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Dunmore Lakes Sand Project

Annual Review

1 July 2020 – 30 June 2021





Document Control				
Ref	Prepared by	Approved by	Date	Distribution
V1.0	EMM Consulting Pty Ltd	Boral Resources	1/09/2021	Initial draft for Boral review
V2.0	EMM Consulting Pty Ltd	Boral Resources	27/09/2021	Department of Planning, Industry and Environment <ul style="list-style-type: none">• Environmental Protection Agency• Shellharbour City Council• Dunmore Quarry CCC Online at https://www.boral.com.au/locations/boraldunmore-operations



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 2020
Annual Review end date	30 June 2021
<p>I, _____ certify that this audit is a true and accurate record of the compliance statuses of the Dunmore Lakes Sand Project for the period of the 2021 Financial Year and that I am authorised to make this statement on behalf of Boral Resources (NSW) Pty Ltd.</p>	
<p>Note</p> <p>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.</p>	
Name of authorised reporting officer	
Title of authorised reporting officer	
Signature	
Date	

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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
FY21	Financial Year 2021 (1 July 2020 – 30 June 2021)
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

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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
$\mu\text{g}/\text{m}^3$	Micrograms per cubic metre

1. Purpose and Scope

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.

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 2021 Financial Year which is 1 July 2020 – 30 June 2021.

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: <ul style="list-style-type: none"> • 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: <ul style="list-style-type: none"> • the effectiveness of the noise and air quality management systems; and 	Section 4

	<ul style="list-style-type: none"> compliance with the performance measures, criteria and operating conditions of this consent; 	
	(e) Identify any discrepancies between the predicted and actual impacts of the development, and analyse the potential cause of any significant discrepancies; and	Section 4
	(f) 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(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)	<p>The Applicant must</p> <ul style="list-style-type: none"> (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 (d) report on waste minimisation and management in the Annual Review. 	Section 4.9
3(72)	<p>The Applicant must:</p> <ul style="list-style-type: none"> (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 2020–30 June 2021) is contained in Table 2 below

Table 2 Statement of Compliance

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

No 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	<p>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.</p> <p>Note: The Department acknowledges that short term exceedances of these objectives may occur during natural events such as heavy rainfall or tidal</p>	<p>Low</p> <p>Exceedances are attributed to external events not associated with the Development</p>	<p>Salinity and associated ions as well as algae was outside WQO described in S3.C24 in the Stage 2 and Stage 3 dredge pond DW-14 and DW-19</p> <p>Short term exceedances are acknowledged in S3 C24 Table 5 Note and may occur.</p> <p>As described in the groundwater monitoring report 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</p>	<p>Section 4.4 (see Surface Water).</p> <p>Section 4.7, Appendix D (see groundwater)</p>



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Relevant Approval	Condition #	Condition Description	Compliance Status	Comments	Section addressed
		saline water inflow		be revised to reflect this occurrence	

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: <ul style="list-style-type: none"> • 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: <ul style="list-style-type: none"> • 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 DPIE 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
Chris Brown	DSS Quarry Manager	(02) 4237 8414 Email: chris.brown@boral.com.au
Angus Shedden	Metropolitan Operations Manager NSW/ACT	(02) 4237 8414 Email: angus.shedden@boral.com.au
Ben Williams	Environmental Coordinator Dunmore	Tel: (02) 4237 8414 Email: ben.williams@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.

Development Consent (DA 195-8-2004) was issued 29 June 2005 for stages 2, 3 and 4 by the Minister for Infrastructure and Planning. 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.

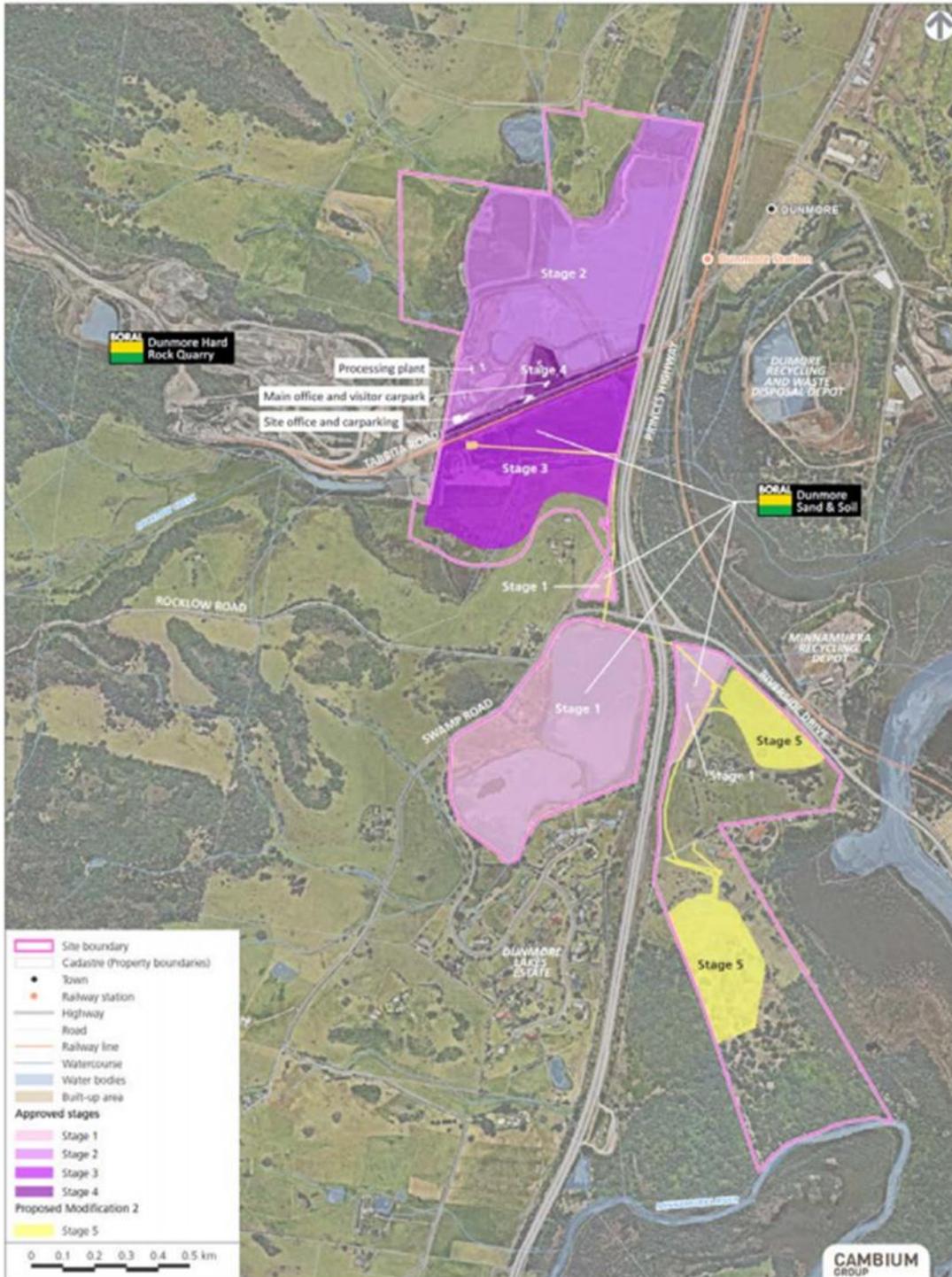


Figure 1 Dunmore Lakes Sand Project Site Layout

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)	5/08/2019
		10CX122266	18/12/2018

2.2. Modifications Approved in the Last 12 Months

DSS sought consent (Modification 2) for an additional extraction area (Stage 5) to the south of the former Stage 1 extraction area. 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 will be established from the Stage 5 extraction areas to the existing Stage 2 processing area. At the Stage 2 processing area, the sand and water will pass over an initial screen to separate oversize organic matter or debris and into a large wash tank to float out any fines. The sand will then be pumped through a cyclone and stockpiled for further dewatering. Water will drain to an existing fines pond and a secondary settling pond before being pumped back to the Stage 5A and Stage 5B dredge ponds.

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

On 21 September 2020, DPIE referred the modification application to NSW Independent Planning Commission for assessment. On 16th November 2020, the development modification was approved by the Minister for Planning and the Notice of Modification was issued.

As a result of the modification, a number of management plans were updated as described below:

- Waste Management Plan was approved 16 June 2021
- Stage 5 Survey Plan and Extraction Limits was approved 17 June 2021
- Staging of Management Plans was approved 18 June 2021
- Air Quality Management Plan was approved 8 July 2021*
- Noise Management Plan was approved 8 July 2021*
- Stage 5 Soil and Water Management Plan was approved 14 July 2021*
- Traffic Management Plan was approved 13 July 2021*
- Flora Fauna Management Plan was approved 20 July 2021*
- Heritage Management Plan was approved 20 July 2021*
- Rehabilitation and Riparian Management Plan was approved 20 July 2021*
- The Acid Sulphate Soils Management Plan was submitted to DPIE however as of the time of writing this report, has yet to be approved.

* Denotes approval of plan occur outside the reporting period of July 2020 to June 2021.

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

2.3. Operations last 12 months

Production at DLSP over the reporting period has been tied to demand and availability of the remaining resource. Production and sales was disrupted during various stages of the year due to the COVID-19 pandemic.

Stage 2 rehabilitation maintenance has been ongoing with Jamberoo Native Nursery in the bird island, north east and northwest planted areas. VENM and PASS importation has continued in Stage 2 to create the final landform as part of ongoing progressive rehabilitation program.

Stage 3 dredging is nearing completion and access track has been created to commence backfilling of Stage 3.

In November 2020, Modification 2 was approved to allow extraction in Stage 5 to the southeast of existing operations. During the reporting period, Stage 5 operations and construction had not yet commenced as management plans were being prepared and updated.

An independent audit for the DLSP was completed on 23 November 2020 by International Environmental Consultants Pty Limited. The audit found that the site is well managed and poses little risk to the receiving environment and that current assessment criteria was being met and is in line with the predictions made in the 2004 EIS. The audit made a number of recommendations to be incorporated into environmental management plans. These actions from the audit are updated in Section 3.

2.4. Operations next 12 months

Dredging in Stage 3 will be completed in mid-August 2021. The remaining resources in the northern edge of Stage 2 will be extracted during the next reporting period. Stage 2 and 3 backfilling and rehabilitation will be ongoing. A further section of Swamp Oak will be planted on the eastern edge of Stage 2 during the spring.

Stage 5A construction and commencement will occur throughout the next reporting period. Aboriginal salvage excavations work will commence around the end of July 2021. Tree

clearing of Stage 5A will commence in accordance with the updated FFMP and vegetation clearing protocol. The right hand turn access lane will be constructed on Riverside Dr.

Construction of the transfer pipeline and booster pumps will be completed and the dredge will be transported to Stage 5A. It is expected that dredging in Stage 5A will commence in October 2021.

Stage 5B preparation works will also commence in the next reporting period after the required offsets have been purchased and nest boxes installed in remnant vegetation areas. An access track will be constructed and vegetation within the disturbance footprint will be cleared as per the vegetation clearing protocol in the FFMP.

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)	
		Road	Rail Transfers Out
July 20	10,017	7,109	0
Aug 20	735	7,823	0
Sept 20	9,618	9,710	0
Oct 20	9,705	8,042	0
Nov 20	7,284	7,801	0
Dec 20	7,402	9,013	376
Jan 21	5,980	6,252	0
Feb 21	7,767	9,458	0
Mar 21	7,739	10,184	0
Apr 21	6,838	11,502	112
May 21	6,941	11,384	0
Jun 21	22,340	16,137	103
Total	102,366	114,415	591
		115,006	

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	10,877
Construction Sand Excluding Industrial	91,262
Industrial Sand	
Foundry, Moulding	
Glass	
Other (Specify)	
TOTAL SITE PRODUCTION	102,139

2.6. Production Sales and Transport Next 12 Months

Production in July and August 2021 will be scaled up to allow the dredge to be removed in mid-August for preventative maintenance prior to transport to Stage 5.

It is expected that production will increase from FY21 levels in the next 12 months due to the commencement of dredging in Stage 5A in October 2021.

It is planned that extraction will re-commence in the northern sections of the Stage 2 ponds up to the approved extraction limits described in DA195-8-2004 and CAA10CX123242 (10 ERM2010/1116). This area has not been previously extracted due to technical and financial constraints at the time.

Production may be influenced by demand and unforeseen closures caused by the ongoing COVID-19 outbreak in Sydney.

3. Actions to be completed from the Last Annual Review

Table 8 Completed Actions (FY20 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 3 starting with the Eastern edge and the south eastern tidal zone.	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
Update the Stage 2, 3 and 4 Groundwater Monitoring and Mitigation Plan (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 DG31 are considered natural occurrences, as per consultant recommendations	The need for SSTV has been discussed with DPIE within the draft conditions for MOD 2. The conditions issued for MOD 2 continue to include the previous WQO objectives described in condition 24 of MOD 3 (refer to Table 4). It is proposed that, as suggested by the auditor, Site Specific Trigger Values (SSTVs) will be determined by appropriately qualified consultants who complete the Water Management Plan based on ambient monitoring data. It is requested that these SSTV sit outside the consent and are instead included in the approved Water Management Plan as approved by the Secretary. This provides the ability for the criteria to be updated in response to changing site conditions and environments without requiring a modification to the consent. Boral is awaiting approval from DPIE to proceed with this approach.	Section 4.7.3, 4.7.4, 4.13 and 4.14
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. Three consecutive dry years were broken by a wet year in	Section 4.4.4, 4.13 and 4.14

	FY21 which further allowed salinity to decrease.	
<p>An independent audit for the DLSP was completed on 23 November 2020 by International Environmental Consultants Pty Limited. The audit found that the site is well managed and poses little risk to the receiving environment and that current assessment criteria was being met and is in line with the predictions made in the 2004 EIS. The audit made a number of recommendations to be incorporated into environmental management plans.</p>		
<p>IEA1: The water quality goals listed in Table 7 of Condition 24 of Schedule 3 be reviewed and updated with appropriate Site Specific Trigger Values (SSTVs) based on long term ambient monitoring data that is now available. There is an opportunity to do this with the new planning consent anticipated for the Stage 5 project.</p>	<p>The need for SSTV has been discussed with DPIE within the draft conditions for MOD 2. The conditions issued for MOD 2 continue to include the previous WQO objectives described in condition 24 of MOD 3 (refer to Table 4).</p> <p>It is proposed that, as suggested by the auditor, SSTVs will be determined by appropriately qualified consultants who complete the Water Management Plan based on ambient monitoring data.</p> <p>It is requested that these SSTV sit outside the consent and are instead included in the approved Water Management Plan as approved by the Secretary. This provides the ability for the criteria to be updated in response to changing site conditions and environments without requiring a modification to the consent</p>	<p>Section 4.13 and 4.14</p>
<p>Rehabilitation monitoring should be expanded to include measures which could be used to verify the achievement of the completion criteria. These could be incorporated into the next review of the management plans post approval of Stage 5.</p>	<p>Completion criteria of active rehabilitation areas was included in the updated Rehabilitation Management plan which was approved in July 2021.</p>	<p>Section 2.2, 4.13</p>
<p>Woody weeds such as lantana should be treated on an annual basis until effective control is achieved.</p>	<p>Weeding and maintenance of regeneration areas is continuing with the contracted bush regenerator.</p> <p>An inspection was undertaken to assess woody weeds throughout the active extraction area. A contractor was engaged to remove woody weeds</p> <p>The removal of the woody weeds will be incorporated into an expanded works for</p>	<p>Section 2.2, 4.13</p>

	the new contract with the bush regenerator.	
VENM inspection and verification systems should be upgraded and strengthened to include regular testing of foreign materials	The waste management plan was updated and the VENM Verification Procedure contains specific instructions and references for foreign materials. This plan was approved in June 2021.	Section 2.2, 4.13
Consideration should be given to upgrading the current Long Term Management Strategy (LTMS) to an Environmental Management Strategy (EMS)	The Long Term Management Strategy is currently under draft and consultation with the CCC and council. After the management plans associated with MOD 2 are approved, a separate EMS will be completed.	Section 4.13

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 1,556mm of rain falling over the reporting period. The highest volume month was March which experienced 215mm of rainfall over a five day period between 19 March 2021 and 23 March 2021.

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 (PM₁₀) every 6 days.

The locations of the compliance air quality monitoring locations are shown below. As part 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.

