

# Dixon Sand Old Northern Road Quarry, Maroota

## Annual Review 2023 - 2024

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Client: Dixon Sand Pty Ltd

Prepared by: Project Environmental Services Pt Ltd

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## Document Control

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Title of Authorised reporting officer	Environmental Officer / Advisor
Signature of Authorised reporting officer	
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Prepared by:	Hunsamon Churcher	Date:	30/09/2024
Authorised by:	David Dixon	Date:	30/09/2024

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Appendix D – Noise Compliance Reports

Appendix E – Monthly Site Inspection

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Appendix G – Bush Regeneration Report

Appendix H – Annual Biodiversity & Rehabilitation Management Report

Appendix I – S94 Contribution

Appendix J – Community Engagement and CCC Meeting Minutes

Appendix K – Complaint Register

Appendix L – Waste Register

## Abbreviations

796/00/HE	Development Consent 796/00/HE for the Old Northern Road quarry,
Annual Review	This document (also formerly known as 'Annual Environmental Management Report')
DA250-09-01	Development Consent DA250-09-01 for the Old Northern Road quarry
DA165-7-2005	Development Consent DA165-7-2005 for the Haerses Road quarry
Dixon Sand	Dixon Sand Pty Ltd
DRG	Division of Resources and Geoscience of the Department (now Resources Regulator, NSW Resources, Department of Primary Industries and Regional Development)
DPHI	Department of Planning, Housing and Infrastructure
DPIRD	Department of Primary Industries and Regional Development
EIS	Environmental Impact Statement
EPA	NSW Environment Protection Authority
EP&A Act	NSW <i>Environment Planning and Assessment Act 1979</i>
EPL3916	Environment Protection Licence 3916 for the Old Northern Road quarry
HRBOA	Biodiversity Offset Area, located at Haerses Road Quarry (for Old Northern Road DA250-09-01)
IEA	Independent Environmental Audit
MEDM	Maximum Extraction Depth Map
MTSGS	Maroota Tertiary Sands Groundwater Source
NVC	Native Vegetation Corridor, located at Old Northern Road Quarry
PIRMP	Pollution Incident Response Management Plan
PM10	Particulate matter <10µm
SCBGS	Sydney Central Basin Groundwater Source
TEOM	Tapered Element Oscillating Microbalance
TSP	Total suspended particulates
WAL	Water Access License

# 1. Statement of Compliance

**Table 1: Statement of Compliance**

All Conditions of the relevant approval(s) were complied with?		
Old Northern Road Quarry	DA250-09-01	No
	EPL3916	Yes
	WAL 24341	Yes

**Table 2: Non-compliances**

Relevant Approvals	Condition #	Condition description (summary)	Compliance Status	Section addressed in Annual Review
DA 250-09-01	Cond. 12 of Sch.5	Submission of Annual Review later than end of March 2024, however DPHI approved an alternative date.	Non-compliant	Table 36, Section 11.1
<i>Compliance Status Key</i>				
Risk Level	Colour code	Description		
High	Non-compliant	Non-compliance with potential for significant environmental consequences, regardless of the likelihood of occurrence		
Medium	Non-compliant	Non-compliance with: <ul style="list-style-type: none"> <li>Potential for serious environmental consequences, but is unlikely to occur, or</li> <li>Potential for moderate environmental consequences, but is likely to occur</li> </ul>		
Low	Non-compliant	Non-compliance with: <ul style="list-style-type: none"> <li>Potential for moderate environmental consequences, but is unlikely to occur, or</li> <li>Potential for low environmental consequences, but is likely to occur</li> </ul>		
Administrative non-compliances	Non-compliant	Only to be applied where the non-compliance does not result in any risk of environmental harm (e.g. submitting a report to government later than required under approval conditions)		

## 2. Introduction

### 2.1 Project Background

Dixon Sand Pty Ltd (Dixon Sand) operates two sand quarries on the Old Northern Road (Lots 29 and 196 DP 752025 and Lots 1 and 2 DP 547255) and at Haerses Road (Lot 170 DP 664766, Lot 170 DP 664767, Lots A and B DP 407341, Lots 176 and 177 DP 752039 and Lot 216 DP 752039) in Maroota, New South Wales. The quarry sites are located approximately 40 kilometres north of Parramatta. The locations of the quarries are shown in Figure 1.

Extraction commenced on Lots 29 and 196, DP752025 at Old Northern Road quarry in the early 1980s, with Dixon Sand undertaking extraction from 1992 to December 1998. The continued approval for extraction on Lots 29 and 196 was granted by the Land and Environment Court NSW on 7 July 2000 with subsequent multiple Modification applications being lodged. Current extraction operations occur on Lot 196, 1 and 2, with materials being processed at the central processing plant, stockpiled and sold to the market on Lot 196.

Extraction commenced at the Haerses Road quarry in 2006 with current extraction operations in Stages 1 and 2, and Cells 1A, 1B, 2A, 2B, 3A and 3B. Sand is being transferred to the Old Northern Road quarry for processing, product blending and sales. Products are also permitted to be sold directly to the market from Haerses Road quarry.

Environmental Monitoring locations for Old Northern Road Quarry are shown in Figure 2.

### 2.2 Scope of this document

The objective of this Annual Review is to report on the overall environmental performance, management of the operations and compliance of Old Northern Road Quarry with the consent conditions issued by the Secretary of NSW Department of Planning, Housing and Infrastructure (DPHI). The reporting period is from 01 July 2023 to 30 June 2024, based on the date of the original quarry development consent 796/00/HE. Reporting for the rehabilitation assessment and ecological monitoring extends outside the specified period due to seasonal timing requirement for the surveys.

Development consent DA250-09-01 (Modification 5) is applicable to this Annual Review.

The following consent conditions outline the requirement of the Annual Review:

**Schedule 5 of Condition 12 of DA250-09-01 (Modification 5)** states:

*By the end of March each year, or other timing as may be agreed by the Secretary, the Applicant must submit a review to the Department reviewing the environmental performance of the development to the satisfaction of the Secretary. This review must:*

- (a) describe the development (including any progressive rehabilitation) that was carried out in the previous calendar year, and the development that is proposed to be carried out over the current calendar year;*
- (b) include a comprehensive review of the monitoring results and complaints records of the development over the previous calendar year, which includes a comparison of these results against the:*
  - relevant statutory requirements, limits or performance measures/criteria;*
  - requirements of any plan or program required under this consent;*

- *monitoring results of previous years; and*
  - *relevant predictions in the documents listed in condition 2(a) of Schedule 2;*
- (c) *evaluate and report on:*
- *the effectiveness of the air quality and noise management systems; and*
  - *compliance with the performance measures, criteria and operating conditions in this consent.*
- (d) *identify any non-compliance over the past calendar year, and describe what actions were (or are being) taken to ensure compliance;*
- (e) *identify any trends in the monitoring data over the life of the development;*
- (f) *identify any discrepancies between the predicted and actual impacts of the development, and analyse the potential cause of any significant discrepancies;*
- (g) *describe what measures will be implemented over the current calendar year to improve the performance of the development.*

*The Applicant must ensure that copies of the Annual Review are submitted to Council and are available to the Community Consultative Committee (see condition 8 of Schedule 5) and any interested person upon request.*

Dixon Sand requested approval from the DPHI for the submission deadline of the Annual Review to be adjusted to reflect the financial year reporting. Approval was granted by the DPHI on 9 February 2018 to submit the Annual Review by the end of September each year.

This Annual Review will report on the environmental performance in relation to the requirements of DA250-09-01 (Modification 5), Environment Protection License (EPL) # 3916 (dated 11 April 2023) and Water Access License (WAL) 24341. The Annual Review has been prepared in accordance with *Post-approval requirements for State Significant mining developments – Annual Review Guideline* (DP&E, October 2015).

## 2.3 Old Northern Road Quarry Approvals

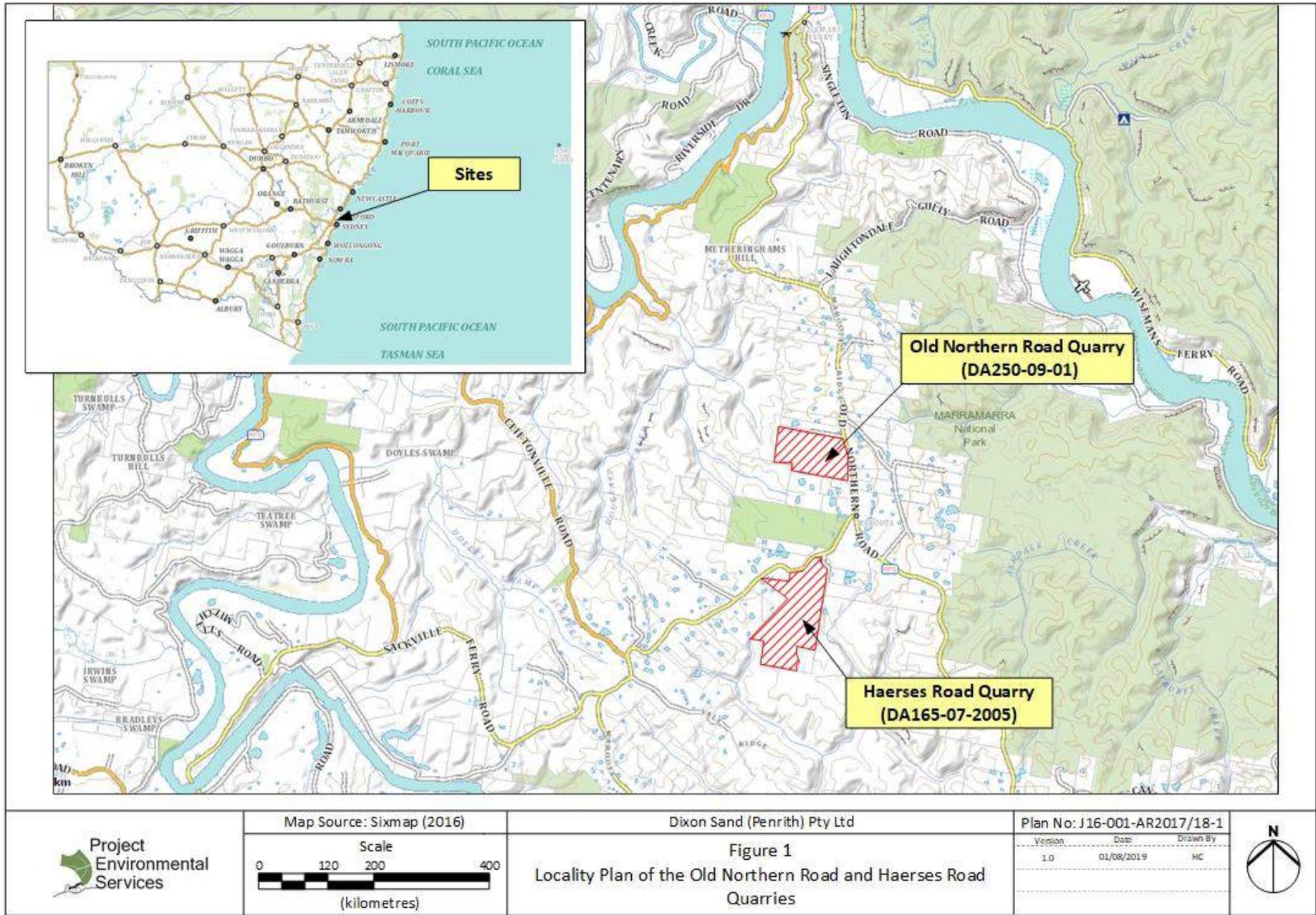
Development consents for the quarry on Lots 29 and 196 and extension into Lots 1 and 2 were issued by the Land and Environment Court on 7 July 2000 (796/00/HE) and 24 May 2004 (DA250-09-01), respectively. Consent No. 796/00/HE allowed for sand extraction, processing, and rehabilitation within Lots 29 and 196. This consent lapsed on 22 March 2010. Continued extraction on Lots 29 & 196 is permitted in DA250-09-01, which now forms a single integrated consent for all activities within Lots 1, 2, 29 and 196. Extraction of Lot 29 has concluded with the area currently being utilised for sediment basins and haul road, with native vegetation rehabilitation commencing in the dedicated Native Vegetation Corridor.

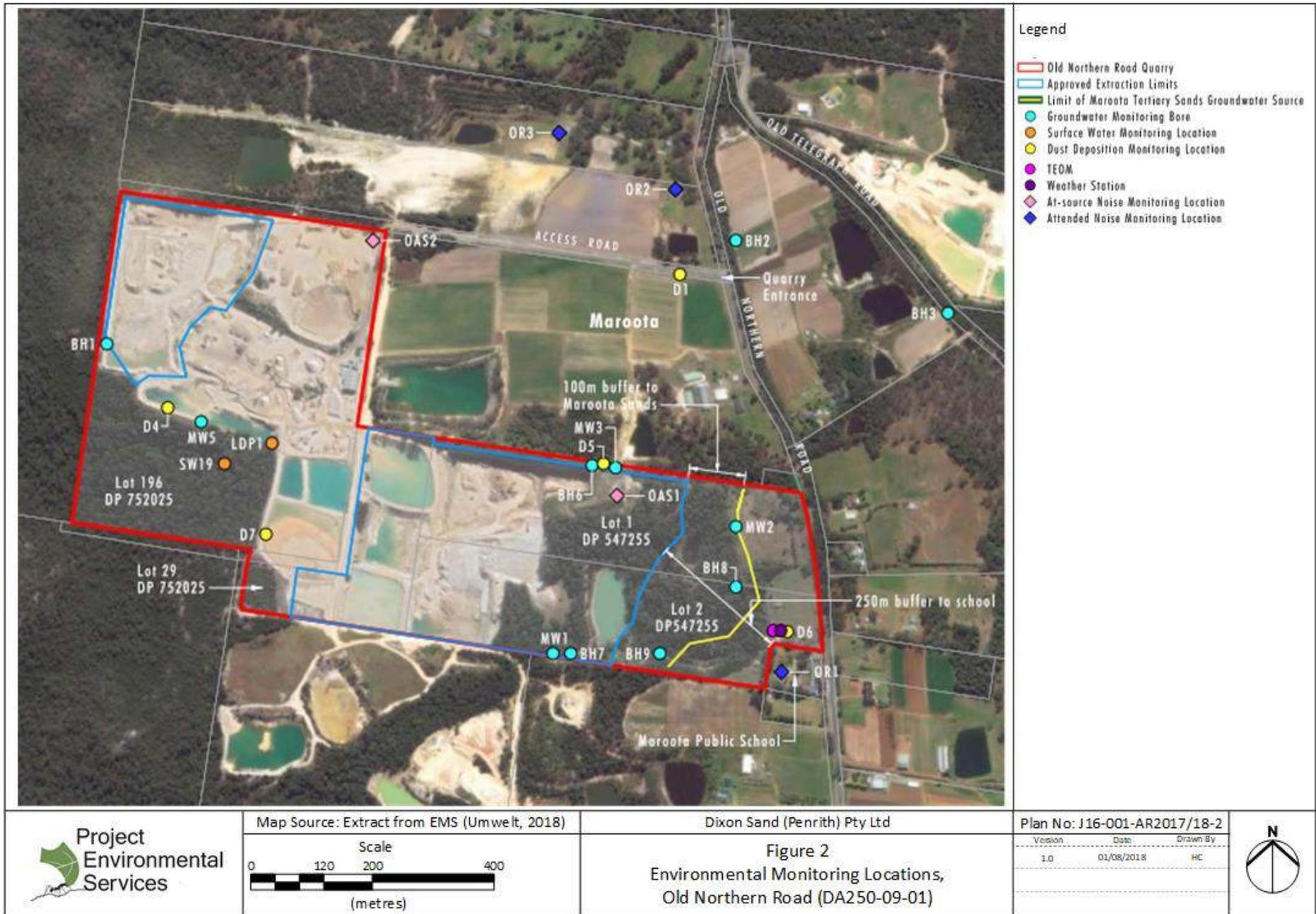
Continued use of the central processing plant on Lot 196, transport of product from the site, water management, and rehabilitation operations are approved under DA250-09-01.

