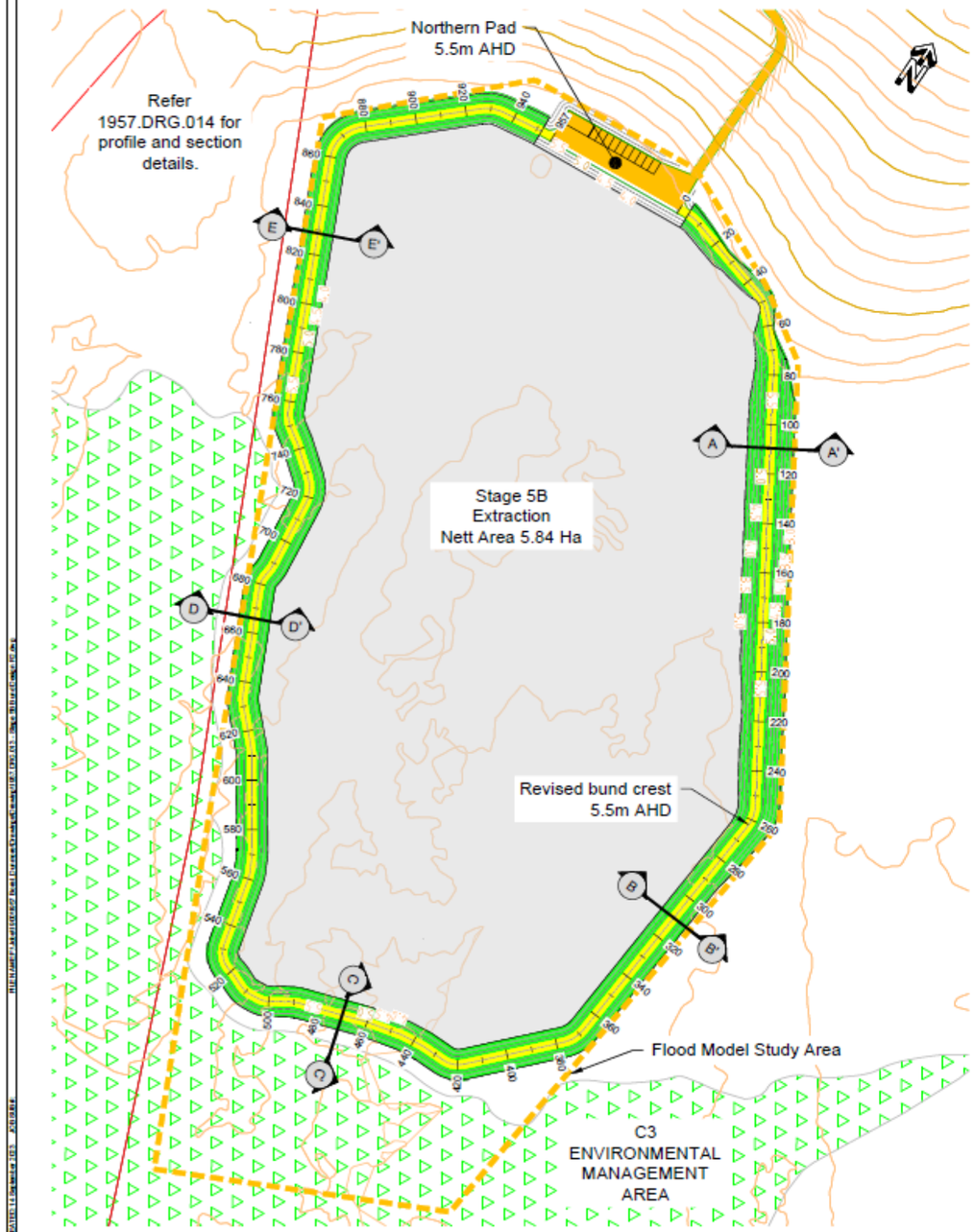
The majority of the access road off Tabbita Road is also above 3.6 metres AHD; however, the ramp abutting Tabbita Road was constructed by RMS below 3.6 metres AHD due to the presence of overhead powerlines and potential safety risks to heavy vehicles.

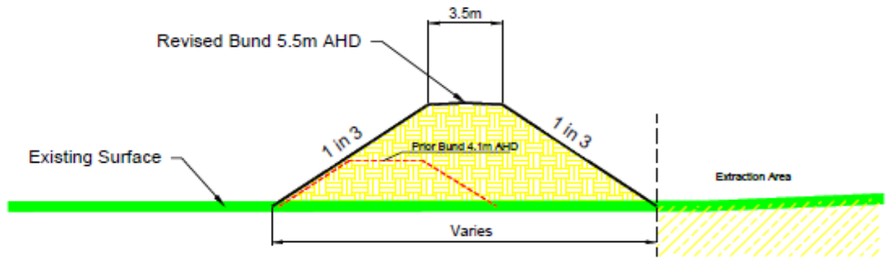
Condition S3.C27 of the consent requires that the flood storage capacity of the site is no less than the pre-existing flood storage capacity at all stages of the development, unless otherwise approved in writing by the Planning Secretary. Total historic extraction volumes within both Stage 2 and Stage 3 area are significantly higher than total backfilling volumes to date which has created an overall increase in flood storage capacity. During the reporting period, extraction moved to the new Stage 5 area while backfilling continued in Stage 2 and 3 which will result in a gradual reduction in flood capacity. However, the final site rehabilitation plan includes unfilled pond area and freshwater wetlands which provide an overall increase in flood retention capacity compared to the pre-mining floodplain.

4.6.2. Stage 5:

A surface water assessment was undertaken for Modification 2 of the Dunmore Lakes Sand Project, which outlined the flood potential of Stage 5. As such, the Stage 5B extraction area is subject to inundation due to backwater flooding from the Minnamurra River. Note that Stage 5B cannot discharge. Flood inundation of Stage 5B is relatively shallow, with depths across most of the extraction area ranging from 0.1 to 0.2m for a flood event of 1% AEP magnitude. The majority of Stage 5B remains flood free in smaller more frequent flood events. The PMF event is predicted to inundate the entire Stage 5B area with flood depths of approximately 1m AHD across most of the extraction area. In accordance with the aforementioned surface water assessment, the PMF level is 5.15m AHD.

A flood bund was designed and built around the extraction footprint of Stage 5B at 5.5m AHD to satisfy the requirement for adequate flood mitigation. The Flood Bund Design is shown below in Figure 22.





Proposed Bund Typical Section

GENERAL NOTES:

BUND DESIGN SUBJECT TO GEOTECHNICAL ENGINEERING SPECIFICATIONS AND APPROVAL PRIOR TO CONSTRUCTION.
1. MATERIAL FOR BUND
(i) MATERIAL MUST CONTAIN NO WOOD, BIODEGRADABLE MATERIAL, WASTE, SCRAP METAL OR ANY OTHER DELETERIOUS MATERIAL.
(ii) THE MATERIAL IS TO BE WELL GRADED CONFORMING WITH A MAXIMUM PARTICLE SIZE OF 150MM WHERE POSSIBLE.
(iii) THE MOISTURE CONTENT OF ANY IMPORTED FILL USED FOR EMBANKMENT WHEN PLACED SHALL BE BETWEEN OMC AND OMC LESS 2%
2. PLACEMENT OF EMBANKMENT FILL
(i) THE BUND EMBANKMENT INCLUDING ANY FILL SHALL BE END TIPPED AND THEN SPREAD IN HORIZONTAL LAYERS NO THICKER THAN 150MM. FILL IS TO BE COMPACTED TO ACHIEVE 95% OF THE MAXIMUM DRY DENSITY AS DETERMINED IN ACCORDANCE WITH AS1289.5.1.1 FOR STANDARD COMPACTION.
(ii) AS FAR AS REASONABLY PRACTICAL THE FILL SHALL BE RAISED EVENLY ACROSS THE WHOLE AREA OF THE EMBANKMENT. ONE LAYER OF FILL SHALL BE PLACED AND COMPACTED ACROSS THE WHOLE OF THE EMBANKMENT PRIOR TO COMMENCING THE NEXT LAYER.
3. MATERIAL FOR CLAY CORE AND CAPPING
(i) ANY CLAY MATERIAL MUST CONTAIN NO WOOD, BIODEGRADABLE MATERIAL, WASTE, SCRAP METAL OR ANY OTHER DELETERIOUS MATERIAL.
(ii) THE CLAY MATERIAL IS TO BE WELL GRADED CONFORMING WITH THE A MAXIMUM PARTICLE SIZE OF 75MM AND EXCHANGEABLE SODIUM PERCENTAGE (ESP) OF NO GREATER THAN 14%.
(iii) THE CLAY MATERIAL SHALL COMPLY WITH THE FOLLOWING:
LIQUID LIMIT <80% AND SHALL PLOT ABOVE THE A LINE (AS1726).
PLASTICITY INDEX >15% AND SHALL PLOT ABOVE THE A LINE (AS1726).
% PASSING THE 75UM SIEVE >45%
PERMEABILITY <10-9M/S MEASURED BY FALLING HEAD METHOD.
4. PLACEMENT OF CLAY LAYER
(i) CLAY MATERIAL SHALL BE COMPACTED TO A MINIMUM OF 98% OF THE MAXIMUM DRY DENSITY OF THE MATERIAL ACROSS THE FULL DEPTH OF THE LAYER AS DETERMINED BY PROCEDURES GIVEN IN AS 1289.5.1.1 FOR STANDARD COMPACTION.
(ii) CLAY MATERIAL SHALL BE DEPOSITED IN HORIZONTAL LAYERS NOT MORE THAN 150MM IN THICKNESS AFTER COMPACTION.
(iii) THE CONTRACTOR SHALL OVER-PLACE AND TRIM CLAY CORE MATERIAL TO ENSURE THE SPECIFIED COMPACTION AND PERMEABILITY IS ACHIEVED TO THE EDGE OF THE BATTER.
(iv) THE EMBANKMENT FINISH SHALL BE FREE OF ALL STONES, STAKES AND SHARP OBJECTS SHALL BE TRIMMED, TEST ROLLED AND SHAPED TO THE APPROPRIATE LEVELS AND SHALL EXHIBIT A PLANAR, NEAT, SMOOTH AND TIGHT FLUSH.

REV | DESCRIPTION | DATE | BY

Legend:

DESIGN FOR APPROVAL
NOT FOR CONSTRUCTION

PROJECT: Dunmore Sand & Gravel

CLIENT: Boral Resources (N.S.W) Pty Ltd

TITLE: Stage 5B Revised Bund Design Layout Plan

GROUNDWORK plus
PH: +61 7 3871 0411
WWW.GROUNDWORK.COM.AU

SCALE: 1:2500 (When Printed On A3) 0 30
DATE: 14 September 2023 DRAWN: MF
PRINTED: 14 September 2023 CHECKED: CH

DRAWING NUMBER: 1957.DRG.013
REVISION: 2
DATUM: HORIZONTAL / VERTICAL / ZONE: MGA / AHD / 56

Figure 22 Stage 5B Flood Bund Design

4.7. Groundwater Monitoring

Environment Earth Sciences (EES) have been commissioned to undertake analysis of the groundwater aquifer at Dunmore Lakes since 2003. They have been commissioned to prepare the Groundwater Monitoring Report for 2023-2024, and when it is completed it will be publicly available on our website.

The conclusions of the 2022-2023 report are as follows:

- Influences on groundwater levels are related to recharge from rainfall and minor tidal influx (this finding is supported by chemical monitoring of tidal seawater intrusion from Rocklow Creek)
- Reductions in groundwater levels are related to period of low rainfall where the aquifer is slowly draining from Roclklow Creek and the south-east aquifer boundary; and
- Water-table fluctuations are therefore naturally occurring and cannot be seen to be impacted by dredging activities in the area, except in immediate proximity to the dredge pond.

4.7.1. Groundwater Monitoring Impact Assessment Criteria

EES have devised site specific trigger values, derived from monitoring the aquifer in Stage 2 and Stage 3 since 2003 and prior to the commencement of operations in Stage 2 and 3. These site specific trigger values have been adopted in the approved Water Management Plan and are reproduced below in Table 23.

Table 21 Groundwater Impact Assessment Criteria

Analyte	Units	Trigger Value		
		DA Criteria	Western bores [1]	Eastern bores [2]
pH	-	6.5-8.5	6.5-8.5	6.5-8.5
Electrical Conductivity (EC)	µS/cm	<1,500	1,500	33,000
Phosphorous (PO_4)[3]	µg/L	5-50 [3]	4.0	0.7
Total Nitrogen	µg/L	100-500	-	-
Sodium (Na)	mg/L	400	560	5,500
Potassium (K)	mg/L	50	50	170
Magnesium (Mg)	mg/L	50	90	420
Chloride (Cl)	mg/L	300	1,400	6,900
Sulfate (SO_4)	mg/L	250	300	1,170
Bicarbonate (HCO_3)	mg/L	750	400	420
Dissolved Iron (Fe)	mg/L	6	3.0	4.0
Ammonium (NH_4)	mg/L	20	1.0	3.0

Notes:
1. Western bores: BHA to BHF; DG17, DG21, DG31, DG36, DG59, DG60 are those located west of the Princes Highway
2. Eastern bores: DG1 to DG7 are those generally located east of the Princes Highway
3. Note value is for total phosphorous not phosphate (multiply by 3.06 when reported as phosphorus)

The location of the groundwater monitoring points and groundwater flow direction for Stages 2-4 is shown in Figure 24. Stage 5 doesn't have enough monitoring points to derive a meaningful indication of flow direction.

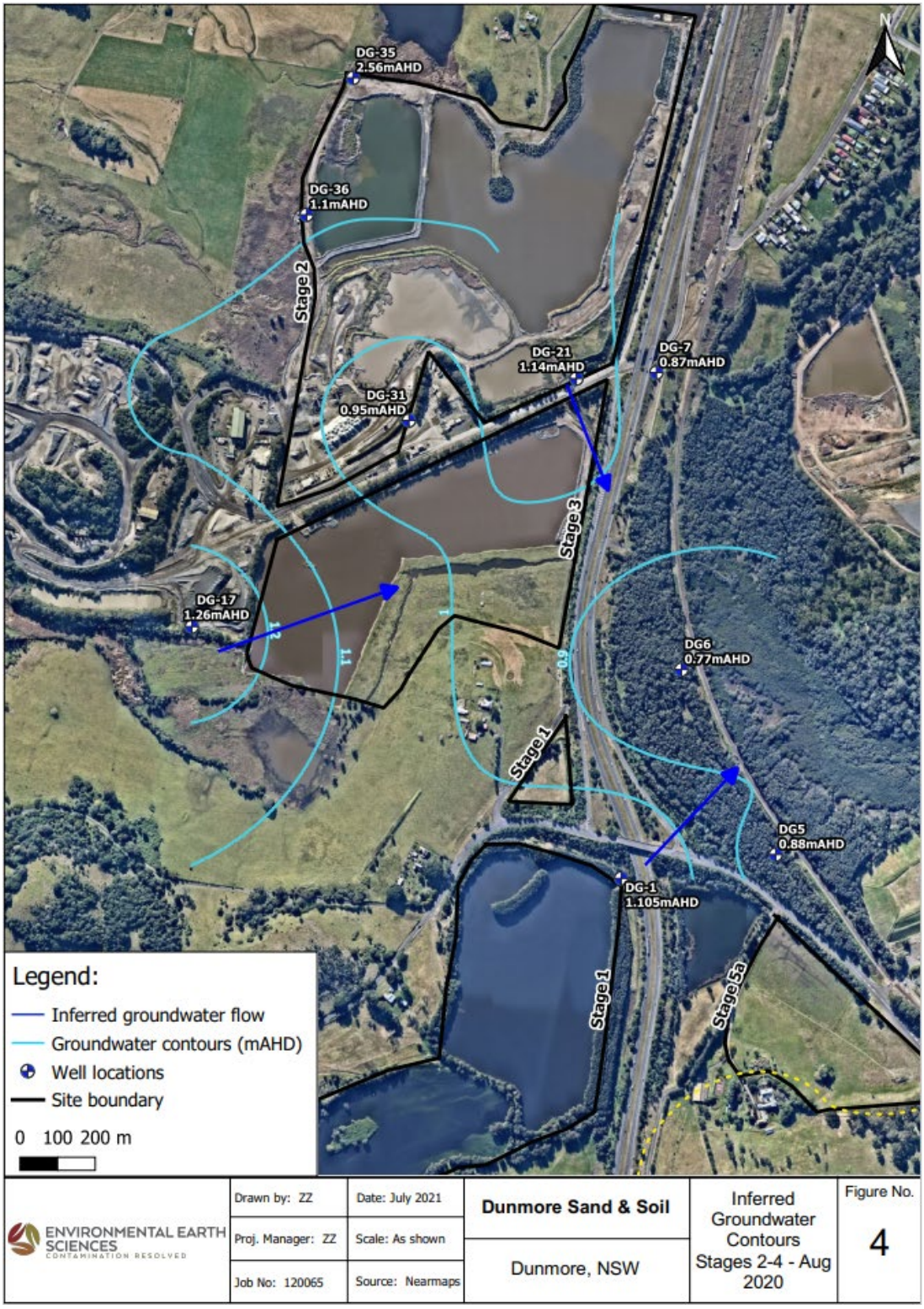


Figure 223 Groundwater Monitoring Locations and Derived Flow

4.7.2. Groundwater Monitoring Current Reporting Period Performance Review

A summary of the groundwater quality data for monitoring bores located west and east of the highway is shown Table 22 and Table 23, respectively.

Elevated levels exhibited in the reporting period were regarded to be natural occurrences, just as they were in the FY23 period. This is exhibited in the following recommendation from the FY23 Groundwater Report:

- Revise the GMMP to reflect exceedances of K, Mg and Cl in the deep aquifer to the east of the highway, and Mg in bores DG17 and DG21 as natural occurences.

Table 22 Groundwater Monitoring Summary West of Princes Highway

Analyte	Units	Trigger Value		DG1				DG17				DG21				DG31				DG35				DG36			
		DA	GMMP	Aug-23	Nov-23	Feb-24	May-24	Aug-23	Nov-23	Feb-24	May-24	Aug-23	Nov-23	Feb-24	May-24	Aug-23	Nov-23	Feb-24	May-24	Aug-23	Nov-23	Feb-24	May-24	Aug-23	Nov-23	Feb-24	May-24
pH	-	6.5 - 8.5	6.5 - 8.5	7.4	7.4	7.5	7.2	7	7.1	7	7.1	7.1	6.6	6.6	7.1	6.8	7	7	7.3	7.1	6.6	6.7	7	6.9	7	6.8	7.2
EC	*µS/cm*	<1500	1500	473	553	573	554	1561	1794	2640	2300	1617	810	830	1096	577	876	670	267	1039	1019	1018	966	888	871	867	1221
TDS	*mg/L*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total N	*mg/L*	100-500	-	1.08	0.32	0.42	1.01	0.06	1.18	1.67	0.44	0.13	0.64	2.41	0.35	0.98	0.51	0.55	0.34	0.65	1.04	2.39	0.3	0.09	0.39	0.3	0.31
Na	*mg/L*	400	560	26	36	43	45	364	184	356	287	199	93	111	100	24	66	37	15	77	82	105	97	73	56	96	142
K	*mg/L*	50	50	2.8	3.3	2.8	4.6	27	25	43	36	4.3	3.3	1.6	2	3	6.7	2.8	1.2	8.2	8.9	8.7	8.6	13	8.6	13	17
Mg	*mg/L*	50	90	6.9	9.4	10	8.2	68	72	101	74	27	42	21	19	11	22	14	4.5	30	38	33	30	23	18	25	32
Cl	*mg/L*	300	1400	44	45	50	53	207	230	390	337	346	82	74	97	24	52	40	31	53	50	52	8.9	68	63	69	55
Ca	*mg/L*	-	-	49	54	54	66	74	88	86	70	42	71	38	43	79	82	70	24	46	224	52	47	42	38	47	63
F	*mg/L*	-	-	0.53	0.23	0.2	0.23	0.88	0.33	< 0.050	0.4	0.22	0.073	0.067	0.1	0.16	0.085	0.078	0.14	0.32	0.49	0.069	0.17	0.81	0.1	0.44	0.39
Fe	*mg/L*	6	3	0.51	3.4	0.45	0.31	0.14	48	1.5	0.09	0.29	39	0.2	0.35	0.59	0.35	0.33	0.1	0.15	1.7	0.21	0.19	0.13	0.69	0.22	0.09
NO3	*mg/L*	-	-	0.31	0.24	0.36	0.68	< 0.01	0.18	0.43	0.31	0.01	0.15	0.31	0.21	0.24	0.21	0.32	0.3	0.17	0.22	0.29	0.28	0.05	0.17	0.24	0.31
SO4	*mg/L*	250	300	12	2.5	6.6	21	109	20	25	43	250	35	89	72	184	167	174	66	230	156	241	204	120	54	126	302
PO4	*mg/L*	5-50	4	0.08	0.07	0.05	0.1	1.28	1.62	1.94	2.25	0.15	0.21	0.19	0.27	0.02	0.03	< 0.01	0.06	0.01	0.02	< 0.01	0.03	0.05	0.03	0.05	0.07
HCO3	*mg/L*	750	400	164	202	202	194	520	584	775	690	179	260	264	281	106	204	183	81	277	285	256	294	277	260	243	260
NH3N	*mg/L*	20	1	<0.01	< 0.01	< 0.01	0.49	< 0.01	0.36	0.24	0.22	< 0.01	0.15	< 0.01	0.15	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.22	1.05	0.87	< 0.01	< 0.01	< 0.01	0.07

NOTE:

EC = Electrical Conductivity; TDS = Total Dissolved Solids; PO4 = Phosphorous; Total N = Total Nitrogen; Na = Sodium; K = Potassium; Mg = Magnesium; Cl = Chloride; Ca = Calcium; F = Fluoride; SO4 = Sulfate; HCO3 = Bicarbonate Alkalinity; Fe = Dissolved Iron; NH3N – Ammonia

DA Criteria is not site specific and outlined under Development Consent 195-8-2004 (2004), issued on 29 June 2005 for The Dunmore Lakes Sand Project (Stages 2-4).