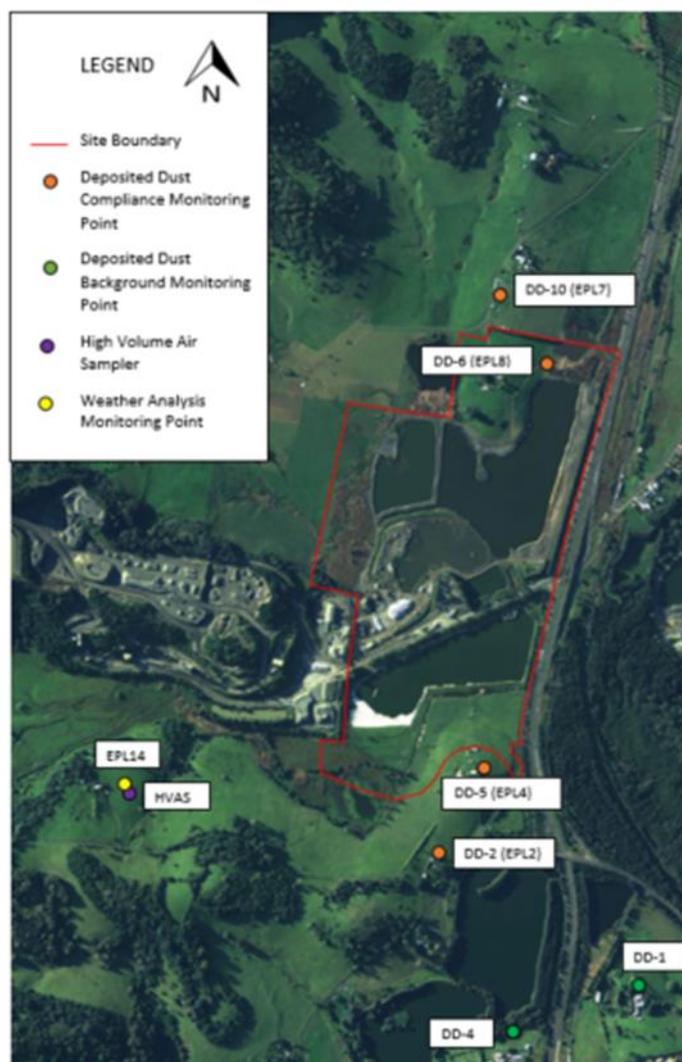


Figure 2 Air Quality Monitoring Locations

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	
		2g/m ² /month ^b	4g/m ² /month ^{a,d}
Deposited Dust ^c	Annual		
<p>^a Cumulative impacts (i.e. increases in concentration due to development plus all other sources)</p> <p>^b Incremental impact (i.e. increases in concentration alone, with zero allowable exceedances of criteria over the life of the development.</p> <p>^c Deposited dust is defined as insoluble solids</p> <p>^d Excludes extraordinary events such as bushfires, prescribed burning, dust storms, sea fog, fire incidents or any other activity as agreed by the Secretary.</p>			

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/m²/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
FY21 average	1.94	1.12	2.80	1.01	2.00	1.08	1.85	1.11
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
FY21 average	1.56	0.81	2.80	1.01
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 again observed to be higher for insoluble solids, however possessed a similar ash fraction to other monitoring sites. This is again 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/m²/month.

Minor elevated readings were recorded in the month of July 2020 at DD-2 and August 2020 at DD-5. The wind direction was from the west and southwest in July and from the west in August (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.

The rolling 12 month average for insoluble solids at each monitoring location was below 4g/m²/month, as shown by the orange line in Figure 3 to 8. This demonstrates that operations were compliant during most stages of the reporting period despite the external influences.

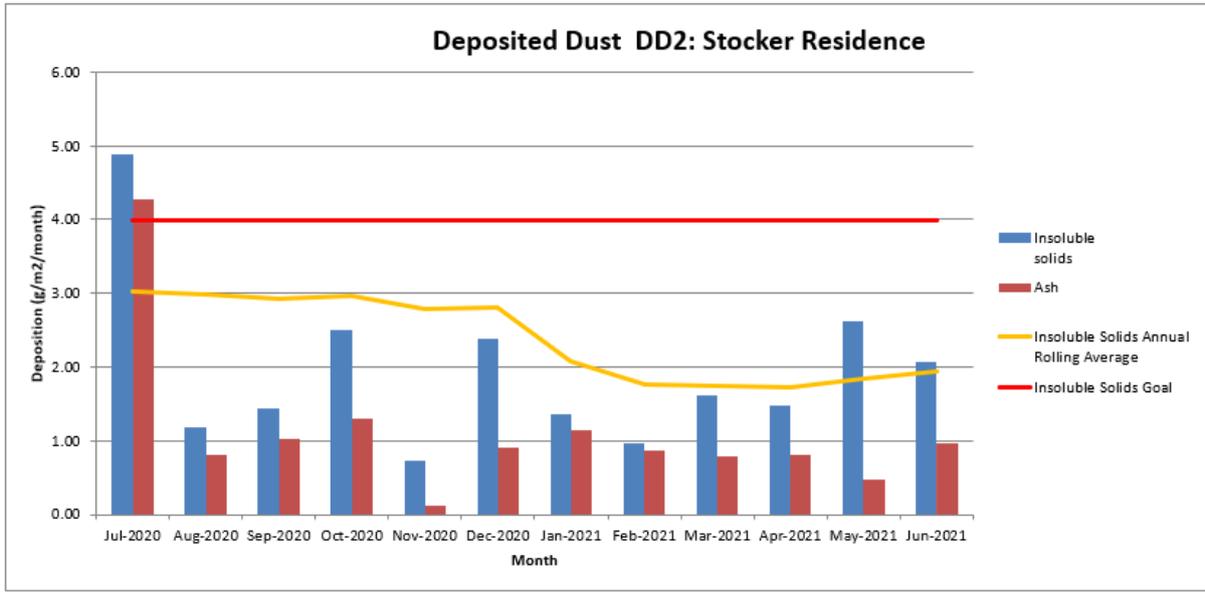


Figure 3 DD-2 Deposited Dust Monitoring Summary

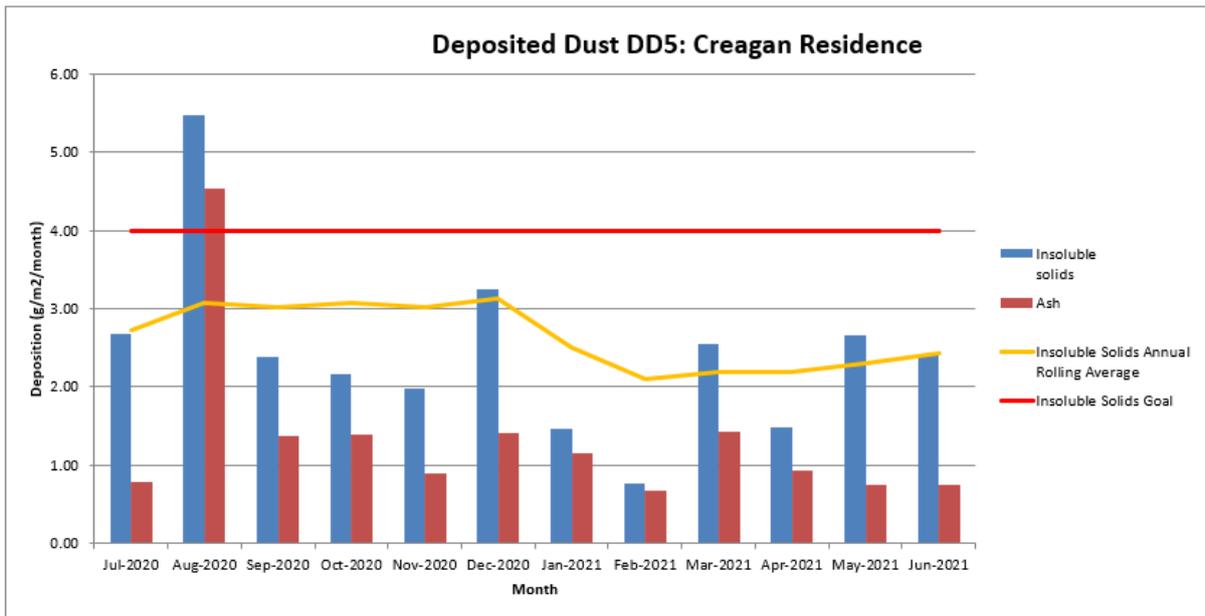


Figure 4 DD-5 Deposited Dust Monitoring Summary

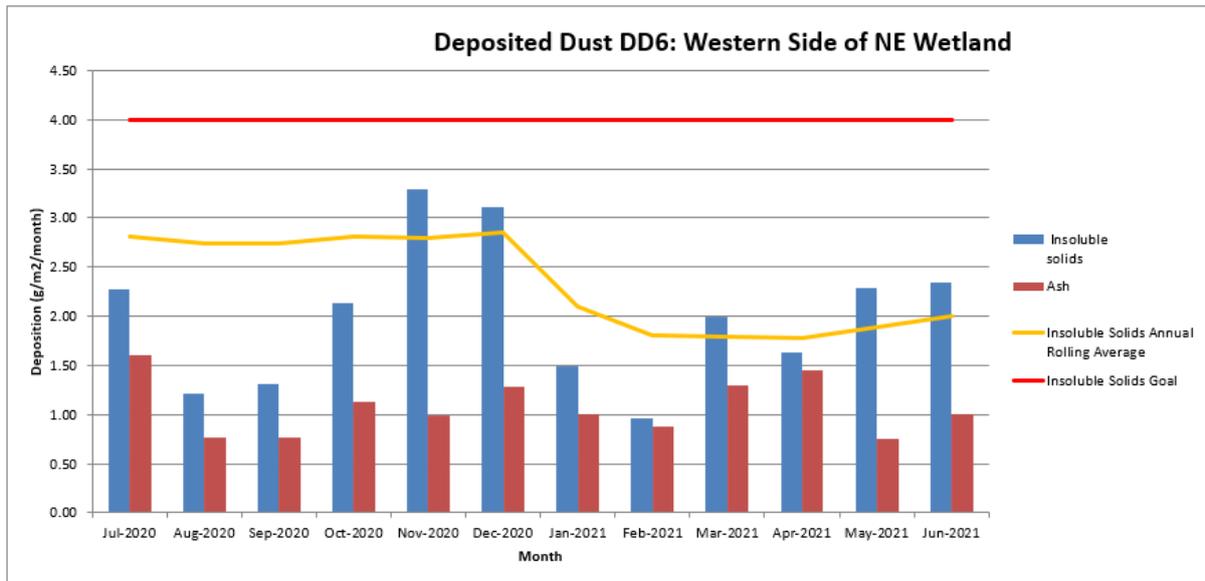


Figure 5 DD-6 Deposited Dust Monitoring Summary

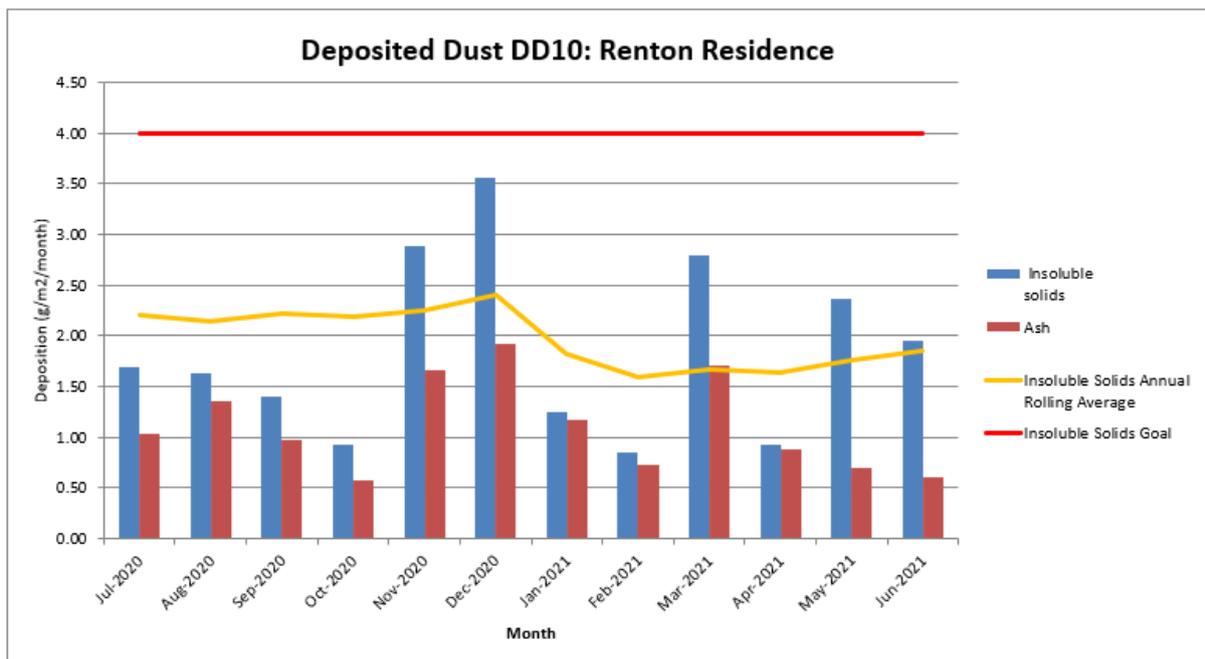


Figure 6 DD-10 Deposited Dust Monitoring Summary

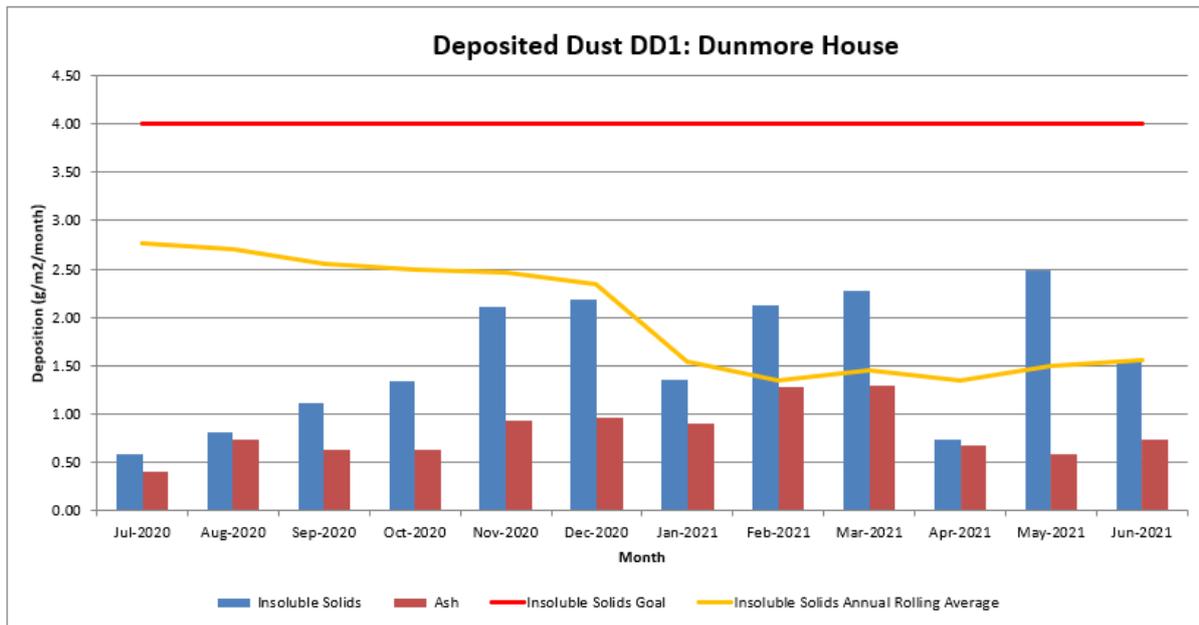


Figure 7 DD-1 Deposited Dust Monitoring Summary

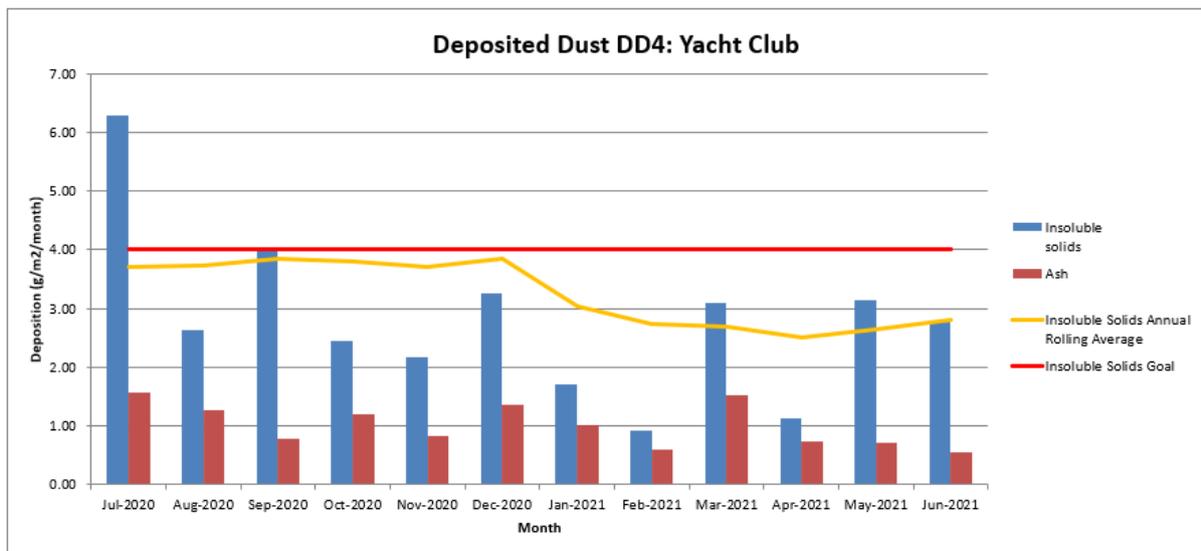


Figure 8 DD-4 Deposited Dust Monitoring Summary

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/m ³
PM ₁₀	24 hour	^b 50 µg/m ³
TSP	Annual	^{a,d} 90 µg/m ³

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

PM₁₀ readings from the current reporting period can be seen in Figure 9 below.