Five modifications to DA250-09-01 have been lodged and approved. Modification 5 is current and was approved on 14 November 2018. A summary of the development consents and modifications is provided in Table 3.

**Table 3: Summary of Old Northern Road Quarry Development Consents and Modifications**

Development Consents	Status	Date of Determination	Comments
Old Northern Road Quarry			
796/00/HE	Approved and superseded by DA250-09-01	7 July 2000	Approval for sand extraction, processing and rehabilitation of Lots 29 and 196, Old Northern Road.
DA250-09-01	Approved and superseded by Modification 1	2 January 2003	Continual of sand extraction on Lot 29 and 196, and the extension of extraction operations into Lots 1 and 2.
DA250-09-01 Modification 1	Approved and superseded by Modification 2	14 February 2006	Haerses Road sand to be transported and processed at the main Processing Plant on Lot 196 at the Old Northern Road
DA250-09-01 Modification 2	Approved and superseded by Modification 3	20 August 2008	Increased truck movements from 120 to 180 per day
DA250-09-01 Modification 3	Approved and superseded by Modification 4	30 August 2012	Amended DA250-09-01 to include extraction on Lots 29 and 196 Permit the extraction of Lot 196 to a level not within 2 metres of the wet weather high groundwater table Surrender of DA796/00/HE issued by the Land and Environment Court
DA250-09-01 Modification 4	Approved and superseded by Modification 5	6 July 2015	Application to include additional extraction areas on Lots 1 and 2 for extraction
DA250-09-01 Modification 5	Approved and current	17 November 2017	Application to extend the life of the quarry to 24 May 2042. Revision and update of the consent conditions in line with modern development consent format





### 3. Operations Summary

#### 3.1 Production and Vehicle Movements

All bulk sand truck movements from the Haerses Road site since commencement of extraction in November 2006 have delivered raw product to the Old Northern Road site for processing. Direct sale of products from Haerses Road Quarry commenced in 2015 under a separate development consent DA165-7-2005.

A total of **243,043.7**tonnes of sand and sandstone products have been produced and sold from the Old Northern Road quarry during the 2023 – 2024 reporting period. A total of **187,755** tonnes of materials have been extracted from Haerses Road and transferred to Old Northern Road for processing and product blending.

An example of the morning truck movement record is contained in Appendix F.

Table 4 provides a summary of the annual production quantities, transfers and truck movements for Old Northern Road Quarry during the reporting period.

**Table 4: Production Data, Transfers & Truck Movements at Old Northern Road Quarry.**

Month	Total combined Production ONR from Lots 1, 2, 29 and 196 and HR (t)	Total Transfers from Haerses Rd to ONR (t)	Maximum Daily Truck Movements at ONR	Maximum No. Trucks 5:45 - 7:00 am at ONR
Jul 2023	17,028.5	18,909	126	18
Aug 2023	17,709.0	20,262	142	20
Sep 2023	24,370.7	14,700	164	20
Oct 2023	23,209.2	16,137	164	18
Nov 2023	26,929.0	16,368	160	34
Dec 2023	21,562.2	9,669	168	28
Jan 2024	18,301.6	10,263	176	24
Feb 2024	19,320.0	17,325	168	28
Mar 2024	24,638.8	13,500	168	28
Apr 2024	18,030.8	16,500	158	26
May 2024	15,600.3	18,480	138	18
Jun 2024	16,343.6	15,642	136	16
<b>Totals / Maximum</b>	<b>243,043.7</b>	<b>187,755</b>	<b>176</b>	<b>34</b>
<b>Annual Limit</b>	<b>495,000</b>	<b>190,000</b>		
		<b>Daily Max Criteria</b>	<b>180</b>	<b>40</b>

## **3.2 Submission of Quarry Production Data to DRG**

Condition 13 of Schedule 2 of DA 250-09-01 requires Dixon Sand to submit calendar year annual production data to the DRG (now Resources Regulator within NSW Resources, Department of Primary Industries and Regional Development, (DPIRD)) using the standard form and include a copy of this data in the Annual Review.

The DPIRD Minerals Return form require reporting of extractive materials for the financial year, and not for the calendar year as specified in the abovementioned consent condition.

The Minerals Return form for the financial year 2023 – 2024 was submitted to DPIRD on 1 August 2024.

## 4. Actions Required from Previous Annual Review

The proposed recommendations contained in the previous 2022 – 2023 Annual Review have been actioned by Dixon Sand and are summarised in Table 5.

**Table 5: Summary of Recommendations and Actions**

Recommendation from the 2022 – 2023 Annual Review	Actions
<b>Vegetation Clearing and Extraction</b>	
<ul style="list-style-type: none"> <li>Vegetation clearing will be undertaken in accordance with the Pre-clearing procedures.</li> </ul>	<ul style="list-style-type: none"> <li>Actioned - vegetation clearing during this 2023 - 2024 reporting period was undertaken in accordance with the Pre-clearing procedures.</li> </ul>
<b>Rehabilitation and bush regeneration</b>	
<b>Old Northern Road Quarry Native Vegetation Corridor Rehabilitation Area</b>	
<ul style="list-style-type: none"> <li>Continue with routine weed control and monitoring of regenerating native species.</li> </ul>	<ul style="list-style-type: none"> <li>Actioned – ongoing routine weed management and monitoring undertaken</li> </ul>
<b>Old Northern Road Quarry Lots 1 and 2</b>	
<ul style="list-style-type: none"> <li>Continue with management of <i>Lantana camera</i> and review techniques recommended in the Ecological Monitoring Report (South East Environmental, 2023)</li> </ul>	<ul style="list-style-type: none"> <li>Actioned – ongoing management of <i>Lantana camera</i> and review of techniques</li> </ul>
<ul style="list-style-type: none"> <li>Supplementary planting or similar treatment in identified areas as required.</li> </ul>	<ul style="list-style-type: none"> <li>Actioned - supplementary planting undertaken in targeted area</li> </ul>
<b>Old Northern Road Quarry other areas</b>	
<ul style="list-style-type: none"> <li>Continue with routine weed management along the southern boundary of Cons Hill (Lot 196) and carry out direct seeding or supplementary planting where suitable, and</li> <li>Continue with rehabilitation works along the western embankment at the Quarry entrance gate. Carry out direct seeding or supplementary planting where suitable.</li> </ul>	<ul style="list-style-type: none"> <li>Actioned – ongoing weed management undertaken. Exotic grasses slashed, brush matted and removed by hand. Supplementary planting of <i>Acacia longifolia</i> and <i>Imperata cylindrica</i> were undertaken.</li> <li>Actioned – ongoing routine weed management undertaken.</li> </ul>
<b>Haerses Road Biodiversity Offset Area (HRBOA)</b>	
<ul style="list-style-type: none"> <li>Continue with management of invasive grass and annual species along the North-western border of the HRBOA</li> </ul>	<ul style="list-style-type: none"> <li>Actioned - continued weed management at the designated location</li> </ul>

## 5. Environmental Performance

### 5.1 Air Quality

#### 5.1.1 Dust Sources and Mitigation Measures

The objectives, criteria limits, procedures, response, reporting and responsibilities of air quality management are contained in the Air Quality Management Plan.

The following potential sources of dust generated from Old Northern Road Quarry and mitigation measures have been identified in Table 6.

**Table 6: Potential sources of dust and mitigation measures.**

Potential Dust Sources	Mitigation Measures
<ul style="list-style-type: none"> <li>• topsoil stripping.</li> <li>• ripping with a bulldozer;</li> <li>• extraction with an excavator and truck;</li> <li>• crushers and screens at the processing plant;</li> <li>• wind erosion from stockpiles;</li> <li>• loading sand products into trucks;</li> <li>• vehicle movement and haulage on site;</li> <li>• product transportation along unsealed haul roads; and</li> <li>• occasional haul road grading.</li> </ul>	<ul style="list-style-type: none"> <li>• minimising the area of disturbance by only clearing areas immediately prior to extraction;</li> <li>• progressive rehabilitation;</li> <li>• maintaining dust suppression equipment to all processing plant;</li> <li>• maintaining a manual sprinkler system including fine sprays on the conveyors of the dry processing plant, overhead sprinklers and a conical jet stockpile sprinkler;</li> <li>• stabilising topsoil stockpiles by planting with a cover crop of non-invasive cereal or legumes;</li> <li>• using a water cart to suppress dust on unsealed roads, during dry conditions on days of operation;</li> <li>• limiting vehicle speed to 20 km/hr on internal unsealed access tracks;</li> <li>• ensuring all loads leaving the site are covered; and</li> <li>• regularly maintaining mobile and fixed equipment to minimise exhaust emissions.</li> </ul>

#### 5.1.2 Compliance Limits

Condition 8 of Schedule 3, DA250-09-01 requires Dixon Sand to operate a continuous air quality monitoring system to minimise the impacts at sensitive receivers such as the Maroota Public School. The following air quality criteria are to be complied with:

- dust deposition - 4g/m<sup>2</sup>/month (annual average) or 2g/m<sup>2</sup>/month increase;
- total suspended particulate matter (TSP) – 90µg/ m<sup>3</sup> (annual mean); and
- particulate matter <10µm (PM10):
  - 50 µg/m<sup>3</sup> (average for 24-hour period)
  - 30 µg/m<sup>3</sup> (annual mean).

The NSW Environment Protection Authority (EPA) also requires the automatic alarm system of the Tapered Element Oscillating Microbalance (TEOM) continuous dust monitoring device to be set at a PM10 trigger value which triggers specific dust mitigation measure:

- 42 µg/m<sup>3</sup> (average for rolling 24-hour period for wind directions between 270° and 315°) for the Old Northern Road quarry

Table 7 lists the relevant PM10 and Total suspended particulates (TSP) criteria as required by the Development Consent and Environment Protection Licence.

**Table 7: PM10 and TSP Criteria.**

Source	Condition	Criteria / Trigger Value	Comments
<b>Old Northern Road</b>			
DA250-09-01	Sch. 3, Cond. 7	30 µg/m <sup>3</sup>	Annual PM <sub>10</sub> average – long term impact assessment
		50 µg/m <sup>3</sup>	24-hour PM <sub>10</sub> average – short term impact assessment
EPL3916	O3.3	37 µg/m <sup>3</sup>	Trigger value for PM <sub>10</sub> automatic alarm
EPL3916	M2.4	42 µg/m <sup>3</sup> with prevailing wind direction from 270° - 315°	Criteria for enacting management plan strategies to notify the EPA, reduce dust emissions immediately and cease operations specific extraction pits, in response to the triggers.
DA250-09-01	Sch. 3, Cond. 7	90 µg/m <sup>3</sup>	Annual average criteria for TSP

### 5.1.3 Results

#### Climatic Data

Monthly climatic measurements were recorded by the weather station located adjacent to the Maroota Public School, in accordance with:

- Condition M4.1 of the EPL 3916,

These results are shown in Table 8.

**Table 8: Monthly Total Rainfall and Averaged Temperatures.**

Month	Jul 2023	Aug 2023	Sep 2023	Oct 2023	Nov 2023	Dec 2023	Jan 2024	Feb 2023	Mar 2024	Apr 2024	May 2024	Jun 2024
<b>Ave Temp (°C)</b>	12.8	13.5	16.9	18.1	19.1	22.1	22.2	22.1	20.7	17.2	14.1	11.5
<b>Total Rainfall (mm)</b>	9.2	32.8	30.6	22.4	124.6	135.2	90.0	73.0	13.8	150.2	89.4	100.8

Data presented in Table 8 shows that the highest monthly rainfall of 150.2mm was recorded in April 2024 and the lowest monthly rainfall of 9.2mm was recorded in July 2023. The total annual rainfall recorded during this reporting period is 872mm, which is drier in comparison to the previous reporting periods which recorded 915.4mm (2022 – 2023), 1527mm (2021 - 2022) and 1090.4mm (2020 - 2021).

From the recorded monthly temperature data, January 2024 experienced the highest average temperature at 22.2°C whilst June 2024 experienced the lowest average temperature at 11.5°C.

Fluctuations in temperatures and rainfalls are generally influenced largely by the El-Nino and La-Nina climatic cycle. A reduction in total rainfall has been observed during this reporting period which was directly influenced by the conclusion of the La-Nina climatic event.

### **Dust Deposition**

Five dust deposition gauges are located on the Old Northern Road Quarry. Table 9 lists the locations of the dust gauges.

**Table 9: Site location of dust deposition gauges**

Dust Gauge I.D.	Location Reference	Quarry Site
D01A	Quarry Access Road, near the Old Northern Road	Old Northern Road
D04	Rehabilitation Area	Old Northern Road
D05	Bundwall, Lot 1	Old Northern Road
D06	Maroota Public School	Old Northern Road
D07	Mulloc Heap	Old Northern Road

Dust deposition results were collected and analysed monthly by a NATA accredited laboratory. Table 10 presents the monthly dust deposition results between July 2023 and June 2024. Table 11 contains the calculated rolling annual averages for the dust deposition gauges.

The monthly laboratory results for dust deposition for this reporting period are presented in Appendix A.

**Table 10: Dust Deposition Results: 26 July 2023 – 26 June 2024.**

Dust Gauge Location	26/07/23	23/08/23	20/09/23	18/10/23	15/11/23	13/12/23	10/01/24	07/02/24	06/03/24	03/04/24	01/05/24	29/05/24
	23/08/23	20/09/23	18/10/23	15/11/23	13/12/23	10/01/24	07/02/24	06/03/24	03/04/24	01/05/24	29/05/24	26/06/24
DA1A Front Gate	3.6*	2.4*	2.2*	2.1*	1.7*	13.7*	2.7*	2.2	2.0*	1.6*	1.0*	2.0*
D4 Rehab	0.5	0.2	0.7	0.5	1.1*	1.5*	1.6	0.3*	0.9*	0.6	0.1	0.1
D5 Bundwall	1.2	0.6	3.2	4.5*	11.4*	23.1	5.2*	3.6*	3.1*	1.4*	7.2*	5.8*
D6 School	0.7*	0.3*	1*	1.4	3.6*	3.5*	1.1*	2.9*	4.9*	3.5*	3.3*	0.5
D7 Mulloc Heap	0.5	0.3*	0.7	1.3	1.1	1.2	2.1	0.3	0.6	0.9	0.4	0.2*

- Note:
- x.x\* Vegetation / algae present in dust gauge
  - x.x\* Insects / Spider web present in dust gauge
  - x.x\* Bird dropping present in dust gauge
  - x.x\* Ash present in dust gauge
  - x.x\* Sand present in dust gauge
  - x.x\* Dust present in dust gauge
  - \*\* Bottle broken – no dust result

**Table 11: Calculated Rolling Annual Averages of Dust Deposition: 26 July 2023 – 26 June 2024.**

Dust Gauge Location	26/07/23	23/08/23	20/09/23	18/10/23	15/11/23	13/12/23	10/01/24	07/02/24	06/03/24	03/04/24	01/05/24	29/05/24
	23/08/23	20/09/23	18/10/23	15/11/23	13/12/23	10/01/24	07/02/24	06/03/24	03/04/24	01/05/24	29/05/24	26/06/24
DA1A Front Gate	4.7	4.7	4.7	4.7	4.8	5.8	5.9	5.9	3.3	3.2	3.1	3.1
D4 Rehab	0.5	0.5	0.5	0.5	0.5	0.6	0.6	0.6	0.7	0.7	0.7	0.7
D5 Bundwall	1.3	1.3	1.5	1.5	2.3	4.1	4.4	4.6	4.8	4.9	5.4	5.9
D6 School	0.7	0.7	0.7	0.7	1.0	1.2	1.2	1.4	1.8	2.0	2.2	2.2
D7 Mulloc Heap	1.9	1.9	1.9	2.0	2.0	2.1	2.2	2.3	2.2	0.8	0.8	0.8

Charts 1 to 4 illustrate the annual average dust deposition results for the reporting periods of 2020 – 2021, 2021 – 2022, 2022 - 2023 and 2023 – 2024 respectively.