GMMP Criteria are site-specific criteria for groundwater quality and a sub-plan to the WMP (Arcadis, 2016).

Elevated concentrations to site-specific GMMP criteria are shown in Red.

Table 23 Groundwater Monitoring Summary East of Princes Highway

Analyte	Units	Trigger Value		DG5-S				DG5-D				DG6-S				DG6-D				DG7			
		DA	GMMP	Aug-23	Nov-23	Feb-24	May-24	Aug-23	Nov-23	Feb-24	May-24	Aug-23	Nov-23	Feb-24	May-24	Aug-23	Nov-23	Feb-24	May-24	Aug-23	Nov-23	Feb-24	May-24
pH	-	6.5 - 8.5	6.5 - 8.5	8.1	7.3	7.3	7.2	7.5	7.3	7.5	7.4	7.6	6.4	6.4	7	6.6	6.8	6.8	6.9	7	6.9	7	7.1
EC	*µS/cm*	<1500	33000	1056	1069	1071	959	14620	15490	15950	14240	16550	18390	19470	19500	29700	29300	29700	29400	757	791	708	645
TDS	*mg/L*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total N	*mg/L*	100-500	-	0.24	0.23	0.9	0.46	11.53	2.15	2.07	4.76	14.73	1.15	1.96	2.01	8.02	19.36	2.78	4.24	0.93	0.35	0.74	0.78
Na	*mg/L*	400	5500	77	79	79	61	2044	3891	2742	2425	2192	5902	3473	3484	4578	7816	5679	5315	69	71	76	70
K	*mg/L*	50	170	6.1	5.2	5.4	4.6	109	109	122	105	134	156	181	181	265	237	266	268	2.3	2.2	2	1.8
Mg	*mg/L*	50	420	19	20	19	16	301	365	379	289	356	497	520	432	683	757	771	660	14	17	16	14
Cl	*mg/L*	300	6900	118	122	127	138	5177	5373	5799	5145	6233	6314	7385	7214	11456	10810	11446	11999	45	41	37	52
Ca	*mg/L*	-	-	89	99	93	91	203	189	138	213	182	163	118	192	312	298	321	378	46	53	46	40
F	*mg/L*	-	-	0.34	0.49	0.15	0.17	0.59	< 0.05	0.64	< 0.05	< 0.05	< 0.05	0.58	< 0.05	< 0.05	< 0.05	< 0.050	0.24	0.6	0.41	0.44	0.47
Fe	*mg/L*	6	4	1.1	1.7	0.56	0.35	0.14	0.66	0.28	0.46	0.39	0.67	1.86	1.5	0.19	2.3	0.74	0.25	0.22	1.3	0.31	0.35
NO3	*mg/L*	-	-	0.14	0.18	0.26	0.37	11.2	0.6	0.97	1.73	14.5	0.57	0.94	1.87	7.71	17.8	2.02	2.56	0.1	0.26	0.4	0.51
SO4	*mg/L*	250	1170	177	109	174	189	580	585	659	887	756	742	882	1343	1440	1272	1460	2063	81	62	78	61
PO4	*mg/L*	5-50	1	0.06	0.05	0.06	0.07	0.11	0.08	0.12	0.18	0.07	0.03	0.07	0.09	0.04	0.03	< 0.01	0.03	0.12	0.08	0.06	0.13
HCO3	*mg/L*	750	420	256	222	260	247	302	302	285	307	332	324	307	303	383	375	383	405	260	281	196	234
NH3N	*mg/L*	20	3	< 0.01	< 0.01	< 0.01	0.17	< 0.01	0.69	1.05	1.25	< 0.01	0.27	0.1	0.43	< 0.01	0.34	< 0.01	0.03	< 0.01	< 0.01	0.19	1.03

NOTE:

EC = Electrical Conductivity; TDS = Total Dissolved Solids; PO4 = Phosphorous; Total N = Total Nitrogen; Na = Sodium; K = Potassium; Mg = Magnesium; Cl = Chloride; Ca = Calcium; F = Fluoride; SO4 = Sulfate; HCO3 = Bicarbonate Alkalinity; Fe = Dissolved Iron; NH3N – Ammonia

DA Criteria is not site specific and outlined under Development Consent 195-8-2004 (2004), issued on 29 June 2005 for The Dunmore Lakes Sand Project (Stages 2-4).

GMMP Criteria are site-specific criteria for groundwater quality and a sub-plan to the WMP (Arcadis, 2016).

Elevated concentrations to site-specific GMMP criteria are shown in Red.

Table 24 Groundwater Monitoring Summary Stage 5

Analyte	Units	Trigger Value		MW5A1				MW5A3				MW5B2-S				MW5B2-D				MW5B3				MW5B4			
		DA	GMMP	Aug-23	Nov-23	Feb-24	May-24	Aug-23	Nov-23	Feb-24	May-24	Aug-23	Nov-23	Feb-24	May-24	Aug-23	Nov-23	Feb-24	May-24	Aug-23	Nov-23	Feb-24	May-24	Aug-23	Nov-23	Feb-24	May-24
pH	-	6.5-8.5	-	7.4	6.5	6.1	7.4	6.4	7.7	6.6	7	6.8	7.1	7.4	7	7.3	7.6	7.1	7.2	7.6	7.8	7.7	7.4	7.3	7.6	7.7	7.4
EC	*µS/cm*	<1500	-	580	326	312	325	1110	795	628	396	807	865	672	734	699	697	910	704	475	507	500	481	659	554	572	532
SO4	*mg/L*	250	-	75	39	47	48	29	8.6	20	28	51	19	37	43	51	21	36	51	17	4.9	8.2	38	18	16	10	37
Cl	*mg/L*	300	-	74	45	53	53	264	147	116	60	63	82	55	68	54	57	77	62	29	31	31	25	17	37	29	25
Ca	*mg/L*	-	-	41	22	11	9.2	49	44	31	19	92	91	51	75	80	82	93	67	53	87	59	56	75	84	67	66
Fe	*mg/L*	6	-	0.1	1	2.6	1.6	2.9	6.2	3.4	1.3	4.8	0.6	0.46	2.5	1.7	1	1.7	0.42	0.15	0.51	0.15	0.15	0.09	1.5	0.19	0.26
K	*mg/L*	50	-	14	13	8.6	3.8	8	7.4	6.1	4.3	5	5.2	5.9	4.3	5.6	7.3	5.6	6.1	1.8	3.6	2.4	2.2	2.6	9.4	3.7	3
Mg	*mg/L*	50	-	9.9	9.2	3.8	5	14	11	10	5.7	11	14	12	10	11	16	14	11	6.1	10	7.4	6.3	9.2	11	8.6	7.2
Na	*mg/L*	400	-	39	63	39	38	96	74	80	44	46	64	39	49	32	52	59	41	16	30	22	20	16	22	29	19
PO4	*µg/L*	5-50	-	0.03	0.02	0.06	0.08	0.08	0.14	0.15	0.15	0.03	0.1	< 0.01	0.1	0.03	0.05	0.03	0.04	0.09	0.06	0.05	0.08	0.09	0.09	0.04	0.08
NH3N	*mg/L*	20	-	< 0.01	0.03	< 0.01	0.55	< 0.01	0.22	< 0.01	0.19	< 0.01	0.11	0.09	0.11	< 0.01	0.13	< 0.01	0.24	< 0.01	< 0.01	< 0.01	0.23	< 0.01	< 0.01	< 0.01	0.08
HCO3	*mg/L*	750	-	136	47	38	43	132	132	132	107	311	290	128	260	281	200	341	205	196	187	175	209	318	222	239	239
ORP	*mv*	-	-	238	546	477	421	246	551	442	419	244	505	467	421	243	512	489	430	238	542	493	422	267	543	508	421
NO2	*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	< 0.01	< 0.01	0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.01	< 0.01
NO3	*mg/L*	-	-	0.21	0.63	0.26	0.51	0.09	0.22	0.23	0.18	0.08	0.24	0.29	0.6	0.18	0.11	0.4	0.86	0.13	0.14	0.3	0.28	0.41	0.1	0.38	0.82
TKN	*mg/L*	-	-	0.02	0.28	0.81	0.09	1.07	1.28	0.4	0.12	0.27	0.5	0.26	0.08	0.02	0.52	0.09	0.08	0.09	0.3	0.15	< 0.01	0.19	0.26	0.24	0.02
Total N	*µg/L*	100-500	-	0.23	0.91	1.07	0.6	1.17	1.51	0.64	0.31	0.35	0.74	0.55	0.68	0.2	0.63	0.5	0.94	0.22	0.44	0.45	0.28	0.6	0.36	0.63	0.84
DO	*mg/L*	-	-	8.2	7.7	7.9	8.5	8	7.2	7.7	8.4	7.9	7	9.6	8.5	7.6	7.3	8.1	9.7	8.1	7.5	8.3	8.6	8.1	7.2	8.4	8.6
Fl	*mg/L*	-	-	0.26	0.075	< 0.050	< 0.05	0.47	0.091	0.094	0.11	0.37	0.094	0.093	0.09	0.36	0.11	0.082	0.11	0.45	0.21	0.21	0.26	0.34	0.2	0.16	0.18
Ecoli	*MPN/100mL*	-	-	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	1
FC	*MPN/100mL*	<1000	-	1	1	3	12	< 1	5	8	14	< 1	< 1	38	< 1	< 1	2	7	10	< 1	1	13	2	3	< 1	16	84
Ent.	*MPN/100mL*	<230	-	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1

NOTE:

EC = Electrical Conductivity; SO4 = Sulfate; Cl = Chloride; Ca = Calcium; Fe = Dissolved Iron; K = Potassium; Mg = Magnesium; Na = Sodium; PO4 = Phosphorous; NH3N = Ammonia; HCO3 = Bicarbonate Alkalinity; ORP = Oxidising Reduction Potential; NO2 = Nitrite; NO3 = Nitrate; TKN = Total Kjeldahl Nitrogen; Total N = Total Nitrogen; DO = Dissolved Oxygen; F = Fluoride; Ecoli = E. coli; FC = Faecal coliforms; Ent. = Enterococci.

DA Criteria is not site specific and outlined under Development Consent 195-8-2004 (2004), issued on 29 June 2005 for The Dunmore Lakes Sand Project (Stages 2-4).

There are not yet any site-specific GMMP Criteria for Stage 5, and therefore the DA criteria are used as the criteria for water quality. However, where there are exceedances, it is likely that GMMP will be developed outlining that they are due to the natural mineralogy of the area rather than mining impacts, which will be reflected in the Water Management Plan.

Elevated concentrations to site-specific GMMP criteria are shown in Red.

4.7.3. Groundwater Long Term Assessment and Analysis

The data obtained from the data loggers installed in bores DG1, DG5, DG6, DG7, DG17, DG21, DG31, DG35, and DG36 indicate that over the current reporting period natural fluctuations in water levels were occurring in response to rainfall and tidal influences.This is consistent with previous findings dating back to 2003 (Environmental Earth Sciences 2009, 2010, 2011, 2012, 2013a, 2014, 2015, 2016a, 2017 and 2018a, 2019, 2020, 2021, 2022, 2023).

All data obtained from the monitored bores strongly indicated the following:

- Influences on groundwater levels are related to recharge from rainfall and minor tidal influx (this finding is supported by chemical monitoring of tidal seawater intrusion from Rocklow Creek);
- Reductions in groundwater levels are related to periods of low rainfall where the aquifer is slowly draining from Rocklow Creek and the south-east aquifer boundary; and
- Water-table fluctuations are therefore naturally occurring and cannot be seen to be impacted by dredging activities in the area, except in immediate proximity to the dredge pond.

4.7.4. Groundwater Summary and Opportunities for Improvement

Based on the data collected to date, it is recommended that DLSP operations:

- Continue to monitor SWL in all bores with downloads and manual measurements at quarterly intervals;
- Exceedances of K, Mg and Cl in the deep aquifer to the east of the highway, and Mg in bores DG17 and DG31 are considered natural occurrences, and the GMMP should be revised to reflect this occurrence;
- GMMP figures should be devised for the Stage 5 bores, as the levels of Magnesium and Nitrogen reflect that there are naturally higher levels that are not related to DSS operations, especially given that no extraction was undertaken at Stage 5B over the reporting period ;
- Continue to monitor groundwater quality in all active bores at quarterly intervals.

4.8. Rehabilitation and Flora and Fauna Management Review

Rehabilitation has been ongoing since operations began and includes landform construction, planting out and maintenance of previous planting campaigns.

4.8.1. Rehabilitation Assessment Criteria

Condition S4.C42 of the consent outlines that the applicant must progressively rehabilitate the site to the satisfaction of the secretary in a manner generally consistent with the concept final landform in the EIS (Appendix 2 of DA 195-8-2004) and in accordance with the DA consent.

S3.C37 outlines that the site must establish and conserve:

- 6 hectares of Freshwater Wetlands on Coastal Floodplains (which may include areas of associated wetland pondage) and;
- 3 hectares of Swamp Oak Floodplain forest;

The final landform planned for the DLSP will exceed these areas. This is in order to provide suitable visual screening and to adequately integrate a compensatory habitat with existing similar habitats located on or near the site.

4.8.2. Rehabilitation and Flora and Fauna Management Performance Review

Rehabilitation works are ongoing along the northern area of stage 2 with 6,300 native plants from the Swamp Oak Forest and Freshwater Wetlands in Coastal Floodplains community types planted along the north western edge of Stage 2 in 2017. A bird island was also constructed and planted out with the communities and species described above.

The banks of the realigned Western Tributary channel in Stage 3 commenced rehabilitation in 2017, with the laying of jute matting and approximately 2,600 tube stock of freshwater wetland species planted out.

In December 2019 a further 8500m^2 of Swamp Oak forest was planted on the NE section of Stage 2. These saplings are progressing well.

The tree screens planted in 2007 are progressing well with individuals now 14 years old.

Landform construction using VENM is ongoing along the southern and eastern section of Stage 2. This landform will form the foundations for a further section of Swamp Oak Forest to be planted. The location of rehabilitation areas can be seen below in Figure 25.

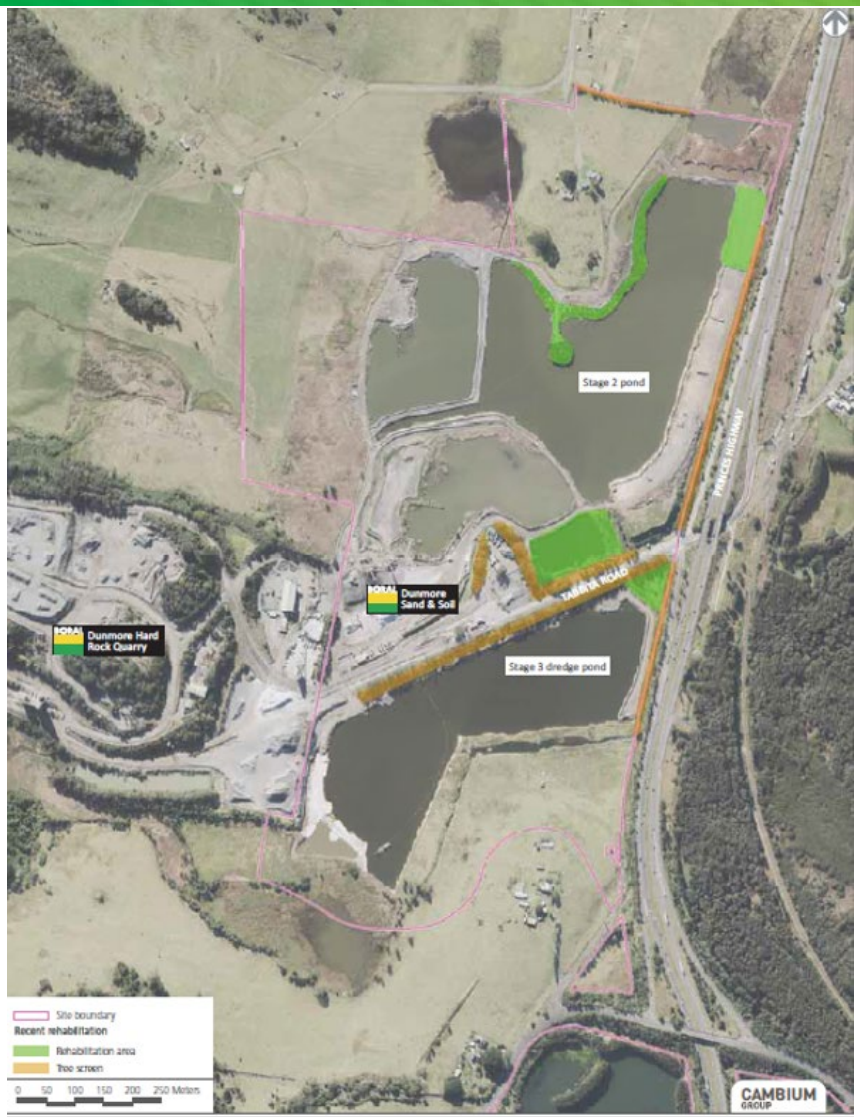


Figure 234 Rehabilitation Area Locations

Maintenance of these sections has been ongoing throughout the current reporting period by the bushland regeneration contractor Jamberoo Native Nursery, which works on site weekly.

Additionally, 143 nest boxes were installed in the surrounding Bangalow forest at Stage 5B to provide habitats for the fauna that may be impacted by the associated vegetation removal. These range from small bird boxes approximately 30cm tall and 25cm wide to Powerful Owl boxes that are over one meter tall and 90 centimetres wide.

Pre-Clearance surveys at Stage 5B were undertaken and the associated report is attached in Appendix E.

The rehabilitation at Stage 5A has commenced, and backfilling with VENM is underway towards the final landform.

The Rehabilitation and Conservation Bond for DSS, including Stage 5B, has been lodged.

Prior to commencement of operations in Stage 5B, an EPBC referral was completed and approved by the federal government.

4.8.3. Rehabilitation and Fauna and Flora Management Long Term Analysis and Assessment

Planted sections have progressed well with many specimens now over 3m tall. So far approximately 2.4 hectares of Swamp Oak Forest and Freshwater Wetland communities have been planted. Comparison photos over the last four reporting periods are shown in Appendix D.

4.8.4. Rehabilitation and Flora and Fauna Summary and Opportunities for Improvement

Maintenance of planted areas will continue during the next reporting period. Backfilling works and landform construction will continue in the next reporting period. An extension of the Swamp Oak Forest at Stage 2 is scheduled for October-November 2024.

Nest boxes at Stage 5B will be evaluated every six months in accordance with section 4.6 of the Flora and Fauna Management Plan.

Rehabilitation of Stage 5A will be completed in next reporting period to return the area to pasture.

4.9. Waste Management

Operational waste associated with the project includes management of production fines generated by the processing plant and VENM received for backfilling of ponds and rehabilitation. Both of these materials will be used to progressively rehabilitate previously extracted areas to create wetlands and flood-free land for the final landform. Backfilling is currently underway at Stage 2, Stage 3 and Stage 5A.

4.9.1. VENM Verification Acceptance and Disposal

In January 2018, the site began accepting Virgin Excavated Natural Material from external sources for the purposes of backfill to support site rehabilitation. VENM is classified as an ‘inert’ non-liquid waste under Schedule 1 Part 3 of the Protection of the Environment Operations Act 1997 and defines VENM as being:

“Virgin excavated natural material (e.g. clay, gravel, sand, soil and rock) that is not mixed with any other waste and that:

(a) has been excavated from areas that are not contaminated, as a result of industrial, commercial, mining or agricultural activities, with manufactured chemicals and that does not contain sulphidic ores or soils, or

(b) consists of excavated natural materials that meet such criteria as may be approved by the EPA."