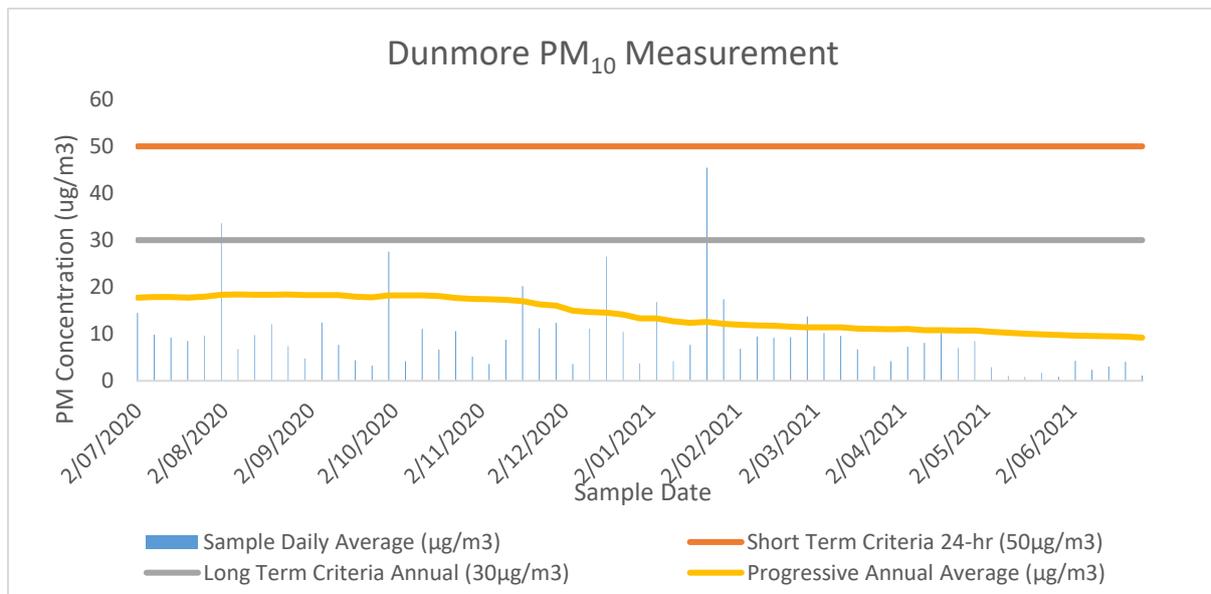


Figure 9 Dunmore PM₁₀ Monitoring Summary

The annual average PM₁₀ measurement for the reporting period was below the long term impact assessment criteria of 30 µg/m³ for PM₁₀ and 90 µg/m³ for TSP. The PM₁₀ 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 PM₁₀ 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 PM₁₀:TSP. Rural areas (such as DLSP), typically experience a PM₁₀:TSP ratio of 0.4. This ratio has been applied to the annual average PM₁₀ 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 current period (µg/m ³)	Quarry reporting average	Albion current period average(µg/m ³)	Park reporting average	Dunmore Long average (µg/m ³)	Quarry Term average
Measured HVAS PM ₁₀	9.21		17.1		13.02	
Derived TSP	23.02		42.75		32.33	

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.

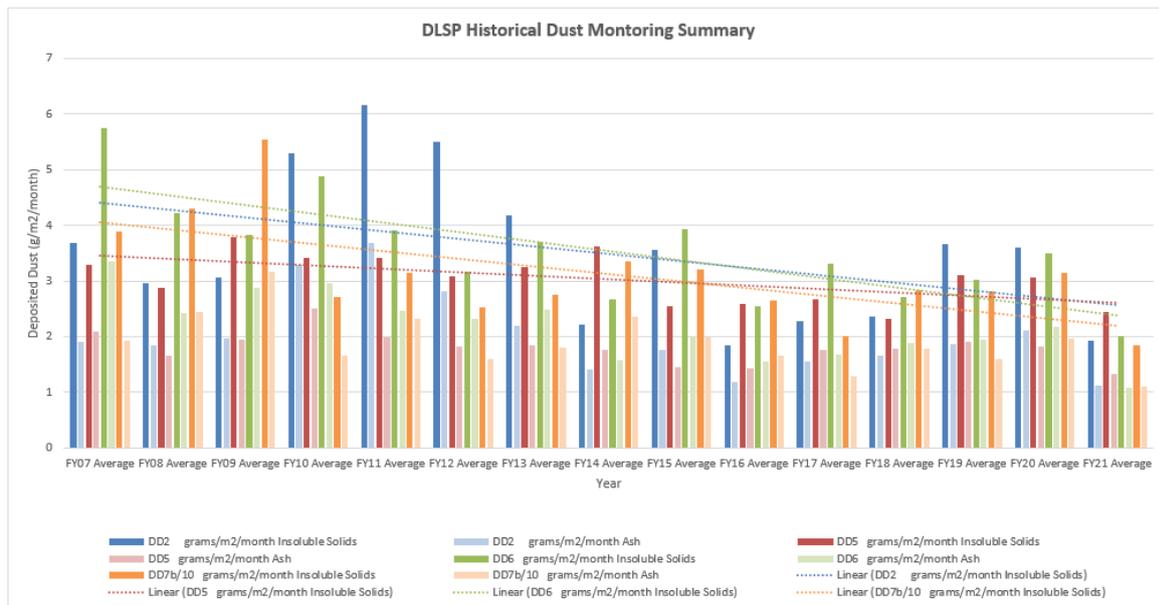


Figure 10 Historical Deposited Dust Trends

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 PM₁₀ 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 PM₁₀ values. A trend can be observed whereby PM₁₀ values are typically higher during summer dry periods and are lower during the winter periods.

This fluctuation is mirrored in the OEH Albion Park PM₁₀ 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 PM₁₀ and deposited dust values are typically influenced by ambient local conditions rather than development operations at DLSP.

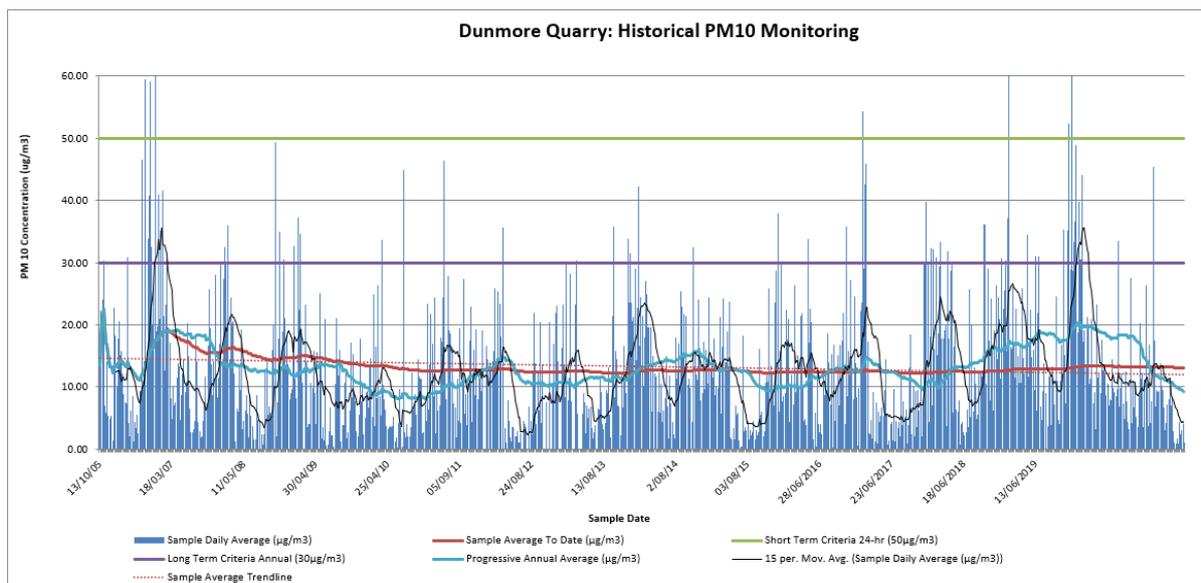


Figure 11 PM₁₀ Historical Monitoring Trends

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 PM₁₀ 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 Particulate Matter Monitoring Data

Receiver Location	Noise Limits dB (A)			
	LAeq (15 minute)			
	Shoulder	Day	Evening	Night
DN-6 Renton	46	46	43	37
DN-7 Dunmore Village	47	49	44	41
DN-8 Stocker	47	49	44	38

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 2020, prepared by Muller Acoustic Consulting Pty Ltd and included in Appendix C.

The report includes a compliance assessment summary for each monitoring location (DN-6, DN-7, DN-8) 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

Location No.	Period	DLSP Contribution	Criteria	Compliant
		dB LAeq(15min)	dB LAeq(15min)	
DN-6	Day	<45	46	✓
DN-7	Day	<49	49	✓
DN-8	Day	<39	49	✓
DN-6	Evening	<39	43	✓
DN-7	Evening	<44	44	✓
DN-8	Evening	<35	44	✓
DN-6	Night	<35	37	✓
DN-7	Night	<41	41	✓
DN-8	Night	<35	38	✓
DN-6	Morning Shoulder	<45	46	✓
DN-7	Morning Shoulder	<47	47	✓
DN-8	Morning Shoulder	<40	47	✓

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.

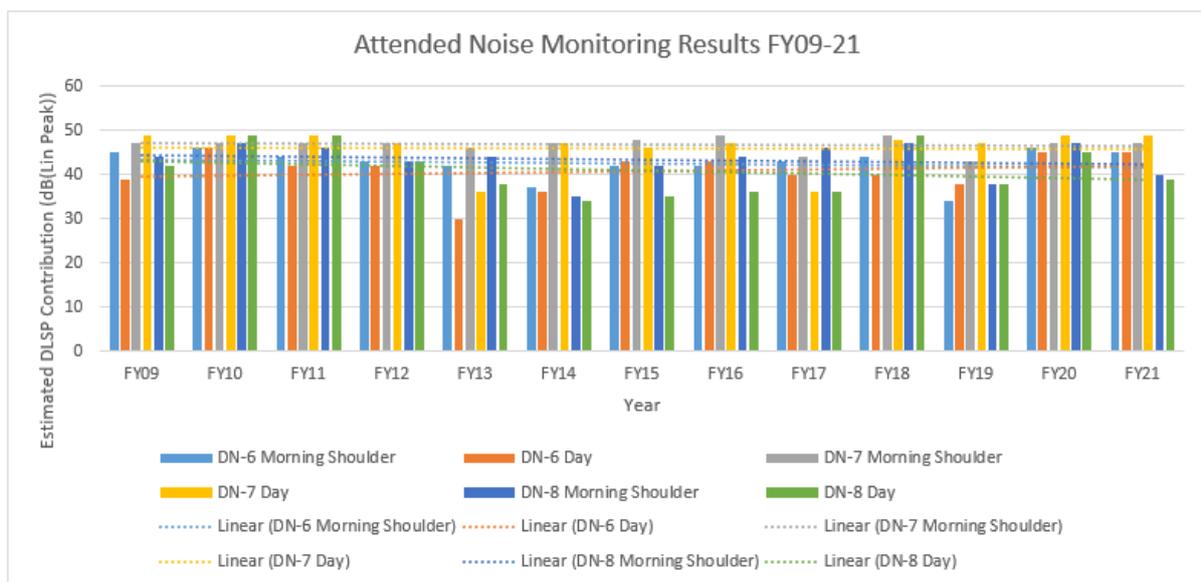


Figure 12 Noise Monitoring Historical Noise Monitoring Trends

4.3.4. Noise Monitoring Summary and Opportunities for Improvement

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

In the previous reporting period, the weather station was upgraded on the site to enable personnel to immediately access weather information. This 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 DW20b (EPL9), during all periods. 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.

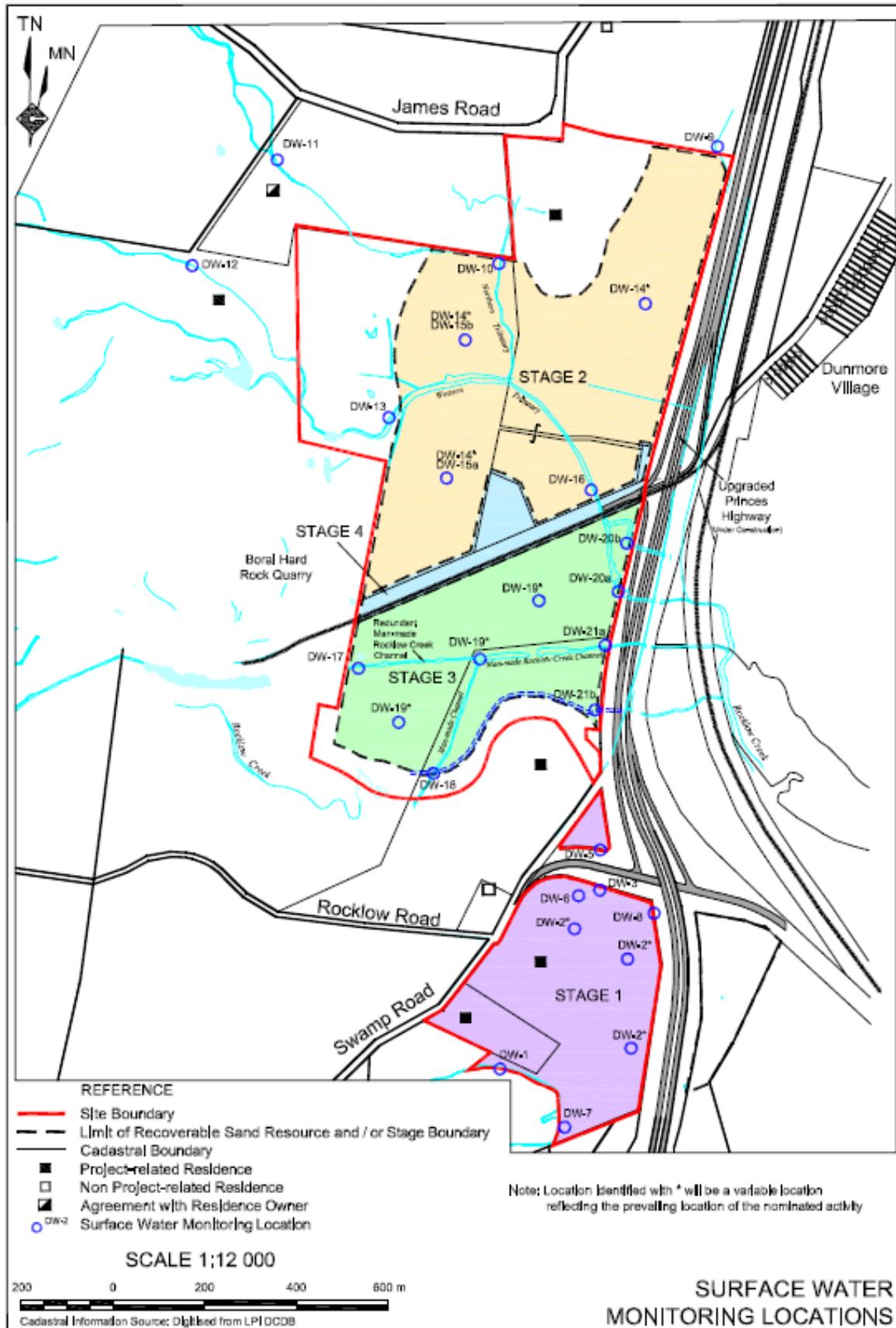


Figure 13 Surface Water Monitoring Locations

4.4.1. Surface Water Quality Impact Criteria

There are 5 compliance monitoring points listed in EPL 11147 which are reproduced below:

- DW 11 (EPL12) – Upstream of Western Tributary in Stage 2
- DW 12 (EPL11) – Upstream of Western Tributary in Stage 2
- DW 18 (EPL13) – Upstream of Rocklow Creek in Stage 3
- DW 20b (EPL9) – Licenced discharge point of DLSP via the re-aligned Western Tributary
- DW 21b (EPL13) – Secondary licenced discharge point to be activated after re-aligning Rocklow Creek. This site has not been activated as Rocklow Creek has not been re-aligned. Extraction is not expected to occur in the southern section of Stage 3 due to the landowners requests.

Discharge water quality criteria for DW20b 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)

There are two water quality compliance operational monitoring points at DLSP. These are the dredge ponds in Stage 2 (DW-14) and Stage 3 (DW-19). 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
Chlorophyll-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

Pollutant	Unit of Measure	Water Quality Objective
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-13 Upstream of Stage 2 Western Tributary
- DW 15a Fines Pond
- DW 16 Water transfer point between Stage 2 and Stage 3
- DW-21a Background monitoring for the man-made Rocklow Creek channel

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. The dredge pond (DW-14 and DW-19) and discharge point (DW20b) are shown in grey. Parameters outside of the water quality objectives are highlighted orange. Monitoring sites in white are upstream monitoring locations and are monitored for background purposes only.

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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.

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. A breakdown of discharge water quality monitoring results at DW20b is summarised below in Table 19.

