

ANNUAL REVIEW
1 April 2023 – 31 March 2024
Northern Dune Extension

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SITE DETAILS

<u>Name of operation</u>	Northern Dune Extension
<u>Name of operator</u>	Holcim (Australia) Pty Ltd
<u>Development consent / project approval #</u>	MP 09 0091
<u>Name of holder of development consent / project approval</u>	Holcim (Australia) Pty Ltd
<u>Annual Review start date</u>	April 1, 2023
<u>Annual Review end date</u>	March 31, 2024
<p><u>I, Peter Radziewicz, certify that this audit report is a true and accurate record of the compliance status of Northern Dune Extension for the period of April 1, 2022 - March 31, 2023 and that I am authorised to make this statement on behalf of Holcim (Australia) Pty Ltd.</u></p> <p><u>Note.</u></p> <p>a) <u>The Annual Review is an 'environmental audit' for the purposes of Division 9.4) of the Environmental Planning and Assessment Act 1979. Division 9.42 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.</u></p> <p>b) <u>The Crimes Act 1900 contains other offences relating to false and misleading information: section 192G (Intention to defraud by false or misleading statement—maximum penalty 5 years imprisonment); sections 307A, 307B and 307C (False or misleading applications/information/documents—maximum penalty 2 years imprisonment or \$22,000, or both).</u></p>	
<u>Name of authorised reporting officer</u>	Peter Radziewicz
<u>Title of authorised reporting officer</u>	Quarry Manager
<u>Signature of authorised reporting officer</u>	
<u>Date</u> 22.07.2024	

1 STATEMENT OF COMPLIANCE

See **Table 1** for statement of commitments for the 2023/24 reporting period for Northern Dune Extension Quarry.

Table 1: Statement of Commitments

Were all conditions of the relevant approval(s) complied with?	
MP 09_0091	Yes
Hunter Water (Special Areas) Regulations 2010 – Approval under Clause 10(1)	Yes
EPL No. 11633	No

One non-compliance has been recorded during the reporting period related to timing of Groundwater monitoring. See **Section 7** for further information.

2 INTRODUCTION

Holcim (Australia) Pty Ltd (Holcim) operates Northern Dune Extension (NDE), a sand quarry located in Tanilba Bay, within the Port Stephens Local Government Area (LGA). The site operates under Project Approval (MP-09-0091) approved by the New South Wales (NSW) Department of Planning and Environment (DPE) on 8 March 2013.

This Annual Review (AR) has been prepared for the Tanilba Northern Dune Extension Project to report on mining activities undertaken during the past 12-month reporting period from 1st April 2023 to 31st of March 2024. This report addresses the site's present compliance obligations and status, activities undertaken at the site during the reporting period and proposed activities for the following 12-month period.

This AR encompasses the annual reporting requirements required by Project Approval MP 09_0091 issued by the Department of Planning and Environment on 8 March 2013 for the Tanilba Northern Dune Extension Project (attached as Appendix 1).

This AR will be distributed to the NSW Department of Climate Change, Energy, the Environment and Water (NSW DCCEEW) (superceded DPE in January 2024), Hunter Water Corporation (HWC) and Port Stephens Council (PSC) and will also be made publicly available on Holcim's website.

The site also operates in accordance with Environment Protection License (EPL) No. 11633 issued by the Environmental Protection Authority (EPA). A location figure and aerial view of the site are outlined in Figure 1 below.

Project Application MP 09_0091 was approved under Section 75J of the *Environmental Planning and Assessment Act 1979* for Sibelco Australia to conduct mining activities on Lots 11, 12 and 13 on DP601306, Lot 408 on DP1041934, and Lots 1 and 2 on DP408240. Project Approval MP 09_0091 has been attached as Appendix 1.

The Annual Review required by approval MP 09_0091 is detailed in Schedule 5, Condition 3 of the approval whereby it is stated:

"Within 12 months of the commencement of quarrying operations, and annually thereafter, the Proponent shall review the environmental performance of the project to the satisfaction of the Director-General. This review must:

- (a) describe the works (including rehabilitation) that were carried out in the previous year, and the works that are proposed to be carried out over current year;*
- (b) include a comprehensive review of the monitoring results and complaints records of the project over the past year, which includes a comparison of these results against:*
 - the relevant statutory requirements, limits or performance measures/criteria;*
 - the monitoring results of previous years; and*
 - the relevant predictions in the EA;*
- (c) identify any non-compliance over the last year, and describe what actions were (or are being) taken to ensure compliance;*
- (d) identify any trends in the monitoring data over the life of the project;*
- (e) identify any discrepancies between the predicted and actual impacts of the project, and analyse the potential cause of any significant discrepancies; and*
- (f) describe what measures will be implemented over the next year to improve the environmental performance of the project."*

Mining commenced within Lots 11 – 13 of the Extension area in 2016 and ceased on 18 December 2018. As such, **no clearing or extraction occurred during the reporting period.**

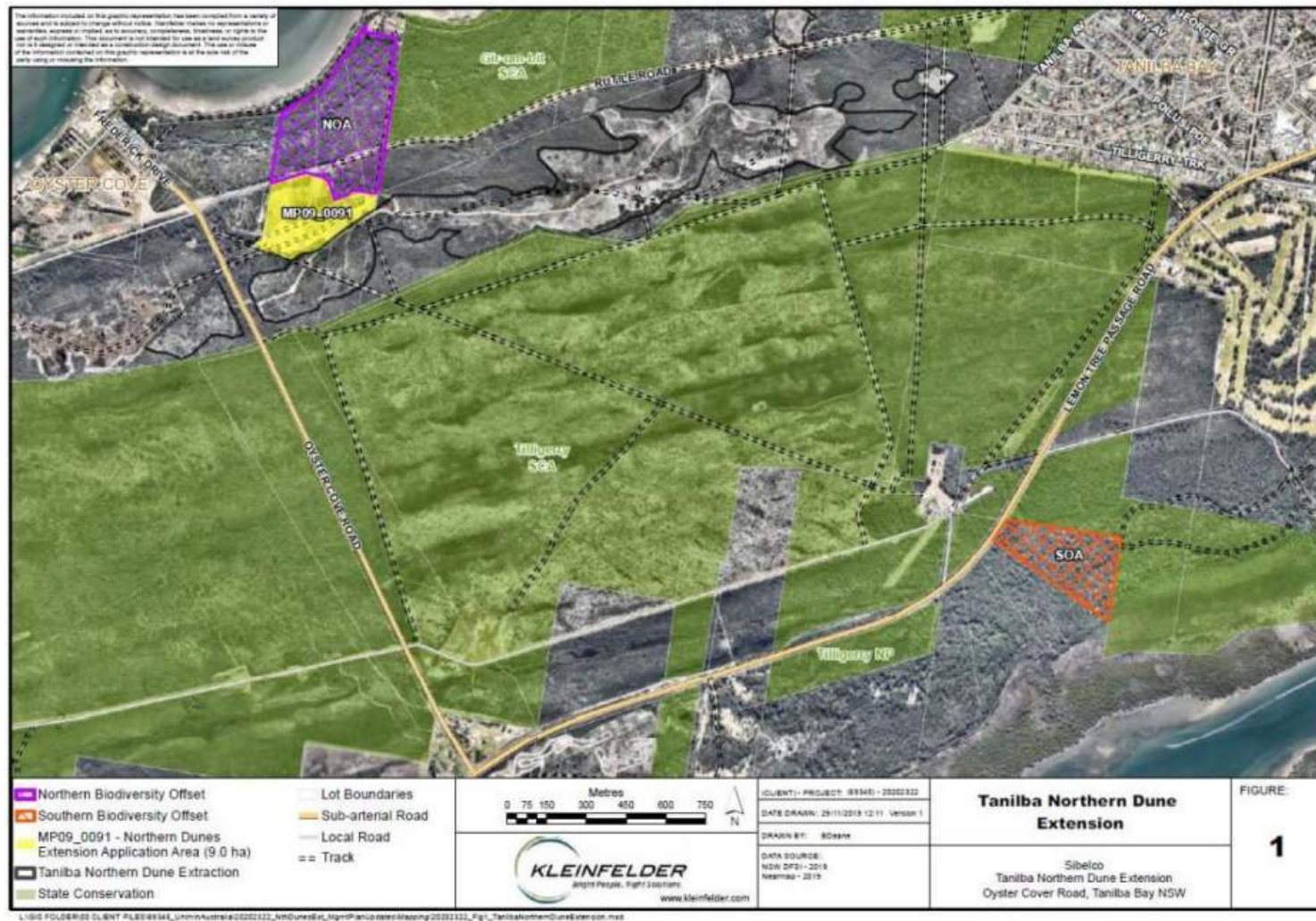


Figure 1: Northern Dune Extension Operations (Including Offset Areas)

In accordance with Schedule 5, Condition 4 of the modified Development Consent the operator (Holcim) is required to undertake an Annual Review of the site. This Annual Review has been prepared in accordance with Schedule 5, Condition 4 (Annual Performance Monitoring) of the Development Consent and in accordance with the *Annual Review Guideline: post approvals requirements for state significant mining developments* (October 2015). The Annual Review requirements and the section where they have been addressed in this document have been provided in **Table 2**.

Table 2: Annual Review Requirement

Condition	Section in Annual Review
<p>3. Annual Review</p> <p>Within 12 months of the commencement of quarrying operations, and annually thereafter, the Proponent shall review the environmental performance of the project to the satisfaction of the Director-General. This review must:</p> <p>(a) describe the works (including rehabilitation) that were carried out in the previous year, and the works that are proposed to be carried out over the current year;</p>	Section 4 and 6
<p>(b) include a comprehensive review of the monitoring results and complaints records of the project over the past year, which includes a comparison of these results against:</p> <ul style="list-style-type: none"> - the relevant statutory requirements, limits or performance measures/criteria; - the monitoring results of previous years; and - the relevant predictions in the EA; 	Section 6 and 7
<p>(c) identify any non-compliance over the last year, and describe what actions were (or are being) taken to ensure compliance;</p>	Section 1 and 11
<p>(d) identify any trends in the monitoring data over the life of the project;</p>	Section 6 and 7
<p>(e) identify any discrepancies between the predicted and actual impacts of the project, and analyse the potential cause of any significant discrepancies; and</p>	Section 6
<p>(f) describe what measures will be implemented over the next year to improve the environmental performance of the project.</p>	Section 12

2.1 Name and Contact Details

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2.2 Background Information and Mining History

The Tanilba Northern Dune is an elevated sand dune system located on the Tilligerry Peninsula adjacent to the township of Oyster Cove in the Port Stephens Shire, New South Wales.

White silica sand has been extracted from the Tanilba Northern Dune by several companies at different locations since 1991 - the approved extraction area in relation to the regional context can be seen in Figure 1.

Prior to 2003, the western parts of the Tanilba Northern Dune were mined by ACI Operations Ltd. Sibelco commenced operations in 2004. Sand extraction works at the Tanilba Northern Dune were comprised of four approval areas separated jurisdictionally by Crown Lands, Hunter Water (x2) and Department of Planning and Environment approvals.

In 2013 approval was granted by the then Minister for Planning and Infrastructure to extend the approval area for quarrying activities by 9 ha in an area to the north of the existing extraction operations. The extension project was a Major Project considered under Part 3A of the *Environmental Planning and Assessment Act 1979* (EP&A Act) and is known as the Tanilba Northern Dune Extension Project (now declared a State Significant Development under an Order dated 22 November 2018). Holcim took ownership of the Project on 1 April 2020.

The project area comprises land owned by the Crown, the Hunter Water Corporation and Holcim (the site) and consists of the following:

- Lots 11, 12, 13 DP601306 (Holcim);
- Lot 408 DP1041934 (Crown Land); and
- Lots 1, 2 DP408240 (Hunter Water Corporation).

The above areas are depicted in Figure 3.

In terms of the mining process, clearance was undertaken progressively across the site to minimise the area exposed at any one time. Topsoil was then stripped before sand was extracted for processing at the nearby Salt Ash processing plant. Sand was extracted in a rolling south to north sequence where possible, with previously mined areas no longer subject to extraction undergoing rehabilitation at the same time. Pre-clearance surveys for flora, fauna and the presence of culturally significant sites were undertaken prior to any clearing of vegetation.

Mined areas are required to be rehabilitated in accordance with an approved Landscape Management Plan (LMP) and areas cleared of vegetation are required to be offset by implementation of a Biodiversity Offset Strategy including management and improvement of vegetation retained in the north of the approval area. Once rehabilitation is complete, the rehabilitated areas will be returned to their respective owners. Extraction ceased in December 2018, with the project moving to a rehabilitation only phase.

A summary of operating parameters at the Tanilba Northern Dunes Extension during the reporting period (reportable per the January 2006 Annual Environmental Management Report guidelines) is provided below.

Table 3: Summary of operations

Parameter	Site detail
Operating hours	Daylight hours from 7:00am to 6:00pm (light permitting) Monday to Friday.
Infrastructure	No permanent infrastructure has been constructed on-site at the Northern Dune Extension as per approvals.
Construction activities	No construction took place at Northern Dune Extension during the reporting period.
Equipment management	No chemicals or mobile plant are stored overnight at Northern Dune Extension.
Waste management	No bins or other waste management facilities are kept on site - any waste produced is removed at the end of each working day.
Lighting	Northern Dune Extension does not operate outside of daylight hours and therefore does not have a lighting system installed.
Exploration	No exploration took place at the Northern Dune Extension during the reporting period.
Blasting	Blasting does not occur at the Northern Dune Extension Project site.
Land clearing	No land clearing occurred during the reporting period.
Extraction	Extraction ceased at the site on December 18, 2019. No extraction occurred during the reporting period.

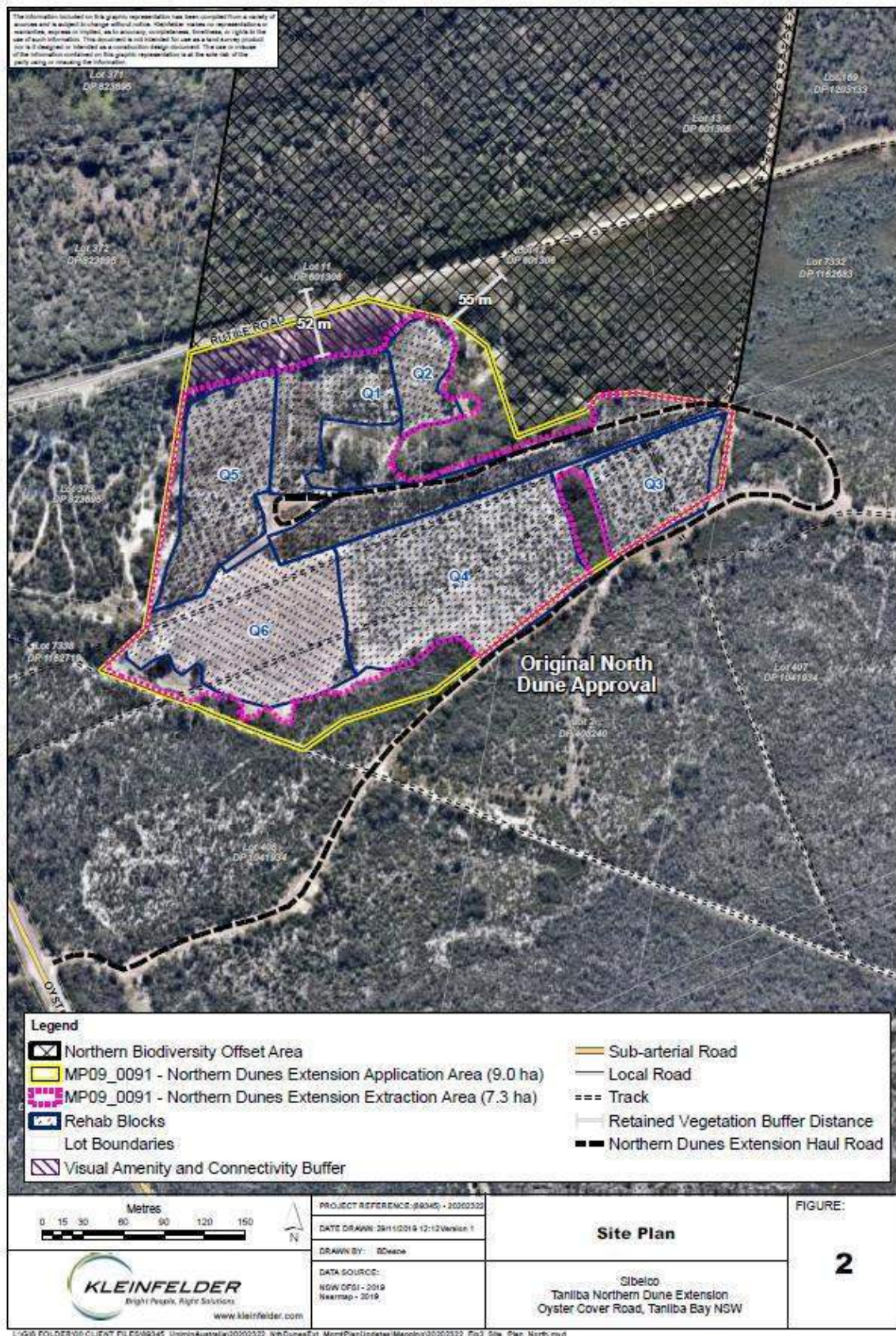


Figure 2: Northern Dune Extension Site Plan

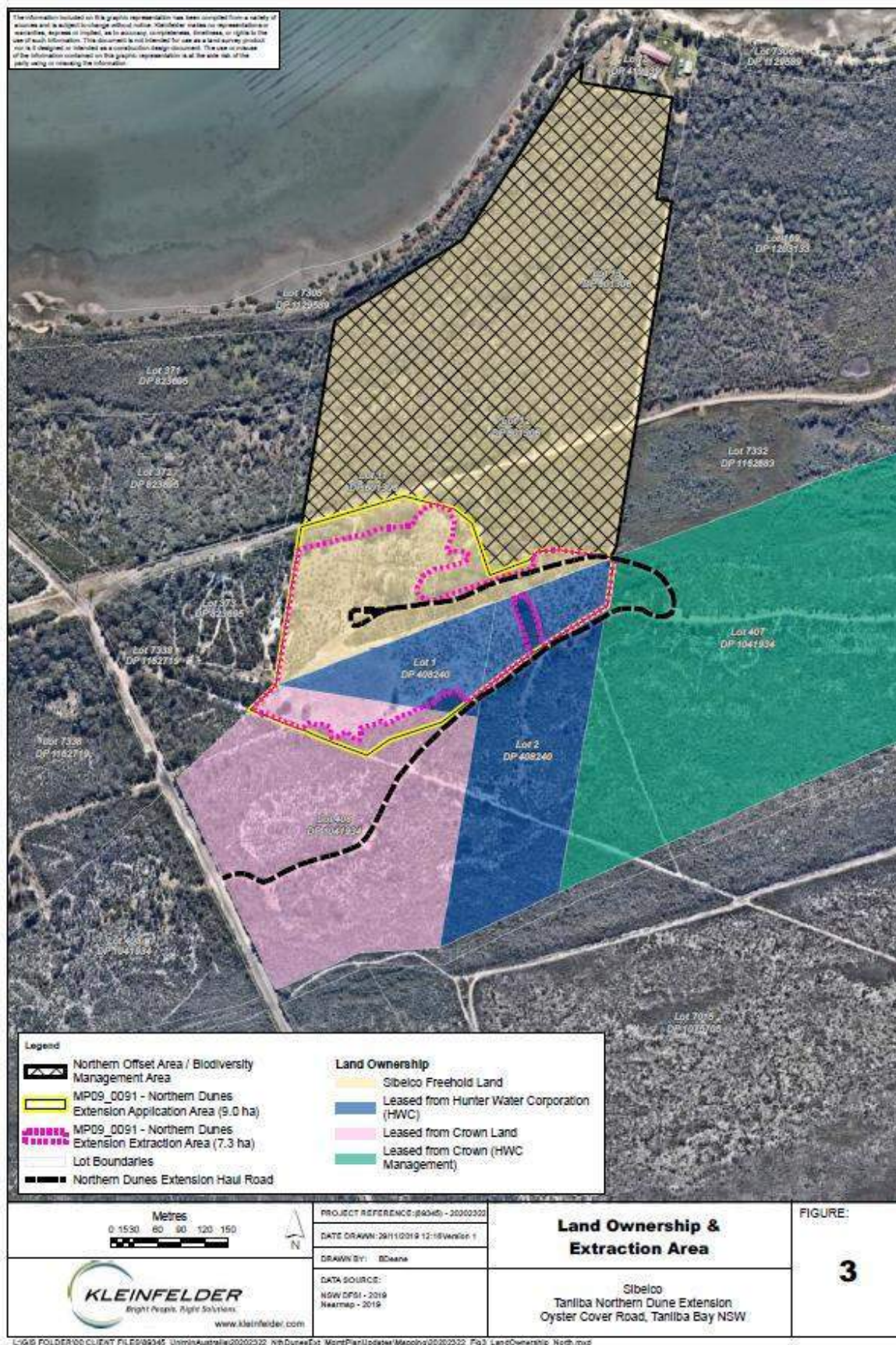


Figure 3: Northern Dune Extension Land Ownership and Extraction Area

3 APPROVALS

The site operates under the following approvals listed in **Table 4**, with the areas of land ownership displayed in **Figure 3**.

Table 4: Approvals for Northern Dune Extension

Approval	Regulatory Authority
MP 09_0091	NSW Department Planning, Housing and Infrastructure
EPL 11633	NSW Environmental Protection Authority
Hunter Water (Special Areas) Regulations 2010 – Approval under Clause 10(1)	Hunter Water Corporation

Holcim holds EPL 11633 which covers its activities at Northern Dune Extension. **Table 5** outlines the EPL licensing limits.

Table 5: EPL Fee-Based Activity at Northern Dune Extension

Scheduled Activity	Fee Based Activity	Scale
Extractive activities	Land-based extractive activity	>100,000 – 500,000 T extracted, processed, or stored

Schedule 2, Condition 6 outlines that the proponent shall not transport more than 150, 000 tonnes of extractive materials from the site in any calendar year.

4 OPERATIONS SUMMARY

4.1 Exploration

No exploration activities were completed during the Annual Review period.

4.2 Land Preparation

No clearing took place during the Annual Review period. All areas of the site were undergoing rehabilitation and predominantly covered by vegetation.

4.3 Construction Activities

There was no construction undertaken during the Annual Review period.

4.4 Quarry Operations

No extraction occurred during the reporting period. Only rehabilitation activities were performed and are discussed in Section 8. No extractive material was transported from site.

4.5 Next Reporting Period

Extraction at the Northern Dune Extension site has ceased. Only rehabilitation activities are proposed during the next reporting period. These are discussed further in Section 8.5. Groundwater monitoring will also be performed as per the Groundwater Management Plan (GMP).

5 ACTIONS REQUIRED FROM PREVIOUS ANNUAL REVIEW

5.1 Actions from 2022/23 Annual Review

No formal feedback from the submission of the 2022/2023 Annual Review was provided by NSW DPHI / NSW Department of Climate Change, Energy, the Environment and Water (NSW DCCEEW) during the 2023/2024 reporting period. Monitoring, complaint management and active site management was undertaken as outlined in Table 6 and in the following Sections of this AEMR.

Table 6: Summary of actions required from 2022/2023 AEMR

Item	Requirement		2023-2024 program	Due Date	Comment / Section in AEMR
OPERATIONS/ADMINISTRATION					
1		Site condition	Inspection of site for identification of maintenance requirements including condition of roadside drainage and rehabilitated areas.	Monthly	Appendix 2
2	S5, CI 3	Annual Review	Prepare and submit AR to DPE on activities undertaken in the 2023-2024 reporting period.	30 June 2024	This AEMR
3	S5 CI 2	Performance review	Monitoring requirements will be reviewed to ensure all future monitoring and reporting following closure is relevant to the activities being performed. The review will be performed in consultation with DPI-Water and HWC.	Following submission of AR.	Section 5.2
GROUNDWATER					
4		Groundwater Level Monitoring	Monitor bores as per approved GMP.	Monthly (weekly for 4 weeks if >100 mm rain per 7 days)	Section 7
5		Groundwater quality Monitoring	Third Party contractor to monitor bores as per approved GMP.	As per GMP.	Section 7
6		GMP Review	The GMP will be reviewed to ensure the monitoring and reporting is relevant to the activities being performed. The review will be performed in consultation with DPI-Water and HWC.	Following submission of AR.	Section 5.2
7		Reporting	The results of the groundwater level and quality monitoring will be reported as per the GMP. Reporting frequency will be determined during the review of the GMP following consultation with DPI-Water and HWC.	Frequency determined following GMP review and consultation with DPI-Water and HWC.	Section 7

Item	Requirement		2023-2024 program	Due Date	
S5, CI 17 - FORMER EXTRACTION AREA (LMP)					
8			Supplementary planting as required following the inspections and biannual monitoring.	As required	Section 8.4
9	LMP 4.3.9	Weed management	Site wide weed control	As required	Section 6.5.4.2 and Section 8.5
10		Maintenance	Follow up inspections to identify and manage regrowth across all rehabilitated areas.	As required	Section 8.2
11	LMP 4.3.6	Performance monitoring	Implement recommendations in Annual Vegetation Rehabilitation Monitoring Report (Kleinfelder 2021).	As required	Section 8.1
12			Monitoring of rehabilitated areas to assess performance against the requirements of the BMP.	Biannual	Section 8.2
13			Prepare report to summarise results of rehabilitation program, identify trends and any management measures required to achieve objectives of rehabilitation program.	April 2024	Section 8
14	S5 CI 2	LMP Review	The LMP will be reviewed to ensure the monitoring and reporting is relevant to the activities being performed. The review will be performed in consultation with DPI-Water and HWC.	Following submission of AR.	Section 5.2
S3, CI15 - OFFSET AREAS (BMP)					
16	BMP 5.1.4	Fauna survey program	Targeted monitoring across all offset areas for Wallum Froglet to detect changes in recruitment success and assess impacts.	In accordance with seasonal survey requirements.	Section 6.5.2
17	BMP 5.1.4, 5.2		Targeted monitoring across all offset areas for <i>Uperoleia sp</i> to identify habitat preferences of spp.	In accordance with seasonal survey requirements.	Section 6.5.2
18	BMP 5.2		Monitoring to determine if Koala is utilising areas determined as Preferred Koala Habitat (Swamp Mahogany – Paperbark Swamp Forest) and Supplementary Habitat (Coastal Sand Apple – Blackbutt Forest) within the offset areas.		Section 6.5.3

	5.1.5 of BMP	Vegetation management and monitoring program	Habitat restoration and rehabilitation program for proposed offset area in Lots 11, 12 and 13:		Section 6.5.4
Item	Requirement		2023-2024 program	Due Date	
22	BMP 5.1.7		The rehabilitation program within the offsets will also aim to expand and enhance the availability of habitat for the Koala through the use of <i>Eucalyptus robusta</i> (Swamp Mahogany); which is a preferred Koala feed tree.	During rehab program.	Section 6.5
23	BMP 5.2		Monitoring of the offset area to ensure vegetation and habitat qualities are being maintained.		Section 6.5
24	S5 CI 2	BMP Review	The BMP will be reviewed to ensure the monitoring and reporting is relevant to the activities being performed. The review will be performed in consultation with DPI-Water and HWC.	Following submission of AR.	Section 5.2
COMMUNITY					
25	S5, CI9	Information Access	Upload the Annual Review for 2022-2023 to the company website when approved.	N/A	Completed
26		Complaints Register	Maintain and update.	Quarterly	Section 9.2

5.2 Management Plan Updates

Schedule 5 Clause 4 of the project approval requires that management plans are reviewed and, if necessary, revised within 3 months of the submission of an Annual Review. No revisions to any of the management plans were deemed necessary following the submission of the previous 2022/23 AEMR.

6 ENVIRONMENTAL PERFORMANCE

6.1 Summary of Environmental Performance

A summary of the conditions of the approval MP 09_0091 and sections within this AR where each condition is addressed is provided in **Table 7** below.

Table 7: Summary of Conditions

MP 09_0091 Reference	Summary of Condition	Report Reference	Compliance
ADMINISTRATIVE CONDITIONS			
S2, CI6	<i>The Proponent shall not transport more than 150,000 tonnes of extractive materials from the site in any calendar year</i>	4.4	Y
S2, CI7	<i>The Proponent shall ensure that no more than three hectares of the site would be exposed (ie cleared but not re-vegetated) at any one time</i>	4.2	Y
ENVIRONMENTAL PERFORMANCE CONDITIONS			
Identification of Boundaries			
S3, CI1	<i>Prior to the commencement of quarrying operations, the Proponent shall:</i> (a) <i>Engage a registered surveyor to mark out the boundaries of the approved limits of extraction; and</i> (b) <i>Ensure that these boundaries are clearly marked at all times in a permanent manner that allows operating staff and inspecting officers to clearly identify those limits</i>	4.4	Y
Noise			
S3, CI2	<i>The Proponent shall ensure that the operational noise generated by the project does not exceed the noise impact assessment criteria in Table 1 at any residence on privately-owned land</i>	4.4	Y
S3, C3	<i>The Proponent shall only conduct quarrying operations on the site ... during stipulated hours</i>	4.4	Y
Noise Monitoring Program			
S3, CI5	<i>The proponent shall prepare and implement a Noise Monitoring Program for the project to the satisfaction of the DG. This program must (amongst other items):</i> <i>Include quarterly noise monitoring during at least the first two years of operations</i>	6.2	Y
Air quality			
S3, CI6	<i>The Proponent shall ensure that all reasonable and feasible avoidance and mitigation measures are employed so that particulate matter emissions generated by the project do not exceed the criteria listed in Tables 2 to 4 at any privately-owned land</i>	6.3.2	Y
S3, CI7	<i>The Proponent shall regularly assess air quality monitoring data</i>	6.3.2	Y
S3, CI8	<i>The Proponent shall prepare and implement a Dust Monitoring Program</i>	6.3.2	Y
Soil and Water – Management and monitoring			
S3, CI10	<i>The Proponent shall not extract sand or other extractive materials or carry out any work in the extraction area below a level of 0.7 m above the predicted maximum groundwater elevation (see condition 14 of schedule 3), other than the construction of any bores approved by NOW</i>	4.4	Y
S3, CI11	<i>The Proponent shall ensure that the final landform of the extraction area must be at least 1 metre above the predicted maximum groundwater elevation</i>	4.2	Y
S3, C13	<i>Erosion and sediment control plan</i>	5.2	Y
S3, CI14	<i>The Ground Water Monitoring Program shall include</i> (a) <i>Detailed baseline data on groundwater levels and quality</i> (b) <i>Groundwater impact assessment criteria</i> (c) <i>A program to monitor groundwater levels and quality</i>	7.1	Y Y Y Y

MP 09_0091 Reference	Summary of Condition	Report Reference	Compliance
	<p>(d) A protocol for the investigation, notification and mitigation of any notified exceedance of the impact assessment criteria;</p> <p>(e) The outcome of groundwater modelling to establish the predicted maximum groundwater elevation for the site</p> <p>(f) a program to monitor any impacts on GDE</p> <p>(g) a contingency plan to manage any acid sulfate soils and potentially acid sulfate soils encountered during quarrying operations</p>		<p>Y</p> <p>N/A</p> <p>Y</p>
MP 09_0091 Reference	Summary of Condition	Report Reference	Compliance
Biodiversity			
S3, CI15	<p>The Biodiversity Management Plan must</p> <p>(c) Address project site and offset areas</p> <p>(d) provide for retention of hollow bearing trees</p> <p>(e) on-going monitoring (at least 6 years) of at least 2 nest boxes for each hollow tree removed during clearing</p> <p>(f) a program to undertake targeted survey for Uperoleia sp</p> <p>(g) implement a program for any areas within offset areas requiring rehabilitation and/or revegetation</p> <p>(i) include monitoring procedures and performance indicators with reference to Uperoleia sp., Koala and Wallum Froglet</p>	6.5	Y
S3, CI16	<p>By 31 December 2013, or otherwise agreed by the Director-General, the Proponent shall:</p> <p>(a) enter into a Biobanking agreement in respect of the proposed offset areas (see Appendix 4) with the Minister for the Environment, in accordance with Part 7A of the Threatened Species Conservation Act 1995, to implement the Biodiversity Offset Strategy; or</p> <p>(b) enter into an agreement with OEH to transfer the offset areas into the national parks estate, to the satisfaction of the Director-General</p>	N/A	Y
Rehabilitation and landscaping			
S3, CI18	The Proponent shall prepare and implement a Landscape Management Plan to the satisfaction of the DG. This shall include a Rehabilitation Management Plan and a Long Term Management Strategy.	8	Y
Aboriginal Cultural Heritage			
S3, CI22	The Proponent shall prepare and implement an Aboriginal Cultural Heritage Management Plan to the satisfaction of the DG	6.6.2	Y
Visual amenity			
S3, CI27	The Proponent shall minimize the visual impacts of the project to the satisfaction of the DG	8	Y
Waste Management			
S3, CI28-31	The Proponent shall comply with conditions of waste management as outlined in the approval]	6.7.1	Y
Dangerous Goods			
S3, CI32	The Proponent shall ensure that chemicals and/or petroleum products are not stored on site	6.7.1	Y
Production Data			
S3, CI34	<p>The Proponent shall</p> <p>(a) provide annual quarry production data to DRE using the standard form for that purpose and</p> <p>(b) include a copy of this data in the Annual Review</p>	4.4	Y
ENVIRONMENTAL MANAGEMENT, REPORTING AND AUDITING			
Annual Review			
S5, CI3	Within 12 months of the commencement of quarrying operations, and annually thereafter, the Proponent shall review the environmental performance of the project to the satisfaction of the Director-General.	This Report and 5.2	Y
Reporting			
S5, CI 5	The Proponent shall notify the DG ... of any incident associated with the project	11	Y
Auditing			

MP 09_0091 Reference	Summary of Condition	Report Reference	Compliance
S5, CI 7	<i>Within 1 month of completion of quarrying operations ... the Proponent shall commission an Independent Environmental Audit to ... assess the environmental performance of the project and whether it is complying with the relevant requirements in this approval and any relevant EPL.</i>	10	Y
Access to Information			
S5, CI 9	<i>From 1 July 2013, the Proponent shall make the following information publicly available on its website:</i> <ul style="list-style-type: none"> • <i>A copy of all approved strategies, plans and programs</i> • <i>A summary of all monitoring results of the project</i> • <i>A complaints register that is updated on a quarterly basis</i> • <i>Copies of any Annual Review</i> • <i>Copies of any Independent Environmental Audit and the Proponents response to the recommendation in any audit</i> 	9.1	Y

6.2 Noise

6.2.1 Key Environmental Performance

The approved Noise Management Plan states that as quarrying operations have been performed for greater than 2 years and the project is currently in the rehabilitation and closure phase, noise monitoring will only be conducted upon the receipt of a verified noise complaint from a local resident. No noise complaints were received during the reporting period.

6.3 Air Quality

6.3.1 Approved Criteria

Air Quality monitoring is required to be undertaken in accordance with the following development consent conditions:

"The Proponent shall ensure that all reasonable and feasible avoidance and mitigation measures are employed so that particulate matter emissions generated by the project do not exceed the criteria listed in Tables 2 to 4 at any privately-owned land."

Table 8: Long term criteria for particulate matter

Pollutant	Averaging Period	^d Criterion
Total suspended particulate (TSP) matter	Annual	^a 90 µg/m ³
Particulate matter < 10 µm (PM ₁₀)	Annual	^a 30 µg/m ³

Table 9: Short term criterion for particulate matter

Pollutant	Averaging Period	^d Criterion
Particulate matter < 10 µm (PM ₁₀)	24 hour	^a 50 µg/m ³

Table 10: Long term criteria for deposited dust

Pollutant	Averaging Period	Maximum increase in deposited dust level	Maximum total deposited dust level
^c Deposited dust	Annual	^b 2 g/m ² /month	^a 4 g/m ² /month

Notes to Tables above:

- ^a Total impact (i.e. incremental increase in concentrations due to the projects plus background concentrations due to all other sources);
- ^b Incremental impact (i.e. incremental increase in concentrations due to the projects on their own);
- ^c Deposited dust is to be assessed as insoluble solids as defined by Standards Australia, AS/NZS 3580.10.1:2003: Methods for Sampling and Analysis of Ambient Air - Determination of Particulate Matter - Deposited Matter - Gravimetric Method.
- ^d Excludes extraordinary events such as bushfires, prescribed burning, dust storms, sea fog, fire incidents, illegal activities or any other activity agreed by the Director-General in consultation with DECCW.

6.3.2 Management Measures

Air quality monitoring for the site is undertaken consistent with the Dust Management Plan, available as Appendix J of the Northern Dune Environmental Management Plan.

Depositional dust monitoring is undertaken at four locations, known as D3 / TB4, D4 / TB2, D5 / TB3 and D6 / TB1 (see **Figure 4**). Monitoring locations D3 / TB4 and D5 / TB3 are located adjacent to the closest sensitive receiver to extraction activities undertaken by Holcim within the Northern Dunes Extension area and represent compliance monitoring sites.

Monitoring locations D4 / TB2 and D6 / TB1 are located immediately adjacent to extraction activities where deposited dust is most likely to be related to Holcim's activities. These sites enable evaluation of compliance stations D3 / TB4 and D5 / TB3 with data from comparison stations D4 / TB2 and D6 / TB1 to infer whether the high dust levels are likely related to the Northern Dune Extension activities or may have been associated with external land use activities.

Depositional dust was monitored monthly over the AR reporting period and analysis conducted by NATA Accredited laboratory Services for insoluble solids in accordance with AS 3580.10-1 - 2003.

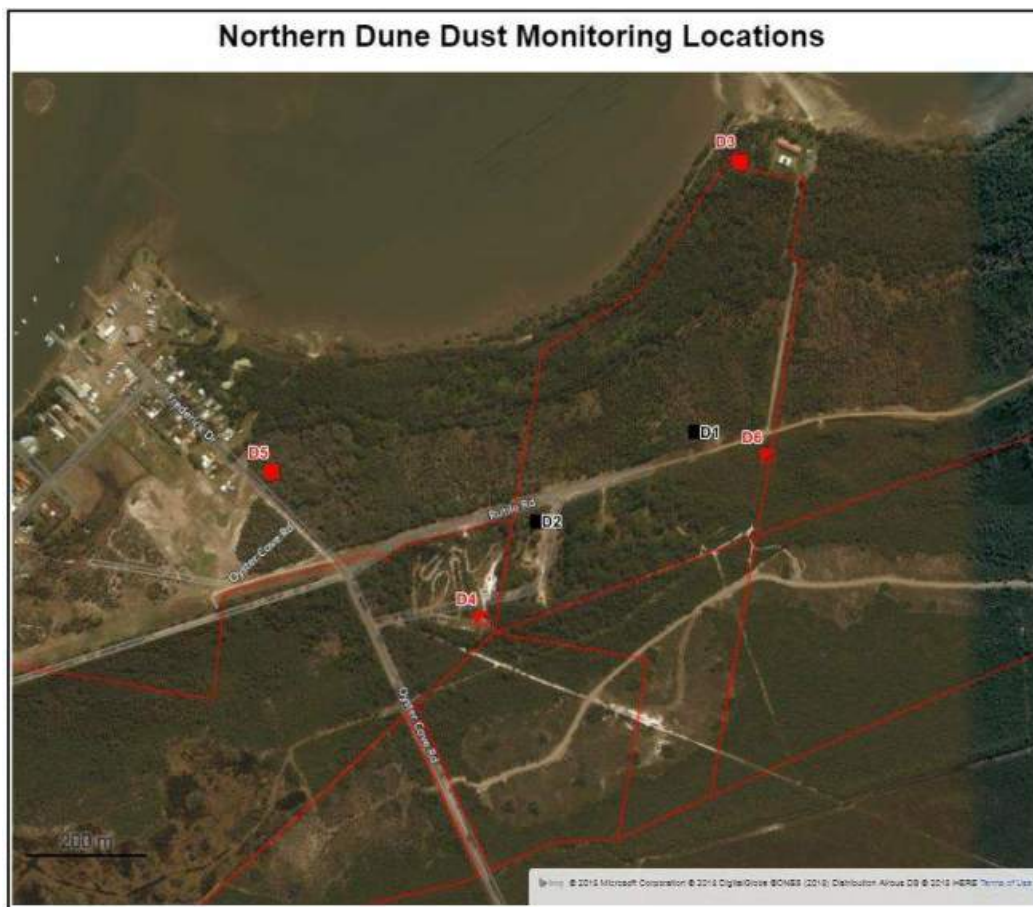


Figure 4: Dust Sampling Locations

6.3.3 Key Environmental Performance

6.3.3.1 Depositional Dust

Monitoring results for the 2023/24 reporting period are presented in Table 11 and Table 12. Results at compliance locations D3 / TB4 and D5 / TB3 have been compared against criteria in Schedule 3, Condition 6, Table 4, shown above. The criteria allow for an annual average of up to 4 g/m²/month for insoluble solids (or Total Insoluble Matter (TIM) as reported by ALS), as a total (inclusive of the site and background dust). The criteria of 2 g/m²/month relates to an incremental impact from the Project alone and is also assessed as a rolling annual average.

TIM is an indicator of the mineral constituent of dust as indicative of soil or rock particles and is the parameter of interest when measuring levels of deposited dust as per *Notes to Tables 2 to 4, Note C* referenced above. Highlighted results within the table indicate where dust trigger limits were exceeded during the reporting period.

The annual rolling average shown for D3 / TB4 and D5 / TB3 in Table 11 and Table 12 was calculated using data obtained over a rolling 12 month period in accordance with *Appendix J Dust Monitoring Program* of the approved Environmental Management Plan (EMP). The annual rolling average was then compared to the long term maximum total deposited dust level trigger level of 4 g/ m²/month under Schedule 3, Clause 6 for analysis of ongoing compliance of Northern Dune Extension operations in relation to depositional dust levels.

As seen in Table 11 and Figure 5, there were two instances where measured deposited dust exceeded 4 g/m²/month at monitoring station D3 / TB4:

- 18 April 2023 (5.4 g/m²).

Review of depositional dust results at comparison sites D4 / TB2 and D6 / TB1 in the same time period found the following:

- In April 2024, comparison site D4 / TB2 had an insoluble matter level of 0.8 g/m², while D6 / TB1 had an insoluble matter level of 0.5 g/m².
- The results at the comparison sites suggest the following:
 - D4 / TB2 has most likely been tampered with or impacted by offsite activities. D4 / TB2 is located in an area that is accessible by the public, including motorbike usage with visible tracks noted around the sample station, and has been susceptible to suspected tampering in the past (as reported in previous Annual Reports).
 - D4 / TB1 has recorded a level of only ~20% of the allowable criteria, while D6 was at only ~10% of allowable criteria suggesting that Holcim activities have not resulted in any significant air quality impacts.
- 9 August 2023 (19.4 g/m²).

Review of depositional dust results at comparison sites D4 / TB2 and D6 / TB1 in the same time period found the following:

- In April 2024, comparison site D4 / TB2 had an insoluble matter level of 0.9 g/m², while D6 / TB1 had an insoluble matter level of 0.5 g/m².
- The results at the comparison sites suggest the following:

- D4 / TB2 has most likely been tampered with or impacted by offsite activities. There is evidence for this through the presence of 17.2g ash content within the sample results. D4 / TB2 is located in an area that is accessible by the public, including motorbike usage with visible tracks noted around the sample station, and has been susceptible to suspected tampering in the past (as reported in previous Annual Reports).
- D4 / TB1 has recorded a level of only ~20% of the allowable criteria, while D6 was at only ~10% of allowable criteria suggesting that Holcim activities have not resulted in any significant air quality impacts.

Further evidence to support this is that given no extraction was occurring during the entire time of the reporting period when results were obtained, the source is highly unlikely to be related to activities on the Northern Dune Extension site. The only activities performed during the reporting period were rehabilitation activities (as discussed in Section 8.2) which generally do not have the potential to generate dust beyond the criteria related to ongoing extraction.

Given that no extractive activity occurred through the reporting period it is possible that background dust levels are responsible for exceedances of the criteria. Any dust exceedances are attributed to external activities, i.e. not related to quarrying operations due to:

1. Extraction and ground disturbing activities have not occurred during the reporting period.
2. Rehabilitation monitoring shows greater ground cover in comparison to previous years (see Section 8).
3. No dust complaints have been received from nearby residents.

The annual rolling average for both D3 / TB 4 and D5 / TB3 are below the trigger threshold under Schedule 3, Clause 6 of the conditions of approval for all months within the monitoring period.

Table 11: Insoluble Matter (g/m²) Monitoring results for the D3 / TB4 Monitoring Station (April 2023 – March 2024).

Sample Period		Dust Monitor		Purpose (Comparison / Compliance)	D3 - Insol. Matter (g/m ²)	Comment	D3 - Annual Rolling Average (g/m ²)	Criteria (g/m ²)
Month	Year	TB	D					
April	2023	TB4	D3	Compliance	5.4	D4 result 0.8 g/m ² , D6 result 0.5 g/m ² . Results suggest exceedance not related to site activities.	2.4	4.0
May	2023	TB4	D3	Compliance	0.8		2.4	4.0
June	2023	TB4	D3	Compliance	0.6		2.2	4.0
July	2023	TB4	D3	Compliance	2.5		2.2	4.0
August	2023	TB4	D3	Compliance	19.4	D3 Ash Content 17.9 g. D4 result 0.9 g/m ² , D6 result 0.5 g/m ² . Results suggest contamination of result at D3 and exceedance not related to site activities.	3.7	4.0
September	2023	TB4	D3	Compliance	1.6		3.4	4.0
October	2023	TB4	D3	Compliance	1.1		3.2	4.0
November	2023	TB4	D3	Compliance	2.5		3.1	4.0
December	2023	TB4	D3	Compliance	0.6		3.0	4.0
January	2024	TB4	D3	Compliance	1.0		2.9	4.0
February	2024	TB4	D3	Compliance	0.8		3.0	4.0
March	2024	TB4	D3	Compliance	0.8		2.9	4.0

Table 12: Insoluble Matter (g/m²) Monitoring results for the D5 / TB3 Monitoring Station (April 2023 – March 2024).

Sample Period		Dust Monitor		Purpose (Comparison / Compliance)	D5 - Insol. Matter (g/m ²)	Comment	D5 - Annual Rolling Average (g/m ²)	Criteria (g/m ²)
Month	Year	TB	D					
April	2023	TB 3	D5	Compliance	0.6		1.1	4.0
May	2023	TB 3	D5	Compliance	0.7		1.0	4.0
June	2023	TB 3	D5	Compliance	0.6		1.0	4.0
July	2023	TB 3	D5	Compliance	0.6		1.0	4.0
August	2023	TB 3	D5	Compliance	0.5		0.9	4.0
September	2023	TB 3	D5	Compliance	0.5		0.9	4.0
October	2023	TB 3	D5	Compliance	2.2		1.0	4.0
November	2023	TB 3	D5	Compliance	1.6		1.0	4.0
December	2023	TB 3	D5	Compliance	2.1		1.1	4.0
January	2024	TB 3	D5	Compliance	3.1		1.3	4.0
February	2024	TB 3	D5	Compliance	0.9		1.2	4.0
March	2024	TB 3	D5	Compliance	0.6		1.2	4.0

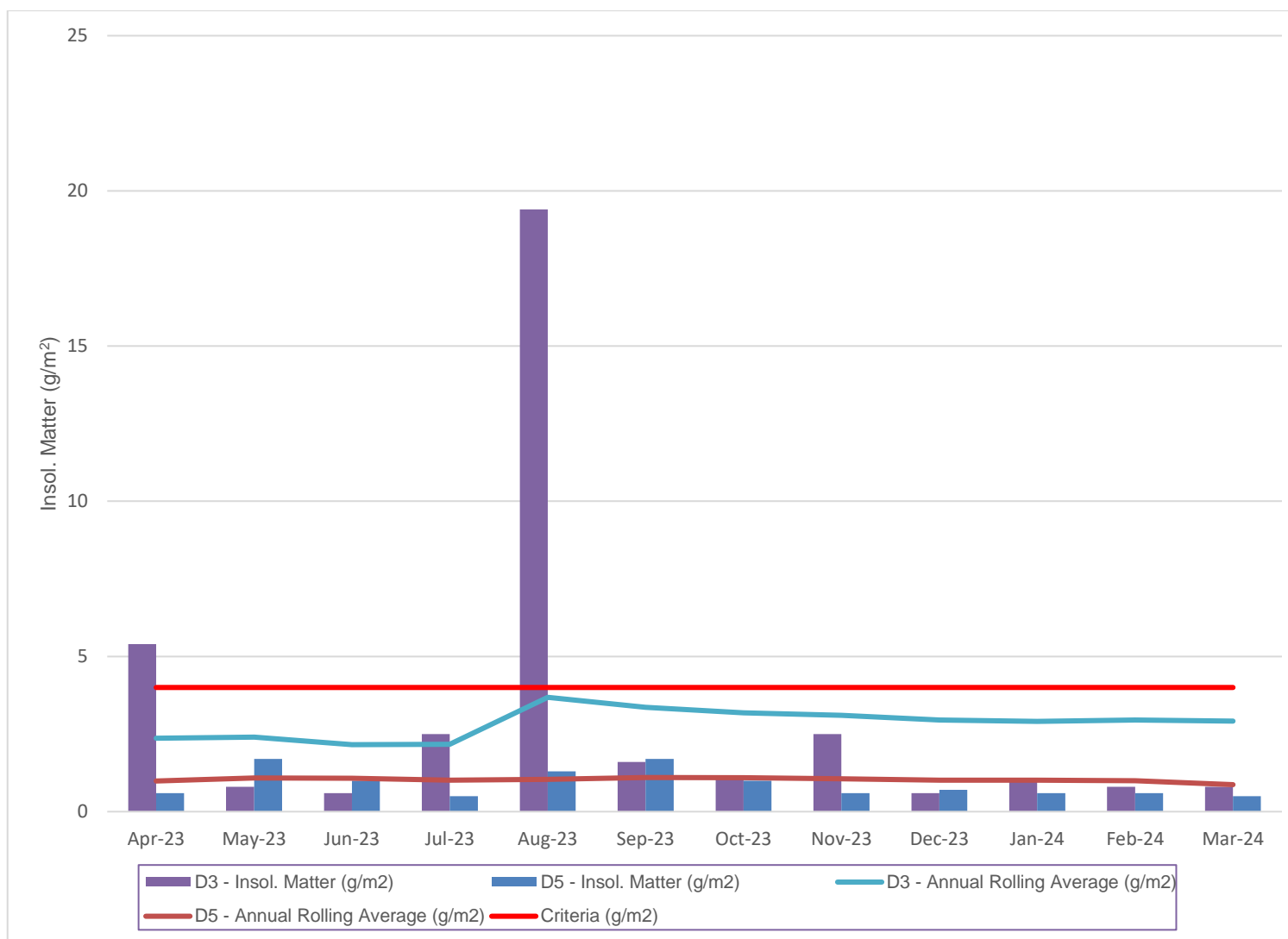


Figure 5: Insoluble Matter (g/m²) Monitoring results for the D5 / TB3 Monitoring Station and D3 / TB4 Monitoring Station

6.3.4 Proposed Improvements

The Northern Dune Extension Dust Management Plan will be reviewed following submission of this AR and updated if necessary. Given that extractive operations are no longer occurring and the potential for air quality impacts from dust due to operations are therefore removed, the value of an ongoing dust monitoring program is limited. The results from this reporting period (and previous) suggest that external sources contribute more dust to the monitoring network than the NDE site which further limits the value.

6.4 Traffic Management

6.4.1 Approved Criteria

The site is required to operate traffic and manage transport through compliance with the requirements of the conditions listed below:

TRAFFIC

Haulage Route

23. All extractive materials dispatched from the site must be delivered to Sibelco's Salt Ash Sand Processing Plant by the most direct route available.

Road Signage

24. Prior to commencing quarrying operations, the Proponent shall:
- (a) install "Trucks Crossing" and "Trucks Entering" warning signs on Nelson Bay Road on both the western and eastern approaches to the intersection of Lemon Tree Passage Road; and
 - (b) pay the full cost of this installation, to the satisfaction of RMS.

On-Site Traffic Management

25. The Proponent shall ensure that:
- (a) all vehicles do not exceed a speed of 25 kph on the site;
 - (b) all loaded vehicles entering or leaving the site have their loads covered; and
 - (c) all loaded vehicles leaving the site are cleaned of sand and other materials that may fall on the road, before leaving the site.

Traffic Management Plan

26. The Proponent shall prepare and implement a Traffic Management Plan for the project, to the satisfaction of the Director-General. This plan must:
- (a) be submitted to the Director-General for approval prior to commencing quarrying operations;
 - (b) include a drivers' code of conduct to minimise the impacts of project-related trucks on local residents and road users; and
 - (c) describe the measures that would be put in place to ensure compliance with the drivers' code of conduct.

6.4.2 Key Environmental Performance

No extractive materials were dispatched from the site during the reporting period resulting in zero truck movements related to the Northern Dune Extension. An approved Traffic Management Plan is in place, available as Appendix H of the Northern Dune EMP. No traffic related non-compliances were recorded during the reporting period.

6.5 Biodiversity

Schedule 3, Condition 15 of the Tanilba Northern Dune Extension Project Approval (MP 09_0091) required the preparation of a Biodiversity Management Plan (BMP). While the BMP requires similar management actions as the LMP, for operational and administrative simplicity, these plans apply to the site as follows:

- Management measures for the extraction area are addressed in the LMP (See Section 8).
- Management of the approved Biodiversity Offset Areas are addressed in the BMP.

Biodiversity offset areas for the project have been established in the north-east of the approved extraction area (Northern Biodiversity Offset Area, NBOA) and to the south-east of the extraction area off Lemon Tree Passage Road (Southern Biodiversity Offset Area, SBOA).

The BMP requires the following actions to be undertaken within the offset areas:

- Annual inspection and monitoring to be conducted by a suitably qualified person/s;
- Implementation of a nest box installation and monitoring program within the northern offset area to replace hollow bearing trees removed from the extraction area;
- Utilisation of potential habitat features from the disturbance area (e.g. large organic debris and habitat hollows) either within the rehabilitation or NBOA;
- Targeted fauna monitoring across all offset areas to monitor for Wallum Froglet (*Crinia tinnula*), Koala (*Phascolarctos cinereus*) and Mahoney's Toadlet (*Uperoleia mahonyi*);
- Establishment of a habitat restoration and rehabilitation program across all offset areas (including the visual amenity buffer along the northern boundary of the extraction area) consisting of:
 - Annual inspections to identify areas requiring weed and pest control;
 - A weed and pest management program;
 - Enhancement of the availability of habitat for the Koala through the use of *Eucalyptus robusta* (Swamp Mahogany) within the offset area;
 - Rehabilitation of the regenerating Grassland-Heath to the surrounding Swamp Mahogany – Paperbark Swamp Forest through seeding and planting of appropriate species;
- Establishment of a vegetation monitoring program (VMP) to ensure vegetation and fauna habitat qualities within the offset areas are being maintained and identify any issues requiring management.

6.5.1 Nest Box Installation and Monitoring Program

The approved BMP requires the establishment and on-going monitoring (at least 6 years) of at least two nest boxes for each tree hollow removed during clearing.

A nest box installation program was implemented on 21st December 2015 to offset the loss of 26 hollows across the whole of the approved extraction area. These were replaced at a 2:1 ratio resulting in the installation of 52 nest boxes in the NBOA within Coastal Sands Apple Blackbutt Forest and the northern section of the Swamp Mahogany – Paperbark Forest. Nest boxes were positioned in areas of vegetation that contained suitable food resources but lacked denning sites for arboreal fauna. As such, the central part of the offset area was the most appropriate site for installation. The installation of the nest boxes was supervised by suitably trained ecologists to ensure appropriate site selection.

Environmental contractor Wedgetail Project Consulting was engaged by Holcim to conduct annual monitoring within the NBOA, however nest box monitoring was discontinued during the 2023-2024 monitoring period as required monitoring had been conducted for the mandated six (6) year period, with the final round of monitoring occurring in September 2022.

6.5.2 Amphibian Monitoring

Targeted monitoring for the Wallum Froglet (*Crinia tinnula*) and Mahony's Toadlet (*Uperoleia mahonyi*) was conducted as part of the requirements outlined in section 5.1.4 of the Biodiversity Management Plan Tanilba Northern Dunes Extension (Kleinfelder, 2014). The monitoring was conducted on 7 November 2023, 20 February 2024 and 21 February 2024 by two WPC ecologists over three nights, following periods of rainfall. A prior diurnal assessment of the offset areas was conducted to determine habitat suitability. Surveys consisted of a meandering search in the NBOA.

Nocturnal surveys for amphibian species employed visual and audible detection techniques with the aid of spotlights. No frog species of any kind (target species inclusive) were heard or observed during the three nights that frog surveys were conducted. Larger, semi-permanent bodies of water to the east (swamp along Rutile Rd) and south-west (Mirror Lakes) of the NBOA were also surveyed on these nights and no frogs were recorded as calling in these areas.

The winter period leading up to the spring and summer frog surveys was very dry with below average rainfall recorded from May 2023 to January 2024. Despite fairly substantial rainfalls prior to each of the surveys, the NBOA and surrounding areas were extremely dry with no standing water observed on site or in the vicinity. Permanent water bodies located several kilometres south of the site that had been assessed by WPC did record presence of *Crinia tinnula* and *Uperoleia mahonyi*, while WPC noted that the NSW Survey Guidelines for Threatened Frogs states surveys should target permanent and temporarily flooded swamps and depressions, which are typically, but not exclusively, on white sands. Waterbodies must be at least 70% full prior to survey, which did not occur on these occasions. The guidelines do not state a minimum rainfall requirement, but a high rainfall event is implied with the water level requirement prior to survey. As part of these surveys, a control population located approximately one kilometre east on Rutile Rd, was used for comparison and was not found to be calling. This indicates that conditions were not suitable for breeding for this species at the time of surveys. With no permanent water bodies on the NBOA, suitable conditions are restricted to periods of higher rainfall. Nearby, more permanent water bodies are presumed to be the core habitat for these species – such as the area noted above and the colloquial named Mirror Lakes to the west. Ongoing surveys after suitable rain events will determine if the species continue to utilise the NBOA.

Opportunistic sightings of non-target amphibian species were also recorded. Additional opportunistic sightings of non-amphibian species within the NBOA included ringtail possum (*Pseudocheirus peregrinus*) (in a slash pine tree), sugar glider (*Petaurus breviceps*), multiple grey-headed flying-foxes (*Pteropus poliocephalus*), swamp wallaby (*Wallabia bicolor*) and microbats that were too numerous to count and too fast to identify. This activity shows that the NBOA offset is being used by various fauna.

The presence of multiple other species indicates that the NBOA and surrounding areas are being utilised by a range of fauna species. The use of alternate survey methods such as pit-fall trapping could be utilised to determine whether *U. mahonyi* is present on site during periods of low rainfall and no standing water bodies.

6.5.3 Koala Monitoring

Koala monitoring was undertaken by WPC using the Spot Assessment Technique (SAT) within the NBOA as described by Phillips and Callaghan (2011). The SAT test involves a radial survey of koala "activity" within the immediate area of a tree that is known or deemed to be utilised by koalas. The search beneath each tree is conducted for two person minutes or until a single pellet is found, whichever occurs first. A tree is defined as a live woody stem of any species (except for cycads, palms, tree ferns and grass trees) which has a diameter at breast height (dbh) greater than 10cm. Two WPC ecologists conducted 15 SAT surveys on 25 January 2024.