Approximately 5 million tonnes of VENM will be required to create the final landform detailed in the Rehabilitation Management Plan. The vast majority of this material will be VENM within the meaning of part (a) above. A small portion of the backfilling materials for the project will consist of VENM within the meaning of part (b) above.

EPL 11147 contains specific conditions relating to VENM verification and acceptance including provisions to accept VENM (b) material that satisfies all the requirements for classification as VENM, except that it contains Potential Acid Sulfate Soil (PASS). After placement of the first load of PASS special frequency water monitoring of Stage 2 surface water and groundwater is triggered. The results of this monitoring is detailed in Section 4.4.2.

Volumes of external VENM received for the current reporting period are detailed below in Table 24.

Table 25 VENM and PASS Backfilling Volumes

Month	VENM (a) received (t)	VENM (b) PASS received (t)	Excavated Sand VENM received (t)
Jul-23	18061	0	0
Aug-23	3823	3487	0
Sep-23	337	217	0
Oct-23	4273	955	0
Nov-23	3588	0	0
Dec-23	3658	0	0
Jan-24	3444	567	0
Feb-24	14699	292	0
Mar-24	20377	639	0
Apr-24	17077	1930	0
May-24	10702	2568	0
Jun-24	10421	1871	0
Total	110460	12526	0

4.9.2. Waste Minimisation and Tracking

Boral is committed to ensuring its extraction and processing activities produce minimal waste material. Approximately 85-90% of the sand processed at Dunmore Sand and Soil becomes washed sand for internal and external sales.

The remaining 10-15% of by-product created during the washing process is considered as fines material or oversized material. The fines material is washed into the fines ponds, which

is used in the creation of the wetlands area, while the oversized product is used in site rehabilitation.

Boral is committed to non-production waste minimisation in accordance with the waste hierarchy, and minimising the amount of waste sent to landfill. To achieve this, all liquid and solid wastes are classified and sorted so they can be appropriately re-used or recycled. Table 25 outlines the total waste and waste types generated by DLSP over the reporting period.

Table 24 Waste Tracking Register

	General Waste (t)	Cardboard (t)	Commingle Recycling (t)	Oil/Oily Waters (t)	Effluent (t)	Solvent (t)
Jul-23	0.20	0.12	0	0	0	0
Aug-23	0.27	0.09	0	0	0	0
Sep-23	0.27	0.06	0	0	0	0
Oct-23	0.38	0.06	0	0	0	0
Nov-23	0.31	0.05	0	0	0	0
Dec-23	0.30	0.16	0	0	0	0
Jan-24	0.34	0.10	0	0	0	0
Feb-24	0.19	0.12	0	0	0	0
Mar-24	0.28	0.12	0	0	0	0
Apr-24	0.83	0.15	0	0	0	0
May-24	0.20	0.19	0.03	0	0	0
Jun-24	0.36	0.06	0	0	0	0
Total	3.91	1.28	0.03	0	0	0

4.9.3. Waste Minimisation Long Term Trends and Analysis

The long term analysis of the waste tracking over the last 5 years is shown below in Table 26.

Table 25 Historical Waste Tracking Summary

Waste Classification		FY20	FY21	FY22	FY23	FY24
Solid Waste	General Waste (t)	1.842	1.301	3.249	3.23	3.91
	Cardboard (t)	0.678	0.354	0.755	0.98	1.28
	Comingle (t)	0.208	0.114	0.189	0.03	0.03
Liquid Waste	Oil/Oily Water (t)	2.95	0.35	5.74	0	0
	Effluent Litres (t)	0.36	0.7	6.28	0	0
	Other (t)	0	0	0	0	0

*all liquid waste volumes have been converted to tonnages in the FY24 register.

General Waste volumes were similar to the previous reporting period. There was no oil or oily water waste or effluent for this reporting period.

4.9.4. Waste Management Summary and Opportunities for Improvement

Education on efficient waste re-use will continue in the next reporting period. VENM will continue to be utilised from Dunmore Quarry and external sources. Further work will continue with subcontractors to optimise the record keeping for waste collection.

4.10. Incident and Emergency Response Management.

The following management actions were undertaken in regard to incident and emergency response.

- The Pollution Incident Response Management Plan was updated in April 2024. The current version is available online on the Boral Dunmore Operations website.
- A Site Emergency Response Plan is available onsite in order to outline procedures in the case of emergency authorities being required on the site.

4.11. Dangerous and Hazardous Goods Storage

Storage of dangerous goods and hazardous material have continued as per established operations. All dangerous goods and chemicals are handled and transported in accordance with the AS1940 and AS25956 and the Dangerous Goods Code and condition S3.C70.

4.12. Community

The DLSP Community Consultative Committee (CCC) continues to serve as a valuable dialogue between Boral and the local community with input and feedback being provided by the community regarding quarry operations and plans. The CCC is run as per condition S5.C6 and the Department of Planning, Industry and Environment's *Community Consultative Committee Guidelines for State Significant Developments* (2016).

Members include:

- An independent chairperson
- At least 2 representatives from Boral (typically the environmental co-ordinator and quarry manager)
- A member from Shellharbour City Council
- Five local community representatives

Members are informed of the environmental performance of the site, provided with an update on operations and given a chance to tour the site and ask questions they may have regarding the operation. CCC members have also been diligent in disseminating the information from the meetings to other interested community members in the local area. The minutes of each meeting is published in the Boral website.

https://www.boral.com.au/locations/boral-dunmore-operations

The CCC met twice during the current reporting period (August 2023 and February 2024).

4.12.1. Environmental Complaints Management

DLSP maintains a complaints register that identifies actions required to resolve issues and concerns raised by the community. The complaints register is also published on the Boral website.

There was one community complaint during the reporting period, as follows:

- On May 28, 2024, there was a complaint from a member of the public relating to debris built up on the intersection of Stage 5A and Riverside Drive. The material was promptly removed.

Figure 24 provides an overview of the noise, vibration, water and dust complaints received since 2007. There have been minimal complaints received over the history of the project.

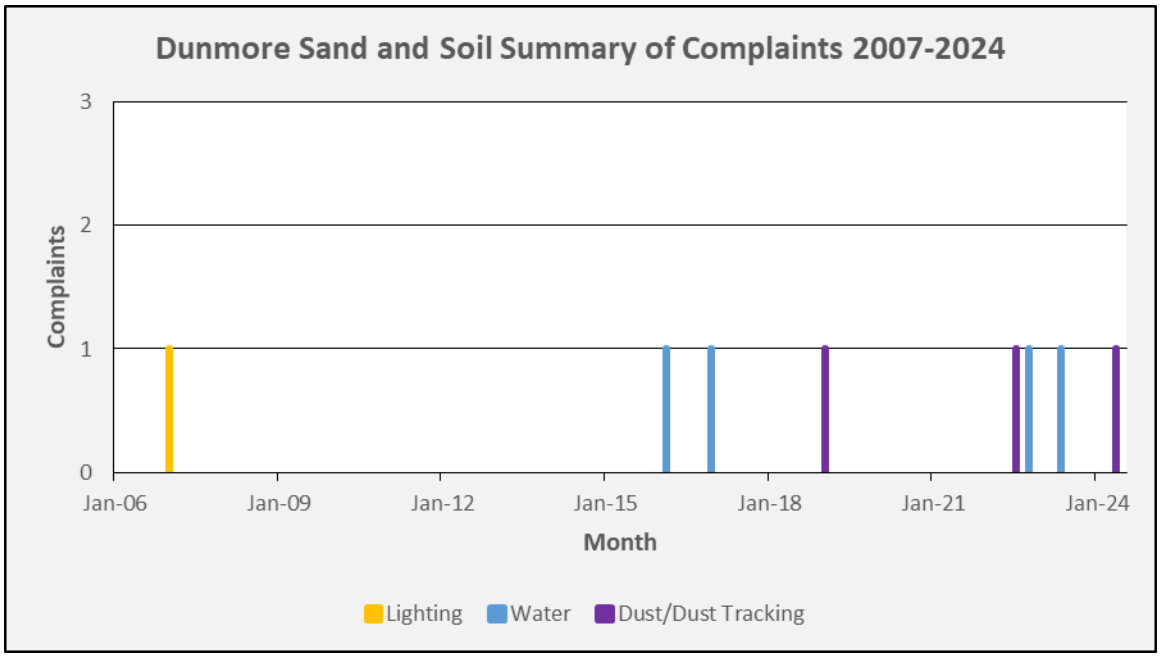


Figure 245 Summary of Historical Complaints

4.13. Independent Environmental Audit

The last Independent Environmental Audit (IEA) was completed in in accordance with Schedule 5, Condition 10 and 11 of DA 195-8-2004. The audit site visit was completed on 21 November 2023 and the audit report was finalised on 16 February 2024. Noting there are a number of matters that require improvement, the overall environmental performance based on the observed condition of the site, the low number of non-compliances and incidents and low number of complaints, is considered '**satisfactory**'. It was identified that there were 9 non-compliances, and the Boral responses to these are in Appendix F.

The audit report is available under the public reporting tab on the Dunmore operations website https://www.boral.com.au/locations/boral-dunmore-operations The next Independent Audit is scheduled to occur in November 2026.

4.14. Summary of Regulator Notifications

As per Condition S5, C7, DSS advised DPE of the following:

- Relocation of Dust Monitor DD-5 after interference;
- TSS Exceedance at Monitoring Point EPL9

There were no other reportable incidents that took place across the reporting period that required notification in accordance with S5, C7 of DA 195-8-2004.

We have been involved in a proactive investigation to the Minnamurra estuary mangrove die-back with the fisheries department as well as the EPA providing access through the site to inspect and report. It was concluded that the dieback was not related to operations at DSS, and was due to natural fluctuations of water level.

5. Conclusion

DLSP continues to focus on ensuring the environment and the neighbouring community are not adversely impacted by site operations.

This reporting period saw the continuation of rehabilitation within the Stage 2 area, which will remain a strong focus during the next reporting period. Rehabilitation will continue in Stage 2, Stage 3 and Stage 5.

The focus over the following 12 months will be continuing operational compliance and utilising remaining resource reserves. Dredging has commenced in Stage 5B, and backfilling has commenced at Stage 5A to move toward the final landform.

6. Activities to be completed by the Next Reporting Period

The next reporting period will contain a strong focus on maintaining regulatory compliance and optimising management actions established in the current reporting period.

A list of actions to be completed by the next reporting period is provided below.

- Continue rehabilitation monitoring of planted sections of Swamp Oak Forest and Freshwater Wetland EEC in Stage 2 and Re-aligned Western Tributary;
- Continue backfilling and landform construction in Stage 5a;
- Plant out a further section of Swamp Oak forest on the eastern edge of Stage 2;
- Continue assessing salinity in the southern section of Stage 3 as per the recommendations in the DLSP EIS;
- Proceed with Stage 5 operations as per the associated management plans;
- Update Stage 2-4 Water Management for the use of site specific trigger values as per the independent auditor recommendations and to align with Stage 5 Soil and Water Management Plan. The updated plans will be combined into a one Soil and Water Management Plan;
- Review GMMP triggers;
- Continue ecological assessment program in relation to the use of nest boxes; and
- Broaden the analyte suite for monitoring point DW16 in accordance with the PRP recommendations.

7. Appendix A Meteorological Monitoring

The location of the onsite weather station is shown below.

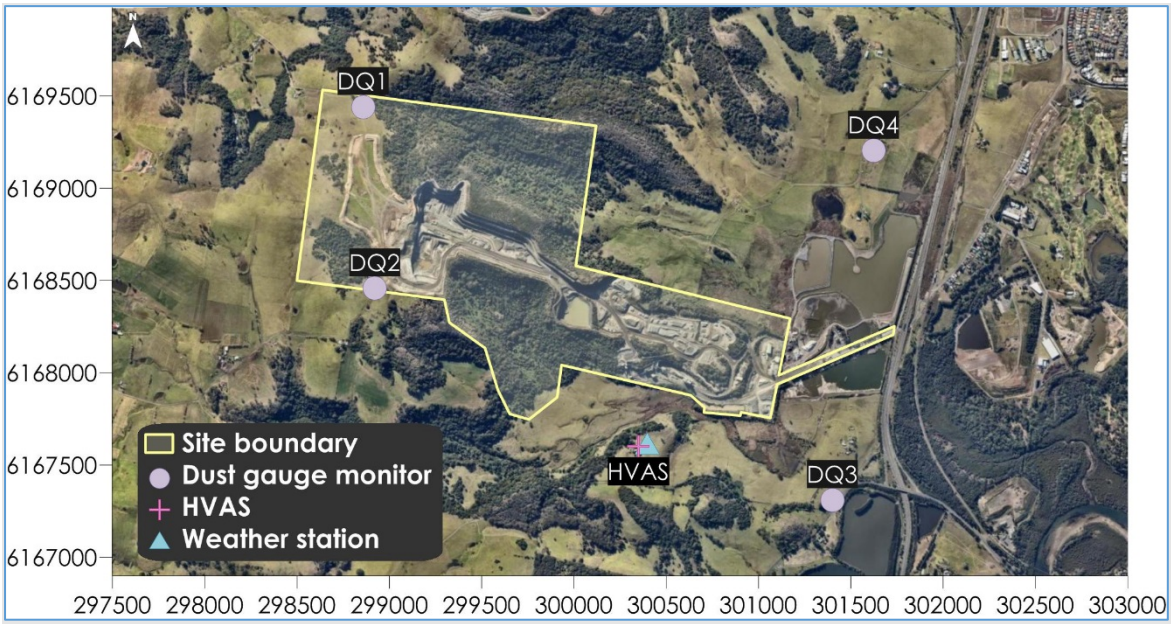


Figure 256 Weather Station Location

A monthly review of weather data is undertaken by the environmental co-ordinator. Important meteorological conditions that are assessed include rainfall, wind speed direction and atmospheric stability.

Rainfall data has been collected since FY2003. A summary of the rainfall measured from the Dunmore Quarry weather station is shown below in Table 28. Historical trends are shown in Table 29 and in red are the months where rainfall was above the regional average.

Table 268 Dunmore Rainfall Summary

Rainfall (mm)			
Month	**Current Reporting Period**	**Site Average**	**Regional Average**
July	56.8	78.4	49
August	67.6	67.6	53.5
September	53.4	52.3	42.7
October	22.4	77.5	64.5
November	216.2	97.4	83.1
December	207.4	87.7	67
January	57.4	88.9	72.9
February	71.8	151.9	140.5
March	80.8	162.8	122.3
April	261	100.9	73.8
May	296	88.5	55.8
June	225	109.9	93.7
Total	1615.8	1144.3	925.6

Table 279 Dunmore Historical Rainfall

	Rainfall (mm)																						
Month	**FY03**	**FY04**	**FY05**	**FY06**	**FY07**	**FY08**	**FY09**	**FY10**	**FY11**	**FY12**	**FY13**	**FY14**	**FY15**	**FY16**	**FY17**	**FY18**	**FY19**	**FY20**	**FY21**	**FY22**	**FY23**	**FY24**	**Site Average**	**Regional Average**
July	20	23.5	54.2	41	96	30.5	63.5	35.5	78	194	39	61.7	5	48	97.5	25	6	20.5	264.2	14.8	450	56.8	78.4	49
August	13.5	38.5	23	3	42.5	58.5	39	0.5	72	85.5	4.5	17	252	327	76	39	31	39	187.1	73.4	39.4	67.6	69.5	53.5
September	14	7.5	40.6	33	101	39	56	19.5	145.5	58.5	11.5	85.5	48.7	82	51	1	41.5	59.5	11.3	46.37	145.2	53.4	52.3	42.7
October	6.5	49	245.4	48	0	17	79	125.5	126	124.5	83.5	6.5	102.5	36.5	32	14.5	128	38.5	114.4	61.85	243.8	22.4	77.5	64.5
November	17	149.5	126.8	144.5	39.5	161.5	46.5	65	198	163.5	25	173	24	48	33	85	92	25.5	83	164.1	61.2	216.2	97.4	83.1
December	70	40.5	136.2	36.5	54	120	112.5	80.5	147.5	63	32	70.5	233.5	116.5	58	53	90.5	2.5	83.8	78.36	41.8	207.4	87.7	67
January	68	30.5	128.8	90	0	65.5	9.5	79	59.5	50.5	183	43.5	192.5	155.5	32.5	36	143.5	65	189.3	151	125	57.4	88.9	72.9
February	112	70	180.4	87.1	186.5	351.5	107.5	197.5	48	257.5	142.5	59	112.5	29.5	283	128.5	35.5	272.5	88.4	295.8	225.4	71.8	151.9	140.5
March	121	84	118	43.5	67.5	36.5	39	74	362.5	196	23.5	326	57	145	441	41.5	156.5	65.5	278.5	670.6	153	80.8	162.8	122.3
April	91.5	200	24.4	8	145	90.5	106	63	37.4	87.5	136	64.5	305	37.5	40.5	26.1	48.5	85	5.9	216.8	140.4	261	100.9	73.8
May	427.5	43.5	85.6	65.5	23	8	20	80.5	58.3	9.5	81	13	53.5	35.5	51.5	44	13.5	52	206.1	202.8	77.6	296	88.5	55.8
June	74.5	42	84.4	124	318.5	85.5	67	52	92	89	239	34	76	429	57	133.5	103	35	44	1.8	12.6	225	109.9	93.7
Total	1036	778.5	1248	724.1	1074	1064	745.5	872.5	1425	1379	1001	954.2	1462	1490	1253	627.1	889.5	760.5	1556	1978	1715	1616	1144.3	925.6

Monthly wind roses and seasonal wind roses are shown below in Figure 29 to Figure 38. Please note calm is defined as winds averaging less than 0.3m/s over the averaging period.