Table 19 Discharge Surface Water Monitoring Results

Sample Type	Date Sampled	48 hr Rainfall (mm)	pH	TSS (mg/L)
Jul Monthly	15/07/2020	31	7.8	12
Jul 50mm	27/07/2020	52	8.1	14
Jul 50mm	29/07/2020	166	7.6	10
Aug Monthly	31/08/2020	0	7.8	25
August 50mm	11/08/2019	125*	7.7	8
Sept Monthly	21/09/2020	3	7.8	41
Oct Monthly	22/10/2020	0	7.4	12
Nov Monthly	18/11/2020	0	7.7	7
Nov 50mm	02/11/2020	67	8.0	12
Dec Monthly	17/12/2020	33	7.9	20
Jan 50mm	04/01/2021	90	7.5	47
Jan Monthly	28/01/2021	5	8	13
Feb Monthly	17/02/2021	2	7.8	16
Mar Monthly+50mm	20/03/2021	50	7.7	3
Mar 50mm	24/03/2021	143	7.8	6
Apr Monthly	28/04/2021	0	8	29
May Monthly	31/05/2021	0	7.5	6
May 50mm	6/05/2021	130	7.8	33
Jun Monthly	29/06/2021	0	7.8	37
FY21 Average	/	/	7.8	18

Eight (8) rainfall 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 within 24 hours of 50mm or more of rainfall within a 48 hour period. These events are highlighted in bold on Table 19 and were:

- 26-28 July 2020 (52mm in 48 hours)
- 29 July 2020 (166mm in 48hours)
- 7-9 August 2020 (125mm in 48 hours)
- 31 October 2020 – 1 November 2020(67mm in 48 hours)

1 July 2020 – 30 June 2021

- 2-3 January 2021 (90mm in 48 hours)
- 18-19 March 2021 (50mm in 48 hours)
- 21-23 March 2021 (143mm in 48 hours)
- 5-6 May 2021 (130mm in 48 hours)

During 7 to 9 August 2020 event, the site was unable to be accessed on 9 and 10 of August due to safety concerns and flash flooding, which caused site closure. As per note 2 within condition M2.3 the site notified the EPA that sampling would be delayed until it was safe to do so on 11 of August 2020. Dredging and backfilling operations ceased during periods of overflow of the dredge pond in accordance with the EPL 11417 conditions.

During 21 to 23 of March 2021, due to widespread localised flooding, the site was closed on 23 and 24 March and sampling sites were inaccessible. As per note 2 within condition M2.3, the site notified the EPA that sampling would be delayed until it was safe to do so on 24 March 2021. Dredging and backfilling operation ceased during periods of overflow of the dredge pond in accordance with the EPL 11417 conditions.

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 continued to be 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 three periods where PASS importation had ceased for 30 days and monitoring reverted back to the weekly sampling regime.

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.

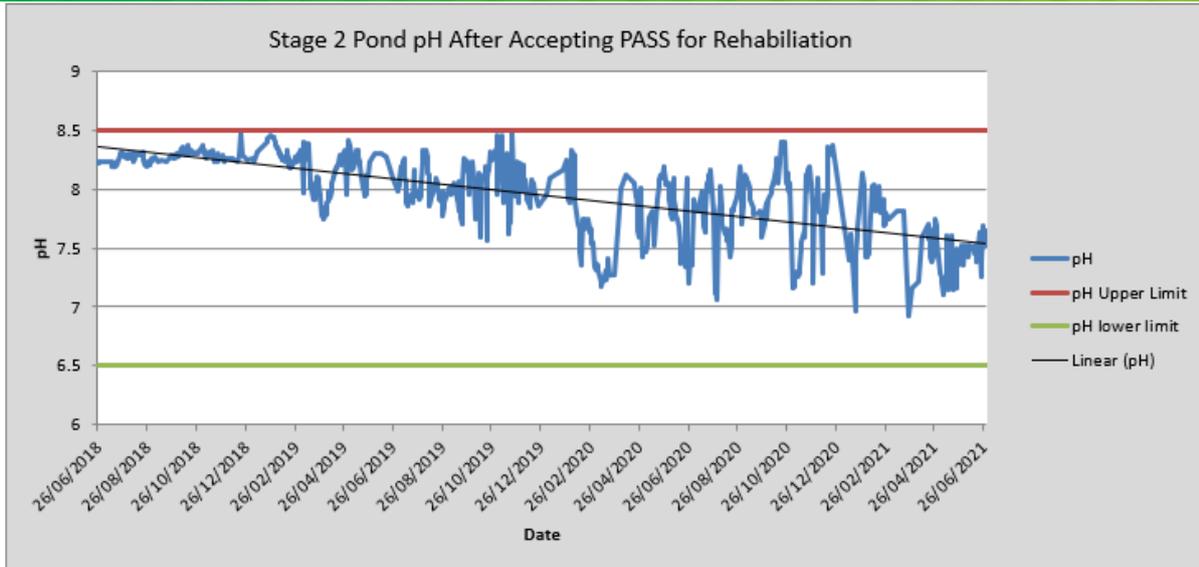


Figure 14 Stage 2 Pond pH After Accepting PASS

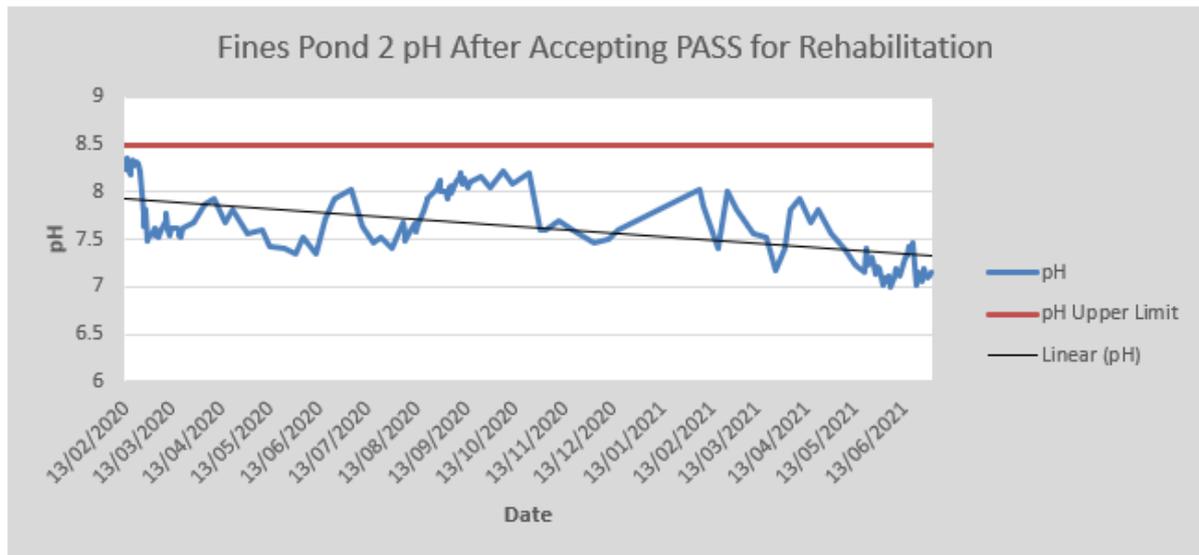


Figure 15 Fines Pond 2 After Accepting PASS for Rehabilitation

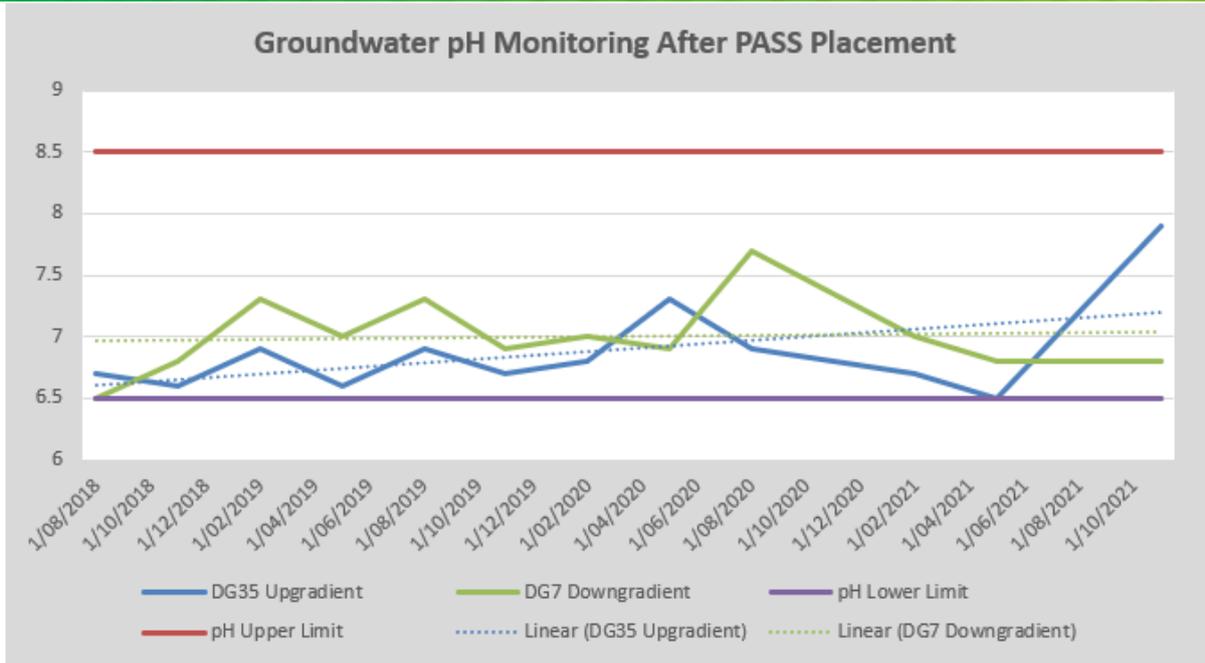


Figure 16 Groundwater pH After Accepting PASS for Rehabilitation

4.4.3. Surface Water Monitoring Long Term Assessment and Analysis

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

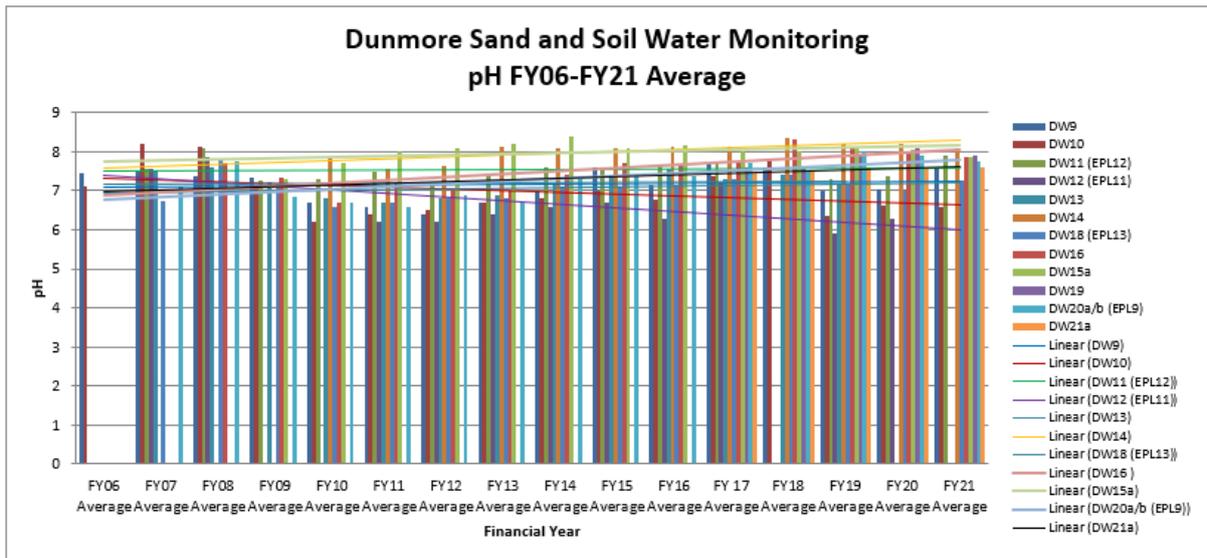


Figure 17 Surface Water pH Historical Monitoring Trends

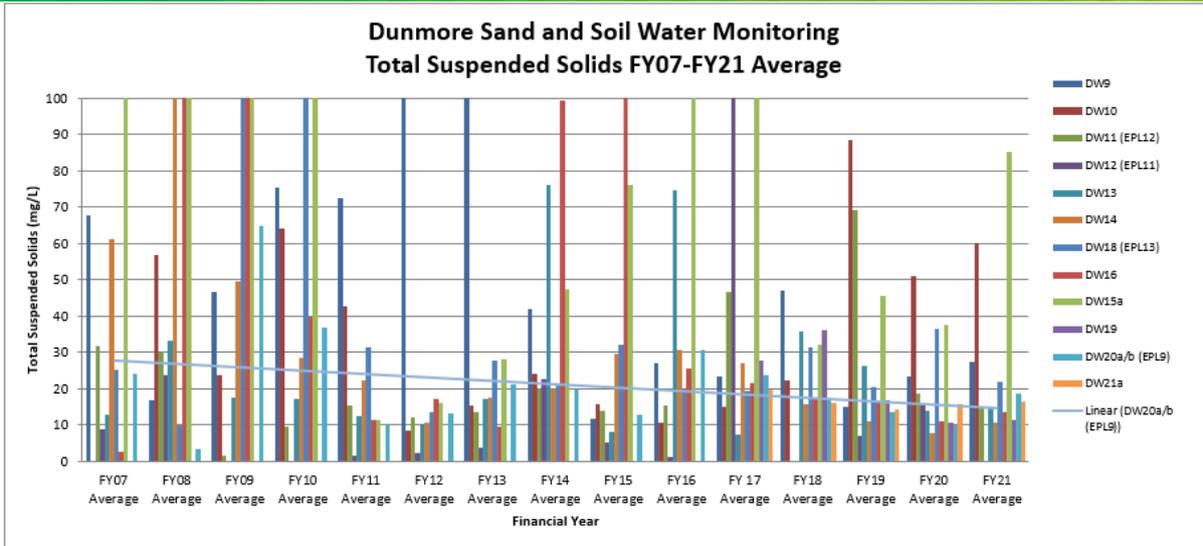


Figure 18 Surface Water TSS Historical Monitoring Trends

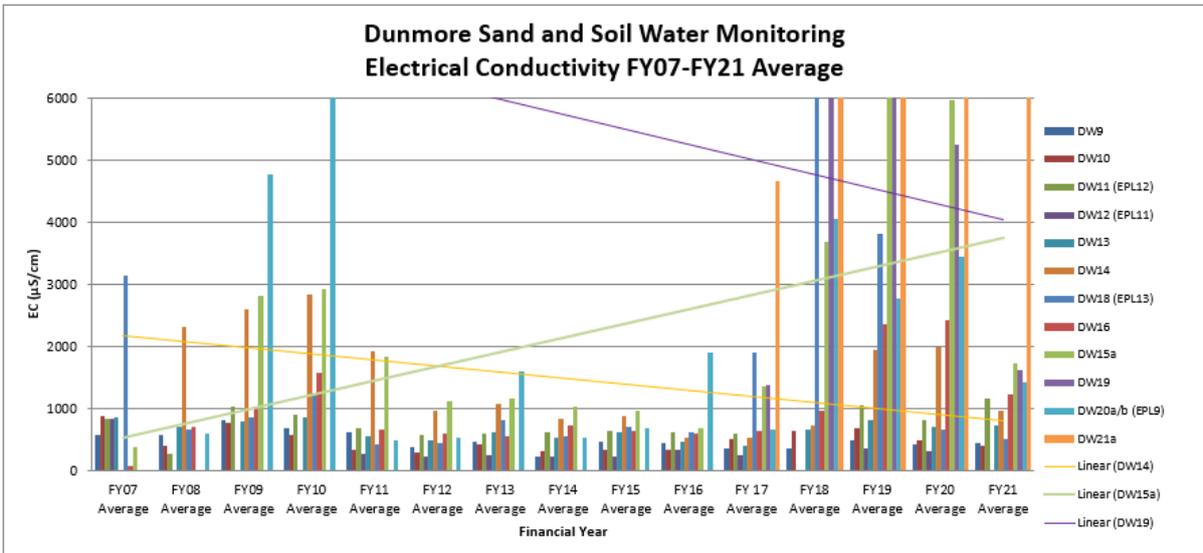


Figure 19 Surface Water Conductivity Historical Monitoring Trends

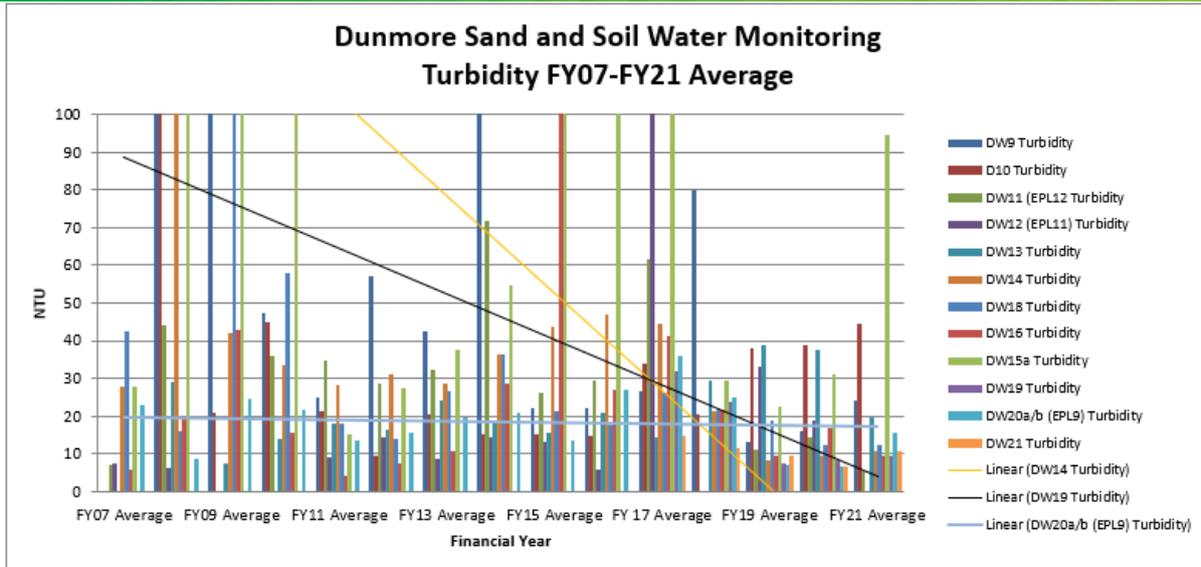


Figure 20 Surface Water Turbidity Monitoring Historical Trends

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.
- Algae was above WQO in the dredge ponds (DW-14 and DW-19) and upstream at DW-10. This would be attributed to the adjacent land uses that include farm and agricultural land and cattle grazing causing elevated nutrient levels such as Nitrogen.