## **TEOM PM<sub>10</sub> and TSP**

### **PM<sub>10</sub>**

In accordance with Condition 8 of Schedule 3, DA250-09-01, the concentration of particulates with an aerodynamic diameter less than ten microns (PM<sub>10</sub>) is monitored via the continuous dust monitor (TEOM) near Maroota Public School. The TEOM records data for the whole 360° angles, of which the 270° - 315° quadrant (westerly to north-westerly) indicate potential dust contributions from the Old Northern Road Quarry. Chart 8 illustrates the PM<sub>10</sub> results for this reporting period, in comparison with relevant consent criteria. Charts 5 to 7 show the PM<sub>10</sub> results for the previous reporting periods of 2020 – 2021, 2021 - 2022 and 2022 – 2023 respectively.

No PM<sub>10</sub> exceedances were recorded during this reporting period. The following PM<sub>10</sub> criteria have been complied with:

- EPL 24-hour average PM<sub>10</sub> criteria of 42 µg/m<sup>3</sup>,
- NEPM 24-hour maximum PM<sub>10</sub> criteria of 50 µg/m<sup>3</sup>, and
- Annual average PM<sub>10</sub> criteria of 30 µg/m<sup>3</sup>.

The annual average PM<sub>10</sub> result for this reporting period is 14.6 µg/m<sup>3</sup>.

### **TSP**

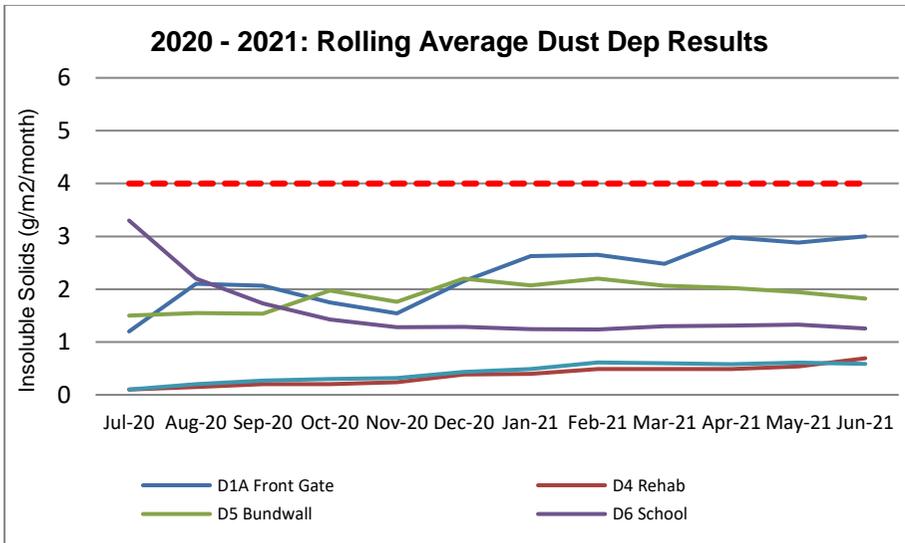
Charts 9 to 12 display TSP results during the 2020 – 2021, 2021 – 2022, 2022 – 2023 and 2023 – 2024 respectively.

No TSP exceedance occurred during this reporting period. The following TSP criteria has been complied with:

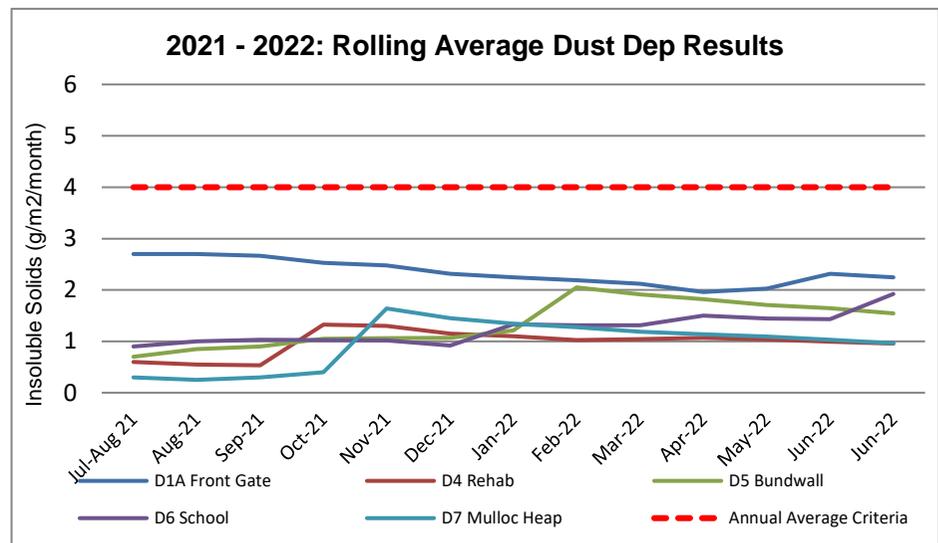
- Annual average TSP criteria of 90 µg/m<sup>3</sup>

The annual average TSP result for this reporting period is 36.6 µg/m<sup>3</sup>.

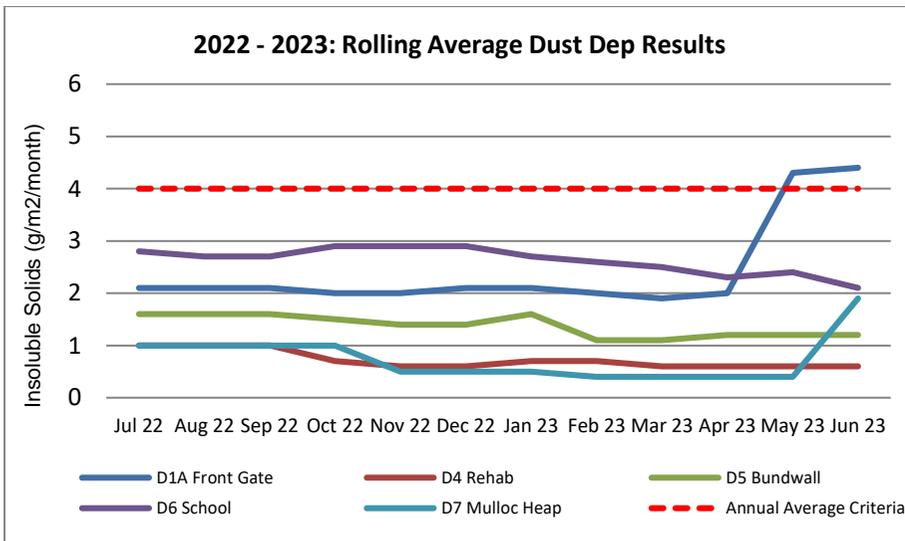
A copy of the full reports containing TEOM, TSP and meteorological data provided by CBased Environmental Pty Ltd are contained in Appendix B.



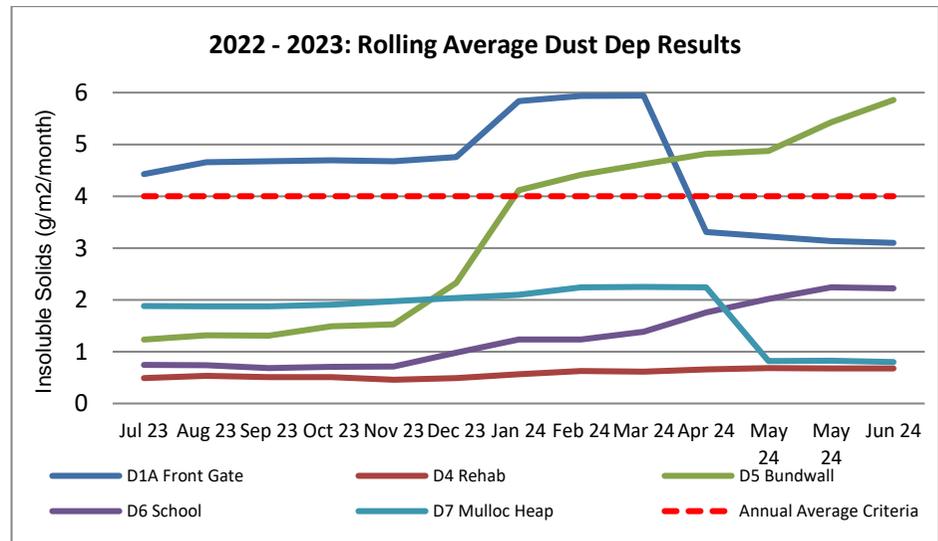
**Chart 1: 2020 - 2021 Rolling Average of Dust Deposition Results**