In addition to SAT surveys, detection dogs trained to locate koala scats were brought to site and run over the northern section of the NBOA. The methodology is quite simple with the dog/s running and

walking ahead and to the side of the dog handler. The handler directs the dog by whistle commands to move in the desired direction, with the dog trained to stop and “show” where scats are located. Dog surveys were conducted on 7 September 2023.

The dog surveys undertaken on the 7 September 2023 did not locate any koala scat in the northern section of the NBOA i.e., north of Rutile Rd. The lack of detection was attributed to unsuitable conditions on the day. That is, the day was quite warm (27o C) with no breeze inside the wooded section of the NBOA. Dense vegetation in this section of the NBOA hinders dog movement.

The SAT surveys completed on 25 January 2024 found evidence of low koala activity in the NBOA., that is three SAT locations had evidence of older scats under a single tree. See Table 13 for an extract of the WPC Monitoring Report indicating Koala activity levels for each SAT test for the NBOA. Additional opportunistic surveys were conducted on the nights of the amphibian surveys, with no koalas identified during these periods.

Within the NBOA, the greater activities have been found to be within the Swamp Mahogany – Paperbark Swamp Forest to the north of the offset area where there are mature trees for feeding, although evidence of use was found throughout the extent of the NBOA in previous years’ monitoring. The NBOA has good habitat suitability for the koala with plenty of mature *Eucalyptus robusta* (Swamp Mahogany), *Melaleuca quinquenervia* (Broad-leaved Paperbark) and *Casuarina glauca* (Swamp She-oak) to the north of the area, although parts of this area were hard to traverse due to of thick belt of *Lantana camara* (Lantana) dominating the understory which has the potential to hinder Koala movement through the site. This year, the northern NBOA was dry and area that were previously inundated were dry, making movement quite easy. The remaining southern areas of the NBOA are still regenerating but have shown promising signs of koala use which will continue to improve as the trees mature. This will provide koalas with more habitat and a greater food source in the future.

The assessed low activity levels within the NBOA suggest that koalas are not permanently resident within the site but use it to transition between other areas of higher populations. Despite the apparent suitability of the NBOA as habitat, a number of possible factors can be suggested as to why the site is not used at higher levels or even permanently. As alluded to above, there is a dense lantana understory that effectively separates the site in two. There has been historic and ongoing disturbance due to recent fires, and human activity including motorcycle riding, dog walking and rubbish dumping, although these activities within the NBOA have decreased as the vegetation has increased in density and made access to the site more difficult.

Location	No Activity					Low Activity					Medium Activity					High Activity				
	2019	2020	2021	2022/ 23	2023/ 24	2019	2020	2021	2022/ 23	2023/ 24	2019	2020	2021	2022/ 23	2023/ 24	2019	2020	2021	2022/ 23	2023/ 24
1	-	-	-	-	-	+	+	+	-	-	-	-	-	-	-	-	-	-	-	-
2	-	-	-	-	-	+	+	+	-	-	-	-	-	-	-	-	-	-	-	-
3	+	+	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4	-	+	-	-	-	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-
5	-	-	-	-	-	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-
6	-	+	-	-	-	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-
7	-	-	-	-	-	-	-	-	-	-	+	-	-	-	-	-	-	-	-	-
8	-	-	-	-	-	-	-	-	-	+	+	+	-	-	-	-	-	-	-	-
9	-	-	-	-	-	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-
10	-	-	-	-	-	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-
11	-	-	-	-	-	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-
12	-	-	-	-	-	+	-	-	-	+	-	-	-	-	-	-	-	-	-	-
13	-	-	-	-	-	+	-	-	-	+	-	-	-	-	-	-	-	-	-	-
14	-	-	-	-	-	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-
15	+	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Table Symbolology – “+” indicates Koala scat present. “-” no scat present

Table 13 Koala activity levels from the Spot Assessment Technique (WPC, 2024)

6.5.4 Habitat Restoration

6.5.4.1 Vegetation Condition Survey

An annual inspection of the NBOA is to be conducted as per Section 5.1.3B of the Biodiversity Management Plan Tanilba Northern Dunes Extension (Kleinfelder, 2019). This survey was conducted on 12 September 2023. As per the BMP, photo monitoring points were established, weed infestations were noted, locations of rubbish dumping were noted, survey the regeneration and health of the *Eucalyptus robusta* along one transect, east to west across the BOA noting the size in classes of trees 1m either side of the transect, noting the extent and requirement of any revegetation works in the BOA.

South of Rutile Rd, a small section of the NBOA abuts the extraction zone. Most of this area was affected by the 2018 fires but has recovered with the higher than average rainfall experienced over the three years from 2020 to 2022. The condition improves moving east from Coastal Sand Apple Blackbutt Forest that fringes the extraction zone and Block Q2 which is quite weed infested until good condition Swamp Mahogany – Paperbark Forest is encountered. The scattered Fishpole Bamboo (*Phyllostachys aurea*) noted in this area last year has grown into a substantial stand and was marked for weed treatment. Some minor Bugle Lily (*Watsonia meriana*) was also observed in this area.. The 50m buffer zone of vegetation along Rutile Rd is quite weedy with exotic grasses, Lantana (*Lantana camara*) and some minor Blackberry (*Rubus fruticosus* spp. agg.), Glory Lilly (*Gloriosa superba*), *Watsonia meriana* and *Pinus elliotii* (Slash Pine) as well as others. This area to the west bordering the NDE and The Knoll is also heavily vegetated with *Leptospermum laevigatum*. As noted in the 2023 North Dunes Extension Post 3 Year Monitoring report (WPC, 2024) this species is quite invasive having formed thickets on the NDE. The vegetation buffer zone acts as a source and control works in the buffer would help to slow its spread.

The main section of the NBOA lies north of Rutile Rd and has been assessed as Swamp Mahogany – Paperbark Swamp Forest “regenerating” in the area immediately to the north, and “mature” at the farthest north section of the BOA. This regenerating area can be further divided into an eastern section that can be classified as advanced regeneration where previous mining and subsequent rehabilitation is obvious – parallel swales are still evident. In this section, weed control efforts have largely brought the woody weeds under control. The western section has quite mature native trees and a mixture of native vegetation and weedy species that are the subject of on-going control efforts (see Section 4). These include slash pine, bugle lily and lantana (*Lantana camara*) that exclude native species and shrubby regrowth are present, and evidence of some regeneration is present with seedlings and saplings apparent. As has been noted since this monitoring has been undertaken, the slash pine has been a concern to the general condition of this area. It is a fast-growing species and a prolific producer of seed with a multitude of seedlings visible each survey. On going weed control efforts have manage to eliminate the dense stands of saplings, but the larger trees that are present produce copious amounts of litter that acts to suppress the regeneration of native species. Many of the larger trees are now of such a size as to present a major issue for removal – both as a safety issue and for the damage that would be caused to native vegetation.

Regeneration of the *E. robusta* within this “regenerating” area was assessed by measuring the health and size of *E. robusta* trees within 1m of a transect running East to West across the NBOA. The individual trees were divided into five height classes (<1m, 1-2m, 2-10m, 10-15m and >15m or mature trees) for determination of age. Trees <1m in height were classified as seedlings/saplings, trees 1-2m in height were classified as saplings, trees 2-10m were classified as immature trees, trees 10-15m were classified as intermediate, while trees estimated to be over 15m in height were classified as mature.

This year, a total of 94 trees were assessed along the transect that is approximately 400m long. The 2021 survey assessed 114 trees, the 2022 survey 78 trees. The differences are attributed to GPS drift and differences in GPS equipment used between the surveys, rather than any dieback or death of trees. No dieback or dead trees were observed along the transect. The assessment found that there were three (3) saplings <1m, only five (5) were estimated to be between 1-2m, in height, with 45 trees estimated to between 2-10m, 41 trees between 10-15m tall and no trees assessed as mature. This indicates that this southern of the NBOA is advanced re-growth, with no trees deemed to be old growth.

The majority of the *E. robusta* – 71 trees - were located in the eastern section of regenerating Swamp Mahogany – Paperbark Swamp Forest. Many of the larger trees were observed to be carrying fruit, a

good indication that ongoing regeneration is occurring or possible. Two areas at the western end of the NBOA are classified as regenerating grassland where the density of trees and shrubs is greatly reduced. Since the initial survey in 2013, natural regeneration has occurred, with many shrubs and some midstorey species self-seeding. However, very few *E. robusta* have established in these areas, and the southern-most section adjacent to Rutile Rd is a dense thicket of *Leptospermum laevigatum* (Coast Teatree) that will prevent any other re-growth of native species. These areas are required to be replanted to increase the canopy cover and modest planting programs have been suggested in the previous reports. The northern most section of the NBOA has been classified as mature Swamp Mahogany – Paperbark Swamp Forest. This area contains mature *E. robusta* and *Melaleuca quinquenervia* trees with an understorey of Tall Saw-sedge (*Gahnia clarkei*) and other swamp flora. Lantana has colonised this section of the BOA with infestation levels varying from scattered individuals to very heavy (<75% cover), with a belt of dense Lantana acting to separate this section from the southern regenerating section of the BOA. Evidence of previous control works is visible, as is regrowth and re-sprouting.

The WPC (2024) NDOA Monitoring Report further identified regrowth of vegetation over a former track where illegal rubbish dumping occurred. The illegal waste required removal while WPC noted that track maintenance would facilitate waste removal but also provide an avenue for members of the public to infiltrate the NBOA.

Weed mapping was conducted as part of the monitoring of the BOA. The key weed species recorded on site that have the potential to restrict revegetation or native fauna use are the Slash Pine, Lantana. Bugle Lily Coastal Teatree with minor occurrences of Bamboo and Pampass Grass. The Slash Pine is concentrated along Rutile Rd in the regenerating Swamp Mahogany – Paperbark Swamp Forest, but seedlings and saplings have spread throughout this entire section of the BOA. The density has been mapped from medium to heavy in these areas and there are many scattered immature and mature trees in other areas. The Slash Pine is rapidly spreading through the BOA and does pose a threat to the viability of the area as an offset if not controlled. Previously, control of this species has been limited to slowing the spread into the northern NBOA and to the east into the adjacent Gur-um-Bit State Recreation Area, but with the increased control effort some of the middle-sized trees have been felled this year. Prolific seed production, rapid growth and production of pine needles that serves to suppress other vegetation acts to degrade the condition of the BOA, providing competition for the Eucalyptus species that are the preferred koala feed trees. While the prevailing thought was that native fauna – except for bird species such as Glossy-Black Cockatoo and Sulphur Crested Cockatoo and other large seed eating birds - do not use the pines for foraging or habitat, this year the ring tail possum observed during night work surveys was in a slash pine suggesting that at least some level of utilisation for foraging is possible.

The Bugle Lily is concentrated in the central portion of the regenerating Swamp Mahogany – Paperbark Swamp Forest with a large central dense infestation that becomes less dense towards the edges. This species is out-competing native species such as the Tall Saw-sedge and was observed to be spreading into the eastern section of the regenerating Swamp Mahogany – Paperbark Forest and has been observed in the southern section of the NBOA, adjacent to the revegetation Block Q2.

Lantana has colonised this section of the BOA with infestation levels varying from scattered individuals to very heavy (<75% cover), with a belt of dense Lantana acting to separate this section from the southern regenerating section of the BOA. At its most dense, Lantana thickets have the potential to hinder movement of koalas through the BOA and effectively divides the Swamp Mahogany – Paperbark Swamp Forest into two sections. The progress with the weed control works has greatly reduced this “wall” and opened up this area. This year’s weed mapping highlights the continued spread of this weed into the mature Swamp Mahogany – Paperbark Swamp Forest where scattered individuals are maturing and spreading into infestations.

Where weed species have not become established the condition of the native vegetation is quite good. Native vegetation is generally in good health with no visible dieback observed amongst the canopy species on site. Seedlings of *E. robusta* have been observed away from the transect, and the large of amount of fruit observed on the *E. robusta* also bodes well for further potential regeneration. The lack of mature trees indicates that the regenerating Swamp Mahogany – Paperbark Swamp Forest is indeed regenerating, and not mature forest as is the case in the northern section of the BOA where trees are greater than 20 m in height and hollows are visible. The lack of hollow bearing trees in this southern section of the NBOA highlights the need to continue with the maintenance of the nest box program, with many of the nest boxes visibly falling into disrepair.

The regenerating grassland is slowly self-seeding with some native species such as Coastal Wattle

(*Acacia longifolia*) and Coast Teatree but would benefit from a modest planting program of tubestock installation of *E. robusta*, Red Bloodwood (*Corymbia gummifera*) and Smooth-barked Apple (*Angophora costata*). Sibelco Australia (the previous owners) had commenced a modest weed control program, and Holcim (Australia) have continued this program. The increased weed control effort recommended in the 2022 Monitoring Report (WPC, 2023) and implemented this year has resulted in further improvement with a larger area covered. This effort needs to be continued to ensure that the biodiversity values of the offsets area continue to improve. Treatment of slash pine infestations may require use of specialist arborist subcontractors.

6.5.4.2 Weed Control Works

WPC was engaged by Holcim (Australia) to conduct weed control works in the BOA during the 2023 reporting period. These works consisted of a team of two Land Management Technicians working on site for two rounds of three days each.

The first weed control event occurred in September 2023, targeting small patches of target weed species and the peripheries of larger infestations (to control spread). Large mature pine individuals with a diameter greater than 200 mm were ring barked, smaller pine specimens were felled. *Lantana camara* was sprayed with Glyphosate at a rate of 100 ml/L using splatter technique. Some isolated individuals were hand removed. *Watsonia meriana* was sprayed with metsulfuron methyl at a rate of 1 g/10 L.

From 27 February to 1 March 2024, staff returned to site to treat small infestations of bamboo, to continue “push-back” into dense infestations (e.g. *Lantana camara*) and to target new germination of weeds occurring in previous treatment footprints. continue the treatment of weeds previously identified during annual monitoring. The target weeds were Lantana (*Lantana camara*), Slash Pine (*Pinus elliottii*) and Watsonia (*Watsonia meriana*).

The following WPC NBOA Monitoring Report (2024) made the following recommendations:

- The weed control effort is increased to allow for a greater area to be worked. Given the level of infestation it is suggested that effort be increased – i.e., 12 person days per year.
- The Slash Pine saplings that have been cut and dropped in the past control efforts should be removed – most can be removed by hand to Rutile Rd and chipped there. This will facilitate native species regeneration.
- The larger Slash Pine trees require a specialist arborist to safely be removed.
- The rubbish along the access track should be removed.
- Consideration to installation a locked gate should also be made – but it is acknowledged that this might draw attention and pose a “challenge” to trespassers.

6.6 Heritage

6.6.1 Approved Criteria

“The Proponent shall prepare and implement an Aboriginal Cultural Heritage Management Plan to the satisfaction of the Director-General. This plan must:

- (a) be prepared in consultation with all relevant local Aboriginal communities;*
- (b) be submitted to the Director-General for approval prior to commencing quarrying operations;*
and
- (c) include:*
 - measures for the protection and management of site 38-4-0318 within Lot 13 DP601306;*
 - a program to complete prospective pre-clearance surveys of the extraction area in consultation with Aboriginal stakeholders;*
 - measures for ongoing consultation with local Aboriginal communities and the involvement of these communities in pre-clearance surveys and the ongoing management of any Aboriginal cultural heritage values identified within the site;*
 - an Aboriginal cultural education program for the induction of personnel and contractors involved in quarrying operations; and*
 - a description of the measures that would be implemented if any new Aboriginal objects or skeletal remains are discovered during the project.”*

6.6.2 Cultural Heritage Management Plan

An Aboriginal Cultural Heritage Management Plan (CHMP) has been prepared in consultation with the three Registered Aboriginal Parties (RAPs) within the local area:

- Worimi Local Aboriginal Land Council;
- Mur-Roo-Ma Incorporated, and;
- Nur-Run-Gee Pty Ltd

The CHMP contains plans of actions for pre-clearance surveys and unexpected finds such as new Aboriginal objects or skeletal remains during extraction as well as an ongoing plan to manage Aboriginal Cultural Heritage. With respect to actions under the CHMP during the reporting period:

- No clearing or extraction occurred as the project is in the rehabilitation phase;
- Site 38-4-0318 is located in the northern part of Lot 13 outside the extraction area. There was no disturbance of this area during the reporting period.

6.6.3 Key Environmental Performance

No clearing or extraction occurred during the reporting period. There were no issues relating to Aboriginal and Cultural Heritage in the reporting period.

6.6.4 Proposed Improvements

The CHMP will be reviewed and if necessary updated in the next reporting period.

6.7 Waste Minimisation

6.7.1 Management Measures

The following management measures are in place at Northern Dune Extension:

- No burning of waste;
- Any noxious plant species will be removed from the site, bagged and disposed of at a licensed landfill;
- Any waste will be removed daily and recycled or disposed of directly at a licensed landfill; and
- The site will be maintained and kept free of rubbish and cleaned up at the end of each working day.
- Waste identified during site monitoring (see Appendix 2) is removed from site.

6.7.2 Key Environmental Performance

No bins or other waste management facilities are kept on site - any waste produced is removed at the end of each working day.

6.7.3 Proposed Improvements

There are no proposed improvements to waste management during the Annual Review period.

7 WATER MANAGEMENT

This section addresses compliance with the approved GMP required by Schedule 3, Clause 14 of Project Approval MP 09_0091, and EPL 11633. It is noted that the GMP was revised in October 2021 and the updated version was approved within the previous reporting period, amending the monitoring requirements in the Tanilba Northern Dunes locations. This is discussed further below in Section 7.1.

No environmental incidents or implementations of the Emergency Response Plan (ERP) in relation to groundwater occurred.

As described in the approved GMP there are no Groundwater Dependent Ecosystems (GDE) identified within the Northern Dune Extension area, therefore no impacts are able to be assessed. A study by SKM in 2012 for the NOW on NSW Coastal GDE's did not identify a GDE at the Northern Dune Extension area site, and a site is not listed in the National Atlas of GDE's.

7.1 Groundwater Management Measures

Groundwater Management issues are managed by the regulatory approved Groundwater Management Plan 2021 (GMP). The GMP has been developed to ensure compliance with the conditions of consent and licensing requirements stipulated by the relevant regulatory authorities, during development and operation at the Northern Dune sites. The GMP provides a formal framework for ongoing monitoring of groundwater to manage the potential impact of sand extraction on groundwater level and quality. The GMP stipulates that:

- No excavation is to be carried out to a depth greater than 0.7m above the maximum predicted elevation of the water table;
- The land surface is to be restored, following mining, to a level at least 1m above the maximum predicted elevation of the water table;
- If concentrations of any analyte are found to exceed the provisional trigger levels given in the GMP, that monitoring point will be re-sampled within fourteen days, with investigatory monitoring implemented should re-sampling also be in exceedance of the trigger values; and
- The relevant Regulatory Authorities will be contacted if any recorded water level exceeds the benchmark maximum predicted groundwater levels.

The GMP states that the GMP will be reviewed at the completion of sand extraction in a zone and/or prior to commencement of operations in each new zone (the Northern Dune Extension is effectively a single zone). If this review indicates a need to change programs or procedures, then a submission outlining the proposed changes and the need for them will be made to DPE and HWC. Extraction ceased in 2018 and no extraction occurred during the reporting period.

A revised GMP was submitted and approved in October 2021 due to the cessation of extraction and progression of the project into a rehabilitation activity. The revised GMP includes monitoring at a reduced number of bores. It was also revised to lower the frequency of groundwater quality monitoring and reporting for bores that:

- Were not representative for the measurement of potential groundwater impacts from rehabilitation activities on the project area; and
- Were not part of the EPL monitoring network.

This resulted in the groundwater quality monitoring locations and frequencies listed in Table 14 remaining. The locations of these bores are shown in Figure 6.

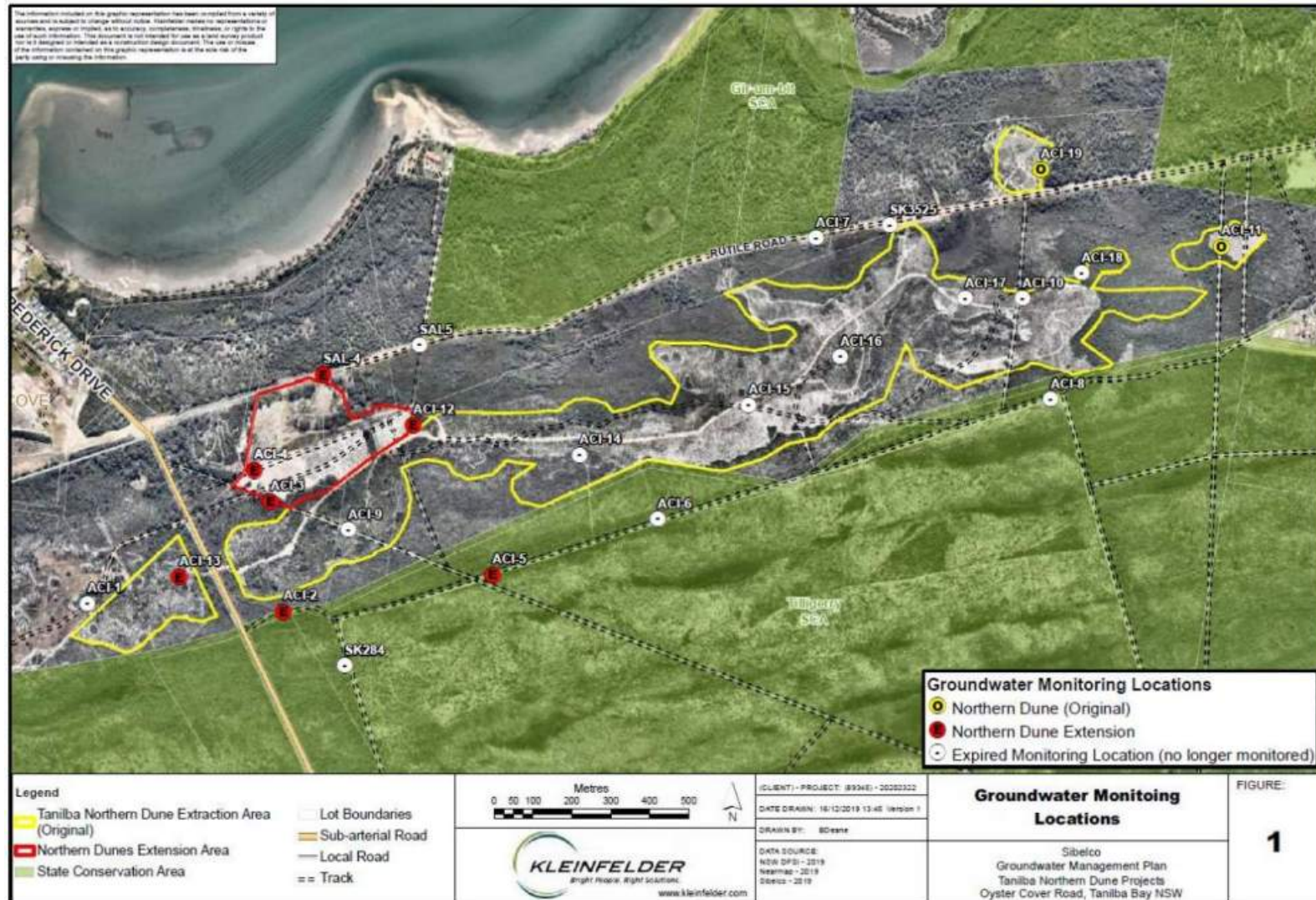


Figure 6: Location of the Tanilba Northern Dune Projects and Associated Current Monitoring Locations

Table 14 Current Groundwater Quality Monitoring Locations

Project	Agency / Approval Jurisdiction	Monitoring Location Name	Easting	Northing	End of Mining Activity	Groundwater quality Monitoring Frequency	Groundwater Level Monitoring Frequency
Northern Dune Extension	DPE / HWC / EPA	ACI-2	402538	6376802	Ceased Jan 2006 (monitoring required until EPL surrendered / varied)	6 Monthly	Monthly
	DPE / HWC / EPA	ACI-5	403076	6376897	Outside of extraction zone (monitoring required until EPL surrendered / varied)	6 Monthly	Monthly
	DPE / HWC / EPA	ACI-13	402270	6376891	Ceased Jun 2005 (monitoring required until EPL surrendered / varied)	6 Monthly	Monthly
	DPE / HWC / EPA	SAL-4	402641	6377413	Outside of extraction zone (monitoring required until EPL surrendered / varied)	6 Monthly	Monthly
	DPE / HWC	ACI-3	402505	6377085	July 2018 (expired July 2023)	Annually	Monthly
	DPE / HWC	ACI-4	402463	6377166	July 2018 (expired July 2023)	Annually	Monthly
	DPE / HWC	ACI-12	402872	6377282	July 2018 (expired July 2023)	Annually	Monthly

Groundwater quality is tested for the parameters required by EPL 11633, as presented in Table 15.

Table 15: EPL 11633 Groundwater Monitoring Requirements

POINT 2,5,13,14

Pollutant	Units of measure	Frequency	Sampling Method
Arsenic	milligrams per litre	Every 6 months	Grab sample
Conductivity	microsiemens per centimetre	Every 6 months	Grab sample
Iron	milligrams per litre	Every 6 months	Grab sample
Manganese	milligrams per litre	Every 6 months	Grab sample
pH	pH	Every 6 months	Grab sample
Standing Water Level	metres	Monthly	In situ
Total petroleum hydrocarbons	milligrams per litre	Every 6 months	Grab sample

Water and land

EPA Identification no.	Type of Monitoring Point	Type of Discharge Point	Location Description
2	Groundwater quality monitoring		Groundwater monitoring bore ACI-2 located to the South of Extraction Zone 1 near DLWC in "Northern Dune Water Bore Locations" figure accompanying additional information supplied to EPA on 6 May 2002.
5	Groundwater quality monitoring		Groundwater monitoring bore ACI-5 located at the South of Extraction Zone 2 & outside lease boundary in "Northern Dune Water Bore Locations" in additional information supplied to EPA on 6 May 2002.
13	Groundwater quality monitoring		Groundwater monitoring bore ACI-13 located within Extraction Zone 1 in "Northern Dune Water Bore Locations" figure in additional information supplied to EPA on 6 May 2002.
14	Groundwater quality monitoring		Groundwater monitoring bore SAL4 as identified on Figure 6.2 of report titled 'Tanilba Northern Dune Sand Extraction Extension - Environmental Assessment' dated August 2012.

7.1.1 Groundwater Levels

Wider groundwater monitoring was initiated at Northern Dune in 2002, prior to the commencement of sand extraction in 2003. Baseline groundwater level and quality monitoring is undertaken within a planned zone prior to commencing sand extraction. Baseline groundwater level monitoring is used to create a Predicted Maximum Groundwater Elevation (PMGE) which is then used for determining depth of extraction and final landform.

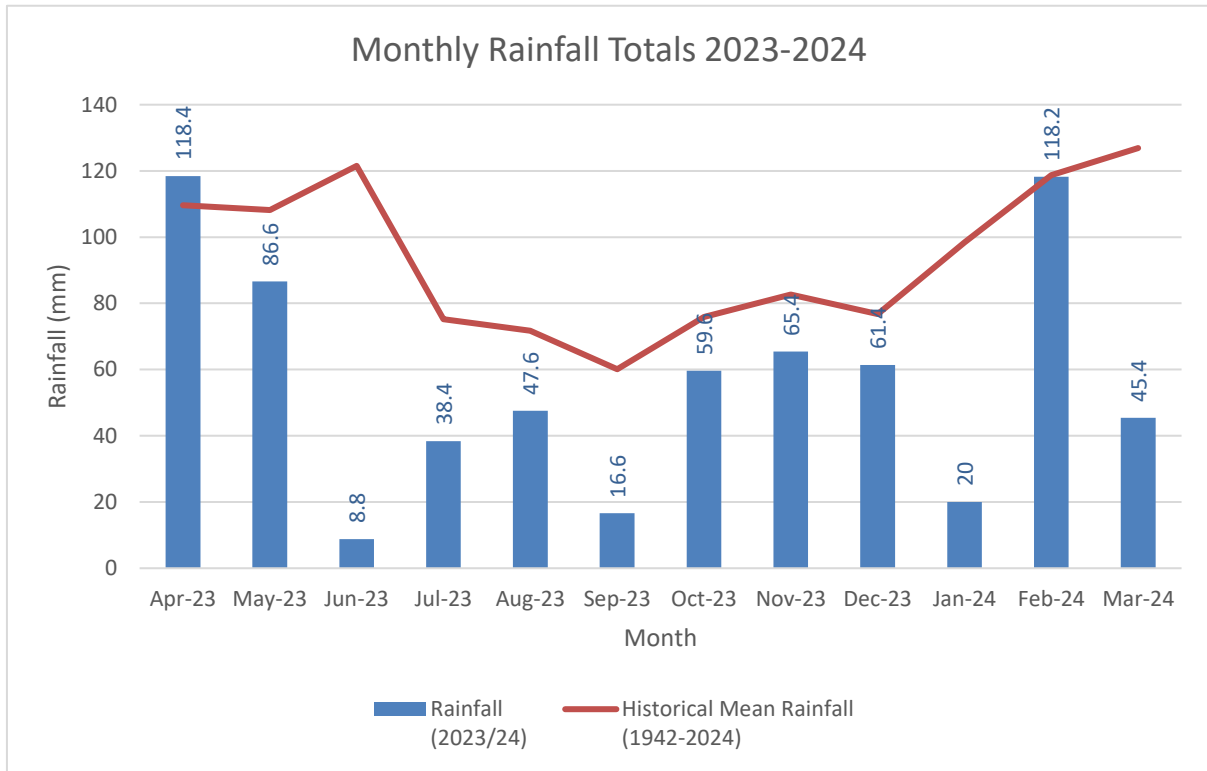


Figure 7: 2023/24 Monthly Rainfall at Williamtown RAAF

Historically, groundwater level data is collected monthly across the entire wider monitoring network with reporting against the piezometers used to analyse Predicted Maximum Groundwater Extent (PMGE) surfaces for the extraction zones.

The current approved Groundwater Management Plan for the Northern Dune Extension site requires monthly groundwater monitoring only at ACI-2, ACI-5, ACI-13 and SAL-4. Monitoring at these locations continues as required by EPL 11633 as per Table 15.

The hydrographs in Appendix 5 demonstrate the groundwater trends throughout the life of the project, and Table 8 presents the monthly results for the current reporting period which demonstrate that all locations were monitored monthly during the current reporting period as per the requirements, although it is noted that no data was recovered at ACI-5 or ACI-13 in September 2023, and no data was recovered at ACI 5 in October 2023. Maintenance on the monitoring locations allowed data collection to resume throughout the remainder of the reporting period at these locations.

Annual rain monitoring data recorded at Williamtown throughout the reporting period has been included in Figure 7 for reference. During the reporting period, the highest recorded rainfall was in April 2023 with 118.4 mm being recorded. April 2023 and February 2024 were the only two months within the reporting period that exceeded historical rainfall averages, with less than half of the historical rainfall average occurring in June 2023, September 2023, January 2024 and March 2024. The rainfall received is likely to influence the groundwater levels which respond to rainfall, while periods of low rainfall were noted by WPC as limiting factors for the success of weed treatment via herbicide application.

Groundwater level monitoring results (**Error! Reference source not found.**) demonstrate that there has been no exceedances of the Predicted Maximum Groundwater Extent (PMGE) during the reporting period.

Table 16: Groundwater Levels at Northern Dune Extension Monitoring Locations

Location	PMGE	DATE / LEVEL (m)											
		18/04/23	16/05/23	14/06/23	12/07/23	9/08/23	11/09/23	11/10/23	8/11/23	8/12/23	9/01/24	8/02/24	11/03/24
ACI-2	8.44	7.45	7.05	7.52	7.39	7.29	7.25	7.08	7.16	6.87	6.77	6.86	6.41
ACI-5	8.16	7.24	7.48	7.39	7.25	7.43	No Data	No Data	7.04	6.71	6.63	6.36	6.33
ACI-13	9.29	7.79	7.56	7.93	7.72	7.61	No Data	7.51	7.70	7.24	7.04	6.80	6.62
SAL-4	8.65	7.65	7.57	7.71	7.56	7.52	7.42	7.26	7.39	7.23	7.39	6.88	6.77

7.1.1.1 Groundwater Level Results Discussion and Trend Summary

During previous reporting periods, it was noted that the trend observed in groundwater levels is that they fluctuate naturally in response to rainfall. During this reporting period, **Error! Reference source not found.** demonstrates the same trend is observed; groundwater levels rise as there is increased monthly rainfall and fall during periods of reduced rainfall. This trend is highlighted when above average rainfall is apparent. The annual trends over previous reporting periods show that following rain significant rain events, groundwater levels return to the expected fluctuating trend over time, and this is demonstrated following the events.

No significant change to the trends demonstrated in groundwater levels over the life of the project have been observed within this reporting period.

7.1.2 Groundwater Quality

In addition to the requirements of EPL11633, Trigger Values were established for a number of initial monitoring bores. Baseline groundwater quality samples were collected prior to extraction to create trigger values for comparison against sample concentrations during extraction operations and post-extraction operations to assist in detecting any changes in groundwater quality at the site.

The trigger values are then tested against predetermined increments. Groundwater quality testing is undertaken as per Table 14 and reported to the relevant regulators.

Groundwater quality is sampled and tested by an external third party with results sent to Holcim. Due to administrative error groundwater quality sampling was not performed within the reporting period. Upon identification of the oversight, an interim sampling round was immediately commissioned. The two sampling rounds most relevant to the reporting period are therefore those performed in March 2023 and May 2024. These results are presented within this section.

The groundwater quality monitoring results presented in Table 17 show that all results were within normal limits with the exception of:

- *March 2023 Monitoring Event:*
 - It is noted that the location ACI-13 reported a dissolved iron concentration (1.58mg/L) slightly above the adopted trigger value (1.547mg/L) set for this specific location during the monitoring event performed in Q1, 16/03/2023 noting Iron exceeded adopted criteria (2.62mg/L) during the same monitoring event (Q1) in 2022. The total Iron concentration however did not breach the trigger value set for this location. As reported previously this is a seasonal trend of background iron mobilised from the coffee rock horizon via rising groundwater levels.
- *May 2024 Monitoring Event:*
 - Total Iron at SAL-4 recorded 6.81 mg/L versus a Trigger value of 3.64 mg/L during the monitoring event on 16/05/2024. Significantly it is noted that the first 16 days of May saw 243mm of rainfall (Williamstown BOM Station). Mean May monthly rainfall for May is 111mm (Williamstown BOM Long Term Average 1942 - 2022). The extraordinary rainfall conditions experienced immediately prior to the monitoring event are likely to have resulted in significant mobilization of iron from the coffee rock horizon.
 - Dissolved Manganese
 - ACI-2 (0.017mg/L vs trigger value of 0.015mg/L) and SAL-4 (0.133mg/L vs Trigger Value of 0.093),
 - Total Manganese at ACI-2 (0.020mg/L vs Trigger Value of 0.014) and SAL-4 (0.231mg/L vs Trigger Value of 0.116)
 - Previous reports have demonstrated how Manganese results are elevated by increased rainfall and have exceeded the assigned triggers related to rainfall events mobilising minerals from the Coffee Rock Horizon. As per the results observed for Iron in May 2024, the first 16 days of May saw 243mm of rainfall (Williamstown BOM Station). Mean monthly rainfall for May is 111mm (Williamstown BOM Long Term Average 1942 - 2022). The extraordinary rainfall conditions experienced immediately prior to the monitoring event are likely to have resulted in significant mobilization of manganese from the coffee rock horizon resulting in the exceedance of Trigger Values.

Table 17: Comparison of Groundwater quality results against trigger values for the 2022/23 reporting period.

	Date	Bore	pH	EC μS/cm	Iron mg/L		Arsenic mg/L		Manganese mg/L		TPH mg/L			
											C6- C9	C10- C14	C15- C28	C29- C40
					Dissolved	Total	Dissolved	Total	Dissolved	Total				
Trigger Value		ACI-2	N/A	N/A	3.058	3.623	0.001	0.01	0.015	0.014	0.02 (LOR)	0.05 (LOR)	1 (LOR)	1 (LOR)
Results	16/03/2023		4.48	94	1.77	2.05	<0.001	0.001	0.010	0.010	<LOR	<LOR	<LOR	<LOR
Results	17/05/2024		4.71	91	2.64	2.85	<0.001	0.001	0.017	0.020	<LOR	<LOR	<LOR	<LOR
Trigger Value		ACI-5	N/A	N/A	2.048	3.286	0.001	0.015	0.014	0.036	0.02	0.05	1	1
Results	16/03/2023		4.56	130	0.39	0.50	<0.001	<0.001	<0.001	<0.001	<LOR	<LOR	<LOR	<LOR
Results	17/05/2024		4.47	133	0.64	0.72	<0.001	<0.001	0.001	0.002	<LOR	<LOR	<LOR	<LOR
Trigger Value		ACI-13	N/A	N/A	1.547	6.428	0.001	0.012	0.061	0.056	0.02	0.05	1	1
Results	16/03/2023		5.13	53	1.58	1.80	<0.001	<0.001	0.056	0.055	<LOR	<LOR	<LOR	<LOR
Results	17/05/2024		4.70	47	0.58	2.04	<0.001	<0.001	0.006	0.010	<LOR	<LOR	<LOR	<LOR
Trigger Value		SAL-4	4.44 - 6.6	213	3.21	3.64	0.001	0.002	0.093	0.116	0.02	0.05	1	1
Results	16/03/2023		4.90	138	0.82	0.96	<0.001	<0.001	0.034	0.034	<LOR	<LOR	<LOR	<LOR
Results	17/05/2024		5.27	133	2.70	6.81	<0.001	0.001	0.133	0.231	<LOR	<LOR	<LOR	<LOR

7.1.2.1 Groundwater Quality Results Discussion and Trend Summary

Observations of groundwater quality trends over time show concentrations have fluctuated throughout the life of the project. This trend has been demonstrated by the results provided in previous annual reports provided as per the approval requirements, along with previously required bi-annual groundwater monitoring reports. This observation was also made based upon analysis of data collected during operations across the wider Tanilba Northern Dune site and presented in the trend predictions of the Environmental Assessment (EA) for the Northern Dune Extension Area.

The fluctuating trend previously identified has been continued in the current reporting period as demonstrated by the data presented in the hydrographs (Quality vs. trigger values) which demonstrate this trend over the life of the project in Appendix 6, and in the tabulated results for the current reporting period provided in Table 17.

The EA for the Northern Dunes Extension project discussed possible causes and influences of the trends observed in metal concentrations (based upon observations of the wider Northern Dune area) and predicted that:

- Peak total iron concentration seems to be attributed to the re-establishment of topsoil and regeneration which occurs after mining has ceased.
- The fluctuation of the water table (in response to rainfall) may cause enhanced mobilisation of iron from the coffee rock horizon, giving rise to potentially increased concentrations of iron.
- Localised variability of metal concentrations has been seen throughout monitoring of the wider northern dune area and appears to be impacted from well construction through localised coffee rock deposits.

Groundwater quality trends have continued as expected during the reporting period. In line with earlier predictions of the EA, measured metal concentrations are consistent with data collected across the wider Tomago Sandbeds and have generally not exceeded the natural variation within metal concentrations recorded in the wider Tomago region. This is due to operations occurring above the deep grey sands and the groundwater table (by maintaining an exclusion zone from the PMGE), which are known to liberate metals in significant quantities if disturbed. The results presented in this report do not suggest any significant disturbance during the reporting period.

8 REHABILITATION AND LANDSCAPE MANAGEMENT

Rehabilitation objectives and targets for the Tanilba Northern Dune Extension Project are described in the LMP prepared to satisfy Schedule 3, Condition 17 of the Tanilba Northern Dune Extension Project Approval (MP 09_0091). The LMP describes management measures for the extraction (disturbed) area and, in accordance with the Project Approval, includes a Rehabilitation Management Plan (RMP) and Long-Term Management Strategy.

8.1 Rehabilitation Management

Rehabilitation at the Tanilba Northern Dunes Extension area is undertaken in conjunction with works in areas mined as part of the approvals for the wider Tanilba Northern Dune. For rehabilitation purposes, works across both approval areas have been subdivided into several blocks: The extraction area within Tanilba Northern Dunes Extension is known as Block Q.

Inspection of revegetated areas forms part of monthly site inspections to identify issues requiring management (refer to Appendix 2). The outcomes and observations of inspection are incorporated into the future works program together with any items or recommendations resulting from the annual performance monitoring program (refer to Appendix 2. Appendix 3**Error! Reference source not found.**).

Works undertaken within the Tanilba Northern Dunes Extension during the reporting period include:

- Supplementary planting of assorted native species undertaken over several planting events
- Weed management inspections to identify areas requiring control by spraying.

The revegetation (planting) program at the Extension site was completed during the 2021/2022 reporting period. Sibelco previously implemented a regime of weed control across the whole of the Tanilba Northern Dunes mining area which is ongoing, and Holcim maintains a continued commitment to ongoing and progressive rehabilitation. Site wide weed management of the Extension area will continue to be undertaken following the completion of planting, as will the required ongoing vegetation monitoring program, to aid in management of the rehabilitation project.

8.2 Rehabilitation Monitoring

The objective of the LMP is to progressively re-establish original vegetation community types, after extraction and landform rehabilitation has been completed, to as close as possible to that of the original vegetation. This recognises that the final landform will be lower in elevation than the original topography, and Section 4.5 of the LMP therefore describes performance measures to assess the success of the rehabilitation. This section addresses compliance to the following parts of the approved LMP:

- 4.5.1 Baseline Data – sets target figures for vegetation structure and content.
- 4.5.2 Performance Indicators – provides performance indicators for each stage of the rehabilitation program.

Section 4.5.3 of the LMP provides completion criteria to be applied to each rehabilitation block at the end of the monitoring program (8 years) to determine eligibility of operational areas for release from further rehabilitation or monitoring. Rehabilitation of the Northern Dunes Extension area commenced in 2016: Section 4.5.3 is therefore not discussed in the current report.

The Tanilba Northern Dunes Extension area has been subdivided into several blocks (known as Q1 to Q6 shown in Table 18) for ease of data collection. Rehabilitation blocks are prepared and biannually surveyed after 6 months of growth for a period of 3 years. Details of each block surveyed for the 2023/24 Annual Report are provided below.

Table 18: Block preparation and survey details for the North Dune Extension Rehabilitation Blocks

Block	Prepared	First Biannual Survey Conducted	Last Biannual Survey Conducted	Comments
Q1	December 2016 - July 2017	January 2018	July 2020	6 Year Monitoring completed – October 2023 (current year)
Q2	July 2018	January 2019	July 2021	All biannual monitoring completed – 5 year monitoring completed (current year)
Q3	July 2018	January 2019	July 2021	
Q4	July 2018	January 2019	July 2021	
Q5	July 2018	January 2019	July 2021	
Q6	July 2019	January 2020	July 2022	

The monitoring plan has been designed in accordance with principles of the EMP and will facilitate the stated aim of the EMP (Section 7.1) to re-establish stable and sustainable native vegetation cover in-line with the original vegetation community types pre-extraction, including similar structural components and species composition at similar elevations.

Furthermore, a permanent photographic record was established within this reporting period for each permanent 20m x 20m quadrat. A photograph is taken from each corner looking into the quadrat at each survey to allow a visual assessment of the rehabilitation progression for future monitoring reports.

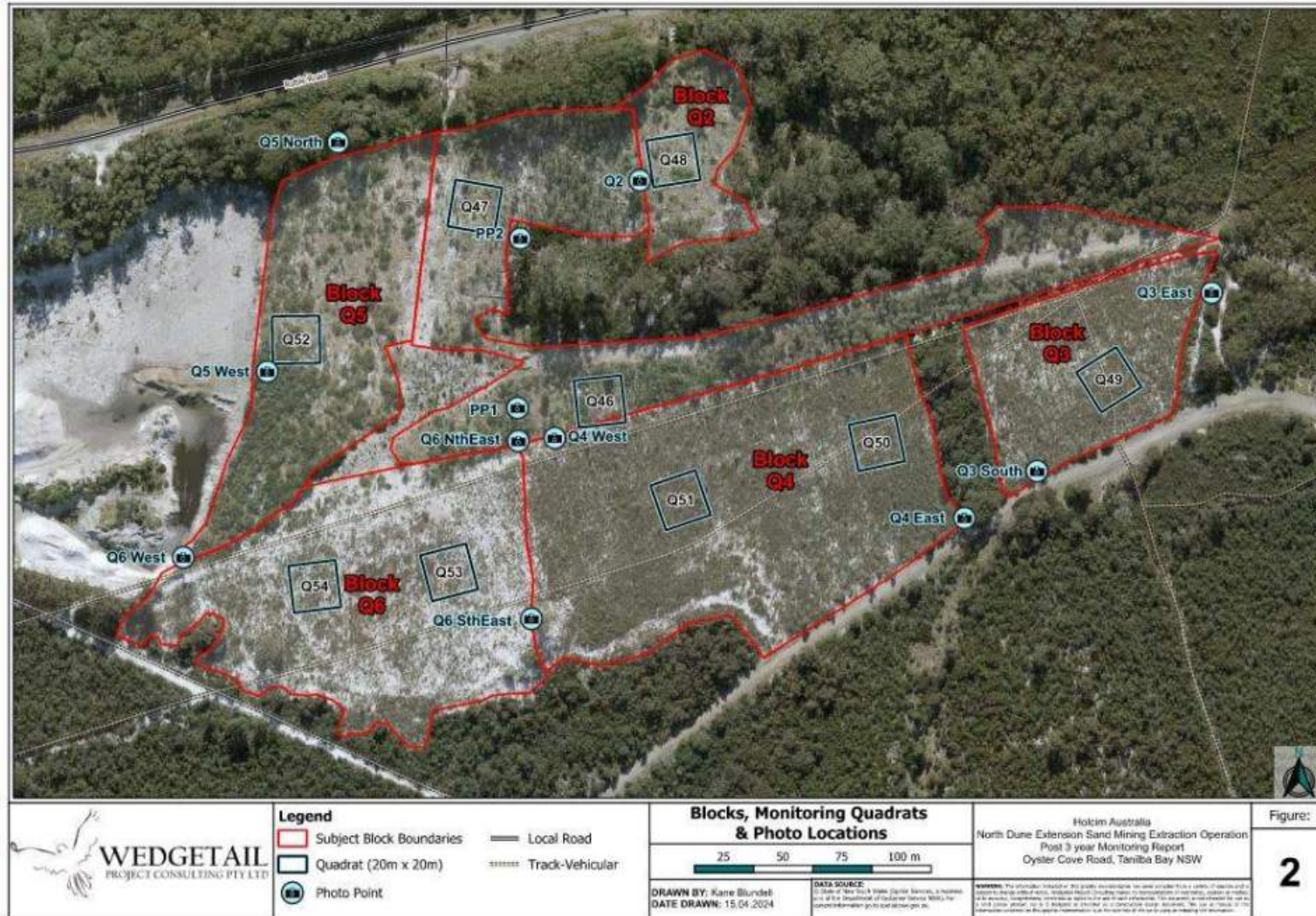


Figure 9: Locations of Blocks Q1 to Q6

A total of nine quadrats were surveyed for the purpose of the current annual report consisting of:

- 2 x quadrats (Q46 and Q47) on Block Q1,
- 1 x quadrat (Q48) on Block Q2,
- 1 x quadrat (Q49) on Block Q3,
- 2 x quadrats (Q50 and Q51) on Block Q4,
- 1 x quadrat (Q52) on Block Q5, and
- 2 x quadrats (Q53 and Q54) on Block Q6.

Each of the blocks has been established at different time intervals as per **Table 18**. Results for each of the blocks is therefore presented in summary separately below.

The full rehabilitation monitoring report is provided in Appendix 3 and includes survey results against rehabilitation and species composition targets established in the LMP. This AEMR provides a summary of the results, highlighting key accomplishments, learnings, recommendations and challenges for restoration works.

Results show that the revegetation of the NDE can be divided into two sections with the old haul road the boundary. Sections or blocks north of the haul road have poorer revegetation than the blocks to the south of the haul road, with reasons discussed below.

Block Q1 monitoring straddles this divide and is now six years since first revegetated. Quadrat 46 (southern section) recorded 32 flora species, 28 of which were native species, below the target of 34. These consisted of five overstorey, three native midstorey, five native shrub species and two native ground stratum species. However, WPC noted that the low number of shrub and / or ground stratum species identified during the survey was attributed to a controlled burn that occurred on the day of the survey.

Plot data demonstrated improvement in almost all parameters compared to previous surveys. Average covers and stratum proportions are consistent with previous years and continue to approach targets. As expected, the average height of plants had substantially increased due to more mature overstorey species. Controlled burn efforts in the area had destroyed most shrub and ground stratum species however, had successfully reduced exotic species within the plot. Species diversity remains satisfactory, with the survival of key species. The quadrat would benefit from continued revegetation efforts to improve diversity.

Quadrat 47 located in the northern section of Block Q1 recorded a total of 22 flora species, of which 18 were native. Whilst the number of native species had improved from previous surveys, overall species diversity had decreased marginally. Invasive species such as *E. curvula* had not been optimally controlled and pervaded the area, despite previous controlled burns in the plot. Fortunately, midstorey and overstorey stratum species were retained. Particularly, *Banksia aemula* and *Corymbia gummifera* remained quite large with some individuals reaching 4 m and 5 m respectively. Despite the lack of diversity in the quadrat, the majority of the species were either flowering or fruiting. Of the key species, *L. polygalifolium*, *M. nodosa* and *B. aemula* were flowering; a seedling of the latter was also observed.

Quadrat Q46 was consistent with previous years and continued to display high densities, covers and stratum proportions that have met targets. Whilst species diversity was satisfactory and steadily approaching targets, the area would benefit from continued revegetation efforts. Previous controlled burns have successfully reduced weed species in the area. Quadrat Q47 is located to the north of the haul road and is an area of poorer revegetation where native plant densities and diversity do not meet targets. This area was dominated by *E. curvula* due to previous unsuccessful controlled burns and lack of species diversity. Of the key species, midstorey (*B. aemula*, *L. polygalifolium* and *M. nodosa*) and

overstory species (*C. gummifera* and *E. piperita*) survived and fortunately recovered somewhat with *B. aemula* seedlings observed.

Block Q2 (Quadrat 48) recorded few native species, with a large percentage of the flora being exotic species and low species diversity. Six of the seven key species were recorded, however with low cover-abundance scores. The high cover of aggressive exotics will impact reproductive efforts of native species. Natural recruitment will be slow until the planted overstorey species achieve sufficient height to begin to shade these species out. In the meantime, ongoing weed control could be continued to suppress the more aggressive weed species and consideration should be given to a seeding program of native shrub and other species to increase diversity. Unfortunately, a controlled burn had spread to the plot following our survey and although this will attempt to quell the spread of invasive species, it will likely impact the newly observed seedlings and damage natural recruitment.

Block Q3 is monitored by Quadrat Q49 and represents excellent revegetation with 42 total species, 41 of which are natives. Seven key species were observed, minus *E. pilularis* and *M. quinquenervia*. The majority of the species recorded a CA score of 2 i.e., < 5% cover, many individuals, making the plot densely vegetated and highly diverse. *A. ulicifolia* and *L. ericoides* were more abundant, with a CA score of 3 and there remains low numbers of invasive species in the plot due to the dense native cover. As expected, there are continued increases in average plant height and the maintenance of good coverage overall. Within 2 m x 2 m plots the average number of plants and species diversity have decreased likely due to senescence of early succession species. Consequentially the high density of flowering plants had provided excellent litter cover. Only a single weed species, *L. laevigatum* was recorded in the quadrat. While as noted, two key species are below target in numbers, it is felt that at this stage it may cause more damage to the existing vegetation if in-fill planting is undertaken at the present state of the vegetation. Seed collection from adjacent areas and spreading may be an option in the short term. As noted in the previous report, with the senescence of some of the early succession species, it may be an appropriate time to undertake in-fill planting.

Block Q4 has two monitoring quadrats, Q50 and Q51, and is six years since first being revegetated. Q50 surveys determined that all parameters are similar to previous surveys in 2022, with the maintenance of excellent overall cover, density and plant height with minimal invasive species. The area remains dominated by early succession species (i.e., *A. ulicifolia*, *B. heterophylla*, *D. retorta*, and *H. linearis*) all receiving a CA score of 3. This quadrat recorded excellent growth parameters with increased average cover, average height, and native species diversity, albeit this last parameter has decreased from the previous year and just fallen below target. Numbers of plants per plot is below target, but probably reflects that achievement of analogue density will require more time for development, rather than any shortfall in the revegetation effort. All key species and *E. robusta* were recorded in this quadrat with excellent numbers. Senescence of some of the plant species is evident, but canopy and midstorey species are beginning to attain considerable height with individual *E. robusta* measured between 180 cm and 400 cm tall.

No weed species were recorded in the quadrat, but two exotic natives *L. laevigatum* and *Melaleuca quinquenervia* were recorded, still seedlings at this stage.

Q51 recorded declines in average cover and average height, but recorded increases in the total number of native species and average number of plants – although this last parameter is still below target. All key species were recorded, while still being dominance of early succession species is decreasing. No weed species were detected, but the exotic native *L. laevigatum* was recorded within the quadrat.

Block Q5 to the west of the NDE is in poor rehabilitation condition and is monitored by quadrat Q52. A very low number of 18 native species, one exotic native and one weed species were recorded. This quadrat was dominated by three species, but natural senescence and the fire have changed the species balance. *L. laevigatum* was still dominant within Q52, with a minor decrease in *E. curvula* and *A. longifolia* during the current survey period. A small number of other native species are increasing in size and/or

number including, *A. falcata*, *A. ulicifolia*, *B. aemula*, *L. polygalifolium*, *L. trinervium* and *M. nodosa*. The fast-growing *L. laevigatum* has expanded, and represents a threat to the revegetation effort, effectively forming a monoculture in sections of the block

Block Q6 is the youngest of the rehabilitated areas, apart from the reworked area of Block 1, and is another rehabilitation block with excellent growth parameters, where all seven key species were recorded in good numbers in both monitoring quadrats, Q53 and Q54, including *E. robusta*. The domination of *D. retorta* may continue until senescence and the establishment of secondary species. Diversity is very good, and many species were observed to be in flower or seed indicating the potential for self-sustaining germination when conditions are right. While no weed species were recorded in the quadrats, the exotic ground cover, *Acanthium australe* and the grass *E. curvula* were observed in the northern section of this block, adjacent to Block Q5. The spread of *L. laevigatum* is concerning as this species is quite invasive and can form dense thickets that shade out all other plants as evidenced by Block 5. Weed control in the areas adjacent to Block 5 and the removal of *L. laevigatum* plants is the only recommendation for this block.

For Q53, average cover and average height, two of the growth parameters for this quadrat have improved since the previous year's monitoring. Diversity (number of species) and plant numbers in both the 20 m quadrat and the 2 m x 2 m lots have decreased indicating some degree of senescence. Despite this slight decline in species diversity, the quadrat remains above target for species. Average plant numbers have decreased in the 2 m plots indicating senescence of some the early succession species. *D. retorta* was still the most widespread species, with *L. ericoides* the next most abundant species. The remaining species all recorded <5% cover and either infrequent or numerous occurrences respectively. All seven key species and *E. robusta* were recorded in the quadrat. Only one native exotic species, *L. laevigatum* was recorded in the quadrat.

Q54 recorded very similar growth parameters to the previous quadrat indicating a fairly uniform revegetation effort. Average vegetation cover at 71.67% was coincidentally the same as the Q53. Species diversity has decreased with age but remains on target at this monitoring event. *D. retorta* remained the dominant species with, with *A. ulicifolia* was the next most common species within Q54. All seven key species and *E. robusta* were recorded in the quadrat. Only one native exotic species, *L. laevigatum* was recorded in the quadrat.

Discussion

It is apparent that the revegetation of the North Dunes Extension is divided into two sections. The "southern" blocks, Blocks Q3, Q4 and Q6 have excellent revegetation with good diversity, numbers, and coverage. This is supported by the growth parameters outlined above and highlighted in the charts appended to the monitoring report (Appendix 3). Chart 3 shows the average species richness per 4m² in the monitoring quadrats, with the southern blocks clearly much higher. Likewise, Chart 6 and Chart 7 show the proportion of ground stratum and shrub stratum species respectively. Again, these two charts split the blocks quite distinctly.

The likely explanation is the source topsoil that was used for the revegetation of these areas. The topsoil in the southern blocks was better vegetated with native species while the topsoil used in the northern blocks was of lower diversity. This is supported by the shrub stratum numbers and proportions. These species are not seeded at all as part of the revegetation effort but germinate from the topsoil, thus indicating that this was the case.

The higher proportion of ground stratum species recorded in the northern blocks are overwhelmingly weed species. Native ground stratum species have consistently been under target – this has been apparent all through the revegetation in the NDE and on the North Dunes adjacent to this site which has been revegetated for over 15 years in the oldest sections. With the weed control efforts in Block Q1, Block Q2 and Block Q5, most of the native species recorded were planted key species. Much of the

remaining native diversity in these blocks was observed around the transplanted *X. glauca*, i.e., having germinated from the soil included in the transplanted stems.

From the above discussion, it indicates that the majority of positive observations relate mainly to the southern blocks. For instance, litter development is beginning to be apparent, especially under the overstorey trees or where dense *D. retorta* has dropped leaves and seed pods such as Block Q1 (southern section) and Blocks Q3 and Q4. The weedier northern blocks do not yet have that litter build up, and of course where controlled burns have occurred what litter had accumulated has been burned off.

The long-term establishment of successful revegetation requires the ability of self-recruitment and to this end a total of 65 native species were recorded across the NDE, an increase of one species from the previous survey – 44 of which were recorded with reproductive features – fruit, flowers or seedlings. This is good a result and included overstorey species with fruit in Block Q1 – the oldest revegetation.

Weed species were much concentrated in the northern blocks, with the western most section of Block Q1 also an area of concern (hence the weed control burns in this section). Blocks Q3 and Q4 only had weed species observed at their edges, with no weed species recorded in the monitoring quadrats themselves. Block Q4, has *E. curvula* starting to encroach from Block Q1. Block Q6 has some minor encroachment Block Q5, but also has an on-going issue with *Acanthospermum australe*, a prostrate (ground-spreading), ground stratum weed species native to North America characteristic of disturbed sites and wasteland. Previous weed control efforts have reduced, but not eliminated this species in this area.

The native invasive species, *Leptospermum laevigatum* has been recorded in all blocks. It is especially prevalent in Block Q5 where it forms a dense a thicket that shades out all other vegetation. It has continued to spread, and it is postulated will hinder the revegetation effort if left unchecked.

Key species plantings have been very successful in all blocks with overstorey species including *Eucalyptus robustus* generally in good numbers. The only exception is Block Q3 where a distinct lack of the midstorey species *Leptospermum polygalifolium* has been noted previously and is probably reducing the average height growth parameter in this section of the rehabilitation.