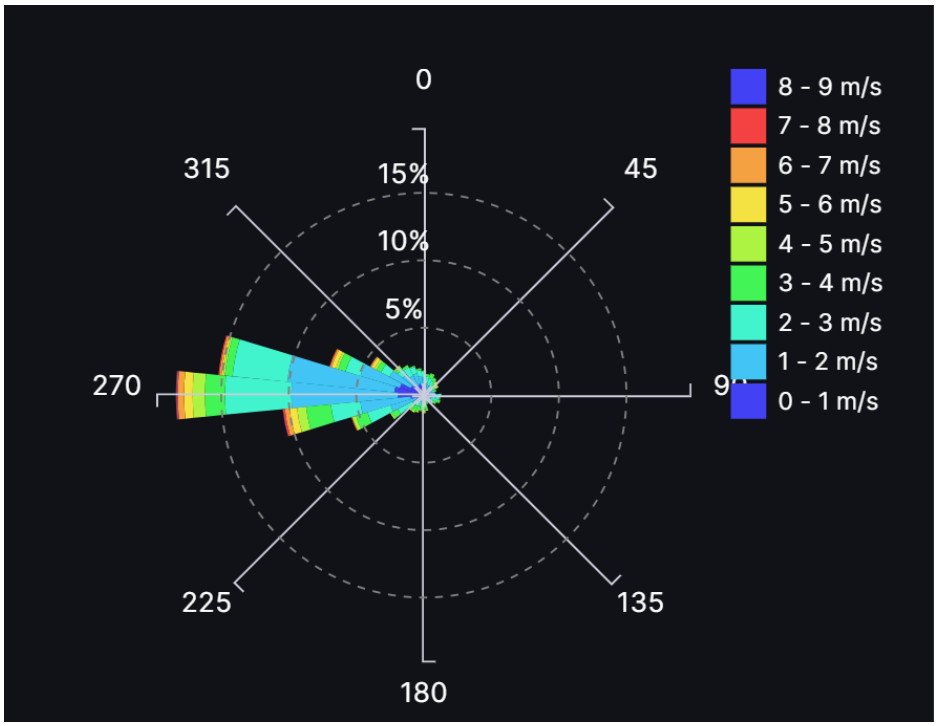


Figure 267 July 2023 Wind Rose

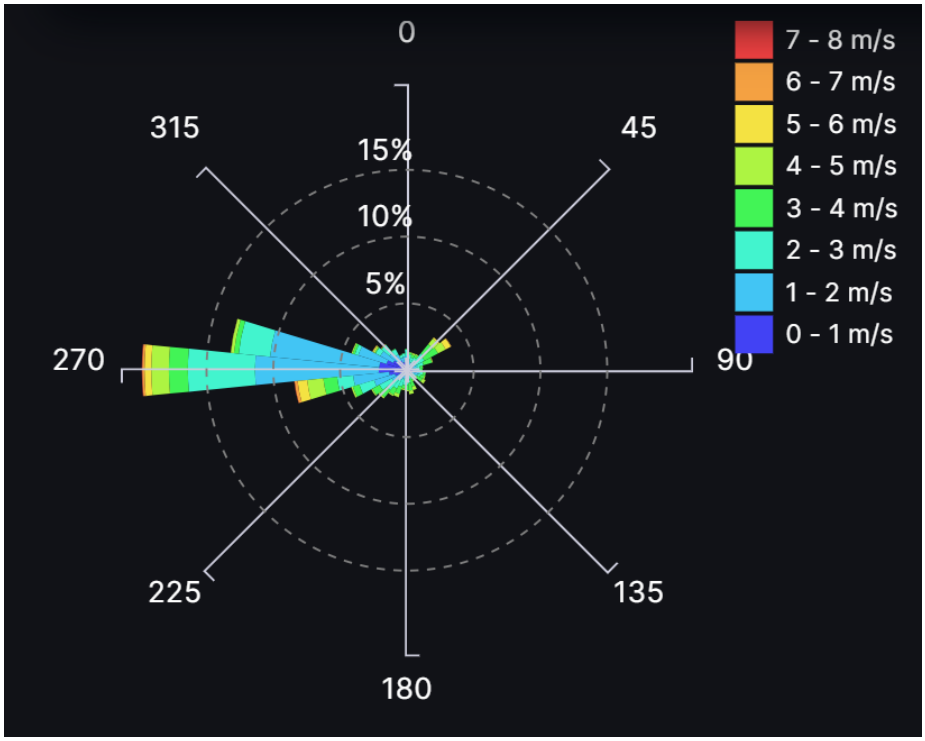


Figure 278 August 2023 Wind Rose

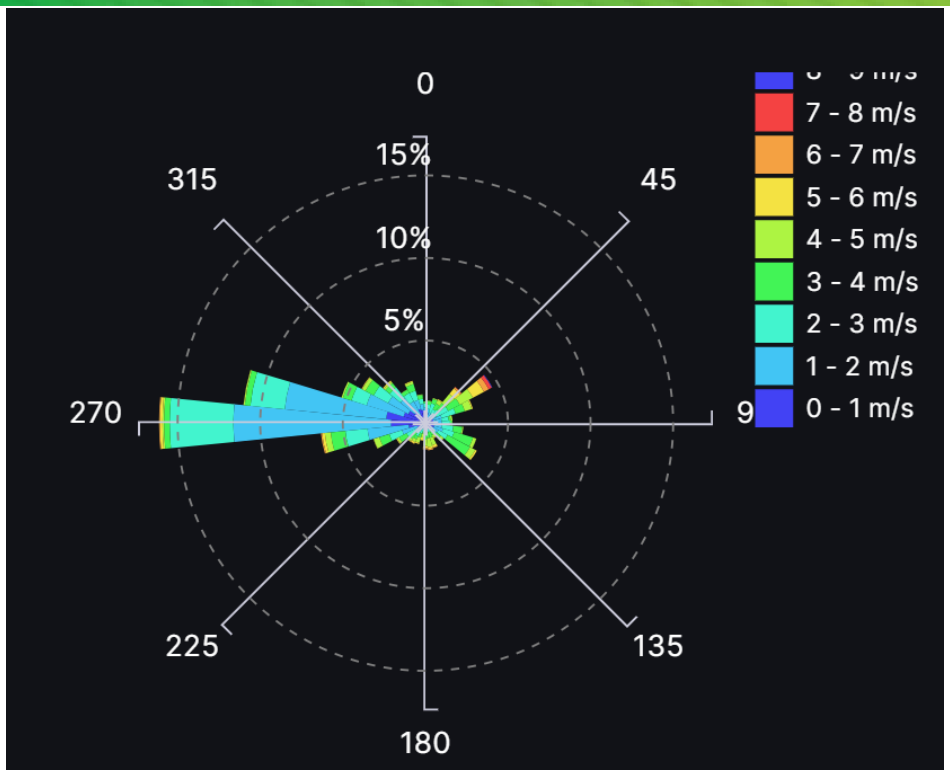


Figure 289 September 2023 Wind Rose

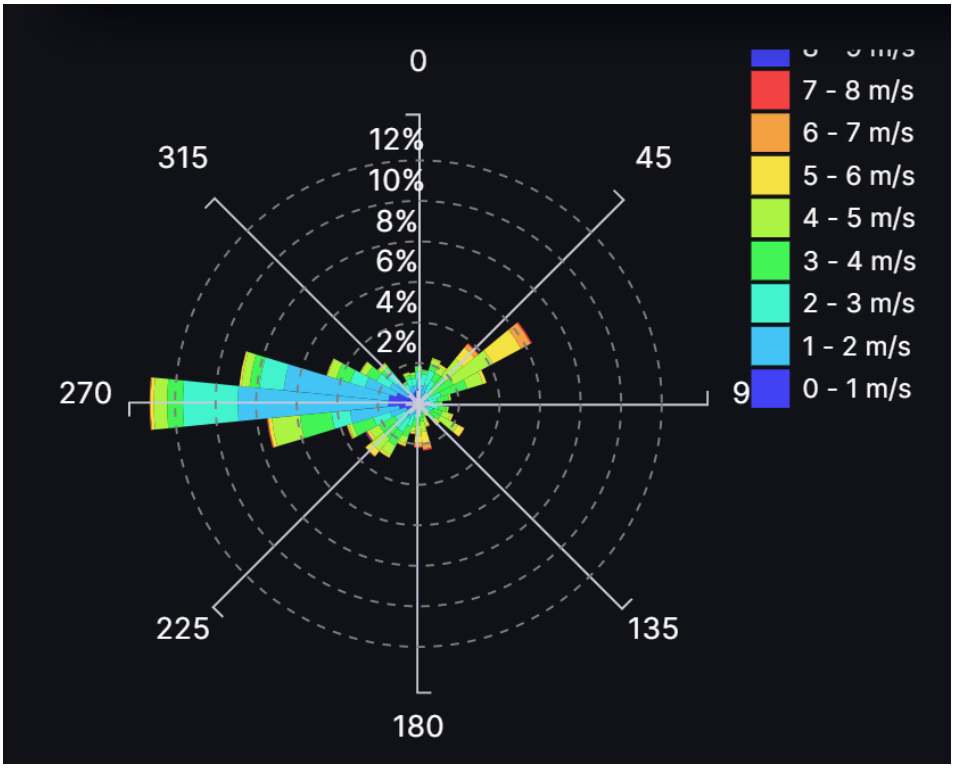


Figure 29 October 2023 Wind Rose

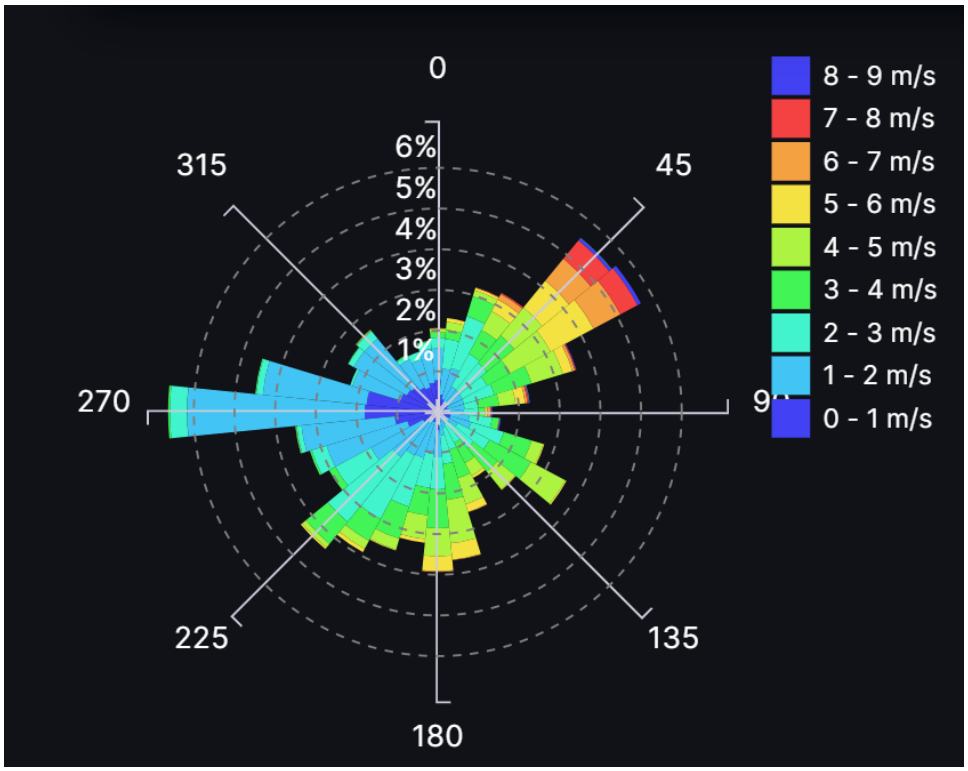


Figure 301 November 2023 Wind Rose

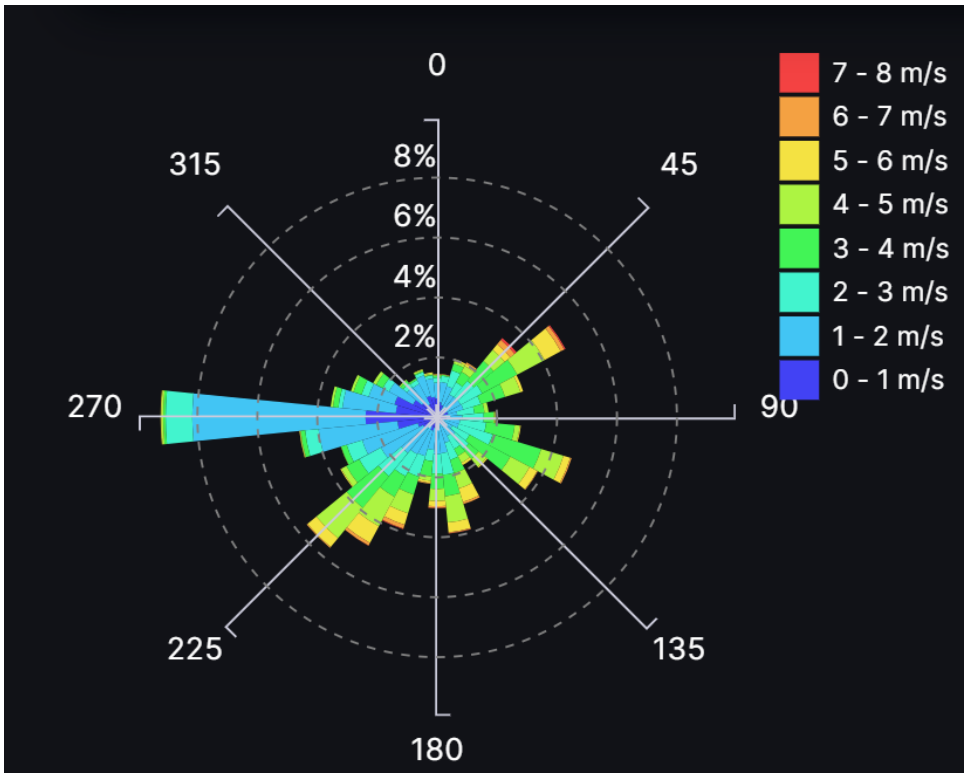


Figure 312 December 2023 Wind Rose

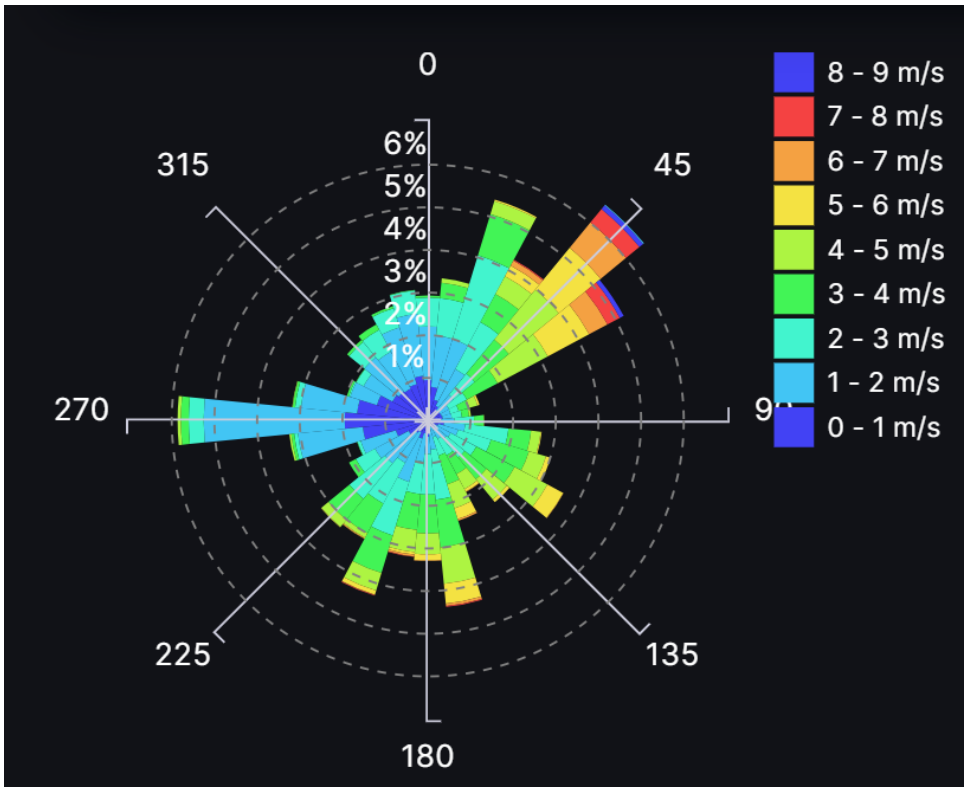


Figure 323 January 2024 Wind Rose

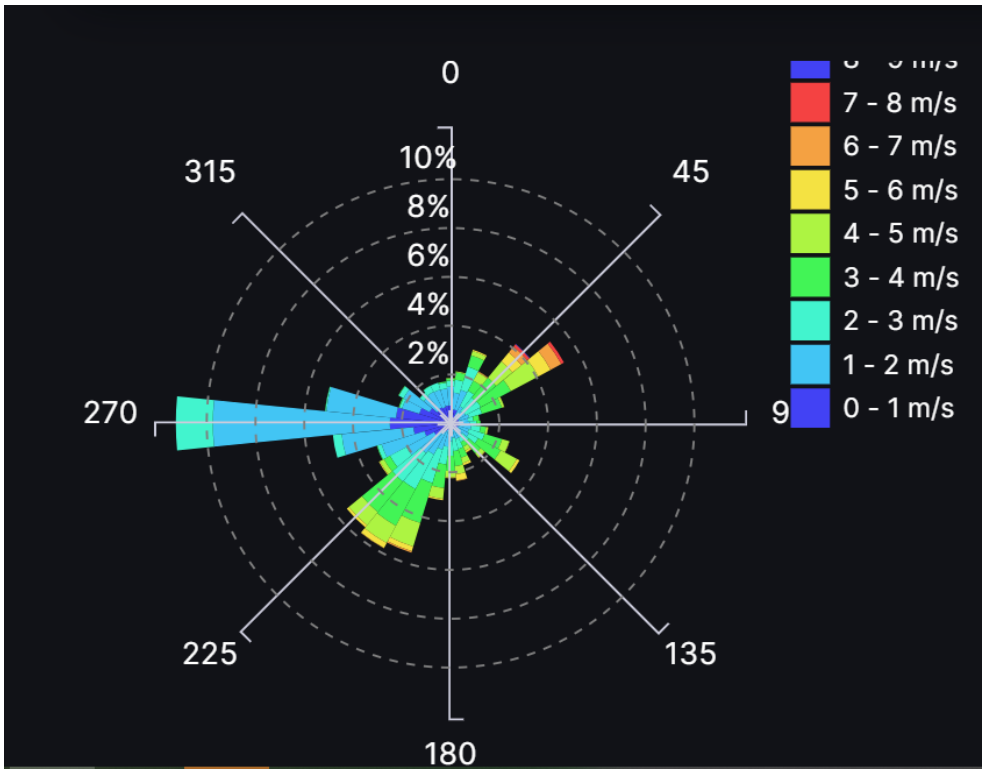


Figure 334 February 2024 Wind Rose

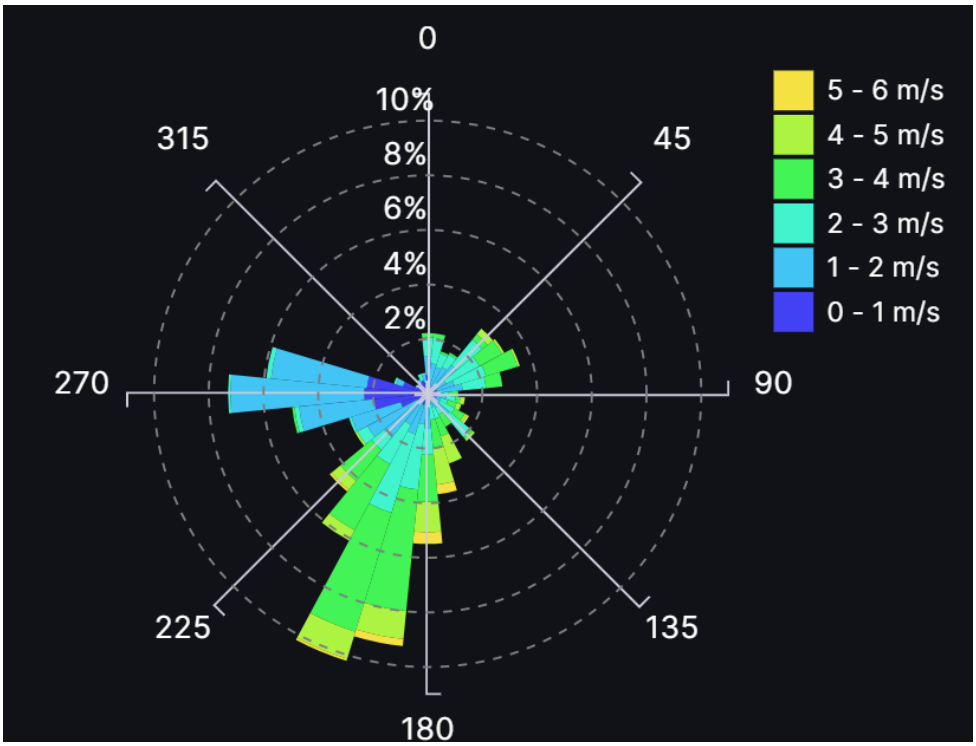


Figure 345 March 2024 Wind Rose

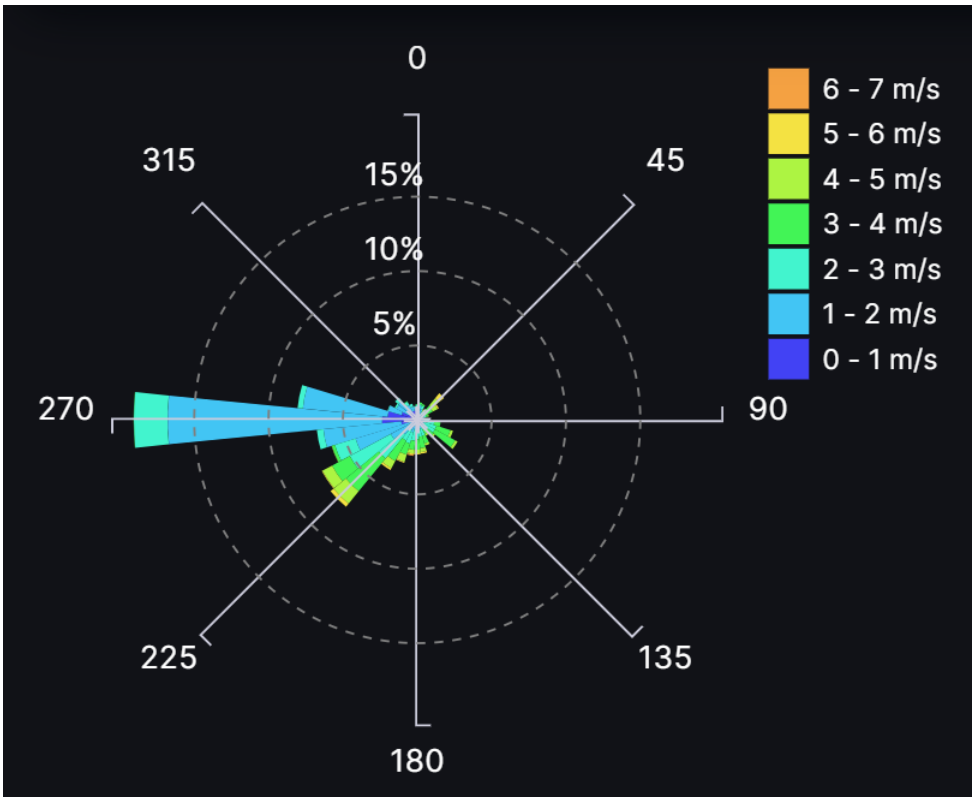


Figure 356 April 2024 Wind Rose

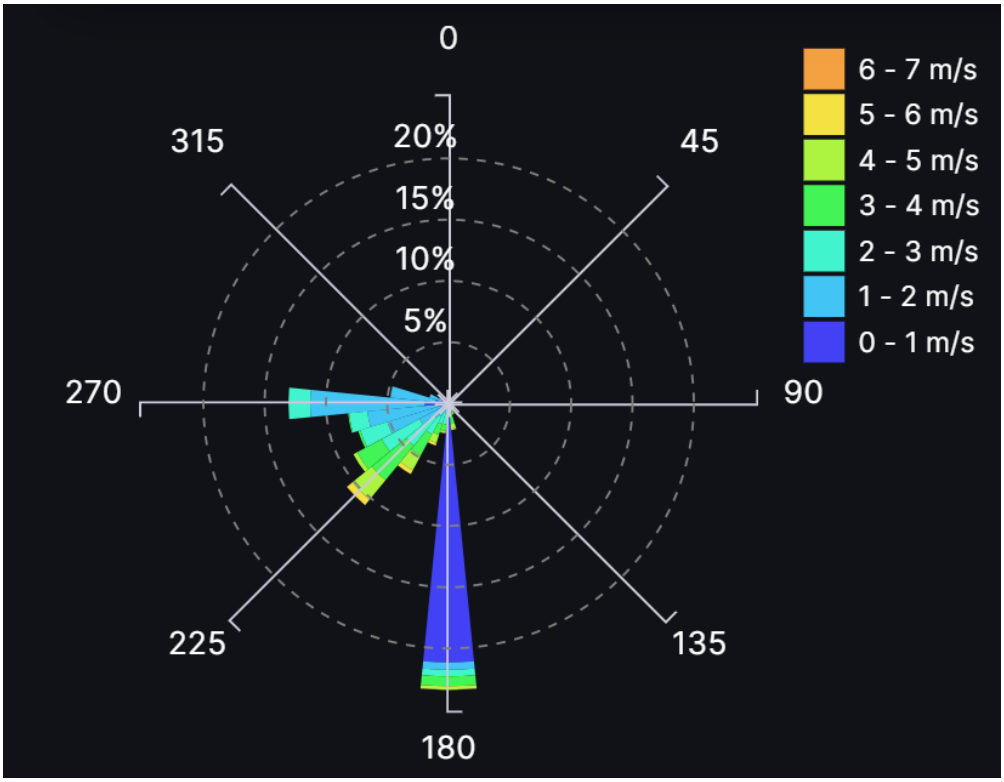


Figure 367 May 2024 Wind Rose

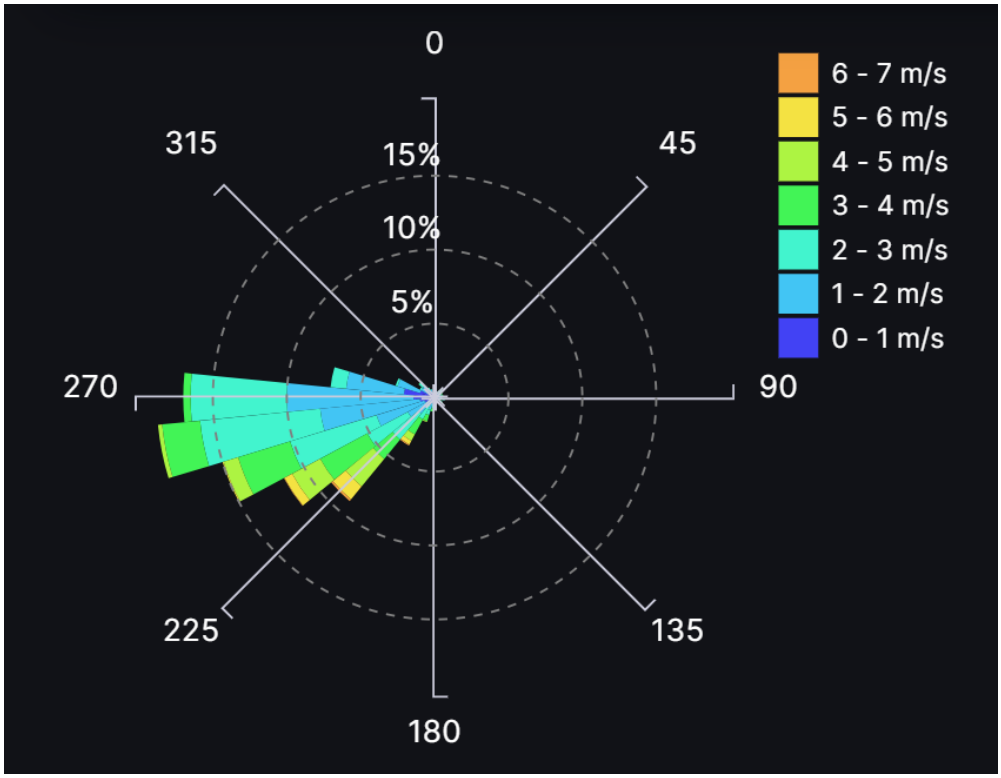


Figure 378 June 2024 Wind Rose

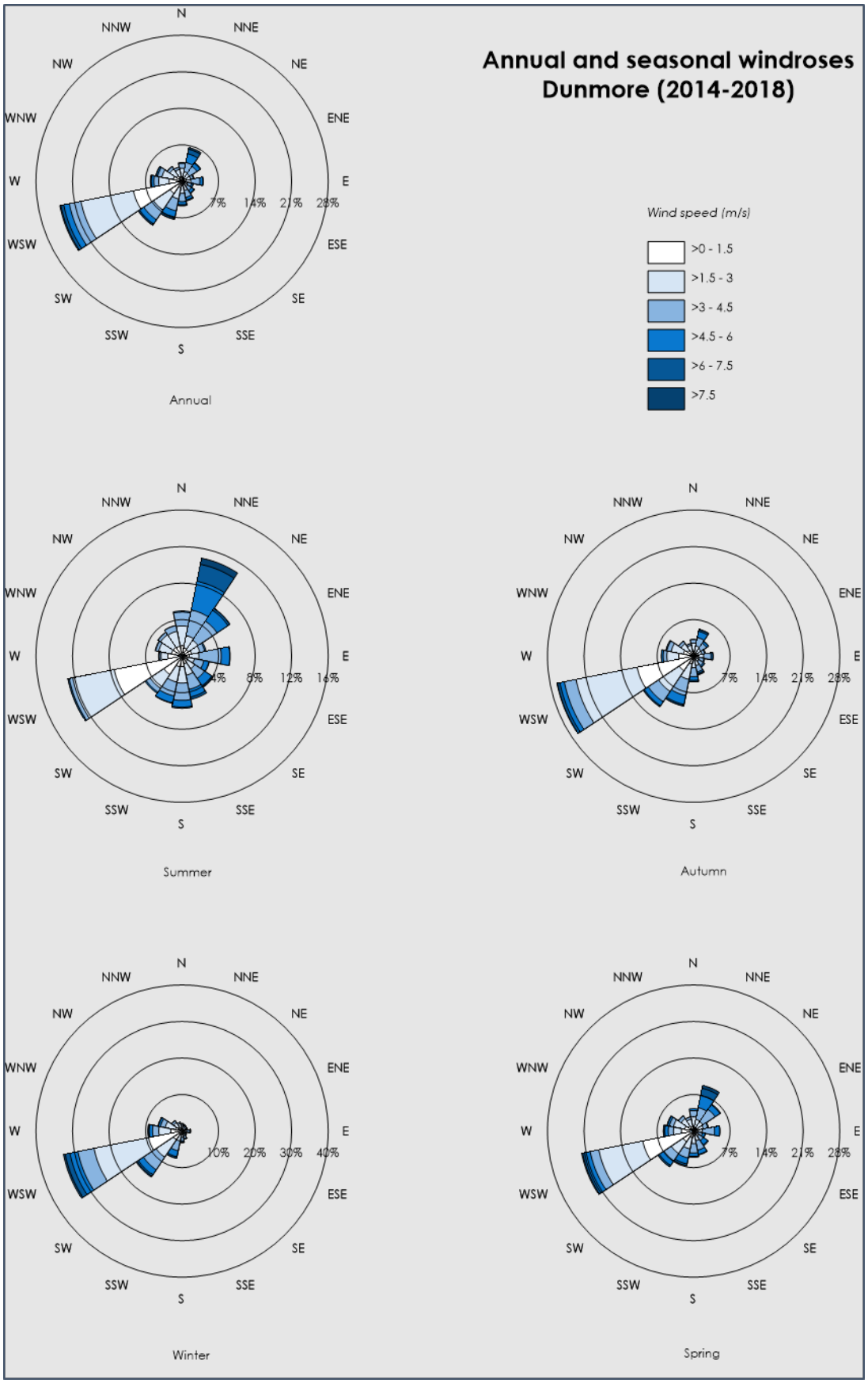


Figure 389 Dunmore Seasonal Wind Rose Data

8. Appendix B Air Quality Additional Data and Graphs

A monthly breakdown of deposited dust monitoring is shown in the Table 30 below. Dominant wind directions and production data are also shown within Table 30.

Table 30 Detail Summary of Historical Dust Data

Month	DD2 grams/m²/month		DD5 grams/m²/month		DD6 grams/m²/month		DD7b/10 grams/m²/month		Deposited Dust Goal
	Insoluble Solids	Ash	Insoluble Solids	Ash	Insoluble Solids	Ash	Insoluble Solids	Ash	
FY07 Average	3.68	1.9	3.3	2.1	5.75	3.36	3.9	1.92	4
FY08 Average	2.97	1.84	2.88	1.66	4.23	2.43	4.31	2.44	4
FY09 Average	3.07	1.98	3.79	1.94	3.83	2.87	5.55	3.17	4
FY10 Average	5.29	3.3	3.42	2.5	4.88	2.96	2.71	1.66	4
FY11 Average	6.16	3.68	3.42	1.99	3.92	2.47	3.15	2.33	4
FY12 Average	5.51	2.82	3.09	1.82	3.17	2.32	2.53	1.6	4
FY13 Average	4.19	2.19	3.26	1.84	3.7	2.48	2.75	1.81	4
FY14 Average	2.21	1.42	3.63	1.76	2.67	1.58	3.36	2.36	4
FY15 Average	3.57	1.77	2.55	1.46	3.94	2	3.2	2	4
FY16 Average	1.85	1.19	2.59	1.44	2.55	1.55	2.66	1.66	4
FY17 Average	2.28	1.56	2.67	1.77	3.31	1.68	2.01	1.30	4
FY18 Average	2.36	1.65	2.32	1.78	2.71	1.88	2.84	1.79	4
FY19 Average	3.66	1.87	3.1	1.9	3.03	1.94	2.81	1.59	4
FY20 Average	3.59	2.11	3.06	1.82	3.49	2.18	3.16	1.98	4
FY21 Average	1.94	1.12	2.44	1.34	2.00	1.08	1.85	1.11	4
FY22 Average	2.07	0.88	1.54	0.92	1.79	1.05	1.21	1.64	4
FY23 Average	2.39	1.39	1.86	1.19	1.69	1.12	1.32	0.90	4
FY24 Average	1.87	0.76	2.50	1.48	1.54	1.03	1.94	0.73	4
Jul-2023	0.92	0.53	1.16	0.23	1.14	0.6	0.62	0.47	4
Aug-2023	3.37	0.47	1.28	0.77	1.74	1.6	1.64	0.63	4
Sep-2023	2.47	1.84	2	1.48	1.61	1.23	2.42	1.07	4
Oct-2023	1.97	0.16	1.05	0.17	1.49	1.1	1.96	1.06	4
Nov-2023	1.78	0.96	3.02	0.47	0.75	0.4	0.81	0.33	4
Dec-2023	5.8	1.6	6.87	6.84	1.38	0.81	3.15	0.46	4
Jan-2024	1.12	1.05	4.62	4.57	3.49	2.18	1.38	1.17	4
Feb-2024	2.12	1.34	ND	ND	2.81	1.92	2.3	1.43	4
Mar-2024	0.88	0.61	2.06	1.26	0.72	0.62	2.88	1.25	4
Apr-2024	1.51	0.23	3.23	0.12	1.21	0.41	1.86	0.57	4
May-2024	0.20	0.09	1.52	0.27	1.86	1.17	3.59	0.02	4
Jun-2024	0.30	0.24	0.68	0.1	0.31	0.28	0.61	0.34	4
FY24 Average	1.87	0.76	2.50	1.48	1.54	1.03	1.94	0.73	4

A detailed breakdown of the particulate monitoring via the HVAS can be seen in Table 31 below.

Table 281 Detailed Summary of PM_{10} Monitoring Data

Date	Sample Daily Average (µg/m³)	Short Term Criteria 24-hr (50µg/m³)	Long Term Criteria Annual (30µg/m³)	Progressive Annual Average (µg/m3)
5/07/2023	0.76	50	30	7.19
11/07/2023	3.74	50	30	7.21
17/07/2023	7.66	50	30	7.34
23/07/2023	1.96	50	30	7.37
29/07/2023	3.62	50	30	7.30
4/08/2023	9.38	50	30	7.34
10/08/2023	4.87	50	30	7.42
16/08/2023	2.85	50	30	7.46
22/08/2023	6.24	50	30	7.56
28/08/2023	22.57	50	30	7.93
3/09/2023	1.43	50	30	7.82
9/09/2023	5.88	50	30	7.87

Date	Sample Daily Average (µg/m$^{3)}$	Short Term Criteria 24-hr (50µg/m$^{3)}$	Long Term Criteria Annual (30µg/m$^{3)}$	Progressive Annual Average (µg/m3)
15/09/2023	26.31	50	30	8.15
21/09/2023	7.24	50	30	7.91
27/09/2023	17.02	50	30	8.11
3/10/2023	29.83	50	30	8.60
9/10/2023	15.86	50	30	8.85
15/10/2023	9.38	50	30	8.99
21/10/2023	11.52	50	30	9.62
27/10/2023	4.99	50	30	9.50
2/11/2023	10.69	50	30	9.42
8/11/2023	20.07	50	30	9.85
14/11/2023	22.86	50	30	10.12
20/11/2023	15.02	50	30	9.85
26/11/2023	4.58	50	30	9.92
2/12/2023	2.51	50	30	9.93
8/12/2023	32.42	50	30	9.71
14/12/2023	19.66	50	30	10.09
20/12/2023	2.02	50	30	9.87
26/12/2023	13.38	50	30	9.86
1/01/2024	6.79	50	30	9.89
7/01/2024	12.83	50	30	9.86
13/01/2024	13.45	50	30	9.77
19/01/2024	13.02	50	30	9.56
25/01/2024	7.53	50	30	9.50
31/01/2024	7.53	50	30	9.44
6/02/2024	6.1	50	30	9.12
12/02/2024	4.72	50	30	8.90
18/02/2024	5.57	50	30	8.88
24/02/2024	11.34	50	30	8.79
1/03/2024	8.67	50	30	8.85
7/03/2024	5.64	50	30	8.84
13/03/2024	13.95	50	30	8.95
19/03/2024	9.74	50	30	9.02
25/03/2024	2.71	50	30	8.91
31/03/2024	2.23	50	30	8.85