**Chart 2: 2021 - 2022 Rolling Average of Dust Deposition Results**



**Chart 3: 2022 - 2023 Rolling Average of Dust Deposition Results**



**Chart 4: 2023 - 2024 Rolling Average of Dust Deposition Results**

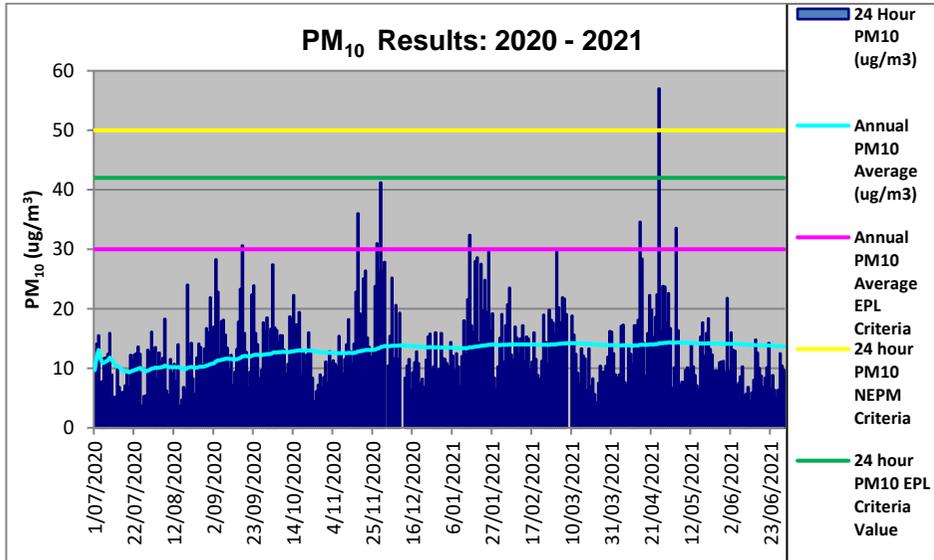


Chart 5: 2020 - 2021 PM10 Results and Criteria

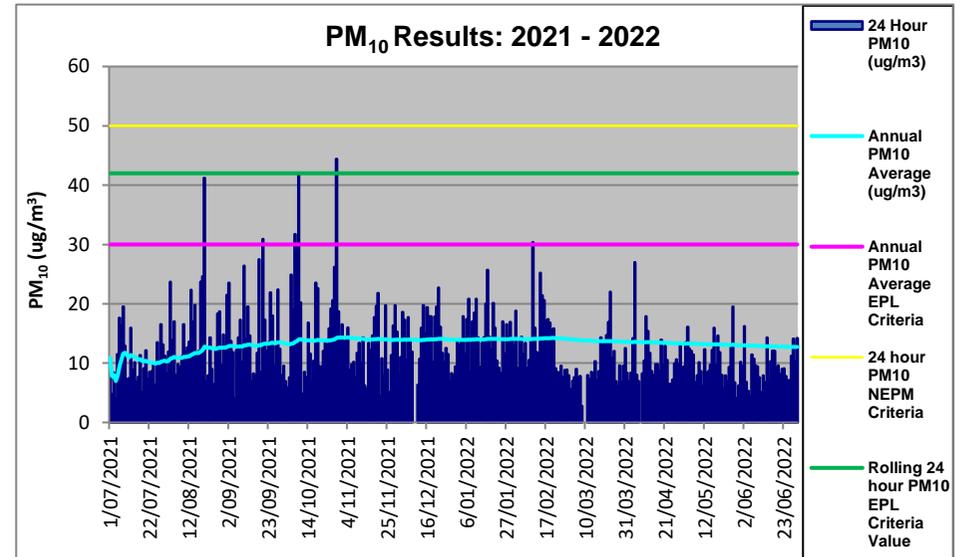


Chart 6: 2021 - 2022 PM10 Results and Criteria

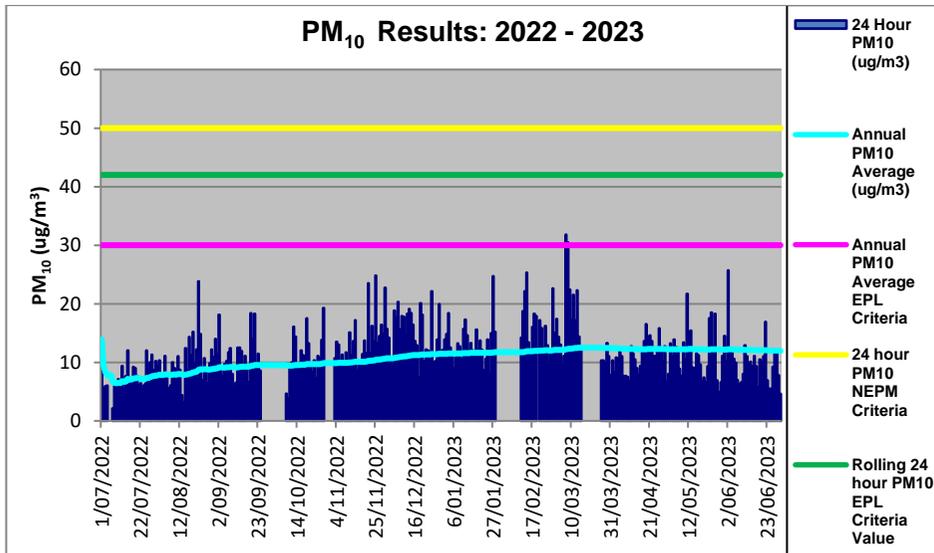


Chart 7: 2022 - 2023 PM10 Results and Criteria

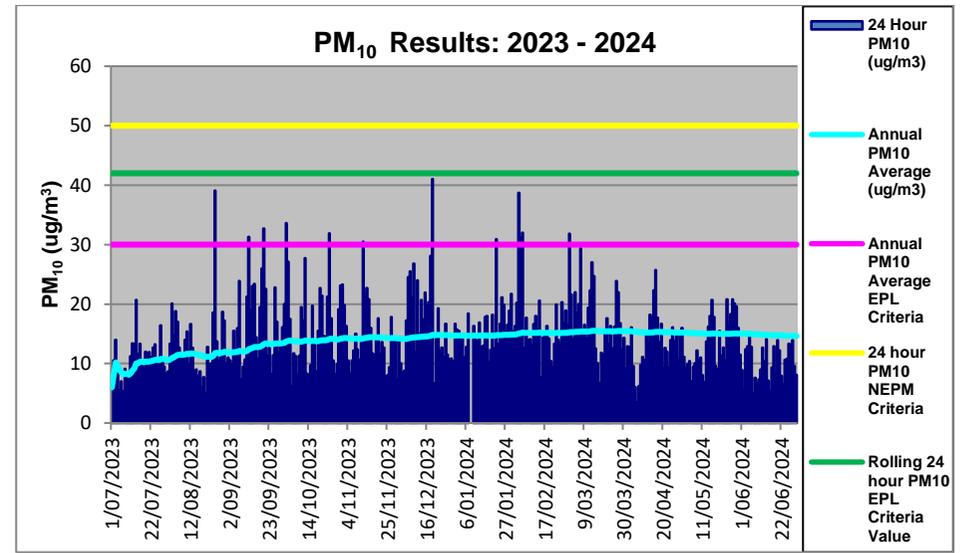


Chart 8: 2023 - 2024 PM10 Results and Criteria

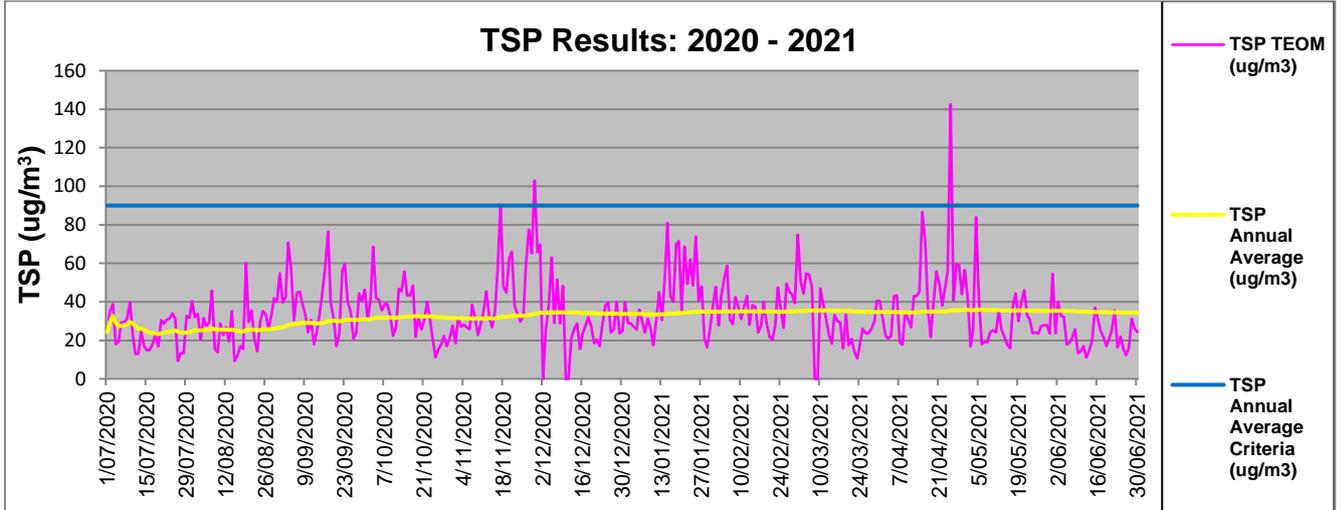


Chart 9: 2020 - 2021 TSP Results and Criteria

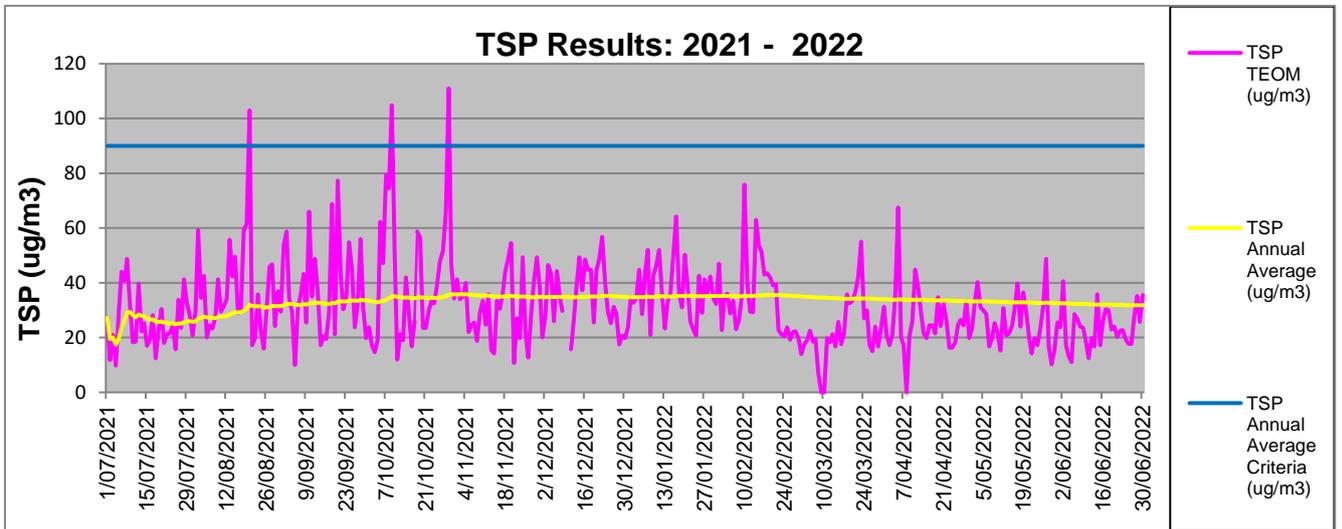


Chart 10: 2021 - 2022 TSP Results and Criteria

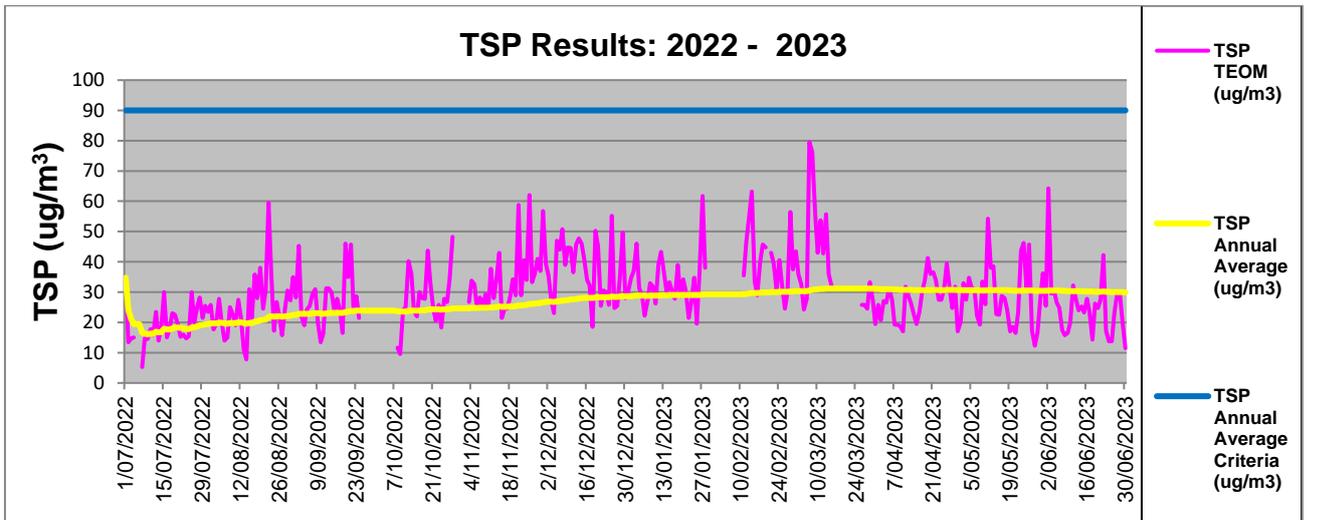


Chart 11: 2022 - 2023 TSP Results and Criteria

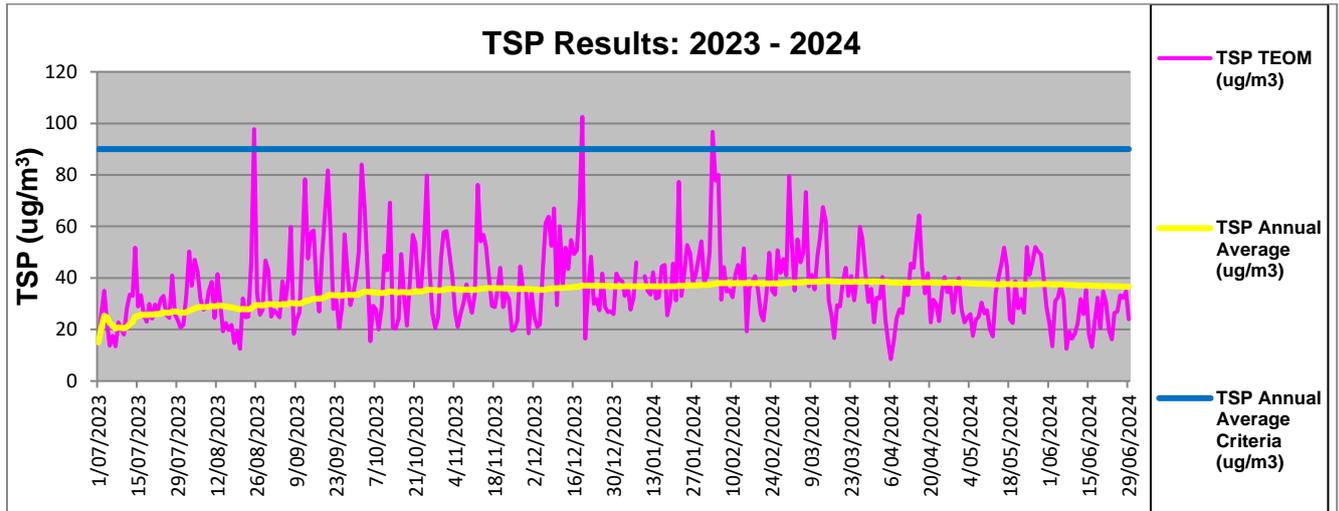


Chart 12: 2023 - 2024 TSP Results and Criteria

### 5.1.4 Analysis

#### Dust Deposition

##### *Reporting Period 2023 – 2024*

Five dust deposition gauges monitor potential dust impacts from the Old Northern Road quarry.

##### **D1A – Front Gate**

Monthly dust deposition result at D1A was exceeded during the 13 December 2023 – 10 January 2024 monitoring period.

Rolling annual exceedances at D1A from 26 July 2023 to 6 March 2024 were due to the previous monthly exceedance reported in the last Annual Review. The flow on effect of rolling annual averages from the last reporting period to this reporting period was previously predicted in the last Annual Review.

##### **D4 – Rehab Area**

All monthly and rolling annual average dust deposition results at D4 were in compliant during the reporting period.

##### **D5 – Bund wall**

Monthly dust deposition results at D5 were exceeded over 6 monitoring periods. The rolling annual average dust deposition results were exceeded over 7 monitoring periods.

##### **D6 - School**

The monthly dust deposition result at D6 was exceeded during the April 2024 monitoring period.

All annual average dust deposition results at D6 were in compliant during the reporting period.

##### **D7 – Mulloc Heap**

All monthly and annual average dust deposition results at D4 were in compliant during the reporting period.

The EIS prepared for the extension of the quarry on Old Northern Road Lots 1 and 2 (ERM, 2001) predicted dust deposition at the nearest receptors to be between 2.2 and 2.9g/m<sup>2</sup>/month. The majority of the monthly dust deposition results at Old Northern Road quarry for the reporting period were within the EIS predicted range of dust levels, with the exception of the following:

- D1A (Front Gate) returned 3.6 g/m<sup>2</sup>/month (26 July – 23 August 2023) and 13.7 g/m<sup>2</sup>/month (13 December 2023 – 10 January 2024) which were attributed to adjacent farming activities,
- D5 (Bund Wall) returned six elevated monthly dust result at 4.5 g/m<sup>2</sup>/month (18 October – 15 November 2023), 11.4 g/m<sup>2</sup>/month (15 November – 13 December 2023), 23.1 g/m<sup>2</sup>/month (13 December 2023 – 10 January 2024), 5.2 g/m<sup>2</sup>/month (10 January – 7 February 2024), 7.2 g/m<sup>2</sup>/month (1 May – 29 May 2024) and 5.8 g/m<sup>2</sup>/month (29 May – 26 June 2024) which were attributed to mainly adjacent farming activities.
- D6 (School) returned elevated monthly results of 3.2 g/m<sup>2</sup>/month (20 September – 18 October 2023), 4.5 g/m<sup>2</sup>/month (18 October – 15 November 2023), 11.4 g/m<sup>2</sup>/month (15 November – 13 December 2023), 23.1 g/m<sup>2</sup>/month (13 December 2023 – 10 January 2024), 5.2 g/m<sup>2</sup>/month (10 January – 7 February 2024), 3.6 g/m<sup>2</sup>/month (7 February – 6 March 2024), 3.1 g/m<sup>2</sup>/month (6 March – 3 April 2024), 7.2 g/m<sup>2</sup>/month (1 May – 29 May 2024) and 5.8 g/m<sup>2</sup>/month (29 May – 26 June 2024).
- D6 (School) returned 3.6 g/m<sup>2</sup>/month (15 November – 13 December 2023), 3.5 (13 December 2023 – 10 January 2024), 4.9 g/m<sup>2</sup>/month (6 March – 3 April 2024), 3.5 g/m<sup>2</sup>/month (3 April – 1 May 2024) and 3.3 g/m<sup>2</sup>/month (1 May – 29 May 2024) which were most likely due to school ground maintenance and the neighbouring property undertaking paddock maintenance in preparation for the annual Maroota Muster event for the school.

### **Historical Data**

It can be seen from Charts 1 to 4 that the majority of the dust deposition results are compliant over the previous 3 years of monitoring.

Historically, the rolling annual averages for D04 (Rehab), D05 (Bundwall), D06 (School) and D07 (Mulloc Heap) have been consistently compliant over the last four reporting periods.

D01 (front gate) was relocated in September 2016 (renamed D01(A)). During the 2020-2021, 2021-2022 and 2022-2023 reporting periods, all monthly and annual average results were generally in compliant, except the anomaly monthly reading of 33.6 g/m<sup>2</sup>/month in May 2023 which was attributed to adjacent farming activities resulting in vast area of exposed ground. This high monthly reading led two rolling annual averages of 4.3 g/m<sup>2</sup>/month and 4.4 g/m<sup>2</sup>/month for May and June 2023. The same high monthly reading led to annual averages being exceeded during this reporting period, and up to March 2024.

During this reporting period, dust results at D4 (Rehab) and D7 (Mulloc Heap) were in compliant.

A number of monthly exceedances at D5 (Bundwall) were attributed to neighbouring farming activity which occurred in the immediate area of the dust gauge.

**PM10**

***Reporting Period 2023-2024***

The EIS predicted a 6<sup>th</sup> highest PM<sub>10</sub> 24-hour average of 42 µg/m<sup>3</sup> and a PM<sub>10</sub> annual average of 7 µg/m<sup>3</sup> (maximum values for 7 discrete receptors modelled). The air quality statement of evidence presented in the Land and Environment Court of NSW for Lots 1 and 2 (ERM, 2003) predicted that the highest 24-hour PM<sub>10</sub> ground level concentration would be 37 µg/m<sup>3</sup> at receptor 3. Consent DA250-09-01 and the Environment Protection Licence subsequently set a maximum rolling 24-hour average of 42 µg/m<sup>3</sup> for the site.