Recommendations

Increasing the native diversity of the northern blocks has been recommended as a priority to facilitate the land surrender. This would entail further weed control efforts but also a concerted seeding campaign with shrub species. Seed could be collected from the adjoining undisturbed vegetation – not from the better rehabilitation areas so as not to hinder their continued development – and applied to the blocks. This will likely require several rounds of control and seeding to achieve the desired results. Species that might be readily collected include but should not be limited to, *Dillwynia retorta*, *Hibbertia linearis*, *Leptospermum trinervium*, *Leucopogon ericoides*, *Acacia ulicifolia* and any of the three *Bossiaea*s found on site.

Planting of *L. polygalifolium* in Block Q3 would also be beneficial to improve vegetation structure and achieve key species targets in this area but may have to wait until the dense pioneer species begin to die back and open some space for ease of movement.

Weed control efforts should be on-going and frequent to bring the problematic weeds under control and to prevent these species spreading into the very good revegetation areas of the southern blocks. Targeted weeds are the very common *A. australe*, *E. curvula*, *L. camara* and *L. laevigatum*.

In summary, the NDE rehabilitation has both excellent and poorer areas of native revegetation. The excellent areas – Blocks Q3, Q4 and Q6 and the southern section of Block Q1 – only require some minor planting and on-going weed control along the edges to stop the spread of *E. curvula* and walkovers in the main revegetation areas to remove *L. Laevigatum*. The northern blocks require additional work

especially weed control targeting *E. curvula* in general and *L. laevigatum* in Block 5 before it spreads further. and seeding with native shrubs, to improve their flora diversity and numbers.

8.3 Weeds

As has been reported previously weeds are a major problem for the Northern Dune Extension. Weeds encroach into blocks Q3, Q4 and Q6 from the adjoining haul roads and weed infested areas adjacent to the site. The northern section of block Q1, the whole of Q2 and Q5 are heavily weed infested.

It should be noted that Holcim has undertaken several weed control measures in the period covered by this report including hand pulling, cut and paint, and herbicide application in Area Q. Weed control operations were undertaken on four occasions between August and September 2023.

8.4 Plantings

Some additional planting occurred within the NDE area during the reporting period. Planting was previously performed up to December 2020 and is continuing to establish (see Section 8.2). Planting of the following species occurred within the NDE area during the reporting period:

- *Melaleuca nodosa* and mixed gum – 585 plants on 18 September 2023.

8.5 Rehabilitation Actions

Weed control activities have been recommended to be substantially increased. Works need to be conducted regularly and frequently to break seed set cycles and to reduce overall weed densities. Weed control works, in the first instance should commence with the less dense areas and weeds encroaching into Blocks Q3, Q4 and Q6 to keep these blocks in their present excellent condition.

Weed works should proceed to the visual screen along Rutile Rd and remove any Lantana, *L. laevigatum*, and *Slash Pine* starting to encroach from the NDE Offsets, and other grassy weeds.

The northern blocks then require intense weed control efforts that should include but not be limited to spot spraying and hand removal of individual plants. These blocks could be progressively weeded in such fashion with intense seeding and/or planting of natives to follow up.

To maximise the weed control efforts, seed collection of native species is required. This seed collection and brush matting should incorporate collection of as wide a range of species as is possible.

An additional revegetation strategy for these northern blocks would be to seed with a high density of native grasses. There are 10 species of native grasses that have been identified during surveys of the various sand extraction projects and while they are usually found occurring in low densities between a dense shrub layer in the heath communities, this approach would at least introduce native species and provide a level of competition with exotic species and help suppress their spread.

9 COMMUNITY

9.1 Community Engagement Activities

Schedule 5, Clause 9 of the project approval requires specific information to be made available on the proponent's website.

Holcim provides information on operations at the Tanilba Northern Dune Extension Project to the public via its website. This includes a copy of approved strategies, management plans, monitoring data, approvals and annual reviews. This AR will be made available on Holcim's website once accepted.

9.2 Complaints

Holcim maintained a community complaint register that was updated quarterly throughout the reporting period to include any new community complaints.

There were no community complaints received during the reporting period.

10 INDEPENDENT AUDIT

Schedule 5 Clause 7 requires an Independent Environmental Audit (IEA) to be commissioned within one month of the completion of quarrying operations. As such an IEA was performed on 7 August 2019. No further IEA was required during the reporting period.

11 INCIDENTS AND NON-COMPLIANCE

Schedule 5 Clause 5 requires reporting of any incident associated with the project as soon as practicable after Holcim becomes aware of the incident. This includes circumstances that cause or threaten to cause material harm to the environment and / or breaches or exceeds the limits of performance measures/criteria in approval MP 09_0091.

One non-compliance, related to the timing of Groundwater quality monitoring has been identified, as discussed in Section 7.1.2.

This non-compliance did not cause material harm to the environment and was rectified upon becoming aware.

12 ACTIVITIES TO BE COMPLETED IN THE NEXT REPORTING PERIOD

Along with the improvements discussed throughout this document, Holcim will undertake the following activities in the next reporting period (April 1 2024 – March 31 2025) to ensure compliance with the consent and to ensure that effective environmental management controls are in place and operating in accordance with the requirements of the Consent.

Table 19: Proposed works – 2024/25

Item	Requirement		2024-2025 program	Due Date
OPERATIONS/ADMINISTRATION				
1		Site condition	Inspection of site for identification of maintenance requirements including condition of roadside drainage and rehabilitated areas.	Monthly
2	S5, CI 3	Annual Review	Prepare and submit AR to DPE on activities undertaken in the 2023-2024 reporting period.	30 June 2025
3	S5 CI 2	Performance review	Monitoring requirements will be reviewed to ensure all future monitoring and reporting following closure is relevant to the activities being performed. The review will be performed in consultation with DPI-Water and HWC.	Following submission of AR.
GROUNDWATER				
4		Groundwater Level Monitoring	Monitor bores as per approved GMP.	Monthly (weekly for 4 weeks if >100 mm rain per 7 days)
5		Groundwater quality Monitoring	Third Party contractor to monitor bores as per approved GMP.	As per GMP.
6		GMP Review	The GMP will be reviewed to ensure the monitoring and reporting is relevant to the activities being performed. The review will be performed in consultation with DPI-Water and HWC.	Following submission of AR.
7		Reporting	The results of the groundwater level and quality monitoring will be reported as per the GMP. Reporting frequency will be determined during the review of the GMP following consultation with DPI-Water and HWC.	Frequency determined following GMP review and consultation with DPI-Water and HWC.
Item	Requirement		2024-2025 program	Due Date
S5, CI 17 - FORMER EXTRACTION AREA (LMP)				
8			Supplementary planting as required following the inspections and rehabilitation monitoring.	As required
9	LMP 4.3.9	Weed management	Site wide weed control	As required
10		Maintenance	Follow up inspections to identify and manage regrowth across all rehabilitated areas.	As required
11	LMP 4.3.6	Performance monitoring	Implement recommendations in Annual Vegetation Rehabilitation Monitoring Report (Wedgetail Project Consulting, 2024).	As required

12			Monitoring of rehabilitated areas to assess performance against the requirements of the BMP.	Biannual
13			Prepare report to summarise results of rehabilitation program, identify trends and any management measures required to achieve objectives of rehabilitation program.	April 2025
14	S5 CI 2	LMP Review	The LMP will be reviewed to ensure the monitoring and reporting is relevant to the activities being performed. The review will be performed in consultation with DPI-Water and HWC.	Following submission of AR.
S3, CI15 - OFFSET AREAS (BMP)				
16	BMP 5.1.4	Fauna survey program	Targeted monitoring across all offset areas for Wallum Froglet to detect changes in recruitment success and assess impacts.	In accordance with seasonal survey requirements.
17	BMP 5.1.4, 5.2		Targeted monitoring across all offset areas for <i>Uperoleia sp nov</i> to identify habitat preferences of spp.	In accordance with seasonal survey requirements.
18	BMP 5.2		Monitoring to determine if Koala is utilising areas determined as Preferred Koala Habitat (Swamp Mahogany – Paperbark Swamp Forest) and Supplementary Habitat (Coastal Sand Apple – Blackbutt Forest) within the offset areas.	
19	5.1.5 of BMP	Vegetation management and monitoring program	Habitat restoration and rehabilitation program for proposed offset area in Lots 11, 12 and 13:	Annual
20			<ul style="list-style-type: none">Inspection to identify areas requiring weed and pest control	Annual
21			<ul style="list-style-type: none">Weed and pest managementRehabilitation of the regenerating Grassland-Heath	Annual
Item	Requirement		2024-2025 program	Due Date
22	BMP 5.1.7		<ul style="list-style-type: none">Supplementary planting of <i>E robusta</i> within offset area to expand availability of habitat for Koala.	During rehab program.
23	BMP 5.2		<ul style="list-style-type: none">Monitoring of the offset area to ensure vegetation and habitat qualities are being maintained.	
24	S5 CI 2	BMP Review	The BMP will be reviewed to ensure the monitoring and reporting is relevant to the activities being performed. The review will be performed in consultation with DPI-Water and HWC.	Following submission of AR.
COMMUNITY				
25	S5, CI9	Information Access	Upload the Annual Review for 2023-2024 to the company website when approved.	N/A
26		Complaints Register	Maintain and update.	Quarterly

13 APPENDICES

APPENDIX 1

Project Approval MP-09-0091

Project Approval

Section 75J of the *Environmental Planning and Assessment Act 1979*

As delegate for the Minister of Planning, I approve the project application referred to in schedule 1, subject to the conditions in schedules 2 to 5.

These conditions are required to:

- prevent, minimise, and/or offset adverse environmental impacts;
- set standards and performance measures for acceptable environmental performance;
- require regular monitoring and reporting; and
- provide for the on-going environmental management of the project.



Chris Wilson
Executive Director
Development Assessment Systems & Approvals

Sydney **8 MARCH** 2013

SCHEDULE 1

Project Application:	09_0091
Proponent:	Sibelco Australia Limited
Approval Authority:	Minister for Planning and Infrastructure
Land:	Lots 11, 12, 13 DP601306; Lot 408 DP1041934; and Lots 1, 2 DP408240.
Project:	Tanilba Northern Dune Extension Project

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DEFINITIONS

Annual Review	The review required by condition 3 of schedule 5
Biodiversity Offset Strategy	The conservation and management of the Proponent's offset sites on the Tilligerry Peninsula, being Lots 11, 12, 13 DP601306 and Lot 24 DP579700
Conditions of this approval	Conditions contained in schedules 2 to 5 inclusive
Council	Port Stephens Council
Day	The period from 7.00am to 6.00pm, Monday to Saturday
Department	Department of Planning and Infrastructure
Director-General	Director-General of the Department of Planning and Infrastructure, or nominee
DRE	Division of Resources and Energy (within the Department of Trade and Investment, Regional Infrastructure and Services)
DST	Daylight Savings Time
EA	Environmental Assessment of the project titled <i>Tanilba Northern Dune Extraction Extension - Environmental Assessment Report</i> prepared by ERM Australia Pty Limited, dated June 2012 and the Proponent's response to the issues raised in submissions, dated November 2012
EP&A Act	<i>Environmental Planning and Assessment Act 1979</i>
EP&A Regulation	<i>Environmental Planning and Assessment Regulation 2000</i>
EPL	Environment Protection Licence under the <i>Protection of the Environment Operations Act 1997 (POEO Act)</i>
EST	Eastern Standard Time
Feasible	Feasible relates to engineering considerations and what is practical to build
HWC	Hunter Water Corporation
Incident	A set of circumstances that causes or threatens to cause material harm to the environment, and/or breaches or exceeds the limits or performance measures/criteria in this approval
Land	Land means the whole of a lot, or contiguous lots owned by the same landowner, in a current plan registered at the Land Titles Office at the date of this approval
m AHD	metres Australian Height Datum
Material harm to the environment	Material harm to the environment as defined in the <i>Protection of the Environment Operations Act 1997</i>
Minister	Minister for Planning and Infrastructure, or nominee
NOW	NSW Office of Water (within the Department of Primary Industries)
OEH	Office of Environment and Heritage (within the Department of Premier and Cabinet)
Privately-owned land	Land that is not owned by a public agency or a quarrying company (or its subsidiary)
Project	The development as described in the EA
Proponent	Sibelco Australia Limited, or its successors in title
Quarrying operations	The extraction, processing and transportation of extractive materials on the site and the associated removal of vegetation, topsoil and overburden
Reasonable	Reasonable relates to the application of judgement in arriving at a decision, taking into account: mitigation benefits, cost of mitigation versus benefits provided, community views and the nature and extent of potential improvements
Rehabilitation	The treatment or management of land disturbed by the project for the purpose of establishing a safe, stable and non-polluting environment
RMS	NSW Roads and Maritime Services
Statement of Commitments	The Proponent's commitments in Appendix 3
Site	Land to which the Project Approval applies, as listed in schedule 1 and shown in Appendix 1

SCHEDULE 2 ADMINISTRATIVE CONDITIONS

Obligation to Minimise Harm to the Environment

1. The Proponent shall implement all reasonable and feasible measures to prevent and/or minimise any material harm to the environment that may result from the construction, operation or rehabilitation of the project.

Terms of Approval

2. The Proponent shall carry out the project generally in accordance with the:
 - (a) EA;
 - (b) Statement of Commitments; and
 - (c) conditions of this approval.

Note: The general layout of the project is shown in the figure in Appendix 1.

3. If there is any inconsistency between the above documents, the most recent document shall prevail to the extent of the inconsistency. However, the conditions of this approval shall prevail to the extent of any inconsistency.
4. The Proponent shall comply with any reasonable requirement/s of the Director-General arising from the Department's assessment of:
 - (a) any reports, plans, programs or correspondence that are submitted in accordance with this approval; and
 - (b) the implementation of any actions or measures contained in these reports, plans, programs or correspondence.

Limits on Approval

5. The Proponent may carry out quarrying operations on the site until 31 December 2020.

Note: Under this Approval, the Proponent is required to rehabilitate and revegetate the site and provide and implement a Biodiversity Offset Strategy to the satisfaction of the Director-General. Consequently this approval will continue to apply in all other respects other than the right to conduct quarrying operations until the site has been rehabilitated and revegetated and the Biodiversity Offset Strategy implemented to a satisfactory standard.

6. The Proponent shall not transport more than 150,000 tonnes of extractive materials from the site in any calendar year.
7. The Proponent shall ensure that no more than three hectares of the site would be exposed (ie cleared but not re-vegetated) at any one time.

Staged Submission of any Strategy, Plan or Program

8. With the approval of the Director-General, the Proponent may submit any strategy, plan or program required by this approval on a progressive basis.

Protection of Public Infrastructure

9. The Proponent shall:
 - (a) repair, or pay the full costs associated with repairing, any public infrastructure that is damaged by the project; and
 - (b) relocate, or pay the full costs associated with relocating, any public infrastructure that needs to be relocated as a result of the project.

Operation of Plant and Equipment

10. The Proponent shall ensure that all plant and equipment used at the site, or to transport extractive materials from the site, is:
 - (a) maintained in a proper and efficient condition; and
 - (b) operated in a proper and efficient manner.

Section 94 Contributions

11. For the life of quarrying operations under the project, the Proponent shall pay Council a Section 94 contribution rate in accordance with the *Port Stephens Section 94 Development Contributions Plan 2007*.

Notification of Commencement

12. The Proponent shall notify the Department of its intention to commence quarrying operations at least two weeks prior to the commencement of quarrying operations.

SCHEDULE 3 ENVIRONMENTAL PERFORMANCE CONDITIONS

IDENTIFICATION OF BOUNDARIES

1. Prior to the commencement of quarrying operations, the Proponent shall:
 - (a) engage a registered surveyor to mark out the boundaries of the approved limits of extraction; and
 - (b) ensure that these boundaries are clearly marked at all times in a permanent manner that allows operating staff and inspecting officers to clearly identify those limits.

NOISE

Impact Assessment Criteria

2. The Proponent shall ensure that the operational noise generated by the project does not exceed the noise impact assessment criteria in Table 1 at any residence on privately-owned land.

Table 1: Noise impact assessment criteria

Receiver	L_{Aeq} (15 min) dB(A)
R1, R2, R3 and all residences in Oyster Cove	37
All other receivers	35

Notes:

- Receiver locations are shown in the Figure in Appendix 2; and
- Noise generated by the project is to be measured in accordance with the relevant procedures and exemptions (including certain meteorological conditions) of the NSW Industrial Noise Policy.

Hours of Operation

3. The Proponent shall only conduct quarrying operations on the site:
 - (a) between 7.00 am and 6.00 pm EST, Monday to Friday;
 - (b) between 7.00 am and 7.00 pm DST, Monday to Friday; and
 - (c) at no time on Saturday, Sunday or public holidays.

Operating Conditions

4. The Proponent shall:
 - (a) implement best practice noise management to minimise the construction, operational and traffic noise of the project;
 - (b) maintain the effectiveness of any noise suppression equipment on site at all times and ensure defective equipment is not used operationally until fully repaired; and
 - (c) conduct extraction activities in a south to north direction so that the topography shields the sensitive receivers,to the satisfaction of the Director-General.

Noise Monitoring Program

5. The Proponent shall prepare and implement a Noise Monitoring Program for the project to the satisfaction of the Director-General. This program must:
 - (a) be submitted to the Director-General for approval prior to commencing quarrying operations;
 - (b) include quarterly attended noise monitoring during at least the first two years of quarrying operations, to be conducted on days when at least 30 truck dispatches occur from the site; and
 - (c) include details of how the noise performance of the project would be monitored, and include a noise monitoring protocol for evaluating compliance with the noise criteria in this approval.

AIR QUALITY

Impact Assessment Criteria

6. The Proponent shall ensure that all reasonable and feasible avoidance and mitigation measures are employed so that particulate matter emissions generated by the project do not exceed the criteria listed in Tables 2 to 4 at any privately-owned land.

Table 2: Long term criteria for particulate matter

Pollutant	Averaging Period	^d Criterion
Total suspended particulate (TSP) matter	Annual	^a 90 µg/m ³
Particulate matter < 10 µm (PM ₁₀)	Annual	^a 30 µg/m ³

Table 3: Short term criterion for particulate matter

Pollutant	Averaging Period	^d Criterion
Particulate matter < 10 µm (PM ₁₀)	24 hour	^a 50 µg/m ³

Table 4: Long term criteria for deposited dust

Pollutant	Averaging Period	Maximum increase in deposited dust level	Maximum total deposited dust level
^c Deposited dust	Annual	^b 2 g/m ² /month	^a 4 g/m ² /month

Notes to Tables 2 to 4:

- ^a Total impact (i.e. incremental increase in concentrations due to the projects plus background concentrations due to all other sources);
- ^b Incremental impact (i.e. incremental increase in concentrations due to the projects on their own);
- ^c Deposited dust is to be assessed as insoluble solids as defined by Standards Australia, AS/NZS 3580.10.1:2003: Methods for Sampling and Analysis of Ambient Air - Determination of Particulate Matter - Deposited Matter - Gravimetric Method.
- ^d Excludes extraordinary events such as bushfires, prescribed burning, dust storms, sea fog, fire incidents, illegal activities or any other activity agreed by the Director-General in consultation with DECCW.

Dust Management

7. The Proponent shall:
- implement best management practice to minimise the dust emissions of the project;
 - regularly assess air quality monitoring data and relocate, modify, and/or stop operations on site as may be required to ensure compliance with the relevant conditions of this approval;
 - minimise any visible off-site air pollution; and
 - minimise surface disturbance of the site, other than as permitted under this approval.

Dust Monitoring Program

8. The Proponent shall prepare and implement a Dust Monitoring Program for the project to the satisfaction of the Director-General. This program must:
- be submitted to the Director-General for approval prior to commencing quarrying operations;
 - include a program for the use of a water tanker on unsealed roads;
 - include details of how the air quality performance of the project would be monitored, and a protocol for evaluating compliance with the relevant air quality criteria in this approval.

SOIL AND WATER

Pollution of Waters

9. Except as may be expressly provided for by an EPL, the Proponent shall comply with section 120 of the *Protection of the Environment Operations Act 1997* in carrying out the project.

Management and Monitoring

10. The Proponent shall not extract sand or other extractive materials or carry out any work in the extraction area below a level of 0.7 m above the predicted maximum groundwater elevation (see condition 14 of schedule 3), other than the construction of any bores approved by NOW.
11. The Proponent shall ensure that the final landform of the extraction area must be at least 1 metre above the predicted maximum groundwater elevation.
12. The Proponent shall prepare and implement a Soil and Water Management Plan for the project to the satisfaction of the Director-General. This plan must:
- (a) be prepared:
 - by suitably qualified person(s), approved by the Director-General; and
 - in consultation with HWC and NOW;
 - (b) include a(n):
 - Erosion and Sediment Control Plan; and
 - Groundwater Monitoring Program; and
 - (c) be submitted to the Director-General for approval prior to commencing quarrying operations.
13. The Erosion and Sediment Control Plan shall:
- (a) be consistent with the requirements of *Managing Urban Stormwater, Soils and Construction Volume 2E Mines and Quarries*, (DECC 2008), or the latest edition;
 - (b) identify activities that could cause soil erosion and generate sediment;
 - (c) describe measures to minimise soil erosion and the potential for the transport of sediment off site;
 - (d) describe the location, function, and capacity of erosion and sediment control structures; and
 - (e) describe what measures would be implemented to maintain these structures over time.
14. The Ground Water Monitoring Program shall include:
- (a) detailed baseline data on groundwater levels and quality, based on statistical analysis;
 - (b) groundwater impact assessment criteria;
 - (c) a program to monitor groundwater levels and quality;
 - (d) a protocol for the investigation, notification and mitigation of any identified exceedances of the groundwater impact assessment criteria;
 - (e) the outcome of groundwater modelling to establish the predicted maximum groundwater elevation for the site;
 - (f) a program to monitor any impacts of the project on groundwater dependent ecosystems, and
 - (g) a contingency plan to manage any acid sulfate soils and potentially acid sulfate soils encountered during quarrying operations.

BIODIVERSITY

Biodiversity Management Plan

15. The Proponent shall prepare and implement a Biodiversity Management Plan for the project to the satisfaction of the Director-General. This plan must:
- (a) be prepared:
 - by suitably qualified person(s), approved by the Director-General; and
 - in consultation with Council and OEH;
 - (b) be submitted to the Director-General for approval prior to commencing quarrying operations;
 - (c) address both the project site and the offset areas;
 - (d) provide for the retention of hollow-bearing trees, wherever practicable;
 - (e) ensure the establishment and on-going monitoring (at least 6 years) of at least 2 nest boxes for each tree hollow removed during clearing;
 - (f) include a program to undertake targeted surveys for the novel *Uperoleia sp.*;

- (g) identify any areas within the offset areas requiring rehabilitation and/or re-vegetation and implement a program for this;
- (h) include a detailed description of the measures that would be implemented, including the procedures to be implemented for:
 - enhancing the quality of existing vegetation, fauna habitat and wildlife corridors;
 - landscaping the site to minimise any visual impacts of the project;
 - maximising the salvage of resources within the approved disturbance area – including vegetative, soil and cultural heritage resources – for beneficial reuse in the offset areas and/or rehabilitation areas;
 - minimising the impacts of the project on fauna, including undertaking pre-clearance surveys and minimising the use of insecticides, herbicides, pesticides and biocides;
 - controlling weeds and feral pests;
 - maintenance of a buffer zone at the northern edge of the extraction area;
 - controlling access;
 - minimising edge effects; and
 - bushfire management; and
- (i) include:
 - management measures;
 - monitoring procedures;
 - performance indicators; and
 - reporting frameworks,
 with particular reference to the novel *Uperoleia sp.*, Koala, and Wallum Froglet.

Long-term Security for Offset

- 16. By 31 December 2013, or otherwise agreed by the Director-General, the Proponent shall:
 - (a) enter into a Biobanking agreement in respect of the proposed offset areas (see Appendix 4) with the Minister for the Environment, in accordance with Part 7A of the *Threatened Species Conservation Act 1995*, to implement the Biodiversity Offset Strategy; or
 - (b) enter into an agreement with OEH to transfer the offset areas into the national parks estate, to the satisfaction of the Director-General.

REHABILITATION AND LANDSCAPING

Landscape Management Plan

- 17. The Proponent shall prepare and implement a Landscape Management Plan for the project to the satisfaction of the Director-General. This plan must:
 - (a) be prepared:
 - by suitably qualified person(s), approved by the Director-General; and
 - in consultation with Council and HWC;
 - (b) be submitted to the Director-General for approval prior to commencing quarrying operations; and
 - (c) include:
 - a Rehabilitation Management Plan; and
 - a Long Term Management Strategy.
- 18. The Rehabilitation Management Plan must include:
 - (a) rehabilitation objectives for the site;
 - (b) a description of the measures that would be implemented to:
 - rehabilitate and stabilise the site;
 - minimise the removal of mature trees; and
 - manage the remnant vegetation and habitat on the site;
 - (c) detailed performance and completion criteria for the rehabilitation and stabilisation of the site;
 - (d) a detailed description of how the performance of rehabilitation would be monitored over time to measure achievement of the performance and completion criteria and the rehabilitation objectives;
 - (e) a detailed description of what measures would be implemented to rehabilitate and manage the landscape of the site, including the procedures to be implemented for:
 - progressively rehabilitating and stabilising areas disturbed by quarrying;
 - implementing revegetation and regeneration within the disturbance areas;
 - protecting areas outside the disturbance areas;

- vegetation clearing protocols, including a protocol for clearing any trees containing hollows and the relocation of hollows from felled trees;
 - managing impacts on fauna, particularly threatened fauna and the novel *Uperoleia* sp.;
 - controlling weeds and pests;
 - controlling access;
 - bushfire management; and
 - reducing the visual impacts of the project;
- (f) a description of the potential risks to successful rehabilitation, and a description of the contingency measures that would be implemented to mitigate these risks; and
- (g) details of who is responsible for monitoring, reviewing, and implementing the plan.
19. The Long Term Management Strategy must:
- (a) define the objectives and criteria for quarry closure and post-extraction management;
 - (b) investigate and/or describe options for the future use of the site;
 - (c) describe the measures that would be implemented to minimise or manage the ongoing environmental effects of the project; and
 - (d) describe how the performance of these measures would be monitored over time.

Rehabilitation Bond

20. Prior to commencing quarrying operations, the Proponent shall lodge a rehabilitation bond for the project with the Director-General. The Proponent may lodge the rehabilitation bond in two portions. The first portion for 4.5 hectares must be lodged with the Department prior to commencing quarrying operations, with no land disturbance to exceed 4.5 hectares until the second portion of the bond is accepted by the Department.

The sum of the bond shall be calculated at \$2.50/m² for the area to be disturbed by quarrying operations, to the satisfaction of the Director-General.

If rehabilitation and revegetation works have been completed in accordance with the Rehabilitation Management Plan and to the satisfaction of the Director-General, the Director-General will release the rehabilitation bond.

If rehabilitation and revegetation works are not completed to the satisfaction of the Director-General, the Director-General will call in all or part of the rehabilitation bond, and arrange for the satisfactory completion of the relevant works.

21. Within 3 months of each Independent Environmental Audit (see condition 8 of schedule 5), the Proponent shall review, and if necessary revise, the sum of the rehabilitation bond to the satisfaction of the Director-General. This review must consider:
- (a) the effects of inflation; and
 - (b) performance under the Rehabilitation Management Plan to date.

ABORIGINAL CULTURAL HERITAGE

Aboriginal Cultural Heritage Management Plan

22. The Proponent shall prepare and implement an Aboriginal Cultural Heritage Management Plan to the satisfaction of the Director-General. This plan must:
- (a) be prepared in consultation with all relevant local Aboriginal communities;
 - (b) be submitted to the Director-General for approval prior to commencing quarrying operations; and
 - (c) include:
 - measures for the protection and management of site 38-4-0318 within Lot 13 DP601306;
 - a program to complete prospective pre-clearance surveys of the extraction area in consultation with Aboriginal stakeholders;
 - measures for ongoing consultation with local Aboriginal communities and the involvement of these communities in pre-clearance surveys and the ongoing management of any Aboriginal cultural heritage values identified within the site;
 - an Aboriginal cultural education program for the induction of personnel and contractors involved in quarrying operations; and

- a description of the measures that would be implemented if any new Aboriginal objects or skeletal remains are discovered during the project.

TRAFFIC

Haulage Route

23. All extractive materials dispatched from the site must be delivered to Sibelco's Salt Ash Sand Processing Plant by the most direct route available.

Road Signage

24. Prior to commencing quarrying operations, the Proponent shall:
 - (a) install "Trucks Crossing" and "Trucks Entering" warning signs on Nelson Bay Road on both the western and eastern approaches to the intersection of Lemon Tree Passage Road; and
 - (b) pay the full cost of this installation, to the satisfaction of RMS.

On-Site Traffic Management

25. The Proponent shall ensure that:
 - (a) all vehicles do not exceed a speed of 25 kph on the site;
 - (b) all loaded vehicles entering or leaving the site have their loads covered; and
 - (c) all loaded vehicles leaving the site are cleaned of sand and other materials that may fall on the road, before leaving the site.

Traffic Management Plan

26. The Proponent shall prepare and implement a Traffic Management Plan for the project, to the satisfaction of the Director-General. This plan must:
 - (a) be submitted to the Director-General for approval prior to commencing quarrying operations;
 - (b) include a drivers' code of conduct to minimise the impacts of project-related trucks on local residents and road users; and
 - (c) describe the measures that would be put in place to ensure compliance with the drivers' code of conduct.

VISUAL

Visual Amenity

27. The Proponent shall minimise the visual impacts of the project to the satisfaction of the Director-General.

WASTE MANAGEMENT

28. The Proponent shall minimise the amount of waste generated by the project to the satisfaction of the Director-General.
29. The Proponent shall ensure that wastewater and/or sewage disposal is not undertaken on the site.
30. The Proponent shall not undertake any refuelling or maintenance of vehicles or equipment on the site, except to the extent necessary to remove vehicles or equipment from the site in the case of breakdowns.
31. The Proponent must not cause, permit or allow any waste generated outside the site to be received at the site for storage, treatment, processing, reprocessing or disposal or any waste generated at the site to be disposed of at the site, except with the approval of the Director-General and as expressly permitted by a licence under the *Protection of the Environment Operations Act 1997*.

Note: This condition only applies to the storage, treatment, processing, reprocessing or disposal of waste at the site if it requires an EPL under the Protection of the Environment Operations Act 1997.

EMERGENCY AND HAZARDS MANAGEMENT

Dangerous Goods

32. The Proponent shall ensure that chemicals and/or petroleum products are not stored on site.

Safety

33. The Proponent shall ensure public safety at the site to the satisfaction of the Director-General.

PRODUCTION DATA

34. The Proponent shall:
- (a) provide annual quarry production data to DRE using the standard form for that purpose; and
 - (b) include a copy of this data in the Annual Review (see condition 3 of Schedule 5).

SCHEDULE 4 ADDITIONAL PROCEDURES

NOTIFICATION OF LANDOWNERS

1. If the results of the monitoring required in schedule 3 identify that the impacts generated by the project on site are greater than the relevant impact assessment criteria, and there is no negotiated agreement in place to allow the impact, then within 2 weeks of obtaining the monitoring results the Proponent shall:
 - (a) notify the Director-General, the affected landowners and tenants (including tenants of any quarry-owned properties) accordingly, and provide monitoring results to each of these parties until the results show that the project is complying with the relevant criteria in schedule 3; and
 - (b) in the case of exceedances of the relevant air quality criteria, send the affected landowners and/or tenants a copy of the NSW Health fact sheet entitled "*Mine Dust and You*" (as may be updated from time to time).

INDEPENDENT REVIEW

2. If a landowner of privately-owned land considers the project to be exceeding the relevant criteria in schedule 3, then he/she may ask the Director-General in writing for an independent review of the impacts of the project on his/her land.

If the Director-General is satisfied that an independent review is warranted, then within 2 months of the Director-General's decision the Proponent shall:

- (a) commission a suitably qualified, experienced and independent person, whose appointment has been approved by the Director-General, to:
 - consult with the landowner to determine his/her concerns;
 - conduct monitoring to determine whether the project is complying with the relevant criteria in schedule 3; and
 - if the project is not complying with these criteria then identify the measures that could be implemented to ensure compliance with the relevant criteria; and
- (b) give the Director-General and landowner a copy of the independent review.

SCHEDULE 5
ENVIRONMENTAL MANAGEMENT, REPORTING AND AUDITING

ENVIRONMENTAL MANAGEMENT

Environmental Management Strategy

1. The Proponent shall prepare and implement an Environmental Management Strategy for the project to the satisfaction of the Director-General. The strategy must:
 - (a) be submitted to the Director-General for approval prior to the commencement of quarrying activities;
 - (b) provide the strategic framework for environmental management of the project;
 - (c) identify the statutory approvals that apply to the project;
 - (d) describe the role, responsibility, authority and accountability of all key personnel involved in the environmental management of the project;
 - (e) describe the procedures that would be implemented to:
 - keep the local community and relevant agencies informed about the operation and environmental performance of the project;
 - receive, handle, respond to, and record complaints;
 - resolve any disputes that may arise during the course of the project;
 - respond to any non-compliance; and
 - respond to emergencies; and
 - (f) include:
 - copies of the various strategies, plans and programs that are required under the conditions of this approval once they have been approved; and
 - a clear plan depicting all the monitoring to be carried out in relation to the project.

Management Plan Requirements

2. The Proponent shall ensure that the Management Plans required under this approval are prepared in accordance with any relevant guidelines, and include:
 - (a) detailed baseline data;
 - (b) a description of:
 - the relevant statutory requirements (including any relevant approval, licence or lease conditions);
 - any relevant limits or performance measures/criteria; and
 - the specific performance indicators that are proposed to be used to judge the performance of, or guide the implementation of, the project or any management measures;
 - (c) a description of the measures that would be implemented to comply with the relevant statutory requirements, limits, or performance measures/criteria;
 - (d) a program to monitor and report on the:
 - impacts and environmental performance of the project; and
 - effectiveness of any management measures (see (c) above);
 - (e) a contingency plan to manage any unpredicted impacts and their consequences;
 - (f) a program to investigate and implement ways to improve the environmental performance of the project over time;
 - (g) a protocol for managing and reporting any:
 - incidents;
 - complaints;
 - non-compliances with statutory requirements; and
 - exceedances of the impact assessment criteria and/or performance criteria; and
 - (h) a protocol for periodic review of the plan.

Note: At the discretion of the Director-General, some of these requirements may be waived where they are either not relevant or necessary.

Annual Review

3. Within 12 months of the commencement of quarrying operations, and annually thereafter, the Proponent shall review the environmental performance of the project to the satisfaction of the Director-General. This review must:
 - (a) describe the works (including rehabilitation) that were carried out in the previous year, and the works that are proposed to be carried out over current year;
 - (b) include a comprehensive review of the monitoring results and complaints records of the project over the past year, which includes a comparison of these results against:
 - the relevant statutory requirements, limits or performance measures/criteria;
 - the monitoring results of previous years; and
 - the relevant predictions in the EA;
 - (c) identify any non-compliance over the last year, and describe what actions were (or are being) taken to ensure compliance;
 - (d) identify any trends in the monitoring data over the life of the project;
 - (e) identify any discrepancies between the predicted and actual impacts of the project, and analyse the potential cause of any significant discrepancies; and
 - (f) describe what measures will be implemented over the next year to improve the environmental performance of the project.

Revision of Strategies, Plans & Programs

4. Within 3 months of:
 - (a) the submission of an annual review under condition 3 above;
 - (b) the submission of an incident report under condition 5 below;
 - (c) the submission of an audit report under condition 8 below; and
 - (d) any modifications to this approval,the Proponent shall review, and if necessary revise, the strategies, plans, and programs required under this approval to the satisfaction of the Director-General.

Note: This is to ensure the strategies, plans and programs are updated on a regular basis, and incorporate any recommended measures to improve the environmental performance of the project.

REPORTING

Incident Reporting

5. The Proponent shall notify the Director-General and any other relevant agencies of any incident associated with the project as soon as practicable after the Proponent becomes aware of the incident. Within 7 days of the date of the incident, the Proponent shall provide the Director-General and any relevant agencies with a detailed report on the incident.

Regular Reporting

6. The Proponent shall provide regular reporting on the environmental performance of the project on its website, in accordance with the reporting arrangements in any plans or programs approved under the conditions of this approval, and to the satisfaction of the Director-General.

AUDITING

Independent Environmental Audit

7. Within 1 month of the completion of quarrying operations, unless the Director-General directs otherwise, the Proponent shall commission and pay the full cost of an Independent Environmental Audit of the project. This audit must:
 - (a) be conducted by suitably qualified, experienced and independent team of experts whose appointment has been endorsed by the Director-General;
 - (b) include consultation with the relevant agencies;
 - (c) assess the environmental performance of the project and assess whether it is complying with the relevant requirements in this approval and any relevant EPL (including any assessment, plan or program required under these approvals);

- (d) review the adequacy of strategies, plans or programs required under the abovementioned approval or licences; and
- (e) be completed within 2 months of the approval of the audit team.

Note: This audit team must be led by a suitably qualified auditor and include experts in any fields specified by the Director-General.

- 8. Within 6 weeks of the completing of this audit, or as otherwise agreed by the Director-General, the Proponent shall submit a copy of the audit report to the Director-General, together with its response to any recommendations contained in the audit report.

ACCESS TO INFORMATION

- 9. From 1 July 2013, the Proponent shall:
 - (a) make the following information publicly available on its website:
 - a copy of all approved strategies, plans and programs;
 - a summary of all monitoring results of the project, which have been reported in accordance with the various plans and programs approved under the conditions of this approval, updated on a quarterly basis;
 - a complaints register, updated on a quarterly basis;
 - copies of any Annual Reviews;
 - copies of any Independent Environmental Audit, and the Proponent's response to the recommendations in any audit;
 - copies of the development consent and approved management plans for existing adjacent quarrying operations; and
 - any other matter required by the Director-General; and
 - (b) keep this information up-to-date, to the satisfaction of the Director-General.

APPENDIX 1 PROJECT SITE

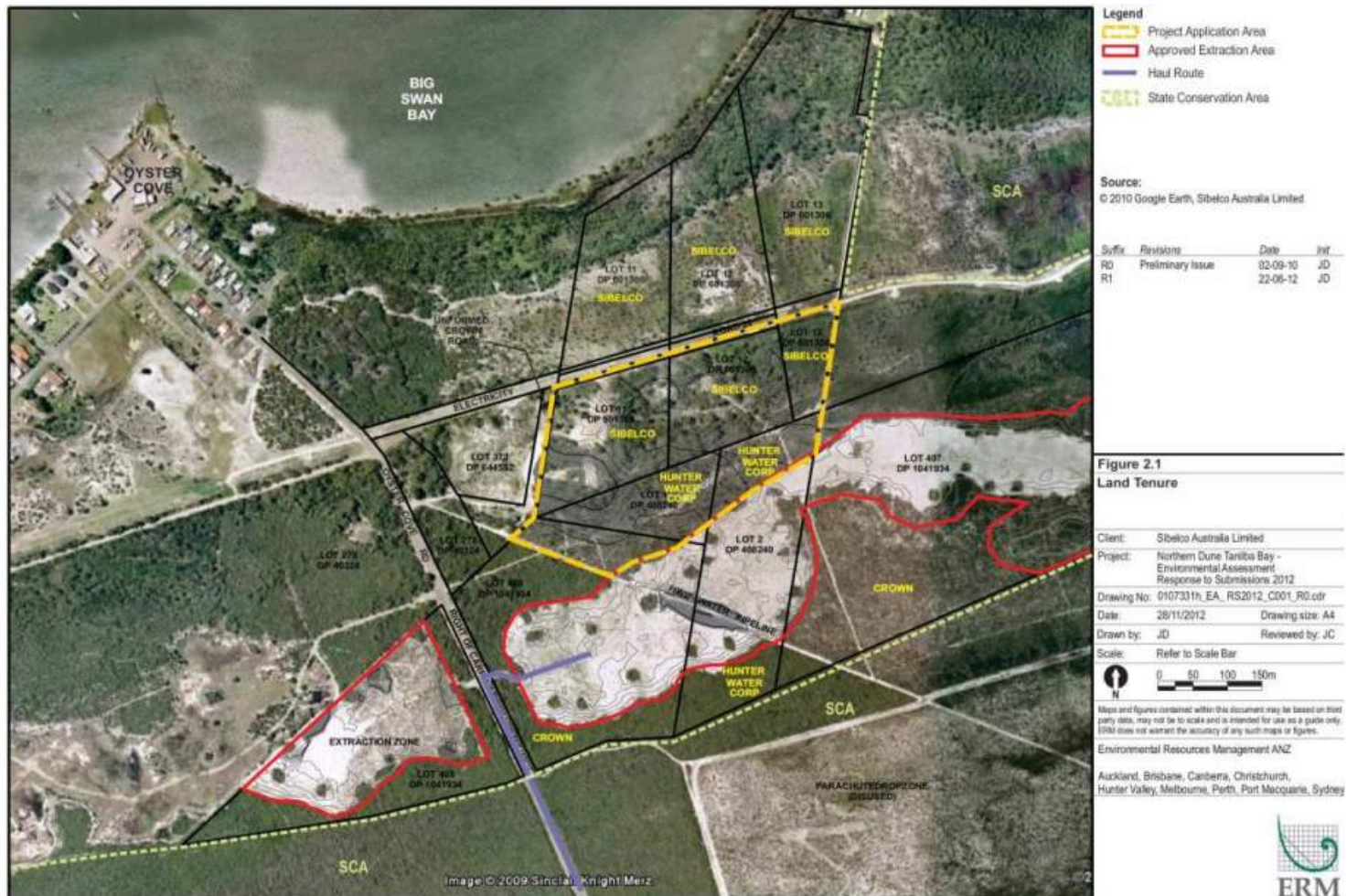


Figure 1: Project site

APPENDIX 2
NOISE RECEIVER LOCATIONS

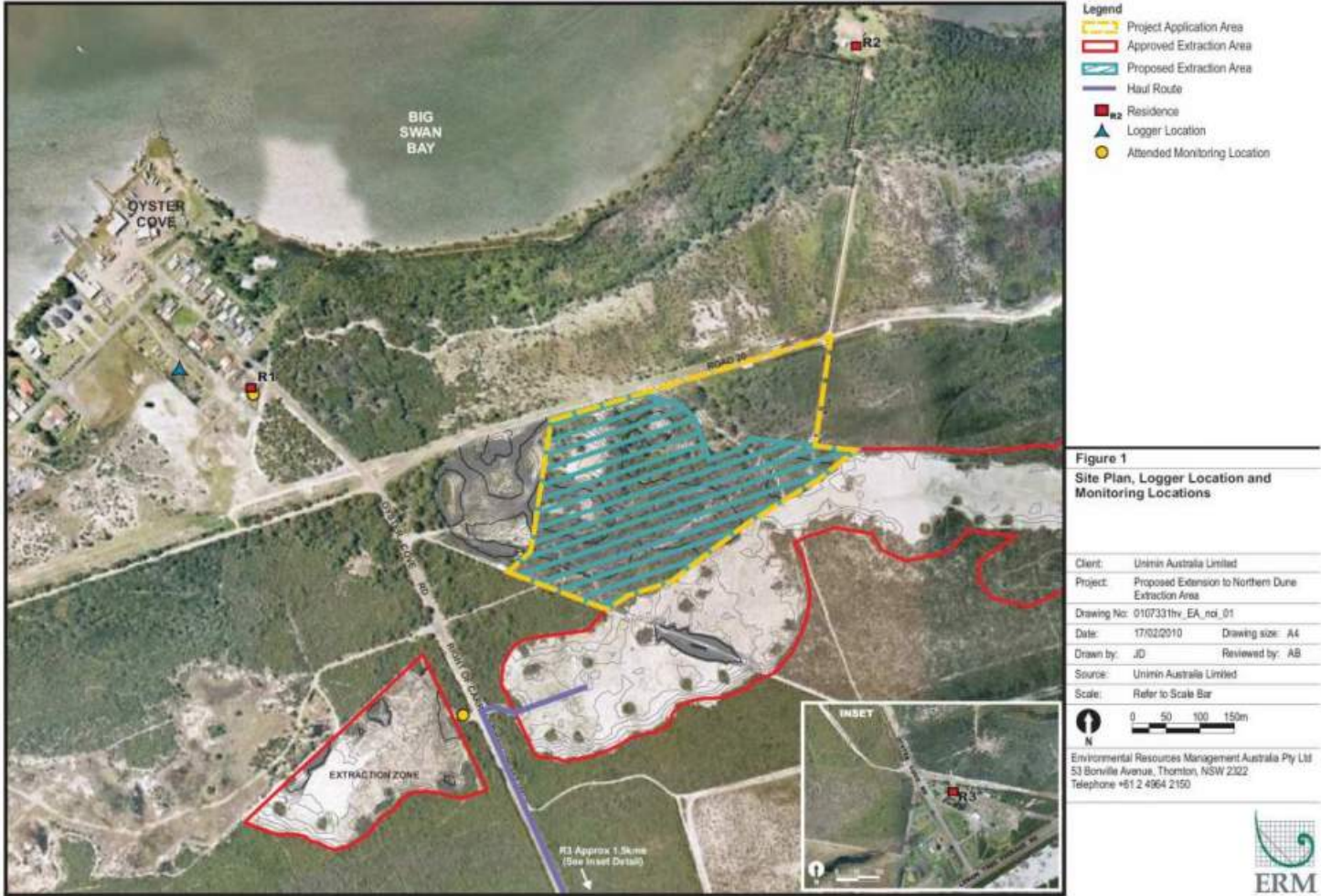


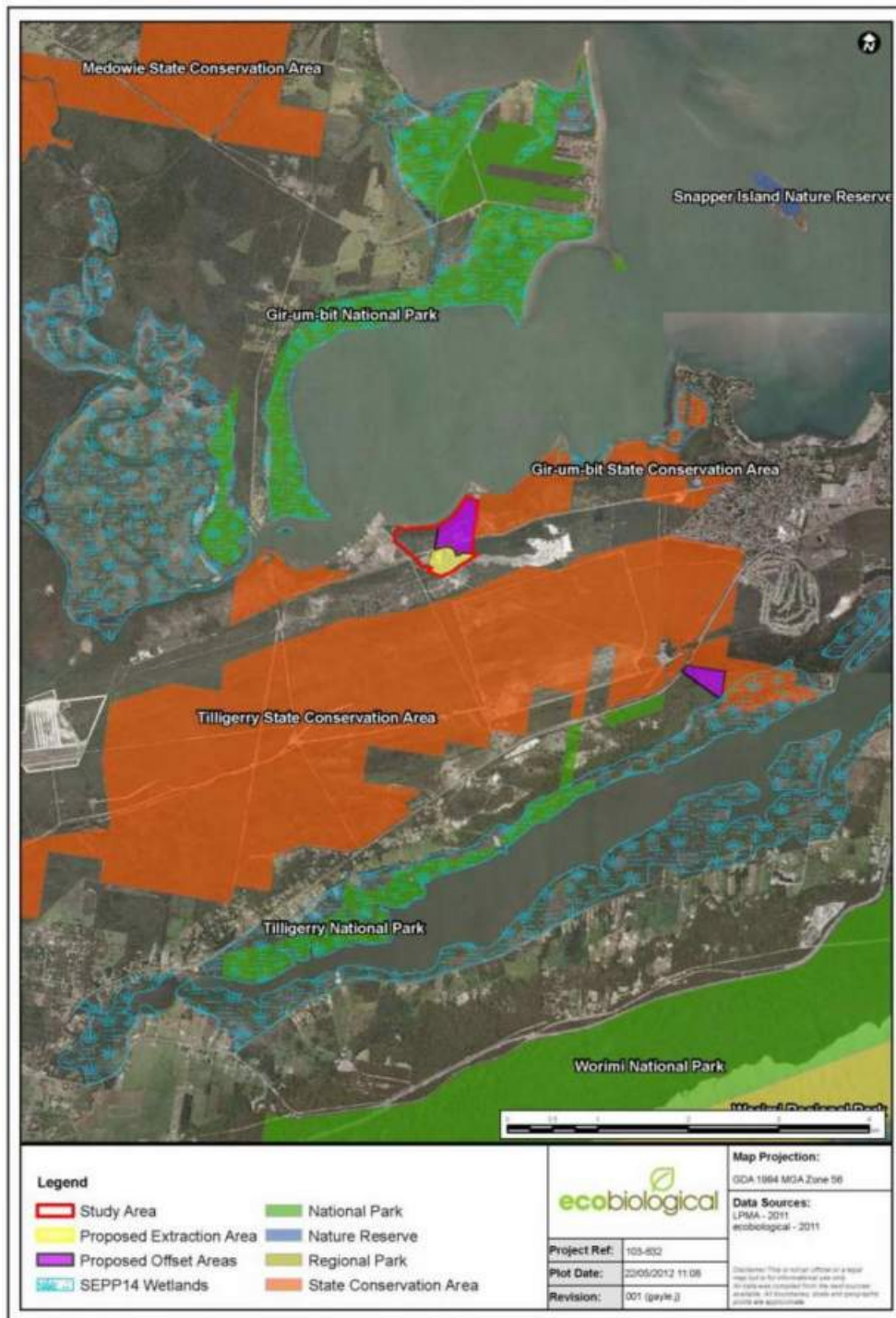
Figure 2: Noise receivers

APPENDIX 3 STATEMENT OF COMMITMENTS

Issue	Mitigation Measure/Commitment
Environmental Management Plan	<p>The currently approved EMP (2003) will be applied over all 9 EMPs and updated as necessary to meet the needs of the extension area. These include:</p> <ul style="list-style-type: none"> • EMP1 - Environmental Induction and Training • EMP2 - Hydrocarbon Spill Procedure • EMP3 - Operations Management Procedure • EMP4 - Extraction Depth and Area Monitoring • EMP5 - Groundwater • EMP6 - Cultural Heritage • EMP7 - Vegetation Rehabilitation • EMP8 - Landform Rehabilitation • EMP9 - Erosion and Sediment Control
Groundwater Monitoring	<p>The Groundwater Management Plan (GMP) in place for the existing operation will be updated to incorporate ongoing monitoring at additional bores SAL4 and SAL5 in accordance with the existing approved monitoring regime.</p> <p>Current environmental management commitments will be adopted for the extraction extension, including:</p> <ul style="list-style-type: none"> • groundwater quality and level monitoring, and reporting as part of the approved groundwater management plan; • regular review of environmental performance through the AEMR process; • maintenance of a minimum 1.0 m vertical buffer between the predicted maximum groundwater elevation and the final landform (extraction will occur to 0.7 m above predicted maximum groundwater elevation, with final rehabilitated landform being 1.0 m above these elevations following placement of 0.3 m topsoil); • staged rehabilitation of extraction areas; • avoiding storing machinery or hazardous materials onsite; and • avoiding servicing or refuelling equipment onsite.
Noise Emissions	<p>The currently approved EMP (2003) would continue to be applied, and updated as necessary to meet the needs of the proposed extension area.</p> <p>All reasonable steps would be undertaken to reduce noise emissions during extraction and transport.</p> <ul style="list-style-type: none"> • sequentially extracting from the south to the north, so that the topography will naturally help shield the sensitive receptors to the north against operational noise emissions; • ensuring all machines are in good working condition, with particular attention to exhaust silencers, engine covers and other noise reduction devices;
Issue	Mitigation Measure/Commitment
	<ul style="list-style-type: none"> • all work and transport will be restricted to daylight hours, typically from 7:00am to 6:00pm Monday to Friday, but when light permits continuing to 7:00pm; and • site imposed speed limits up to 25 km/hr to be enforced to minimise noise generation.
Air Emissions	<p>Air emissions related management measures are already in place and proposed to continue as part of the extension of operations to reduce the generation of particulate emissions.</p> <p>A water tanker will be used on all unsealed roads on an as-needs basis, dependant on weather conditions.</p> <p>Sand extraction cells will be progressively rehabilitated throughout the life of the extraction. It is anticipated that no more than three hectares will be exposed at any one time.</p>
Surface and Groundwater Quality	<p>Surface water management principles will be implemented to prevent contamination of surface (and therefore groundwater) quality. Management and monitoring actions stipulated in the existing Groundwater Management Plan (2011) for current operations will be</p> <p>Additional documents will be produced for the extraction extension area to mitigate any impacts to the quality of the groundwater, the adjoining forested wetlands and, to aid in the rehabilitation of the extraction area post sandmining including:</p> <ul style="list-style-type: none"> • Surface Water Management Plan to prevent runoff, pollution and sedimentation from the extraction area entering into adjoining forested wetlands; • Vegetation and Weed Management Plan for rehabilitation of the proposed sand extraction area; and • Offset Strategy and associated Habitat Management Plan which will detail management actions to be undertaken on the remaining portions of Lots 11, 12 and 13 and on Lot 24. This plan will cover vegetation, weed, fire and stormwater management, minimisation of edge effects, control of public access and management of habitat enhancement measures.
Ecology	<p>Hollow bearing trees 16, 17, 18 and 20 (refer to Figure 2.2, Northern Dune Submission Report) to be retained.</p> <ul style="list-style-type: none"> • avoidance of the use of biocides and implementing erosion and sediment controls; • incorporating implementation of pre-clearing surveys, a fauna displacement mitigation protocol, Koala mitigation measures, nestbox installation and monitoring, and a monitoring plan for the Wallum Froglet as detailed in Annex M of the EA; • staged rehabilitation of the extraction area (to be supported by a Vegetation Rehabilitation Management Plan), to be conducted in the same fashion as successful rehabilitation of Sibelco's existing approved extraction areas directly to the south; and • implementation of an Offset Strategy as detailed in Section 11.6.4 if the EA.
Vegetation Clearing	At least one week prior to any vegetation clearing, a survey of habitat trees will be conducted in the planned clearing area in accordance

Issue	Mitigation Measure/Commitment
	with the survey methodology outlined in Section 11.6.1 of the EA.
	Pre-clearing surveys will be conducted to check for the presence of any Koalas within the proposed extraction area.
	Hollow-bearing trees will be left standing for two nights after the surrounding vegetation has been cleared to encourage any native fauna species utilising the habitat hollows to self-relocate. The actual felling of any habitat trees will be attended by a suitably experienced fauna ecologist in order to ensure the safety of any fauna found to be in the hollows. On all occasions, trees having potential habitat hollows should be 'soft felled' by an experienced machine operator in accordance with the procedure outlined in section 11.6.1 of the EA.
Fauna Displacement Protocol	A fully qualified, experienced and licensed ecologist will supervise clearing and encourage movement of any displaced animals into adjoining vegetation.
	Captured fauna and/or displaced fauna will be relocated to adjacent habitat by an ecologist. During tree removal or any other construction activity, Fauna Displacement protocols outlined in Section 11.6.2 of the EA will be followed in the case of an injured animal.
Wallum Froglet Management Plan	A management plan for the Wallum Froglet (<i>Crinia tinnula</i>) will be developed in accordance with the management guidelines outlined under Section 6 of the National Recovery Plan for the Wallum Sedgefrog and Other Wallum- dependent Frog Species. In particular this will include specifications on: <ul style="list-style-type: none"> • minimising affects from soil disturbance; • ensuring sufficient retention of vegetation particularly around breeding sites; and • monitoring the habitat condition and frog numbers to ensure the threats to the species are properly managed. This should be undertaken with sufficient regularity and should preferably be carried out a year or more before development starts and continue for the duration of extraction operations, including rehabilitation works.
Nestbox Installation and Monitoring Program	A nestbox installation and monitoring program will be implemented on a ratio of 2:1 to replace 38 hollows present in the 17 hollow-bearing trees mapped within the proposed extraction area. Nestboxes should be erected prior to clearing commencing in order to provide alternative den and/or nest sites for any displaced fauna.
Issue	Mitigation Measure/Commitment
	Nestboxes are to be erected within the Proposed Offset Areas on Lots 11, 12 and 13. Nest box designs should be selected to replace the natural hollow sizes removed (ie, 20 small, 16 medium and 2 large) and will target insectivorous bats, gliders and possums. Annual monitoring for a minimum 6-year period post installation is recommended to record uptake of the nestboxes and to attend to any maintenance issues. A brief letter confirming annual inspection of the nestboxes and documentation of results should be provided to OEH.
Vegetation Management and Monitoring Plan	Weed Management and Vegetation Management and Monitoring Plans will be prepared for the rehabilitation area and proposed Offset Areas on Lots 11, 12, 13 and 24, which will include a thorough and intensive program to protect the adjoining forested wetland communities against weed invasion, and surface and underground run-off that may occur both during and after sand extraction activities. The management and monitoring plans will consider: <ul style="list-style-type: none"> • the nature and control of sediment run-off during the extraction phase particularly as a result of an exceptional storm event; • the volume, path and content of stormwater discharging from the site during and after extraction; • the handling of hydrocarbon spills on the site; • existing flow regime of surface and groundwater flow from the proposed extraction area into the forested wetlands; and • weed invasion
Biodiversity Offset Strategy	A biodiversity offset strategy will be adopted as outlined in detail in Annex P of the EA. Biodiversity offsets are proposed on lands currently owned by Sibelco, comprising portions of Lots 11 to 13, DP601306 (approximately 18.35 ha) and all of Lot 24, DP579700 (approximately 9.44 ha) (the offset lands). A secure offset mechanism (through a Voluntary Conservation Agreement or other similar tool for management in perpetuity) will be placed over these offset lands, which will result in permanent protection and management of the land and result in numerous ecological benefits.
Aboriginal Heritage	As ground visibility is limited within the extraction extension area, further archaeological work is required prior to commencement of extraction operations. The further assessment will be undertaken in accordance with any conditions of consent and will consist of a prospective clearing program that will be undertaken to improve ground visibility and allow the registered Aboriginal stakeholders to inspect the ground surface within the approved extraction area, to provide greater certainty of the presence or otherwise of Aboriginal archaeological sites. Sibelco will contact the three Aboriginal stakeholder groups at least three weeks prior to the proposed clearing and invite them to attend. Details of the methodology as agreed by the registered Aboriginal stakeholders is presented in Chapter 7 of Annex N of the EA, including procedures for undertaking the required site clearance, required actions should Aboriginal sites or artefacts be found during the prospective clearing program, and the requirements for updating the Cultural Heritage Management Plan, which will be undertaken prior to commencement of any extraction.
Issue	Mitigation Measure/Commitment
Bushfire	<ul style="list-style-type: none"> • provision of a separation distance (minimum of 10 m) between stockpiles of combustible material and remnant vegetation; • managing operations and the site to minimise likelihood of ignition sources through good 'housekeeping' (for example, all waste in bins); • emergency planning procedures in the event of a fire occurring on the site; • fitting of all earth moving machinery with spark arresting mufflers and haul trucks have serviceable exhaust systems to prevent accidental ignition of vegetation; and • equipping the operations to assist in the management of any fires on-site, including presence of fire extinguishers, water cart (as contracted), and the site front-end loader and bulldozer for any requisite fire fighting purposes.
Waste Management	<ul style="list-style-type: none"> • no burning of waste; • any noxious plant species will be removed from the site, bagged and disposed of at a licensed landfill; • any waste will be removed daily and recycled or disposed of directly at a licensed landfill; and • the site will be maintained and kept free of rubbish and cleaned up at the end of each working day.