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.

As dredging has ceased in the proximity of the tidal zone in FY21 the salinity of the pond in Stage 3 has decreased from the previous reporting period. As dredging will cease in Stage 3 during the next reporting period this drop in salinity is expected to continue. This phenomenon is similar to what occurred for the Stage 1 and 2 dredge ponds once dredging had ceased in these areas.

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. Groundwater data collected in Stage 3 since 2003 describes the aquifer as having a rapid response to rainfall. This is explained in greater detail in the Groundwater Annual report in Appendix D.

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 will continue within the southern and eastern section of Stage 3 over the next 12 months. It is expected as backfilling and landform construction continues in the southern section of Stage 3, salinity caused by tidal saline flow will continue to decrease in the Stage 3 pond.

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 water enters the site ponds from the Western Eastern and Northern Tributaries and flows out of the ponds back into the re-aligned Western Tributary.
- One instance of flooding occurred in February 2021 which led to an overflow of the Stage 3 dredge pond. 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

- Typically five tanker loads of water is used during dry days in summer
- The water cart on site holds 30,000 L
- The site was operational for 5 days a week
- There were 98 rain days during the current reporting period

The use of water due to dust suppression can be calculated as 27ML.

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 production was 220,995 tonnes.
- Water loss from sand production is calculated as 20.62 ML.

Total water use is therefore calculated as water use for dust suppression (27ML) plus water loss from sand production (20.62ML).

The calculated total water use volume is 47.62ML, 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.

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.

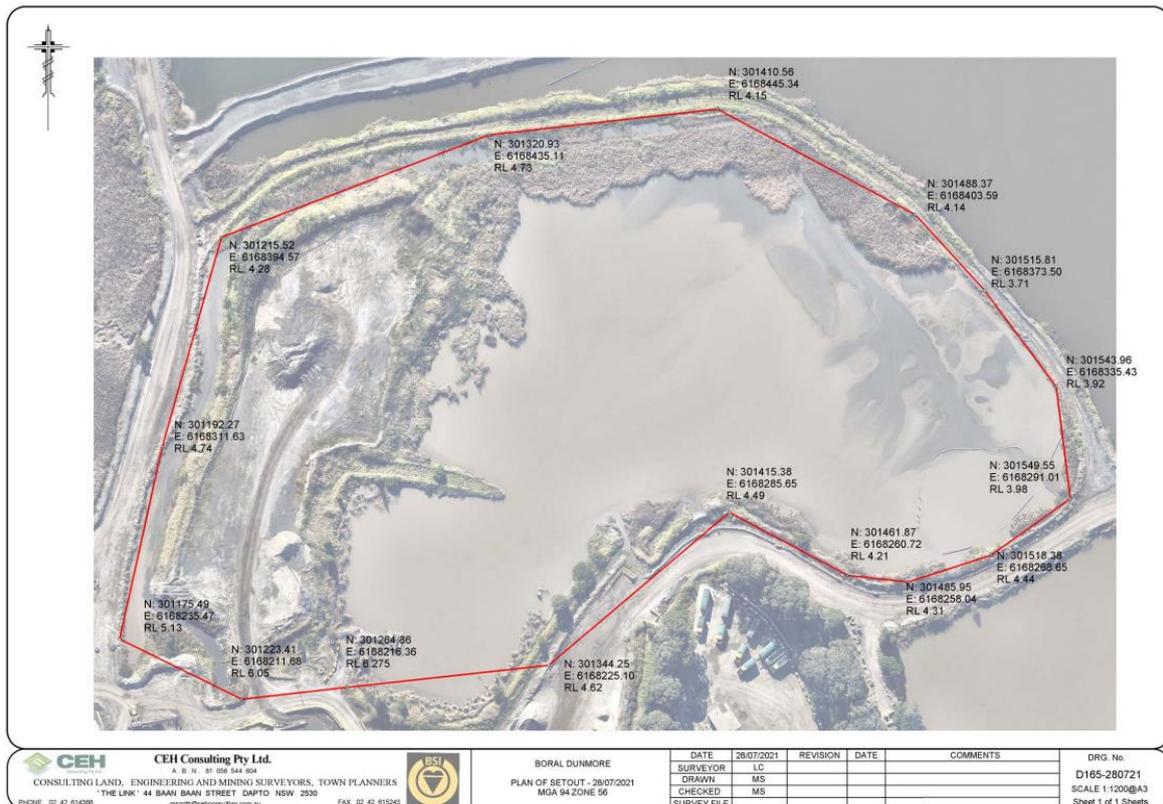


Figure 21 Surveyed Fines Pond Bund

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.

Extraction volumes exceeded backfilling volumes during the reporting period, so it has been assessed that the flood storage capacity of the site is greater than the previous reporting period as per condition S3.C27 of the consent.

4.7. Groundwater Monitoring

Environment Earth Sciences (EES) have been commissioned to undertake analysis of the groundwater aquifer at Dunmore Lakes since 2003. The full Groundwater Annual Report is located in Appendix D and relevant sections have been reproduced below.

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 21.

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 is shown in Figure 22.

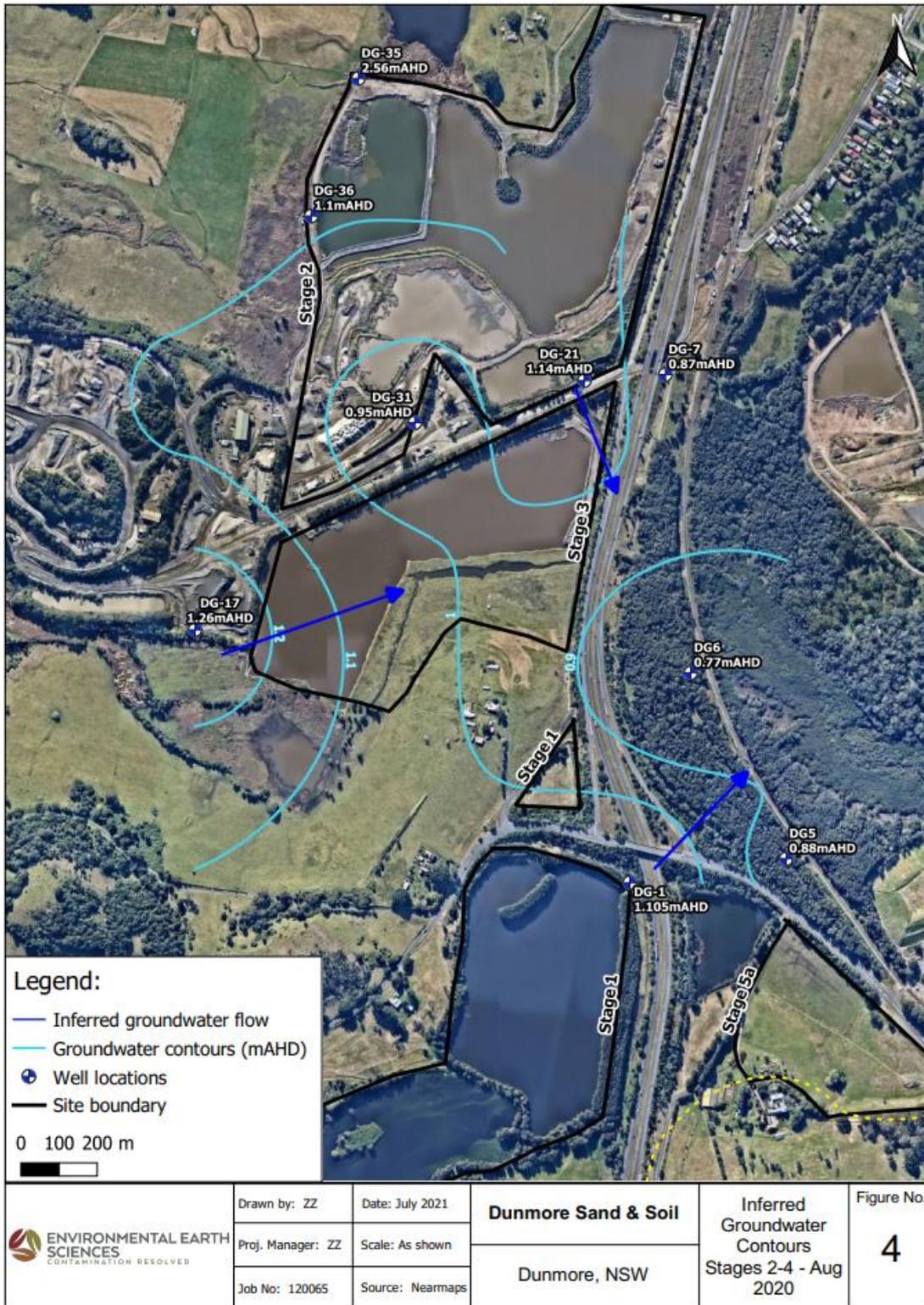


Figure 22 Groundwater Monitoring Locations and Derived Flow

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.

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Table 22 Groundwater Monitoring Summary West of Princes Highway

Table 4: Results for bores west of the Princes Highway (ID: DG1, DG17, DG21, DG31, DG35, DG36) between August 2020 - Present

Analyte ¹	Units	Trigger Value		DG1*				DG17				DG21				DG31*				DG35				DG36			
		DA ²	GMMP ³	Aug-20	Nov-20	Feb-21	May-21																				
pH	-	6.5 – 8.5	6.5 – 8.5	7.6	7.4	7.1	7.3	7.2	7.1	7.1	7	6.1	6.4	6.4	6.3	7.3	7.2	6.9	6.9	6.9	7.9	6.7	6.5	7.1	7.2	7	6.9
EC	µS/cm	<1,500	1,500	643	664	646	547	2,100	2,870	2,650	2,400	1,939	1,089	1,111	1,188	594	2,500	2,230	620	1,106	1,048	1,081	1,049	1,016	1,129	1,083	1,134
TDS	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total N	mg/L	100 – 500	-	1.32	6.62	2.68	2.15	0.77	1.5	1.44	0.57	0.15	0.79	0.21	0.66	1.06	1.76	0.56	0.82	1.31	0.76	1.02	1	0.2	0.16	0.4	0.45
Na	mg/L	400	560	11	20	41	75	277	289	449	265	238	134	62	92	14	179	379	40	22	41	59	58	18	46	67	70
K	mg/L	50	50	3.7	4.2	4.5	2.5	26	86	38	41	2.5	105	1.2	1.3	3.7	16	12	5.2	9.7	11	9.4	5.7	15	17	16	11
Mg	mg/L	50	90	8.6	11	11	19	85	103	112	117	23	12	13	19	7.4	38	27	16	18	24	25	34	18	38	24	32
Cl	mg/L	300	1,400	37	37	39	41	313	466	425	432	445	200	203	225	70	579	442	56	59	65	61	62	79	100	99	105
Ca	mg/L	-	-	33	53	41	58	30	57	27	116	33	28	16	41	22	70	46	54	32	46	40	52	36	42	35	36
F	mg/L	-	-	<0.5	0.3	0.3	0.2	0.6	0.81	0.8	<0.05	<0.5	0.5	0.3	<0.05	<0.5	2.33	0.1	0.2	<0.5	0.3	0.3	0.06	0.5	0.5	0.4	0.3
Fe	mg/L	6	3	0.09	0.23	0.02	0.23	0.11	0.29	0.01	0.07	1.2	0.65	0.37	0.43	0.27	0.64	1.5	0.4	0.21	0.05	1.2	0.15	0.11	0.05	<0.01	0.13
NO ₃	mg/L	-	-	0.1	0.13	0.53	1.01	0.04	0.04	0.15	0.192	0.03	<0.01	0.11	0.151	0.14	0.17	0.31	0.218	0.13	0.13	0.26	0.228	0.2	0.09	0.17	0.42
SO ₄	mg/L	250	300	11	5.4	3.3	3.3	30	4.1	12	17	169	109	95	135	116	233	284	151	264	241	240	268	84	136	142	182
PO ₄	mg/L	5 – 50	4	0.06	0.23	0.08	0.07	0.59	2.78	2.93	3.49	0.13	0.26	0.18	0.24	0.03	0.04	0.08	0.03	0.03	0.95	0.01	0.02	0.04	0.05	0.08	0.04
HCO ₃	mg/L	750	400	281	356	336	249	584	1073	981	996	105	124	124	134	55	184	229	95	218	301	299	269	248	354	329	334
NH ₃ N	mg/L	20	1	<0.01	0.88	1.7	<0.01	0.45	0.55	0.78	0.43	<0.01	<0.01	0.2	0.0	<0.01	0.72	0.5	<0.01	0.68	0.7	0.53	0.41	<0.01	<0.01	0.08	<0.01

Notes:

1. 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; Fe = Dissolved Iron; NH3N = Ammonia
2. 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).
3. GMMP Criteria are site-specific criteria for groundwater quality and a sub-plan to the WMP (Arcadis, 2016).
4. Elevated concentrations to site-specific GMMP criteria are shaded in Red.

* Results for DG1 is DG15 in Boral's spreadsheet and DG31 is DG31S

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Table 23 Groundwater Monitoring Summary East of Princes Highway

Table 5: Results for bores east of the Princes Highway (ID: DG5-S, DG5-D, DG6-S, DG6-D and DG7) between August 2020 - Present

Analyte ¹	Units	Trigger Value		DG5-S				DG5-D				DG6-S				DG6-D				DG7			
		DA ²	GMMR ³	Aug-20	Nov-20	Feb-21	May-21																
pH	-	6.5 – 8.5	6.5 – 8.5	7.4	7.4	7.4	7.4	7.3	7.5	7.9	7.4	6.5	6.6	6.8	6.4	7	6.9	6.9	6.8	7.7	6.8	7	6.8
EC	µS/cm	<1,500	33,000	1,499	1,437	1,388	1,213	13,810	16,040	15,300	15,760	20,900	22,700	19,540	20,800	24,400	25,500	26,100	27,500	480	1,309	944	1,191
TDS	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total N	mg/L	100 – 500	-	0.49	0.86	0.41	0.42	0.9	1.6	2.02	3.85	2.26	2.48	2.38	5.22	12.11	12.38	21.41	18.74	0.46	2.04	0.76	2.71
Na	mg/L	400	5,500	29	57	71	58	734	1472	3031	2243	1155	614	3766	3272	1525	634	4539	4261	8.5	56	67	82
K	mg/L	50	170	10	12	10	5.9	127	145	140	163	181	156	189	228	189	154	197	264	4.4	3.7	3.1	2.5
Mg	mg/L	50	420	9.7	13	13	17	266	321	376	375	328	174	348	588	423	195	494	764	4.9	17	11	20
Cl	mg/L	300	6,900	258	241	236	182	4815	5676	5731	5754	7887	8207	7661	8252	8112	9843	9747	10610	42	263	138	208
Ca	Ca-	-	-	45	74	58	95	57	68	54	195	66	175	56	235	38	175	62	396	29	60	33	58
F	mg/L	-	-	< 0.5	1.19	0.3	0.2	0.7	2.32	0.72	< 0.05	0.6	2.35	0.4	< 0.05	< 0.5	2.24	0.2	< 0.05	0.5	1.22	0.51	0.3
Fe	mg/L	6	4	0.32	0.56	< 0.01	0.18	0.71	0.73	0.01	0.45	1.1	0.41	0.11	0.33	0.06	1.8	0.01	0.01	1.5	0.69	0.02	0.24
NO ₃	mg/L	-	-	0.44	0.2	0.41	0.416	0.56	0.44	0.97	2.09	1.25	2.39	1.29	4.36	10.5	12.2	19.6	17.5	0.16	0.13	0.76	1.05
SO ₄	mg/L	250	1,170	112	104	117	161	610	712	563	836	1064	996	729	1212	1308	1348	1040	1522	22	86	74	119
PO ₄	mg/L	5 – 50	1	0.05	0.25	0.02	0.10	0.22	0.36	0.10	0.13	0.14	0.23	0.08	0.05	0.04	0.03	0.03	0.17	0.06	0.10	0.19	0.12
HCO ₃	mg/L	750	420	197	286	284	254	281	311	299	289	353	306	294	289	353	448	448	428	164	169	209	192
NH ₃ N	mg/L	20	3	< 0.01	< 0.01	0.0	< 0.01	< 0.01	1.32	1.3	1.18	0.31	0.59	0.9	0.2	0.57	1.1	1.2	0.02	0.21	0.95	0.71	< 0.01

Notes:

- 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; Fe = Dissolved Iron; NH₃N = Ammonia
- DA Criteria is not site specific and outlined under Development Consent 195-B-2004 (2004), issued on 29 June 2005 for The Dunmore Lakes Sand Project (Stages 2 – 4).
- GMMR Criteria are site-specific criteria for groundwater quality and a sub-plan to the WMP (Arcadis, 2016).
- Elevated concentrations to site-specific GMMR criteria are shaded in Red.