6/04/2024	3.57	50	30	8.83
12/04/2024	1.38	50	30	8.78
18/04/2024	6.59	50	30	8.84
24/04/2024	4.96	50	30	8.89
30/04/2024	5.05	50	30	8.96
6/05/2024	5.45	50	30	8.92
12/05/2024	5.45	50	30	8.81
18/05/2024	3.21	50	30	8.79
24/05/2024	1.45	50	30	8.79
30/05/2024	1.95	50	30	8.78
5/06/2024	12.94	50	30	8.98
11/06/2024	3.17	50	30	9.02
17/06/2024	1.19	50	30	8.89

Date	Sample Daily Average (µg/m$^{3)}$	Short Term Criteria 24-hr (50µg/m$^{3)}$	Long Term Criteria Annual (30µg/m$^{3)}$	Progressive Annual Average (µg/m3)
23/06/2024	4.99	50	30	8.82
29/06/2024	3.98	50	30	8.88

9. Appendix C Annual Noise Monitoring Compliance Report

Annual Noise Monitoring Assessment 2023

Dunmore Lakes Sand Project
Dunmore, NSW
July 2023

Prepared for: Boral Resources (NSW) Pty Ltd
July 2023
MAC180747-10RP2

Muller Acoustic Consulting

Document Information

Annual Noise Monitoring Assessment 2023

Dunmore Lakes Sand Project

Dunmore, NSW

July 2023

Prepared for: Boral Resources (NSW) Pty Ltd

Prepared by: Muller Acoustic Consulting Pty Ltd
PO Box 678, Kotara NSW 2289
ABN: 36 602 225 132
P: +61 2 4920 1833
www.mulleracoustic.com

Document ID	Date	Prepared By	Signed	Reviewed By	Signed
MAC180747-10RP2	31 July 2023	Nicholas Shipman		Rod Linnett	

DISCLAIMER

All documents produced by Muller Acoustic Consulting Pty Ltd (MAC) are prepared for a particular client's requirements and are based on a specific scope, circumstances and limitations derived between MAC and the client. Information and/or report(s) prepared by MAC may not be suitable for uses other than the original intended objective. No parties other than the client should use or reproduce any information and/or report(s) without obtaining permission from MAC. Any information and/or documents prepared by MAC is not to be reproduced, presented or reviewed except in full.

CONTENTS

This page has been intentionally left blank

1 Introduction

Muller Acoustic Consulting Pty Ltd (MAC) has completed a Noise Monitoring Assessment (NMA) on behalf of Boral Resources (NSW) Pty Ltd for Dunmore Lakes Sand Project (DLSP), at Dunmore, NSW.

The monitoring has been conducted in accordance with the Dunmore Lakes Sand Project Noise Management Plan V7 (NMP, 2021) and in general accordance with the Noise Policy for Industry (NPI). This assessment has been undertaken during July 2023 and forms the annual noise monitoring program to address conditions outlined in the Development Consent (DA 195-8-2004) with the commencement of Stage 5A.

This report summarises the operator-attended noise monitoring results measured at eight receivers in comparison to the relevant noise limits contained in the Development Consent and NMP.

The assessment has been conducted in accordance with the following documents:

- NSW Environment Protection Authority (EPA), Noise Policy for Industry (NPI), 2017;
- NSW Environment Protection Authority (EPA's), Approved Methods for the measurement and analysis of environmental noise in NSW, 2022;
- Dunmore Lakes Sand Project Noise Management Plan V7 (NMP), 2021;
- Dunmore Lakes Sand Quarry Environmental Protection Licence No. 11147;
- Discussion Paper - Validation of Inversion Strength Estimation Method (EPA) 2014; and
- Standards Australia AS 1055:2018 - Acoustics - Description and measurement of environmental noise.

A glossary of terms, definitions and abbreviations used in this report is provided in **Appendix A**.

This page has been intentionally left blank

2 Noise Criteria

The DLSP Noise Management Plan (NMP), outlines the applicable noise criteria for residential receivers surrounding the operation, and are presented in **Table 1.**

Table 1 Consent Criteria

Receiver Location[1]	Day (7am - 6pm)	Evening (6pm - 10pm)	Night (10pm - 12am)	Morning Shoulder (6am - 7am)
	dB $L_{Aeq(15min)}$	dB $L_{Aeq(15min)}$	dB $L_{Aeq(15min)}$	dB $L_{Aeq(15min)}$
Dunmore Village residences – 31 Shellharbour Road	49	44	41	47
R20	49	44	38	47
R3, R11, R12, R13, R14, R15, R16, R17, R18, 79 Fig Hill Lane	48	43	38	48
R19	47	43	38	46
R4, R5, R6, R7, R8, R9, R10	47	43	38	43
Renton (183 James Road, Dunmore)	46	43	37	46
All other residences	40	35	35	35

Note 1: Referenced from DLSP NMPv7 Table 7.

Maximum Noise Trigger Levels for residential receivers are presented in **Table 2.**

Table 2 Maximum Noise Trigger Levels

Receiver Location	Night[1] (10pm - 12am)	Morning Shoulder[1] (6am - 7am)
	dB L_{Amax}	dB L_{Amax}
R1, R2, R3, R11, R12, R13, R14, R15, R16, R17 and R18	61	
R4, R5, R6, R7, R8, R9, R10	53	
R19	56	

Note 1: Referenced from DLSP NMPv7 Table 8.

Section L3 of the DLSP Environmental Protection Licence (EPL #11147), outlines the applicable noise limits for residential receivers surrounding the operation. The criteria outlined in the EPL is reproduced below in **Table 3** along with relevant noise conditions.