APPENDIX 4 BIODIVERSITY OFFSET STRATEGY



APPENDIX 2

MONTHLY INSPECTIONS

Attachment 6.2A - Environmental Hazard Inspection (Aggregate Operations)

Site Details	Northern Dune
Inspection Completed By:	Zoe Archard + Craig Foo
Inspection Date	18/4/23

	Compliance		Comments	Action	Who	When
	Yes	No				
STORAGE PROVISIONS						
Check all chemical & hydrocarbons drums are labelled and stored in designated areas.	N/A					
Check that bunded areas that are fitted with drain valves are locked in the closed position .	N/A					
Check bunds are in good condition (free from cracks, degradation and physical damage), are watertight and the bunds are reasonably clean.	N/A					
Check that stormwater that collects within the bund is regularly removed (not to the offsite stormwater system).	N/A					
Check for signs of spills, leaks, straining or contaminated runoff.	N/A					

STORMWATER DISCHARGE						
Check that all spills have been cleaned up and that no residual spillage is free to wash into the off site stormwater system.	N/A					
Check for evidence of contaminants or blockages in drains.	N/A					
Check that cleaning devices (grates, settling pits, interceptor traps etc.) are being maintained correctly.	N/A					
Check that material build-up or damage to paved areas (including vehicle or plant wash down areas) does not allow contaminated water to bypass controls (pits or interceptors) or to flow into the off site stormwater system.	N/A					
Check off site stormwater drains for signs of contamination.	N/A					
AIR EMISSIONS						
Check that water sprays, containment systems and/or dust extraction equipment is working correctly.	N/A					
Check the site boundary for noticeable dust deposits (settled dust or windborne).						
Check that dust emissions are not crossing the site boundary from an appropriate vantage point	✓		NO extraction			

NOISE CHECK (If residential properties are in close proximity to the site)						
Walk along appropriate site boundaries to check for any new or annoying noises that may create a nuisance for nearby residences.	N/A		NO extraction or rehab			
WASTE DISPOSAL						
Check waste storage areas to ensure that waste is stored, labelled and segregated correctly.	N/A					
EMERGENCY RESPONSE EQUIPMENT						
Check that emergency response equipment (including spill kits) are intact, complete, readily accessible and stationed in an appropriate location.	N/A					
GENERAL						
Complete a site boundary check to ensure that any risks posed by neighbours (such as discharge onto HOLCIM site, incorrect storage near fences, etc.) are identified and actioned.	N/A					
Check that all known hazards, incidents and complaints that have occurred throughout the month have been correctly recorded in INX and effective action is being taken.	N/A					
GENERAL HOUSEKEEPING						
Check equipment or operating plant for leaks or spills.	N/A		NO machines onsite			

Check the graveyard or lay down area to ensure only equipment or materials with a future use are held in storage (all other items should be removed and recycled or disposed of in an appropriate manner).	N/A		No storage			
CEMENT SILO						
Check the silo roof to ensure that silo access openings are closed and appropriately sealed and that there is no evidence of leakage during filling cycles.	N/A					
Check the outlet of the silo filter /pressure release ducting at ground level to determine if cement is being discharged during filling cycles.	N/A					
SLURRY PITS, SETTLING PONDS, SILT TRAPS AND OIL INTERCEPTORS						
Visually check that the slurry pits, settling ponds, silt traps and oil interceptors are maintained and emptied or cleaned as required.	N/A					
FLORA AND FAUNA						
Inspect site for any new outbreak of weeds. If new weeds are identified take appropriate action to control the outbreak.			grass + other weeds on road in recently retubed area.	weed spraying + spot burn.		

weed spraying in near future

Attachment 6.02A - Environmental Hazard Inspection (Aggregate Operations)

Site Details	Northern Dune Sand (NDS) Northern Dune Sand Extension (NDSE)
Inspection Completed By:	Zoe Archard & Rodney Harwood
Inspection Date	16/05/2023

	Compliance		Comments	Action	Who	When
	Yes	No				
PERMIT SPECIFIC REQUIREMENTS						
No material erosion issued identified on roadside drainage, rehabilitation areas and topsoil stockpiles (SWMP/LMP/DA4659-89)	✓		Site no longer extracting, site now non-operational and is under rehabilitation.			
All installed sediment fencing is in good working order (SWMP)	✓					
Illegal waste dumping is identified and removed or action recorded to remove from site/ Northern Offset Area during annual clean up (EMP/BMP)	✓					
Boundary to the Northern Offset Area (NOA) is protected through delineation barriers (e.g. felled trees, sand mounds and fencing) and the retention of vegetation along boundaries to control access to the area (BMP)	✓					

Attachment 6.02A - Environmental Hazard Inspection (Aggregate Operations)

	Compliance		Comments	Action	Who	When
Any tracks leaving Rutile Road into the site have suitable barriers to prevent unauthorised access (e.g. gates/barriers) (BMP)	✓		Yes			
Map of Koala habitat for the Site is located in the Salt Ash site office visible for all staff and contractors (BMP)	✓		Yes in Managers Office			
50 meter buffer is maintained between rehabilitation area and Wallum Froglet habitat areas (LMP)	✓		Yes			
No new weed infestations are observed within the rehabilitated area. If new weeds are identified, take appropriate action to control the outbreak (LMP).	✓					
No material dieback or vegetation loss is evident for native re-vegetation within the rehabilitation areas (LMP/DA4659-89)	✓					
Any mobile equipment used at Site is equipped with fire extinguishers (LMP)	✓		There is no mobile equipment on site. Site is non-operational			
A gate is installed and maintained on all site access roads that adjoin Oyster Cove Road and locked at all times (condition 52 DA4659-89)	✓		Concrete blocks across main entrance			

STORAGE PROVISIONS

Attachment 6.02A - Environmental Hazard Inspection (Aggregate Operations)

	Compliance		Comments	Action	Who	When
No hydrocarbons are stored on site no evidence of refueling activities on site (condition O4 EPL 11633)	✓		There is no mobile equipment or chemicals on site.			
Check for signs of spills, leaks, straining or contaminated runoff.	✓		There is no mobile equipment or chemicals on site.			
STORM WATER DISCHARGE						
Check that all spills have been cleaned up and that no residual spillage is free to wash into the off-site storm water system.	✓		No Drains			
Check for evidence of contaminants or blockages in drains.	✓		No Drains			
Check off site storm water drains for signs of contamination.	✓		No Drains	□		
AIR EMISSIONS						
Check that all dust deposition gauges are in good working order and not vandalised (DMP)	✓					
Check the site boundary for noticeable dust deposits (settled dust or windborne).	✓		No visible dust detected			
Check that dust emissions are not crossing the site boundary from an appropriate vantage point.	✓		Site is non-operational			
NOISE CHECK (If residential properties are in close proximity to the site)						

Attachment 6.02A - Environmental Hazard Inspection (Aggregate Operations)

	Compliance		Comments	Action	Who	When
Walk along appropriate site boundaries to check for any new or annoying noises that may create a nuisance for nearby residences.	✓		Site is non-operational			
WASTE DISPOSAL						
No operational waste is stored on site	✓		No waste on site			
EMERGENCY RESPONSE EQUIPMENT						
Check that emergency response equipment (including spill kits) are intact, complete, readily accessible and stationed in an appropriate location.	✓		Kept in utility vehicle when on site			
GENERAL						
Complete a site boundary check to ensure that any risks posed by neighbours (such as discharge onto HOLCIM site, incorrect storage near fences, etc.) are identified and actioned.	✓		No material is stored near any fences or the likelihood of discharge onto the Holcim site.			
Check that all known hazards, incidents and complaints that have occurred throughout the month have been correctly recorded in iCare and effective action is being taken.	✓		No complaints, Hazards or incidents have occurred			
GENERAL HOUSEKEEPING						
Check equipment or operating plant for leaks or spills.	✓		No HME on site			

Attachment 6.02A - Environmental Hazard Inspection (Aggregate Operations)

FLORA AND FAUNA

Inspect site for any new outbreak of weeds. If new weeds are identified, take appropriate action to control the outbreak.



Grass on Haul Rd. Require burning and spraying

Attachment 6.02A - Environmental Hazard Inspection (Aggregate Operations)

Site Details	Northern Dune Sand (NDS) Northern Dune Sand Extension (NDSE)
Inspection Completed By:	Zoe Archard & Rodney Harwood
Inspection Date	14/06/2023

	Compliance		Comments	Action	Who	When
	Yes	No				
PERMIT SPECIFIC REQUIREMENTS						
No material erosion issued identified on roadside drainage, rehabilitation areas and topsoil stockpiles (SWMP/LMP/DA4659-89)	✓		Site no longer extracting, site now non-operational and is under rehabilitation.			
All installed sediment fencing is in good working order (SWMP)	✓					
Illegal waste dumping is identified and removed or action recorded to remove from site/ Northern Offset Area during annual clean up (EMP/BMP)	✓		No waste dumped on site. Rubbish dumped on Rutile rd			
Boundary to the Northern Offset Area (NOA) is protected through delineation barriers (e.g. felled trees, sand mounds and fencing) and the retention of vegetation along boundaries to control access to the area (BMP)	✓					

Attachment 6.02A - Environmental Hazard Inspection (Aggregate Operations)

	Compliance		Comments	Action	Who	When
Any tracks leaving Rutile Road into the site have suitable barriers to prevent unauthorised access (e.g. gates/barriers) (BMP)	✓		Yes			
Map of Koala habitat for the Site is located in the Salt Ash site office visible for all staff and contractors (BMP)	✓		Yes in Managers Office			
50 meter buffer is maintained between rehabilitation area and Wallum Froglet habitat areas (LMP)	✓		Yes			
No new weed infestations are observed within the rehabilitated area. If new weeds are identified, take appropriate action to control the outbreak (LMP).	✓		Weed spraying in Area Q Haul Rd			
No material dieback or vegetation loss is evident for native re-vegetation within the rehabilitation areas (LMP/DA4659-89)	✓					
Any mobile equipment used at Site is equipped with fire extinguishers (LMP)	✓		There is no mobile equipment on site. Site is non-operational			
A gate is installed and maintained on all site access roads that adjoin Oyster Cove Road and locked at all times (condition 52 DA4659-89)	✓		The knoll Gate chain has been cut. Concrete blocks across main entrance			

STORAGE PROVISIONS

Attachment 6.02A - Environmental Hazard Inspection (Aggregate Operations)

	Compliance		Comments	Action	Who	When
No hydrocarbons are stored on site no evidence of refueling activities on site (condition O4 EPL 11633)	✓		There is no mobile equipment or chemicals on site.			
Check for signs of spills, leaks, straining or contaminated runoff.	✓		There is no mobile equipment or chemicals on site.			
STORM WATER DISCHARGE						
Check that all spills have been cleaned up and that no residual spillage is free to wash into the off-site storm water system.	✓		No Drains			
Check for evidence of contaminants or blockages in drains.	✓		No Drains			
Check off site storm water drains for signs of contamination.	✓		No Drains	□		
AIR EMISSIONS						
Check that all dust deposition gauges are in good working order and not vandalised (DMP)	✓		All good no damage or sabotaged			
Check the site boundary for noticeable dust deposits (settled dust or windborne).	✓		No visible dust detected			
Check that dust emissions are not crossing the site boundary from an appropriate vantage point.	✓		Site is non-operational			
NOISE CHECK (If residential properties are in close proximity to the site)						

Attachment 6.02A - Environmental Hazard Inspection (Aggregate Operations)

	Compliance		Comments	Action	Who	When
Walk along appropriate site boundaries to check for any new or annoying noises that may create a nuisance for nearby residences.	✓		Site is non-operational			
WASTE DISPOSAL						
No operational waste is stored on site	✓		No waste on site			
EMERGENCY RESPONSE EQUIPMENT						
Check that emergency response equipment (including spill kits) are intact, complete, readily accessible and stationed in an appropriate location.	✓		Kept in utility vehicle when on site			
GENERAL						
Complete a site boundary check to ensure that any risks posed by neighbours (such as discharge onto HOLCIM site, incorrect storage near fences, etc.) are identified and actioned.	✓		No material is stored near any fences or the likelihood of discharge onto Holcim site.			
Check that all known hazards, incidents and complaints that have occurred throughout the month have been correctly recorded in iCare and effective action is being taken.	✓		No complaints, Hazards or incidents have occurred			
GENERAL HOUSEKEEPING						
Check equipment or operating plant for leaks or spills.	✓		No HME on site			

Attachment 6.02A - Environmental Hazard Inspection (Aggregate Operations)

FLORA AND FAUNA

Inspect site for any new outbreak of weeds. If new weeds are identified, take appropriate action to control the outbreak.	✓		Grass on Haul Rd. Require burning and spraying			
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Attachment 6.02A - Environmental Hazard Inspection (Aggregate Operations)



Attachment 6.02A - Environmental Hazard Inspection (Aggregate Operations)

Site Details	Northern Dune Sand (NDS) Northern Dune Sand Extension (NDSE)
Inspection Completed By:	Zoe Archard & Rodney Harwood
Inspection Date	12/07/2023

	Compliance		Comments	Action	Who	When
	Yes	No				
PERMIT SPECIFIC REQUIREMENTS						
No material erosion issued identified on roadside drainage, rehabilitation areas and topsoil stockpiles (SWMP/LMP/DA4659-89)	✓		Site no longer extracting, site now non-operational and is under rehabilitation.			
All installed sediment fencing is in good working order (SWMP)	✓					
Illegal waste dumping is identified and removed or action recorded to remove from site/ Northern Offset Area during annual clean up (EMP/BMP)	✓		Illegal waste dumped in Area A (photos attached) removed as much waste as the ute could hold. Clear remaining next inspection. Waste disposed of in Salt Ash waste/ scrap metal bins			
Boundary to the Northern Offset Area (NOA) is protected through delineation barriers (e.g. felled trees, sand mounds and fencing) and	✓					

Attachment 6.02A - Environmental Hazard Inspection (Aggregate Operations)

	Compliance		Comments	Action	Who	When
the retention of vegetation along boundaries to control access to the area (BMP)						
Any tracks leaving Rutile Road into the site have suitable barriers to prevent unauthorised access (e.g. gates/barriers) (BMP)	✓					
Map of Koala habitat for the Site is located in the Salt Ash site office visible for all staff and contractors (BMP)	✓					
50 meter buffer is maintained between rehabilitation area and Wallum Froglet habitat areas (LMP)	✓					
No new weed infestations are observed within the rehabilitated area. If new weeds are identified, take appropriate action to control the outbreak (LMP).	✓					
No material dieback or vegetation loss is evident for native re-vegetation within the rehabilitation areas (LMP/DA4659-89)	✓					
Any mobile equipment used at Site is equipped with fire extinguishers (LMP)	✓		There is no mobile equipment on site. Site is non-operational			
A gate is installed and maintained on all site access roads that adjoin Oyster Cove Road and locked at all times (condition 52 DA4659-89)	✓		Concrete blocks across main entrance			

Attachment 6.02A - Environmental Hazard Inspection (Aggregate Operations)

	Compliance	Comments	Action	Who	When
STORAGE PROVISIONS					
No hydrocarbons are stored on site no evidence of refueling activities on site (condition O4 EPL 11633)	✓		There is no mobile equipment or chemicals on site.		
Check for signs of spills, leaks, straining or contaminated runoff.	✓		There is no mobile equipment or chemicals on site.		
STORM WATER DISCHARGE					
Check that all spills have been cleaned up and that no residual spillage is free to wash into the off-site storm water system.	✓		No Drains		
Check for evidence of contaminants or blockages in drains.	✓		No Drains		
Check off site storm water drains for signs of contamination.	✓		No Drains		
AIR EMISSIONS					
Check that all dust deposition gauges are in good working order and not vandalised (DMP)	✓				
Check the site boundary for noticeable dust deposits (settled dust or windborne).	✓		No visible dust detected		
Check that dust emissions are not crossing the site boundary from an appropriate vantage point.	✓		Site is non-operational		

Attachment 6.02A - Environmental Hazard Inspection (Aggregate Operations)

	Compliance		Comments	Action	Who	When
NOISE CHECK (If residential properties are in close proximity to the site)						
Walk along appropriate site boundaries to check for any new or annoying noises that may create a nuisance for nearby residences.	✓		Site is non-operational			
WASTE DISPOSAL						
No operational waste is stored on site	✓		No waste on site			
EMERGENCY RESPONSE EQUIPMENT						
Check that emergency response equipment (including spill kits) are intact, complete, readily accessible and stationed in an appropriate location.	✓		Kept in utility vehicle when on site			
GENERAL						
Complete a site boundary check to ensure that any risks posed by neighbours (such as discharge onto HOLCIM site, incorrect storage near fences, etc.) are identified and actioned.	✓		No material is stored near any fences or the likelihood of discharge onto the Holcim site.			
Check that all known hazards, incidents and complaints that have occurred throughout the month have been correctly recorded in iCare and effective action is being taken.	✓		No complaints, Hazards or incidents have occurred			
GENERAL HOUSEKEEPING						
Check equipment or operating plant for leaks or spills.	✓		No HME on site			

Attachment 6.02A - Environmental Hazard Inspection (Aggregate Operations)

FLORA AND FAUNA						
Inspect site for any new outbreak of weeds. If new weeds are identified, take appropriate action to control the outbreak.	✓					

Attachment 6.02A - Environmental Hazard Inspection (Aggregate Operations)



Attachment 6.02A - Environmental Hazard Inspection (Aggregate Operations)



Attachment 6.02A - Environmental Hazard Inspection (Aggregate Operations)



Attachment 6.02A - Environmental Hazard Inspection (Aggregate Operations)

Site Details	Northern Dune Sand (NDS) Northern Dune Sand Extension (NDSE)
Inspection Completed By:	Zoe Archard & Rodney Harwood
Inspection Date	09/08/2023

	Compliance		Comments	Action	Who	When
	Yes	No				
PERMIT SPECIFIC REQUIREMENTS						
No material erosion issued identified on roadside drainage, rehabilitation areas and topsoil stockpiles (SWMP/LMP/DA4659-89)	✓		Site no longer extracting, site now non-operational and is under rehabilitation.			
All installed sediment fencing is in good working order (SWMP)	✓					
Illegal waste dumping is identified and removed or action recorded to remove from site/ Northern Offset Area during annual clean up (EMP/BMP)	✓		Illegal waste dumped in Area Q (photos attached) Remove next visit (could only fit waste from The knoll in Ute this visit)			
Boundary to the Northern Offset Area (NOA) is protected through delineation barriers (e.g. felled trees, sand mounds and fencing) and the retention of vegetation along boundaries to control access to the area (BMP)	✓					

Attachment 6.02A - Environmental Hazard Inspection (Aggregate Operations)

	Compliance		Comments	Action	Who	When
Any tracks leaving Rutile Road into the site have suitable barriers to prevent unauthorised access (e.g. gates/barriers) (BMP)	✓					
Map of Koala habitat for the Site is located in the Salt Ash site office visible for all staff and contractors (BMP)	✓					
50 meter buffer is maintained between rehabilitation area and Wallum Froglet habitat areas (LMP)	✓					
No new weed infestations are observed within the rehabilitated area. If new weeds are identified, take appropriate action to control the outbreak (LMP).	✓					
No material dieback or vegetation loss is evident for native re-vegetation within the rehabilitation areas (LMP/DA4659-89)	✓					
Any mobile equipment used at Site is equipped with fire extinguishers (LMP)	✓		There is no mobile equipment on site. Site is non-operational			
A gate is installed and maintained on all site access roads that adjoin Oyster Cove Road and locked at all times (condition 52 DA4659-89)	✓		Concrete blocks across main entrance			

STORAGE PROVISIONS

Attachment 6.02A - Environmental Hazard Inspection (Aggregate Operations)

	Compliance		Comments	Action	Who	When
No hydrocarbons are stored on site no evidence of refueling activities on site (condition O4 EPL 11633)	✓		There is no mobile equipment or chemicals on site.			
Check for signs of spills, leaks, straining or contaminated runoff.	✓		There is no mobile equipment or chemicals on site.			
STORM WATER DISCHARGE						
Check that all spills have been cleaned up and that no residual spillage is free to wash into the off-site storm water system.	✓		No Drains			
Check for evidence of contaminants or blockages in drains.	✓		No Drains			
Check off site storm water drains for signs of contamination.	✓		No Drains			
AIR EMISSIONS						
Check that all dust deposition gauges are in good working order and not vandalised (DMP)	✓					
Check the site boundary for noticeable dust deposits (settled dust or windborne).	✓		No visible dust detected			
Check that dust emissions are not crossing the site boundary from an appropriate vantage point.	✓		Site is non-operational			
NOISE CHECK (If residential properties are in close proximity to the site)						

Attachment 6.02A - Environmental Hazard Inspection (Aggregate Operations)

	Compliance		Comments	Action	Who	When
Walk along appropriate site boundaries to check for any new or annoying noises that may create a nuisance for nearby residences.	✓		Site is non-operational			
WASTE DISPOSAL						
No operational waste is stored on site	✓		No waste on site			
EMERGENCY RESPONSE EQUIPMENT						
Check that emergency response equipment (including spill kits) are intact, complete, readily accessible and stationed in an appropriate location.	✓		Kept in utility vehicle when on site			
GENERAL						
Complete a site boundary check to ensure that any risks posed by neighbours (such as discharge onto HOLCIM site, incorrect storage near fences, etc.) are identified and actioned.	✓		No material is stored near any fences or the likelihood of discharge onto the Holcim site.			
Check that all known hazards, incidents and complaints that have occurred throughout the month have been correctly recorded in iCare and effective action is being taken.	✓		No complaints, Hazards or incidents have occurred			
GENERAL HOUSEKEEPING						
Check equipment or operating plant for leaks or spills.	✓		No HME on site			

Attachment 6.02A - Environmental Hazard Inspection (Aggregate Operations)

FLORA AND FAUNA

Inspect site for any new outbreak of weeds. If new weeds are identified, take appropriate action to control the outbreak.

Grass Old Haul Rd, Area Q

Attachment 6.02A - Environmental Hazard Inspection (Aggregate Operations)



Attachment 6.02A - Environmental Hazard Inspection (Aggregate Operations)

Site Details	Northern Dune Sand (NDS) Northern Dune Sand Extension (NDSE)
Inspection Completed By:	Zoe Archard & Rodney Harwood
Inspection Date	11/09/2023

	Compliance		Comments	Action	Who	When
	Yes	No				
PERMIT SPECIFIC REQUIREMENTS						
No material erosion issued identified on roadside drainage, rehabilitation areas and topsoil stockpiles (SWMP/LMP/DA4659-89)	✓		Site no longer extracting, site now non-operational and is under rehabilitation.			
All installed sediment fencing is in good working order (SWMP)	✓					
Illegal waste dumping is identified and removed or action recorded to remove from site/ Northern Offset Area during annual clean up (EMP/BMP)	✓					
Boundary to the Northern Offset Area (NOA) is protected through delineation barriers (e.g. felled trees, sand mounds and fencing) and the retention of vegetation along boundaries to control access to the area (BMP)	✓					

Attachment 6.02A - Environmental Hazard Inspection (Aggregate Operations)

	Compliance		Comments	Action	Who	When
	Yes	No				
Any tracks leaving Rutile Road into the site have suitable barriers to prevent unauthorised access (e.g. gates/barriers) (BMP)	✓					
Map of Koala habitat for the Site is located in the Salt Ash site office visible for all staff and contractors (BMP)	✓					
50 meter buffer is maintained between rehabilitation area and Wallum Froglet habitat areas (LMP)	✓					
No new weed infestations are observed within the rehabilitated area. If new weeds are identified, take appropriate action to control the outbreak (LMP).	✓					
No material dieback or vegetation loss is evident for native re-vegetation within the rehabilitation areas (LMP/DA4659-89)	✓					
Any mobile equipment used at Site is equipped with fire extinguishers (LMP)	✓		There is no mobile equipment on site. Site is non-operational			

Attachment 6.02A - Environmental Hazard Inspection (Aggregate Operations)

	Compliance		Comments	Action	Who	When
	Yes	No				
A gate is installed and maintained on all site access roads that adjoin Oyster Cove Road and locked at all times (condition 52 DA4659-89)	✓		Concrete blocks across main entrance			
STORAGE PROVISIONS						
No hydrocarbons are stored on site no evidence of refueling activities on site (condition O4 EPL 11633)	✓		There is no mobile equipment or chemicals on site.			
Check for signs of spills, leaks, straining or contaminated runoff.	✓		There is no mobile equipment or chemicals on site.			
STORM WATER DISCHARGE						
Check that all spills have been cleaned up and that no residual spillage is free to wash into the off-site storm water system.	✓		No Drains			
Check for evidence of contaminants or blockages in drains.	✓		No Drains			
Check off site storm water drains for signs of contamination.	✓		No Drains			
AIR EMISSIONS						

Attachment 6.02A - Environmental Hazard Inspection (Aggregate Operations)

	Compliance		Comments	Action	Who	When
	Yes	No				
Check that all dust deposition gauges are in good working order and not vandalised (DMP)	✓					
Check the site boundary for noticeable dust deposits (settled dust or windborne).	✓		No visible dust detected			
Check that dust emissions are not crossing the site boundary from an appropriate vantage point.	✓		Site is non-operational			
NOISE CHECK (If residential properties are in close proximity to the site)						
Walk along appropriate site boundaries to check for any new or annoying noises that may create a nuisance for nearby residences.	✓		Site is non-operational			
WASTE DISPOSAL						
No operational waste is stored on site	✓		No waste on site			
EMERGENCY RESPONSE EQUIPMENT						
Check that emergency response equipment (including spill kits) are intact, complete, readily accessible and stationed in an appropriate location.	✓		Kept in utility vehicle when on site			
GENERAL						
Complete a site boundary check to ensure that any risks posed by neighbours (such as discharge onto	✓		No material is stored near any fences or the likelihood of			

Attachment 6.02A - Environmental Hazard Inspection (Aggregate Operations)

	Compliance		Comments	Action	Who	When
	Yes	No				
HOLCIM site, incorrect storage near fences, etc.) are identified and actioned.			discharge onto the Holcim site.			
Check that all known hazards, incidents and complaints that have occurred throughout the month have been correctly recorded in iCare and effective action is being taken.	✓		No complaints, Hazards or incidents have occurred			
GENERAL HOUSEKEEPING						
Check equipment or operating plant for leaks or spills.	✓		No HME on site			

FLORA AND FAUNA						
Inspect site for any new outbreak of weeds. If new weeds are identified, take appropriate action to control the outbreak.	✓		Burnt grass in Area Q (photos attached) Cut down 2 pine trees in Area Q. (photos attached)			

Attachment 6.02A - Environmental Hazard Inspection (Aggregate Operations)



Attachment 6.02A - Environmental Hazard Inspection (Aggregate Operations)



Attachment 6.02A - Environmental Hazard Inspection (Aggregate Operations)



Attachment 6.02A - Environmental Hazard Inspection (Aggregate Operations)



Attachment 6.02A - Environmental Hazard Inspection (Aggregate Operations)

Waste removed from Rutile Rd 20&21/9/23 disposed of at Salt Ash site, waste bin and Tyres awaiting collection.





Attachment 6.02A - Environmental Hazard Inspection (Aggregate Operations)

Site Details	Northern Dune Sand (NDS) Northern Dune Sand Extension (NDSE)
Inspection Completed By:	Zoe Archard & Rodney Harwood
Inspection Date	11/10/2023

	Compliance		Comments	Action	Who	When
	Yes	No				
PERMIT SPECIFIC REQUIREMENTS						
No material erosion issued identified on roadside drainage, rehabilitation areas and topsoil stockpiles (SWMP/LMP/DA4659-89)	✓		Site no longer extracting, site now non-operational and is under rehabilitation.			
All installed sediment fencing is in good working order (SWMP)	✓					
Illegal waste dumping is identified and removed or action recorded to remove from site/ Northern Offset Area during annual clean up (EMP/BMP)	✓					
Boundary to the Northern Offset Area (NOA) is protected through delineation barriers (e.g. felled trees, sand mounds and fencing) and the retention of vegetation along boundaries to control access to the area (BMP)	✓					

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Attachment 6.02A - Environmental Hazard Inspection (Aggregate Operations)

	Compliance		Comments	Action	Who	When
	Yes	No				
Any tracks leaving Rutile Road into the site have suitable barriers to prevent unauthorised access (BMP)	✓					
Map of Koala habitat for the Site is located in the Salt Ash site office visible for all staff and contractors (BMP)	✓					
50 meter buffer is maintained between rehabilitation area and Wallum Froglet habitat areas (LMP)	✓					
No new weed infestations are observed within the rehabilitated area. If new weeds are identified, take appropriate action to control the outbreak (LMP).	✓					
No material dieback or vegetation loss is evident for native re-vegetation within the rehabilitation areas (LMP/DA4659-89)	✓					
Any mobile equipment used at Site is equipped with fire extinguishers (LMP)	✓		There is no mobile equipment on site. Site is non-operational			

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Attachment 6.02A - Environmental Hazard Inspection (Aggregate Operations)

	Compliance		Comments	Action	Who	When
	Yes	No				
A gate is installed and maintained on all site access roads that adjoin Oyster Cove Road and locked at all times (condition 52 DA4659-89)	✓		Concrete blocks across main entrance. Motor vehicles (maybe quads, motor bikes) been riding along Area M and L old haul Rd (rehabilitated area). Rehabilitation area suffered loss of trees. (photos attached)			
STORAGE PROVISIONS						
No hydrocarbons are stored on site no evidence of refueling activities on site (condition O4 EPL 11633)	✓		There is no mobile equipment or chemicals on site.			
Check for signs of spills, leaks, straining or contaminated runoff.	✓		There is no mobile equipment or chemicals on site.			
STORM WATER DISCHARGE						
Check that all spills have been cleaned up and that no residual spillage is free to wash into the off-site storm water system.	✓		No Drains			
Check for evidence of contaminants or blockages in drains.	✓		No Drains			
Check off site storm water drains for signs of	✓		No Drains			

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Attachment 6.02A - Environmental Hazard Inspection (Aggregate Operations)

	Compliance		Comments	Action	Who	When
	Yes	No				
contamination.						
AIR EMISSIONS						
Check that all dust deposition gauges are in good working order and not vandalised (DMP)	✓					
Check the site boundary for noticeable dust deposits (settled dust or windborne).	✓		No visible dust detected			
Check that dust emissions are not crossing the site boundary from an appropriate vantage point.	✓		Site is non-operational			
NOISE CHECK (If residential properties are in close proximity to the site)						
Walk along appropriate site boundaries to check for any new or annoying noises that may create a nuisance for nearby residences.	✓		Site is non-operational			
WASTE DISPOSAL						
No operational waste is stored on site	✓		No waste on site			
EMERGENCY RESPONSE EQUIPMENT						
Check that emergency response equipment (including spill kits) are intact, complete, readily accessible and stationed in an appropriate location.	✓		Kept in utility vehicle when on site			

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Attachment 6.02A - Environmental Hazard Inspection (Aggregate Operations)

	Compliance		Comments	Action	Who	When
	Yes	No				
GENERAL						
Complete a site boundary check to ensure that any risks posed by neighbours (such as discharge onto HOLCIM site, incorrect storage near fences, etc.) are identified and actioned.	✓		No material is stored near any fences or the likelihood of discharge onto the Holcim site.			
Check that all known hazards, incidents and complaints that have occurred throughout the month have been correctly recorded in iCare and effective action is being taken.	✓		No complaints, Hazards or incidents have occurred			
GENERAL HOUSEKEEPING						
Check equipment or operating plant for leaks or spills.	✓		No HME on site			

FLORA AND FAUNA						
Inspect site for any new outbreak of weeds. If new weeds are identified, take appropriate action to control the outbreak.	✓		Chainsaw down trees in Area Q. Sprayed reshooting grass in Area Q. Sprayed old haul Rd C. Photos attached. (evidence of the grass dying on haul Rd C)			

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Attachment 6.02A - Environmental Hazard Inspection (Aggregate Operations)

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Attachment 6.02A - Environmental Hazard Inspection (Aggregate Operations)



Attachment 6.02A - Environmental Hazard Inspection (Aggregate Operations)



Commented [1]: Vehicles driving through rehabilitated area.

Attachment 6.02A - Environmental Hazard Inspection (Aggregate Operations)



Commented [2]: Grass Dying from weed spraying

Attachment 6.02A - Environmental Hazard Inspection (Aggregate Operations)

Site Details	Northern Dune Sand (NDS) Northern Dune Sand Extension (NDSE)
Inspection Completed By:	Zoe Archard & Rodney Harwood
Inspection Date	08/11/2023

	Compliance		Comments	Action	Who	When
	Yes	No				
PERMIT SPECIFIC REQUIREMENTS						
No material erosion issued identified on roadside drainage, rehabilitation areas and topsoil stockpiles (SWMP/LMP/DA4659-89)	✓		Site no longer extracting, site now non-operational and is under rehabilitation.			
All installed sediment fencing is in good working order (SWMP)	✓					
Illegal waste dumping is identified and removed or action recorded to remove from site/ Northern Offset Area during annual clean up (EMP/BMP)	✓					
Boundary to the Northern Offset Area (NOA) is protected through delineation barriers (e.g. felled trees, sand mounds and fencing) and the retention of vegetation along boundaries to control access to the area (BMP)	✓					

Attachment 6.02A - Environmental Hazard Inspection (Aggregate Operations)

	Compliance		Comments	Action	Who	When
	Yes	No				
Any tracks leaving Rutile Road into the site have suitable barriers to prevent unauthorised access (e.g. gates/barriers) (BMP)	✓					
Map of Koala habitat for the Site is located in the Salt Ash site office visible for all staff and contractors (BMP)	✓					
50 meter buffer is maintained between rehabilitation area and Wallum Froglet habitat areas (LMP)	✓					
No new weed infestations are observed within the rehabilitated area. If new weeds are identified, take appropriate action to control the outbreak (LMP).	✓					
No material dieback or vegetation loss is evident for native re-vegetation within the rehabilitation areas (LMP/DA4659-89)	✓					
Any mobile equipment used at Site is equipped with fire extinguishers (LMP)	✓		There is no mobile equipment on site. Site is non-operational			

Attachment 6.02A - Environmental Hazard Inspection (Aggregate Operations)

	Compliance		Comments	Action	Who	When
	Yes	No				
A gate is installed and maintained on all site access roads that adjoin Oyster Cove Road and locked at all times (condition 52 DA4659-89)	✓		Concrete blocks across main entrance			
STORAGE PROVISIONS						
No hydrocarbons are stored on site no evidence of refueling activities on site (condition O4 EPL 11633)	✓		There is no mobile equipment or chemicals on site.			
Check for signs of spills, leaks, straining or contaminated runoff.	✓		There is no mobile equipment or chemicals on site.			
STORM WATER DISCHARGE						
Check that all spills have been cleaned up and that no residual spillage is free to wash into the off-site storm water system.	✓		No Drains			
Check for evidence of contaminants or blockages in drains.	✓		No Drains			
Check off site storm water drains for signs of contamination.	✓		No Drains			
AIR EMISSIONS						

Attachment 6.02A - Environmental Hazard Inspection (Aggregate Operations)

	Compliance		Comments	Action	Who	When
	Yes	No				
Check that all dust deposition gauges are in good working order and not vandalised (DMP)	✓					
Check the site boundary for noticeable dust deposits (settled dust or windborne).	✓		No visible dust detected			
Check that dust emissions are not crossing the site boundary from an appropriate vantage point.	✓		Site is non-operational			
NOISE CHECK (If residential properties are in close proximity to the site)						
Walk along appropriate site boundaries to check for any new or annoying noises that may create a nuisance for nearby residences.	✓		Site is non-operational			
WASTE DISPOSAL						
No operational waste is stored on site	✓		No waste on site			
EMERGENCY RESPONSE EQUIPMENT						
Check that emergency response equipment (including spill kits) are intact, complete, readily accessible and stationed in an appropriate location.	✓		Kept in utility vehicle when on site			
GENERAL						

Attachment 6.02A - Environmental Hazard Inspection (Aggregate Operations)

	Compliance		Comments	Action	Who	When
	Yes	No				
Complete a site boundary check to ensure that any risks posed by neighbours (such as discharge onto HOLCIM site, incorrect storage near fences, etc.) are identified and actioned.	✓		No material is stored near any fences or the likelihood of discharge onto the Holcim site.			
Check that all known hazards, incidents and complaints that have occurred throughout the month have been correctly recorded in iCare and effective action is being taken.	✓		No complaints, Hazards or incidents have occurred			
GENERAL HOUSEKEEPING						
Check equipment or operating plant for leaks or spills.	✓		No HME on site			

FLORA AND FAUNA						
Inspect site for any new outbreak of weeds. If new weeds are identified, take appropriate action to control the outbreak.	✓					

Attachment 6.02A - Environmental Hazard Inspection (Aggregate Operations)

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Attachment 6.02A - Environmental Hazard Inspection (Aggregate Operations)

Site Details	Northern Dune Sand (NDS) Northern Dune Sand Extension (NDSE)
Inspection Completed By:	Rodney Harwood
Inspection Date	08/12/2023

	Compliance		Comments	Action	Who	When
	Yes	No				
PERMIT SPECIFIC REQUIREMENTS						
No material erosion issued identified on roadside drainage, rehabilitation areas and topsoil stockpiles (SWMP/LMP/DA4659-89)	✓		Site no longer extracting, site now non-operational and is under rehabilitation.			
All installed sediment fencing is in good working order (SWMP)	✓					
Illegal waste dumping is identified and removed or action recorded to remove from site/ Northern Offset Area during annual clean up (EMP/BMP)	✓					
Boundary to the Northern Offset Area (NOA) is protected through delineation barriers (e.g. felled trees, sand mounds and fencing) and the retention of vegetation along boundaries to control access to the area (BMP)	✓					

Attachment 6.02A - Environmental Hazard Inspection (Aggregate Operations)

	Compliance		Comments	Action	Who	When
	Yes	No				
Any tracks leaving Rutile Road into the site have suitable barriers to prevent unauthorised access (e.g. gates/barriers) (BMP)	✓					
Map of Koala habitat for the Site is located in the Salt Ash site office visible for all staff and contractors (BMP)	✓					
50 meter buffer is maintained between rehabilitation area and Wallum Froglet habitat areas (LMP)	✓					
No new weed infestations are observed within the rehabilitated area. If new weeds are identified, take appropriate action to control the outbreak (LMP).	✓					
No material dieback or vegetation loss is evident for native re-vegetation within the rehabilitation areas (LMP/DA4659-89)	✓					
Any mobile equipment used at Site is equipped with fire extinguishers (LMP)	✓		There is no mobile equipment on site. Site is non-operational			

Attachment 6.02A - Environmental Hazard Inspection (Aggregate Operations)

	Compliance		Comments	Action	Who	When
	Yes	No				
A gate is installed and maintained on all site access roads that adjoin Oyster Cove Road and locked at all times (condition 52 DA4659-89)	✓		Concrete blocks across main entrance			
STORAGE PROVISIONS						
No hydrocarbons are stored on site no evidence of refueling activities on site (condition O4 EPL 11633)	✓		There is no mobile equipment or chemicals on site.			
Check for signs of spills, leaks, straining or contaminated runoff.	✓		There is no mobile equipment or chemicals on site.			
STORM WATER DISCHARGE						
Check that all spills have been cleaned up and that no residual spillage is free to wash into the off-site storm water system.	✓		No Drains			
Check for evidence of contaminants or blockages in drains.	✓		No Drains			
Check off site storm water drains for signs of contamination.	✓		No Drains			
AIR EMISSIONS						

Attachment 6.02A - Environmental Hazard Inspection (Aggregate Operations)

	Compliance		Comments	Action	Who	When
	Yes	No				
Check that all dust deposition gauges are in good working order and not vandalised (DMP)	✓					
Check the site boundary for noticeable dust deposits (settled dust or windborne).	✓		No visible dust detected			
Check that dust emissions are not crossing the site boundary from an appropriate vantage point.	✓		Site is non-operational			
NOISE CHECK (If residential properties are in close proximity to the site)						
Walk along appropriate site boundaries to check for any new or annoying noises that may create a nuisance for nearby residences.	✓		Site is non-operational			
WASTE DISPOSAL						
No operational waste is stored on site	✓		No waste on site			
EMERGENCY RESPONSE EQUIPMENT						
Check that emergency response equipment (including spill kits) are intact, complete, readily accessible and stationed in an appropriate location.	✓		Kept in utility vehicle when on site			
GENERAL						

Attachment 6.02A - Environmental Hazard Inspection (Aggregate Operations)

	Compliance		Comments	Action	Who	When
	Yes	No				
Complete a site boundary check to ensure that any risks posed by neighbours (such as discharge onto HOLCIM site, incorrect storage near fences, etc.) are identified and actioned.	✓		No material is stored near any fences or the likelihood of discharge onto the Holcim site.			
Check that all known hazards, incidents and complaints that have occurred throughout the month have been correctly recorded in iCare and effective action is being taken.	✓		No complaints, Hazards or incidents have occurred			
GENERAL HOUSEKEEPING						
Check equipment or operating plant for leaks or spills.	✓		No HME on site			

FLORA AND FAUNA						
Inspect site for any new outbreak of weeds. If new weeds are identified, take appropriate action to control the outbreak.	✓					

Attachment 6.02A - Environmental Hazard Inspection (Aggregate Operations)

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Environmental Hazard Inspection Worksheet (Aggregate Operations)

Site Details	Northern Dune.
Inspection Completed By:	Peter Radziewicz
Inspection Date	18.1.23

	Compliance		Comments	Action	Who	When
	Yes	No				
STORAGE PROVISIONS						
Check all chemical & hydrocarbons drums are labelled and stored in designated areas.	✓		NO STORAGE ON SITE.			
Check that bunded areas that are fitted with drain valves are locked in the closed position .	✓		" "			
Check bunds are in good condition (free from cracks, degradation and physical damage), are watertight and the bunds are reasonably clean.	✓		" "			
Check that stormwater that collects within the bund is regularly removed (not to the offsite stormwater system).	✓		NO WATER RUN OFF			
Check for signs of spills, leaks, straining or contaminated runoff.	✓					

STORMWATER DISCHARGE		AIR EMISSIONS	
Check that all spills have been cleaned up and that no residual spillage is free to wash into the off site stormwater system.	✓		
Check for evidence of contaminants or blockages in drains.	✓	NO EVIDENCE FOUND.	
Check that cleaning devices (grates, settling pits, interceptor traps etc.) are being maintained correctly.	✓	N/A.	
Check that material build-up or damage to paved areas (including vehicle or plant wash down areas) does not allow contaminated water to bypass controls (pits or interceptors) or to flow into the off site stormwater system.	✓	N/A.	
Check off site stormwater drains for signs of contamination.	✓	N/A.	
Check that water sprays, containment systems and/or dust extraction equipment is working correctly.		N/A.	
Check the site boundary for noticeable dust deposits (settled dust or windborne).	✓	DUST SAMPLES TAKEN. NOTED AS FINE.	
Check that dust emissions are not crossing the site boundary from an appropriate vantage point	✓		

NOISE CHECK (If residential properties are in close proximity to the site)						
Walk along appropriate site boundaries to check for any new or annoying noises that may create a nuisance for nearby residences.	✓					
WASTE DISPOSAL						
Check waste storage areas to ensure that waste is stored, labelled and segregated correctly.	✓		NA.			
EMERGENCY RESPONSE EQUIPMENT						
Check that emergency response equipment (including spill kits) are intact, complete, readily accessible and stationed in an appropriate location.	✓		EMERGENCY RESPONSE KIT STORED IN			
GENERAL						
Complete a site boundary check to ensure that any risks posed by neighbours (such as discharge onto HOLCIM site, incorrect storage near fences, etc.) are identified and actioned.	✓		Rubbish on Oyster Cove Road.			
Check that all known hazards, incidents and complaints that have occurred throughout the month have been correctly recorded in INX and effective action is being taken.	✓		NIL Reported.			
GENERAL HOUSEKEEPING						
Check equipment or operating plant for leaks or spills.	✓		No machines on site at time of inspection.			

Check the graveyard or lay down area to ensure only equipment or materials with a future use are held in storage (all other items should be removed and recycled or disposed of in an appropriate manner).		✓	NA			
CEMENT SILO						
Check the silo roof to ensure that silo access openings are closed and appropriately sealed and that there is no evidence of leakage during filling cycles.		✓	NA			
Check the outlet of the silo filter /pressure release ducting at ground level to determine if cement is being discharged during filling cycles.		✓	NA			
SLURRY PITS, SETTLING PONDS, SILT TRAPS AND OIL INTERCEPTORS						
Visually check that the slurry pits, settling ponds, silt traps and oil interceptors are maintained and emptied or cleaned as required.		✓	NA			
FLORA AND FAUNA						
Inspect site for any new outbreak of weeds. If new weeds are identified take appropriate action to control the outbreak.			Weeds are along Entrance Road.	Get some weed spraying & completed when it cools down.		

Environmental Hazard Inspection Worksheet (Aggregate Operations)

Site Details	<i>Northern Drome.</i>
Inspection Completed By:	<i>Petar Radzевич, Craig Foo.</i>
Inspection Date	<i>20/2/23.</i>

	Compliance		Comments	Action	Who	When
	Yes	No				
STORAGE PROVISIONS						
Check all chemical & hydrocarbons drums are labelled and stored in designated areas.	✓					
Check that bunded areas that are fitted with drain valves are locked in the closed position .	✓					
Check bunds are in good condition (free from cracks, degradation and physical damage), are watertight and the bunds are reasonably clean.	✓					
Check that stormwater that collects within the bund is regularly removed (not to the offsite stormwater system).	✓					
Check for signs of spills, leaks, straining or contaminated runoff.	✓					

STORMWATER DISCHARGE						
Check that all spills have been cleaned up and that no residual spillage is free to wash into the off site stormwater system.	✓		Could not see any evidence off spills.			
Check for evidence of contaminants or blockages in drains.	✓					
Check that cleaning devices (grates, settling pits, interceptor traps etc.) are being maintained correctly.	✓					
Check that material build-up or damage to paved areas (including vehicle or plant wash down areas) does not allow contaminated water to bypass controls (pits or interceptors) or to flow into the off site stormwater system.	✓					
Check off site stormwater drains for signs of contamination.	✓					
AIR EMISSIONS						
Check that water sprays, containment systems and/or dust extraction equipment is working correctly.	✓		N/A.			
Check the site boundary for noticeable dust deposits (settled dust or windborne).	✓		Sample checked			
Check that dust emissions are not crossing the site boundary from an appropriate vantage point	✓					

NOISE CHECK (if residential properties are in close proximity to the site)					
Walk along appropriate site boundaries to check for any new or annoying noises that may create a nuisance for nearby residences.	✓	No Machines in area at time of inspection.	Nil Complaints.		
WASTE DISPOSAL					
Check waste storage areas to ensure that waste is stored, labelled and segregated correctly.	✓				
EMERGENCY RESPONSE EQUIPMENT					
Check that emergency response equipment (including spill kits) are intact, complete, readily accessible and stationed in an appropriate location.	✓	checked kit			
GENERAL					
Complete a site boundary check to ensure that any risks posed by neighbours (such as discharge onto HOLCIM site, incorrect storage near fences, etc.) are identified and actioned.	✓	No discharge.			
Check that all known hazards, incidents and complaints that have occurred throughout the month have been correctly recorded in INX and effective action is being taken.	✓	No Complaints by neighbours.			
GENERAL HOUSEKEEPING					
Check equipment or operating plant for leaks or spills.	✓				

Check the graveyard or lay down area to ensure only equipment or materials with a future use are held in storage (all other items should be removed and recycled or disposed of in an appropriate manner).	✓	As Machinery stored on site			
CEMENT SILO					
Check the silo roof to ensure that silo access openings are closed and appropriately sealed and that there is no evidence of leakage during filling cycles.			NA		
Check the outlet of the silo filter /pressure release ducting at ground level to determine if cement is being discharged during filling cycles.			NA.		
SLURRY PITS, SETTLING PONDS, SILT TRAPS AND OIL INTERCEPTORS					
Visually check that the slurry pits, settling ponds, silt traps and oil interceptors are maintained and emptied or cleaned as required.			NA		
FLORA AND FAUNA					
Inspect site for any new outbreak of weeds. If new weeds are identified take appropriate action to control the outbreak.			NA		

Environmental Hazard Inspection Worksheet (Aggregate Operations)

Site Details	Northern Dune
Inspection Completed By:	Rock Harwood, Peter Radziewicz
Inspection Date	8/3/23

	Compliance		Comments	Action	Who	When
	Yes	No				
STORAGE PROVISIONS						
Check all chemical & hydrocarbons drums are labelled and stored in designated areas.	✓					
Check that bunded areas that are fitted with drain valves are locked in the closed position .	✓					
Check bunds are in good condition (free from cracks, degradation and physical damage), are watertight and the bunds are reasonably clean.	✓					
Check that stormwater that collects within the bund is regularly removed (not to the offsite stormwater system).	✓					
Check for signs of spills, leaks, straining or contaminated runoff.	✓					

STORMWATER DISCHARGE						
Check that all spills have been cleaned up and that no residual spillage is free to wash into the off site stormwater system.	✓					
Check for evidence of contaminants or blockages in drains.	✓					
Check that cleaning devices (grates, settling pits, interceptor traps etc.) are being maintained correctly.	✓					
Check that material build-up or damage to paved areas (including vehicle or plant wash down areas) does not allow contaminated water to bypass controls (pits or interceptors) or to flow into the off site stormwater system.	✓					
Check off site stormwater drains for signs of contamination.	✓		No signs of waste or contamination			
AIR EMISSIONS						
Check that water sprays, containment systems and/or dust extraction equipment is working correctly.	✓					
Check the site boundary for noticeable dust deposits (settled dust or windborne).	✓		checked sample bottles.			
Check that dust emissions are not crossing the site boundary from an appropriate vantage point	✓					

NOISE CHECK (If residential properties are in close proximity to the site)

Walk along appropriate site boundaries to check for any new or annoying noises that may create a nuisance for nearby residences.	✓		Not in operation		
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WASTE DISPOSAL

Check waste storage areas to ensure that waste is stored, labelled and segregated correctly.	✓				
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EMERGENCY RESPONSE EQUIPMENT

Check that emergency response equipment (including spill kits) are intact, complete, readily accessible and stationed in an appropriate location.	✓		Kit Inspected.		
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GENERAL

Complete a site boundary check to ensure that any risks posed by neighbours (such as discharge onto HOLCIM site, incorrect storage near fences, etc.) are identified and actioned.	✓				
Check that all known hazards, incidents and complaints that have occurred throughout the month have been correctly recorded in INX and effective action is being taken.	✓				

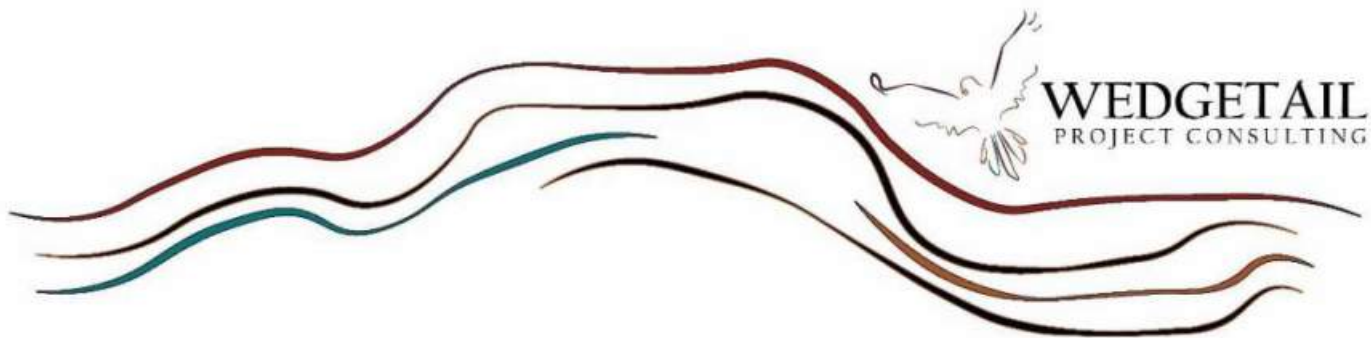
GENERAL HOUSEKEEPING

Check equipment or operating plant for leaks or spills.	✓		check No operation		
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Check the graveyard or lay down area to ensure only equipment or materials with a future use are held in storage (all other items should be removed and recycled or disposed of in an appropriate manner).						
CEMENT SILO						
Check the silo roof to ensure that silo access openings are closed and appropriately sealed and that there is no evidence of leakage during filling cycles.	✓		NA			
Check the outlet of the silo filter /pressure release ducting at ground level to determine if cement is being discharged during filling cycles.	✓		NA			
SLURRY PITS, SETTLING PONDS, SILT TRAPS AND OIL INTERCEPTORS						
Visually check that the slurry pits, settling ponds, silt traps and oil interceptors are maintained and emptied or cleaned as required.	✓		NA			
FLORA AND FAUNA						
Inspect site for any new outbreak of weeds. If new weeds are identified take appropriate action to control the outbreak.	✓		Leeds in North-Dune Area D	Contact Whorrm to get sprayed	PA	Brad Mark

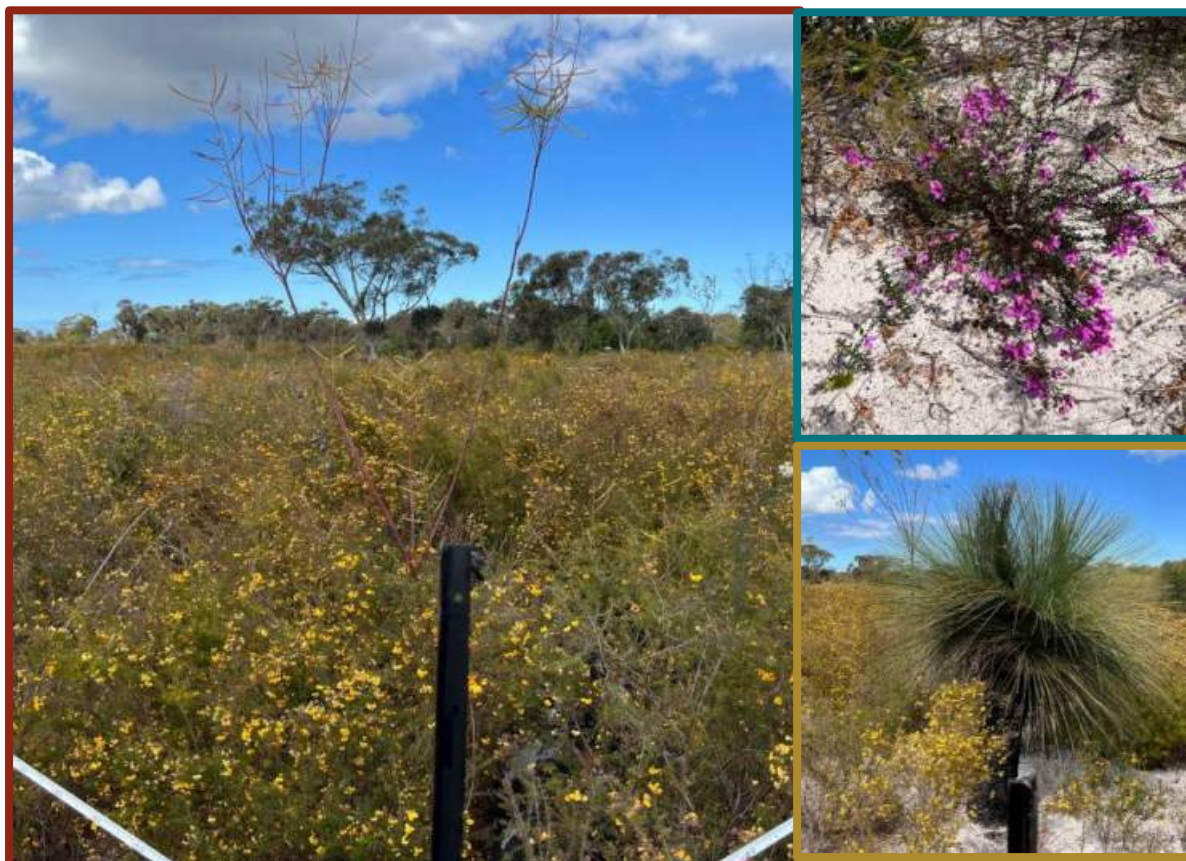
APPENDIX 3

ANNUAL REHABILITATION MONITORING REPORT

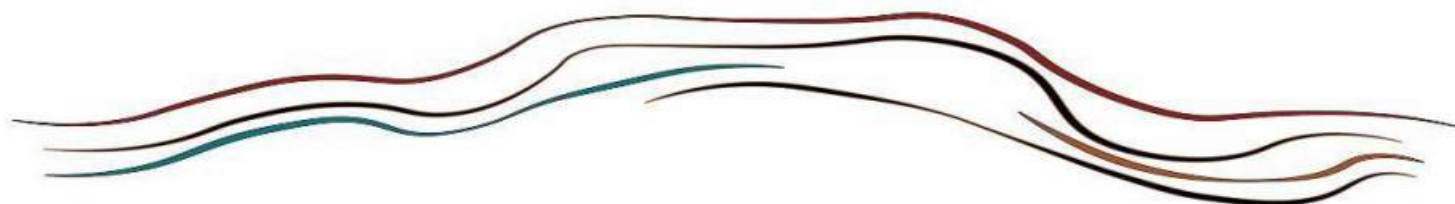


North Dune Extension 2023 Vegetation Rehabilitation Annual Monitoring Report

Oyster Cove, New South Wales



Rev 1
15 April 2024



North Dune Extension 2023 Vegetation Rehabilitation Annual Monitoring Report

Oyster Cove, New South Wales

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1. INTRODUCTION

Holcim Australia (formerly Sibelco Australia) was granted consent to extract white silica sand from the Tanilba North Dune Extension located in the Oyster Cove area, in the Port Stephens Council Local Government Area (**Figure 1**). While sand extraction operations have now ceased, consent conditions require the vegetative rehabilitation of mined areas following sand extraction. An ongoing vegetation monitoring program has been established to aid in management of the rehabilitation project.

The extraction of sand was granted by the Minister for Planning and Infrastructure (DP&I) for quarrying activities to occur over 9 ha in an area bounded by Rutile Rd to the north and previous sand extraction operations at Tanilba North Dune. This project is labelled the Tanilba North Dune Extension Project (the NDE) and is located within Lots 11, 12 and 13 DP 601306; Lot 408 DP 1041934; and Lots 1 and 2 DP 408240. The extension project was a Major Project assessment and is considered under Part 3A of the *Environmental Planning and Assessment Act 1979* (EP&A Act). Kleinfelder was appointed by the former owners, Sibelco Australia to conduct the rehabilitation monitoring for this project in January 2017, and the new owners Holcim Australia Pty Ltd, appointed Kleinfelder to continue the monitoring program from July 2020. A modification to the Landscape Management Plan (LMP) was undertaken by Kleinfelder (Kleinfelder, 2020a) on behalf of Sibelco Australia in July 2020. The major outcome from that review that affected future reporting were changes to the monitoring requirement. At the completion of the initial three-year biannual monitoring, annual monitoring utilising the Post 3-Year Monitoring methodology was to be implemented. Monitoring for this report was undertaken by Wedgetail Project Consulting (WPC) after the movement of key personnel from Kleinfelder to WPC.

An annual report is prepared in autumn to support the Annual Environmental Management Report (AEMR). As the site has aged and moved into the post-three period, monitoring is conducted annually to determine if significant changes are occurring.