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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, as illustrated in Appendix A. 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).

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;
- 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 8500m² 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 23.



Figure 23 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.

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 E.

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.

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. Stage 2 and Stage 3 is currently being backfilled.

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 24 VENM and PASS Backfilling Volumes

Month	VENM (a) received (t)	VENM (b) received (t)	PASS	Excavated Sand VENM received (t)
Jul-20	224.96	847.08		0
Aug-20	374.14	716.72		564.98
Sep-20	1311.2	3663.02		1012.16
Oct-20	91.12	2210.94		0
Nov-20	14.48	5723.12		0
Dec-20	0	10661.04		0
Jan-21	0	8781.46		0
Feb-21	0	0		0
Mar-21	0	0		0
Apr-21	356.7	592.48		0
May-21	984.2	1582.42		0
Jun-21	684.4	6293.18		33.34
Total	4041.2	41071.46		1610.48

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 26 outlines the total waste and waste types generated by DLSP over the reporting period. In the current reporting period, a considerable focus was placed on increasing recycling volumes. Please note that items like filter bins/oily rags and scrap metal are sent to the workshop at Dunmore Quarry and are included in the Dunmore Quarry Waste Tracking Register.

Table 25 Waste Tracking Register

	General Waste (t)	Cardboard (t)	Commingle Recycling (t)	Oil/Oily Waters (t)	Effluent (t)	Solvent (t)
Jul-20	0.082	0	0.05	0	0	0
Aug-20	0.142	0.074	0	0		0
Sep-20	0.062	0	0	0	0	0
Oct-20	0.216	0	0	0	0.35	0
Nov-20	0.061	0	0.017	0	0	0
Dec-20	0.01	0	0	0.35	0	0.6
Jan-21	0.082	0.16	0.022	0	0.35	0
Feb-21	0.021		0.017	0	0	0
Mar-21	0.106		0.005	0	0	0
Apr-21	0.156	0	0	0		0
May-21	0.228	0.12	0	0	0	0
Jun-21	0.135	0	0.003	0	0	0
Total	1.301	0.354	0.114	0.35	0.7	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 26 Historical Waste Tracking Summary

Waste Classification		FY17	FY18	FY19	FY20	FY21
Solid Waste	General Waste (t)	4.731	4.466	2.605	1.842	1.301
	Cardboard (t)	0.636	0.948	0.274	0.678	0.354
	Comingle (t)	0.36	0.345	0.33	0.208	0.114
Liquid Waste	Oil/Oily Water (t)	0	1.531	4.99	2.95	0.35
	Effluent Litres (t)	3.73	0.589	0.245	0.36	0.7
	Other (t)	0	0	0	0	0.6

*all liquid waste volumes have been converted to tonnages in the FY21 register.

General Waste volumes decreased during the current reporting period compared to the previous reporting period. This is due to a decrease in staff numbers during the last reporting period. 26% of solid waste generated was recycled which was lower than the previous period (46% solid waste recycled).

Effluent is pumped out from the portable facilities on the dredge, which was slightly above the previous periods volumes. The office is serviced by an underground aerated waste water treatment system (AWTS) which does not require effluent pump out. This system is regularly serviced and maintained by Bio-septic.

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. A new national contract has been started with Cleanaway which will allow more efficient and centralised waste tracking. A particular focus will be increasing the ratio of comingle waste recycling, which did decrease compared to the last reporting period.

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 May 2021. 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.
- A vehicle pedestrian safety upgrades were completed during the reporting period. Car park and traffic areas were refurbished to minimise pedestrian and vehicle interactions wherever possible.

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 (September 2020 and February 2021).

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 were no community complaints during the reporting period.

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

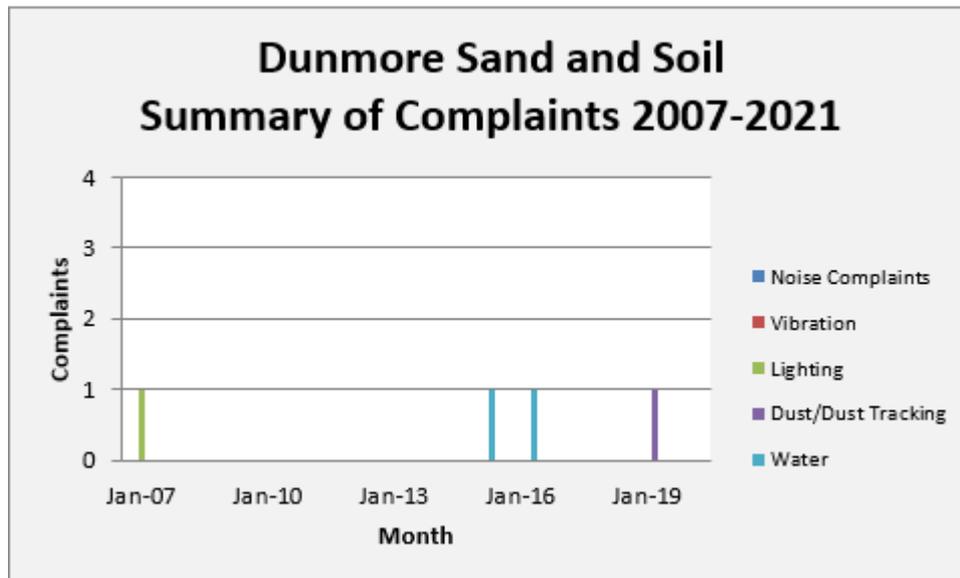


Figure 24 Summary of Historical Complaints

4.13. Independent Environmental Audit

The Independent Environmental Audit (IEA) was completed in accordance with Schedule 5, Condition 10 and 11 of DA 195-8-2004. The audit site visit was completed on 14 October 2020 and the audit report was finalised on 23 November 2020.

The audit report is available under the public reporting tab on the Dunmore operations website <https://www.boral.com.au/locations/boral-dunmore-operations>

One (1) non-compliance was identified and five (5) recommendations were given. The audit found that the site is well managed and poses little risk to the receiving environment and that current assessment criteria was being met and is in line with the predictions made in the 2004 EIS.

This non-compliance was noted in the report as a natural occurrence which has not resulted in harm to the environmental and is included in Table 3 Annual Review Compliance Key. This non-compliance relates to the Water Quality Objectives described in Schedule 3 Condition 24.

The natural conditions which affect salinity and algae in the dredge ponds and K, Mg and Cl in the groundwater is described in Section 4.4.3 and Section 4.7.3 respectively. As described in these sections, the elevations are due to natural phenomenon due to tidal saline flow and the proximity of operations to the saline sections of Rocklow Creek.

It is noted that in the reporting period salinity in the ponds has decrease due to higher rainfall recharge (much of 2018 2019 and 2020 were drought) and the cessation of dredging in the saline section of Rocklow Creek as highlighted in the EIS and discussed in Section 4.4.3 of this report.

It was reported to the DPIE as part of the response to recommendations. A summary of the regulator correspondence is included in Section 4.15. The auditor provided the following recommendation IEA1 which is reproduced below

“Groundwater did not exceed the site-specific trigger levels (SSTV) in 2018/2019 outlined in the GMMP. Some exceedances have occurred in the water quality objectives however these have not resulted in harm to the environment.

Values in Table 7 are not appropriate or reflective of natural conditions as described in Section 3.5.3 of the audit report. This audit has recommended that Table 7 be updated as part of the new consent process for MOD2. Sufficient data exists to create SSTV with more appropriate values.

It is noted that short term exceedances of the objectives may occur due to natural events such as heavy rainfall or tidal saline inflow.”

A summary of the audit recommendations are included below and have been incorporated into the update suite of management plans and site procedures.

Table 27 Audit recommendations and actions

Ref	Recommendation	Action
IEA1	The water quality goals listed in Table 7 of Condition 24 of Schedule 3 be reviewed and updated with appropriate Site Specific Trigger Values (SSTVs) based on long term ambient monitoring data that is now available. There is an opportunity to do this with the new planning consent anticipated for the Stage 5 project.	<p>The need for SSTV has been discussed with DPIE within the draft conditions for MOD 2. The conditions issued for MOD 2 continue to include the previous WQO objectives described in condition 24 of MOD 3 (refer to Table 4).</p> <p>It is proposed that, as suggested by the auditor, SSTVs will be determined by appropriately qualified consultants who complete the Water Management Plan based on ambient monitoring data.</p> <p>It is requested that these SSTV sit outside the consent and are instead included in the approved Water Management Plan as approved by the Secretary. This provides the ability for the criteria to be updated in response to changing site conditions and</p>

		<p>environments without requiring a modification to the consent.</p> <p>Dunmore Sand and Soil is still awaiting confirmation from the DPIE that such an arrangement is acceptable.</p> <p>In the interim, the Stage 5 Soil and Water Management Plan has been prepared and approved with site specific trigger values.</p>
IEA2	<p>Rehabilitation monitoring should be expanded to include measures which could be used to verify the achievement of the completion criteria. These could be incorporated into the next review of the management plans post approval of Stage 5.</p>	<p>Completion criteria of active rehabilitation areas was included in the updated Rehabilitation Management plan which was approved in July.</p>
IEA3	<p>Woody weeds such as lantana should be treated on an annual basis until effective control is achieved.</p>	<p>Weeding and maintenance of regeneration areas is continuing with the contracted bush regenerator.</p> <p>An inspection was undertaken to assess woody weeds throughout the active extraction area. A contractor was engaged to remove woody weeds</p> <p>The removal of the woody weeds will be incorporated into expanded works for the new contract with the bush regenerator.</p>
IEA4	<p>VENM inspection and verification systems should be upgraded and strengthen to include regular testing of foreign materials</p>	<p>The waste management plan was updated and the VENM Verification Procedure contact specific instruction and references for foreign materials. The plan was approved June 2021.</p>
IEA5	<p>Consideration should be given to upgrading the current Long Term Management Strategy (LTMS) to an Environmental Management Strategy (EMS)</p>	<p>The Long Term Management Strategy is currently under draft and consultation with the CCC and council.</p> <p>After the management plans associated with MOD 2 are approved, a separate EMS will be completed.</p>



4.14. Summary of Regulator Notifications

As part of the summary documentation and response to recommendation for the Independent Environmental Audit, the DPIE contacted Boral to request an action plan for the noted natural elevations of Water Quality Objectives noted in Schedule 3 Condition 24. Boral provided a reply under reference code DA195-8-2004-PA-11.

As per the recommendations in the 2020 IEA, Boral proposed that SSTVs will be updated as a part of the Stage 2-4 Water Management Plan for the site. This plan will be updated by appropriately qualified consultants, with SSTVs to be based on ambient monitoring data. Water quality data exists from 2006 and SSTVs will be determined using methods outlined in ANZECC 2000 Water Quality Guidelines

It is requested that these SSTV sit outside the consent and are instead included in the approved Water Management Plan as approved by the Secretary. This provides the ability for the criteria to be updated in response to changing site conditions and environments without requiring a modification to the consent. A record of this correspondence is provided below.

Boral is still awaiting reply from the DPIE to approve this methodology. In the meantime, the Stage 5 Soil and Water Management Plan was approved with site specific trigger values for dredge pond water quality and groundwater values. After approval from DPIE is provided using site specific trigger values, Boral will proceed with updating the Stage 2, 3 and 4 Soil Water Management Plan with endorsed and appropriately qualified consultants.



Build something great™



24 February 2021

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Dear Ms O'Reilly,

Dunmore Sand & Soil Pty Limited (DSS) is a wholly owned subsidiary of Boral Limited, operating a sand dredging operation in the Illawarra, south of Sydney. DSS operates under a State significant development (SSD) consent, DA 195-8-2004. In accordance with DA 195-8-2004, an Independent Environmental Audit (IEA) was prepared and submitted to DPIE on 27 November 2020. This audit report was subsequently approved by the Secretary on 17 December 2020.

Section 3.5.3 of the 2020 IEA recommended that DSS adopt site specific trigger values (SSTVs) rather than the values denoted from Table 5 in Schedule 3 Condition 24 of DA 195-8-2004.

As per the recommendations in the 2020 IEA, it is therefore proposed that SSTVs will be updated as a part of the Stage 2-4 Water Management Plan for the site. This plan will be updated by appropriately qualified consultants, with SSTVs to be based on ambient monitoring data. Water quality data exists from 2006 and SSTVs will be determined using methods outlined in ANZECC 2000 Water Quality Guidelines.

While the need for SSTVs was discussed with DPIE's assessment team during the preparation of the recently approved Modification 2 to DA 195-8-2004, the conditions issued for Modification 2 continue to include the previous water quality objectives described in Schedule 3 Condition 24 Table 5. Notwithstanding this, Condition 24 also states:

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:

To this end, it is proposed that SSTVs are included in the Stage 2-4 Water Management Plan (as approved by the Secretary), thereby providing the ability for the criteria to be updated in response to changing site conditions and environments without requiring a modification to the consent.

This approach has been adopted for groundwater quality in the most recently approved Water Management Plan and has been approved by the Secretary.



As requested in correspondence with DPIE (attached to this email), a status update will be provided in the upcoming annual review.

Should you have any questions on the above, please do not hesitate to contact me on 0401 895 478, or at ben.williams@boral.com.au.

Yours faithfully,

A handwritten signature in blue ink, appearing to be the name "Ben Williams".

Ben Williams
Environmental Coordinator
Dunmore Quarry and Dunmore Sand & Soil

5. Conclusion

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

Throughout this reporting period, extraction and processing of sand materials was below average compared to previous years, as production aligns with the remaining approved resource.

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 and 3 while the remaining resource is extracted.

The focus on the next 12 months will be continuing operational compliance and utilising remaining resource reserves. Dredging will cease in the Stage 3 pond during the next reporting period. Extraction will re-commence in the northern section of Stage 2 as per CAA 10CX123242 (10 ERM2010/1116).

Stage 5A salvage operations, construction and extraction is expected to begin late in the calendar year as detailed in the associated updated approved management plans.



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.

Stage 5A operations are anticipated to begin during the next 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 2 and 3;
- 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;
- Follow up with DPIE for approval for the use of site specific trigger values as per the independent auditor recommendations. When approval is provided, update the Stage 2, 3 and 4 Water Management Plan;
- Proceed with Stage 5 operations as per the associated management plans;
- Provide update of the construction and extraction phase of Stage 5 in the next Annual Review;
- Review and if necessary, update management plans as per S5.C4 post Annual Review and IEA.

Dunmore Lakes Sand Project Annual Review

1 July 2020 – 30 June 2021

7. Appendix A Meteorological Monitoring

The location of the onsite weather station is shown below.

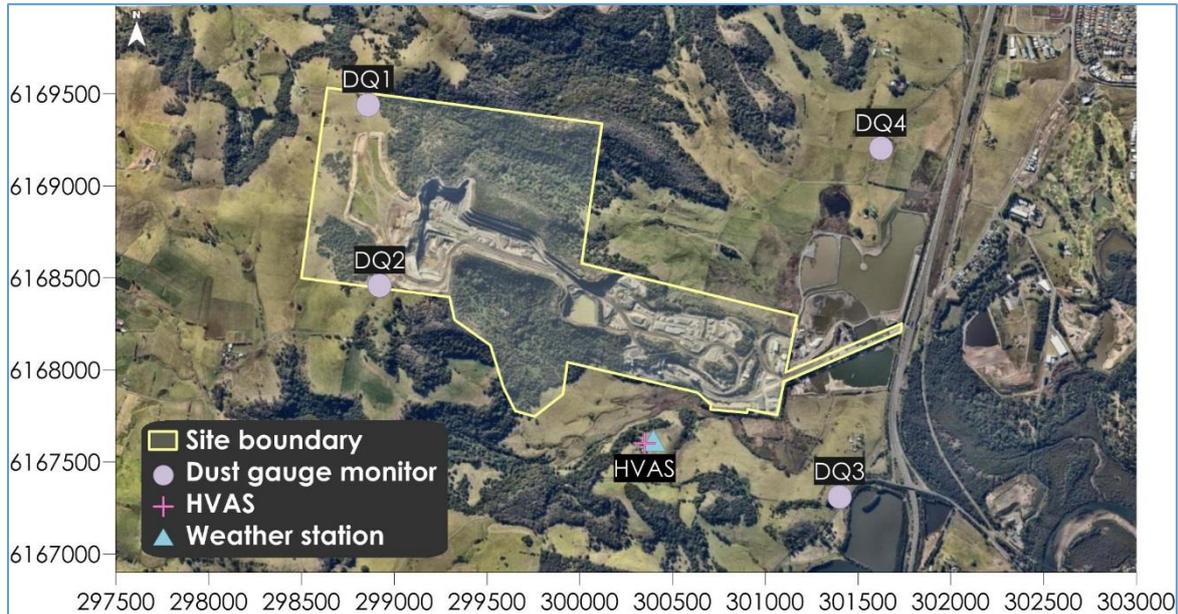


Figure 25 Weather Station Location

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.