The rolling annual average PM<sub>10</sub> values (light blue line on Chart 8) remained below the EPA long term criteria of 30µg/m<sup>3</sup> (pink line on Chart 8) for this reporting period.

The 24-hour average PM<sub>10</sub> levels (dark blue columns on Chart 8) remained below the 24-hour EPL management level of 42 µg/m<sup>3</sup> (green line on Chart 8) and the 24-hour NEPM short term criteria level of 50 µg/m<sup>3</sup> (yellow line on Chart 8) for the whole duration of this reporting period. No PM<sub>10</sub> exceedances were recorded during this reporting period.

**Table 12: PM10 – EPL and NEPM Management Criteria Exceedance**

Event No.	Exceedance Date	Exceeded PM10	Exceeded criteria (ug/m <sup>3</sup> )	Comment
No PM10 criteria have been exceeded during this reporting period.				

***Historical Data***

It can be seen from Charts 5 to 8 that all the annual average PM<sub>10</sub> results recorded at the TEOM comply with the annual average PM<sub>10</sub> criteria of 30µg/m<sup>3</sup> over the previous four years of annual review reporting.

A number of 24-hour average PM<sub>10</sub> exceedances were recorded over the last four reporting periods with causes attributed to activities not related to quarry operations. Exceedances recorded during the 2019-2020 period were directly influenced by cumulative poor air quality associated with bushfires in the local, and regional and inter-state areas. Exceedances during the 2020-2021 period were attributed to forecasted windy conditions and a number of hazard reduction burns across the region. Exceedance during the 2021-2022 period was associated with forecasted warm and windy conditions together with a local bushfire event occurring in Maroota. There were no 24-hour average PM<sub>10</sub> exceedances during this 2023-2024 reporting period.

The annual PM<sub>10</sub> average for the 2023-2024 reporting period is 14.6 µg/m<sup>3</sup>, which is lower than the EPA criterion of 30µg/m<sup>3</sup> but double of the predicted value of 7 µg/m<sup>3</sup> in the EIS. This annual average is comparable to the recorded historical values of 12.0 µg/m<sup>3</sup> (2022-2023), 12.7 µg/m<sup>3</sup> (2021-2022), 13.7 µg/m<sup>3</sup> (2020-2021) and much lower than the 21.3 µg/m<sup>3</sup> (2019-2020). The cause of the previous higher annual average of recorded 21.3 µg/m<sup>3</sup> (2019-2020) is attributed to higher frequency of extraordinary events such bushfire, hazard reduction burns and hot and gusty weather conditions.

## **Total Suspended Particles**

### **Reporting Period 2023 - 2024**

The Total Suspended Particles (TSP) results are reported in Charts 9 to 12 inclusive. The annual average TSP for this reporting period is 36.6 µg/m<sup>3</sup> which is lower than the annual average TSP criteria of 90 µg/m<sup>3</sup> set out by the consent and EPL. Elevated TSP values were a reflection of high PM10 values.

### **Historical Data**

Reporting of TSP commenced in December 2017. Historical annual average TSP values were 38.3 µg/m<sup>3</sup> (2017-2018), 40.0 µg/m<sup>3</sup> (2018-2019), 53.4 µg/m<sup>3</sup> (2019-2020), 34.3 µg/m<sup>3</sup> (2020-2021), 31.8 µg/m<sup>3</sup> (2021-2022) and 29.9 µg/m<sup>3</sup> (2022-2023). The higher annual average TSP value recorded in 2019-2020 were attributed to cumulative effects of poor air quality associated with bushfires in the local, and regional and inter-state areas.

## **5.1.5 Changes to Environmental Procedures**

Dixon Sand is currently liaising with the EPA regarding the suitability of a number of dust deposition gauges in the air quality monitoring program. The outcome of the review will be implemented, and the Air Quality Management Plan revised accordingly.

## **5.2 Noise Management**

### **5.2.1 Noise Sources and Mitigation Measures**

The objectives, criteria limits, procedures, response, reporting and responsibilities of noise management are contained in the Noise Management Plan.

The following potential sources of noise and mitigation measures at the Old Northern Road have been identified in Table 13.

**Table 13: Potential sources of Noise and mitigation measures.**

<b>Potential Noise Sources</b>	<b>Mitigation Measures</b>
<ul style="list-style-type: none"> <li>• Extraction by bulldozers and excavators;</li> <li>• Moving of materials and stockpiling by dump trucks and excavators;</li> <li>• Truck haulage including bogie trucks, truck and dogs;</li> <li>• Wet/dry processing of sand; and</li> <li>• Ancillary activities including maintenance undertaken in the workshop</li> <li>• Construction/ maintenance of bund walls</li> <li>• Water transfers using pumps</li> </ul>	<ul style="list-style-type: none"> <li>• Construction of noise bunds in strategic locations as stipulated in the EIS/EAs and consent conditions;</li> <li>• Compliance with approved hours of operation;</li> <li>• Regular maintenance of road surfaces, vehicles and equipment to reduce noise emissions; and</li> <li>• Enforcement of speed limits for trucks and limited use of exhaust brakes in residential and school areas.</li> <li>• Enforcement of a 20km/h speed limit on quarry access road and haul roads.</li> <li>• Switch off plant when not in use and use of automatic idle shutdown.</li> </ul>

The Noise Management Plan for Old Northern Road quarry requires attended noise monitoring to be undertaken bi-annually.

## 5.2.2 Compliance Limits

### Noise Criteria

The Old Northern Road noise criteria are listed in Table 14. The approved hours of operation are contained in Table 15. Noise monitoring for the quarry is based on these criteria.

**Table 14: Old Northern Road Noise Criteria.**

Consent Condition	Conditions												
DA250-09-01, Condition 3 of Schedule 3 and	<p>The Applicant must ensure that the noise generated by the development does not exceed the criteria in Table 2 at any residence on privately-owned land or at the Maroota Public School.</p> <p><i>Table 2: Noise criteria dB(A)</i></p> <table border="1" style="width: 100%; border-collapse: collapse; text-align: center;"> <thead> <tr> <th style="background-color: #cccccc;">Receiver</th> <th style="background-color: #cccccc;">Averaging Period</th> <th style="background-color: #cccccc;">Shoulder (6.00 am to 7.00 am)</th> <th style="background-color: #cccccc;">Day (7.00 am to 6.00 pm)</th> </tr> </thead> <tbody> <tr> <td>Any residence on privately owned land</td> <td><i>L<sub>Aeq</sub> (15 minute)</i></td> <td>37</td> <td>44</td> </tr> <tr> <td>Any classroom at Maroota Public School</td> <td><i>L<sub>Aeq</sub> (1 hour)</i></td> <td>-</td> <td>45</td> </tr> </tbody> </table> <p>Noise generated by the development is to be measured in accordance with the relevant requirements and exemptions (including certain meteorological conditions) of the NSW Industrial Noise Policy. Appendix 6 sets out the meteorological conditions under which these criteria apply and the requirements for evaluating compliance with these criteria.</p> <p>However, the noise criteria in Table 2 do not apply if the Applicant has an agreement with the relevant landowner to exceed the noise criteria, and the Applicant has advised the Department in writing of the terms of this agreement.</p> <p><i>Note: Should an agreement with a landowner be terminated for any reason, the Applicant must comply with the noise criteria in Table 2.</i></p>	Receiver	Averaging Period	Shoulder (6.00 am to 7.00 am)	Day (7.00 am to 6.00 pm)	Any residence on privately owned land	<i>L<sub>Aeq</sub> (15 minute)</i>	37	44	Any classroom at Maroota Public School	<i>L<sub>Aeq</sub> (1 hour)</i>	-	45
Receiver	Averaging Period	Shoulder (6.00 am to 7.00 am)	Day (7.00 am to 6.00 pm)										
Any residence on privately owned land	<i>L<sub>Aeq</sub> (15 minute)</i>	37	44										
Any classroom at Maroota Public School	<i>L<sub>Aeq</sub> (1 hour)</i>	-	45										

**Table 15: Old Northern Road Approved Hours of Operation.**

Consent Condition	Condition												
DA250-09-01, Condition 1 of Schedule 3	<p>The Applicant must comply with the operating hours set out in Table 1.</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <caption><i>Table 1: Operating hours</i></caption> <thead> <tr> <th style="background-color: #cccccc;">Activity</th> <th style="background-color: #cccccc;">Permissible Hours</th> </tr> </thead> <tbody> <tr> <td>Quarrying operations (excluding truck arrival, loading and dispatch)</td> <td>7.00 am to 6.00 pm Monday to Saturday At no time on Sundays or public holidays</td> </tr> <tr> <td>Truck arrival (unladen)</td> <td>5.45 am to 6.00 pm Monday to Saturday At no time on Sundays or public holidays</td> </tr> <tr> <td>Truck loading Truck dispatch Truck arrival (laden)</td> <td>6.00 am to 6.00 pm Monday to Saturday At no time on Sundays or public holidays</td> </tr> <tr> <td>Bund construction or rehabilitation works within 250 m of Maroota Public School</td> <td>7.00 am to 6.00 pm Monday to Friday during school holiday periods unless otherwise approved in writing by the EPA</td> </tr> <tr> <td>Maintenance</td> <td>May be conducted at any time, provided that these activities are not audible at any privately-owned residence</td> </tr> </tbody> </table>	Activity	Permissible Hours	Quarrying operations (excluding truck arrival, loading and dispatch)	7.00 am to 6.00 pm Monday to Saturday At no time on Sundays or public holidays	Truck arrival (unladen)	5.45 am to 6.00 pm Monday to Saturday At no time on Sundays or public holidays	Truck loading Truck dispatch Truck arrival (laden)	6.00 am to 6.00 pm Monday to Saturday At no time on Sundays or public holidays	Bund construction or rehabilitation works within 250 m of Maroota Public School	7.00 am to 6.00 pm Monday to Friday during school holiday periods unless otherwise approved in writing by the EPA	Maintenance	May be conducted at any time, provided that these activities are not audible at any privately-owned residence
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Maintenance	May be conducted at any time, provided that these activities are not audible at any privately-owned residence												
DA250-09-01, Condition 2 of Schedule 3	<p>The following activities may be carried out outside the hours specified in condition 1 above:</p> <ul style="list-style-type: none"> <li>(a) delivery or dispatch of materials as requested by the NSW Police Force or other public authorities; and</li> <li>(b) emergency work to avoid the loss of lives, property or to prevent environmental harm.</li> </ul> <p>In such circumstances, the Applicant must notify the Secretary and affected residents prior to undertaking the activities, or as soon as is practical thereafter.</p>												

### 5.2.3 Results

Attended noise monitoring were undertaken in December 2023 and June 2024. Attended noise monitoring was conducted at receivers (where permission to enter the property was granted) and at-source, in accordance with the requirements of the Noise Management Plan. In instances where ambient noise such as road traffic, birds, insects and tree breezes were found to be the dominant noise sources, noise levels were obtained at alternative locations closer to the quarry. Predicted noise levels are then extrapolated from the near-distance location to the sensitive receiver locations.

Quarry operations in December 2023 fell into two categories for main sources of noise during the monitoring period which were:

- sand processing and truck loading (main plant, front end loaders and trucks), and
- pit operations with rock breaking and water pumps.

Quarry operations in June 2024 fell into three categories for main sources of noise during the monitoring period which were:

- sand processing and truck loading (main plant, front end loaders and trucks),
- extraction of bulk sandstone by rock saw, and
- stockpile management with articulated dump trucks.

Results for predicted noise impacts for Old Northern Road quarry undertaken in December 2023 and June 2024 are contained in Tables 16 and 17 respectively.

The full noise monitoring reports for December 2023 and June 2024 are contained in Appendix D.

**Table 16: Extrapolated noise levels for Old Northern Road Quarry, December 2023.**

Receiver	Noise Criteria (dBA)		Extrapolated Day noise level (dBA)	Comment
	Shoulder	Day		
OR1	-	45	42	Predicted levels correlate well with measured levels and all locations shown to meet noise limits during the day period.
OR2	37	44	38	
OR3			38(+5)	
R2			40	
R3			41	
R4/R5			41	

**Table 17: Predicted Noise Impacts for Old Northern Road Quarry, June 2024.**

Receiver	Noise Criteria (dBA)		Extrapolated noise level (dBA)	Comment
	Shoulder	Day		
OR1	-	45	33	Predicted levels correlate well with measured levels and all locations shown to meet noise limits during the day period.
OR2	37	44	36	
OR3			35	
R2			34	
R3			33	
R4/R5			33	

### 5.2.4 Analysis

**Old Northern Road - Attended Noise Monitoring – December 2023**

Attended noise monitoring and modelling results indicate that the Quarry was compliant with the noise criteria for shoulder and daytime operations at all receivers under the meteorological conditions at the time.

**Old Northern Road - Attended Noise Monitoring – June 2024**

Attended noise monitoring and modelling results indicate that the Quarry was compliant with the noise criteria for shoulder and daytime operations at all receivers under the meteorological conditions at the time.

### 5.2.5 Noise Exceedance and Non-Compliance

No noise exceedance or non-compliance have been recorded during this monitoring period.

### 5.2.6 Discrepancies between Predicted and Actual Noise Impacts

Table 18 compares the predicted noise levels contained in the EIS (ERM, 2001) during non-adverse weather with quarry operations in Strip 2 and 3 on Lots 1 and 2. The extrapolated noise levels from December 2023 and June 2024 assessment at the receivers are also presented here for comparison.

Modelled noise impacts contained in the EIS (ERM, 2001) show that a maximum external level of LAeq 36 dB(A) has been calculated for the Maroota Public School (the school) and assuming that internal noise levels are 10 dB less than external noise levels (with windows opened), the predicted internal noise level is approximately 26 dB(A).

Extrapolated December 2023 and June 2024 noise monitoring results at the school (external) yielded noise levels of 33dB(A) and 42 dB(A) respectively. Extrapolated noise monitoring results for residences on Old Northern Road yielded levels between 33 and 38(+5) dB(A) for the biannual monitoring events.

There are minor discrepancies between the predicted and actual noise impacts experienced at the school and residences with higher noise levels extrapolated during the attended noise monitoring. Despite of the higher extrapolated noise levels in December 2023, all noise impacts comply with the daytime noise criteria. Dixon Sand is currently operating and extracting materials in Strip 3 which is east of Strip 2 which was the location used to model predicted impacts in the EIS (ERM, 2001). Therefore, current quarry operations are located closer to the school and receivers, which resulted in the recorded noise levels being higher than the predicted levels. All extrapolated noise levels at the school and residences in June 2024 are lower than the predicted impacts in the EIS. This is likely to be attributed to a reduction in quarry operation during the time of the monitoring.

**Table 18: Comparison of predicted and actual noise impacts, December 2023 and June 2024.**

Receptor	EIS (ERM, 2001) Predicted Daytime Noise Levels LAeq (dB(A))	Daytime Noise Criteria LAeq (dB(A))	December 2023 Daytime Noise Levels	June 2024 Daytime Noise Levels	Compliance with Daytime Noise Criteria
R1	43	44	N/M	N/M	Yes
R2	40	44	40	34	Yes
R3	37	44	41	33	Yes
R4	35	44	41	33	Yes
R5	34	44	41	33	Yes
R6 (OR3)	N/A	44	38(+5)	35	Yes
School Building 1 (OR1)	36 (external) ~26 (internal)	45	42	33	Yes
School Building 2	35 (external) ~25 (internal)				

Note: N/A – R6 residential building constructed after the EIS (ERM, 2001)

N/M – R1 noise levels not measured due to existing Noise Agreement between Accurso and Dixon Sand.