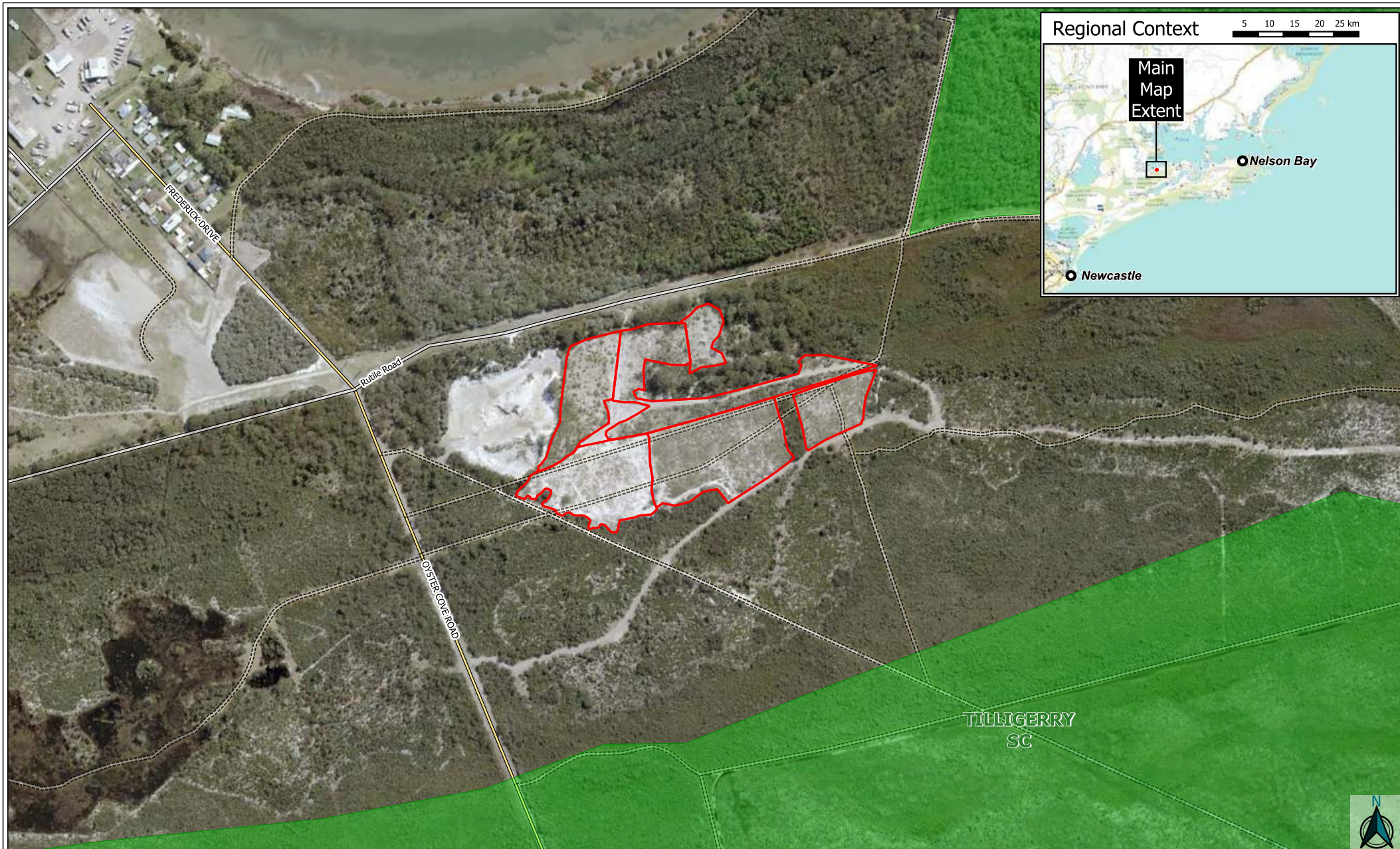
2. SCOPE


The NDE has been subdivided into several smaller blocks for ease of data collection. This report provides details for the monitoring of the revegetation of Blocks Q1, Q2, Q3, Q4, Q5 and Q6 for the Northern Dunes Extension. Rehabilitation blocks were prepared and biannually surveyed after 6 months of growth, for a period of 3 years. Details of each block surveyed for the 2023 annual report are shown in **Table 1**. Biannual monitoring was completed on Block Q1 in July 2020 and the first of the Post 3 Year Monitoring events was completed in October 2021. This report presents the results from the fourth Post 3-Year Monitoring event for this block. The remaining blocks were monitored at the 5 year stage post revegetation for the second time, and those results are presented in this report. Please note Block 6 monitoring was brought forward to align with blocks Q2 – Q5.

A comment is necessary on the labelling used throughout this report. The NDE rehabilitation blocks have been labelled “Block Q” as an extension to the labelling system that was utilised throughout the Tanilba North Dunes Sand Extraction Area – Blocks A - P. Post 3-Year monitoring also used quadrats that were numbered 1 through 45. This system was continued for the NDE and has resulted in both the Sand Extraction Area blocks and monitoring quadrats labelled with the prefix “Q”.

Table 1: Block preparation and survey schedule details for the North Dunes Extension Rehabilitation blocks for the 2022 monitoring report.

Block	Prepared for Revegetation	First Biannual Survey Conducted	Last Biannual Survey Conducted	Comments
Q1	December 2016 - July 2017	January 2018	July 2020	6 Year Monitoring Completed – October 2023 (This report)
Q2	July 2018	January 2019	July 2021	All Biannual Monitoring Completed – 5 year monitoring completed (This report)
Q3	July 2018	January 2019	July 2021	
Q4	July 2018	January 2019	July 2021	
Q5	July 2018	January 2019	July 2021	
Q6	July 2019	January 2020	July 2022	



 <p>WEDGETAIL PROJECT CONSULTING PTY LTD</p>	<p>Legend</p> <p> Subject Block Boundary</p> <p> State Conservation Area</p> <p> Sub-Arterial Road</p> <p> Local Road</p> <p> Track-Vehicular</p>	<p>Locality</p> <p>100 200 300 400 m</p> <p>DATA SOURCE: © State of New South Wales (Spatial Services, a business unit of the Department of Customer Service NSW). For current information go to spatial.nsw.gov.au.</p> <p>DRAWN BY: Kane Blundell DATE DRAWN: 15.04.2024</p>	<p>Holcim Australia North Dune Extension Sand Mining Extraction Operation Post 3 year Monitoring Report Oyster Cove Road, Tanilba Bay NSW</p> <p>WARNING: The information included on this graphic representation has been compiled from a variety of sources and is subject to change without notice. Wedgetail Project Consulting makes no representations or warranties, express or implied, as to accuracy, completeness, timeliness or rights to the use of such information. This document is not intended for use as a land survey product nor is it designed or intended as a construction design document. The use or misuse of the information contained on this graphic representation is at the sole risk of the party using or misusing the information.</p>	<p>Figure:</p> <p>1</p>
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3. METHODS

3.1 QUADRAT MONITORING DESIGN

The Post 3 Year monitoring established on each of the former extraction blocks is the same methodology as has been employed in all Post 3 Year monitoring on the Tanilba North Dunes site and ensures continuity of methodology.

3.1.1 20 m x 20 m Quadrat Monitoring

One permanent 20 m x 20 m (0.04 ha) quadrat per hectare of rehabilitation has been used to give a broad scale indication of the rehabilitation structure and diversity (the standard recommended for vegetation surveys by the Flora and Fauna Survey Guidelines for the Lower Hunter and Central Coast Regional Environmental Management Strategy (LHCCREMS)). The location of these quadrats was selected and placed in areas that are most representative of the total rehabilitation block (**Figure 2**). The data collected from these quadrats included:

- Total species identification (richness) (Full species list in **Appendix D**).
- Species cover abundance (diversity) using the modified Braun-Blanquet cover-abundance scale, **Table 3**).
- Average height of each stratum.
- Reproductive status of species i.e., observations are made as to whether seedlings, fruit or flowers were recorded.
- General comments.

Table 2: Modified Braun-Blanquet cover-abundance scale.

Rating	Cover-abundance
1	< 5% cover, few individuals or sparse occurrence
2	< 5% cover, many individuals
3	5 - 25% cover
4	25 - 50% cover
5	50 - 75% cover
6	75 - 100% cover

1.1.1 2 m x 2 m Plot Monitoring

Within these 20 m x 20 m quadrats, six smaller 4 m² (2 m x 2 m) plots were surveyed to give a more detailed indication of the rehabilitation structure and diversity. The location of each of these plots within the 20 m x 20 m quadrats is selected at random each year. Within each of these plots the following data is recorded for each species:

- Average height of each species type,
- Total number of plants/species, and,

- Estimated percentage foliage cover.

The combination of the 20 m x 20 m quadrats and 2 m x 2 m plots identifies how the rehabilitation area compares against the performance criteria of the EMP. This information is summarised in **Table 3**.

Table 3: A summary of which survey method addresses the performance criteria of the EMP.

Performance criteria	Survey Type	
	20 m x 20 m Quadrat	2 m x 2 m Plot
Post 3 Year Monitoring to determine development of: Mature pioneer stage characterised by		
Gradual dieback of some primary colonisers	✓	✓
Appearance of mature vegetation species	✓	✓
Planted trees and shrubs present in predetermined numbers		✓
Beginning of differentiation of structural layers (canopy, sub-canopy, shrub layer)		✓
No significant erosion problems	✓	

There are seven species considered key to the establishment of Wallum Heath/Woodland. These species and their method of re-introduction are detailed in **Table 4** below. Those installed as tubestock are measured as part of the above criteria.

Table 4 : Key species and method of revegetation

Scientific Name	Common Name	Method of Planting
<i>Banksia aemula</i>	Wallum Banksia	Tubestock, Brush matting
<i>Corymbia gummifera</i>	Red Bloodwood	Tubestock, Brush matting
<i>Eucalyptus piperita</i>	Sydney Peppermint	Tubestock, Brush matting
<i>Eucalyptus pilularis</i>	Blackbutt	Tubestock, Brush matting
<i>Eucalyptus robusta</i>	Swamp Mahogany	Tubestock, Brush matting
<i>Leptospermum polygalifolium</i>	Tantoon	Tubestock, Brush matting
<i>Melaleuca nodosa</i>	Prickly-leaved Paperbark	Tubestock
<i>Melaleuca quinquenervia</i>	Broad-leaved paperbark	Tubestock, Brush matting
<i>Xanthorrhoea glauca</i>	-	Transplant

A permanent photographic record was established for each permanent 20 m x 20 m quadrat. A photograph is taken from each corner looking into the quadrat at each survey to allow a visual assessment of the rehabilitation progression in future monitoring reports.

3.2 MONITORING OUTCOMES

3.2.1 Defining Targets



The desired outcome for the vegetation rehabilitation of the sand extraction areas is to achieve a vegetative structure and composition comparable to that of the surrounding areas which have a similarly shallow elevation above the water table. The data collected from monitoring events has been compared with targets for these parameters. The target figures for the ideal outcome for the parameters described in **Table 2** were determined from two 20 m x 20 m (400 m² each) sample plots located in the undisturbed vegetation either side of the extraction area near Block A of the Tanilba North Dunes Sand Extraction Project in 2005. The target figures from these two survey plots have been used for all rehabilitation blocks.

3.2.2 Assessment of Rehabilitation Parameters

The total averages for each parameter at 6-month intervals, for each block, have been shown in charts (**Appendix B**). These charts compare the similarity and divergences between blocks by analysing the recorded data for each block against the same timeline (i.e. 3 years).

Predictive trends for height and foliage cover growth out to the end of operations has been analysed by plotting the initial data from the data recorded to date and extrapolating this inclination until it meets the targeted parameter (i.e., height or foliage cover targets). The results are given in **Appendix C**.



 <p>WEDGETAIL PROJECT CONSULTING PTY LTD</p>	<p>Legend</p> <p> Subject Block Boundaries</p> <p> Quadrat (20m x 20m)</p> <p> Photo Point</p> <p> Local Road</p> <p> Track-Vehicular</p>	<p>Blocks, Monitoring Quadrats & Photo Locations</p> <p>25 50 75 100 m</p> <p><small>DATA SOURCE: © State of New South Wales (Spatial Services, a business unit of the Department of Customer Service NSW). For current information go to spatial.nsw.gov.au.</small></p>	<p>Holcim Australia North Dune Extension Sand Mining Extraction Operation Post 3 year Monitoring Report Oyster Cove Road, Tanilba Bay NSW</p> <p><small>WARNING: The information included on this graphic representation has been compiled from a variety of sources and is subject to change without notice. Wedgetail Project Consulting makes no representations or warranties, express or implied, as to accuracy, completeness, timeliness or rights to the use of such information. This document is not intended for use as a land survey product nor is it designed or intended as a construction design document. The use or misuse of the information contained on this graphic representation is at the sole risk of the party using or misusing the information.</small></p>	<p>Figure:</p> <p>2</p>

4. MONITORING RESULTS

4.1 BLOCK Q1

This block has two quadrats used for monitoring and is now six years since first revegetated.

4.1.1 Quadrat Q46

This quadrat recorded a total of 32 species, 28 of which were natives, below the target of 34 (**Table 5**). Five overstorey species were recorded – *Corymbia gummifera*, *E. pilularis*, *E. piperita*, *E. robusta* and *Melaleuca nodosa* with *E. pilularis* presenting as the most mature at 6 m tall. Three midstorey species were recorded, *Banksia aemula*, *Leptospermum polygalifolium* and *L. laevigatum* in which the latter is an exotic in this system. Only five shrub species and two ground stratum species were recorded in this quadrat, due to a controlled burn that occurred on the day of the survey.

Of the key species, listed in **Table 4**, *Banksia aemula*, dominated the plot in overall numbers however only received a cover abundance score (CA) of 3, i.e., between 5 - 25% cover. This species was flowering at the time of the survey indicating potential for reproduction. Similarly, the following natives received a CA of 3; *Acacia longifolia*, *Eragrostis brownii*, *E. pilularis*, *Leptospermum polygalifolium*, *Leptospermum trinervium* and *Melaleuca nodosa*.

Almost all parameters for this plot have improved compared to previous surveys as listed in **Table 5**. Average covers and stratum proportions are consistent with previous years and continue to approach targets. As expected, the average height of plants had substantially increased due to more mature overstorey species.

Controlled burn efforts in the area had destroyed most shrub and ground stratum species however, had successfully reduced exotic species within the plot. Species diversity remains satisfactory, with the survival of key species. The quadrat would benefit from continued revegetation efforts to improve diversity.



Plate 1: Controlled burn occurring in the vicinity of Q46 on the day of monitoring. Note the reduction in plants – native and exotic in the ground cover stratum.

4.1.2 Quadrat Q47

This quadrat recorded a total of 22 flora species, of which 18 are natives. Whilst the number of native species had improved from previous surveys, overall species diversity had decreased marginally. Invasive species such as *E. curvula* had not been optimally controlled and pervaded the area with a CA abundance score of 6 i.e., 75-100%, despite previous controlled burns in the plot.

Fortunately, midstory and overstory stratum species were retained. Particularly, *Banksia aemula* and *Corymbia gummifera* remained quite large with some individuals reaching 4 m and 5 m respectively. Despite the lack of diversity in the quadrat, the majority of the species were either flowering or fruiting. Of the key species, *L. polygalifolium*, *M. nodosa* and *B. aemula* were flowering; a seedling of the latter was also observed which is a very pleasing result.

4.1.3 Block Summary

Quadrat Q46 was consistent with previous years and continued to display high densities, covers and stratum proportions that have met targets. Whilst species diversity was satisfactory and steadily approaching targets, the area would benefit from continued revegetation efforts. Previous controlled burns have successfully reduced weed species in the area.

Quadrat Q47 is located to the north of the haul road and is an area of poorer revegetation where native plant densities and diversity do not meet targets. This area was dominated by *E. curvula* due to previous unsuccessful controlled burns and lack of species diversity. Of the key species, midstory (*B. aemula*, *L. polygalifolium* and *M. nodosa*) and overstory species (*C. gummifera* and *E. piperita*) survived and fortunately recovered somewhat with *B. aemula* seedlings observed.

Table 5: Growth parameters for Block Q1 monitoring quadrats for Post 3 Year monitoring and comparison to targets.

Parameter	Target	3 Yr Growth Param	4 Yr Mon (2021)			5 Yr Mon (2022)			6 Yr Mon (2023)		
			Q46	Q47	Block Ave	Q46	Q47	Block Ave	Q46	Q47	Block Ave
Ave. Cover (%)	80	57.71	83.33	66.67	75.00	66.67	60.00	57.5	80.00	65.00	72.50
Ave. height (cm)	230	66.62	114.81	75.23	95.02	71.88	55.0	79.7	120.96	124.52	122.74
Total Native Species (400 m ²)	34	-	34	14	28.25	29	16	22.5	38	18	28
Total Weed Species (400 m ²) – no target	-	-	7	11	9	3	15	9	4	4	4
Ave. No. of plants (plants/4 m ²)	40	17.14	45.17	95.50	70.33	15.67	45.17	30.42	26.33	44.67	35.50
Ave. No. Fire resistant species (plants/4 m ²)	1	1.46	1.33	1.67	1.50	1.33	1.33	1.33	1.67	2.83	2.25
Ave. Species Richness (species/4 m ²)	12	6.04	9.33	5.67	7.50	5.00	9.33	7.17	8.00	6.67	7.25
Ave. Exotic Species (species/4 m ²) – No target	0	-	1.5	1.83	1.67	0.67	2.66	1.67	0.50	2	1.25
Ave. Ground stratum proportion (%)	27	43.54	30.0	37.0	34.0	30.0	30.37	30.2	26.6	43.5	35.0
Ave. Shrub stratum proportion (%)	61	29.40	55.0	19.0	37.0	36.67	55.32	45.9	41.7	9.9	25.8
Ave. Midstorey stratum proportion (%)	7	14.60	9.0	21.0	15.0	30.00	9.22	19.6	20.5	17.9	19.2
Ave. Overstorey stratum proportion (%)	5	12.47	5.0	24.0	15.0	3.33	5.09	4.2	11.2	28.8	20.0

4.2 BLOCK Q2

Q48 continued to be poorly vegetated and substantially lacking in species diversity and overall number of plants; well below targets and more so than previous years. The plot cover was similar to the 2022 surveys although average plant height has increased as expected. This area has made little progress and though it appeared that weed diversity decreased, majority of the weed species were grouped as ‘miscellaneous weeds’, thus misrepresenting the extent of the weeds. Indeed, *E. curvula* dominated the space with a CA score of 6 i.e., 75%-100%.

Fortunately, six of the key species were recorded in the quadrat, (*B. aemula*, *C. gummifera*, *E. piperita*, *E. robusta*, *L. polygalifolium*, *M. nodosa* and *X. glauca*) of which seedlings for *B. aemula*, *L. polygalifolium* and *X. glauca* were observed. These species also returned a CA score of 3. Other natives such as *A. longifolia* were recorded with an abundance with a CA score of 3.

The high cover of aggressive exotics will impact reproductive efforts of native species. Natural recruitment will be slow until the planted overstorey species achieve sufficient height to begin to shade these species out. In the meantime, ongoing weed control could be continued to suppress the more aggressive weed species and consideration given to a seeding program of native shrub and other species to increase diversity.

Unfortunately, a controlled burn had spread to the plot following our survey and although this will attempt to quell the spread of invasive species, it will likely impact the newly observed seedlings and damage natural recruitment.

Table 6: Growth parameters for Blocks Q2 monitoring quadrats for Post 3 Year monitoring and comparison to targets and end of 3-year monitoring.

Parameter	Target	3 Year Monitoring	4 Year Monitoring	5 Year Monitoring
Ave. Cover (%)	80	61.33	83.33	81.67
Ave. height (cm)	230	29.16	71.41	154.39
Total Native Species (400 m ²)	34	-	21	18
Total Weed Species (400 m ²)	-	-	11	3
Ave. No. of plants (plants/4 m ²)	40	97.67	89.83	16.67
Ave. No. Fire resistant species (plants/4 m ²)	1	1.00	1.33	1.33
Ave. Species Richness (species/4 m ²)	12	7.4	8.00	4.00
Ave. Exotic Species (species/4 m ²)	-	4.6	5.16	1.67
Ave. Ground stratum proportion (%)	27	66.5	61.23	42.8
Ave. Shrub stratum proportion (%)	61	21.77	16.03	19.6
Ave. Midstorey stratum proportion (%)	7	8.00	12.38	17.4
Ave. Overstorey stratum proportion (%)	5	3.73	10.36	20.2.



Plate 2: Quadrat Q48 from the SW corner. Vegetation has increased in height and cover from the previous year's monitoring.

4.3 BLOCK Q3

Q49 maintains excellent revegetation with 42 total species, 41 of which are natives. Seven key species were observed, minus *E. pilularis* and *M. quinquenervia*. The majority of the species recorded a CA score of 2 i.e., < 5% cover, many individuals, making the plot densely vegetated and highly diverse. *A. ulicifolia* and *L. ericoides* were more abundant, with a CA score of 3 and there remains low numbers of invasive species in the plot due to the dense native cover.

As expected, there are continued increases in average plant height and the maintenance of good coverage overall. Within 2 m x 2 m plots the average number of plants and species diversity have decreased likely due to senescence of early succession species. Consequentially the high density of flowering plants had provided excellent litter cover.

Table 7: Growth parameters for Block Q3 monitoring quadrats for Post 3 Year monitoring and comparison to targets.

Parameter	Target	3 Year Monitoring	4 Year Monitoring	5 Year Monitoring
Ave. Cover (%)	80	69.62	78.33	70.00
Ave. height (cm)	230	55.13	69.60	86.35
Total Native Species (400 m ²)	34	-	44	41
Total Weed Species (400 m ²)	-	-	1	1
Ave. No. of plants (plants/4 m ²)	40	27.62	28.33	14.83
Ave. No. Fire resistant species (plants/4 m ²)	1	1.74	1.33	2.00
Ave. Species Richness (species/4 m ²)	12	13.37	11.67	9.50
Ave. Exotic Species (species/4 m ²)	0	-	0	0

Parameter	Target	3 Year Monitoring	4 Year Monitoring	5 Year Monitoring
Ave. Ground stratum proportion (%)	27	9.64	8.30	7.71
Ave. Shrub stratum proportion (%)	61	77.71	80.44	70.18
Ave. Midstorey stratum proportion (%)	7	5.27	2.96	7.75
Ave. Overstorey stratum proportion (%)	5	7.38	8.29	14.36



Plate 3: Quadrat Q49 in Block Q3 from the SE corner showing the senescence of native species, (left) but growth of the Banksia (right).

Only a single weed species, *L. laevigatum* was recorded in the quadrat. While as noted, two key species are below target in numbers, it is felt that at this stage it may cause more damage to the existing vegetation if in-fill planting is undertaken at the present state of the vegetation. Seed collection from adjacent areas and spreading may be an option in the short term. As noted in the previous report, with the senescence of the some of the early succession species, it may be an appropriate time to undertake in-fill planting.

4.4 BLOCK Q4

This block has two monitoring quadrats, Q50 and Q51 and overall is another example of excellent revegetation as can be seen from **Table 8**.

4.4.1 Quadrat Q50

All parameters are similar to previous surveys in 2022, with the maintenance of excellent overall cover, density and plant height with minimal invasive species. The area remains dominated by early succession species (i.e., *A. ulicifolia*, *B. heterophylla*, *D. retorta*, and *H. linearis*) all receiving a CA score of 3.

This quadrat recorded excellent growth parameters with increased average cover, average height, and native species diversity, albeit this last parameter has decreased from the previous year and just fallen below target (**Table 8**). Numbers of plants per plot is below target, but probably reflects that achievement of analogue density will require more time for development, rather than any shortfall in the revegetation effort (**Plate 4**). All key species and *E. robusta* were recorded in this quadrat with excellent numbers and increasing CA scores. Senescence of some of the plant species is evident, but canopy and midstorey species are beginning to attain considerable height with individual *E. robusta* measured between 180 cm and 400 cm tall.

No weed species were recorded in the quadrat, but two exotic natives *L. laevigatum* and *Melaleuca quinquenervia* were recorded, still seedlings at this stage.

Table 8: Growth parameters for Block Q4 monitoring quadrats for Post 3 Year monitoring and comparison to targets.

Parameter	Target	3 Yr Mon	4 Year Monitoring			5 Year Monitoring		
			Q50	Q51	Block Ave	Q50	Q51	Block Ave
Ave. Cover (%)	80	69.06	75.00	81.67	78.33	80.00	68.33	74.17
Ave. height (cm)	230	54.87	72.51	67.83	70.17	90.93	81.09	86.01
Total Native Species (400 m ²)	34	-	40	39	39.5	33	35	34
Total Weed Species (400 m ²)	-	1	2	0	2	1	1	1
Ave. No. of plants (plants/4 m ²)	40	31.68	26.00	28.17	27.08	22.83	27.00	24.92
Ave. No. Fire resistant species (plants/4 m ²)	1	1.33	1.83	0.83	1.33	1.67	1.33	1.50
Ave. Species Richness (species/4 m ²)	12	12.65	13.50	14.17	13.83	10.67	13.50	12.08
Ave. Exotic Species (species/4 m ²)	0		0	0	0	0	0	0
Ave. Ground stratum proportion (%)	27	4.04	6.31	7.18	6.75	4.76	7.53	6.14
Ave. Shrub stratum proportion (%)	61	84.93	72.62	79.97	76.29	68.45	76.95	72.70
Ave. Midstorey stratum proportion (%)	7	5.54	12.52	7.18	9.85	14.00	5.84	9.92
Ave. Overstorey stratum proportion (%)	5	5.49	8.54	5.67	7.11	12.80	9.68	11.24



Plate 4: Block Q4, Quadrat 50, showing good growth and diversity, but senescence and some bare ground is still visible.

4.4.2 Quadrat Q51

This quadrat recorded declines in average cover and average height, but recorded increases in the total number of native species and average number of plants – although this last parameter is still below target (**Table 8**). All key species and *E. robusta* were again recorded within the quadrat with only *L. polygalifolium* and *X. glauca* in low abundance. The dominance of early succession species in this section of the block is declining (**Plate 5**) (as evidenced by the decline in overall cover), with only two species, *A. ulicifolia* and *D. retorta* recording CA score of 3. Continued growth of key species was apparent with *E. robusta* recording a CA score of 3. No weed species were recorded, but the exotic native *L. laevigatum* was recorded in the quadrat.



Plate 5: View Q51 from the SE corner showing extensive die back of the early succession natives, but also the good growth of the overstorey species.

4.4.3 Block Summary

This block continues to have excellent growth parameters, but the section represented by Q51 is exhibiting strong signs of die back as the early succession species senesce. A particular feature of the re-planting effort has been the high numbers of *E. robusta* that have successfully established. Cover abundance for this key koala feed tree was 3 (5% to 25%) with heights of between 2.5 and 2.7 m measured. No weed species were recorded in the block, but the exotic native species *L. laevigatum* and *M. quinquenervia* were recorded. Both of these are native species and are naturally found nearby but are not considered native to this vegetation community. *E. curvula* was observed to be encroaching from the adjacent block, Block 1 and this grass needs control before it becomes established and undoes the good work that has been achieved.

4.5 BLOCK Q5

This block is monitored by Quadrat Q52. This block has quite dense shrubby and midstorey vegetation at its southern extent which becomes more open and weedier at its northern extent (**Figure 2**). This denser vegetation is largely composed of *A. longifolia*, *A. falcata*, *Dodonaea triquetra* and dense *L. laevigatum*. The two *Acacia* species and *D. triquetra* are relatively short-lived species and will in the next 2-3 years start to die back, leaving this block with less native vegetation cover than at present. The weed reduction burn that occurred at the time of the monitoring should act to stimulate the germination of the *Acacias* and increase the vegetative cover.

The growth parameters for this quadrat are generally very poor (**Table 9**). This quadrat recorded a very low 18 native species, a reduction of one from last survey, but only one exotic native and one weed species. This quadrat was dominated by three species, but natural senescence and the fire have changed the species balance (**Plate 5**). *L. laevigatum* was still estimated to have a CA score of 5, while *E. curvula* and *A. longifolia* were reduced to a CA score of 2. A small number of other native species are increasing in size and/or number and recorded CA scores of 2 including, *A. falcata*, *A. ulicifolia*, *B. aemula*, *L. polygalifolium*, *L. trinervium* and *M. nodosa*. The fast-growing *L. laevigatum* has expanded, and represents a threat to the revegetation effort, effectively forming a monoculture in sections of the block (**Plate 6**).

Table 9: Growth parameters for Block Q5 monitoring quadrats for Post 3 Year monitoring and comparison to targets.

Parameter	Target	3 Year Monitoring	4 Year Monitoring	5 Year Monitoring
Ave. Cover (%)	80	79.81	82.50	85.00
Ave. height (cm)	230	93.75	100.31	262.36
Total Native Species (400 m ²)	34	-	19	18
Total Weed Species (400 m ²)	-	-	6	2
Ave. No. of plants (plants/4 m ²)	40	18.26	15.83	10.67
Ave. No. Fire resistant species (plants/4 m ²)	1	3.07	0.83	0.83
Ave. Species Richness (species/4 m ²)	12	4.08	5.33	3.00
Ave. Exotic Species (species/4 m ²)	0	2.27	1.0	1.17

Parameter	Target	3 Year Monitoring	4 Year Monitoring	5 Year Monitoring
Ave. Ground stratum proportion (%)	27	36.77	21.53	4.17
Ave. Shrub stratum proportion (%)	61	31.99	34.72	34.72
Ave. Midstorey stratum proportion (%)	7	23.89	32.64	48.61
Ave. Overstorey stratum proportion (%)	5	7.35	11.11	12.50



Plate 6: Block Q5, Quadrat 52 from the NW corner showing the effect of the weed reduction burn.



Plate 7: View of Q51 from the SE corner showing the lack of growth under the dense *L. laevigatum*.

4.6 BLOCK Q6

This block was monitored with two quadrats – Quadrats Q53 and Q54.

4.6.1 Quadrat Q53

Average cover and average height, two of the growth parameters for this quadrat have improved since the previous year's monitoring. Diversity (number of species) and plant numbers in both the 20 m quadrat and the 2 m x 2 m lots have decreased indicating some degree of senescence. Despite this slight decline in species diversity, the quadrat remains above target for species diversity – 35 species for the quadrat and an average of 12.17 for the plots (**Table 10**). Average plant numbers have decreased in the 2 m plots indicating senescence of some the early succession species. *D. retorta* was still the most widespread species with a CA score of 4 (25% - 50%), with *L. ericoides* the next most abundant species with a CA score of 3 (5% - 25%). The remaining species all recorded CA scores 1 or 2, indicating <5% cover and either infrequent or numerous occurrences respectively. All seven key species and *E. robusta* were recorded in the quadrat, which bodes well for achievement of targets. Only one native exotic species, *L. laevigatum* was recorded in the quadrat.

4.6.2 Quadrat Q54

This quadrat returned very similar growth parameters to the previous quadrat indicating a fairly uniform revegetation effort. Average vegetation cover at 71.67% was coincidentally the same as the Q53. Species diversity has decreased with age but remains on target at this monitoring event. *D. retorta* remained the dominant species with a CA score of 4, but *A. ulicifolia* was the next most common species with a CA score of 3. Again, the remaining species all recorded CA scores 1 or 2. All seven key species and *E. robusta* were recorded in the quadrat. Only one native exotic species, *L. laevigatum* was recorded in the quadrat.

Table 10: Growth parameters for Block Q6 monitoring quadrats for Post 3 Year monitoring and comparison to targets.

Parameter	Target	3 Yr Monitoring	4 Year Monitoring			5 Year Monitoring		
			Q53	Q54	Block Ave	Q53	Q54	Block Ave
Ave. Cover (%)	80	65.00	63.33	65.00	64.17	71.67	71.67	71.67
Ave. height (cm)	230	48.42	49.14	43.65	46.40	62.46	59.81	61.13
Total Native Species (400 m ²)	34	-	38	41	39.5	35	34	35.5
Ave. No. of plants (plants/4 m ²)	40	37.92	40.33	40.83	40.58	28.67	27.33	28.00
Ave. No. Fire resistant species (plants/4 m ²)	1	2.10	1.83	1.00	1.42	1.50	1.33	2.08
Ave. Species Richness (species/4 m ²)	12	14.61	14.0	13.0	13.5	12.17	12.00	12.08
Ave. Exotic Species (species/4 m ²)	0	-	0	0	0	0	0.17	0.08
Ave. Ground stratum proportion (%)	27	5.63	2.67	3.74	3.20	3.82	4.19	4
Ave. Shrub stratum proportion (%)	61	72.11	71.91	82.11	77.01	71.14	70.18	70.66

Parameter	Target	3 Yr Monitoring	4 Year Monitoring			5 Year Monitoring		
			Q53	Q54	Block Ave	Q53	Q54	Block Ave
Ave. Midstorey stratum proportion (%)	7	15.39	15.66	9.96	12.81	17.57	20.35	18.96
Ave. Overstorey stratum proportion (%)	5	6.87	9.76	4.19	6.97	7.47	5.28	6.38



Plate 8 Block Q6 Quadrat Q53 from the SE corner, Note the proliferation of flowers - largely *D. retorta*, *H. linearis*, and *L. ericoides*. Some die back is visible.



Plate 9: Block Q6 Quadrat Q54 from the NE corner showing the improved height (poles are 2 m high), and coverage. The quadrat is still dominated by early succession species, but some key species are visible.

4.6.3 Block Summary

Another rehabilitation block with continuing excellent growth parameters. All seven key species were recorded in good numbers and includes *E. robusta*. The domination of *D. retorta* continue until senescence and the establishment of secondary species. Diversity is very good, and many species were observed to be in flower or seed indicating the potential for self-sustaining germination when conditions are right. While no weed species were recorded in the quadrats, the exotic ground cover *Acanthium australe* and the grass *E. curvula* were observed in the northern section of this block, adjacent to Block Q5. The spread of *L. laevigatum* is concerning as this species is quite invasive and can form dense thickets that shade out all other plants as evidenced by Block 5. Weed control in the areas adjacent to Block 5 and the removal of *L. laevigatum* plants is the only recommendation for this block.

5. DISCUSSION AND RECOMMENDATIONS

5.1 DISCUSSION

The revegetation of the North Dunes Extension is neatly divided into two sections. The “southern” blocks, Blocks Q3, Q4 and Q6 are excellent revegetation with good diversity, numbers, and coverage. This is supported by the growth parameters outlined in **Section 4 Results** above but highlighted in **Appendix B** charts. **Chart 3** shows the average species richness per 4 m² in the monitoring quadrats, with the southern blocks clearly much higher. Likewise, **Chart 6** and **Chart 7** show the proportion of ground stratum and shrub stratum species respectively. Again, these two charts split the blocks quite distinctly, although weed control efforts have reduced the proportion of ground cover stratum species in Block Q5 – albeit they were largely exotic. The likely explanation is the source topsoil that was used for the revegetation of these areas. The topsoil in the southern blocks was better vegetated with native species while the topsoil used in the northern blocks was of lower diversity and quality. This is supported by the shrub stratum numbers and proportions. These species are not seeded at all as part of the revegetation effort but germinate from the topsoil and thus indicating that this was the case. The higher proportion of ground stratum species recorded in the northern blocks are overwhelmingly weed species. Native ground stratum species have always been under target – this has been apparent all through the revegetation in the NDE and on the North Dunes adjacent to this site which has been revegetated for over 15 years in the oldest sections. With the weed control efforts in Block Q1, Block Q2 and Block Q5, most of the native species recorded were planted key species. Much of the remaining native diversity in these blocks was observed around the transplanted *X. glauca*, i.e., having germinated from the soil included in the transplanted stems.

From the above discussion, it would follow that the majority of positive observations relate mainly to the southern blocks. For instance, litter development is beginning to be apparent, especially under the overstorey trees or where dense *D. retorta* has dropped leaves and seed pods such as Block Q1 (southern section) and Blocks Q3 and Q4. The weedier northern blocks do not yet have that litter build up, and of course where controlled burns have occurred what litter had accumulated has been burned off.

The long-term establishment of successful revegetation requires the ability of self-recruitment and to this end a total of 65 native species were recorded across the NDE, an increase of one species from the previous survey – 44 of which were recorded with reproductive features – fruit, flowers or

seedlings. This is good a result and included overstorey species with fruit in Block Q1 – the oldest revegetation.

Weed species were concentrated in the northern blocks (the northern section of Q1, Q2 and Q5) with the western most section of Block Q1 also an area of concern (hence the weed control burns in this section). Blocks Q3 and Q4 generally had weed species restricted to their edges, with no weed species recorded in the monitoring quadrats themselves. Block Q4, has *E. curvula* starting to encroach from Block Q1. Block Q6 has some minor encroachment from Block Q5, but also has an on-going issue with *Acanthospermum australe*, a prostrate (ground-spreading), ground stratum weed species native to North America characteristic of disturbed sites and wasteland. Previous weed control efforts have reduced, but not eliminated this species in this area. As has been mentioned elsewhere, the native invasive species, *Leptospermum laevigatum* has been recorded in all blocks. It is especially prevalent in Block Q5 where it forms a dense a thicket that shades out all other vegetation. It has continued to spread, and it is postulated will hinder the revegetation effort if left unchecked. The sand extraction area known as The Knoll immediately adjacent to Block 5 is also under threat from spread of this species.

Key species plantings have been very successful in all blocks with overstorey species including *Eucalyptus robusta* generally in good numbers. The only exception is Block Q3 where a distinct lack of the midstorey species *Leptospermum polygalifolium* has been noted previously and is probably reducing the average height growth parameter in this section of the rehabilitation.

5.2 RECOMMENDATIONS

Increasing the native diversity of the northern blocks is recommended as a priority to facilitate surrender. This would entail further weed control efforts but also a concerted seeding campaign with shrub species. Seed could be collected from the adjoining undisturbed vegetation – not from the better rehabilitation areas so as not to hinder their continued development – and applied to the blocks. This will likely require several rounds of control and seeding to achieve the desired results. Species that might be readily collected include but should not be limited to, *Dillwynia retorta*, *Hibbertia linearis*, *Leptospermum trinervium*, *Leucopogon ericoides*, *Acacia ulicifolia* and any of the three *Bossiaea*s found on site.

Planting of *L. polygalifolium* into Block Q3 would also be beneficial to improve vegetation structure and achieve key species targets in this area but may have to wait until the dense pioneer species begin to die back and open some space for ease of movement.

Weed control efforts should be on-going and frequent to bring the problematic weeds under control and to prevent these species spreading into the very good revegetation areas of the southern blocks. Targeted weeds are the very common *A. australe*, *E. curvula*, *L. camara* and *L. laevigatum*.

5.3 CONCLUSIONS

The NDE rehabilitation has both excellent and poorer areas of native revegetation. The excellent areas – Blocks Q3, Q4 and Q6 and the southern section of Block Q1 – only require some minor planting and on-going weed control along the edges to stop the spread of *E. curvula* and walkovers in the main revegetation areas to remove *L. Laevigatum*. The northern blocks require additional work especially weed control targeting *E. curvula* in general and *L. laevigatum* in Block 5 before it spreads further. and seeding with native shrubs, to improve their flora diversity and numbers.

APPENDIX A: PHOTOGRAPHIC MONITORING RECORD

Block Q1



Plate 10: View of Block Q1 from PP1 looking East (left) and West (right) January 2018



Plate 11: Block Q1 PP2 January 2018



Plate 12: Block Q1 PP2 July 2018



Plate 13: Block Q1 PP1 looking from east to west January 2019



Plate 14: Block Q1 PP2 looking west January 2019



Plate 15: View of Block Q1 from PP1 looking East (left) and West (right) July 2019



Plate 16: Block Q1 PP2 looking west July 2019



Plate 17: View of Block Q1 from PP1 looking East (left) and West (right) January 2020. Notice the dieback of shrub species and the height of the Eucalypt (left) and the prevalence of *Eragrostis curvula* (right)



Plate 18: Block Q1 PP2 looking west January 2020



Plate 19: Block Q1 PP2 looking south - west – north, July 2020 just after controlled burns



Plate 20: Block Q1 PP1 looking west – north – east, October 2021



Plate 21: Block Q1 PP1 looking west – north – east, October 2023



Plate 22: Block Q1 PP2 looking south - west – north, October 2021

Block Q2



Plate 23: Block Q2 looking east January 2019



Plate 24: Block Q2 looking east July 2019



Plate 25: Block Q2 looking east January 2020. Note the die back of *Acacia longifolia* around the perimeter of the block



Plate 26: Block Q2 looking east July 2020.



Plate 27: Block Q2 looking east January 2021.



Plate 28: Block Q2 looking east October 2021



Plate 29: Block Q2 looking east October 2023

Block Q3



Plate 30: Block Q3 east (looking west) January 2019



Plate 31: Block Q3 east (looking west) July 2019



Plate 32: Block Q3 east (looking west) January 2020



Plate 33: Block Q3 east (looking west) July 2020



Plate 34: Block Q3 east (looking west) January 2021



Plate 35: Block Q3 east (looking west) July 2021



Plate 36: Block Q3 east (looking west) July 2023



Plate 37: Block Q3 south (looking east along haul road) January 2019



Plate 38 Block Q3 south (looking east along haul road) July 2019



Plate 39: Block Q3 south (looking east along the haul road) January 2020



Plate 40: Block Q3 south (looking east along haul road) July 2020



Plate 41: Block Q3 south (looking east along haul road) January 2021



Plate 42: Block Q3 south (looking east along haul road) October 2021

Block Q4



Plate 43: Block Q4 east (looking west) January 2019



Plate 44: Block Q4 east (looking west) July 2019



Plate 45: Block Q4 east (looking west) January 2020



Plate 46: Block Q4 east (looking west) July 2020



Plate 47: Block Q4 east (looking west) January 2021



Plate 48: Block Q4 west (looking east) January 2019



Plate 49: Block Q4 west (looking east) July 2019



Plate 50: Block Q4 west (looking east) January 2020. Note the grassy weeds adjacent to this block (far left and right of photo)



Plate 51: Block Q4 west (looking east) January 2020.



Plate 52: Block Q4 west (looking east) January 2021. Note the dense weedy grass infestation in Block Q1 (left of photo) and the encroachment into this block.



Plate 53: Block Q4 west (looking east) October 2021

Block Q5



Plate 54: Block Q5 looking east January 2019



Plate 55: Block Q5 looking east July 2019



Plate 56: Block Q5 looking east January 2020



Plate 57: Block Q5 North - looking south July 2020



Plate 58: Block Q5 north (looking south) January 2021. Growth of vegetation necessitated the relocation of the photo point for this block. Note the dominance of grasses (brown) and *Acacia longifolia* (large green shrubs)

Block Q6



Plate 59: Block Q6 south-east (looking south-west to north-east) July 2020.



Plate 60: Block Q6 south-east (looking south-west to north-east) January 2021.



Plate 61: Block Q6 south-east (looking south-west to north-east) October 2021



Plate 62: Block Q6 south-east (looking south-west to north-east) February 2022



Plate 63: Q6 south-east (looking south-west to north-east) October 2023



Plate 64: Block Q6 North-east (looking south and west) July 2020.



Plate 65: Block Q6 North-east (looking south and west) January 2021. Note the grassy weeds encroaching from Block Q1 at right of photo



Plate 66: Block Q6 West - looking east - south - west, January 2021



Plate 67: Block Q6 West - looking east - south - west, October 2021



Plate 68: Block Q6 West - looking east - south - west, February 2022



Plate 69: Block Q6 West - looking east - south - west, October 2023

APPENDIX B: NORTH DUNES EXTENSION BLOCKS Q1 TO Q6 GROWTH PARAMETER COMPARISON CHARTS

The following charts compare the different growth parameters at the same time as measured from the commencement of rehabilitation. The charts are presented in the same order as the parameter tables in Section 3.

Chart 1 shows the average vegetative cover over the course of the monitoring. While reductions in cover are evident for individual blocks, the overall trend is for increasing cover with age. The results of the latest weed efforts are apparent for Block Q1 with the latest reduction in cover at the 5 Year point. The ability of the vegetation to recover and increase after disturbances due to drought (18-month point) suggests a degree of resilience that indicates good self-sustaining development. More recent dips in cover can be attributed to species changes due to early succession species being slowly replaced by secondary succession species.

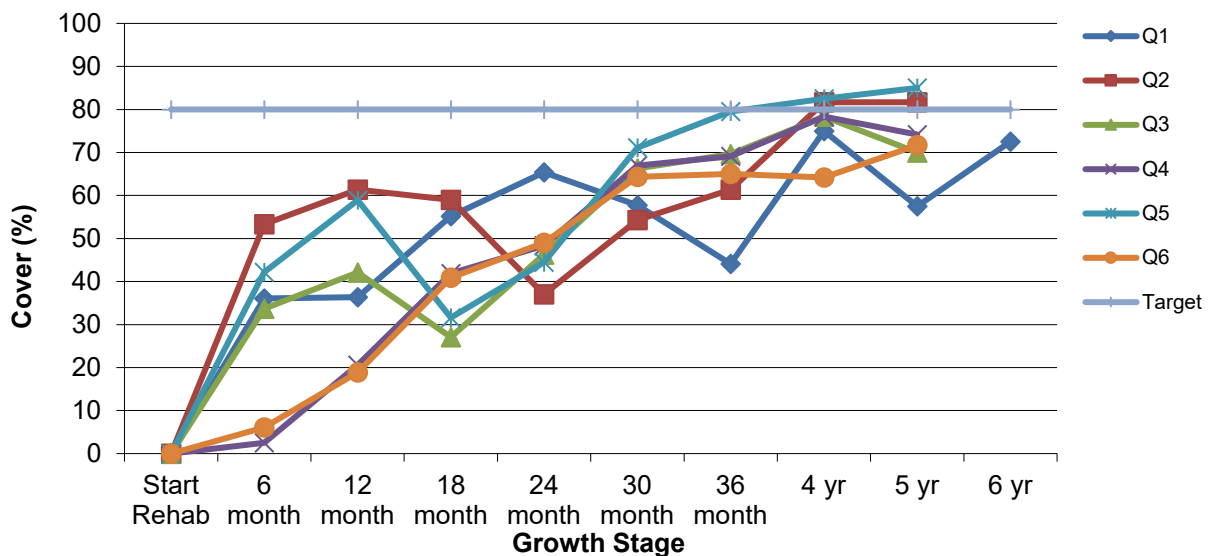


Chart 1: Comparison of average foliage cover across the blocks for the period of monitoring to date.

Chart 2 shows the average height of all species for each of the rehabilitation blocks. As expected, height increases with age of the revegetation, with minor dips due to die-back due to drought or weed control efforts. The natural maturation of overstorey and midstorey species will continue to increase this parameter. The dominance of fast-growing species such as *L. laevigatum* in Block 5 is responsible for that blocks sudden increase in average height.

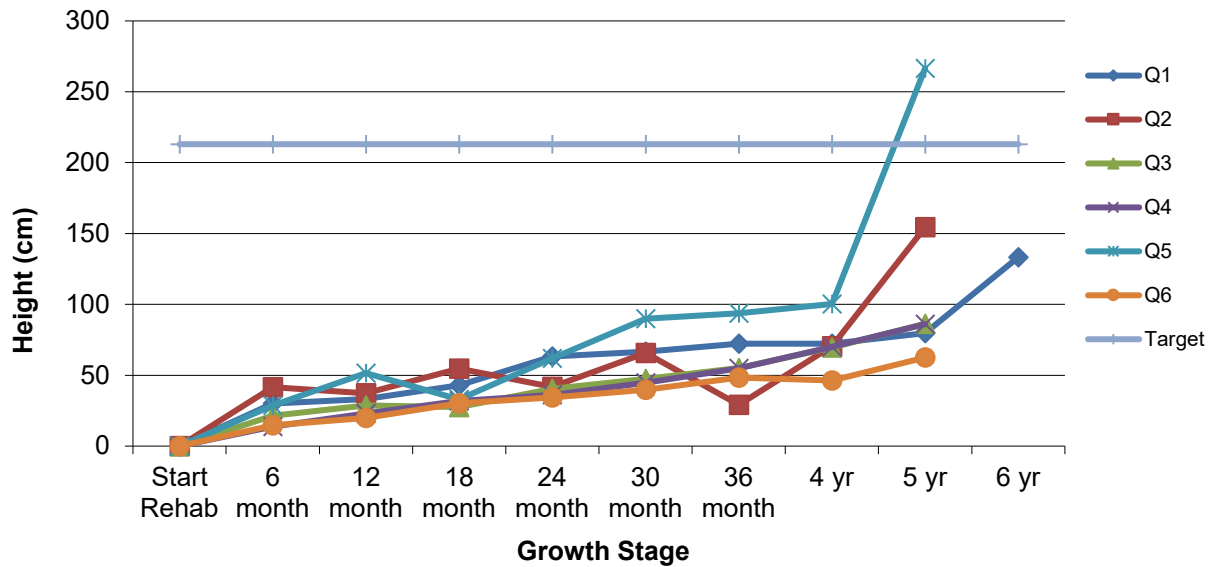


Chart 2: Comparison of average height of all strata across the blocks for the duration of the monitoring.

Chart 3 shows the average species richness or diversity per 4m² plots in the quadrats. There is a clear difference between the northern blocks (Q1, Q2 and Q5) and the southern blocks (Q3, Q4 and Q6) with the southern blocks recording higher species diversity. This higher species diversity is equated to better revegetation, possibly due to better quality topsoil at the original clearing of the NDE. All blocks now appear to be on a downward trajectory, attributed to natural succession processes.

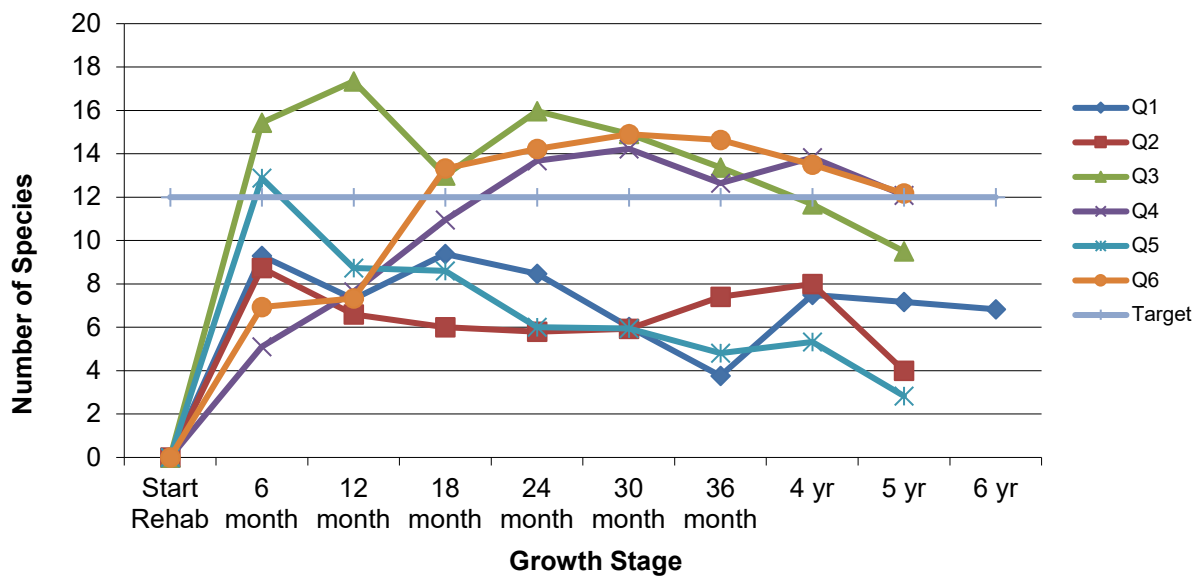


Chart 3: Comparison of the average species richness per 4m².

Chart 4 shows the average number of plants per 4 m² plot within the monitoring quadrats. Weed control burns have greatly reduced the average number of plants in Blocks Q1, Q2 and Q5. Block Q5 has had consistently low plant numbers due to the prevalence of larger shrub species such as *A. longifolia* and *L. laevigatum*.

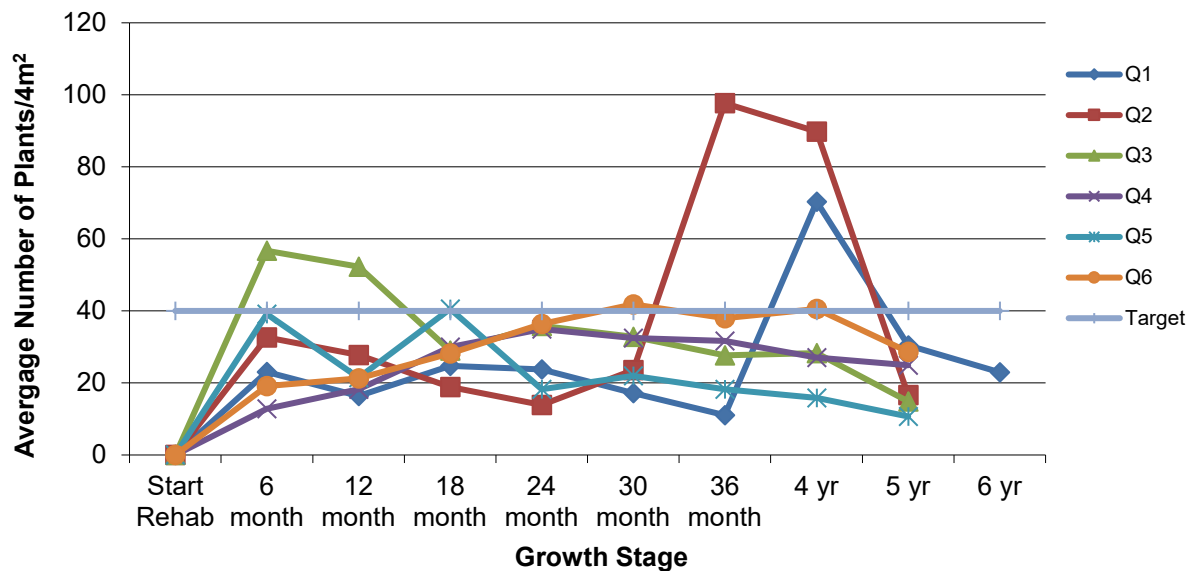


Chart 4: Comparison of the average number of plants/4m².

The average number of fire-resistant species has been fairly consistent across the blocks and throughout the revegetation and above target. The exception is Block Q5. Examination of past monitoring data reveals very high numbers of *L. laevigatum* in a small number of 4 m² plots with evident die back of other fire-resistant species. Recent weed control burns may have acted to facilitate the germination of fire-tolerant species.

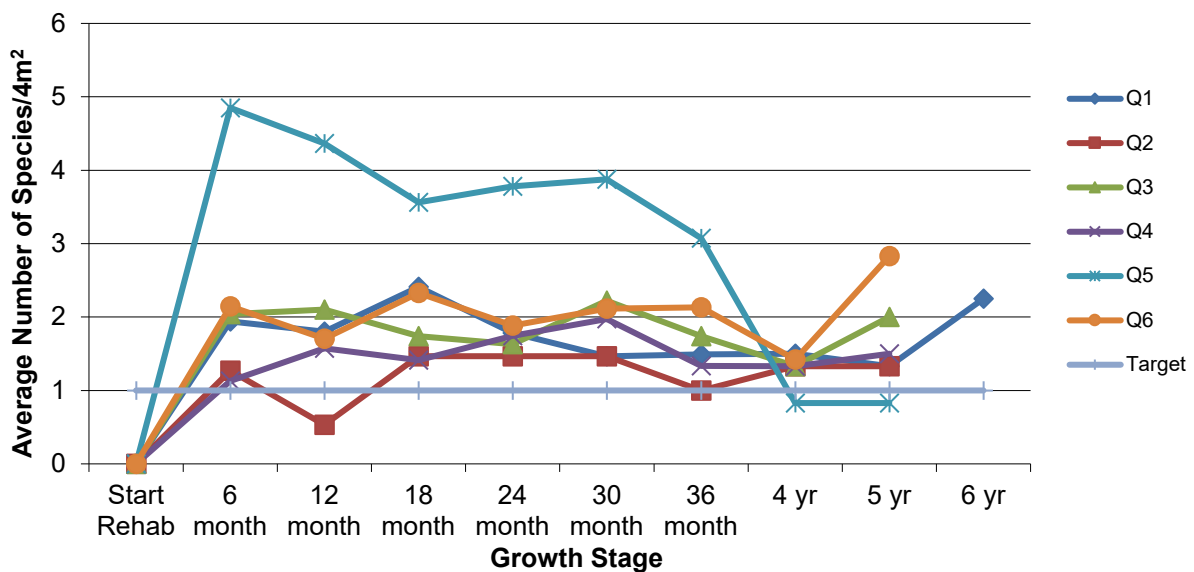


Chart 5: Comparison of the average number of fire-resistant species/4m²

Chart 6 shows the relative proportions of ground species across the blocks. Blocks Q1, Q2 and Q5 have in the past had a much higher proportion of ground species compared to Blocks Q3, Q4 and Q6. The weed control burns have greatly reduced the number of annual exotic species that increase the proportion of this stratum. The weed species that have been recorded in these blocks are largely ground stratum species and can be expected to rebound when conditions become conducive, e.g., higher rainfall and temperatures in the spring. The lack of native ground species has been noted throughout revegetation of the North Dunes and North Dunes Extension.

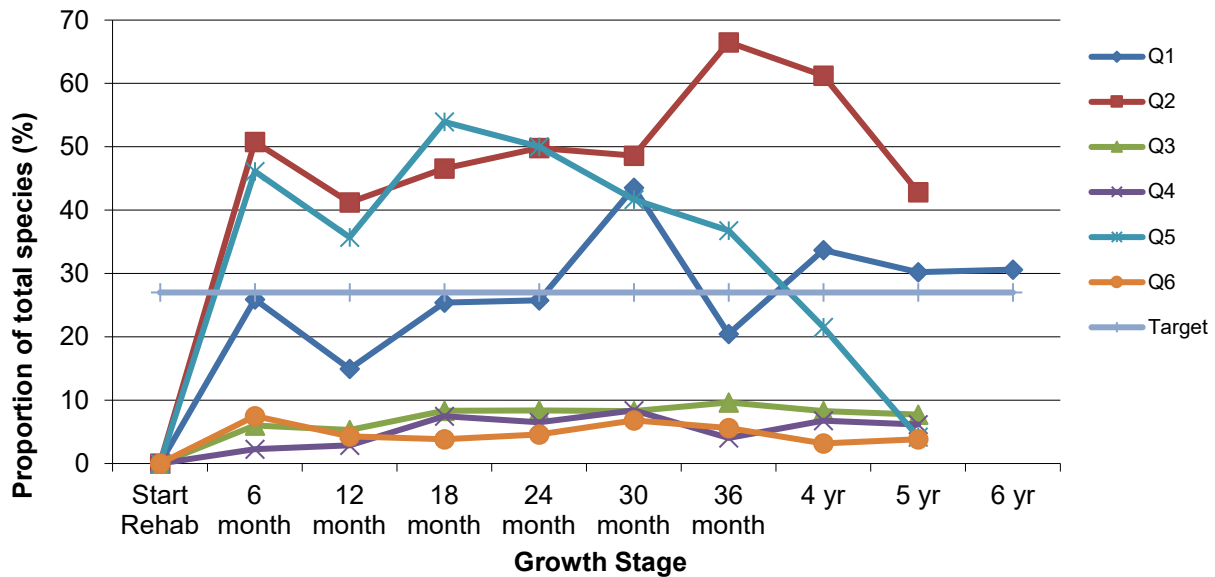


Chart 6: Comparison of the average proportion of ground stratum species/4m².