Dunmore Lakes Sand Project Annual Review



1 July 2020 – 30 June 2021

Table 28 Dunmore Rainfall Summary

Rainfall (mm)				
Month	Current Period	Reporting	Site Average	Regional Average
July	264.2		63.3	49
August	187.1		71	53.5
September	11.3		47.7	42.7
October	114.4		72.5	64.5
November	83		89.9	83.1
December	83.8		84.3	67
January	189.3		85.4	72.9
February	88.4		144.7	140.5
March	278.5		140.9	122.3
April	5.9		84.3	73.8
May	206.1		72.2	55.8
June	44		114.7	93.7
Total	1556		1070.4	925.6

Table 29 Dunmore Historical Rainfall

Month	Rainfall (mm)																			Site Average	Regional Average
	FY03	FY04	FY05	FY06	FY07	FY08	FY09	FY10	FY11	FY12	FY13	FY14	FY15	FY16	FY17	FY18	FY19	FY20	FY21		
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	63.3	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	71.0	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	47.7	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	72.5	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	89.5	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	84.3	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	85.4	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	144.7	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	140.9	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	84.3	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	72.2	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	114.7	93.7
Total	1035.5	778.5	1247.8	724.1	1073.5	1064	745.5	872.5	1424.7	1379	1000.5	954.2	1462.2	1490	1253	627.1	889.5	760.5	1556	1070.4	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.