### 5.2.7 Noise Trend

As quarry operations progress eastwards on Lots 1 and 2 towards Maroota Public School and other identified private residences, noise levels are expected to increase as a result of reduced proximity between machinery and noise receivers.

Charts 13 to 18 illustrate the long-term trend in noise monitoring levels for Maroota Public School and residences on Old Northern Road. Noise monitoring was undertaken during the period 2003 to 2007 however data has been omitted from this trending analysis due to the monitoring locations differing from the locations identified in the current Noise Management Plan.

It can be seen from Chart 13 that quarry noise level fluctuations occurred at Maroota Public School over the fifteen-year period, with a general increasing trend with daytime noise level peaking in December 2019 at LAeq15 45 dB(A) and June 2021 at LAeq15 46 dB(A). Since 2021, noise levels measured at the school have been compliant, remaining below the noise criteria of 45 dB(A). Extrapolated noise monitoring results at the school in December 2023 and June 2024 are LAeq15 of 42 dB(A) and LAeq15 of 33 dB(A), respectively.

Chart 14 provides long-term data for receiver OR2 at 4624 Old Northern Road. Fluctuations in daytime and shoulder noise levels can be observed with reduced daytime noise levels were recorded between December 2011 to May

2014, possibly a consequence of reduced quarry activities on Lots 29 and 196. From December 2014 to June 2021, a general increasing daytime noise levels trend can be observed, with noise levels ranging from LAeq15min 34.1 to 45 dB(A). From June 2021 to June 2024 there is a declining trend in daytime noise levels.

Charts 16 and 17 display an increasing trend in quarry noise levels at receivers R2 and R3 from December 2018 to December 2020 (R2) and December 2021 (R3), peaking at LAeq15 44 dB(A). A declining trend in noise levels can be observed since the peak.

Chart 15 shows long term trend at receiver OR3 (R6) ranging between LAeq15 35 and 46 dB(A).

Chart 18 shows long term trend at receiver R4/5 with an increasing trend in noise levels from December 2018, peaking at LAeq15 45 dB(A) in June 2021. A declining trend in noise levels can be noted since June 2021.

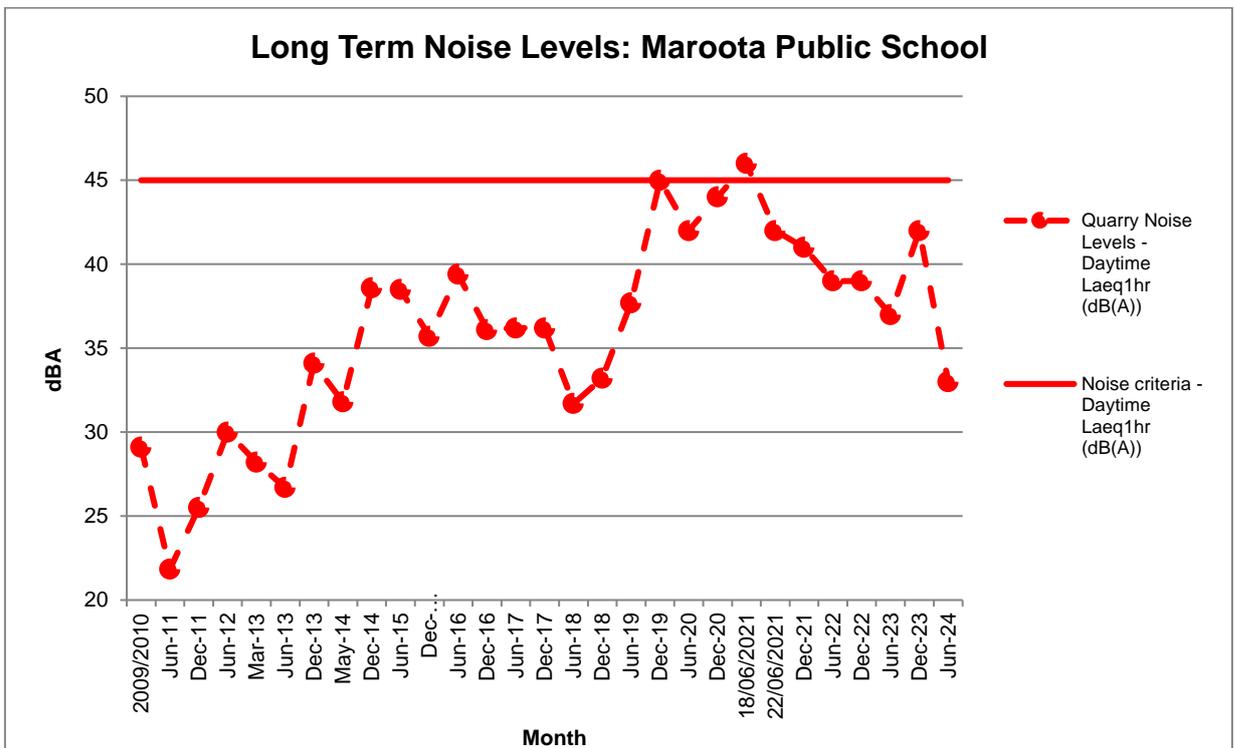


Chart 13: Long term noise trend – Maroota Public School

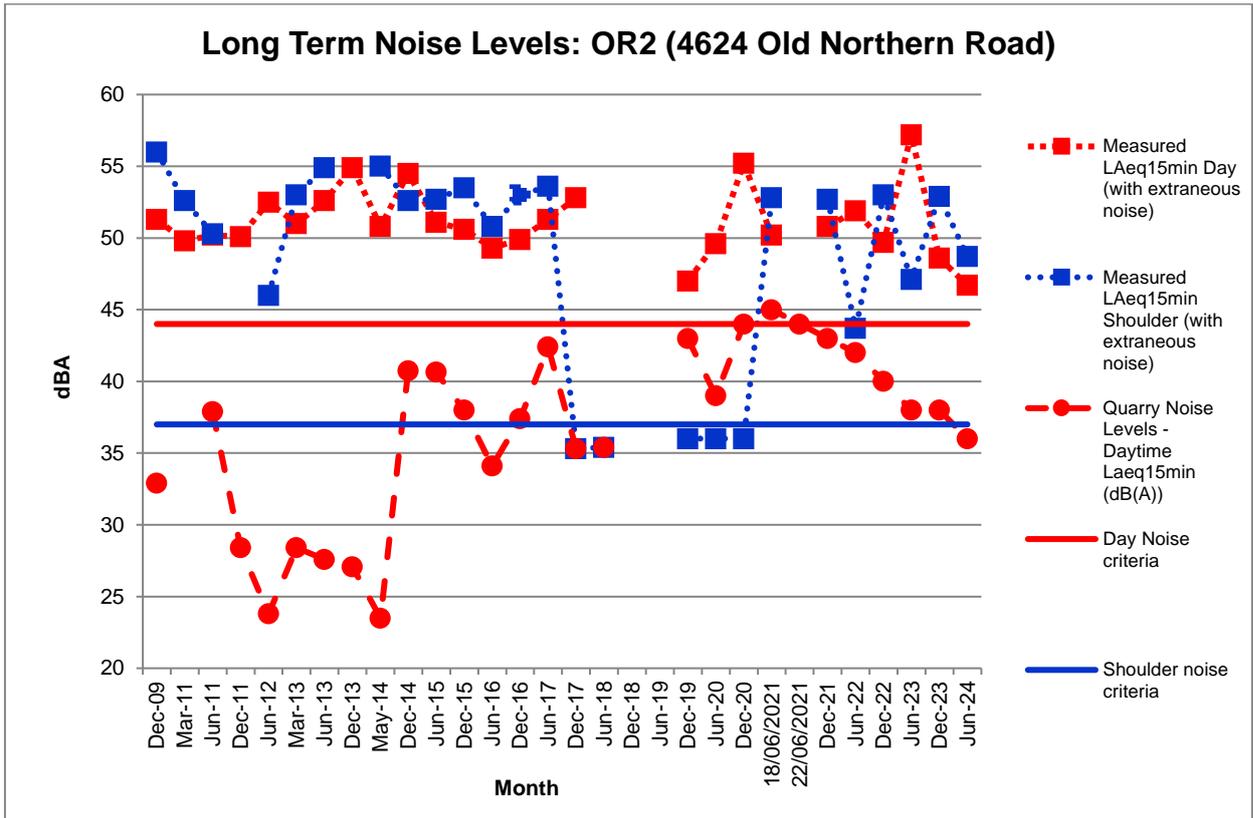


Chart 14: Long term noise trend – OR2 (No. 4624 Old Northern Road)

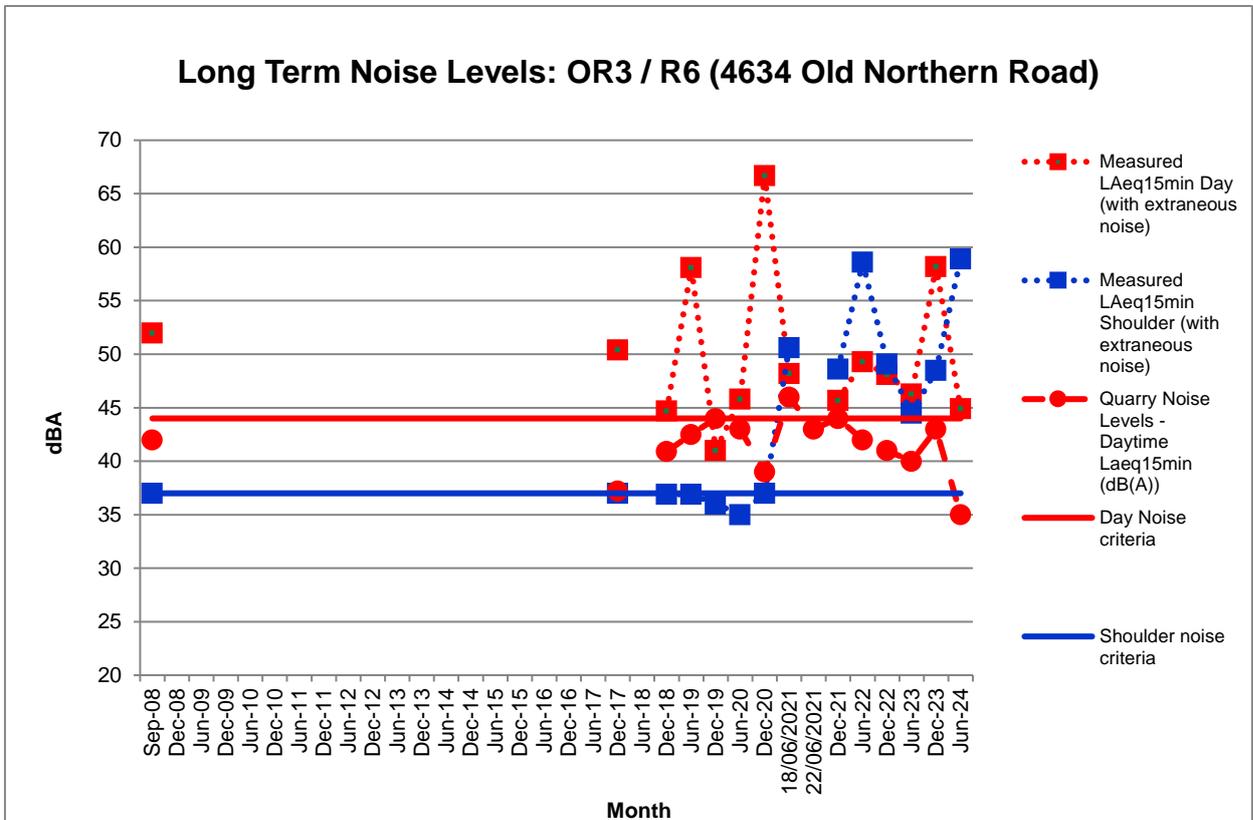


Chart 15: Long term noise trend – OR3/R6 (No. 4634 Old Northern Road)

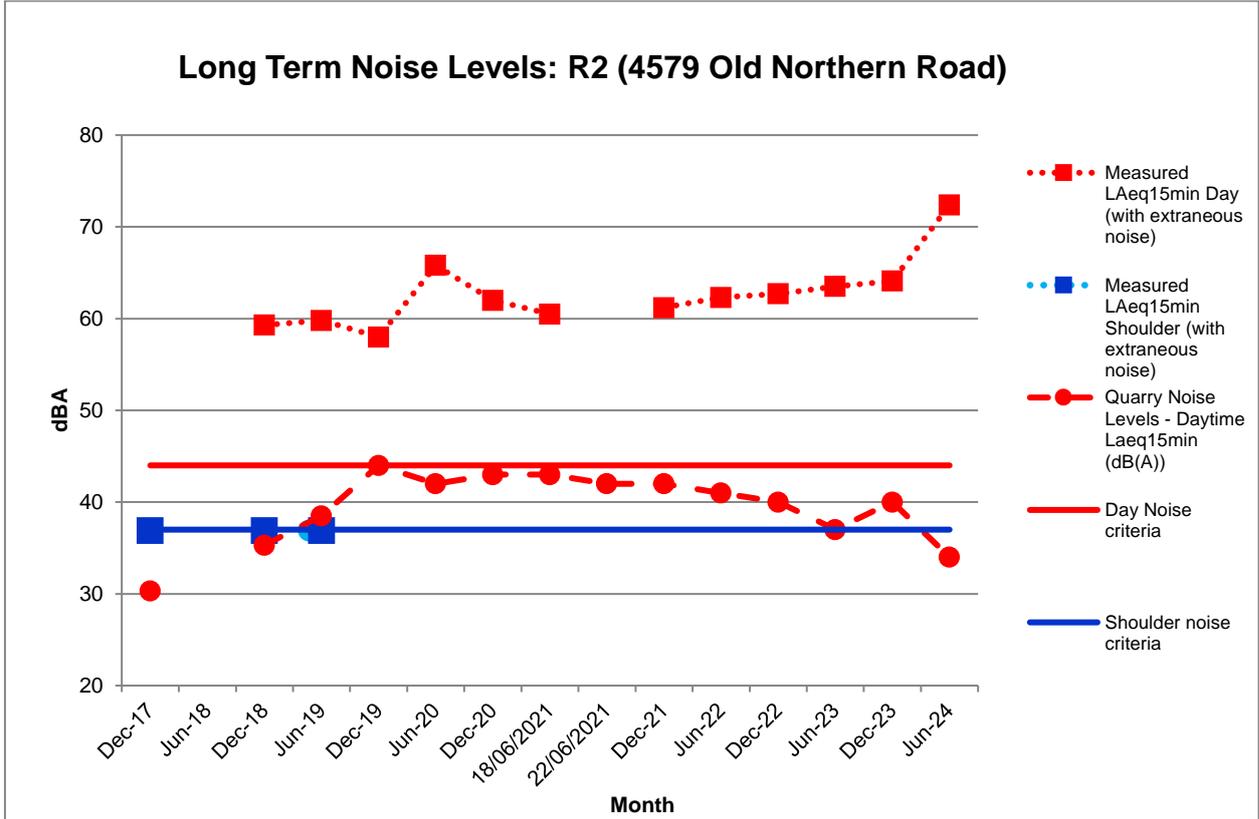


Chart 16: Long term noise trend – R2 (No. 4579 Old Northern Road)