The proportion of shrub species has always been very high in both the NDE (**Chart 7**) and the Tanilba North Dunes revegetation. These species tend to be both early coloniser species and later succession species. All these species self-recruit from the soil seed bank. It is this stratum that is missing from the poorer blocks - Q1, Q2 and Q5 – and lends support to the argument that the topsoil that was stripped and respread over these blocks did not support vegetation as species rich as the topsoil used for the revegetation of Blocks Q3, Q4, and Q6.

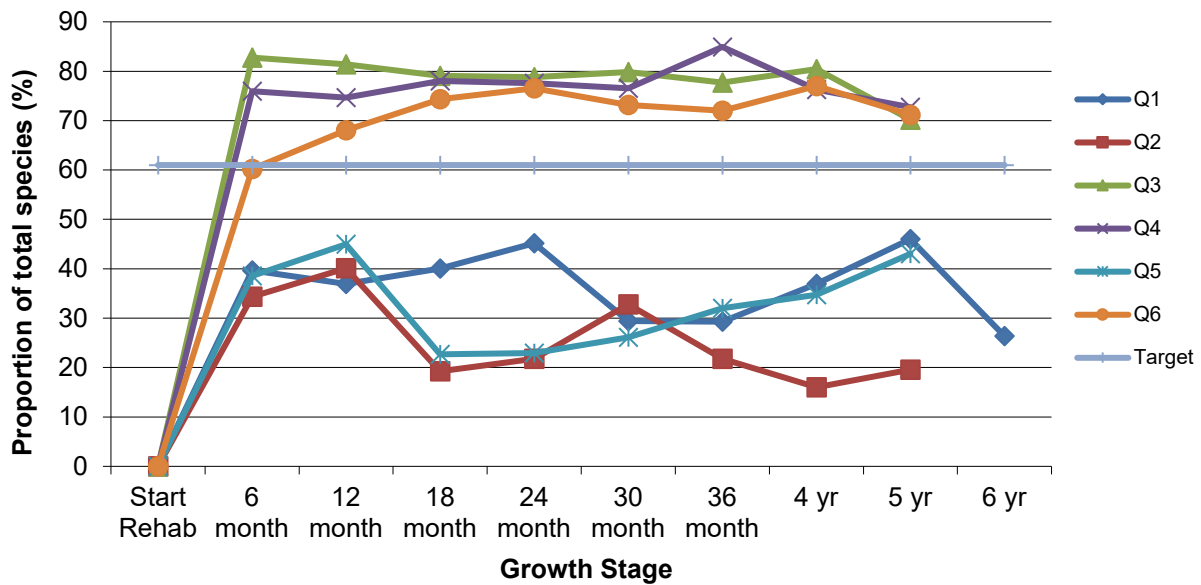


Chart 7: Comparison of the proportion of shrub stratum species/4m².

Midstorey species are predominantly planted, with some naturally recruited from the soil seed bank. Blocks with lower species diversity – e.g., Block Q5 – will then have a larger proportion of species in this stratum because of the planting of *B. aemula*, *L. polygalifolium* and *L. trinervium*. The reduction in the proportion of ground species due to the burns also acts to increase this stratum as these species are not as effected by the fires.

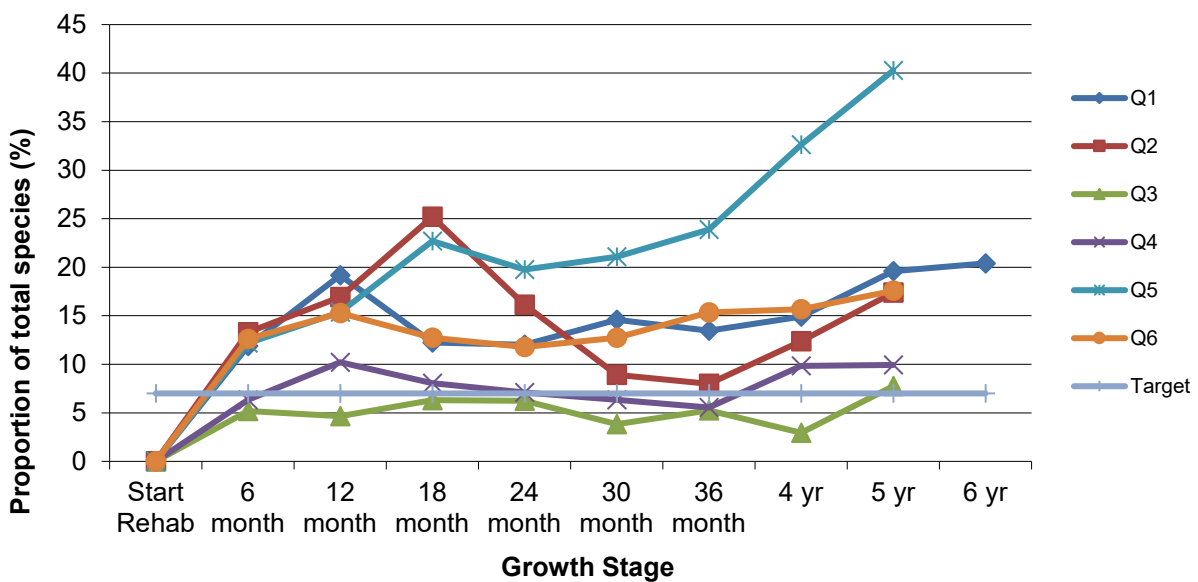


Chart 8: Comparison of the proportion of midstorey species/4m².

Overstorey species are almost totally planted and the fluctuations in the proportions of this stratum can be attributed to the timing of plantings by Sibelco and Holcim staff and contractors.

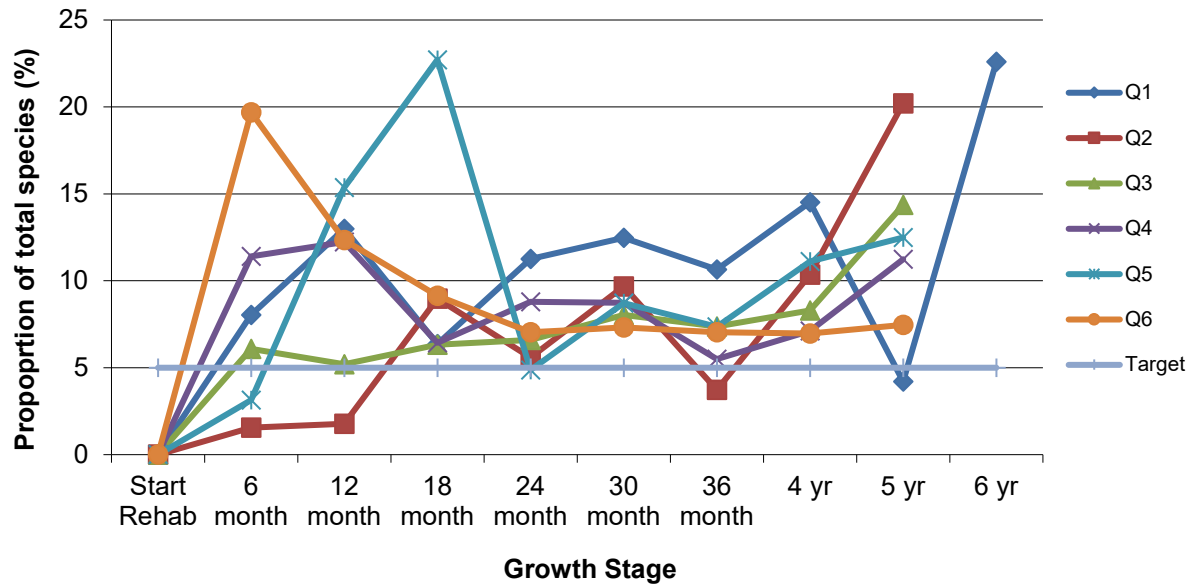


Chart 9: Comparison of the proportion of overstorey species/4m².

APPENDIX C: PREDICTIVE TRENDS

Available Data

Data is available for 5 Year monitoring for Block Q1, while Blocks Q2 to Q6 have been surveyed at the 4 Year point of revegetation.

Changes to Predictive Modelling

Given the relatively short period of time that the Extension has been subject to monitoring, the predictive models will be subject to change with the collection of additional data.

Results

Cover

Monitoring data shows that two of the blocks have achieved the target cover of 80% - Blocks Q2, and Q5 (**Chart 10**). Block Q1 was predicted to achieve cover by 2024, but fire control efforts will have altered that prediction. Blocks Q3 and Q4 have experienced reductions in cover due to senescence of pioneer species and are now predicted to achieve cover targets by 2027 and 2026 respectively. Block Q6 is predicted to achieve target cover by 2025.

Height

Chart 11 shows the projected time to achieve target height, with widely varying forward projections for the blocks. Block Q5 has achieved the target height, but the proviso is that the species responsible include *A. falcata* and *L. laevigatum*, species not considered native the vegetation community. With the recent monitoring data, many of the predictions show achievement of target heights in the near future. For instance, Block Q2 is predicted for later in 2024, while Block Q1 is predicted for 2026. Blocks Q3, Q4 and Q6 are all projected for the early 2030's which is a significant improvement on previous projections. This may of course change with ongoing monitoring.

A Cautionary Note

Development of plants and communities over time is not a linear process. Combinations of allometry and complex thinning laws have been shown to govern how individuals and communities develop. Furthermore, the overall development of the total respiratory surface (green area) at any given location has been shown to be a function of the evaporative thermodynamics at the locality (See the attached bibliography for a selection of relevant references). Nor do the predictive models take into account disturbances such as fire or drought which has affected all blocks during the course of the rehabilitation, or likewise the restorative effects of sustained rainfall once the drought has broken. Nor do they account for restarts in rehabilitation as has occurred in the northern section of Block Q1.

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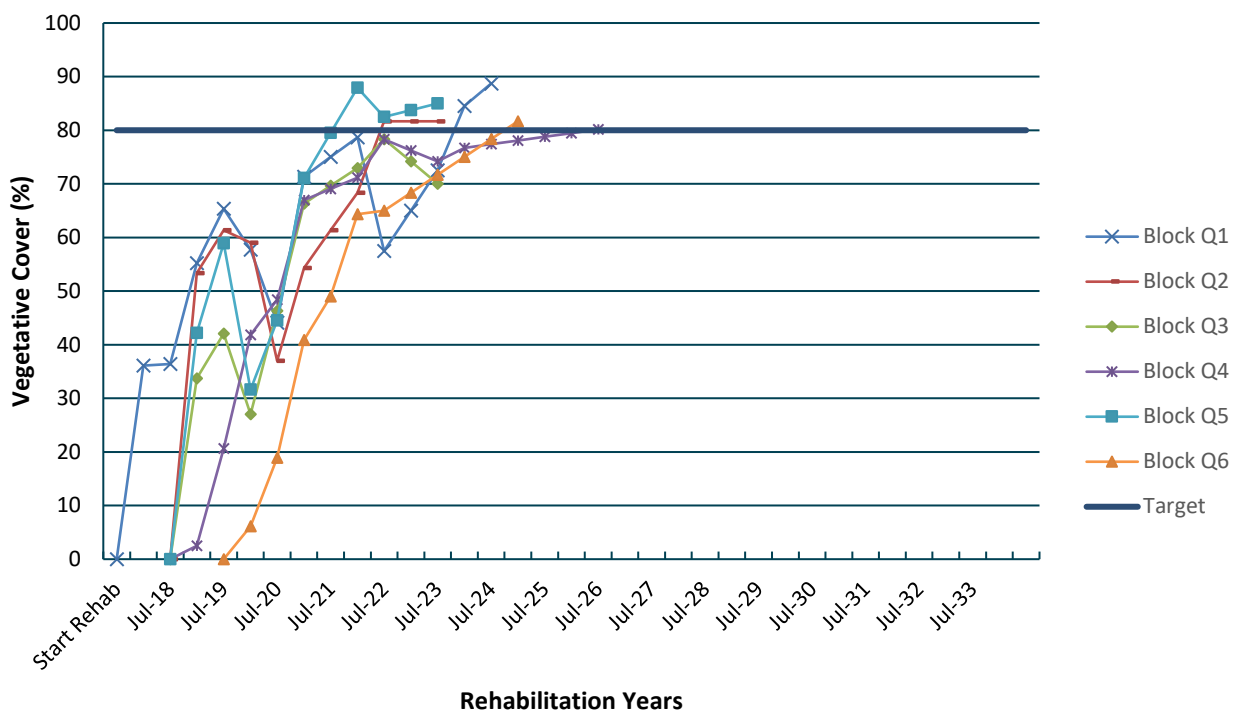


Chart 10: The projected dates for the achievement of the target average foliage cover of 80% for the NDE Blocks Q1 - Q6. Block Q1 is based on 9 surveys. Blocks Q2 – Q6 are based on 8 surveys.

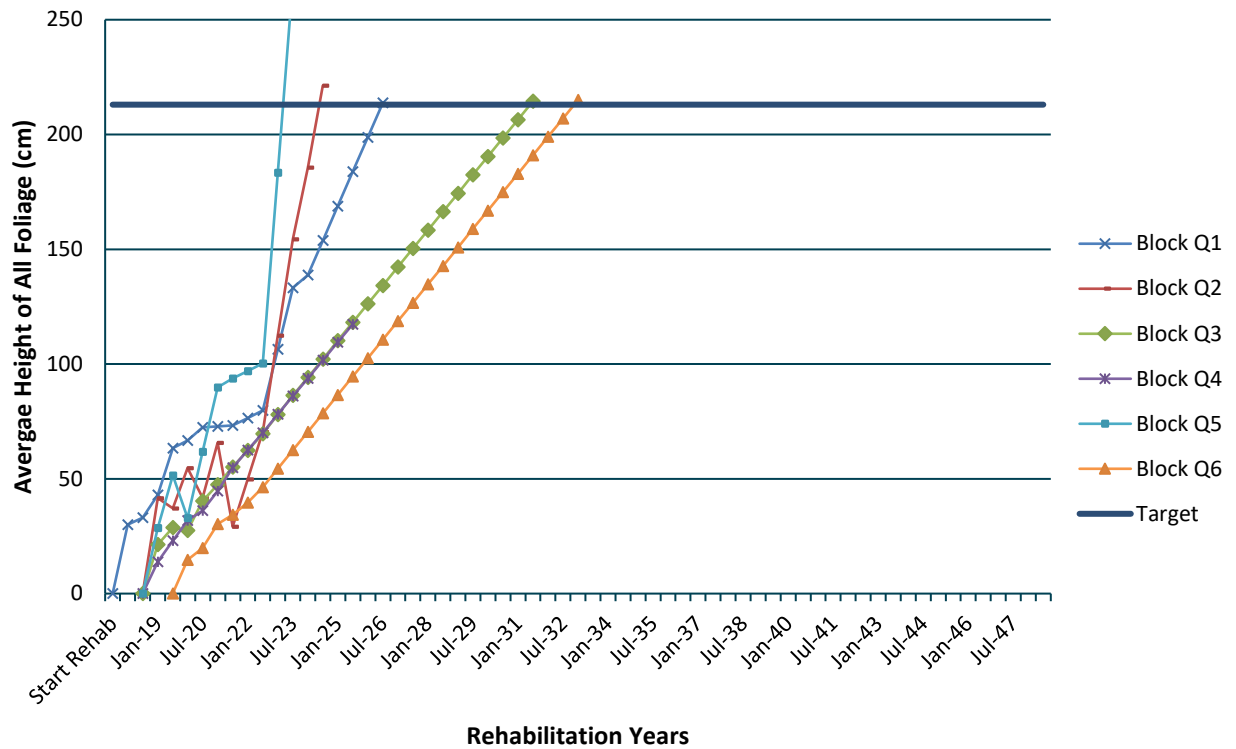


Chart 11: The projected dates for the achievement of the target average height of 213 cm for the revegetation of the NDE. Block Q1 is based on 9 surveys. Blocks Q2 to Q6 are based on 8 surveys.

APPENDIX D: FLORA SPECIES LIST BY BLOCK

Date: Oct 2023	Block	Q1		Q2	Q3	Q4		Q5	Q6		No of Species Observed as or with			
Family	Species	Q46	Q47	Q48	Q49	Q50	Q51	Q52	Q53	Q54	Seedlings	Flower	Fruit	Total S, F&F
Poaceae	<i>*Eragrostis curvula</i>	2	6	6				2						0
Verbenaceae	<i>*Lantana camara</i>		1											0
Myrtaceae	<i>*Leptospermum laevigatum</i>	2	2	2	2	1	1	5	1	1		4		4
Poaceae	<i>*Melinis repens</i>	1										1		1
	Misc weeds	2	2	3										0
Fabaceae (Mimosoideae)	<i>Acacia longifolia</i>	3	2	3	2			2	2	2	2	6	1	0
Fabaceae (Mimosoideae)	<i>Acacia falcata</i>		1					2				1		0
Fabaceae (Mimosoideae)	<i>Acacia suaveolens</i>		1		2	2		1	2	2	1		6	0
Fabaceae (Mimosoideae)	<i>Acacia ulicifolia</i>	2	1		3	3	3	2	2	3	1		8	9
Apiaceae	<i>Actinotus helianthi</i>	2		1	1	1	1				4	1		5
Euphorbiaceae	<i>Amperea xiphioclada</i>				1				1			2		2
Fabaceae (Faboideae)	<i>Aotus ericoides</i>	2	1			1	1	1	2	1		6	1	7
Proteaceae	<i>Banksia aemula</i>	3	3	3	2	3	2	2	2	2	2	6		8
Fabaceae (Faboideae)	<i>Bossiaea ensata</i>				2		1			1		2		2
Fabaceae (Faboideae)	<i>Bossiaea heterophylla</i>	1	3	1	2	3	2	1	1	2			9	9
Fabaceae (Faboideae)	<i>Bossiaea rhombifolia</i>	1		1										0
Cyperaceae	<i>Caustis recurvata</i>				1	2	2		2	2	3			0
Proteaceae	<i>Conospermum taxifolium</i>				2	1	2		2	2		4		4
Myrtaceae	<i>Corymbia gummifera</i>	2	3	1	2	2	1		2	2				0
Cyperaceae	<i>Cyperus spp</i>		1											0
Myrtaceae	<i>Darwinia leptantha</i>				1							1		1
Phormiaceae	<i>Dianella sp.</i>	2	2	2				1						0
Fabaceae (Faboideae)	<i>Dillwynia retorta</i>				2	3	3		4	4		5		5
Sapindaceae	<i>Dodonaea triquetra</i>	1	1	1							1		3	4
Poaceae	<i>Eragrostis brownii</i>	3												0
Rutaceae	<i>Eriostemon australasius</i>				2				1	1		1		1

Date: Oct 2023	Block	Q1		Q2	Q3	Q4		Q5	Q6		No of Species Observed as or with			
Family	Species	Q46	Q47	Q48	Q49	Q50	Q51	Q52	Q53	Q54	Seedlings	Flower	Fruit	Total S, F&F
Myrtaceae	<i>Eucalyptus pilularis</i>	3												0
Myrtaceae	<i>Eucalyptus piperita</i>		2	1	1	2	2		2	1		3	1	4
Myrtaceae	<i>Eucalyptus robusta</i>	1		2	2	3	3	1	1	1				0
Myrtaceae	<i>Euryomyrtus ramosissima</i>	2			2	2	2	1	2	2		6		6
Cyperaceae	<i>Gahnia spp.</i>	2			1	2	1							0
Fabaceae (Faboideae)	<i>Gompholobium virgatum</i>	1			2	1	2					3		3
Haloragaceae	<i>Gonocarpus teucrioides</i>	2												0
Fabaceae (Faboideae)	<i>Hardenbergia violacea</i>	1						1				2		2
Myrtaceae	<i>Harmogia densifolia</i>				2	3	2		2	2		5		5
Dilleniaceae	<i>Hibbertia acicularis</i>						1		1	1		2		2
Dilleniaceae	<i>Hibbertia fasciculata</i>				1				2	2		3		3
Dilleniaceae	<i>Hibbertia linearis</i>	2		1	2	3	2		2	2	1	7		7
Restionaceae	<i>Hypolaena fastigiata</i>				1									0
Proteaceae	<i>Isopogon anemonifolius</i>				2							1		1
Cyperaceae	<i>Lepidosperma laterale</i>	1												
Santalaceae	<i>Leptomeria acida</i>				1	2	2		2	2			2	2
Myrtaceae	<i>Leptospermum polygalifolium</i>	3	3	3	2	2	1	2	2	2	2	4		6
Myrtaceae	<i>Leptospermum trinervium</i>	3			2	1		2	2	2	1	2		2
Restionaceae	<i>Lepyrodia scariosa</i>													0
Ericaceae (Epacridoideae)	<i>Leucopogon ericoides</i>	2			3	2	3	1	3	2		7		7
Ericaceae (Epacridoideae)	<i>Leucopogon virgatus</i>	1					1					2		2
Ericaceae (Epacridoideae)	<i>Leucopogon spp.</i>				1							1		1
Lomandraceae	<i>Lomandra multiflora</i>	1												0
Lomandraceae	<i>Lomandra longifolia</i>	2	2		1				1			3		3
Myrtaceae	<i>Melaleuca nodosa</i>	3	3	2	2	2	2	2	2	2		3	2	5
Myrtaceae	<i>Melaleuca quinquenervia</i>					1								0

Date: Oct 2023	Block	Q1		Q2	Q3	Q4		Q5	Q6		No of Species Observed as or with			
Family	Species	Q46	Q47	Q48	Q49	Q50	Q51	Q52	Q53	Q54	Seedlings	Flower	Fruit	Total S, F&F
Myrtaceae	<i>melaleuca armillaris</i>			1								1		1
Ericaceae	<i>Monotoca elliptica</i>	2	1	1	2	2	2	1	2	2	2			2
Ericaceae	<i>Monotoca scoparia</i>	1			1	1	2		1	1		2		2
Olacaceae	<i>Olax stricta</i>				1	1	2			1		4		4
Proteaceae	<i>Paspalidium distans</i>	1												0
Proteaceae	<i>Persoonia lanceolata</i>	2			2	2	2		2	2			5	5
Rutaceae	<i>Philotheca salsolifolia</i>					1								0
Thymelaeaceae	<i>Pimelea linifolia</i>				1				1	1	3	3		6
Apiaceae	<i>Platysace ericoides</i>	1			1	2	1		1			1		1
Rhamnaceae	<i>Pomax umbellata</i>	2	1	1							1	1	1	3
Euphorbiaceae	<i>Pseudanthus orientalis</i>				1									0
Dennstaedtiaceae	<i>Pteridium esculentum</i>	1		1			1							0
Euphorbiaceae	<i>Ricinocarpos pinifolius</i>	1					1		1	1		4		4
Cyperaceae	<i>Schoenus ericetorum</i>	2			2	2	2	1	2	2		6		6
Elaeocarpaceae	<i>Tetratheca thymifolia</i>					1	2		2	1		3		
Ericaceae	<i>Woolisia pungens</i>	1			1	2	2		2	2		5		5
Xanthorrhoeaceae	<i>Xanthorrhoea glauca</i>	1	1	3	1	1	1	2	1	1	2	1		3
Rutaceae	<i>Zieria laxiflora</i>						1					1		1
	Total	42	22	21	42	34	36	20	36	35	14	41	11	44
	Natives	38	18	18	41	33	35	18	35	34				
	Average	Lot Q1				Lot Q4			Lot Q6					
	Ave Total spp.	32				34.5			35.5					
	Ave Native spp.	28				34			34.5					

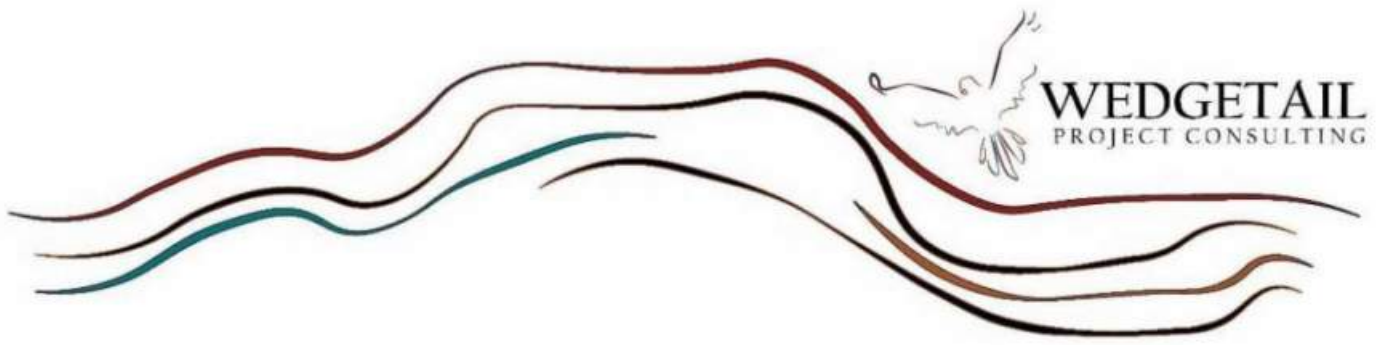
APPENDIX E: Staff Contributions and Qualifications

The following staff were involved in the compilation of this report.

Name	Qualification	Title/Experience	Contribution
Nigel Fisher	BSc (Hons) PhD	Senior Ecologist	Flora Surveys, Report Review
Kane Blundell	BEd	GIS	Mapping and Figures
Jonathon Berry	<i>B.AppSc(Hons)</i> <i>MEIANZ</i>	Principal Advisor	Report Review
Rachel Neal	<i>BBS</i> (Hons)	Ecologist	Flora surveys, report writing

APPENDIX 4

BIODIVERSITY OFFSET MONITORING REPORT

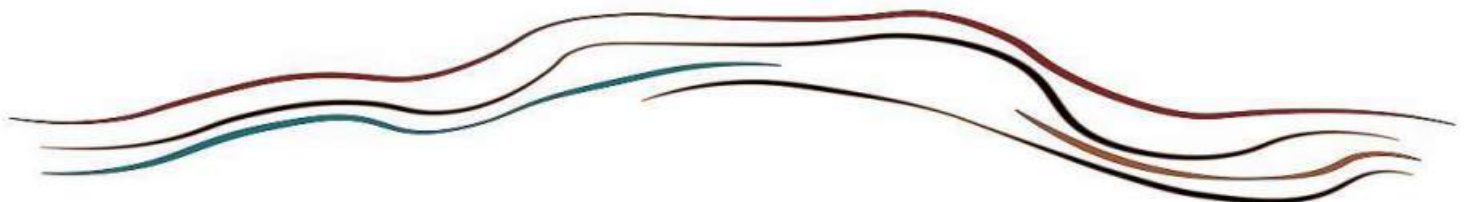


North Dune Extension Biodiversity Offset Area 2023 Monitoring Report

Tanilba North Dunes Extension Northern Biodiversity
Offsets Area



Rev 3
19 April 2024



North Dune Extension Biodiversity Offset Area 2023 Monitoring Report

Tanilba North Dunes Extension Northern Biodiversity Offsets Area

REPORT PREPARED FOR:

Holcim (Australia) Pty Ltd

REPORT PREPARED BY:

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Version Control

Rev. No.	Revision Date	Author / Position	Reviewer	Details
Rev 1	19 April 2024	Mark Dean/Ecologist Nigel Fisher/Senior Ecologist	Nigel Fisher Senior Ecologist	Final

EXECUTIVE SUMMARY

Holcim (Australia) has consent to extract white silica sand from the Tanilba North Dune Extension located in the Oyster Cove area, in the Port Stephens Council Local Government Area. Schedule 3, Condition 15 of the Tanilba Northern Dune Extension Project Approval (MP 09_0091) required the preparation of a Biodiversity Management Plan (BMP) (Kleinfelder, 2019). The BMP outlines management measures for the approved Biodiversity Offsets Areas (BOA). BOAs for the project have been established in the north-east of the approved extraction area (Northern Biodiversity Offset Area, NBOA). The NBOA consists of an area of 18.3 ha of native vegetation in varying condition that is covered by Lots 11, 12 and 13 of DP 601306 and is located to the north and north-east of the Tanilba North Dunes Extension sand extraction project. The NBOA is owned as freehold by Holcim (Australia).

The BMP requires the following actions to be undertaken within the NBOA. The relevant sections of the BMP are noted:

- Annual inspection and monitoring to be conducted by a suitably qualified person/s (Section 5.1.3B) – results detailed in this report,
- Implementation of a nest box installation and monitoring program within the northern offset area to replace hollow bearing trees removed from the extraction area (Section 5.1.3F),
- Targeted fauna monitoring across all offset areas to monitor for Wallum Froglet (*Crinia tinnula*), Mahony's Toadlet (*Uperoleia mahonyi*), and Koala (*Phascolarctos cinereus*) (Section 5.2),
- Establishment of a habitat restoration and rehabilitation program across the offset areas (including the visual amenity buffer along the northern boundary of the extraction area) consisting of (Section 5.1.3D),
 - o Annual inspections to identify areas requiring weed and pest control (5.1.3B),
 - o A weed and pest management program (Section 5.1.3C),
 - o Enhancement of the availability of habitat for the Koala through the installation of *Eucalyptus robusta* (Swamp Mahogany) within the offset area (Section 5.1.3D),
 - o Rehabilitation of the regenerating Grassland-Heath to the surrounding Swamp Mahogany – Paperbark Swamp Forest through seeding and planting of appropriate species (Section 5.1.3D).

To satisfy the above requirements, Wedgetail Project Consulting (WPC) was engaged by Holcim to conduct targeted fauna monitoring for the amphibians and koalas as outlined above, an assessment of the vegetation of the NBOA and weed mapping to inform and conduct weed control works.

Amphibians

Targeted fauna monitoring for the Wallum Froglet (*Crinia tinnula*) and Mahony's Toadlet (*Uperoleia mahonyi*) was conducted by WPC ecologists on the 7th November 2023, 20th and 21st February 2024 over the three nights, following periods of rainfall. Surveys consisted of a search along tracks in the NBOA. Nocturnal surveys for amphibian species employed visual and audible detection techniques with the aid of spotlights. No frogs of any species were recorded calling on any of the three nights surveys were conducted within the NBOA or in two control population sites to the east and west of the NBOA. Rainfall over the winter months had well below average, and despite substantial rainfall in the days preceding the surveys, no standing water was visible. Additional opportunistic sightings

of non-amphibian species within the NBOA included the Ringtail Possum (*Pseudocheirus peregrinus*) (in a slash pine tree), sugar glider (*Petaurus breviceps*), multiple grey-headed flying-foxes (*Pteropus poliocephalus*), swamp wallaby (*Wallabia bicolor*) and microbats. Previous survey results show that one of the targeted species are utilising the NBOA for breeding and foraging habitat when the conditions are suitable. With no permanent water bodies on the NBOA, this is restricted to periods of higher rainfall. Nearby more permanent water bodies are presumed to be the core habitat for these species. Ongoing surveys after suitable rain events will determine if the species continue to utilise the NBOA.

Koala SAT Surveys

Two methods were used for the detection of koalas this year.

Detection dogs trained to locate koala scats were brought to site and run over the northern section of the NBOA on the 7th September, 2024. The methodology is quite simple with the dog/s running and walking ahead and to the side of the dog handler. The handler directs the dog by whistle commands to move in the desired direction, with the dog trained to stop and “show” where scats are located. Results were disappointing with no detections made, so the decision was made to use the traditional SAT method.

Koala monitoring was undertaken using the Spot Assessment Technique (SAT) within the NBOA as described by Phillips and Callaghan (2011). The SAT test involves a radial survey of koala “activity” within the immediate area of a tree that is known or deemed to be utilised by koalas. The search beneath each tree is conducted for two person minutes or until a single pellet is found, whichever occurs first. A tree is defined as a live woody stem of any species (except for cycads, palms, tree ferns and grass trees) which has a diameter at breast height (dbh) greater than 10 cm. Two WPC ecologists conducted 15 SAT surveys on the January 25th, 2024. These SAT surveys located older scats at three locations (SAT 8, 12 and 13), indicating low koala activity in the NBOA. Within the NBOA, the greater activities have been found to be within the Swamp Mahogany – Paperbark Swamp Forest in the north of the offset area where there are mature trees for feeding, although evidence of use was found throughout the extent of the NBOA in previous years monitoring. The NBOA has good habitat suitability for the koala to the north of the area, although parts of this area were hard to traverse due to of thick belt of *Lantana camara* (lantana) dominating the understory which has the potential to hinder Koala movement through the site, although this survey, vegetation was not present in area that have been previously inundated, making movement relatively easy. This survey, in conjunction with the Amphibian surveys WPC utilised thermal imaging binoculars to scan the vegetation for koalas over two nights. No koalas were observed over these nights. The remaining southern areas of the NBOA are still regenerating but have shown promising signs of koala use in previous years monitoring which will continue to improve as the trees mature.

Vegetation Condition Survey

An annual inspection of the NBOA is to be conducted as per Section 5.1.3B of the Biodiversity Management Plan Tanilba Northern Dunes Extension (Kleinfelder, 2019). This survey was conducted on 12th of September 2023. As per the BMP, photo monitoring points were established, weed infestations were noted, locations of rubbish dumping were noted, survey the regeneration and health of the *Eucalyptus robusta* along one transect, east to west across the BOA noting the size in classes of trees 1 m either side of the transect, noting the extent and requirement of any revegetation works in the BOA.

South of Rutile Rd, a small section of the NBOA abuts the extraction zone. Most of this area was affected by the 2018 fires but has recovered with the higher than average rainfall experienced over the three years from 2020 to 2022. The condition improves moving east from Coastal Sand Apple Blackbutt Forest that fringes the extraction zone and Block Q2 which is quite weed infested until good condition Swamp Mahogany – Paperbark Forest is encountered. The scattered Fishpole Bamboo (*Phyllostachys aurea*) noted in this area last year has grown into a substantial stand and was marked for weed treatment. Some minor Bugle Lily (*Watsonia meriana*) as also observed in this area. The 50 m buffer zone of vegetation along Rutile Rd is quite weedy with exotic grasses, Lantana (*Lantana camara*) and some minor Blackberry (*Rubus fruticosus* spp. agg.), Glory Lilly (*Gloriosa superba*), *W. meriana* and *Pinus elliottii* (Slash Pine). The main section of the NBOA lies north of Rutile Rd and has been assessed as Swamp Mahogany – Paperbark Swamp Forest “regenerating” in the area immediately to the north, and “mature” at the farthest north section of the BOA. This regenerating area can be further divided into an eastern section that can be classified as advanced regeneration where previous mining and subsequent rehabilitation has been undertaken. The western section has quite mature native trees and a mixture of native vegetation and weedy species that are the subject of on-going control efforts.

Regeneration of the *E. robusta* within this “regenerating” area was assessed by measuring the health and size of *E. robusta* trees within 1 m of a transect running East to West across the NBOA. The individual trees were divided into five height classes (<1m, 1-2m, 2-10m, 10-15m and >15m or mature trees) for determination of age. Trees <1m in height were classified as seedlings/saplings, trees 1-2m in height were classified as saplings, trees between 2 and 10m were classified as immature trees, trees 10-15m were classified as intermediate, while trees estimated to be over 15m in height were classified as mature. This year, a total of 94 trees were assessed along the transect that is approximately 400m long. The 2021 survey assessed 114 trees and the 2022 survey assessed 78 trees, the difference attributed to GPS drift rather than any dieback or death of trees.

The assessment found that there were three seedling/saplings <1 m, only five were estimated to be between 1 m - 2 m, in height, with 45 trees estimated to be between 2 m - 10 m, 41 trees between 10 m - 15 m tall and no trees assessed as mature. This indicates that this southern of the NBOA is advanced re-growth, with no trees deemed to be old growth. The majority of the *E. robusta* – 71 trees - were located in the eastern section of regenerating Swamp Mahogany – Paperbark Swamp Forest. Many of the larger trees were observed to be carrying fruit, a good indication that ongoing regeneration is occurring or possible.

Two areas at the western end of the NBOA are classified as regenerating grassland where the density of trees and shrubs is greatly reduced. Since the initial survey in 2013, natural regeneration has occurred, with many shrubs and some midstorey species self-seeding. The northern most section of the NBOA has been classified as mature Swamp Mahogany – Paperbark Swamp Forest. This area contains mature *E. robusta* and *Melaleuca quinquenervia* trees with an understorey of Tall Saw-sedge (*Gahnia clarkei*) and other swamp flora.

Weed mapping was conducted as part of the monitoring of the BOA. The key weed species recorded on site that have the potential to restrict revegetation or native fauna use are the slash pine, lantana, bugle lily, and the coastal teatree all mentioned previously, with minor occurrences of bamboo and pampas grass. The Slash Pine is concentrated along Rutile Rd in the regenerating Swamp Mahogany – Paperbark Swamp Forest, but seedlings and saplings have spread throughout this entire section of the BOA. The density has been mapped from medium to heavy in these areas and there are many scattered immature and mature trees in other areas. The Slash Pine is rapidly spreading through the BOA and does pose a threat to the viability of the area as an offset. The Bugle

*Lily is concentrated in the central portion of the regenerating Swamp Mahogany – Paperbark Swamp Forest with a large central dense infestation that becomes less dense towards the edges. Lantana has colonised this section of the BOA with infestation levels varying from scattered individuals to very heavy (<75% cover), with a belt of dense Lantana acting to separate this section from the southern regenerating section of the BOA. Evidence of previous control works conducted by contractors is visible. Where weed species have not become established the condition of the native vegetation is quite good. Native vegetation is generally in good health with no visible dieback observed amongst the canopy species on site. The regenerating grassland is slowly self-seeding with some native species such as Coastal Wattle (*Acacia longifolia*) and Coast Teatree but would benefit from a modest planting program of tubestock installation of *E. robusta*, Red Bloodwood (*Corymbia gummifera*) and Smooth-barked Apple (*Angophora costata*). Sibelco Australia (the previous owners) had commenced a modest weed control program, and Holcim (Australia) have continued this program. Further on-going and more intense weed control efforts will be required to improve the condition of the BOA.*

Weed Control Works

*WPC was engaged by Holcim (Australia) to conduct weed control works in the BOA during the 2023 reporting period. These works consisted of a team of two Land Management Technicians working on site for two rounds of three days each. Works were performed on the 19th to 21st of September 2023, Environmental Technicians from WPC carried out weed control activities within the NBOA. On the 27th of February to 1st of March 2024, staff returned to site to continue the treatment of weeds previously identified by WPC staff during annual monitoring. The target weeds were *Lantana camara* (Lantana), *Pinus elliottii* (Slash Pine), *Phyllostachys aurea* (Fishpole Bamboo) and *Watsonia meriana* (Watsonia). The following recommendations are made –*

- *The weed control effort is increased to allow for a greater area to be worked. Given the level of infestation it is suggested that effort be increased – i.e., 12 person days per year. To this end, the next weed control proposal will recommend an additional two days a year, increasing to a team of two for three days, twice a year in autumn and spring.*
- *The Slash Pine saplings that have been cut and dropped in the past control efforts should be removed – most can be removed by hand to Rutile Rd and chipped there. This will facilitate native species regeneration as shown above.*
- *The larger Slash Pine trees require a specialist arborist to safely be removed.*
 - o *This is not a small undertaking given the proximity of the high voltage power lines and Rutile Rd, although Rutile Rd has now been blocked off to the east of the site and is essentially a dead end, making traffic control easier and operations safer.*
 - o *The volume of material that is required to be removed also necessitates chipping and disposal off site.*
- *The rubbish along the access track should be removed.*
- *Consideration to installation a locked gate should also be made – but it is acknowledged that this might draw attention and pose a “challenge” to trespassers.*

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INTRODUCTION

BACKGROUND INFORMATION

Holcim (Australia) Sibelco Australia has consent to extract white silica sand from the Tanilba North Dune Extension located in the Oyster Cove area, in the Port Stephens Council Local Government Area.

Schedule 3, Condition 15 of the Tanilba Northern Dune Extension Project Approval (MP 09_0091) required the preparation of a Biodiversity Management Plan (BMP) (Kleinfelder, 2019). The BMP outlines management measures for the approved Biodiversity Offsets Area (BOA).

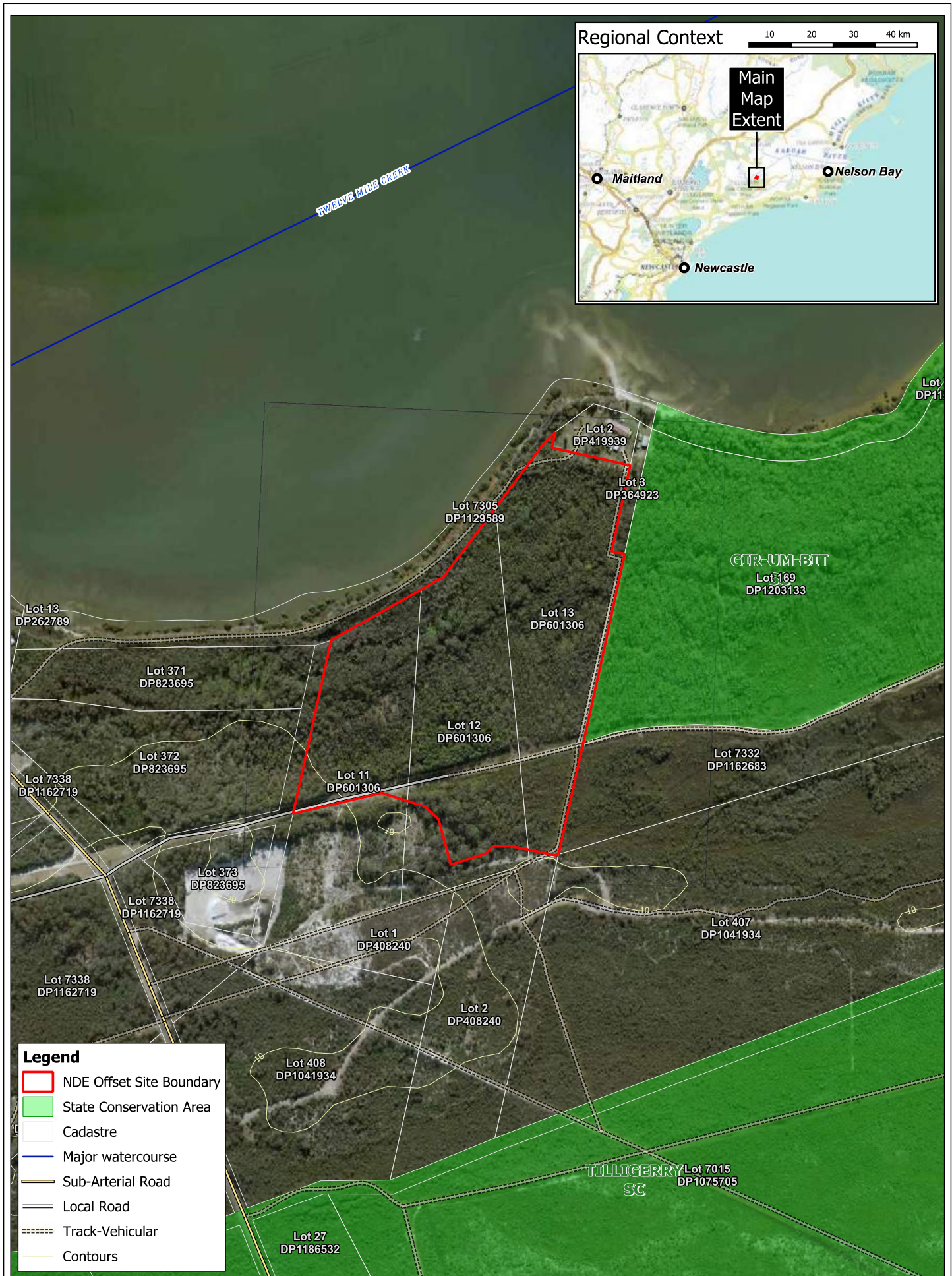
The Northern BOA consists of an area of 18.3 ha of native vegetation in varying condition that is covered by Lots 11, 12 and 13 of DP 601306 and is located to the north and north-east of the Tanilba North Dunes Extension sand extraction project. The NBOA is owned as freehold by Holcim (Australia) (**Figure 1**).

SCOPE

The BMP requires the following actions to be undertaken within the NBOA. The relevant sections of the BMP are noted:

- Annual inspection and monitoring to be conducted by a suitably qualified person/s (Section 5.1.3B) – results detailed in this report,
- Implementation of a nest box installation and monitoring program within the northern offset area to replace hollow bearing trees removed from the extraction area (Section 5.1.3F) – these can now be discontinued as monitoring has been conducted for the mandated six years and was not conducted this year.
- Targeted fauna monitoring across all offset areas to monitor for Wallum Froglet (*Crinia tinnula*), Mahony's Toadlet (*Uperoleia mahonyi*), and Koala (*Phascolarctos cinereus*) (Section 5.2),
- Establishment of a habitat restoration and rehabilitation program across the offset areas (including the visual amenity buffer along the northern boundary of the extraction area) consisting of (Section 5.1.3D),
 - o Annual inspections to identify areas requiring weed and pest control (5.1.3B),
 - o A weed and pest management program (Section 5.1.3C),
 - o Enhancement of the availability of habitat for the Koala through the installation of Eucalyptus robusta (Swamp Mahogany) within the offset area (Section 5.1.3D),
 - o Rehabilitation of the regenerating Grassland-Heath to the surrounding Swamp Mahogany – Paperbark Swamp Forest through seeding and planting of appropriate species (Section 5.1.3D).

To satisfy the above requirements, Wedgetail Project Consulting (WPC) was engaged by Holcim to conduct targeted fauna monitoring for the amphibians and koalas as outlined above, annual monitoring of the 52 nest boxes that have been installed in the NBOA, an assessment of the vegetation of the NBOA and weed mapping to inform and conduct weed control works.



Regional Context

10 20 30 40 km



100 200 300 400 500 m

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 DRAWN BY: Kane Blundell
 DATA SOURCE:
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Locality

Holcim (Australia) Pty Ltd
 North Dune Extension Biodiversity Offset Area 2023
 Monitoring Report
 Oyster Cove Rd, Tanilba Bay NSW

Figure:

1



TARGETED AMPHIBIAN SURVEYS

AMPHIBIANS

Targeted fauna monitoring for the Wallum Froglet (*Crinia tinnula*) and Mahony's Toadlet (*Uperoleia mahonyi*) was conducted by WPC ecologists as part of the requirements outlined in section 5.1.4 of the Biodiversity Management Plan Tanilba Northern Dunes Extension (Kleinfelder, 2014). Monitoring was conducted on the 7th November 2023, and 20th and 21st February 2024 by two ecologists over the three nights, following periods of rainfall. Surveys were undertaken at night, after rainfall was received (**Table 1**). **Figure 2** shows the northern dune offset areas in which the nocturnal surveys were conducted.

Table 1: Weather Conditions During Surveys

Date	Temperature (°C)	Humidity (%)	Barometric pressure (hPa)	Wind (spd/direction)	Rain past 24 hours (mm)	Rain past 5 days (mm)
7/11/2023	15.9	65	1019	30/ESE	19.2	21.8
20/02/2024	26.2	80	1017	0	0.2	45.2
21/02/2024	25.1	78	1018	0	4	42.8

Methods and Results

A prior diurnal assessment of the offset areas was conducted in 2017 to determine habitat suitability. Surveys consisted of a meandering search in the NBOA. Survey effort was focused around ephemeral and semi-permanent water bodies using both spotlighting and call-playback techniques. Surveys revealed that no permanent water existed within the offset area. Several areas were noted which had the potential to contain water after rainfall and later became the target of nocturnal surveys. The greatest potential to detected threatened amphibian species was identified within the NBOA with habitats including areas of Melaleuca/Swamp Mahogany Forest and low-lying areas dominated by herbs, rushes and/or emergent vegetation.

Nocturnal surveys for amphibian species employed visual and audible detection techniques with the aid of spotlights. No frog species of any kind including the target species were heard or observed during the three nights that frog surveys were conducted. Larger, semi-permanent bodies of water to the east (swamp along Rutile Rd) and south-west (Mirror Lakes) of the NBOA were also surveyed on these nights and no frogs were recorded as calling in these areas (**Figure 2**).

The second survey period on the 20th and 21st February, again no standing water was observed in the NBOA, but spotlighting and the use of a Pulsar Merger LFR XP 50 thermal binocular recorded a ringtail possum (*Pseudocheirus peregrinus*) (in a slash pine tree), sugar glider (*Petaurus breviceps*), multiple grey-headed flying-foxes (*Pteropus poliocephalus*), swamp wallaby (*Wallabia bicolor*) and microbats that were too numerous to count and too fast to identify. This activity shows that the NBOA offset is being used by various fauna.

Discussion

The winter period leading up to the spring and summer frog surveys was very dry with below average rainfall recorded from May 2023 to January 2024 (**Appendix B**). Despite fairly substantial rainfalls prior

to each of the surveys, the NBOA and surrounding areas were extremely dry with no standing water observed on site or in the vicinity. Permanent water bodies located several kilometres south of the site along Cabbage Tree Rd, surveyed for other clients/jobs did record both target species indicating that they are present in an extended vicinity. A period of sustained high rainfall will be required to saturate the sand-based soils and raise the water table. Results from previous surveys show that at least one of the targeted species, *Crinia tinnula* has utilised the NBOA for breeding and foraging habitat when the conditions are suitable. The lack of evidence of *Uperoleia mahonyi* utilising the NBOA should not be of concern. NSW Survey Guidelines for Threatened Frogs states surveys should target permanent and temporarily flooded swamps and depressions, which are typically, but not exclusively, on white sands. Waterbodies must be at least 70% full prior to survey, which did not occur on these occasions. The guidelines do not state a minimum rainfall requirement, but a high rainfall event is implied with the water level requirement prior to survey. As part of these surveys, a control population located approximately one kilometre east on Rutile Rd, was used for comparison and was not found to be calling. This indicates that conditions were not suitable for breeding for this species at the time of surveys. With no permanent water bodies on the NBOA, suitable conditions are restricted to periods of higher rainfall. Nearby, more permanent water bodies are presumed to be the core habitat for these species – such as the area noted above and the colloquial named Mirror Lakes to the west. Ongoing surveys after suitable rain events will determine if the species continue to utilise the NBOA.

The presence of multiple other species indicates that the NBOA and surrounding areas are being utilised by a range of fauna species. The use of alternate survey methods such as pit-fall trapping could be utilised to determine whether *U. mahonyi* is present on site during periods of low rainfall and no standing water bodies.



KOALA SPOT ASSESSMENT TECHNIQUE (SAT) TESTS

Koala monitoring for the NBOA was undertaken by WPC as part of the requirements of section 5.2 of the of the Biodiversity Management Plan Tanilba Northern Dunes Extension (Kleinfelder, 2019):

Monitoring Methodology

Detection dogs trained to locate koala scats were brought to site and run over the northern section of the NBOA. The methodology is quite simple with the dog/s running and walking ahead and to the side of the dog handler. The handler directs the dog by whistle commands to move in the desired direction, with the dog trained to stop and “show” where scats are located.

Koala monitoring was undertaken using the Spot Assessment Technique (SAT) within the NBOA as described by Phillips and Callaghan (2011). The SAT test involves a radial survey of koala “activity” within the immediate area of a tree that is known or deemed to be utilised by koalas. In the field this the test is applied as follows:

- Locate and mark a tree (the centre tree) that meets one or more of the following criteria,
 - o A tree of any species beneath which are one or koala fecal pellets and/or,
 - o A tree in which a koala has been overserved and/or,
 - o Any other tree known or considered to be a potentially important for koalas.
- Identify and mark the nearest 29 trees to the centre tree,
- Undertake a search for koala fecal pellets beneath each of the 30 marked trees based on a cursory inspection of the undisturbed ground surface within a distance of 1m of the base of the tree. If no fecal pellets are found, a more thorough inspection of the leaf litter and ground cover is conducted.

The search beneath each tree is conducted for two person minutes or until a single pellet is found, whichever occurs first. A tree is defined as a live woody stem of any species (except for cycads, palms, tree ferns and grass trees) which has a diameter at breast height (dbh) greater than 10cm. Two WPC ecologists Nigel Fisher and Mark Dean conducted SAT surveys on the 18th of March 2023. A total of 15 SAT tests were conducted over the offset area in 2023.

Results and Discussion

The dog surveys undertaken on the 7th September did not locate any koala scat in the northern section of the NBOA i.e., north of Rutile Rd. The lack of detection was attributed to unsuitable conditions on the day. That is, the day was quite warm (27° C) with no breeze inside the wooded section of the NBOA. And the dense vegetation in this section of the NBOA hinders dog movement.

Given these set of conditions, it was decided to conduct traditional SAT test using the methodology as outlined above. The SAT surveys that were completed on January 25th 2024, found evidence of low koala activity in the NBOA., that is three SAT locations had evidence of older scats under a single tree. Please see **Table 3** and **Figure 3** for Koala activity levels for each SAT test for the NBOA. Additional opportunistic surveys were conducted on the nights of the amphibian surveys, February 20th and 21st where WPC ecologist Nigel Fisher and Jake Mauger utilised thermal imaging binoculars (Pulsar Merger XP50 LRF Thermal Binoculars) to scan the vegetation as noted above. No koalas were observed.

In previous years’ surveys, activity has been found to be within the Swamp Mahogany – Paperbark Swamp Forest in the north of the offset area during the 2019 and 2020 where there are mature trees

for feeding, although evidence of use was found throughout the extent of the NBOA. The NBOA has good habitat suitability for the koala with plenty of mature *Eucalyptus robusta* (Swamp Mahogany), *Melaleuca quinquenervia* (Broad-leaved Paperbark) and *Casuarina glauca* (Swamp She-oak) to the north of the area, although parts of this area were hard to traverse due to a thick belt of *Lantana camara* (Lantana) dominating the understory which has the potential to hinder Koala movement through the site. This year, the northern NBOA was dry and areas that were previously inundated were dry, making movement quite easy. The remaining southern areas of the NBOA are still regenerating but have shown promising signs of koala use which will continue to improve as the trees mature. This will provide koalas with more habitat and a greater food source in the future.

The assessed low activity levels within the NBOA suggest that koalas are not permanently resident within the site but use it to transition between other areas of higher populations. Despite the apparent suitability of the NBOA as habitat, a number of possible factors can be suggested as to why the site is not used at higher levels or even permanently. As alluded to above, there is a dense Lantana understory that effectively separates the site in two (see Weed Mapping Section below). There has been historic and ongoing disturbance due to recent fires, and human activity including motorcycle riding, dog walking and rubbish dumping, although these activities within the NBOA have decreased as the vegetation has increased in density and made access to the site more difficult.

Additional monitoring techniques that could be employed include a more comprehensive use of the thermal binoculars, as well as acoustic recording devices such as a Wildlife Acoustics Song Metre SM4. A single device, left out over a period of seven days during the breeding season (September to December) would cover the NBOA. Any males that are calling during this period should be recorded.



Plate 1: Detection dog and handler at the base of a tree

Table 2: Koala activity levels from the Spot Assessment Technique.

Location	No Activity					Low Activity					Medium Activity					High Activity				
	2019	2020	2021	2022/ 23	2023/ 24	2019	2020	2021	2022/ 23	2023/ 24	2019	2020	2021	2022/ 23	2023/ 24	2019	2020	2021	2022/ 23	2023/ 24
1	-	-	-	-	-	+	+	+	-	-	-	-	-	-	-	-	-	-	-	-
2	-	-	-	-	-	+	+	+	-	-	-	-	-	-	-	-	-	-	-	-
3	+	+	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4	-	+	-	-	-	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-
5	-	-	-	-	-	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-
6	-	+	-	-	-	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-
7	-	-	-	-	-	-	-	-	-	-	+		-	-	-	-	-	-	-	-
8	-	-	-	-	-	-	-	-	-	+	+	+	-	-	-	-	-	-	-	-
9	-	-	-	-	-	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-
10	-	-	-	-	-	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-
11	-	-	-	-	-	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-
12	-	-	-	-	-	+	-	-	-	+	-	-	-	-	-	-	-	-	-	-
13	-	-	-	-	-	+	-	-	-	+	-	-	-	-	-	-	-	-	-	-
14	-	-	-	-	-	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-
15	+	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Table Symbology – “+” indicates Koala scat present. “-“ no scat present

Vegetation Communities

- Coastal Sand Apple Blackbutt Forest
- Coastal Sand Wallum woodland - Heath
- Regen Area Swamp Mahogany Paperbark Forest
- Regenerating Grassland - Heath
- Swamp Mahogany Forest
- Swamp Oak Forest
- Cleared



Legend

- NDE Offset Site Boundary
- Local Road
- Track-Vehicular
- SAT Locations

50 100 150 200 m

DATE DRAWN: 18.04.2024
DRAWN BY: Kane Blundell

DATA SOURCE:
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Location of SAT tests

Holcim (Australia) Pty Ltd
North Dune Extension Biodiversity Offset Area 2023
Monitoring Report
Oyster Cove Rd, Tanilba Bay NSW

Figure:

3



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VEGETATION CONDITION SURVEY

BACKGROUND

An annual inspection of the NBOA is to be conducted as per Section 5.1.3B of the Biodiversity Management Plan Tanilba Northern Dunes Extension (Kleinfelder, 2019). This survey was conducted on 12th September 2023. As per the BMP, photo monitoring points were established, weed infestations were noted, locations of rubbish dumping were noted, survey the regeneration and health of the *Eucalyptus robusta* along one transect, east to west across the BOA noting the size in classes of trees 1 m either side of the transect, noting the extent and requirement of any revegetation works in the BOA.

RESULTS

General Condition

The vegetation condition of the NBOA is presented in **Figure 5**.

South of Rutile Rd, a small section of the NBOA abuts the extraction zone. Most of this area was affected by the 2018 fires but has recovered with the higher than average rainfall experienced over the three years from 2020 to 2022 (PP1 - **Plate 4** and **Appendix B**). The condition improves moving east from Coastal Sand Apple Blackbutt Forest that fringes the extraction zone and Block Q2 which is quite weed infested until good condition Swamp Mahogany – Paperbark Forest is encountered. The scattered Fishpole Bamboo (*Phyllostachys aurea*) noted in this area last year has grown into a substantial stand and was marked for weed treatment. Some minor Bugle Lily (*Watsonia meriana*) as also observed in this area.

The 50 m buffer zone of vegetation along Rutile Rd is quite weedy with exotic grasses, Lantana (*Lantana camara*) and some minor Blackberry (*Rubus fruticosus* spp. agg.), Glory Lilly (*Gloriosa superba*), *W. meriana* and *Pinus elliotii* (Slash Pine). This area to the west bordering the NDE and The Knoll is also heavily vegetated with *Leptospermum laevigatum*. As noted in the 2023 North Dunes Extension Post 3 Year Monitoring report (WPC, 2024) this species is quite invasive having formed thickets on the NDE. The vegetation buffer zone acts as a source and control works in the buffer would help to slow its spread.

The main section of the NBOA lies north of Rutile Rd and as can be seen from **Figure 5**, has been assessed as Swamp Mahogany – Paperbark Swamp Forest “regenerating” in the area immediately to the north, and “mature” at the farthest north section of the BOA.

This regenerating area can be further divided into an eastern section that can be classified as advanced regeneration where previous mining and subsequent rehabilitation is obvious – parallel swales are still evident. In this section, weed control efforts have largely brought the woody weeds under control. The western section has quite mature native trees and a mixture of native vegetation and weedy species that are the subject of on-going control efforts (see **Section 4**). These include slash pine, bugle lily (PP5 - **Plate 8**) and lantana (*Lantana camara*) (PP2 - **Plate 5**) that exclude native species and shrubby regrowth are present, and evidence of some regeneration is present with seedlings and saplings apparent.