L3.1 Noise from the premises must not exceed the following limits:

Table 3 EPL Noise Limits

Description	Address	Day (7am - 6pm)	Evening (6pm - 10pm)	Night (10pm - 6am)	Morning Shoulder (6am - 7am)
		dB $LA_{eq(15min)}$	dB $LA_{eq(15min)}$	dB $LA_{eq(15min)}$	dB $LA_{eq(15min)}$
Renton	James Road	46	43	37	46
Dunmore Village	31 Shellharbour Road	49	44	41	47
Stocker	Swamp Road	49	44	38	47

Note: The night-time noise limit for Dunmore Village was determined on the basis of predicted noise levels that would be attained after a noise reduction of 8 dB(A) for the loader and/or loading area.

L3.2 For the purposes of condition L3.1:

- *Shoulder is the period 6am to 7am Monday to Saturday;*
- *Day is defined as the period from 7am to 6pm Monday to Saturday and 8am to 6 pm Sundays and Public holidays;*
- *Evening is defined as the period from 6pm to 10pm; and*
- *Night is defined as the period from 10pm to 6am.*

L3.3 Noise from the premised is to be measured at the most affected point on or within the residential boundary or at the most affected point within 30m of the dwelling (rural situations) where the dwelling is more than 30m from the boundary to determine compliance with the $LA_{eq(15\ minute)}$ noise limit in this condition.

The modification factors presented in Section 4 of the NSW Industrial Noise Policy must also be applied to the measured noise levels where applicable.

L3.4 The noise emission limits identified in this condition apply under meteorological conditions of:

- *wind speeds up to 3 m/s at 10metres above the ground level; or*
- *temperature inversions conditions of up to 6oC/100m and wind speeds up to 2m/s at 10 metres above ground level.*

3 Methodology

3.1 Locality

DLSP is located at Dunmore near Shellharbour, NSW. Receivers in the locality surrounding DLSP are primarily rural and residential. Highway traffic is a dominant noise source for receivers as they are situated within 500m of the Princes Highway. The representative monitoring locations with respect to DLSP are presented in the locality plan in **Figure 1. Table 4** presents the noise criteria for each assessed receiver.

Table 4 Attended Monitoring Locations and Consent Criteria

ID[2]	Description[3]	Day[1]	Evening[1]	Night[1]	Morning Shoulder[1]
		dB $L_{Aeq(15min)}$	dB $L_{Aeq(15min)}$	dB $L_{Aeq(15min)}$	dB $L_{Aeq(15min)}$
DN-6	Renton	46	43	37	46
DN-7	Dunmore Village	49	44	41	47
DN-8	Stocker (R20)	49	44	38	47
DN-9	R17	48	43	38	48
DN-10	R14	48	43	38	48
DN-11	R11	48	43	38	48
DN-12	R3	48	43	38	48
DN-13	R4	47	43	38	43

Note 1: Day - the period from 7am to 6pm Monday to Saturday or 8am to 6pm on Sundays and public holidays; Evening - the period from 6pm to 10pm; Night - the remaining periods and the morning shoulder period is from 6am to 7am.

Note 2: Referenced from DLSP NMPv7 Figure 3 and Figure 4.

Note 3: Referenced from DLSP NMPv7 Table 7.

Table 5 presents the attended monitoring locations and maximum noise trigger levels for each assessed receiver.

Table 5 Attended Monitoring Locations and Maximum Noise Trigger Levels

ID[2]	Description[3]	Night[1] (10pm - 12am)	Morning Shoulder[1] (6am - 7am)
		dB L_{Amax}	dB L_{Amax}
DN-9, DN-10, DN-11 and DN-12	R1, R2, R3, R11, R12, R13, R14, R15, R16, R17 and R18	61	
DN-13	R4, R5, R6, R7, R8, R9, R10	53	
DN6, DN7 and DN-8	Renton, Dunmore Village and Stocker	N/A	

Note 1: Referenced from DLSP NMPv7 Table 8.

Note 2: Referenced from DLSP NMPv7 Figure 1, Figure 2, Figure 3 and Figure 4.

Note 3: Referenced from DLSP NMPv7 Table 7.

3.2 Assessment Methodology

The attended noise measurements were conducted in general accordance with the procedures described in Standards Australia AS 1055:2018, "Acoustics - Description and Measurement of Environmental Noise" and the DLSP NMP. Noise measurements of two 15-minutes in duration during the day period and one 15-minute duration during the remaining periods were conducted at eight locations (DN-6, DN-7, DN-8, DN-9, DN-10, DN-11, DN-12, DN-13) using Svantek Type 1, 971 noise analysers between Tuesday 11 July 2023 and Tuesday 18 July 2023 to satisfy the requirements of the NMP. All acoustic instrumentation used carries appropriate and current NATA (or manufacturer) calibration certificates with records of all calibrations maintained by MAC as per Approved Methods for the measurement and analysis of environmental noise in NSW (EPA, 2022) and complies with AS/NZS IEC 61672.1-2019-Electroacoustics - Sound level meters - Specifications. Calibration of all instrumentation was checked prior to and following measurements. Drift in calibration did not exceed ±0.5dBA.

To understand meteorological conditions during the evening and night periods, direct measurement of temperature profile was undertaken at Trevethan Reserve, Minnamurra at 2m above ground level and at 50m above ground level using a weather balloon between Tuesday 11 July 2023 to Thursday 13 July 2023.

The results of the temperature measurements were used to determine the temperature lapse rate in general accordance with the Validation of Inversion Strength Estimation Method (2014). These measurements, in combination with the on-site weather station provide a reference to validate the relevant meteorological conditions under which compliance is assessed.

Extraneous noise sources were excluded from the analysis to determine the dB $LA_{eq(15min)}$ DSLP noise contribution for comparison against the relevant criteria. In the event of quarry attributed noise being above criteria, prevailing meteorological conditions for the monitoring period are sourced from the onsite meteorological station and analysed in accordance with Fact Sheet A4 of the NPI to determine the stability category present at the time of each attended measurement.

Where the quarry is inaudible, the contribution is estimated to be at least 10dBA below the ambient noise level.

MAC
Muller Acoustic Consulting

N

FIGURE 1

LOCALITY PLAN

MAC180747

Dunmore Lakes Sand Project, Dunmore

KEY

Receiver Locations

Site Boundary

0 200 400 600 800 m

This page has been intentionally left blank

4 Results

A summary of the operator attended measurements at location DN-6 to DN-13 are presented **Table 6** to **Table 13** and provide the following information;

- Monitoring location.
- Date, time and assessment period.
- Observed Wind Speed (WS, m/s), Wind Direction (WD) and Temperature (Temp) in °C at 1.5m above the ground measured at the monitoring location.
- Measured Temperature (Temp) in °C at 2.0m and 60.0m above ground level at a representative location.
- Average Wind Speed (WS, m/s), Wind Direction (WD) and Temperature (Temp) in °C at 10m above ground level at the on-site weather station.
- Atmospheric stability class derived from the on-site weather station.
- Calculated temperature inversion strength.
- Ambient measured noise levels $LA_{eq(15min)}$ and $LA_{90(15min)}$ in dB re 20µPa.
- DLSP $LA_{eq(15min)}$ and LA_{max} noise level contribution.
- Noise Limit $LA_{eq(15min)}$ and LA_{max}.

Results of the attended noise survey identified that the DLSP was audible for short durations during the measurements, however extraneous sources such as distant traffic, insects, livestock and birds were audible during the survey period and dominated the acoustic environment. The attended noise measurements within the development consent conditions (ie lower than 6°C/100m) remained below the consent noise criteria during the assessment period.

Table 6 DN-6 - Attended Noise Monitoring Summary

Date & Period	Time (hrs)	1.5m WS WD Temp	Descriptor		Criteria	Observed Meteorology							Description and SPL, dBA
			L_{Aeq}	L_{A90}	$L_{Aeq(15min)}$/ L_{Amax}	WS (m/s)[1]	WD[1]	2m Temp˚C	60m Temp˚C	Delta Temp˚C	Lapse Rate ˚C/100m[2]	Stability Class[1]	
12/07/2023 Morning Shoulder	06:33	0.1m/s N 15˚C	62	59	46/n/a	1.9	W	4.6	9.5	4.9	10.1	G	Traffic 55-67 DLSP inaudible
DLSP Contribution													<46dB LAeq(15min)
18/07/2023 Day	11:04	1m/s E 18˚C	60	57	46	1.5	E	n/a	n/a	n/a	n/a	n/a	Traffic 53-72 Birds 53-60 Aircraft 56-66 DLSP inaudible
DLSP Contribution													<46dB LAeq(15min)
18/07/2023 Day	11:19	1m/s E 18˚C	60	57	46	1.5	E	n/a	n/a	n/a	n/a	n/a	Traffic 53-68 Train 53-62 Aircraft 56-60 DLSP inaudible
DLSP Contribution													<46dB LAeq(15min)
11/07/2023 Evening	18:01	0.2m/s N 12˚C	61	58	43	2.4	W	n/a	n/a	n/a	n/a	n/a	Traffic 62-68 DLSP inaudible
DLSP Contribution													<43dB LAeq(15min)
11/07/2023 Night	23:12	0.1m/s N 9˚C	51	43	37/ n/a	1	WNW	10.7	8.9	-1.8	-0.8	E	Traffic 39-63 DLSP inaudible
DLSP Contribution													<33dB LAeq(15min)

Note 1: Data from on-site weather station.

Note 2: Calculated from 2m and 60m temperature.

Table 7 DN-7 - Attended Noise Monitoring Summary													
Date & Period	Time (hrs)	1.5m WS WD Temp	Descriptor		Criteria	Observed Meteorology							Description and SPL, dBA
			L_{Aeq}	L_{A90}	$L_{Aeq(15min)}$/ L_{Amax}	WS (m/s)[1]	WD[1]	2m Temp˚C	60m Temp˚C	Delta Temp˚C	Lapse Rate ˚C/100m[2]	Stability Class[1]	
12/07/2023 Morning Shoulder	06:09	0.1m/s N 15˚C	66	64	47/ n/a	0.4	ENE	4.8	8.0	3.2	6.6	G	Traffic 61-74 Train 60-69 DLSP inaudible
DLSP Contribution													<47dB LAeq(15min)
18/07/2023 Day	11:43	1m/s ESE 18˚C	56	50	49	1.9	E	n/a	n/a	n/a	n/a	n/a	Traffic 47-72 Birds 47-56 DLSP inaudible
DLSP Contribution													<40dB LAeq(15min)
18/07/2023 Day	11:58	1m/s ESE 18˚C	57	52	49	1.7	NE	n/a	n/a	n/a	n/a	n/a	Traffic 48-74 Birds 50-59 Aircraft 51-62 DLSP inaudible
DLSP Contribution													<42dB LAeq(15min)
11/07/2023 Evening	18:25	0.3m/s N 12˚C	62	59	44	0.3	W	n/a	n/a	n/a	n/a	n/a	Traffic 56-71 DLSP inaudible
DLSP Contribution													<44dB LAeq(15min)
11/07/2023 Night	22:48	0.1m/s N 10˚C	57	50	41/ n/a	2.3	W	8.0	9.1	1.1	2.3	F	Traffic 44-63 Train 45-81 DLSP inaudible
DLSP Contribution													<40dB LAeq(15min)

Note 1: Data from on-site weather station.

Note 2: Calculated from 2m and 60m temperature.

Table 8 DN-8 - Attended Noise Monitoring Summary													
Date & Period	Time (hrs)	1.5m WS WD Temp	Descriptor		Criteria	Observed Meteorology							Description and SPL, dBA
			L_{Aeq}	L_{A90}	$L_{Aeq(15min)}$/ L_{Amax}	WS (m/s)[1]	WD[1]	2m Temp˚C	60m Temp˚C	Delta Temp˚C	Lapse Rate ˚C/100m[2]	Stability Class[1]	
13/07/2022 Morning Shoulder	06:30	0.1m/s N 11˚C	62	56	47/ n/a	1.9	W	2.5	12.4	9.9	20.6	G	Traffic 54-79 Birds 50-69 DLSP impacts <50 (5 seconds)
DLSP Contribution													<30dB LAeq(15min)
18/07/2022 Day	12:22	0.4m/s E 18˚C	64	47	49	1.6	NW	n/a	n/a	n/a	n/a	n/a	Traffic 46-79 Birds 46-56 DLSP inaudible
DLSP Contribution													<37dB LAeq(15min)
18/07/2022 Day	12:37	1.2m/s E 18˚C	64	46	49	3.5	NW	n/a	n/a	n/a	n/a	n/a	Traffic 42-85 Birds 49-56 DLSP inaudible
DLSP Contribution													<36dB LAeq(15min)
11/07/2022 Evening	20:56	0.1m/s N 12˚C	60	50	44	1.2	W	7.5	13.2	5.7	11.8	G	Traffic 47-85 DLSP inaudible
DLSP Contribution													<40dB LAeq(15min)
11/07/2022 Night	22:21	0.1m/s N 10˚C	55	43	38/ n/a	1.1	W	6.6	9.1	2.5	5.3	G	Traffic 40-76 Aircraft 40-58 DLSP inaudible
DLSP Contribution													<33dB LAeq(15min)

Note 1: Data from on-site weather station.

Note 2: Calculated from 2m and 60m temperature.

Table 9 DN-9 - Attended Noise Monitoring Summary

Date & Period	Time (hrs)	1.5m WS WD Temp	Descriptor		Criteria	Observed Meteorology							Description and SPL, dBA
			L_{Aeq}	L_{A90}	$L_{Aeq(15min)}$/ L_{Amax}	WS (m/s)[1]	WD[1]	2m Temp˚C	60m Temp˚C	Delta Temp˚C	Lapse Rate ˚C/100m[2]	Stability Class[1]	
13/07/2023 Morning Shoulder	06:05	0.1m/s N 11˚C	55	52	48//61	2.6	W	2.6	12.0	9.4	19.7	G	Traffic 48-61 Birds <45 DLSP inaudible
DLSP Contribution													<42dB $L_{Aeq(15min)}$ <42dB L_{Amax}
18/07/2023 Day	12:55	2.5m/s E 19˚C	47	44	48	2.7	W	n/a	n/a	n/a	n/a	n/a	Traffic 46-67 Wind in vegetation 46-58 DLSP inaudible
DLSP Contribution													<34dB $L_{Aeq(15min)}$
18/07/2023 Day	13:10	1.2m/s SE 19˚C	50	45	48	2.9	WNW	n/a	n/a	n/a	n/a	n/a	Traffic 43-70 Birds 44-52 DLSP inaudible
DLSP Contribution													<35dB $L_{Aeq(15min)}$
11/07/2023 Evening	21:12	0.1m/s N 12˚C	53	48	43	2.2	W	7.3	13.2	5.9	12.3	G	Traffic 44-60 DLSP inaudible
DLSP Contribution													<38dB $L_{Aeq(15min)}$
11/07/2023 Night	22:00	0.1m/s W 11˚C	43	39	38/61	1.8	W	6.9	10.5	3.6	7.4	G	Traffic 35-52 DLSP inaudible
DLSP Contribution													<29dB $L_{Aeq(15min)}$ <29dB L_{Amax}

Note 1: Data from on-site weather station.

Note 2: Calculated from 2m and 60m temperature.

Table 10 DN-10 - Attended Noise Monitoring Summary

Date & Period	Time (hrs)	1.5m WS WD Temp	Descriptor		Criteria	Observed Meteorology							Description and SPL, dBA
			L_{Aeq}	L_{A90}	$L_{Aeq(15min)}$/ L_{Amax}	WS (m/s)[1]	WD[1]	2m Temp˚C	60m Temp˚C	Delta Temp˚C	Lapse Rate ˚C/100m[2]	Stability Class[1]	
13/07/2023 Morning Shoulder	06:32	0.1m/s W 4˚C	60	58	48/61	1.9	W	2.4	12.6	8.2	21.2	G	Traffic 54-68 Birds 54-58 DLSP inaudible
DLSP Contribution													<48dB $L_{Aeq(15min)}$ <48dB L_{Amax}
18/07/2023 Day	13:29	2.5m/s N 20˚C	49	41	48	2.6	NW	n/a	n/a	n/a	n/a	n/a	Traffic 39-82 Wind in vegetation 39-63 DLSP inaudible
DLSP Contribution													<31dB $L_{Aeq(15min)}$
18/07/2023 Day	13:44	2m/s N 20˚C	49	41	48	3.1	W	n/a	n/a	n/a	n/a	n/a	Traffic 39-70 Birds 48-72 DLSP inaudible
DLSP Contribution													<31dB $L_{Aeq(15min)}$
11/07/2023 Evening	21:28	0.1m/s N 11˚C	51	42	43	1.1	W	7.0	11.8	4.8	10.1	G	Traffic 42-62 DLSP inaudible
DLSP Contribution													<32dB $L_{Aeq(15min)}$
11/07/2023 Night	22:02	0.1m/s N 10˚C	51	43	38/61	1.8	W	6.8	10.4	3.6	7.5	G	Traffic 38-74 DLSP inaudible
DLSP Contribution													<33dB $L_{Aeq(15min)}$ <33dB L_{Amax}

Note 1: Data from on-site weather station.

Note 2: Calculated from 2m and 60m temperature.

Table 11 DN-11 - Attended Noise Monitoring Summary													
Date & Period	Time (hrs)	1.5m WS WD Temp	Descriptor		Criteria	Observed Meteorology							Description and SPL, dBA
			L_{Aeq}	L_{A90}	$L_{Aeq(15min)}$/ L_{Amax}	WS (m/s)[1]	WD[1]	2m Temp˚C	60m Temp˚C	Delta Temp˚C	Lapse Rate ˚C/100m[2]	Stability Class[1]	
12/07/2023 Morning Shoulder	06:39	0.2m/s W 8˚C	57	54	48/61	2	W	4.6	9.8	5.2	10.9	G	Traffic 51-76 Birds 51-70 DLSP inaudible
DLSP Contribution													<44dB $L_{Aeq(15min)}$ <44dB L_{Amax}
18/07/2023 Day	14:02	0.2m/s N 20˚C	51	47	48	3.5	WSW	n/a	n/a	n/a	n/a	n/a	Traffic 44-66 Aircraft 46-52 DLSP inaudible
DLSP Contribution													<37dB $L_{Aeq(15min)}$
18/07/2023 Day	14:17	0.2m/s N 20˚C	52	48	48	2	WNW	n/a	n/a	n/a	n/a	n/a	Traffic 49-71 Birds 40-50 DLSP inaudible
DLSP Contribution													<38dB $L_{Aeq(15min)}$
11/07/2023 Evening	21:45	0.1m/s N 10˚C	52	44	43	2.4	W	7.0	10.9	3.9	8.3	G	Traffic 39-72 DLSP inaudible
DLSP Contribution													<34dB $L_{Aeq(15min)}$
11/07/2023 Night	22:20	0.1m/s N 10˚C	50	44	38/61	1.1	W	6.6	9.2	2.6	5.5	G	Traffic 39-62 DLSP inaudible
DLSP Contribution													<34dB $L_{Aeq(15min)}$ <34dB L_{Amax}

Note 1: Data from on-site weather station.

Note 2: Calculated from 2m and 60m temperature.

Table 12 DN-12 - Attended Noise Monitoring Summary

Date & Period	Time (hrs)	1.5m WS WD Temp	Descriptor		Criteria	Observed Meteorology							Description and SPL, dBA
			L_{Aeq}	L_{A90}	$L_{Aeq(15min)}$/ L_{Amax}	WS (m/s)[1]	WD[1]	2m Temp˚C	60m Temp˚C	Delta Temp˚C	Lapse Rate ˚C/100m[2]	Stability Class[1]	
12/07/2023 Morning Shoulder	06:18	0.2m/s SW 8˚C	58	52	48/61	1.1	WNW	4.7	7.8	3.1	6.4	G	Traffic 49-83 Birds 49-66 DLSP inaudible
DLSP Contribution													<42dB $L_{Aeq(15min)}$ <42dB L_{Amax}
18/07/2023 Day	14:40	0.1m/s E 20˚C	71	55	48	1.5	NW	n/a	n/a	n/a	n/a	n/a	Traffic 48-87 Birds 48-54 DLSP inaudible
DLSP Contribution													<45dB $L_{Aeq(15min)}$
18/07/2023 Day	14:55	0.1m/s NE 20˚C	71	53	48	1.6	WNW	n/a	n/a	n/a	n/a	n/a	Traffic 47-82 Train 52-62 DLSP inaudible
DLSP Contribution													<43dB $L_{Aeq(15min)}$
11/07/2023 Evening	20:36	0.1m/s N 12˚C	64	44	43	1.3	W	7.8	12.8	5.0	10.4	G	Traffic 41-81 DLSP inaudible
DLSP Contribution													<34dB $L_{Aeq(15min)}$
11/07/2023 Night	22:41	0.3m/s N 8˚C	61	41	38/61	1.8	W	7.7	9.0	1.3	2.7	F	Traffic 41-76 DLSP inaudible
DLSP Contribution													<31dB $L_{Aeq(15min)}$ <31dB L_{Amax}

Note 1: Data from on-site weather station.

Note 2: Calculated from 2m and 60m temperature.