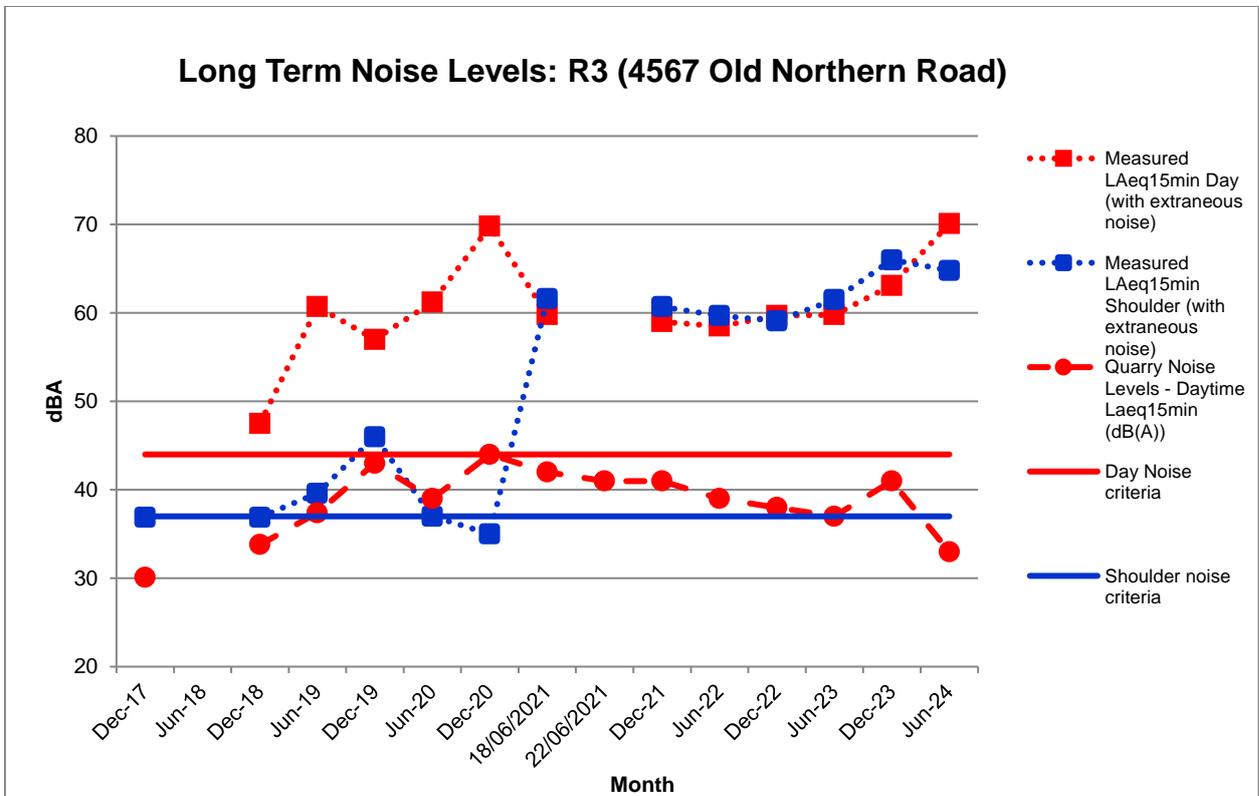


Chart 17: Long term noise trend – R3 (No. 4567 Old Northern Road)

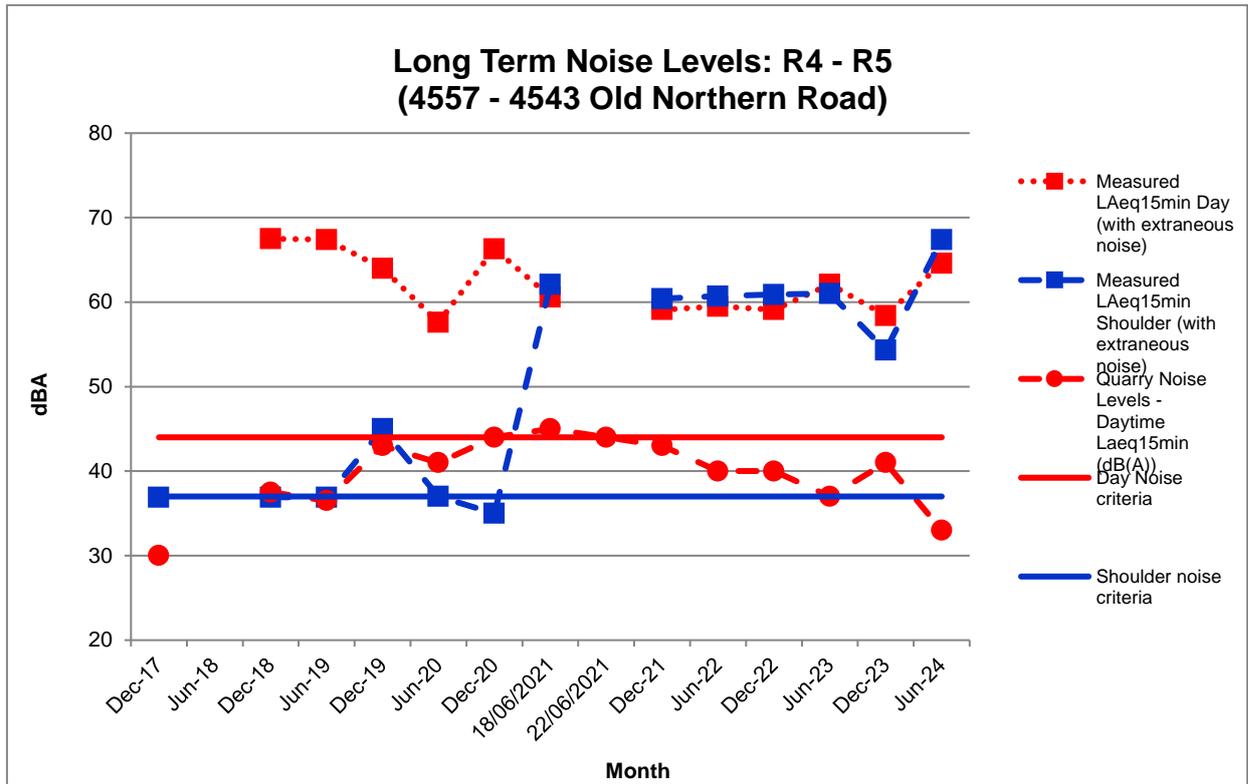


Chart 18: Long term noise trend – R4/R5 (No. 4634 Old Northern Road)

### 5.2.8 Changes to Environmental Procedures

There are no proposed changes to the noise procedures as a result of noise compliance during this reporting period.

Dixon Sand is required to construct a noise bund within the 250m buffer to the Maroota Public School prior to commencing extraction in Strip 4 on Lots 1 and 2. Any construction or maintenance of noise bund walls are to be carried out in accordance with the strategies outlined in the Old Northern Road Noise Management Plan. Should vegetation clearing be required for the bund construction, undertake vegetation clearing in accordance with the pre-clearing procedures. Construction of the noise bund for the 250m buffer to the Maroota Public School is anticipated to be undertaken during the next reporting period.

Continue to undertake attended noise monitoring in accordance with the Noise Management Plan.

## 5.3 Traffic and Transport

### 5.3.1 Ongoing Management Measures

#### Vehicle Movements

Vehicle movement records have been sent to Council on a monthly basis and Section 94 Contribution payments made. There were no exceedances of permitted vehicle movements during the reporting period.

#### Monthly Inspections

Observations of road conditions and maintenance requirements are inclusive in the monthly site inspection checklists. An example of the monthly site inspection checklist is attached in Appendix E.

#### Community Liaison

Liaison between Dixon Sand and the representative of Maroota Public School is conducted on a regular basis during the Community Consultative Committee meetings which are held bi-annually. Details of the CCC meetings and community engagement and contributions are discussed further in Section 8.

### 5.3.2 Traffic Related Complaints

No traffic related complaint was received for Old Northern Road Quarry during the 2023 – 2024 reporting period.

Please note that Dixon Sand has no jurisdiction over haulage trucks outside the quarry premise as these are not contracted or owned by Dixon Sand. The enforcement of truck noise compliance rests with TfNSW and the EPA. Dixon Sand is restricted by its legal jurisdiction in prohibiting the use of the trucks' safety features such as engine braking. Dixon Sand however is committed to assisting in the education campaign through induction, traffic management policies and inter-pit agreement.

A copy of the complaints register containing the complaints summary during the reporting period is attached in Appendix K.

**Table 19: Traffic Complaints, recommended action(s) and outcome**

Old Northern Road Quarry
Complaint Details
Dixon Sand did not receive any traffic related complaints during this reporting period.

### 5.3.3 Compliance

Assessment of compliance against the relevant conditions is summarised in Table 20.

**Table 20: Road and Traffic Compliance.**

DA250-09-01 (Mod 5)	Condition	Compliance	Comments															
Condition 5(b) of Schedule 2	continue to receive and process extractive material from Haerses Road Sand Quarry, and dispatch quarry products from the site, until 14 February 2046.	Yes	Material transported from Haerses Road to Old Northern Road during this reporting period.															
Condition 7 of Schedule 2	Truck movements at the site (i.e. one-way trip, either arrival or dispatch), including truck movements between the site and the Haerses Road Sand Quarry, must not exceed: (a) 180 per day; and (b) 40 between 5.45 am and 7.00 am.	Yes	Maximum recorded daily truck movements were <b>176 in and out bound</b> . Maximum number of morning trucks was <b>34 in and out bound</b>															
Condition 12 of Schedule 2	The Applicant must pay Council an annual financial contribution toward the maintenance of local roads used for haulage of quarry products. The contribution must be determined in accordance with The Hills Shire Council Contributions Plan No. 6 Extractive Industries, or any subsequent relevant contributions plan adopted by Council.	Yes	Refer to Appendix I for S.94 contribution (example)															
Condition 1 of Schedule 3	The Applicant must comply with the operating hours set out in Table 1.	Yes	Refer to truck records															
<p><i>Table 1: Operating hours</i></p> <table border="1"> <thead> <tr> <th>Activity</th> <th>Permissible Hours</th> </tr> </thead> <tbody> <tr> <td rowspan="2">Quarrying operations (excluding truck arrival, loading and dispatch)</td> <td>7.00 am to 6.00 pm Monday to Saturday</td> </tr> <tr> <td>At no time on Sundays or public holidays</td> </tr> <tr> <td rowspan="2">Truck arrival (unladen)</td> <td>5.45 am to 6.00 pm Monday to Saturday</td> </tr> <tr> <td>At no time on Sundays or public holidays</td> </tr> <tr> <td rowspan="2">Truck loading Truck dispatch Truck arrival (laden)</td> <td>6.00 am to 6.00 pm Monday to Saturday</td> </tr> <tr> <td>At no time on Sundays or public holidays</td> </tr> <tr> <td>Bund construction or rehabilitation works within 250 m of Maroota Public School</td> <td>7.00 am to 6.00 pm Monday to Friday during school holiday periods unless otherwise approved in writing by the EPA</td> </tr> <tr> <td>Maintenance</td> <td>May be conducted at any time, provided that these activities are not audible at any privately-owned residence</td> </tr> </tbody> </table>				Activity	Permissible Hours	Quarrying operations (excluding truck arrival, loading and dispatch)	7.00 am to 6.00 pm Monday to Saturday	At no time on Sundays or public holidays	Truck arrival (unladen)	5.45 am to 6.00 pm Monday to Saturday	At no time on Sundays or public holidays	Truck loading Truck dispatch Truck arrival (laden)	6.00 am to 6.00 pm Monday to Saturday	At no time on Sundays or public holidays	Bund construction or rehabilitation works within 250 m of Maroota Public School	7.00 am to 6.00 pm Monday to Friday during school holiday periods unless otherwise approved in writing by the EPA	Maintenance	May be conducted at any time, provided that these activities are not audible at any privately-owned residence
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Maintenance	May be conducted at any time, provided that these activities are not audible at any privately-owned residence																	
Condition 2 of Schedule 3	The following activities may be carried out outside the hours specified in condition 1 above: (a) delivery or dispatch of materials as requested by the NSW Police Force or other public authorities; and (b) emergency work to avoid the loss of lives, property or to prevent environmental harm.	Yes	Condition not triggered															

DA250-09-01 (Mod 5)	Condition	Compliance	Comments
Condition 21 of Schedule 3	The Applicant must keep accurate records of all laden truck movements to and from the site (including time of arrival and dispatch) and publish a summary of records on its website every 6 months.	Yes	Refer to Summary Truck Record on Dixon Sand's website: <a href="http://www.dixonsand.com.au/environment">http://www.dixonsand.com.au/environment</a>
Condition 22 of Schedule 3	The Applicant must: (a) advise its drivers and its clients not to arrive at the site prior to 5:45 am on any day; (b) ensure that all laden trucks have their loads covered when arriving at or leaving the site; (c) ensure that all laden trucks are cleaned of material that may fall from vehicles, before leaving the site; and (d) use its best endeavours to ensure that appropriate signage is displayed on all trucks used to transport product from the development so they can be easily identified by road users.	Yes	Requirements outlined in the Traffic Management Plan
Condition 2 of Schedule 3	The Applicant must prepare a Traffic Management Plan for the development to the satisfaction of the Secretary. This plan must: (a) be prepared in consultation with the RMS and Council; (b) be submitted to the Secretary for approval within 3 months of the approval of Modification 5, unless otherwise agreed by the Secretary; (c) describe the processes in place to control the arrival and dispatch of trucks; (d) include a Drivers' Code of Conduct that details the safe and quiet driving practices that must be used by drivers travelling to and from the site, particularly in the vicinity of the Maroota Public School; (e) describe the measures to be put in place to ensure compliance with the Drivers' Code of Conduct; (f) include specific measures to minimise the impact of heavy vehicles, including restrictions on routes and times (particularly in relation to peak hours, holiday periods and times immediately before and after school hours, i.e. 8.30 am – 9.00 am and 3.00 pm – 3.30 pm); and (g) propose measures to minimise the transmission of dust and tracking of material onto the surface of the public road from vehicles leaving the quarry.  The Applicant must implement the approved Traffic Management Plan as approved by the Secretary.	Yes	Refer to the Traffic Management Plan

### 5.3.4 Analysis

The production and truck movement data outlined above is evidence that Dixon Sand has operated in compliance with the consent conditions during the 2023 – 2024 reporting period. In addition, the Quarry did not receive any traffic related complaints during this reporting period.

### 5.3.5 Findings and Effectiveness of Traffic Management

Current traffic management and mitigation measures are being implemented through Old Northern Road Quarry Traffic Management Plan (TMP). The mitigation measures listed in Table 5.1 in the TMP are categorised into three main categories: (1) truck movement measures, (2) site operational control measures and (3) transport related consultation measures.

During the period of this Annual Review, the adopted mitigation measures have been effective in managing traffic on the quarry premise. Restrictions on number of truck movements to and from site during morning and daytime period have been complied with. All haulage truck operators have been inducted onto site and a record maintained.

During induction, the haulage truck operators were provided with a copy of the following documents:

- Site Traffic Management Plan - outlining specific requirements the responsibilities and requirements,
- Quarry Premise Map - showing traffic flow directions,
- Maroota Local Traffic Management Policy - outlining the inter-pit agreement between the three signatories of local quarries, and
- Site Induction Declaration – declaration to be made and signed by haulage truck operators confirming induction requirements.

The implemented mitigation measures and educational campaign increases awareness and emphasises the importance of traffic related compliance. This has proven to be effective as there is a decreasing trend in the number of traffic related complaints over the last four reporting years, as discussed in later Section 8.3.