As has been noted since this monitoring has been undertaken, the slash pine has been a concern to the general condition of this area. It is a fast-growing species and a prolific producer of seed with a multitude of seedlings visible each survey. On going weed control efforts have manage to eliminate the dense stands of saplings, but the larger trees that are present produce copious amounts of litter that

acts to suppress the regeneration of native species. Many of the larger trees are now of such a size as to present a major issue for removal – both as a safety issue and for the damage that would be caused to native vegetation.

Regeneration of the *E. robusta* within this “regenerating” area was assessed by measuring the health and size of *E. robusta* trees within 1 m of a transect running East to West across the NBOA (**Figure 5**). The individual trees were divided into five height classes (<1 m, 1 m – 2 m, 2 m – 10 m, 10 m – 15 m and >15 m or mature trees) for an approximate determination of age. Trees <1m in height were classified as seedlings/saplings, trees 1 m – 2 m in height were classified as saplings, trees between 2 m and 10 m were classified as immature trees, trees 10 m – 15 m were classified as intermediate, while trees estimated to be over 15 m in height were classified as mature (**Table 4 - Appendix A**). This year, a total of 94 trees were assessed along the transect that is approximately 400 m long. The 2021 survey assessed 114 trees, the 2022 survey 78 trees. The differences are attributed to GPS drift and differences in GPS equipment used between the surveys, rather than any dieback or death of trees. No dieback or dead trees were observed along the transect.

The assessment found that there were three seedling/saplings <1 m, only five were estimated to be between 1 m - 2 m, in height, with 45 trees estimated to be between 2 m - 10 m, 41 trees between 10 m - 15 m tall and no trees assessed as mature. This indicates that this southern of the NBOA is advanced re-growth, with no trees deemed to be old growth. The majority of the *E. robusta* – 71 trees - were located in the eastern section of regenerating Swamp Mahogany – Paperbark Swamp Forest. Many of the larger trees were observed to be carrying fruit, a good indication that ongoing regeneration is occurring or possible.

Two areas at the western end of the NBOA are classified as regenerating grassland where the density of trees and shrubs is greatly reduced. Since the initial survey in 2013, natural regeneration has occurred, with many shrubs and some midstorey species self-seeding (**Plate 9**). However, very few *E. robusta* have established in these areas, and the southern-most section adjacent to Rutile Rd is a dense thicket of *Leptospermum laevigatum* (Coast Teatree) that will prevent any other re-growth of native species. These areas are required to be replanted to increase the canopy cover and modest planting programs have been suggested in the previous reports.

The northern most section of the NBOA has been classified as mature Swamp Mahogany – Paperbark Swamp Forest. This area contains mature *E. robusta* and *Melaleuca quinquenervia* trees with an understorey of Tall Saw-sedge (*Gahnia clarkei*) and other swamp flora. Lantana has colonised this section of the BOA with infestation levels varying from scattered individuals to very heavy (<75% cover), with a belt of dense Lantana acting to separate this section from the southern regenerating section of the BOA (PP7 - **Plate 10**). Evidence of previous control works is visible, as is regrowth and re-sprouting.

An access track is becoming overgrown at PP4 (**Plate 7**). There is historical illegal rubbish dumping along this track that requires removal. Improving the access track via clearing of vegetation would facilitate the removal of this rubbish and the removal of felled slash pines but may facilitate access by the public.

Vegetation Communities

- Coastal Sand Apple Blackbutt Forest
- Coastal Sand Wallum woodland - Heath
- Regen Area Swamp Mahogany Paperbark Forest
- Regenerating Grassland - Heath
- Swamp Mahogany Forest
- Swamp Oak Forest
- Cleared



Legend

- NDE Offset Site Boundary
- Local Road
- Track-Vehicular
- Eucalyptus robusta* Transect
- Tree Record
- Photo Point
- Formerly Mined Area



DATE DRAWN: 18.04.2024
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Vegetation Condition

Holcim (Australia) Pty Ltd
 North Dune Extension Biodiversity Offset Area 2023
 Monitoring Report
 Oyster Cove Rd, Tanilba Bay NSW

Figure:

4





Plate 2: PP1 looking east showing poor condition (foreground) and better condition vegetation (background)



Plate 3: PP2 looking north showing dense Lantana and previous control works



Plate 4: PP3 looking north showing typical understory



Plate 5: PP4 looking north along access track showing Slash Pine infestation and control works (bottom left).



Plate 6: PP5 looking south showing dense Bugle Lily infestation



Plate 7: PP6 looking west showing the regenerating grassland area (north). Note the shrubby regrowth.



Plate 8: PP7 looking north at the dense Lantana "belt" that separates the regenerating and mature Swamp Mahogany – Paperbark Swamp Forest. Control efforts are visible in the foreground.

Weed Mapping

Weed mapping was conducted as part of the monitoring of the BOA (**Figure 6**). The key weed species recorded on site that have the potential to restrict revegetation or native fauna use are the slash pine, lantana, bugle lily, and the coastal teatree all mentioned previously, with minor occurrences of bamboo and pampas grass.

The slash pine is concentrated along Rutile Rd in the regenerating Swamp Mahogany – Paperbark Swamp Forest, but seedlings and saplings have spread throughout this entire section of the BOA. The density has been mapped from medium to heavy in these areas and there are many scattered immature and mature trees in other areas. The slash pine is rapidly spreading through the BOA and does pose a threat to the viability of the area as an offset if not controlled. Previously, control of this species has been limited to slowing the spread into the northern NBOA and to the east into the adjacent Gur-um-Bit State Recreation Area, but with the increased control effort some of the middle-sized trees have been felled this year (see Section 4 below). Prolific seed production, rapid growth and production of pine needles that serves to suppress other vegetation acts to degrade the condition of the BOA, providing competition for the *Eucalyptus* species that are the preferred koala feed trees. While the prevailing thought was that native fauna – except for bird species such as Glossy-Black Cockatoo and Sulphur Crested Cockatoo and other large seed eating birds - do not use the pines for foraging or habitat, this year the ring tail possum observed during night work surveys was in a slash pine suggesting that at least some level of utilisation for foraging is possible.

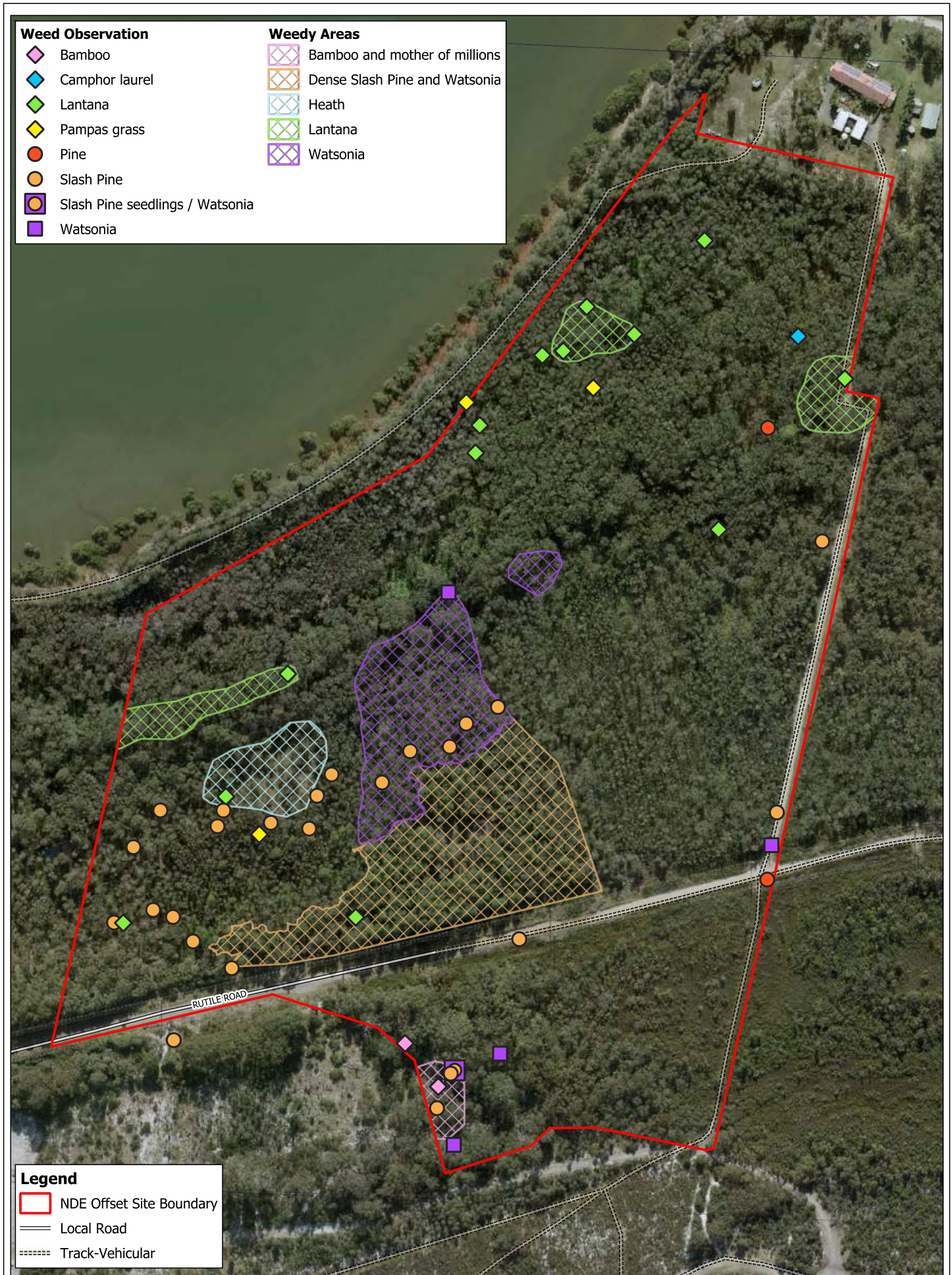
The bugle lily is concentrated in the central portion of the regenerating Swamp Mahogany – Paperbark Swamp Forest with a large central dense infestation that becomes less dense towards the edges. This species is out-competing native species such as the Tall Saw-sedge and was observed to be spreading

into the eastern section of the regenerating Swamp Mahogany – Paperbark Forest and has been observed in the southern section of the NBOA, adjacent to the revegetation Block Q2.

Lantana is the major threatening weed in the BOA, forming dense thickets at ground level and climbing into the mature tree canopies and covering a substantial portion of the BOA (**Figure 6**). The infestation density covers the full spectrum from isolated or scattered individuals to the dense thicket or belt referred to earlier (**Plate 12**). At its most dense, these thickets have the potential to hinder movement of koalas through the BOA and effectively divides the Swamp Mahogany – Paperbark Swamp Forest into two sections. The progress with the weed control works has greatly reduced this “wall” and opened up this area. This year’s weed mapping highlights the continued spread of this weed into the mature Swamp Mahogany – Paperbark Swamp Forest where scattered individuals are maturing and spreading into infestations.



Plate 9: Example of the dense Lantana that threatens to overwhelm native flora and restrict movement of native fauna.



Vegetation Condition Discussion and Recommendations

Where weed species have not become established the condition of the native vegetation is quite good. Native vegetation is generally in good health with no visible dieback observed amongst the canopy species on site. Seedlings of *E. robusta* have been observed away from the transect, and the large of amount of fruit observed on the *E. robusta* also bodes well for further potential regeneration. The lack of mature trees indicates that the regenerating Swamp Mahogany – Paperbark Swamp Forest is indeed regenerating, and not mature forest as is the case in the northern section of the BOA where trees are greater than 20 m in height and hollows are visible. The lack of hollow bearing trees in this southern section of the NBOA highlights the need to continue with the maintenance of the nest box program, with many of the nest boxes visibly falling into disrepair.

The regenerating grassland is slowly self-seeding with several native shrub species such as Coastal Wattle (*Acacia longifolia*), Coastal Teatree, *Bossiaea rhombifolia*, *Dodonaea triquetra* (Sticky Hopbush), *Acacia ulicifolia* (Prickly Moses) and *Platysace ericoides*. The area still has *Eragrostis curvula* (African lovegrass) as the dominant groundcover, but this species will eventually be shaded out. Spot spraying of these grasses would encourage native species regeneration. A modest planting program of tubestock installation of *E. robusta*, Red Bloodwood (*Corymbia gummifera*) and Smooth-barked Apple (*Angophora costata*) would be beneficial for the revegetation and is a requirement of the BMP as noted in the introduction.

Sibelco Australia (the previous owners) had commenced a modest weed control program, and Holcim (Australia) have continued this program. The increased weed control effort recommended in the 2022 Monitoring Report (WPC, 2023) and implemented this year has resulted in further improvement with a larger area covered. This effort needs to be continued to ensure that the biodiversity values of the offsets area continue to improve.

The slash pine infestation requires specialist arborist and tree removal subcontractors. Previous weed control efforts have used a “cut and drop” approach to controlling this species, but the density of trees is so high that it is now deemed necessary to remove the fallen timber. This will however result in considerable damage to the surrounding native vegetation, including to mature Swamp Mahogany as it will be necessary to employ machinery to achieve this. Additionally, this may “open up” the NBOA and allow greater access by the general public with consequent damage caused by 4WD and/or motor bikes and illegal rubbish dumping. This year’s work included the felling of a number of the middle-sized pine trees were felled but left *in situ*.

There is certain amount of historical rubbish along the access track that requires removal. The access track at PP4 requires a locked gate to limit access. While it is acknowledged that this might attract attention that may facilitate illegal access, provision of access to the site for fire-fighting and weed control is desirable.

WEED CONTROL WORKS

WPC was engaged by Holcim (Australia) to continue the weed control works in the BOA during the 2023 reporting period. As recommended in the 2022 Monitoring Report (WPC, 2023), these works consisted of a team of two Land Management Technicians working on site for two rounds of three days each. **Figure 6** shows the areas targeted during the first round of works, September 19 to 21, 2023.

these four days of works, outlined as the yellow boxes. The technicians were instructed to work from areas of low infestation towards higher infestation and concentrated on the section to the south of Rutile Rd and then southern regenerating section of the BOA.

WORKS PERFORMED – ROUND 1

The first round of weed control in September 2023 consisted of treating the small, isolated patches and scattered infestations of target weed species noted in the vegetation condition survey and observed as part of this work. Larger dense infestations of target weeds were treated around the edges preventing further encroachment into “cleaner” areas. Some very large mature pines were felled or ringbarked. required retreatment (**Plate 10**). Other previously treated areas such as south of Rutile Road appeared relatively clean with only minimal new germination of pine. Details of the works undertaken are provided in **Table 3**.

Table 3: Details of the weed control works for Round 1, September 2023.

Area	Works Undertaken	Observations/Notes
Driveway & Residence	Small patches of wine and watsonia treated on corner of driveway and Rutile Road. Scattered Lantana targeted towards boundary at residential end (Plate 11), pushing back towards a thicket of Lantana joining the peninsula side.	Lantana here appears to be struggling to compete with the dense ground cover of <i>Gahnia sieberiana</i> and Bracken.
Peninsula Side	Thicket or “wall” of lantana targeted from a currently accessible peninsula side pushing it back towards a usually wet Swamp Mahogany “forest”. Further west Lantana thicket targeted between two Melaleuca stands, drier high side and lower wet Peninsula side. Where accessible Lantana targeted from both sides pushing in towards the centre.	Area behind usually to wet for Lantana to establish further in, this may need to be monitored due to a predicted dry year/s forecasted.
SW corner, Nth of Rutile Road	Various sizes, largish and small (2-3 m) pine targeted cleaning up this area. Hand removal of a few scattered lantana. This area joined a large dense infestation of pine along Rutile Road. A thin edge was treated pushing back towards the road.	Germination of new pine appeared minimal believed to be due to the dense ground cover of <i>Gahnia</i> .
West of centre track	Various sizes, (very large, mature trees to small) of pine along the track side and back of infestation treated, pushing in towards the centre and Rutile Road. A “ring” around the large infestation (Plate 12) of <i>W. meriana</i> treated pushing towards the centre to prevent further spread.	New germination of pine present in this area especially around previously treated area where ground cover is minimal. These however are unlikely to survive given the forecasted dry hot summer.

Area	Works Undertaken	Observations/Notes
	Watsonia had opportunistically taken advantage of gaps in the Gahnia surrounding the dense infestation spreading out (Plate 13).	

Control Methods

Pinus elliottii - Large mature individuals with a diameter greater than 200 mm were ring barked, smaller specimens were felled.

Lantana camara - Lantana was sprayed with Glyphosate at a rate of 100 ml/L using splatter technique. Some isolated individuals were hand removed.

Watsonia meriana - Watsonia was sprayed with metsulfuron methyl at a rate of 1 g/10 L.

Management Issues:

Treatment of *W. meriana* can only be undertaken this time of year (spring) given its short growth period above ground. Given that, emphasis on *W. meriana* control would have been ideal. However, isolated patches of other target weeds were also of priority to prevent them establishing and outcompeting native vegetation in those areas.

Lantana has a much broader growing time frame and given the right environmental conditions can be controlled most of the year round. Last summer lantana was very healthy due to the very humid, wet conditions. The predicted dry, hot heat for summer of 2023/24 is cause for concern, the plants may be too stressed for herbicide control. Given the low-lying area and that some infestations are well shaded, treatment in this way may be possible in some situations. Otherwise, slower, more labour-intensive methods may be required.



Plate 10: Example of treatment of large slash pine



Plate 11: Lantana sprawling through bracken.



Plate 12: Example of the *W. meriana* infestation.



Plate 13: Example of *W. meriana* opportunistically colonising the spaces between native vegetation

WORKS PERFORMED – ROUND 2

The second round of weed control works was conducted from the 27th of February to the 1st of March and consisted of treating small isolated patches of bamboo Adjacent to the NDE, Block Q2, treating dense infestations of target weeds around their edges to “push back” into the centre of the infestations. New germinations of target weed species were re-treated in previously treated areas, and finally new germinations and re-sprouts of the lantana thickets were treated. Details are provided in **Table 4** below.

Table 4: Details of the weed control works for Round 2, February/March 2024.

Area	Works Undertaken	Observations/Notes
South Side, South of Rutile Road	Regrowth and new germination of Bamboo targeted, cleaning up area. Mother of Millions was also observed and sprayed within this area (Plate 14).	Only a small amount of mother of millions noticed in area, however, is early in the season and will require monitoring to prevent it taking hold.
Peninsula Side	Continued progression on targeting thicket or “wall” of Lantana (Plate 15). Access was available to all perimeter of the thicket due to a drier season than in Sept 2023.	Centre of thicket still difficult to access, some sections may not have been reached, will require targeting next year. Lantana has not at this stage has not encroached the usually wet melaleuca “forest” and shouldn’t, as access was available to push back.
Middle of site, East – West track	East side, thicket of Lantana targeted (Plate 16), access available to all of perimeter, most of centre of thicket also reached. Further west continuing target of Lantana thicket from last year, between two Melaleuca stands, drier high side and lower wet Peninsula side. Where accessible Lantana targeted from both sides pushing in towards the centre.	Should only require “mop up” of individuals and new germination in September. Lantana thicket dense, long, and wide (Plate 17). Further pushing in required over time before entire infestation can be reached.
Rutile Road, Nth side	Various sizes, medium to small pine along North strip of Rutile Road treated, pushing toward centre of pine “forest”. A few remaining Lantana in area cut out of trees (Plate 18).	High volume of pine still exists in this area to an average of 50 m off Rutile Road. New germination appears to be minimal due to the extremely dense undergrowth of Gahnia in some areas. Some large and medium pines are situated close to powerlines (Plate 19) and have the potential to reach if felled.

Control Methods:

Pinus elliottii - Pines with a diameter 200 mm and under were felled.

Lantana camera - Lantana was sprayed with Glyphosate at a rate of 100 ml/L using splatter technique. Some isolated individuals were hand removed.

Phyllostachys aurea – Fishpole Bamboo sprayed with metsulphuron methyl at a rate of 1 g/10 L.

Success Rates:

Treated *W. meriana* and lantana from September 2023 has had great success with very high mortality rates across all areas treated. A very few isolated individuals of lantana have had minor regrowth. Some stems, out of reach of spray application, high up in the trees are surviving, these plants will require skirting where the lower stems are cut by hand and the growth on the ground treated with herbicide. Felled pines have allowed scattered sunlight penetration for germination of native ground covers (**Plate 20**) and growth for struggling saplings (**Plate 21**). Pine germination has been minimal.

Management Issues:

Many areas have lantana not visible through the dense undergrowth of ground ferns and *Baloskion pallens*, it is only noticeable while pushing through the dense, native vegetation (fig 9) to reach the thickets of Lantana (the visible infestations that have outgrown the undergrowth). These areas at first glance appear “clean” and void of weed species, however if growth rates continue as they have been, with the rainfall and humidity, it will lead to new or extended high density infestations. Sections where this has been observed have been targeted while “wading” through the head high native vegetation to reach the primary infestation, but it is unknown as to the extent of the problem.



Plate 14: Mother of millions, foreground, bamboo, background.



Plate 15: Peninsula side, showing previously treated lantana, foreground, with further targeted lantana in background.



Plate 16: Centre of NBOA, east side showing targeted lantana with treatment “pushing in” into centre of infestation.



Plate 17: Dense lantana infestation towards western boundary



Plate 18: Lantana requiring skirting – showing its ability to climb up into the canopy



Plate 19: Slash pine growing adjacent to powerlines. These have been intentionally left untreated due to size and risk of bringing down the powerlines.



Plate 20: Growth of natives in gaps left in previously treated areas of slash pine showing the possible regeneration potential of the native vegetation



Plate 21: Example of lantana growing under dense native ground cover vegetation. This makes detection difficult until the lantana outgrows the natives.

DISCUSSION

The increased effort of 12 person days per year has allowed progress to be achieved, with follow-up work and the ability to push into new areas of the NBOA. Some progress has been made with the slash pine area with middle sized trees and seedlings felled in the main infestation area. Likewise, the dense lantana “wall” infestation has been greatly reduced. The watsonia continues to be an issue and has been observed expanding its area within the NBOA. Of particular note is a single very large slash pine located in the north-east corner (**Figure 5**) labelled “Pine”. This tree has been unsuccessfully ring barked in the very first round of weed work. It requires removal as seedlings have been observed spreading into the adjacent vegetation. But its size and proximity to the track/driveway and the risk it may pose to the public requires a specialist arborist.

The following recommendations are made and are largely the same as for the previous report –

- The weed control effort is increased to allow for a greater area to be worked. Given the level of infestation it is suggested that effort be increased – i.e., 12 person days per year. To this end, the next weed control proposal will recommend an additional two days a year, increasing to a team of two for three days, twice a year in autumn and spring.
- The Slash Pine saplings that have been cut and dropped in the past control efforts should be removed – most can be removed by hand to Rutile Rd and chipped there. This will facilitate native species regeneration as shown above..
- The larger Slash Pine trees require a specialist arborist to safely be removed.
 - o This is not a small undertaking given the proximity of the high voltage power lines and Rutile Rd, although Rutile Rd has now been blocked off to the east of the site and is essentially a dead end, making traffic control easier and operations safer.
 - o The volume of material that is required to be removed also necessitates chipping and disposal off site.
- The rubbish along the access track should be removed.
- Consideration to installation a locked gate should also be made – but it is acknowledged that this might draw attention and pose a “challenge” to trespassers.

Vegetation Communities

- Coastal Sand Apple Blackbutt Forest
- Coastal Sand Wallum woodland - Heath
- Regen Area Swamp Mahogany Paperbark Forest
- Regenerating Grassland - Heath
- Swamp Mahogany Forest
- Swamp Oak Forest
- Cleared

Weeds Treated

- Lantana (Sep 2023)
- Scattered Pines (Sep 2023)
- Scattered Pines / Watsonia (Sep 2023)
- Slash Pines (Sep 2023)
- Watsonia (Sep 2023)

Legend

- NDE Offset Site Boundary
- Local Road
- Track-Vehicular

25 50 75 100 m

DATE DRAWN: 18.04.2024
DRAWN BY: Kane Blundell
DATA SOURCE:
© 2024 Aerometrex Ltd. All Rights Reserved

Weed Treatment (Sep 2023)

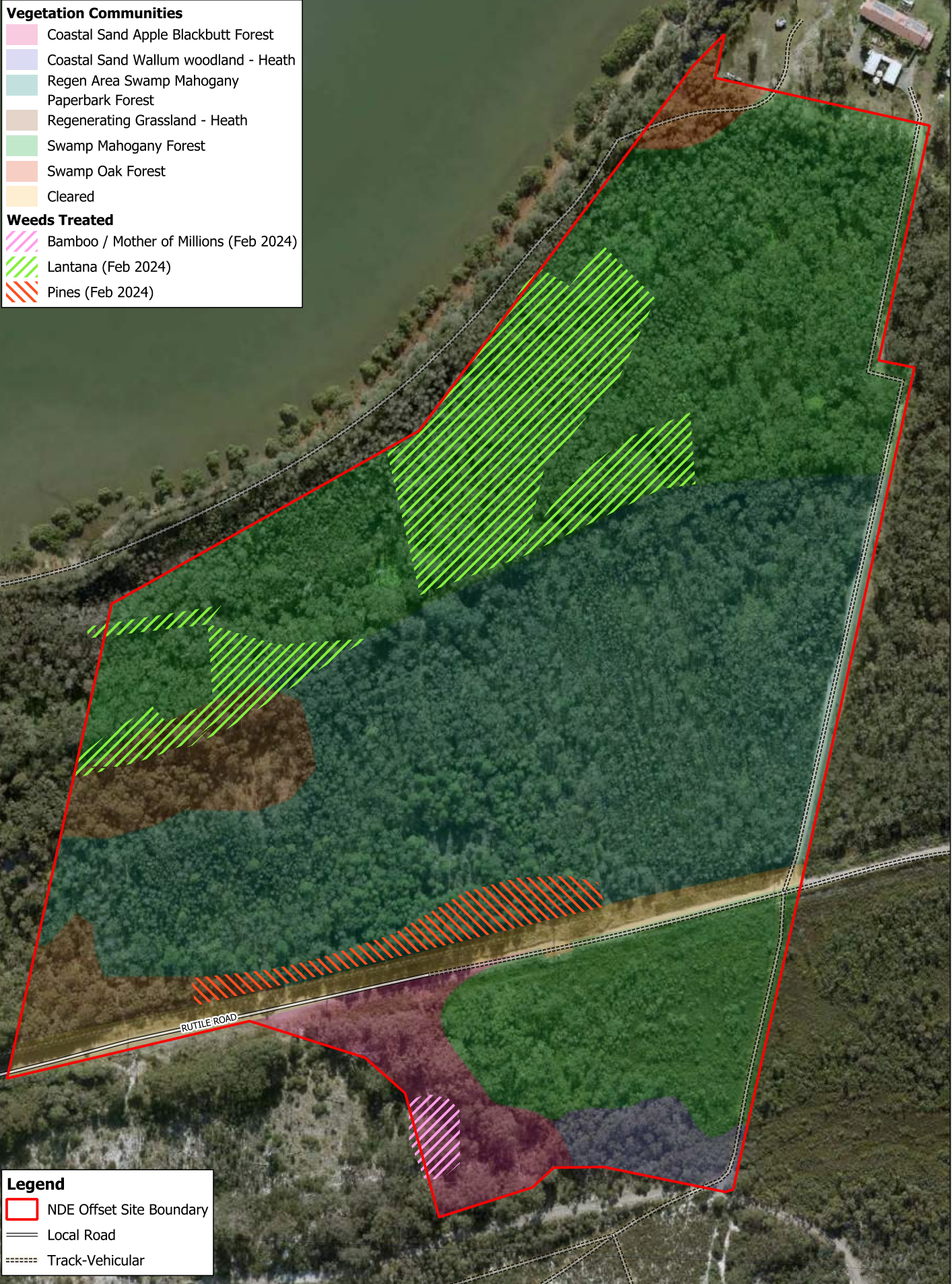
Holcim (Australia) Pty Ltd
North Dune Extension Biodiversity Offset Area 2023
Monitoring Report
Oyster Cove Rd, Tanilba Bay NSW

Figure:

6



- Vegetation Communities**
- Coastal Sand Apple Blackbutt Forest
 - Coastal Sand Wallum woodland - Heath
 - Regen Area Swamp Mahogany Paperbark Forest
 - Regenerating Grassland - Heath
 - Swamp Mahogany Forest
 - Swamp Oak Forest
 - Cleared
- Weeds Treated**
- Bamboo / Mother of Millions (Feb 2024)
 - Lantana (Feb 2024)
 - Pines (Feb 2024)



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- NSW Survey Guidelines for Threatened Frogs. <https://www.environment.nsw.gov.au/research-and-publications/publications-search/nsw-survey-guide-for-threatened-frogs>.
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- Wedgetail Project Consulting (2024), North Dune Extension 2023 Vegetation Rehabilitation Annual Monitoring Report. Report prepared for Holcim (Australia) by Wedgetail Project Consulting.

APPENDIX A: SIZE CLASSES OF *EUCALYPTUS ROBUSTA*

Table 5: Size class of the *Eucalyptus robusta* trees surveyed in the Northern Dunes Offsets Area in 2022

Tree No. (From East)	Tree Height (m)					Comments
	<1	1-2	2-10	>10-15	Mature >15m	
1			✓			
2	✓					
3			✓			
4			✓			
5			✓			
6			✓			
7			✓			
8			✓			
9			✓			
10			✓			
11			✓			
12			✓			
13			✓			
14			✓			
15			✓			
16				✓		
17				✓		
18			✓			
19			✓			
20		✓				
21						
22			✓			
23			✓			
24			✓			
25			✓			
26			✓			
27				✓		
28				✓		
29				✓		
30			✓			
31			✓			
32				✓		
33				✓		
34				✓		

Tree No. (From East)	Tree Height (m)					Comments
	<1	1-2	2-10	>10-15	Mature >15m	
35				✓		
36				✓		
37			✓			
38				✓		
39			✓			
40	✓					
41			✓			
42			✓			
43			✓			
44				✓		
45			✓			
46				✓		
47		✓				
48			✓			
49				✓		
50			✓			
51				✓		
52			✓			
53			✓			
54		✓				
55			✓			
56				✓		
57			✓			
58			✓			
59		✓				
60			✓			
61				✓		Tree 57 in 2022 survey
62				✓		
63				✓		
64			✓			
65		✓				
66			✓			
67			✓			Much fruit on most trees
68				✓		
69				✓		
70				✓		
71				✓		Western side of NBOA

Tree No. (From East)	Tree Height (m)					Comments
	<1	1-2	2-10	>10-15	Mature >15m	
72			✓			Measured at 9.5 m in hieght
73				✓		
74				✓		
75				✓		
76				✓		
77				✓		
78				✓		
79				✓		
80				✓		
81				✓		
82				✓		
83				✓		
84				✓		
85				✓		
86			✓			
87				✓		
88			✓			
89				✓		
90				✓		
91				✓		
92			✓			
93				✓		
94			✓			Last <i>E. robusta</i> on western edge of NBOA

APPENDIX B: MONTHLY RAINFALL FOR PREVIOUS 10 YEARS

Table 6: Monthly Rainfall recorded at the RAAF Williamtown weather station. Months of amphibian survey for the 2023 annual reporting period are highlighted in yellow.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Mean	99.4	118.8	128.0	109.6	108.2	123.0	75.6	72.0	60.6	76.1	82.9	77.1	1132.4
2013	203.4	202.8	167.4	117.8	85.4	117.4	70.8	6.8	21.8	41.6	246.4	18.2	1299.8
2014	10.2	67.4	94.4	106.4	75.0	73.0	34.8	145.4	55.2	40.6	57.4	108.2	868.0
2015	118.6	60.6	58.4	364.0	152.4	102.8	44.0	30.2	147.0	58.6	61.6	123.0	1321.2
2016	422.4	32.4	40.8	150.8	11.2	156.9	52.6	55.8	49.8	74.6	40.8	59.0	1147.1
2017	62.2	59.0	232.4	118.6	11.6	236.6	30.8	27.4	13.8	96.2	57.6	41.6	987.8
2018	15.4	109.0	169.2	91.0	21.0	244.2	0.6	18.2	111.0	137.4	77.6	51.4	1046.0
2019	14.6	33.6	145.8	36.0	47.2	157.2	23.4	98.6	75.4	45.0	51.8	0.8	729.4
2020	67.2	171.6	106.2	53.6	105.6	81.6	242.6	38.8	28.0	252.0	58.2	156.2	1361.6
2021	186.8	157.8	459.2	70.0	90.8	104.6	44.2	48.8	85.2	74.4	213.8	20.4	1556.0
2022	89.6	161.4	354.0	124.0	114.2	28.6	327.4	38.4	74.4	90.8	50.0	19.2	1472.0
2023	106.2	107.4	106.0	118.4	86.6	8.8	38.4	47.6	16.6	59.6	65.4	61.4	822.4
2024	20.0	118.2	45.4										

Source: Monthly Rainfall Williamtown RAAF

http://www.bom.gov.au/jsp/ncc/cdio/weatherData/av?p_nccObsCode=139&p_display_type=dataFile&p_stn_num=061078

APPENDIX C: STAFF CONTRIBUTIONS

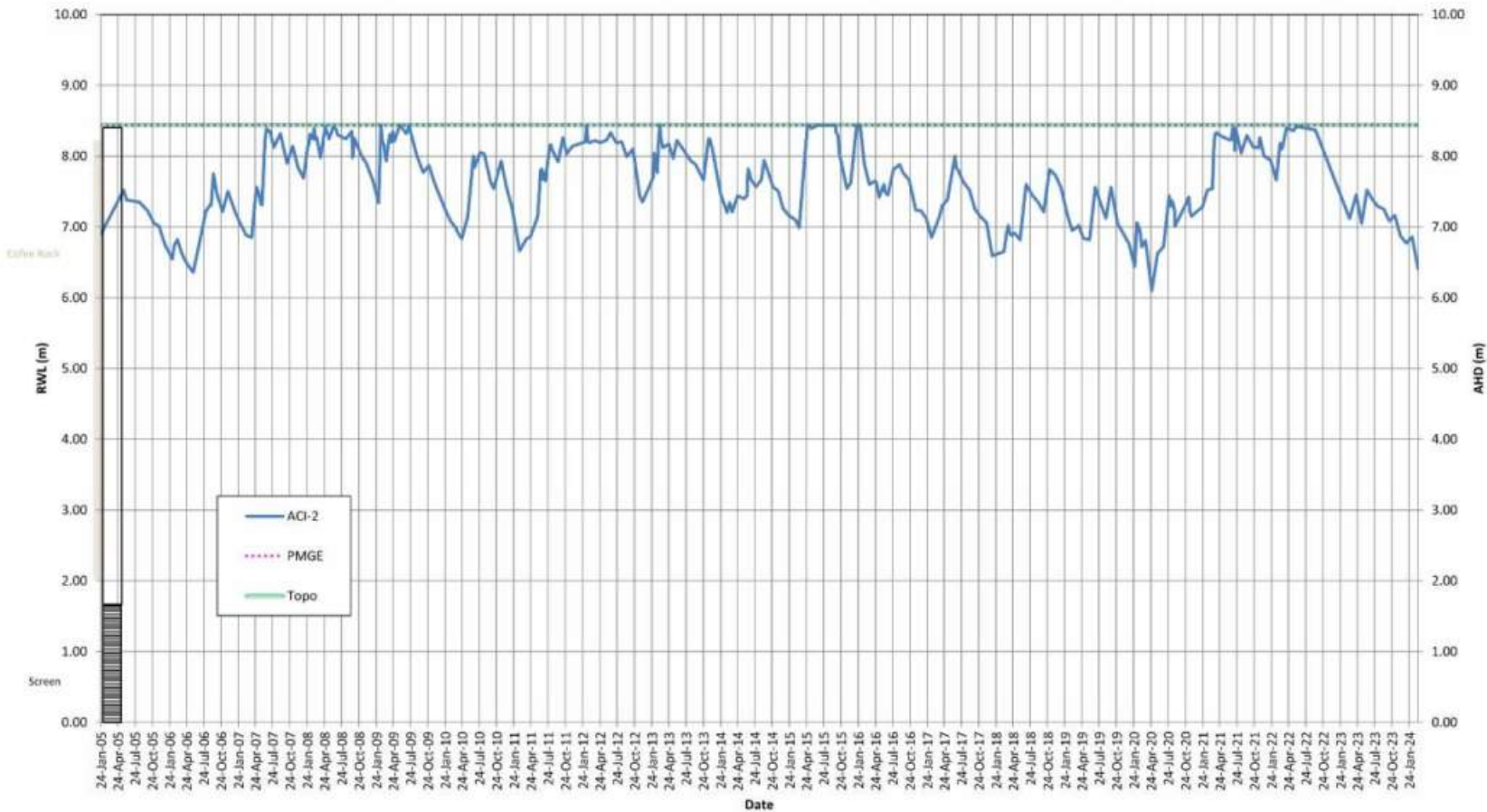
The following staff were involved in the works required for the compilation of this report.

Name	Qualification	Title/Experience	Contribution
Nigel Fisher	BSc (Hons) PhD	Senior Ecologist	Project Management, Field Work
Mark Dean	BEnvSc & Mgt	Ecologist	Field Work, Reporting
Jake Mauger	BEnvSc & Mgt	Ecologist	Field Work
Racheal Neal	BBSec (Hons)	Junior Ecologist	Field Work
Sarah Scott-Cochrane	Con&LandMGT (Cert 3)	Land Mgt Supervisor	Field Work, Reporting
Katrina Hailstone	Con&LandMGT (Cert 2)	Land Mgt Technician	Field Work
Kane Blundell	Grad. Dip. Sp.Sci. (in progress)	GIS Analyst	Kane Blundell

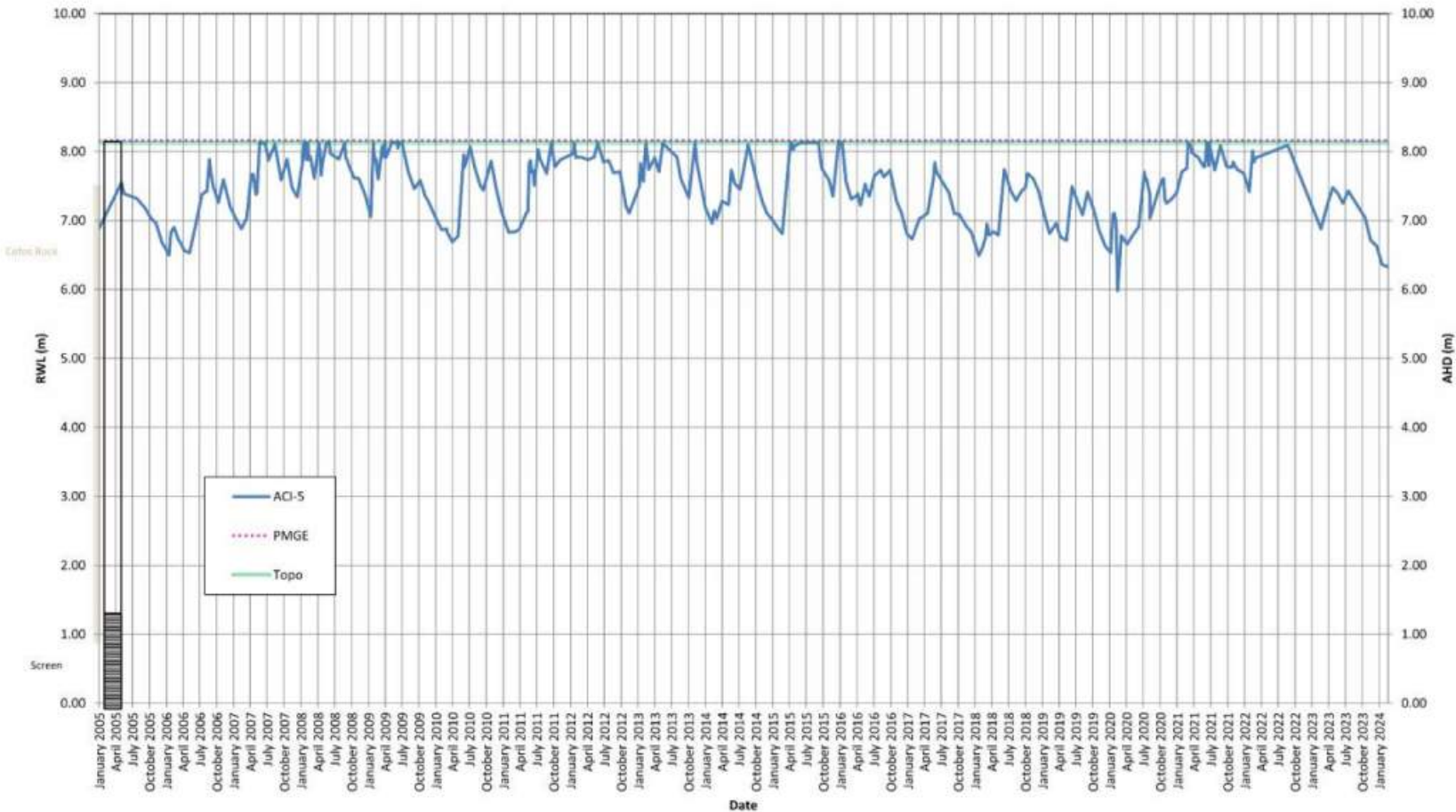
APPENDIX 5

GROUNDWATER LEVEL TREND HYDROGRAPHS

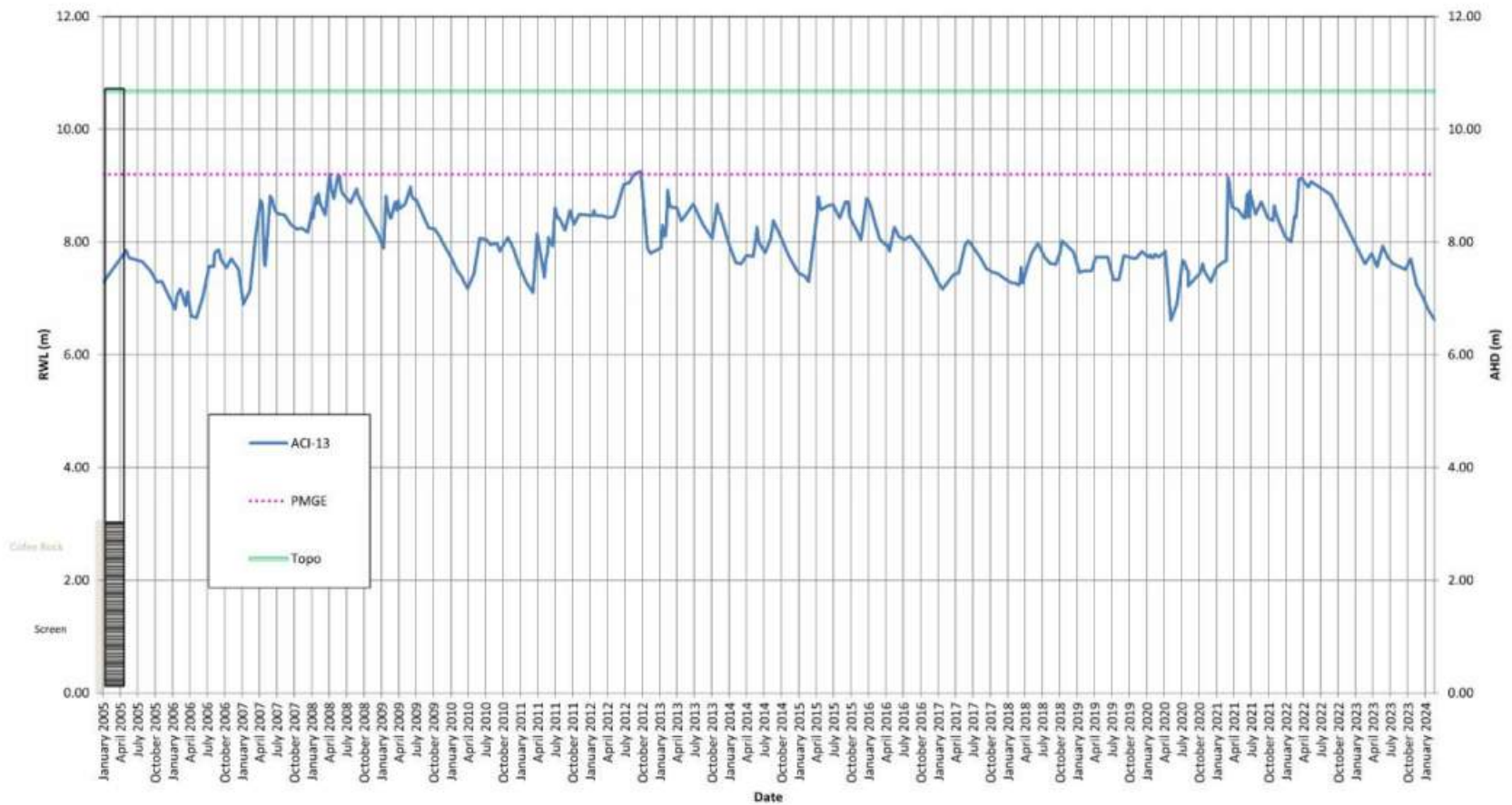
ACI-2 (level against PMGE)



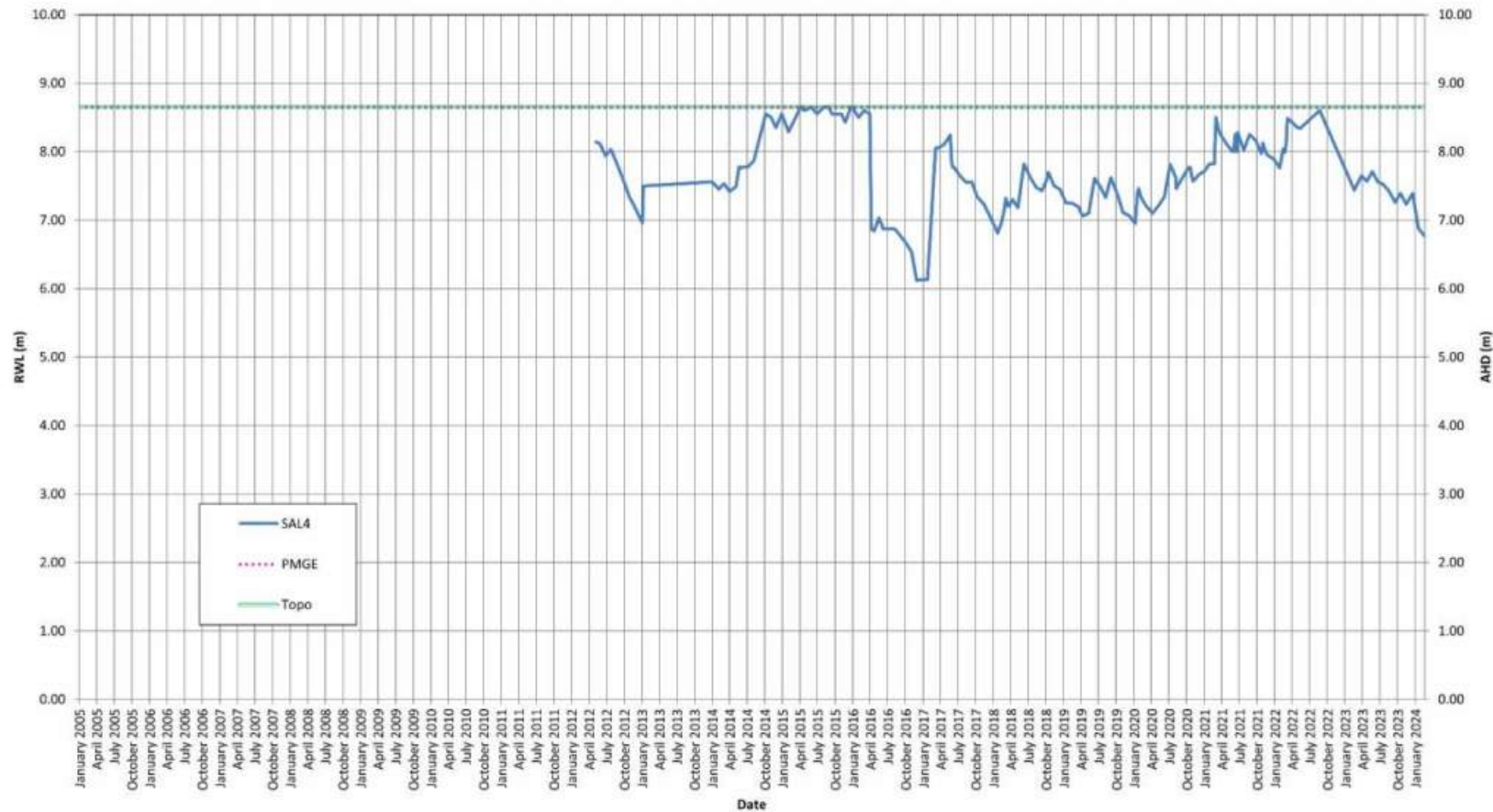
ACI-5 (level against PMGE)



ACI-13 (level against PMGE)

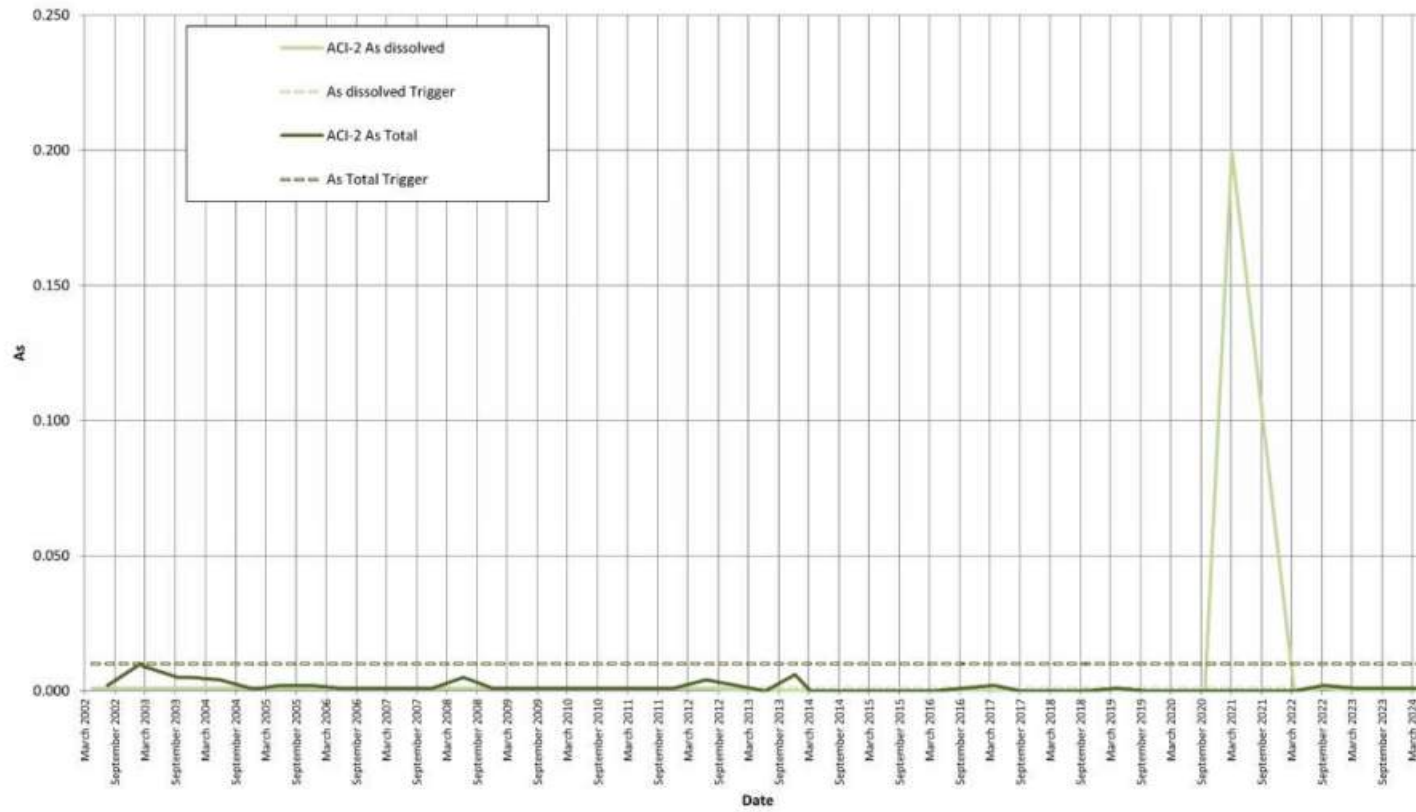


SAL4 (level against PMGE)

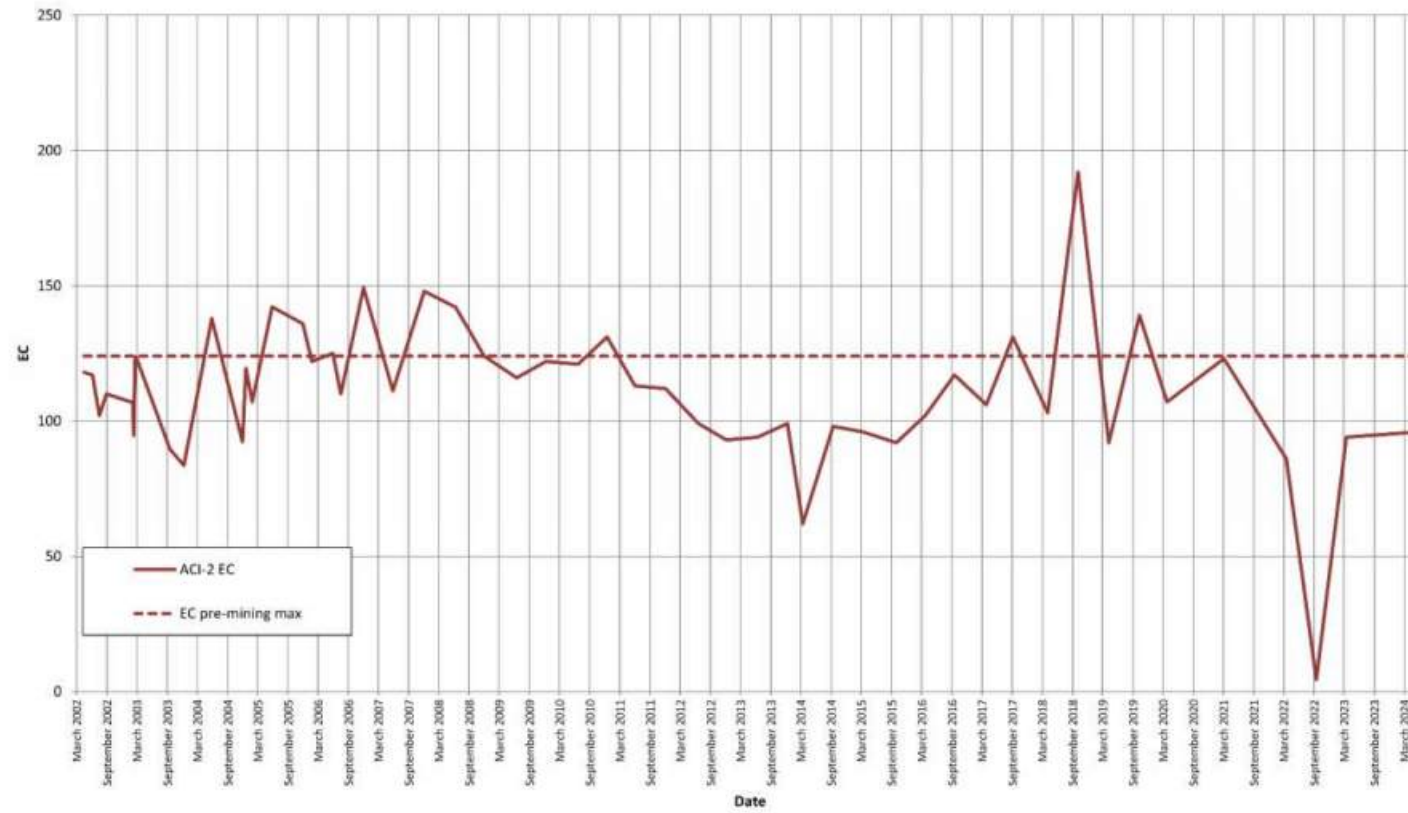


APPENDIX 6
GROUNDWATER QUALITY TREND
HYDROGRAPHS (QUALITY vs.
TRIGGER VALUES)

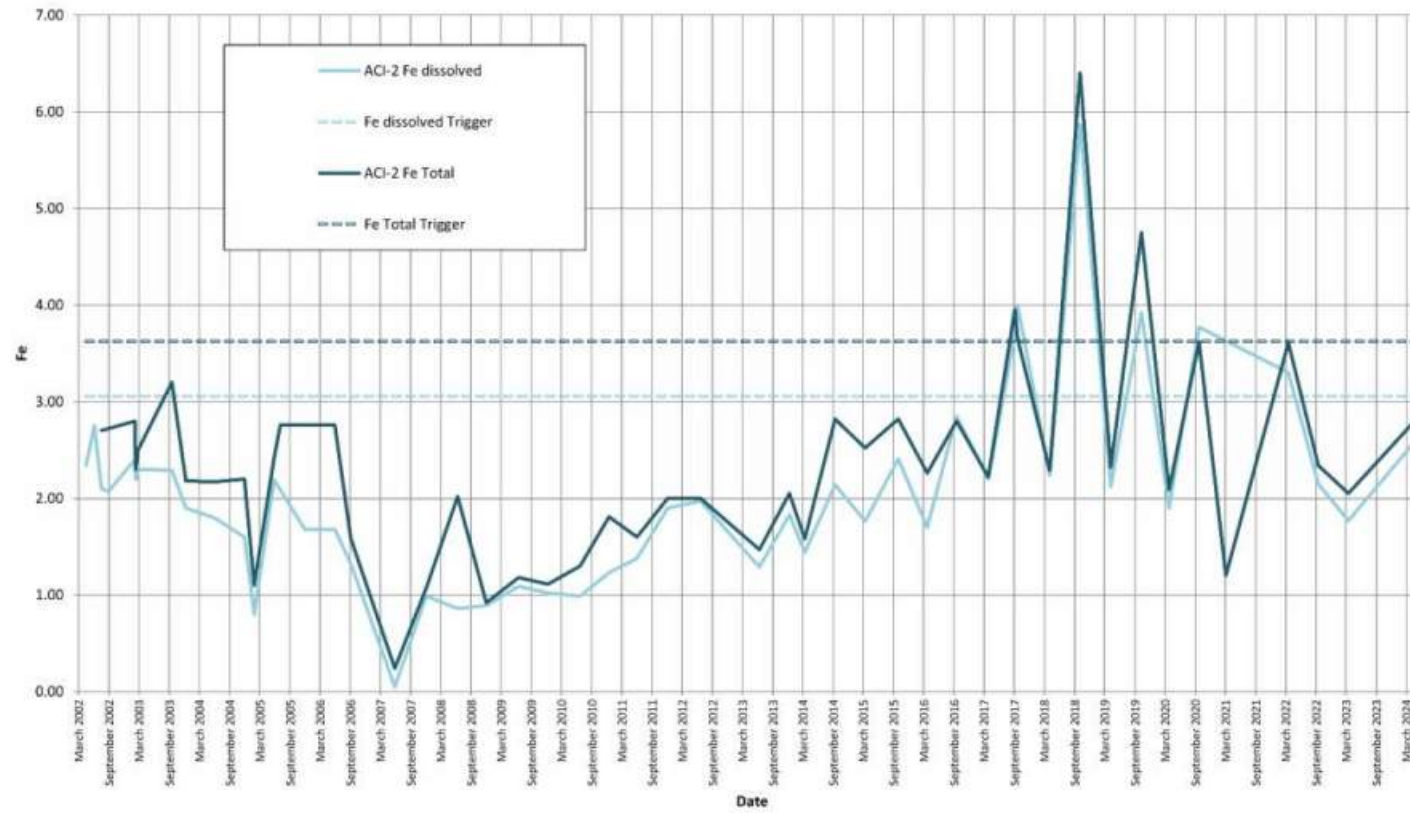
ACI-2 (Arsenic)