Dunmore Wind Data July 20

Data from Dunmore Weather Station

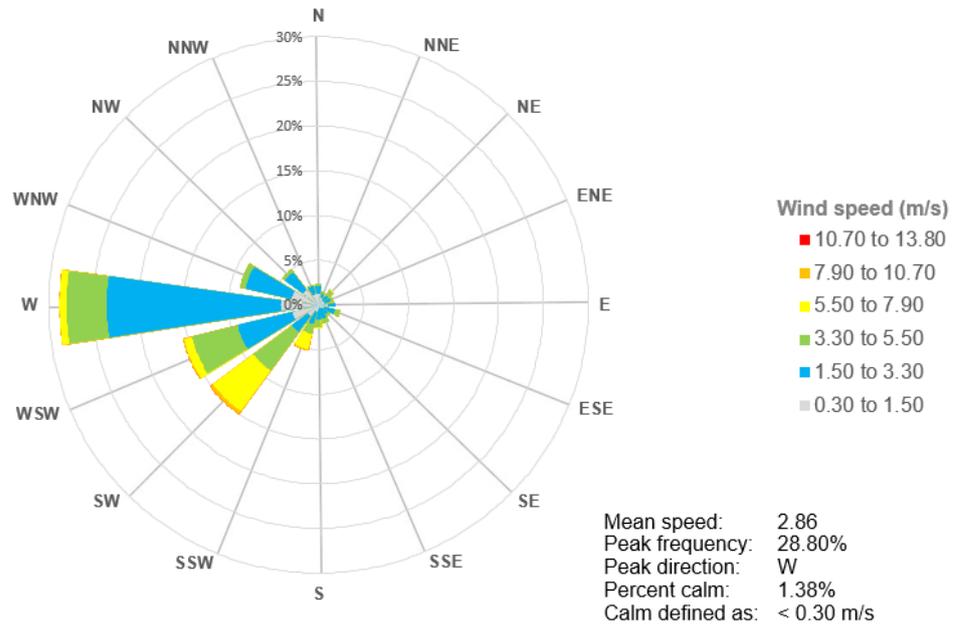


Figure 26 July 2020 Wind Rose

Dunmore Wind Data August 20

Data from Dunmore Weather Station

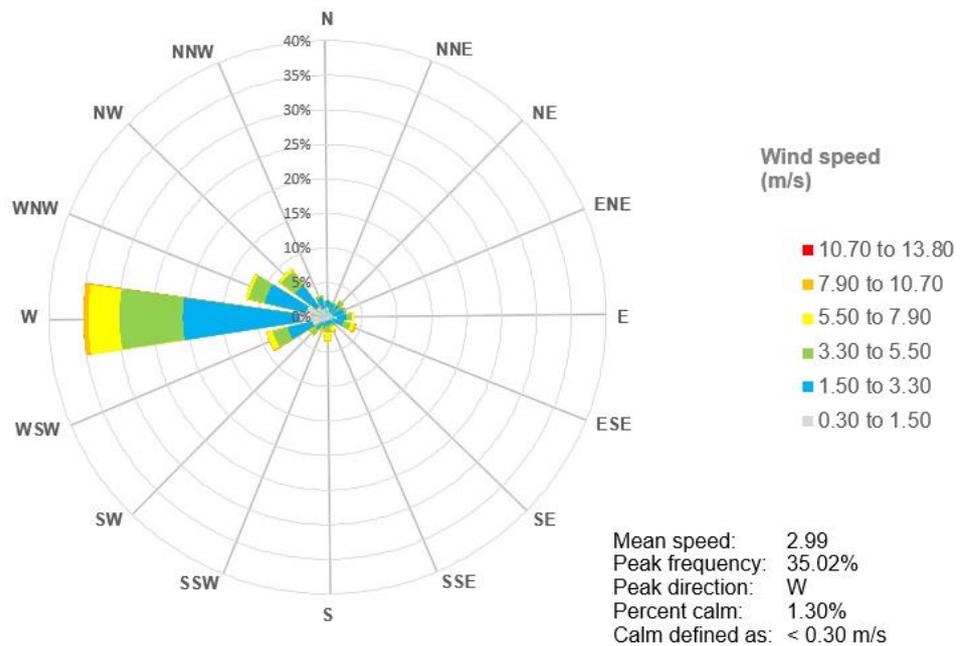


Figure 27 August 2020 Wind Rose

Dunmore Wind Data September 20

Data from Dunmore Weather Station

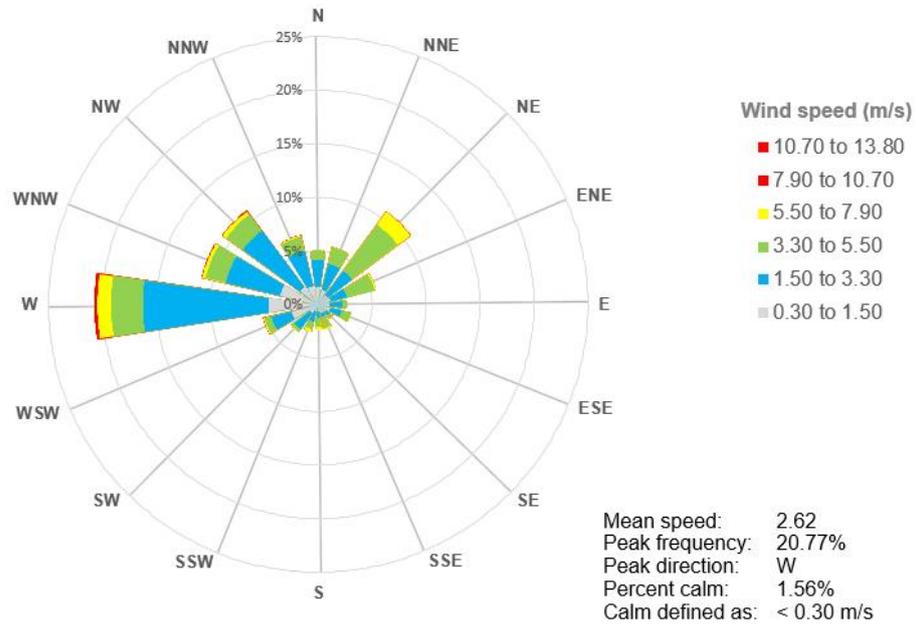


Figure 28 September 2020 Wind Rose

Dunmore Wind Data October 20

Data from Dunmore Weather Station

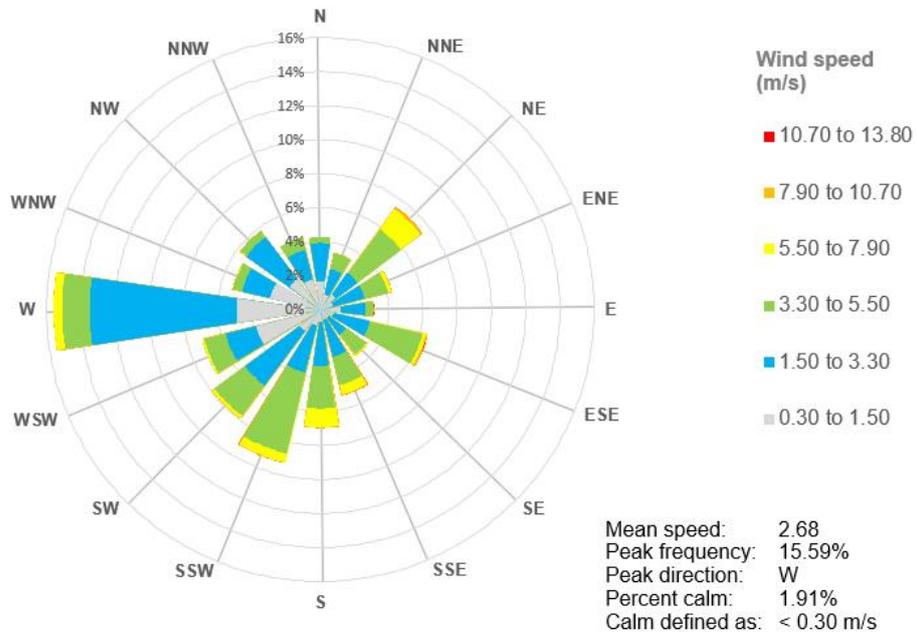


Figure 29 October 2020 Wind Rose



Dunmore Wind Data November 20

Data from Dunmore Weather Station

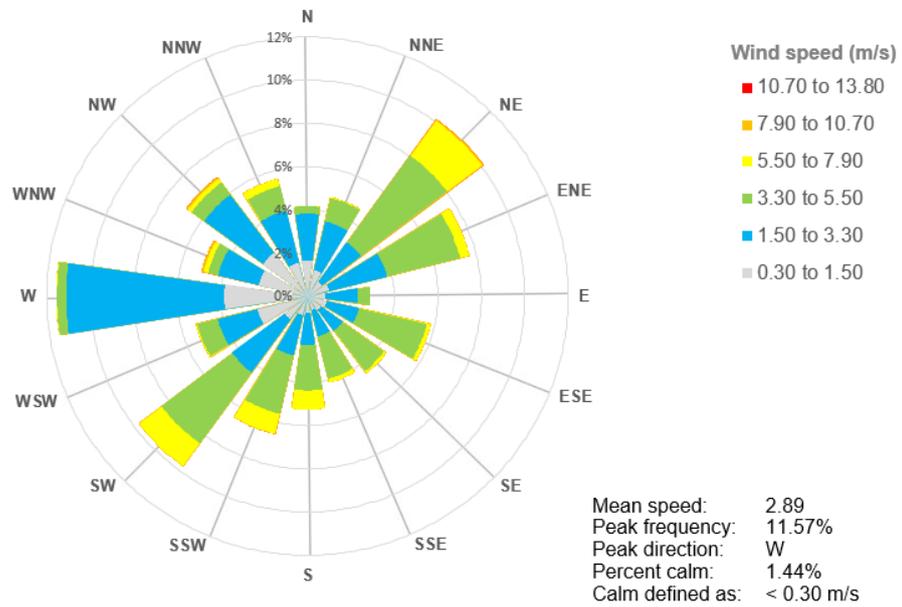


Figure 30 November 2020 Wind Rose

Dunmore Wind Data December 20

Data from Dunmore Weather Station

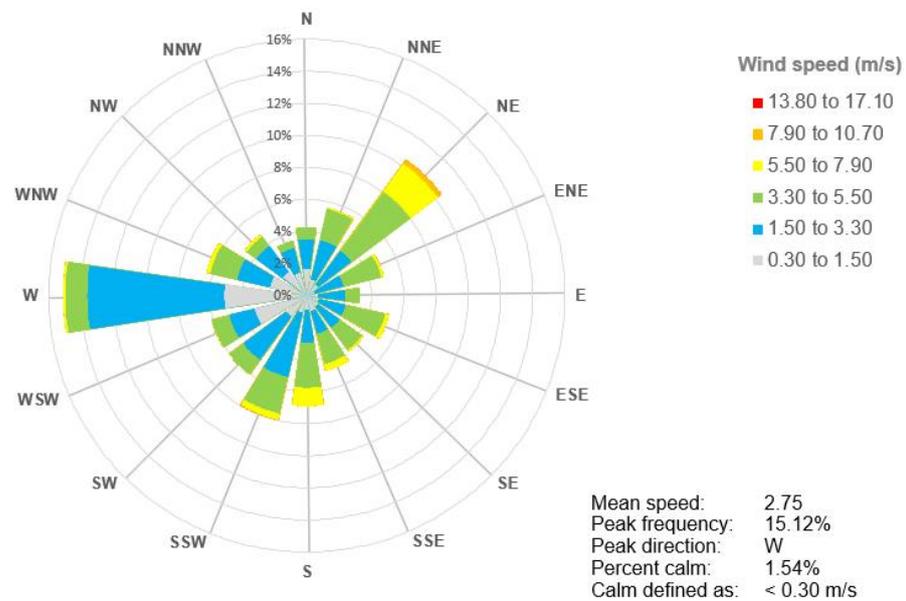


Figure 31 December 2020 Wind Rose



Dunmore Wind Data January 21

Data from Dunmore Weather Station

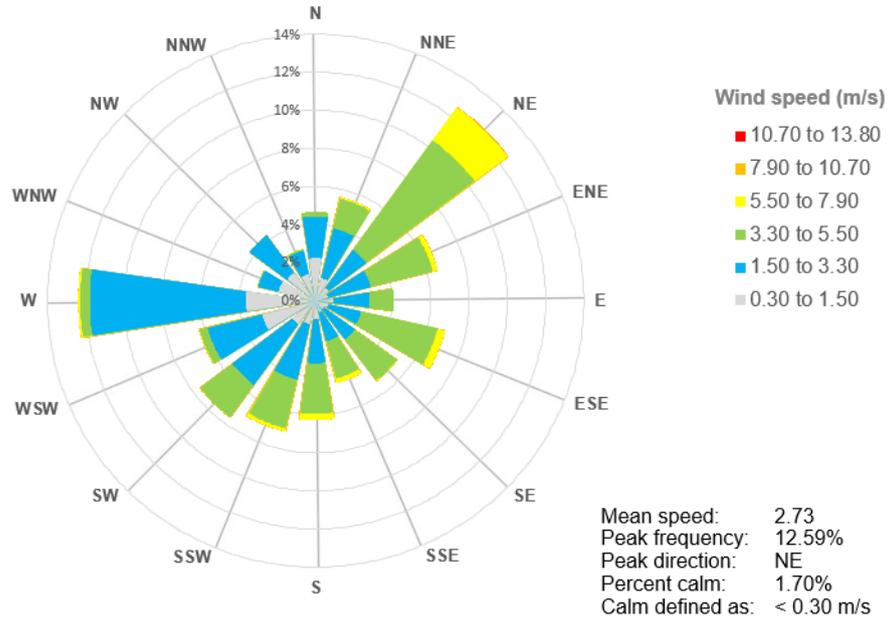


Figure 32 January 2021 Wind Rose

Dunmore Wind Data February 21

Data from Dunmore Weather Station

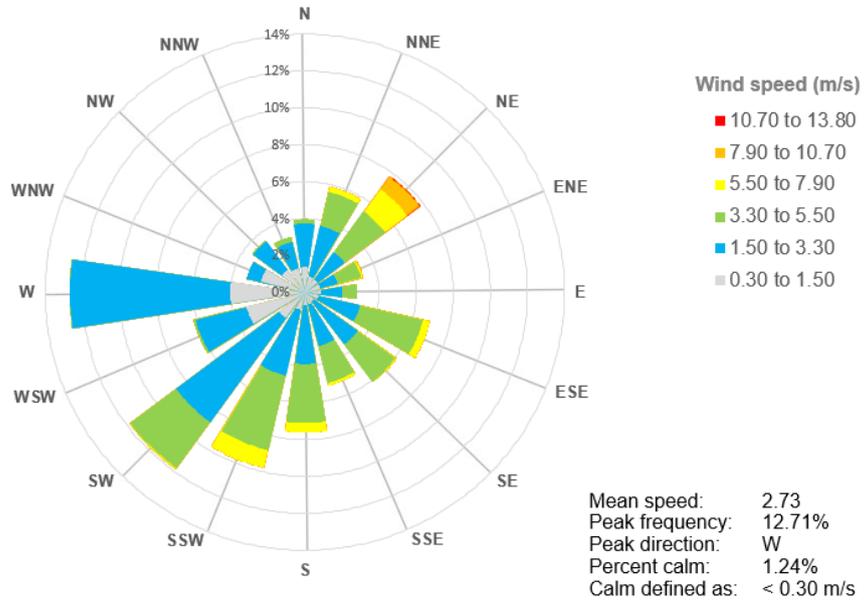


Figure 33 February 2021 Wind Rose



Dunmore Wind Data March 21

Data from Dunmore Weather Station

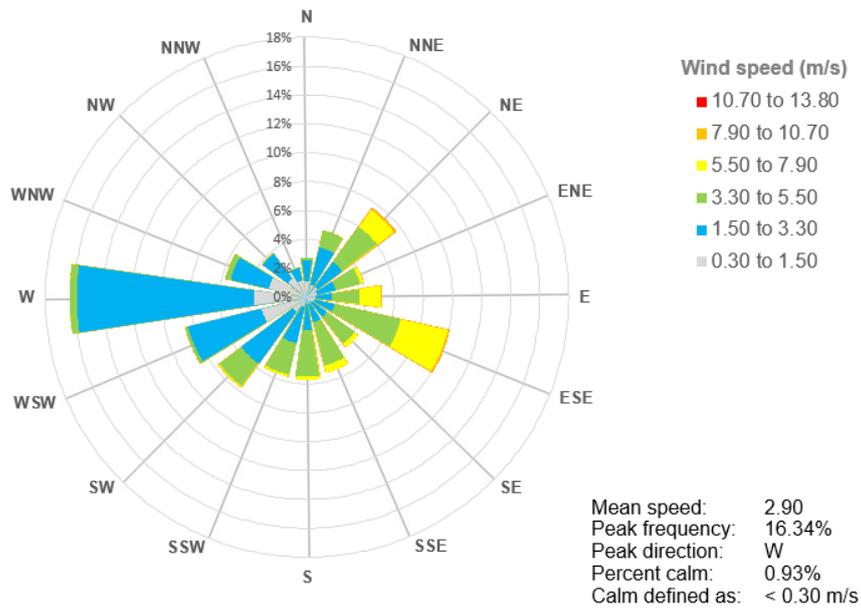


Figure 34 March 2021 Wind Rose

Dunmore Wind Data April 21

Data from Dunmore Weather Station

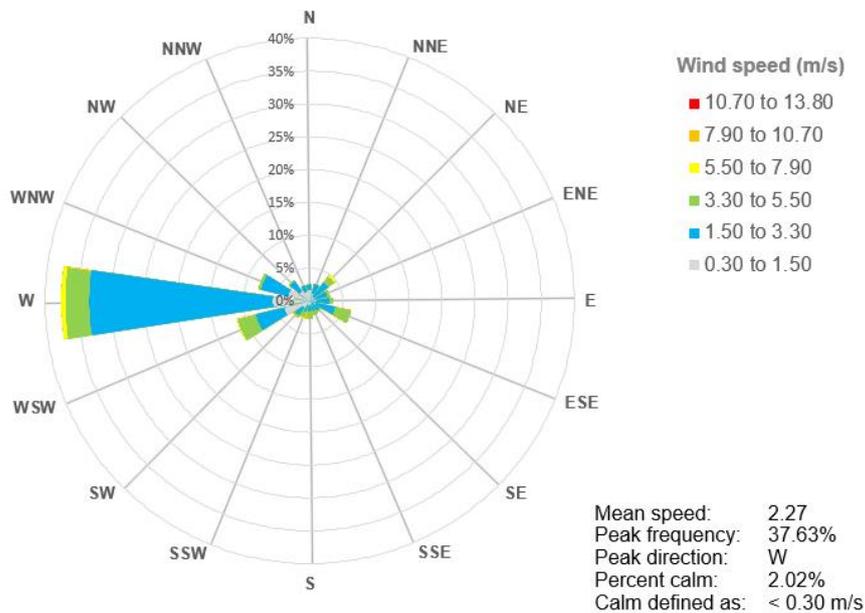


Figure 35 April 2021 Wind Rose



Dunmore Wind Data May 21

Data from Dunmore Weather Station

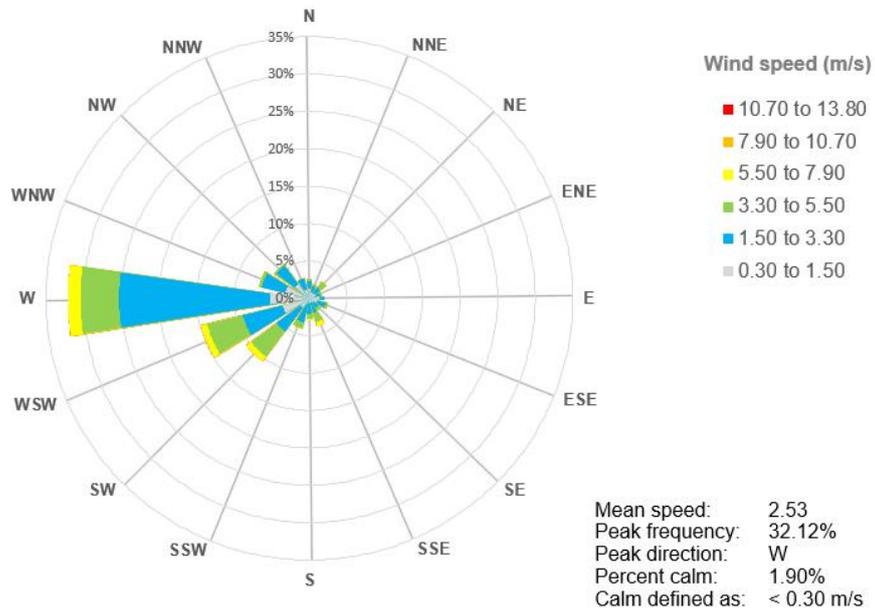


Figure 36 May 2021 Wind Rose

Dunmore Wind Data June 21

Data from Dunmore Weather Station

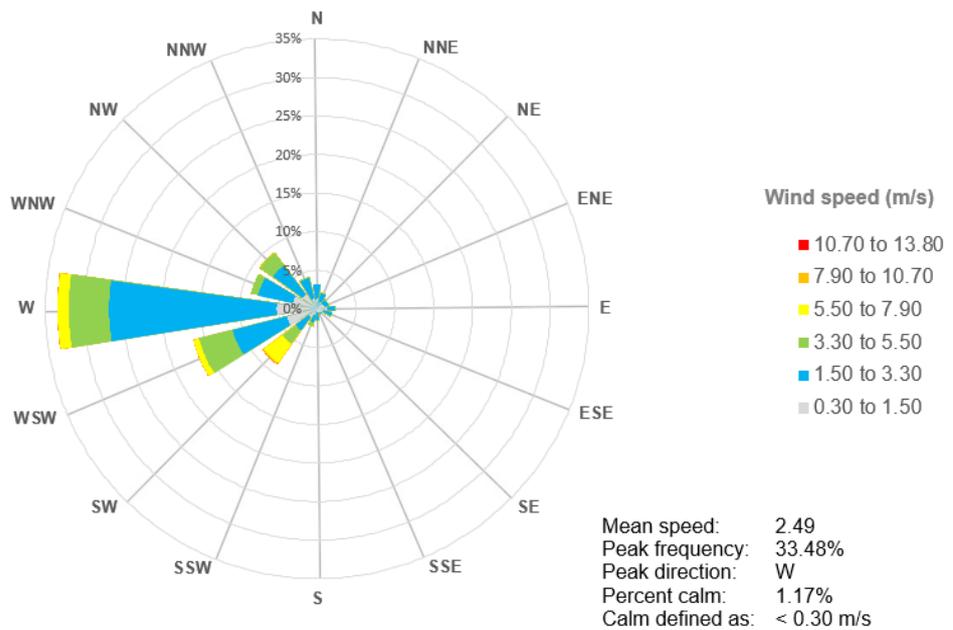


Figure 37 June 2021 Wind Rose



Figure 38 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/m ² /month		DD5 grams/m ² /month		DD6 grams/m ² /month		DD7b/10 grams/m ² /month		Deposited Dust Goal	Dominant Wind Direction	Direction of Strongest Winds	Production Tonnes
	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			
Jul-2020	4.89	4.28	2.67	0.78	2.28	1.61	1.69	1.03	4	W (28%)	SW	10,017
Aug-2020	1.19	0.80	5.47	4.54	1.21	0.76	1.63	1.36	4	W (35%)	W	735
Sep-2020	1.43	1.02	2.38	1.37	1.31	0.76	1.4	0.97	4	W (21%)	W	9,618
Oct-2020	2.51	1.30	2.17	1.39	2.13	1.13	0.93	0.58	4	W (16%)	ESE	9,705
Nov-2020	0.72	0.12	1.97	0.90	3.29	0.99	2.88	1.66	4	W (12%)	NE	7,284
Dec-2020	2.39	0.91	3.24	1.40	3.11	1.28	3.56	1.92	4	W (15%)	NE	7,402
Jan-2021	1.36	1.15	1.47	1.14	1.49	1.00	1.25	1.17	4	NE (13%)	NE	5,980
Feb-2021	0.96	0.87	0.76	0.67	0.96	0.88	0.85	0.72	4	W (13%)	NE	7,767
Mar-2021	1.62	0.79	2.54	1.43	2.00	1.30	2.79	1.7	4	W (16%)	ESE	7,739
Apr-2021	1.47	0.81	1.48	0.92	1.63	1.45	0.93	0.88	4	W (38%)	W	6,838
May-2021	2.62	0.48	2.66	0.75	2.29	0.75	2.36	0.7	4	W (32%)	W	6,941
Jun-2021	2.06	0.96	2.41	0.74	2.34	1.01	1.95	0.61	4	W (33%)	W	22,340
FY21 Average	1.94	1.12	2.44	1.34	2.00	1.08	1.85	1.11	4			102,366

A detailed breakdown of the particulate monitoring via the HVAS can be seen in Table 31 below. Cells shaded in grey depict the monitoring time periods that were affected by the Currowan bushfire.

Table 31 Detailed Summary of PM₁₀ Monitoring Data

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/m ³)	Comments
2/07/2020	14.5	50	30	17.77	
8/07/2020	9.86	50	30	17.86	
14/07/2020	9.21	50	30	17.85	
20/07/2020	8.5	50	30	17.77	
26/07/2020	9.63	50	30	17.93	
1/08/2020	33.57	50	30	18.34	
7/08/2020	6.77	50	30	18.39	
13/08/2020	9.8	50	30	18.36	
19/08/2020	12.12	50	30	18.35	

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Date	Sample Daily Average ($\mu\text{g}/\text{m}^3$)	Short Term Criteria 24-hr ($50\mu\text{g}/\text{m}^3$)	Long Term Criteria Annual ($30\mu\text{g}/\text{m}^3$)	Progressive Annual Average ($\mu\text{g}/\text{m}^3$)	Comments
25/08/2020	7.37	50	30	18.41	
31/08/2020	4.81	50	30	18.27	
6/09/2020	12.42	50	30	18.29	
12/09/2020	7.66	50	30	18.30	
18/09/2020	4.4	50	30	17.96	
24/09/2020	3.21	50	30	17.83	
30/09/2020	27.51	50	30	18.21	
6/10/2020	4.21	50	30	18.22	
12/10/2020	11.05	50	30	18.22	
18/10/2020	6.65	50	30	18.05	
24/10/2020	10.58	50	30	17.64	
30/10/2020	5.11	50	30	17.47	
5/11/2020	3.57	50	30	17.41	
11/11/2020	8.73	50	30	17.26	
17/11/2020	20.2	50	30	17.01	
23/11/2020	11.23	50	30	16.33	
29/11/2020	12.34	50	30	16.05	
5/12/2020	3.57	50	30	14.94	
11/12/2020	11.11	50	30	14.65	
17/12/2020	26.44	50	30	14.53	
23/12/2020	10.46	50	30	14.10	
29/12/2020	3.74	50	30	13.35	
4/01/2021	16.76	50	30	13.31	
10/01/2021	4.22	50	30	12.72	
16/01/2021	7.66	50	30	12.34	
22/01/2021	45.44	50	30	12.59	
28/01/2021	17.41	50	30	12.14	

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1 July 2020 – 30 June 2021

Date	Sample Daily Average ($\mu\text{g}/\text{m}^3$)	Short Term Criteria 24-hr ($50\mu\text{g}/\text{m}^3$)	Long Term Criteria Annual ($30\mu\text{g}/\text{m}^3$)	Progressive Annual Average ($\mu\text{g}/\text{m}^3$)	Comments
3/02/2021	6.83	50	30	11.97	
9/02/2021	9.45	50	30	11.81	
15/02/2021	9.15	50	30	11.74	
21/02/2021	9.27	50	30	11.54	
27/02/2021	13.73	50	30	11.44	
5/03/2021	10.16	50	30	11.43	
11/03/2021	9.57	50	30	11.40	
17/03/2021	6.71	50	30	11.17	
23/03/2021	3.09	50	30	11.09	
29/03/2021	4.22	50	30	11.01	
4/04/2021	7.25	50	30	11.08	
10/04/2021	8.08	50	30	10.83	
16/04/2021	10.16	50	30	10.81	
22/04/2021	6.95	50	30	10.72	
28/04/2021	8.5	50	30	10.71	
4/05/2021	2.91	50	30	10.47	
10/05/2021	1.07	50	30	10.28	
16/05/2021	0.83	50	30	10.06	
22/05/2021	1.66	50	30	9.89	
28/05/2021	0.83	50	30	9.76	
3/06/2021	4.28	50	30	9.66	
9/06/2021	2.32	50	30	9.58	
15/06/2021	3.03	50	30	9.50	
21/06/2021	4.04	50	30	9.43	
27/06/2021	1.13	50	30	9.21	



9. Appendix C Annual Noise Monitoring Compliance Report



10. Appendix D Annual Groundwater Monitoring report

11. Appendix E 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



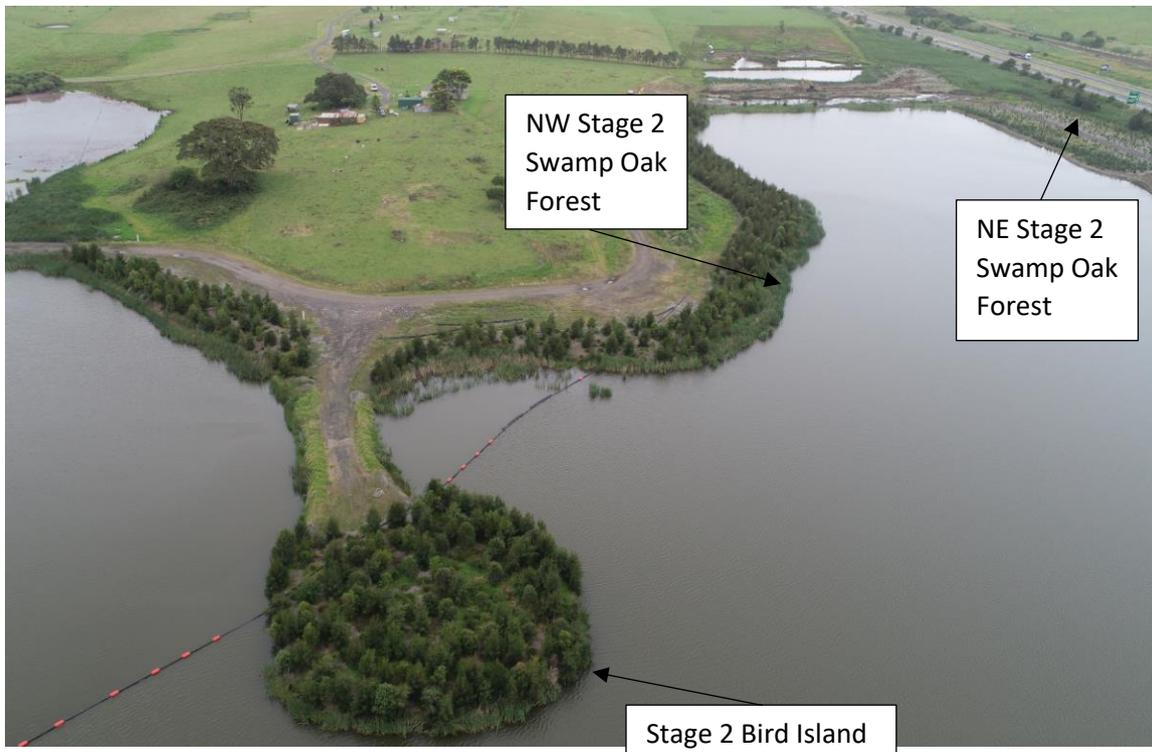
FY21 NW Stage 2 Swamp Oak Forest Rehabilitation Progress



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