Table 13 DN-13 - Attended Noise Monitoring Summary

Date & Period	Time (hrs)	1.5m WS WD Temp	Descriptor		Criteria	Observed Meteorology							Description and SPL, dBA
			L_{Aeq}	L_{A90}	$L_{Aeq(15min)}$/ L_{Amax}	WS (m/s)[1]	WD[1]	2m Temp˚C	60m Temp˚C	Delta Temp˚C	Lapse Rate ˚C/100m[2]	Stability Class[1]	
12/07/2023 Morning Shoulder	06:00	0.2m/s SW 8˚C	58	52	43/53	0.4	SW	4.9	6.5	1.6	5.7	G	Traffic 49-70 Train 49-62 DLSP inaudible
DLSP Contribution													<42dB $L_{Aeq(15min)}$ <42dB L_{Amax}
18/07/2023 Day	15:13	1m/s N 20˚C	57	51	47	2.3	W	n/a	n/a	n/a	n/a	n/a	Traffic 48-72 Birds 46-59 DLSP inaudible
DLSP Contribution													<41dB $L_{Aeq(15min)}$
18/07/2023 Day	15:28	1.6m/s N 20˚C	58	53	47	2.6	W	n/a	n/a	n/a	n/a	n/a	Traffic 48-73 Pedestrians 47-56 DLSP inaudible
DLSP Contribution													<43dB $L_{Aeq(15min)}$
11/07/2023 Evening	20:16	0.1m/s N 12˚C	54	47	43	1.6	W	8.3	13.1	4.8	10.0	G	Traffic 45-72 DLSP inaudible
DLSP Contribution													<37dB $L_{Aeq(15min)}$
11/07/2023 Night	22:59	0.1m/s N 8˚C	55	43	38/53	2.2	W	8.2	8.8	0.6	1.2	F	Traffic 39-73 DLSP inaudible
DLSP Contribution													<33dB $L_{Aeq(15min)}$ <33dB L_{Amax}

Note 1: Data from on-site weather station.

Note 2: Calculated from 2m and 60m temperature.

This page has been intentionally left blank

5 Noise Compliance Summary

The compliance summary for each monitoring location (DN-6, DN-7, DN-8, DN-9, DN10, DN11, DN12, DN-13) is presented in **Table 14** for the day and evening periods.

Table 14 Noise Compliance Assessment Summary

Location	Estimated Noise Contribution dB $LA_{eq(15min)}$			Criteria dB $LA_{eq(15min)}$		Compliant		
	Day (Round 1)	Day (Round 2)	Evening	Day	Evening	Day (Round 1)	Day (Round 2)	Evening
DN-6	<46	<46	<43	46	43	✓	✓	✓
DN-7	<40	<42	<44	49	44	✓	✓	✓
DN-8	<37	<36	<40	49	44	✓	✓	✓
DN-9	<34	<35	<38	48	43	✓	✓	✓
DN-10	<31	<31	<32	48	43	✓	✓	✓
DN-11	<37	<38	<34	48	43	✓	✓	✓
DN-12	<45	<43	<34	48	43	✓	✓	✓
DN-13	<41	<43	<37	47	43	✓	✓	✓

Note: Day - the period from 7am to 6pm Monday to Saturday or 8am to 6pm on Sundays and public holidays; Evening - the period from 6pm to 10pm; Night - the remaining periods and the morning shoulder period is from 6am to 7am.

The compliance summary for each monitoring location (DN-6, DN-7, DN-8, DN-9, DN10, DN11, DN12, DN-13) is presented in **Table 15** for the night assessment period.

Table 15 Noise Compliance Assessment Summary

Location	Estimated Noise Contribution				Criteria				Compliant			
	Night		Morning Shoulder		Night		Morning Shoulder		Night		Morning Shoulder	
	dB $L_{Aeq(15min)}$	dB L_{Amax}	dB $L_{Aeq(15min)}$	dB L_{Amax}	dB $L_{Aeq(15min)}$	dB L_{Amax}	dB $L_{Aeq(15min)}$	dB L_{Amax}	dB $L_{Aeq(15min)}$	dB L_{Amax}	dB $L_{Aeq(15min)}$	dB L_{Amax}
DN-6	<33	n/a	<46	n/a	37	n/a	46	n/a	✓	n/a	✓	n/a
DN-7	<40	n/a	<47	n/a	41	n/a	47	n/a	✓	n/a	✓	n/a
DN-8	<33	n/a	<30	n/a	38	n/a	47	n/a	✓	n/a	✓	n/a
DN-9	<29	<29	<42	<42	38	61	48	61	✓	✓	✓	✓
DN-10	<33	<33	<48	<48	38	61	48	61	✓	✓	✓	✓
DN-11	<34	<34	<44	<44	38	61	48	61	✓	✓	✓	✓
DN-12	<31	<31	<42	<42	38	61	48	61	✓	✓	✓	✓
DN-13	<33	<33	<42	<42	38	53	43	53	✓	✓	✓	✓

Note: Day - the period from 7am to 6pm Monday to Saturday or 8am to 6pm on Sundays and public holidays; Evening - the period from 6pm to 10pm; Night - the remaining periods and the morning shoulder period is from 6am to 7am.

6 Discussion

6.1 Discussion of Results - Location DN-6

The noise monitoring survey identified that the acoustic environment at this location is dominated by road traffic noise from the Princes Highway, approximately 350m to the east. DLSP noise was inaudible during all measurement periods with the noise contribution calculated (during short breaks in traffic) to be below the relevant noise criteria for all periods. Extraneous sources audible during the survey included traffic, birds, aircraft and passing trains.

6.2 Discussion of Results - Location DN-7

The noise monitoring survey identified that the acoustic environment at this location is dominated by road traffic noise from the Princes Highway, approximately 350m to the west. DLSP noise was inaudible during the measurement periods and the noise contributions were calculated (during short breaks in traffic) to be below the relevant noise criteria for all periods. Extraneous sources audible during the survey included traffic, passing trains, birds and aircraft.

6.3 Discussion of Results - Location DN-8

The noise monitoring survey identified that the acoustic environment at this location is dominated by road traffic noise from the Princes Highway, approximately 350m to the east. DLSP noise impacts were audible on one occasion during the morning shoulder measurement period with the noise contribution calculated (during short breaks in traffic) to be below the relevant noise criteria for all periods. Extraneous sources audible during the survey included traffic, birds and aircraft.

6.4 Discussion of Results - Location DN-9

The noise monitoring survey identified that the acoustic environment at this location is dominated by road traffic noise from the Princes Highway, approximately 160m to the east. DLSP noise was inaudible during the measurement periods with the noise contribution calculated (during short breaks in traffic) to be below the relevant noise criteria for all periods. Extraneous sources audible during the survey included traffic, birds and wind in vegetation.

6.5 Discussion of Results - Location DN-10

The noise monitoring survey identified that the acoustic environment at this location is dominated by road traffic noise from the Princes Highway, approximately 140m to the east. DLSP noise was inaudible during the measurement periods with the noise contribution calculated (during short breaks in traffic) to be below the relevant noise criteria for all periods. Extraneous sources audible during the survey included traffic, birds and wind in vegetation.

6.6 Discussion of Results - Location DN-11

The noise monitoring survey identified that the acoustic environment at this location is dominated by road traffic noise from the Princes Highway, approximately 150m to the east. DLSP noise was inaudible during the measurement periods with the noise contribution calculated (during short breaks in traffic) to be below the relevant noise criteria for all periods. Extraneous sources audible during the survey included traffic, birds and aircraft.

6.7 Discussion of Results - Location DN-12

The noise monitoring survey identified that the acoustic environment at this location is dominated by road traffic noise from the Princes Highway, approximately 470m to the west. DLSP noise was inaudible during the measurement periods with the noise contribution calculated (during short breaks in traffic) to be below the relevant noise criteria for all periods. Extraneous sources audible during the survey included traffic, birds and passing trains.

6.8 Discussion of Results - Location DN-13

The noise monitoring survey identified that the acoustic environment at this location is dominated by road traffic noise from Riverside Drive, approximately 10m to the west. DLSP noise was inaudible during the measurement periods with the noise contribution calculated (during short breaks in traffic) to be below the relevant noise criteria for all periods. Extraneous sources audible during the survey included traffic, pedestrians, birds and passing trains.

7 Conclusion

Muller Acoustic Consulting Pty Ltd (MAC) has completed a Noise Monitoring Assessment (NMA) on behalf of Boral Resources (NSW) Pty Ltd for Dunmore Lakes Sand Project (DLSP), Dunmore, NSW.

Attended noise monitoring was undertaken between Tuesday 11 July 2023 and Tuesday 18 July 2023 at eight representative monitoring locations. The assessment has identified that noise emissions generated by DLSP were audible on one occasion during the assessment period. DSLP contributed noise emissions were below the relevant criteria at all locations during all measurement periods therefore satisfying the relevant consent conditions.

This page has been intentionally left blank

Appendix A - Glossary of Terms

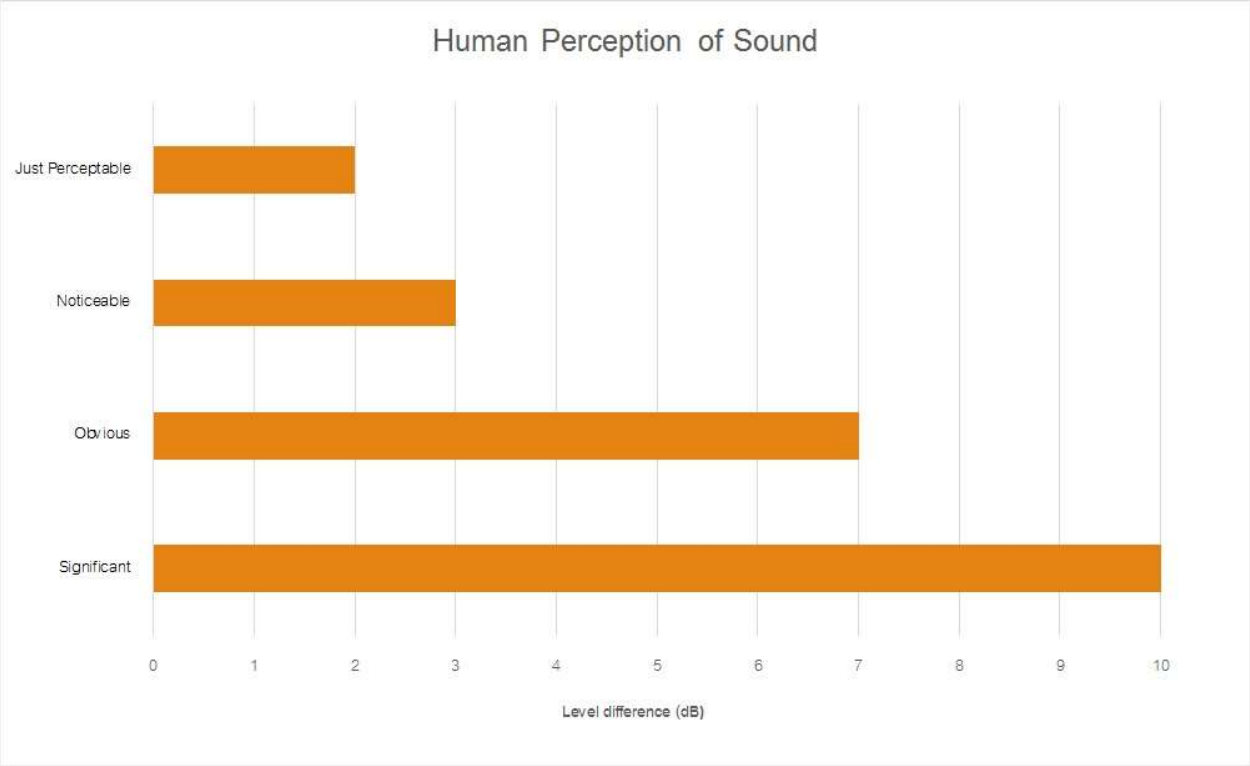
Table A1 provides a number of technical terms have been used in this report.

Table A1 Glossary of Terms	
Term	Description
1/3 Octave	Single octave bands divided into three parts
Octave	A division of the frequency range into bands, the upper frequency limit of each band being twice the lower frequency limit.
ABL	Assessment Background Level (ABL) is defined in the NPI as a single figure background level for each assessment period (day, evening and night). It is the tenth percentile of the measured LA90 statistical noise levels.
Adverse Weather	Weather effects that enhance noise (that is, wind and temperature inversions) that occur at a site for a significant period of time (that is, wind occurring more than 30% of the time in any assessment period in any season and/or temperature inversions occurring more than 30% of the nights in winter).
Ambient Noise	The noise associated with a given environment. Typically a composite of sounds from many sources located both near and far where no particular sound is dominant.
A Weighting	A standard weighting of the audible frequencies designed to reflect the response of the human ear to noise.
dBA	Noise is measured in units called decibels (dB). There are several scales for describing noise, the most common being the 'A-weighted' scale. This attempts to closely approximate the frequency response of the human ear.
dB(Z), dB(L)	Decibels Linear or decibels Z-weighted.
Hertz (Hz)	The measure of frequency of sound wave oscillations per second - 1 oscillation per second equals 1 hertz.
LA10	A noise level which is exceeded 10 % of the time. It is approximately equivalent to the average of maximum noise levels.
LA90	Commonly referred to as the background noise, this is the level exceeded 90 % of the time.
LAeq	The summation of noise over a selected period of time. It is the energy average noise from a source, and is the equivalent continuous sound pressure level over a given period.
LAmax	The maximum root mean squared (rms) sound pressure level received at the microphone during a measuring interval.
RBL	The Rating Background Level (RBL) is an overall single figure background level representing each assessment period over the whole monitoring period. The RBL is used to determine the intrusiveness criteria for noise assessment purposes and is the median of the ABL's.
Sound power level (LW)	This is a measure of the total power radiated by a source. The sound power of a source is a fundamental location of the source and is independent of the surrounding environment. Or a measure of the energy emitted from a source as sound and is given by : = 10.log10 (W/Wo) Where : W is the sound power in watts and Wo is the sound reference power at 10-12 watts.

Table A2 provides a list of common noise sources and their typical sound level.

Table A2 Common Noise Sources and Their Typical Sound Pressure Levels (SPL), dBA	
Source	Typical Sound Level
Threshold of pain	140
Jet engine	130
Hydraulic hammer	120
Chainsaw	110
Industrial workshop	100
Lawn-mower (operator position)	90
Heavy traffic (footpath)	80
Elevated speech	70
Typical conversation	60
Ambient suburban environment	40
Ambient rural environment	30
Bedroom (night with windows closed)	20
Threshold of hearing	0

Figure A1 – Human Perception of Sound



Muller Acoustic Consulting Pty Ltd
PO Box 678, Kotara NSW 2289
ABN: 36 602 225 132
Ph: +61 2 4920 1833
www.mulleracoustic.com

MAC
Muller Acoustic Consulting

10. Appendix D Rehabilitation Progress Monitoring

FY17 Re-aligned Western Tributary Rehabilitation Progress

FY18 Re-aligned Western Tributary Rehabilitation Progress

FY19 Re-aligned Western Tributary Rehabilitation Progress

FY20 Re-aligned Western Tributary Rehabilitation Progress

FY21 Re-aligned Western Tributary Rehabilitation Progress

FY17 NW Stage 2 Swamp Oak Forest Rehabilitation Progress

FY18 NW Stage 2 Swamp Oak Forest Rehabilitation Progress

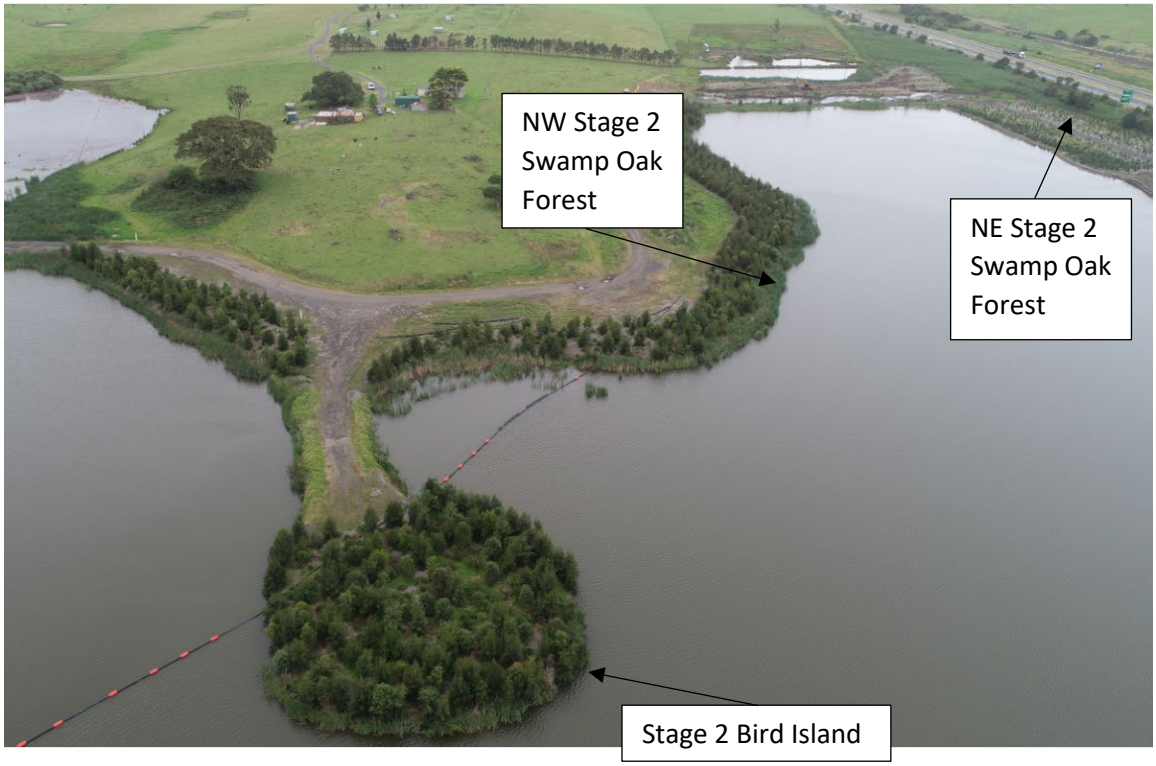
FY19 NW Stage 2 Swamp Oak Forest Rehabilitation Progress

FY20 NW Stage 2 *Swamp Oak Forest Rehabilitation Progress*

FY21 NW Stage 2 Swamp Oak Forest Rehabilitation Progress

FY20 NE Stage 2 Swamp Oak Forest Rehabilitation Progress

FY21 NE Stage 2 Swamp Oak Forest Rehabilitation Progress



Dunmore Bird Island and Stage 2 Rehabilitation Area December 2020

11. Appendix E Stage 5B Pre-Clearance Surveys

cambiumgroup.com.au

Cambium Group Pty Ltd
ATF Mascarenhas Family Trust
ABN 37 136 178 708

M 0417 673 473
accounts@cambiumgroup.com.au
PO Box 349 Collaroy Beach NSW 2097

15 January 2024	**BORAL SHARED BUSINESS SERVICES** DUNMORE SAND AND SOIL 38 TABBITTA ROAD DUNMORE NSW 2529	**Attention**	Matt Bray
		Email	Matt.Bray@boral.com.au
		Project	Dunmore Sand and Soil Stage 5B Preclearance survey 2024

Dear Matt,

Please find attached the short report on the outcomes of the pre-clearing habitat assessment for Stage 5B at Dunmore Sand and Soil. As you're aware, ecologists from Ecoplanning attended the site on 10 January 2024 to identify, tag and map habitat features within the area proposed for clearing and to observe the presence of fauna. They also assessed nearby vegetation as possible sites for the relocation fauna that may be encountered during the clearing process.

The outcomes of their assessment is detailed in the attached report.

Please don't hesitate to get in touch if you would like to discuss this further,

Regards,

Dr Emilie Mascarenhas - Principal Environmental Specialist
CAMBIUM GROUP

Emilie Mascarenhas
Principal Environmental Specialist
Cambium Group
Supplied by email
emilie@cambiumgroup.com.au

15 January 2022

Re: Pre-clearance survey to identify fauna, habitat trees and habitat features, Dunmore Quarry, Stage 5b Extraction Area, Dunmore, NSW.

Dear Emilie,

It is understood that Development Consent (DA 195-8-2004) as modified in 2020 for Stage 5 requires the preparation and implementation of a number of management plans to guide the environmental management of the development throughout its operational life (Cambium Group 2023). Part of this DA requires a suitably qualified Ecologist to conduct a pre-clearance survey within Stage 5b extraction area (herby referred to as 'the subject site'). Vegetation clearing management protocols are outlined in Table B.1 of the Flora and Fauna Management Plan (FFMP) for the Dunmore Lakes Sand Project (Cambium Group 2023).