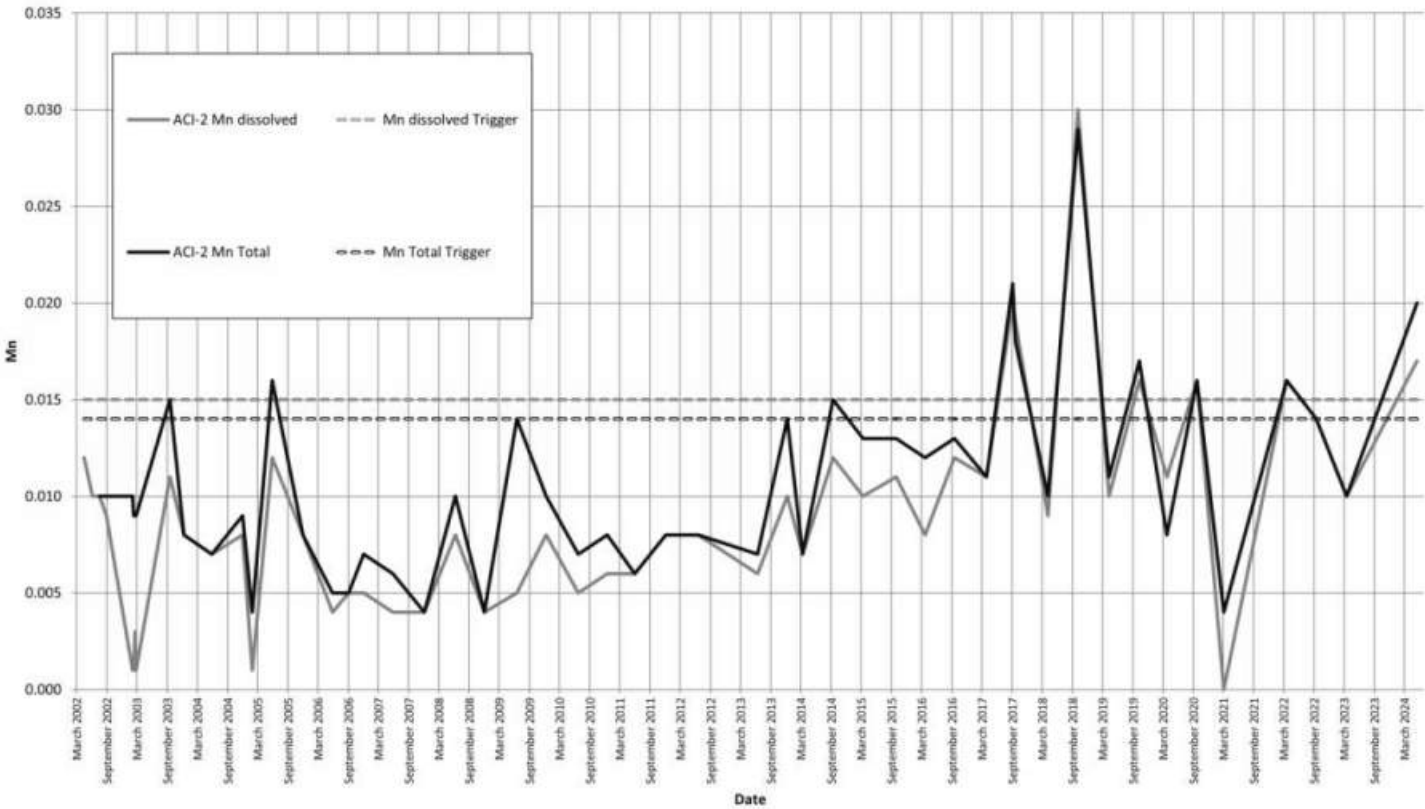
ACI-2 (EC)



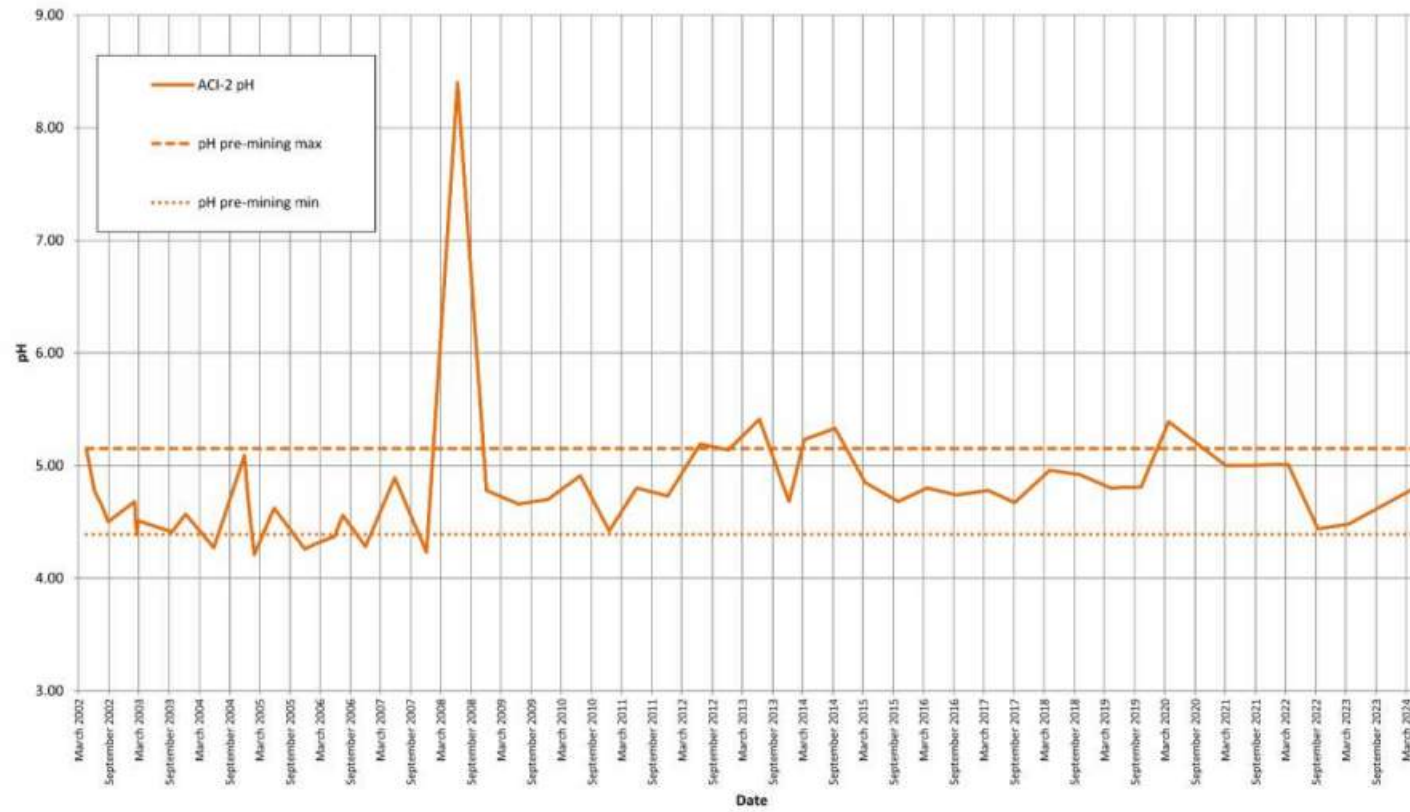
ACI-2 (Iron)



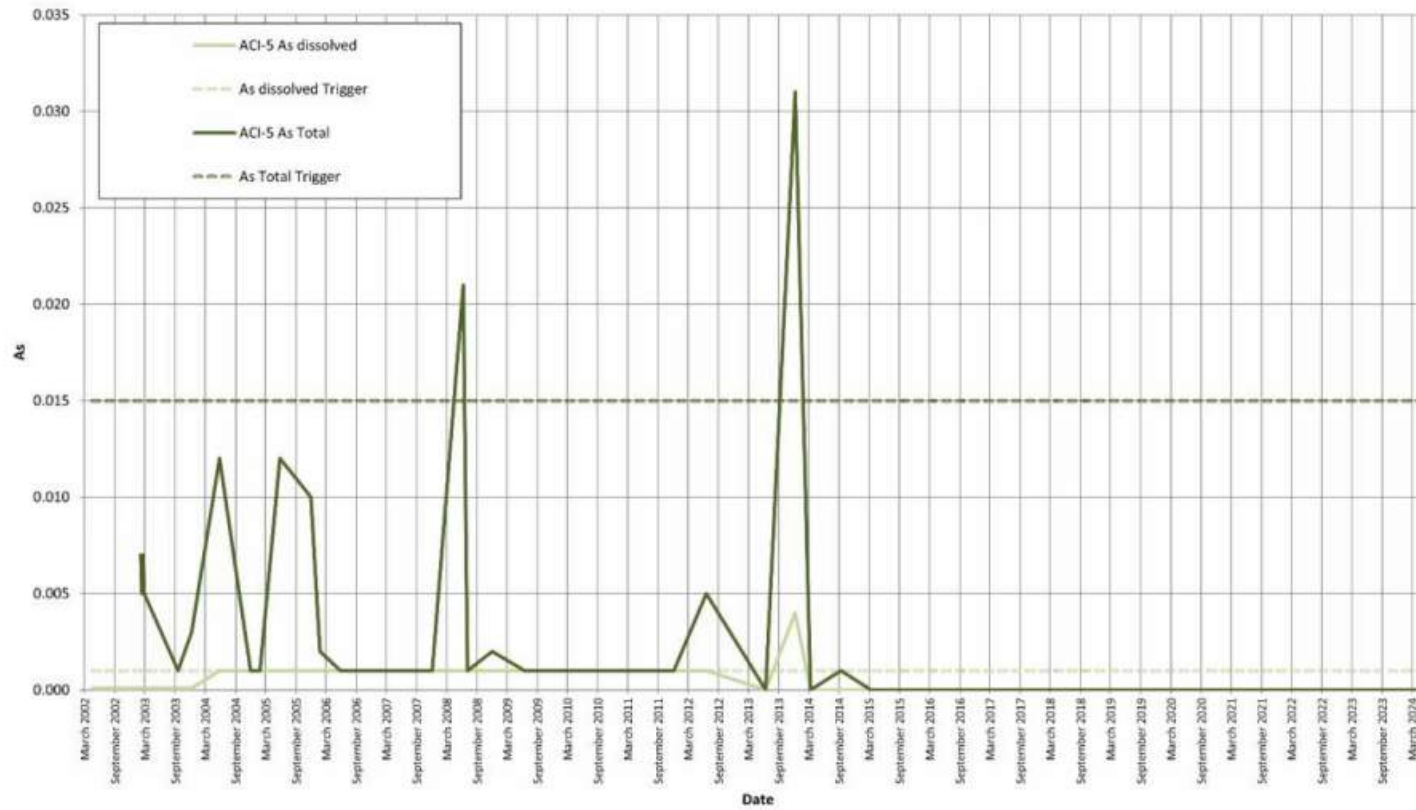
ACI-2 (Manganese)



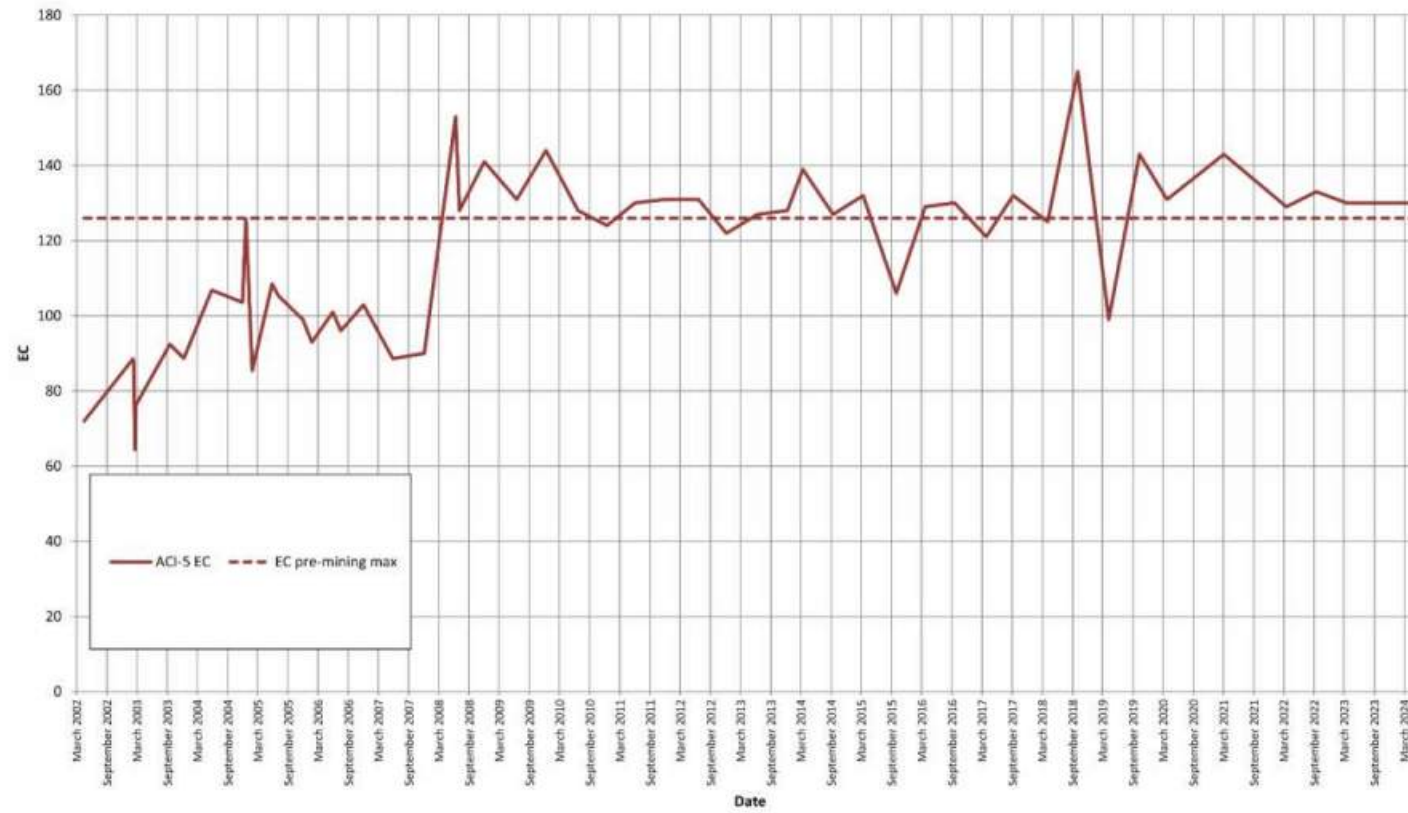
ACI-2 (pH)



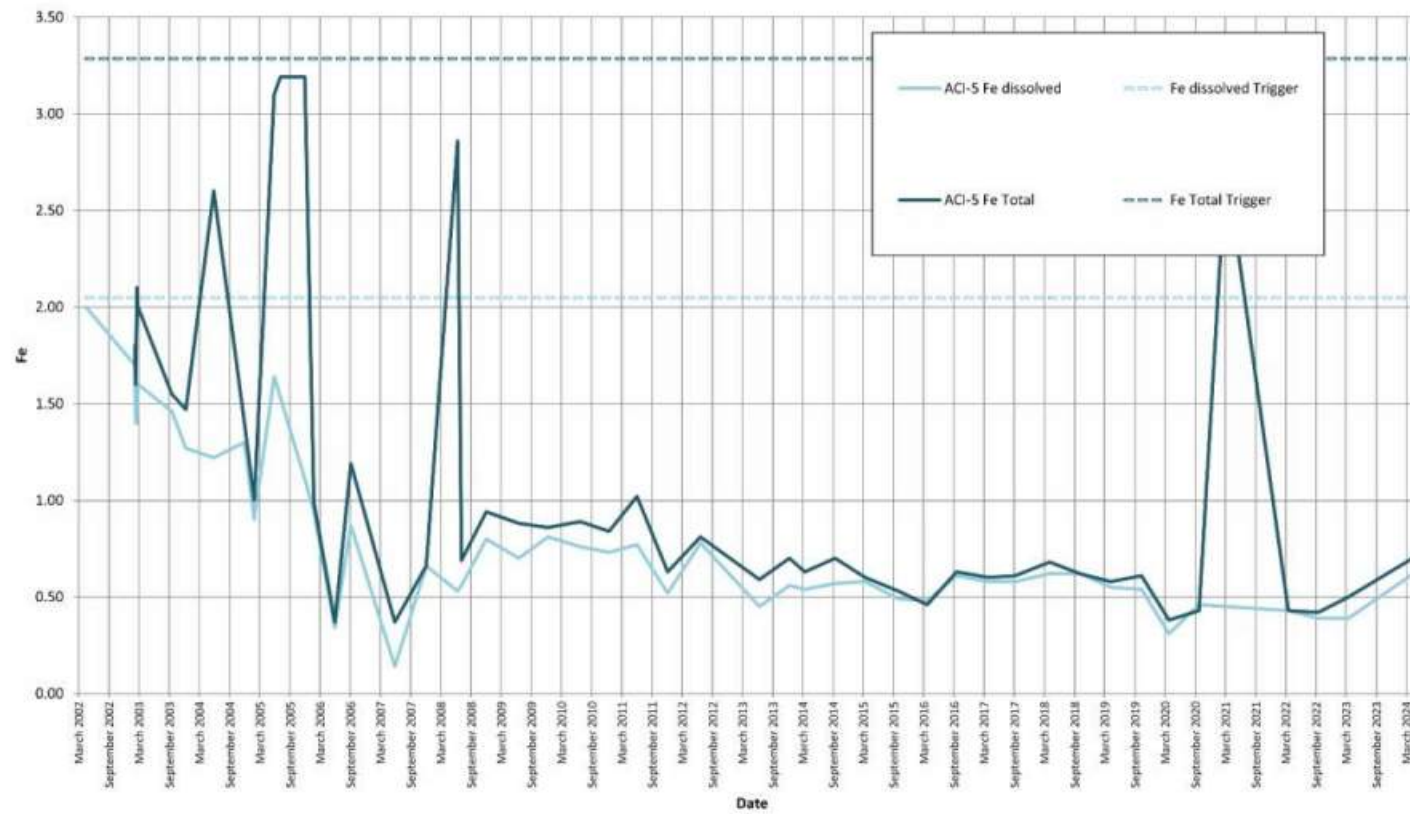
ACI-5 (Arsenic)



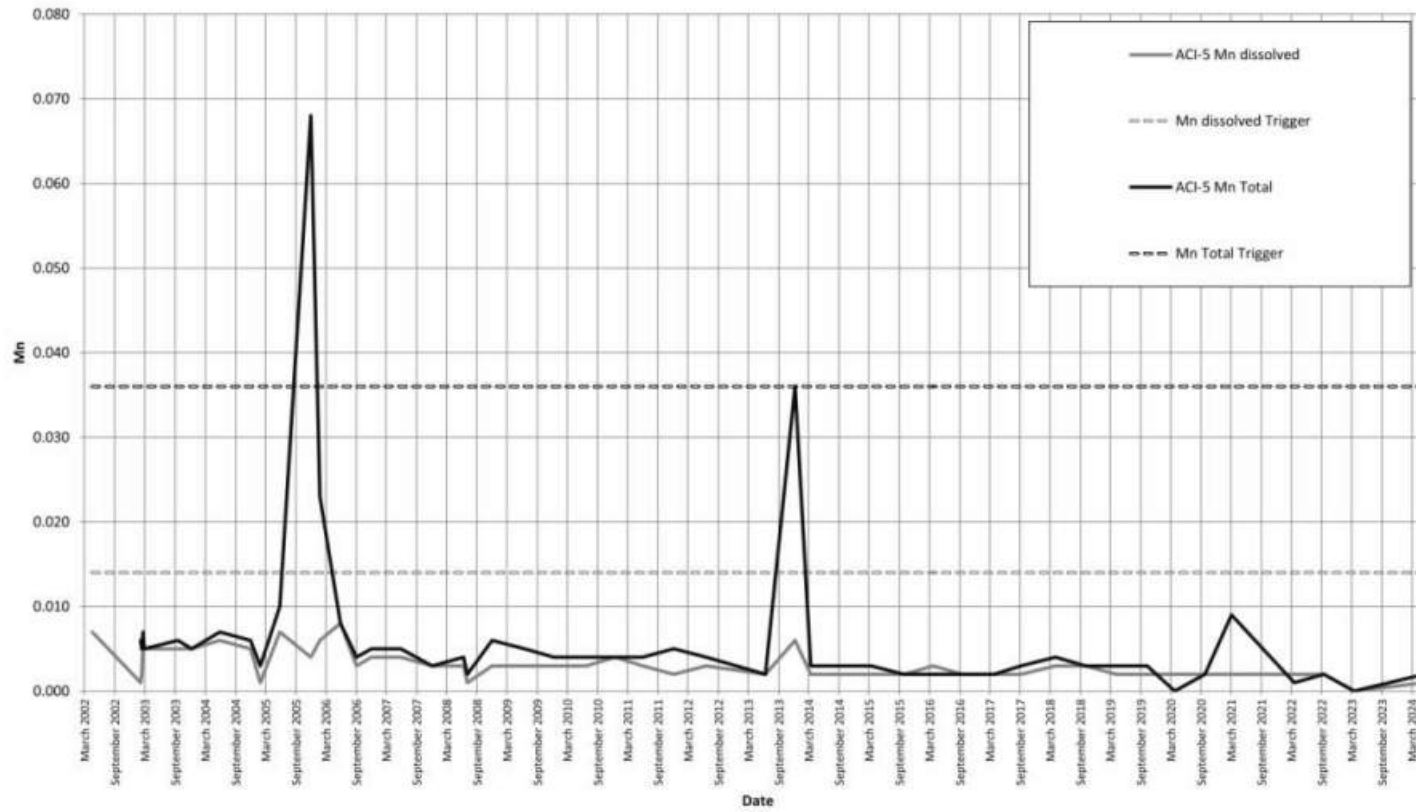
ACI-5 (EC)



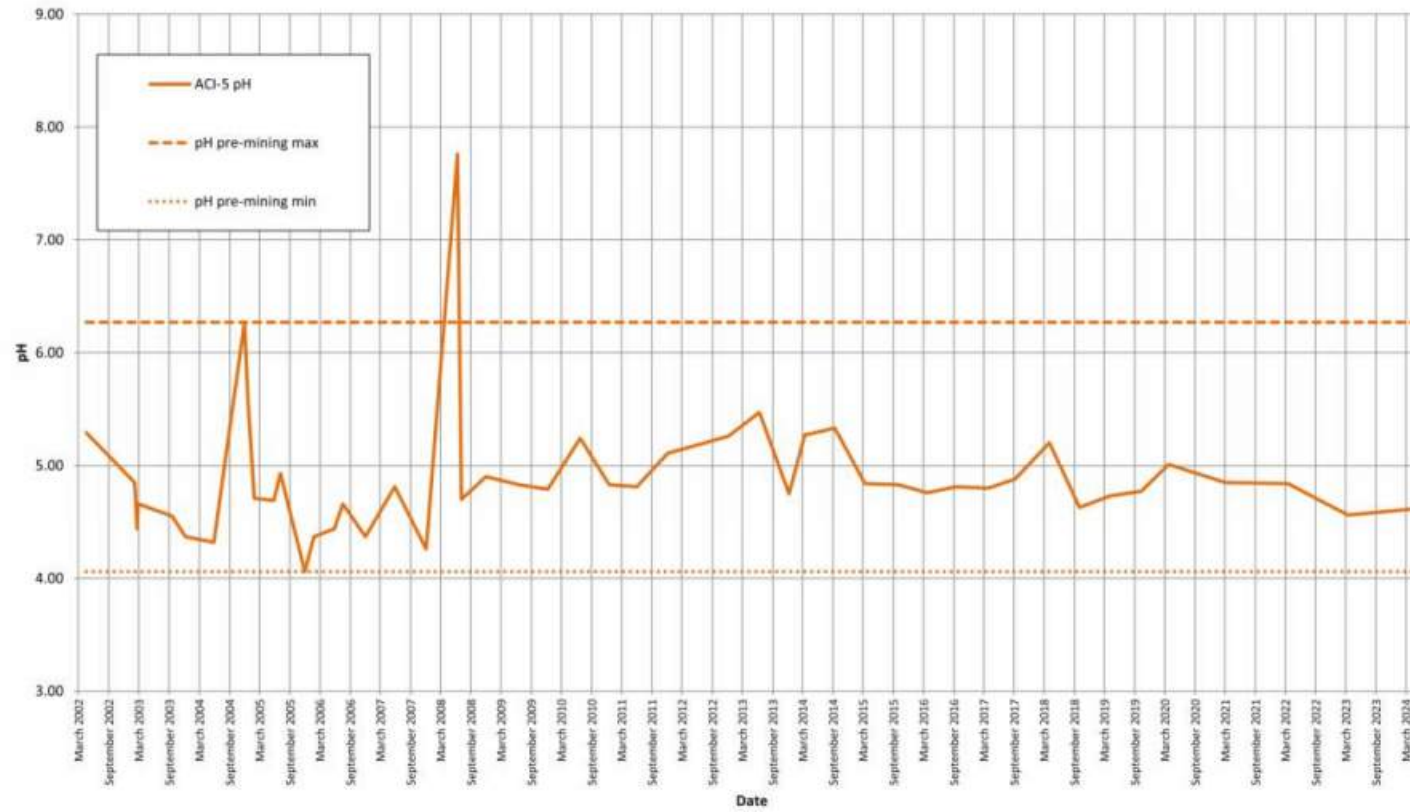
ACI-5 (Iron)



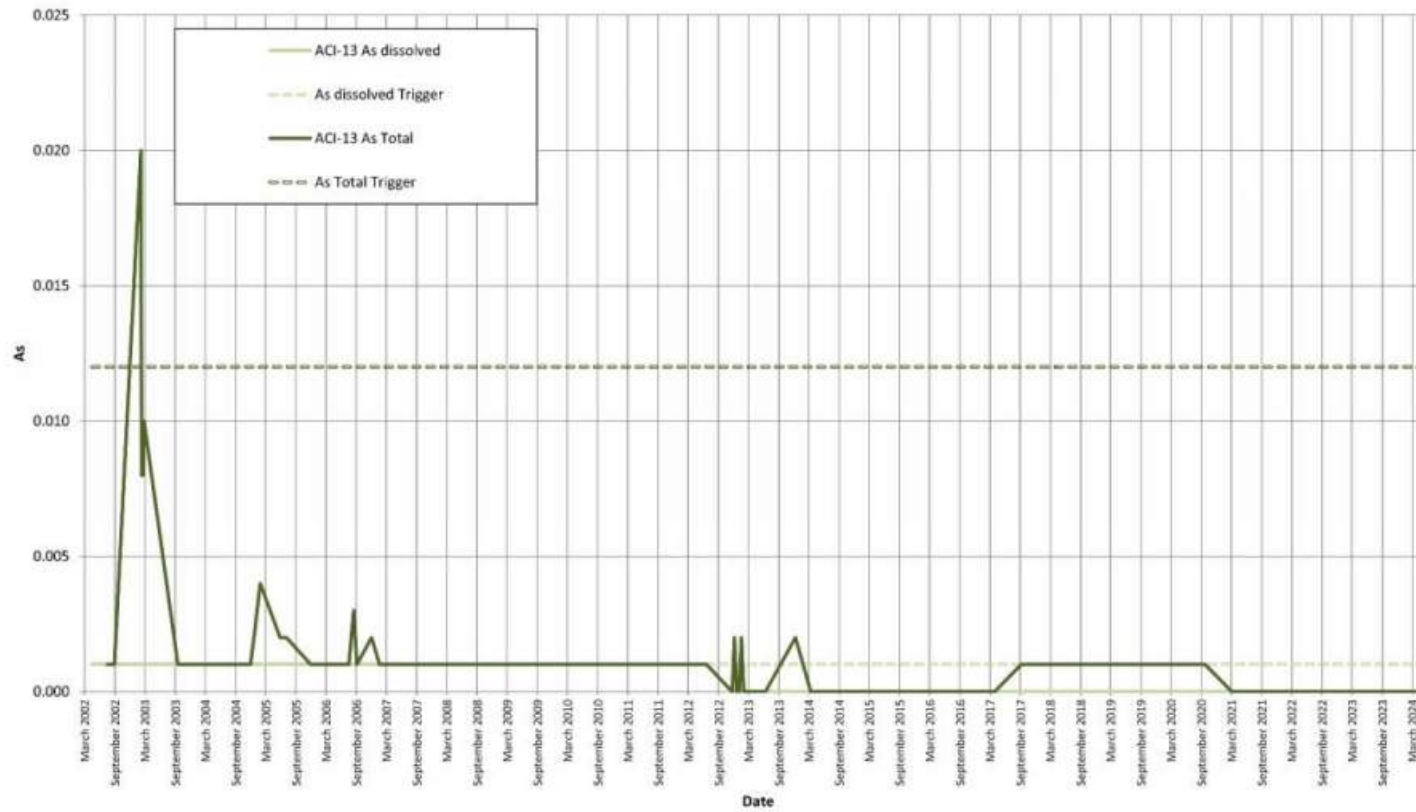
ACI-5 (Manganese)



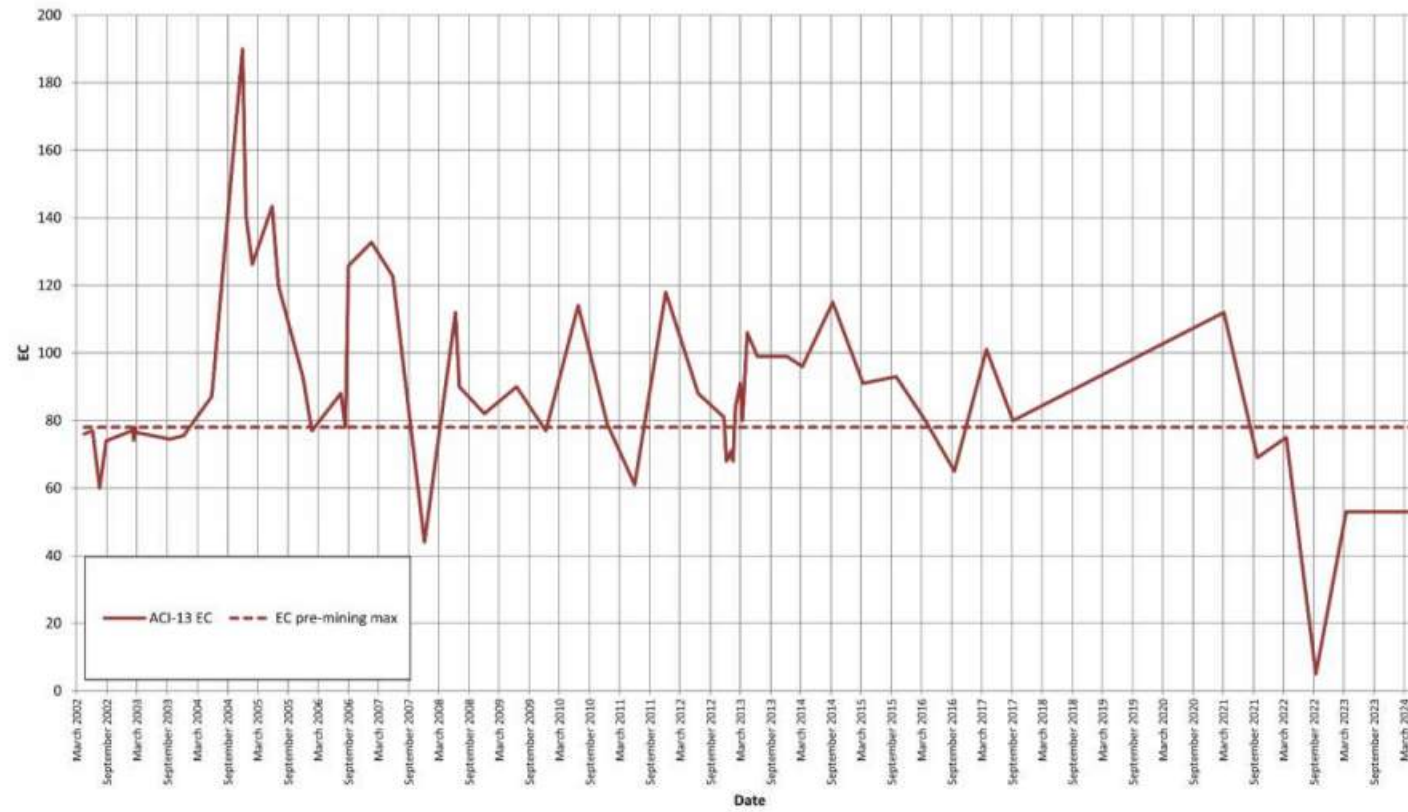
ACI-5 (pH)



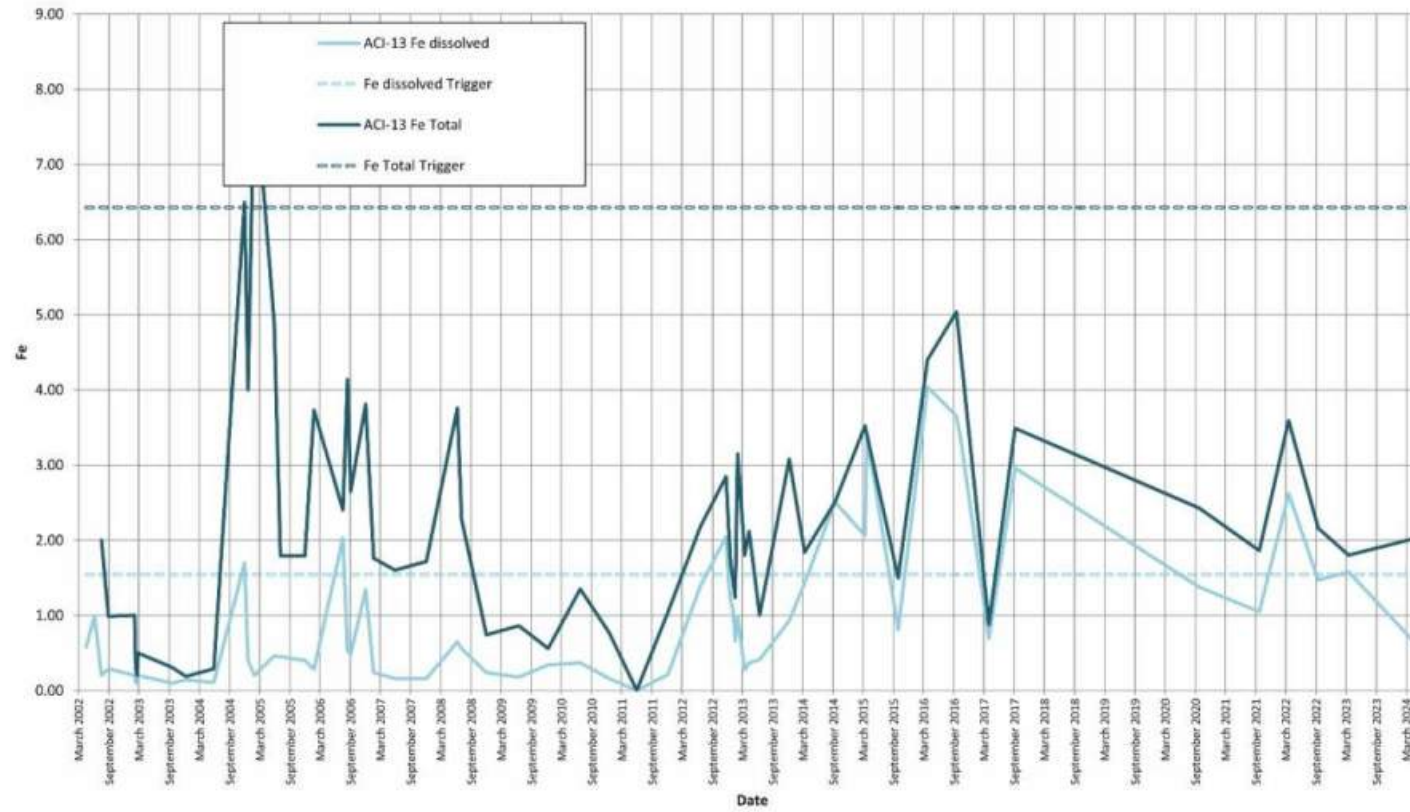
ACI-13 (Arsenic)



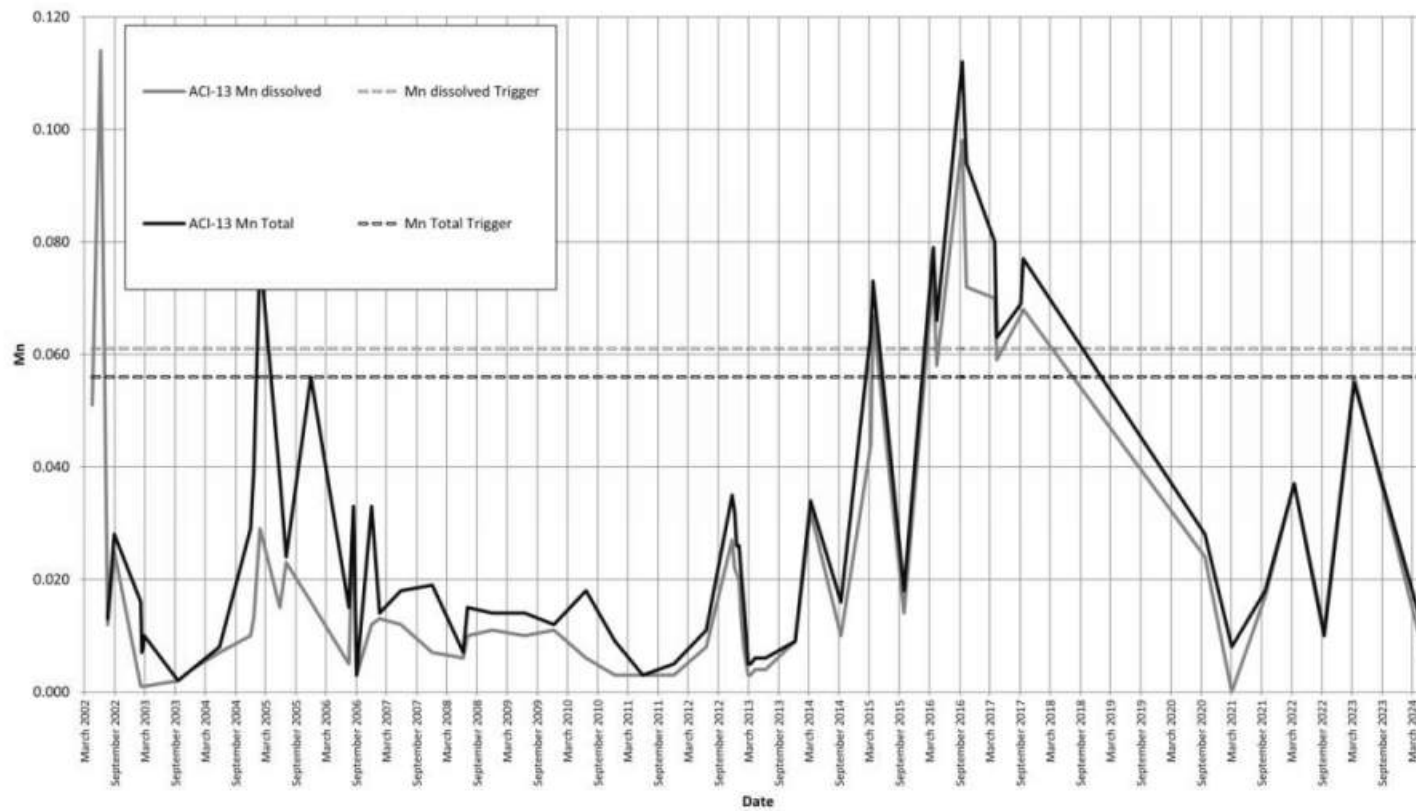
ACI-13 (EC)



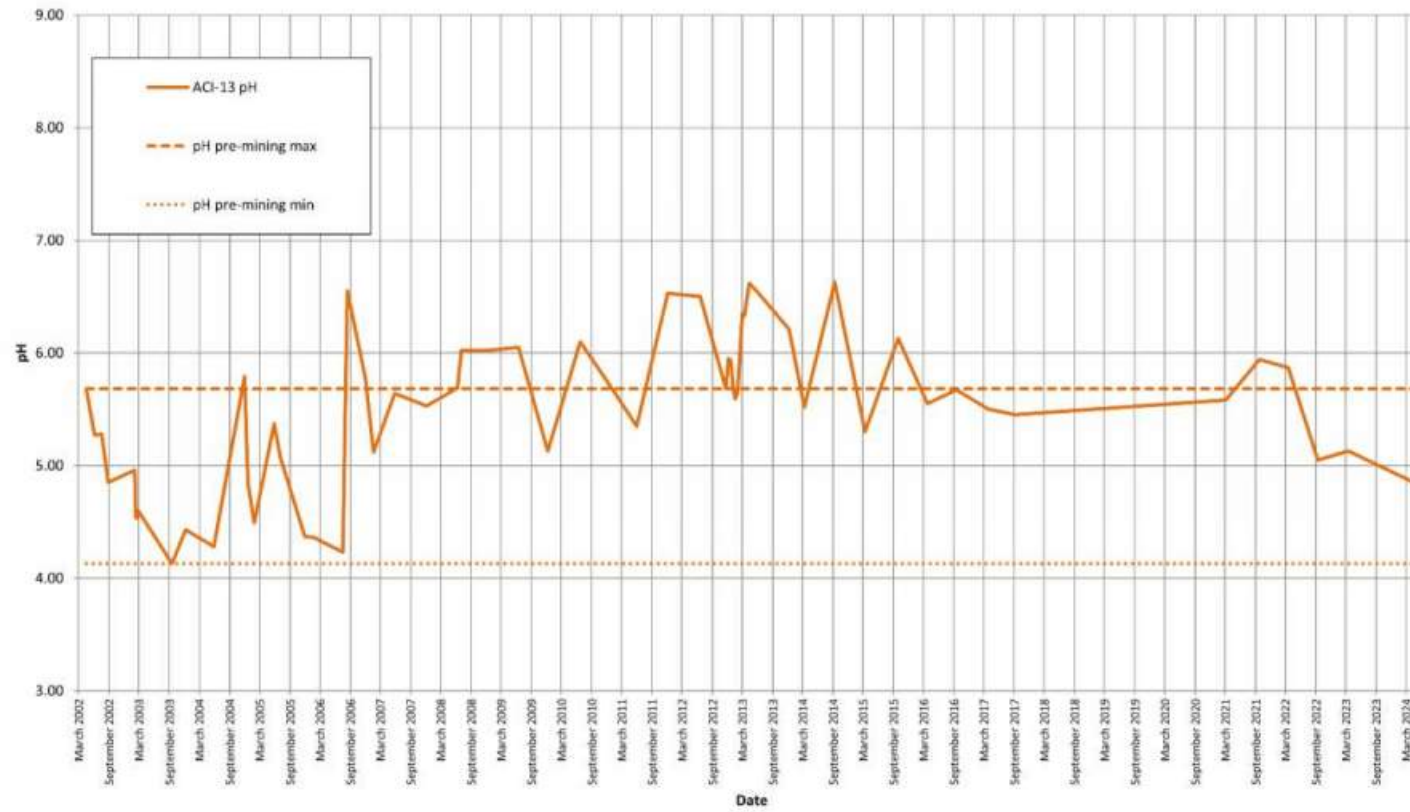
ACI-13 (Iron)



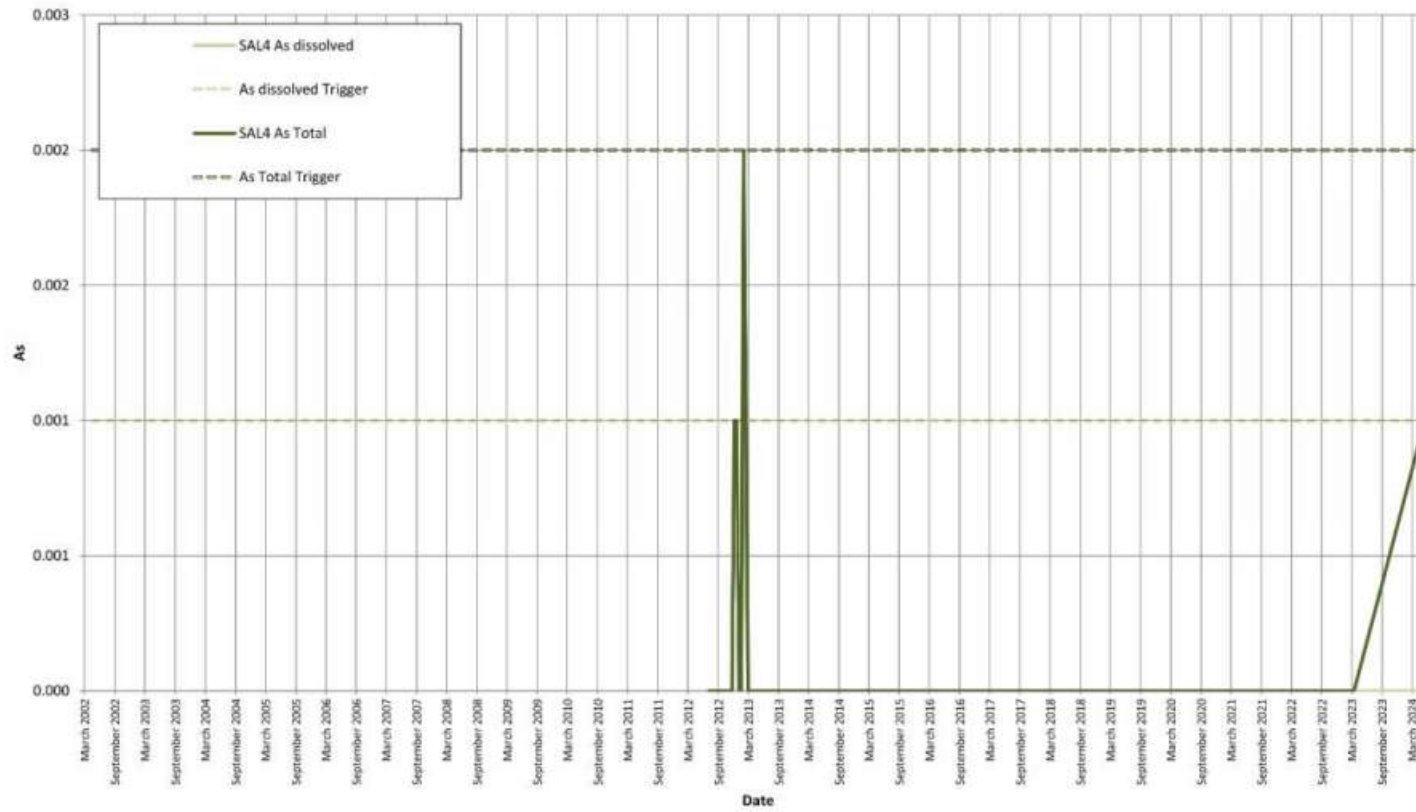
ACI-13 (Manganese)



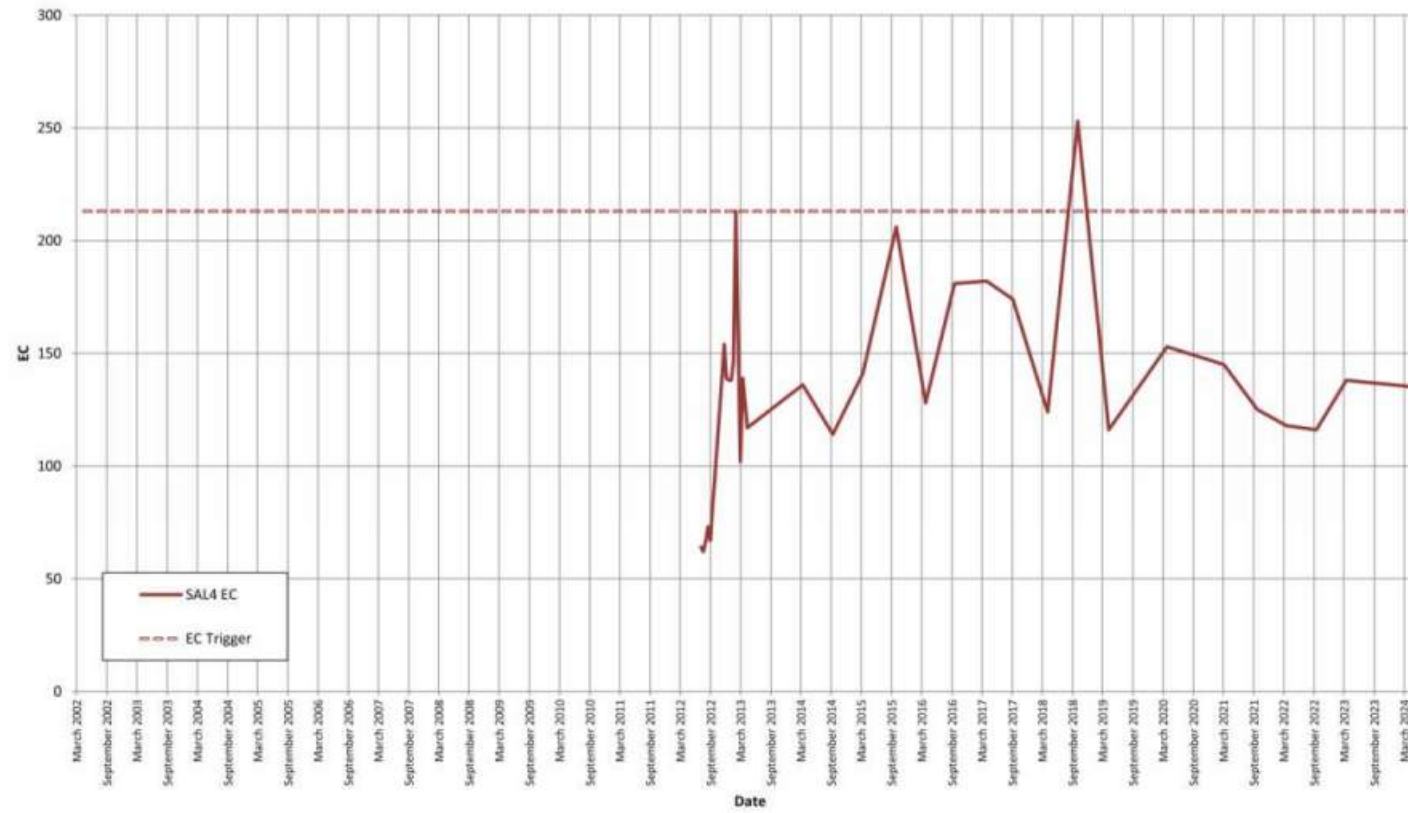
ACI-13 (pH)



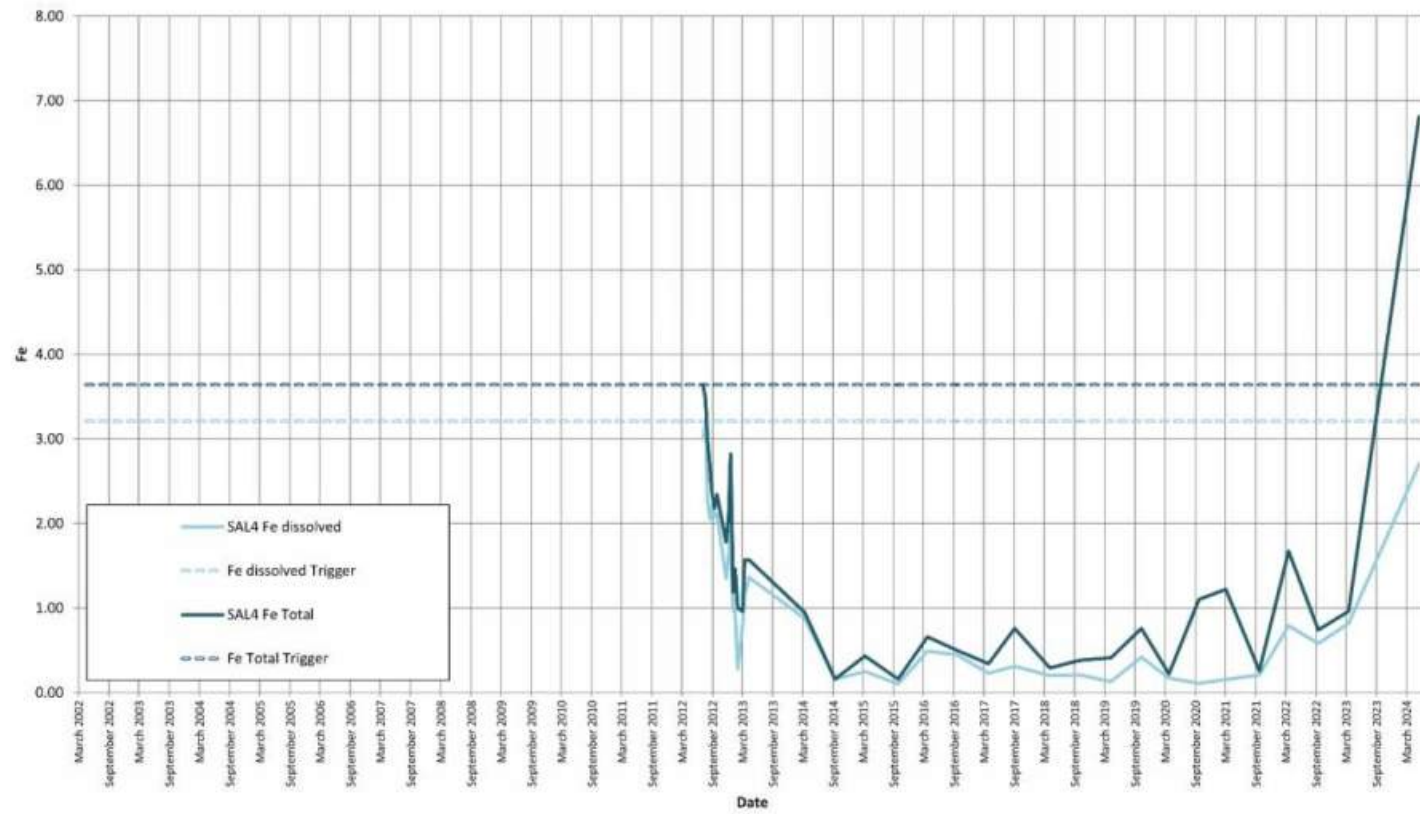
SAL4 (Arsenic)



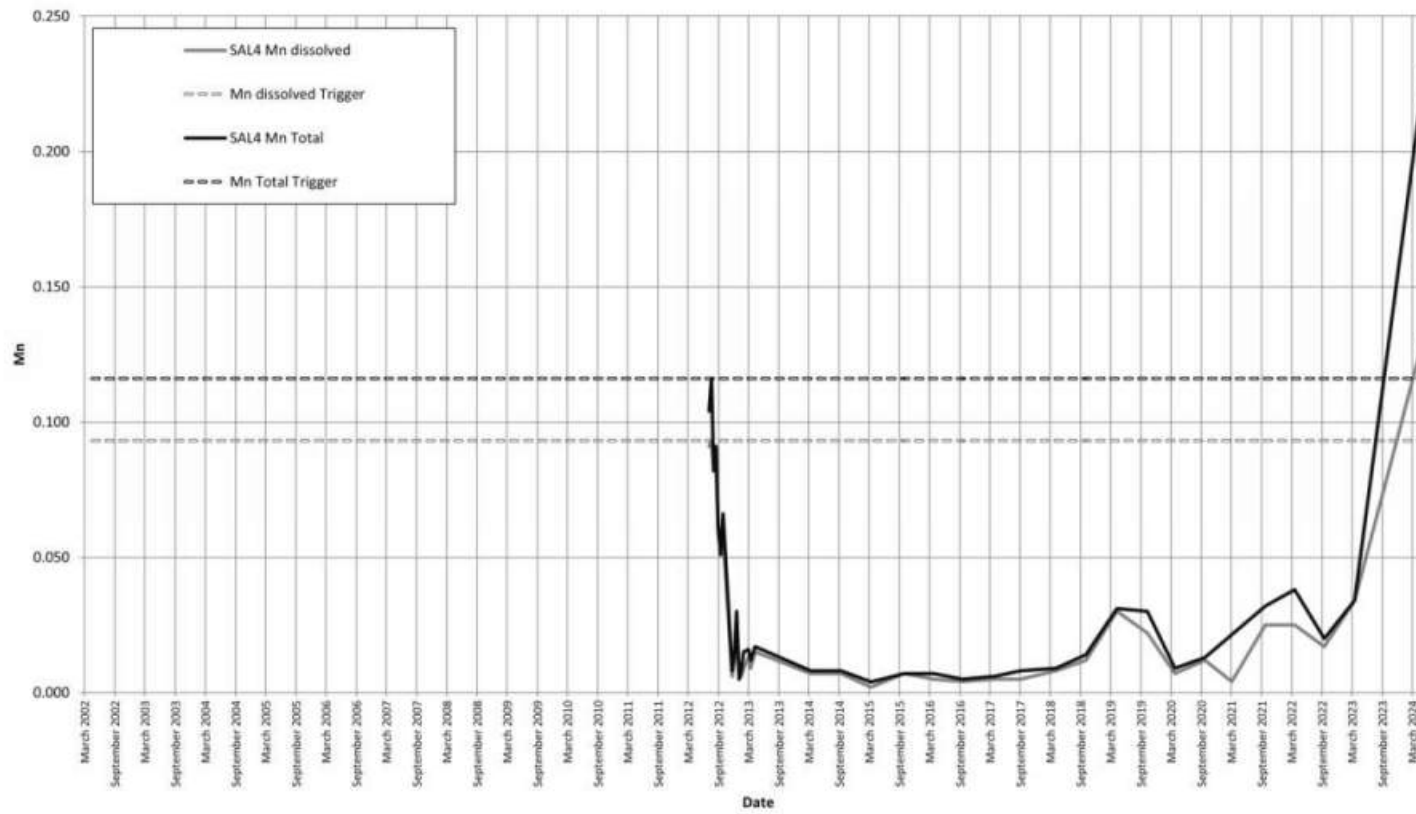
SAL4 (EC)



SAL4 (Iron)



SAL4 (Manganese)



SAL4 (pH)