Ecoplanning advises that the required pre-clearance fauna survey was completed on 10 January 2024 by Nicholas Agostino (Ecologist) and Hannah Kusch (Ecologist). Additionally, an evening fauna survey was also completed on 10 January 2024 to identify any nocturnal fauna utilizing the site for breeding, roosting, or foraging.

All surveys completed have followed the FFMP (Cambium Group 2023) and included the following:

- Survey during the day on 10 January 2023 to mark hollow-bearing trees (HBTs). All HBT's were marked with pink flagging tape and a spray-painted 'H' to ensure they were clearly visible for when clearing works begin (**Figure 1**). A brief day-time fauna survey was also conducted.
- Identify nearby habitat suitable for the release of fauna that may be encountered during the preclearing process.
- Survey during the evening of 10 January 2024 included spotlighting HBTs within the subject site to observe the presence of fauna. This involved the use of head torches, hand torches and binoculars to inspect all habitat trees within the study area.

Figure 2 shows the location of tagged HBTs, survey effort and observed fauna. Two (2) Rainbow Lorikeets (*Trichoglossus moluccanus*) were observed entering a hollow in Tree no. 2 during the evening fauna survey. It was unclear whether the pair were roosting or nesting in the tree. Two (2) microbats were also observed within the subject site during evening survey. It was unclear the species of the pair, or whether they were roosting on site. The survey did not observe microbats using HBTs within the area.

A hive of active European honeybees (*Apis mellifera*) was also observed in a hollow of Tree no. 20.

Hollow bearing, habitat trees and other habitat

Twenty-three (23) hollow bearing trees were marked during the pre-clearance survey, which contained a total of 56 hollows of various sizes (as shown in **Table 1**).

Table 1: Fauna recorded within the study area during current pre-clearance survey.

Habitat feature	Entrance size (cm)	Quantity
Hollow	2-5	20
Hollow	5-10	26
Hollow	10-15	6
Hollow	15-20	4

Nearby habitat suitable for fauna and habitat relocation

The remnant bushland to the south of the subject site currently contains one hundred a forty-three (143) nest boxes installed in 2023 and has been deemed suitable for the relocation of fauna during the clearance works.

Please do not hesitate to contact me should you require anything further prior to commencement of the clearance works.

Yours sincerely,

Nicholas Agostino

Ecologist
BSc (Hons)
M: 0401 754 313
E: nicholas.agostino@ecoplanning.com.au

References

Cambium Group (2023) *Dunmore Lakes Sand Project Flora and Fauna Management Plan*.

Figure 1. **Ecologist Hannah Kusch marking a hollow-bearing tree.**

Boral Limited
Build something great™

BORAL®

Figure 1
Preclearance survey - Stage 5B
Stage 5B Preclearance / Dunmore Lakes Sand Project

DISCLAIMER
Cambium Group Pty Ltd disclaims all liability for all claims, expenses, losses, damages, and costs any person/company may incur as a result of their /its reliance on the accuracy or completeness of this document or its capability to achieve any purpose. © Cambium Group Pty Ltd 2024.

Source: LPI (2017), Aerometrex (2023), Boral (2016), Cambium Group (2023), Ecoplanning (2024).

12. Appendix F Boral Response to Audit Recommendations

Response to Recommendations and Non-Compliances – Independent Environmental Audit 2023 – Dunmore Sand and Soil

Table 1 – Response to Non-Compliances

Condition Reference	Description	Audit Risk Rating	Response	Boral Actions
S3.C19 The Applicant must ensure that particulate matter emissions generated by the development do not cause exceedances of the criteria in Table 3 at any residence on privately-owned land.	The relevant criteria are included in the Air Quality Management Plan 2021 but not the Air Quality Monitoring Program 2017 or in the Annual Reviews. No PM2.5 reported in Annual Reviews. Incorrect Annual PM10 values used (30 rather than 25 ug/m3) in reporting for Annual Review. Opportunity for Improvement [DSS2/23]: Update Air Quality Monitoring Program 2017 with correct criteria, or remove from website if it is superseded by the Air Quality Monitoring Program in Section 6 of the Air Quality Management Plan 2021. Opportunity for Improvement [DSS3/23]: Monitor and report against all current condition of consent Air Quality Criteria in the Annual Reviews.	Non-Compliant – Low Risk	The Air Quality Monitoring Program 2017 has been superseded by the program in the Air Quality Management Plan 2021 (most recently updated December 2023). The superseded Monitoring Program will be removed from the website to ensure that the publicly available Monitoring Program is current. Additionally, PM2.5 will be reported in accordance with the Air Quality Criteria set out in S3.C19 in the Annual Reviews from now on.	Boral to remove the Air Quality Monitoring Program 2017 from the website and report PM2.5 in any following Annual Reviews.
S3.C20A The Applicant must: a) take all reasonable steps to: - minimise odour, fume and particulate matter (including PM10 and PM2.5)	The relevant criteria are included in the Air Quality Management Plan 2021 but not the Air Quality Monitoring Program 2017 or in the Annual Reviews. No evaluation for PM2.5 is evident.	Non-Compliant – Low Risk	The Air Quality Monitoring Program 2017 will be removed from the website to ensure that the publicly available Monitoring Program is current. Additionally, PM2.5 will be	Boral to remove the Air Quality Monitoring Program 2017 from the website and report PM2.5 in any following Annual Reviews.

Condition Reference	Description	Audit Risk Rating	Response	Boral Actions
emissions of the development; - minimise visible off-site air pollution generated by the development; and - minimise the extent of potential dust generating surfaces exposed on the site at any given point in time; b) operate an air quality management system to guide the day to day planning of quarrying operations and implementation of both proactive and reactive air quality mitigation measures to ensure compliance with the relevant conditions of this consent; c) minimise the air quality impacts of the development during adverse meteorological conditions and extraordinary events; d) carry out regular air quality monitoring to determine whether the development is complying with the relevant conditions in this consent; and			reported in accordance with the Air Quality Criteria set out in S3.C19 in the Annual Reviews from now on.	

Condition Reference	Description	Audit Risk Rating	Response	Boral Actions
regularly assess meteorological and air quality monitoring data and relocate, modify or stop operations on the site to ensure compliance with the relevant conditions of this consent.				
S3.C20C e) The Applicant must implement the Air Quality Management Plan as approved by the Planning Secretary.	Section 8 of the Air Quality Management Plan provides implementation details, but the old criteria are being reported on in the Annual Review.	Non-Compliant – Low Risk	Annual Reviews are to address the current Air Quality criteria set out in the Air Quality Management Plan.	Boral to change Annual Review template and data sheets so they address the relevant Air Quality criteria.
S3.C22 Except as may be expressly provided by an EPL, the Applicant must comply with section 120 of the *Protection of the Environment Operations Act 1997* during the carrying out of the development.	An exceedance of the TSS limit of 50 was recorded in February 2023 at surface water sampling site DW20B during an uncontrolled discharge.	Non-Compliant – Low Risk	During June 2023, a requirement around maintaining freeboard was implemented in Stage 2 Pond, which discharges into monitoring point DW20B. This freeboard is to be maintained to minimise uncontrolled discharges and prevent exceedances of the Water Discharge Pollution Limits set out in Table 4 of S3.C23.	Boral to ensure freeboard in Stage 2 pond is maintained using controlled discharges to reduce the frequency and severity of uncontrolled discharges.
S3.C23 Except as may be expressly provided by an EPL, the Applicant must ensure that the discharges from any licenced discharge point/s do not cause additional exceedances of the criteria in Table 4.	An exceedance of the TSS limit of 50 was recorded in February 2023 at surface water sampling site DW20B during an uncontrolled discharge.	Non-Compliant – Low Risk	During June 2023, a requirement around maintaining freeboard was implemented in Stage 2 Pond, which discharges into monitoring point DW20B. This freeboard is to be maintained to minimise uncontrolled	Boral to ensure freeboard in Stage 2 pond is maintained using controlled discharges to reduce the frequency and severity of uncontrolled discharges.

Condition Reference	Description	Audit Risk Rating	Response	Boral Actions
S3.C24 The applicant must ensure that water quality in the dredge ponds and in groundwater comply with the water quality objectives in Table 5, or other such level as approved by the Planning Secretary.	While the non-compliance risk is low, the matter of operating within water quality objectives is a consistent theme. It was noted that the EPL was modified in June 2023 to reflect agreed monitoring thresholds for ongoing water quality.	Non-Compliant – Low Risk	discharges and prevent exceedances of the Water Discharge Pollution Limits set out in Table 4 of S3.C23. Minimising exceedances of Water Discharge Pollution Limits and Water Quality Objectives is to be a priority. The EPL has been varied and the Water Management Plan has been updated – ensuring coherence with the guidelines prescribed in these documents will minimise the non-compliances associated with water quality exceedances.	Boral to ensure coherence with EPL and Soil and Water Management Plan, and update plans and procedures if exceedances continue to ensure they are minimised.
S3.C48 Within 6 months of the approval of Modification 2, the Applicant must lodge and updated Conservation and Rehabilitation Bond with the Department to ensure that the biodiversity offset, compensatory habitat and rehabilitation requirements of the site are implemented in accordance with the performance and completion criteria set out in the Flora and Fauna Management Plan, Rehabilitation Management	Updated Conservation and Rehabilitation Bond not lodged as details with DP&E for confirmation of acceptance of costing associated with bond.	Non-Compliance – Low Risk	The Bond Costing Report was approved by the Department in late December 2023 – this bond is currently sitting with the finance team, who will lodge it as soon as possible.	Boral to lodge bond as soon as possible to minimise delays.

Condition Reference	Description	Audit Risk Rating	Response	Boral Actions
Plan and the relevant conditions of this consent. The sum of the bond must be an amount agreed by the Planning Secretary and determined by: a) calculating the full cost of implementing the biodiversity offset and compensatory habitat requirements of the consent at third party rates (other than land acquisition costs); b) calculating the cost of rehabilitating all disturbed areas of the site, taking into account the likely surface disturbance over the next 3 years of quarrying operations; and employing a suitably qualified, independent and experienced person to verify the calculated costs.				
S5.C10 By 30 September 2017, and every 3 years thereafter, unless the Planning Secretary directs otherwise, the Applicant must commission and pay the full cost of an Independent	Boral commissioned the 2023 IEA after the 30/09/23, around 18/10/23.	Non-Compliant – Low Risk	Punctuality of commissioning and organising audit to be prioritised for future Independent Environmental Audits.	Boral to ensure audits are organised with high notice to prevent hold-ups with commissioning.

Condition Reference	Description	Audit Risk Rating	Response	Boral Actions
Environmental Audit of the development. This audit must: a) be conducted by suitably qualified, experienced and independent team of experts whose appointment has been endorsed by the Planning Secretary; b) include consultation with the relevant agencies and the CCC; c) assess the environmental performance of the development and whether it is complying with the relevant requirements in this consent and any relevant EPL and/or Water Licence (including any assessment, plan or program required under these approvals); d) review the adequacy of any approved strategy, plan or program required under these approvals; and e) recommend measures or actions to improve the environmental performance of the development, and/or any assessment, plan or				

Condition Reference	Description	Audit Risk Rating	Response	Boral Actions
program required under these approvals. c) Note: This audit team must be led by a suitably qualified auditor and include experts in any fields specified by the Planning Secretary.				
S5.C12 By 30 November 2016, unless otherwise agreed by the Planning Secretary, the Applicant must: a) make the following information publicly available on its website: • the documents listed in condition 2(c) of Schedule 2; • current statutory approvals for the development; approved strategies, plans or programs; • a summary of the monitoring results of the development, which have been reported in accordance with the various plans and programs approved under the conditions of this consent;	Opportunity for Improvement [DSS11/23]: Upload the following documents to the website: • Modification 2 – Consolidated Development Consent; • 20/21 Annual Review; • Response to the recommendation of the 2020 IEA; Documents listed in condition 2(c) of Schedule 2.	Non-Compliant – Low Risk	All of these documents will be uploaded to the website as soon as possible so that all required information is publicly available.	Boral to upload all documents to the website as soon as possible.

Condition Reference	Description	Audit Risk Rating	Response	Boral Actions
• contact details to enquire about the development or to make a complaint; • a complaints register, which is to be updated on a monthly basis; • the Annual Reviews of the development; • reports prepared as part of any independent environmental audit, and the Applicant's response to the recommendations in any audit report; • any other matter required by the Planning Secretary; and b) keep this information up-to-date, to the satisfaction of the Planning Secretary.				

Table 2 – Response to Recommendations / Opportunities for Improvement

Reference	Consent Condition/Issue	Recommendation	Response	Boral Actions
DSS1/23	Schedule 3, Condition 12B - The Applicant is not permitted to undertake any vegetation clearance, construction or extraction activities within lands zoned as E3 under the	Request from DP&E an administrative change to Consolidated Consent to update to current zoning to C3, as well as remove *'Error! Reference source not found.'*	The Consolidated Consent will be updated to remove the error message, include a revised map of the C3 areas and amend the numbering discrepancies.	Boral to write a letter to the Department outlining what changes are required in the Consolidated Consent.

Reference	Consent Condition/Issue	Recommendation	Response	Boral Actions
	Shellharbour Local Environment Plan 2013. In this regard, the Applicant must adjust its final flood bund design and extraction footprint for Stage 5B and the location of ancillary infrastructure (including water management infrastructure) to stand off these lands.	and condition misnumbering throughout consent.		
DSS2/23	Schedule 3, Condition 19 – The Applicant must ensure that particulate matter emissions generated by the development do not cause exceedances of the criteria in Table 3 at any residence on privately-owned land.	Update Air Quality Monitoring Program 2017 with correct criteria, or remove from website if it is superseded by the Air Quality Monitoring in Section 6 of the Air Quality Management Plan 2021.	The Air Quality Monitoring Program 2017 has been superseded by the program in the Air Quality Management Plan 2021 (most recently updated December 2023). The superseded Monitoring Program will be removed from the website to ensure that the publicly available Monitoring Program is current. Additionally, PM2.5 will be reported in accordance with the Air Quality Criteria set out in S3.C19 in the Annual Reviews from now on.	Boral to remove the Air Quality Monitoring Program 2017 from the website and report PM2.5 in any following Annual Reviews.
DSS3/23	Schedule 3, Condition 19 – The Applicant must ensure that particulate matter emissions generated by the development do not cause exceedances of the criteria in Table 3 at any residence on privately-owned land.	Monitor and report against all current condition of consent Air Quality Criteria in the Annual Reviews.		
DSS4/23	Schedule 3, Condition 21B – The Applicant must report on water extracted from the	Water balance calculations to be checked for future Annual Review as reporting	Water balance calculations in the Annual Review will be revised to ensure they	Boral to revise water balance calculations to ensure precision and

Reference	Consent Condition/Issue	Recommendation	Response	Boral Actions
	site each year (direct and indirect) in the Annual Review, including water taken under each water licence. Note: Under the Water Act 1912 and/or the Water Management Act 2000, the Applicant is required to obtain all necessary water licences for the development.	discrepancies noted in Annual Review 2020-2021 and 2022-2023.	accurately represent water take over the financial year. These must take into consideration production amounts to factor in water loss off site.	accuracy and ensure that factors associated with annual production so that off-site water loss is considered.
DSS5/23		Water balance calculations use annual production amounts for water loss off site due to sale, this calculation should use transport data of sales as this is more accurate of sand related water loss due to sales and movement of minerals offsite.		
DSS6/23	Schedule 3, Condition 57 – The Applicant must maximise the use of rail transport for delivery/despatch outside the Illawarra Region, to the satisfaction of the Planning Secretary. Details of transportation modes and measures to assess and encourage rail transport must be provided in the Annual Review.	Ensure rail transport mode is documented in FY23/24 Annual Review, and detail measures to assess and encourage rail transport in Annual Reviews.	Rail transport volumes and how they have changed over time will be included in future Annual Reviews to analyse trends and determine how these volumes can be increased.	Boral to report on rail transport volumes and measures taken to increase these volumes in Annual Review.
DSS7/23	Schedule 5, Condition 1 – If the Planning Secretary requires, the Applicant must prepare an Environmental Management Strategy for the development to the	Legislation section needs to be updated with relevant legislation for Biodiversity Conservation Act.	The Legislation section of the Environmental Management Strategy will be updated so that it reflects the relevant	Boral to update the EMS to include the relevant Biodiversity Conservation Act legislation.

Reference	Consent Condition/Issue	Recommendation	Response	Boral Actions
	satisfaction of the Planning Secretary.		Biosecurity Conservation Act.	
DSS8/23	Schedule 5, Condition 3 – Within 3 months of: a) The submission of an incident report; b) The submission of an Annual Review; c) The submission of an Audit Report; d) The approval of any modifications of this consent	The document control tables within all the plans, strategies and programs required under this consent do not reflect the reviews have occurred. Ensure all documents are reviewed in accordance with this condition of consent. Update the relevant management plans to contain information on timing of review.	The most recent review in all management plans, strategies and programs will be included in the document control table so that readers can figure out when the document was last reviewed.	Boral to add the latest review date and reviewer name in the document control table of every plan, strategy and program.
DSS9/23	Schedule 5, Condition 6 – The Applicant must operate a Community Consultative Committee (CCC) for the development, to the satisfaction of the Planning Secretary.	Review CCC operations against latest guideline – DP&E CCC guideline – State Significant Projects June 2023 version.	The CCC program and operations will be reviewed in accordance with the new CCC Guideline.	Boral to review CCC program against new CCC Guideline.
DSS10/23	Schedule 5, Condition 9 – By the end of September each year, or other timing as may be agreed by the Planning Secretary, the Applicant must review the environmental performance of the development to the satisfaction of the Planning Secretary.	Update Annual Review document Table 1 to include condition 9 e) and ensure all Appendices are attached to the Annual Review and/or available on the website.	Table 1 of the Annual Review template will be updated to include condition 9 e), and all associated requirements will be included in relevant sections and Appendices.	Boral to update Annual Review template Table 1 with condition 9 e) and ensure all Appendices are included.

Reference	Consent Condition/Issue	Recommendation	Response	Boral Actions
DSS11/23	Schedule 5, Condition 12 – By 30 November 2016, unless otherwise agreed by the Planning Secretary, the Applicant must make the listed information (within the condition) publicly available on its website.	Upload the following documents to the website: • Modification 2 – Consolidated Development Consent; • 20/21 Annual Review; • Response to the recommendation of the 2020 IEA; Documents listed in condition 2(c) of Schedule 2.	All of these documents will be uploaded to the website as soon as possible so that all required information is publicly available.	Boral to upload all documents to the website as soon as possible.
DSS12/23	Air Quality Management Program 2017 assessed other criteria.	EPS recommends the Air Quality Monitoring Program 2017 is updated with the correct criteria, or removed from its website if it is superseded by the Air Quality Monitoring in Section 6 of the Air Quality Management Plan 2021.	The Air Quality Monitoring Program 2017 has been superseded by the program in the Air Quality Management Plan 2021 (most recently updated December 2023). The superseded Monitoring Program will be removed from the website to ensure that the publicly available Monitoring Program is current.	Boral to remove the Air Quality Monitoring Program 2017 from the website.
DSS13/23	Flora and Fauna Management Plan 2021 adequacy review.	Remove reference to superseded legislation *NSW Threatened Species Conservation Act 1995* from Dunmore Lakes Sand	The reference to the *Threatened Species Conservation Act 1995* will be removed from the Flora and Fauna Management Plan.	Boral to remove superseded legislation from Flora and Fauna Management Plan.

Reference	Consent Condition/Issue	Recommendation	Response	Boral Actions
		Project: Flora and Fauna Management Plan 2021.		
DSS14/23	Heritage Management Plan adequacy review.	Include clear and specific information on monitoring in future iterations of the Heritage Management Plan.	Any following Heritage Management Plans or updates of the current Heritage Management Plan will place a heavier focus on the monitoring that was undertaken.	Boral to ensure that when contractor (Kelleher Nightingale) is engaged to update or write the next iteration of the Heritage Management Plan, feedback is provided that information pertaining to the monitoring is to be included.
DSS15/23	Long Term Management Strategy adequacy review.	Include clear and specific information on assigned responsibilities in future iterations of the Long Term Management Strategy.	Any following Long Term Management Strategies or updates of the current Long Term Management Strategy will place a heavier focus on assigned responsibilities.	Boral to ensure that when contractor (Cambium Group) is engaged to update or write the next iteration of the Long Term Management Strategy, feedback is provided that information pertaining to assigned responsibilities is to be included.
DSS16/23	Traffic Management Plan adequacy review.	Include clear and specific information on monitoring and assigned responsibilities in future iterations of the Traffic Management Plan.	Any following Traffic Management Plans or updates of the current Traffic Management Plan will place a heavier focus on monitoring and assigned responsibilities.	Boral to ensure that when contractor (EMM) is engaged to update or write the next iteration of the Traffic Management Plan, feedback is provided that information pertaining to monitoring and assigned responsibilities is to be included.