### 5.3.6 Additional Management Controls

No additional management controls identified.

### 5.3.7 Changes to Environmental Procedures

No changes to the environmental procedures are proposed or deemed necessary for road and traffic management.

## 5.4 Waste Management

### 5.4.1 Waste Generation, Disposal and Recycling

Dixon Sand manages a number of waste streams at the Old Northern Road Quarry.

During the reporting period, waste oil and grease were removed from the quarry by a licensed contractor for processing and disposal. Scrap metals were transported by a licensed waste transporter and recycled at a licensed metal recycling facility.

Glass, paper, cardboard and plastic (general solid waste – non-putrescible) were recycled via Council’s fortnightly scheduled bin collection service. Food waste and other general solid waste (putrescible) were disposed of and collected via Council’s weekly scheduled bin collection. Other bulky waste associated with the workshop activities was disposed of in skip bins and transported offsite by a licensed waste transporter. Used printer ink cartridges were disposed of at the designated drop off bin at the Post Office or Officeworks. Coffee pods were returned to the manufacturer to composting and package recycling.

No building or putrescible wastes have been disposed of at the site.

The amount of waste transported off site from the Old Northern Road to be recycled, processed and disposed of during the monitoring period is contained in Table 21. The waste tracking register is contained in Appendix L.

**Table 21: Old Northern Road – Total waste generated on site, July 2023 to June 2024.**

Waste Type	Disposal / Recycling / Processing	Amount of Waste Generated
General Solid Waste - Putrescible	The Hills Shire Council Waste Contractor weekly bin collection (3 x 240L Red bin)	Approx. 38 m <sup>3</sup>
General Solid Waste - Recyclables	The Hills Shire Council Waste Contractor fortnightly bin collection (2 x 240L Yellow bin)	Approx. 12 m <sup>3</sup>
Scrap Metals	Recycled by Westland Metals	79 tonnes
Non-putrescible waste from workshop	Skip Bins provided and picked up by Asquith Mini Skips	48m <sup>3</sup>
Hydrocarbon waste	Collected and transported by Grease Eater	3,900 litres
Liquid Waste (waste oil)	Collected and transported by ABC Waste Oil Collection	8,700 litres
Ink Cartridge	Drop off at Post Office or Officeworks	0.1 m <sup>3</sup>
Coffee Pods	Returned to supplier for composting and package recycling	< 0.1 m <sup>3</sup>
Sewerage waste	Treated by onsite envirocycle unit	As per specification

### 5.4.2 Waste Importation

DA 250-09-01 does not permit any importation of waste onto the quarry premise.

### 5.4.3 Changes to Environmental Procedures

No changes to the waste management procedure are proposed for the next 2024 - 2025 reporting period.

Continued efforts to minimise waste generation and maximise recycling and reuse of materials are to be undertaken such as labelling of bins for effective waste segregation, waste reduction posters and toolbox talks to raise awareness.

## 6. Water Management

### 6.1 Monitoring and Compliance Limits

DA250-09-01 Modification 4 required Dixon Sand to install and monitor 2 additional monitoring bores. Installation and commencement of monitoring of these two additional bores occurred in September 2015.

#### 6.1.1 Groundwater Levels and Criteria / Trigger Levels

Groundwater levels for the Old Northern Road Quarry have been measured on a monthly basis. The groundwater monitoring system comprised initially of five boreholes in 2003. Five additional boreholes were installed and monitored monthly since June 2011. Borehole MW4 has been decommissioned as the area is now under extraction. Boreholes BH8 and BH9 have been installed on Lot 2 to satisfy Condition 3.25 of Schedule 2, DA250-09-01 (Modification 4). Borehole BH2 was damaged in December 2019 due to vehicle strike and therefore monitoring has been suspended until the monitoring well is rectified.

Borehole locations are listed in Table 22.

**Table 22: Boreholes for groundwater monitoring at the Old Northern Road quarry.**

Monitoring Bore	Location Reference	Aim of Monitoring
MW1	Quarry Lot 2, southern boundary	Localised perched aquifer
MW2	Quarry Lot 1, west of existing house	Localised perched aquifer
MW3	DS2, northern boundary of Quarry Lot 1	Localised perched aquifer
MW4*	DS3, western boundary of Quarry Lot 2 –	Localised perched aquifer
MW5	Quarry Lot 196, south of main dam	Localised perched aquifer
BH1	Western boundary of Quarry Lot 196	Sydney Basin Central Groundwater Source
BH2	Located in Lot 1, DP204159	Sydney Basin Central Groundwater Source
BH3	Located in Lot 1, DP204159	Sydney Basin Central Groundwater Source
BH6	Northern boundary of Quarry on Lot 1	Sydney Basin Central Groundwater Source
BH7	Southern boundary of Quarry on Lot 2	Sydney Basin Central Groundwater Source
BH8	Within the 100m buffer to MTSGS on Lot 2	Localised perched aquifer
BH9	Within the 100m buffer to MTSGS on Lot 2	Sydney Basin Central Groundwater Source

*Note: MW4\* decommissioned due to its location being in the active extraction area.*

The baseline groundwater level statistics with the 20<sup>th</sup> and 80<sup>th</sup> percentile results are listed in Table 23.

**Table 23: Baseline Groundwater Level Statistics and Trigger Values (2003 – 2020)**

<b>Monitoring Bore</b>	<b>Minimum</b>	<b>20<sup>th</sup> Percentile</b>	<b>50<sup>th</sup> Percentile</b>	<b>80<sup>th</sup> Percentile</b>	<b>Maximum</b>
MW1	173.1	176.0	177.5	178.3	180.0
MW2	191.2	194.3	199.0	200.3	202.1
MW3	173.6	175.1	177.4	178.4	180.3
MW5	158.4	162.1	162.6	162.9	164.0
BH1	106.1	106.2	106.2	107.1	107.5
BH2	162.1	165.0	165.0	166.7	167.9
BH3	158.1	160.5	161.0	161.7	162.1
BH6	161.7	164.1	164.7	165.5	166.2
BH7	157.0	160.0	160.4	161.2	162.1
BH8	189.2	189.5	189.8	189.9	190.3
BH9	157.8	161.3	163.0	163.8	164.4

### 6.1.2 Groundwater Quality and Criteria / Trigger Levels

The Soil and Water Management Plan requires groundwater quality sampling to be undertaken on a 6-monthly basis. Groundwater quality sampling was undertaken in December 2023 and June 2024. Groundwater samples were obtained and sampled by a NATA qualified laboratory for analysis of electrical conductivity, total suspended solids and turbidity. pH measurements were taken in the field due to short sample holding time. Table 24 contains that baseline groundwater quality statistics and trigger values.

**Table 24: Baseline Groundwater Quality Statistics and Trigger Values (2010 – 2020)**

Monitoring Bore	pH			Electrical Conductivity ( $\mu\text{S}/\text{c}$ )		
	20th Percentile	50th Percentile	80th Percentile	20th Percentile	50th Percentile	80th Percentile
MW1	4.0	4.1	4.6	206	249	271
MW2	3.7	3.9	4.5	239	560	618
MW3	5.2	5.6	6.1	129	141	160
MW5	4.4	5.1	5.4	135	151	213
BH1	6.0	6.1	6.6	161	185	214
BH2	4.9	5.7	7.1	262	293	325
BH3	5.9	6.0	6.9	176	186	269
BH6	5.2	5.5	5.8	120	127	156
BH7	4.4	4.8	5.8	242	252	258
BH8	3.9	4.0	4.1	267	278	291
BH9	5.4	5.5	5.6	262	269	275

### 6.1.3 Surface Water Monitoring and Discharge Event

Condition M2.3 of EPL 3916 requires Dixon Sand to monitor (by sampling and obtaining results by analysis) the concentration of the pollutants utilising the specified methodology, units of measure and sampling frequency outlined in Table 25. Water discharged at the main storage dam weir must meet these criteria outlined in the EPL 3916. Water sampling at the EPA licensed discharge point is to be obtained and analysed against the criteria in Condition L2.4 of EPL 3916 prior to being discharged from the main water storage dam, as listed Table 26.

**Table 25: EPL 3916 Surface water sampling requirement at LDP01.**

Pollutant	Units of Measure	Frequency	Sampling Method
pH	pH	Daily during any discharge	Grab sample
Total Suspended Solids	Milligrams per litre	Daily during any discharge	Grab sample
Turbidity	Nephelometric turbidity units	Daily during any discharge	Grab sample

**Table 26: EPL 3916 Surface water discharge criteria.**

Pollutant	Units of Measure	100 <sup>th</sup> Percentile concentration limit
pH	pH	4.5 – 6.5
Total Suspended Solids	milligrams per litre	50

## 6.2 Extraction Limits

### Old Northern Road Extraction Limits

Extraction limits for the Old Northern Road quarry are defined by DA250-09-01 and listed in Table 27 below.

**Table 27: Old Northern Road Quarry Extraction limits**

DA250-09-01 Conditions	Extraction limit
Condition 17 of Schedule 2	Extraction below a depth of 15.24 m below original ground level is restricted to Lot 196 DP 752025 within the hatched area shown in the figure in Appendix 2 and to a depth not greater than 127.5 m AHD.
Condition 18 of Schedule 2	Extraction on Lot 29 DP 752025 is limited to a depth not greater than 15.24 m below original ground level.
Condition 19 of Schedule 2	Extraction on Lots 1 and 2 DP 547255, with the exception of the MTSGS buffer zone, is limited to a depth not greater than 170 m AHD in the east, gradually reducing to 153 m AHD in the west, and as shown conceptually in the figure in Appendix 4.
Condition 20 of Schedule 2	The Applicant must ensure that no extraction occurs with 2 m of the highest recorded wet weather groundwater level within the MTSGS buffer zone.
Condition 21 of Schedule 2	The Applicant must: <ul style="list-style-type: none"> <li>(a) establish the highest recorded wet weather groundwater level within the MTSGS buffer zone based on all available (and at least 12 months) site specific groundwater monitoring data;</li> <li>(b) engage a suitably qualified and experienced expert to establish the maximum depths to which extraction can be undertaken within the MTSGS buffer zone to comply with condition 20 above; and</li> <li>(c) submit a Maximum Extraction Depth Map (contour map or similar) for the development, which demonstrates compliance with conditions 17 to 20 above (inclusive), to the Secretary for approval within 3 months of the approval of Modification 5.</li> </ul>
Condition 22 of Schedule 2	The Applicant must comply with the extraction depths specified in the Maximum Extraction Depth Map to the satisfaction of the Secretary.

Notwithstanding Condition 17 of Schedule 2 of DA250-09-01, Licence 627635 was granted by Department of Planning, Industry and Environment (Crown Lands) and commenced on 4<sup>th</sup> June 2021 permitting Dixon Sand to undertake extraction of the area hatched on Lot 196 (Appendix 2 of DA 250-09-01) beyond the depth of 15.24 m below original ground level.

## 6.3 Results

### 6.3.1 Groundwater Levels

Chart 19 depicts the long term recorded groundwater levels, with monitoring commencing in June 2003. Charts 20 to 30 (inclusive) illustrate the groundwater levels for all monitoring bores for this reporting period.

### 6.3.2 Groundwater Quality

Chart 31 displays the long-term pH results for all monitoring bores from June 2010 to June 2024. Charts 32 to 42 (inclusive) show the pH results and trigger values for each bore for this reporting period.

Chart 43 presents the long-term electrical conductivity results for all monitoring bores from June 2010 to June 2024. Charts 44 to 54 (inclusive) show the electrical conductivity results and trigger values for each bore for this reporting period.

### 6.3.3 Surface Water Monitoring

Charts 55 to 58 (inclusive) illustrate the pH, electrical conductivity, turbidity and total suspended solids of the water samples obtained from the surface monitoring location SW19.

### 6.3.4 Water Discharge Events

No scheduled water discharge at LDP01 occurred during this reporting period.

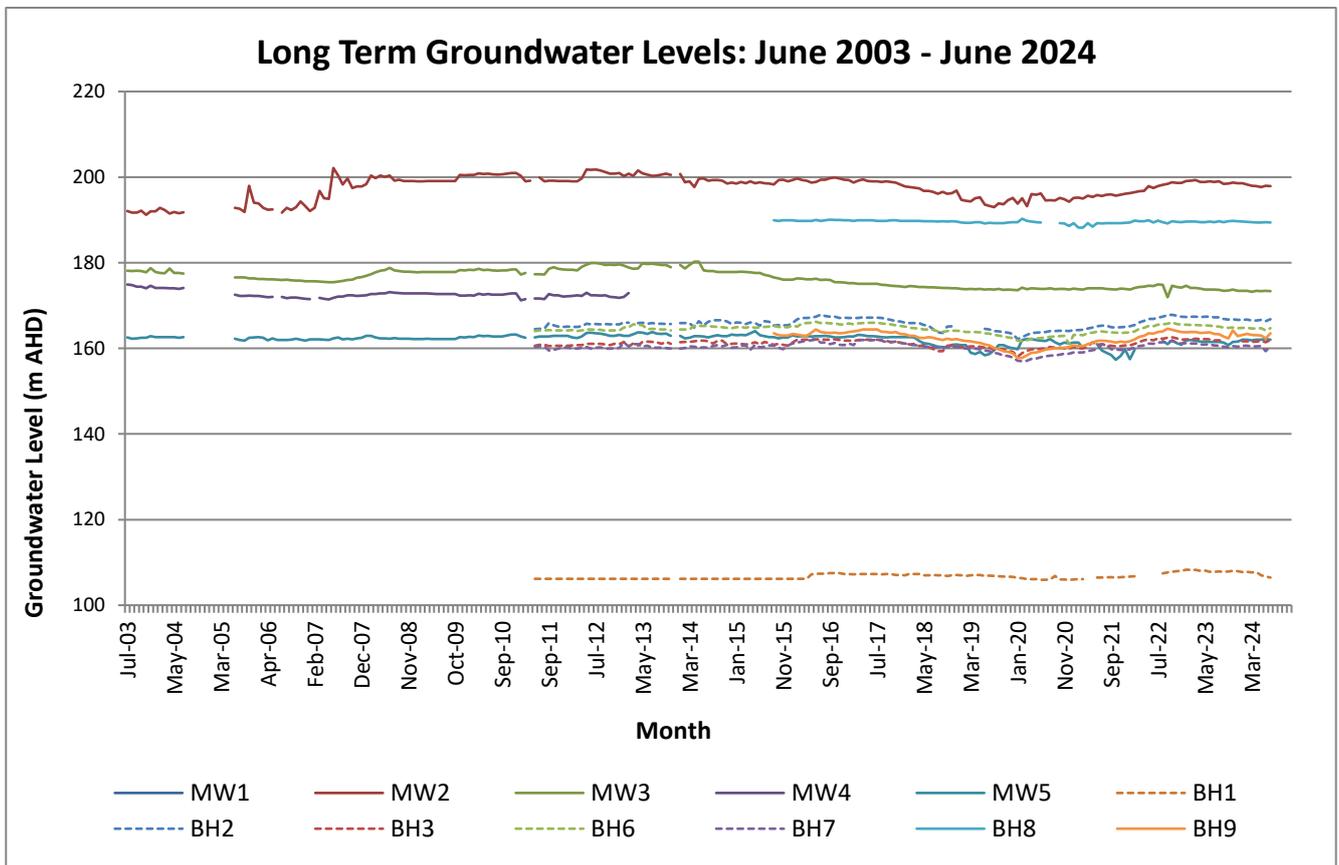


Chart 19: Long Term Groundwater Levels – all Boreholes.

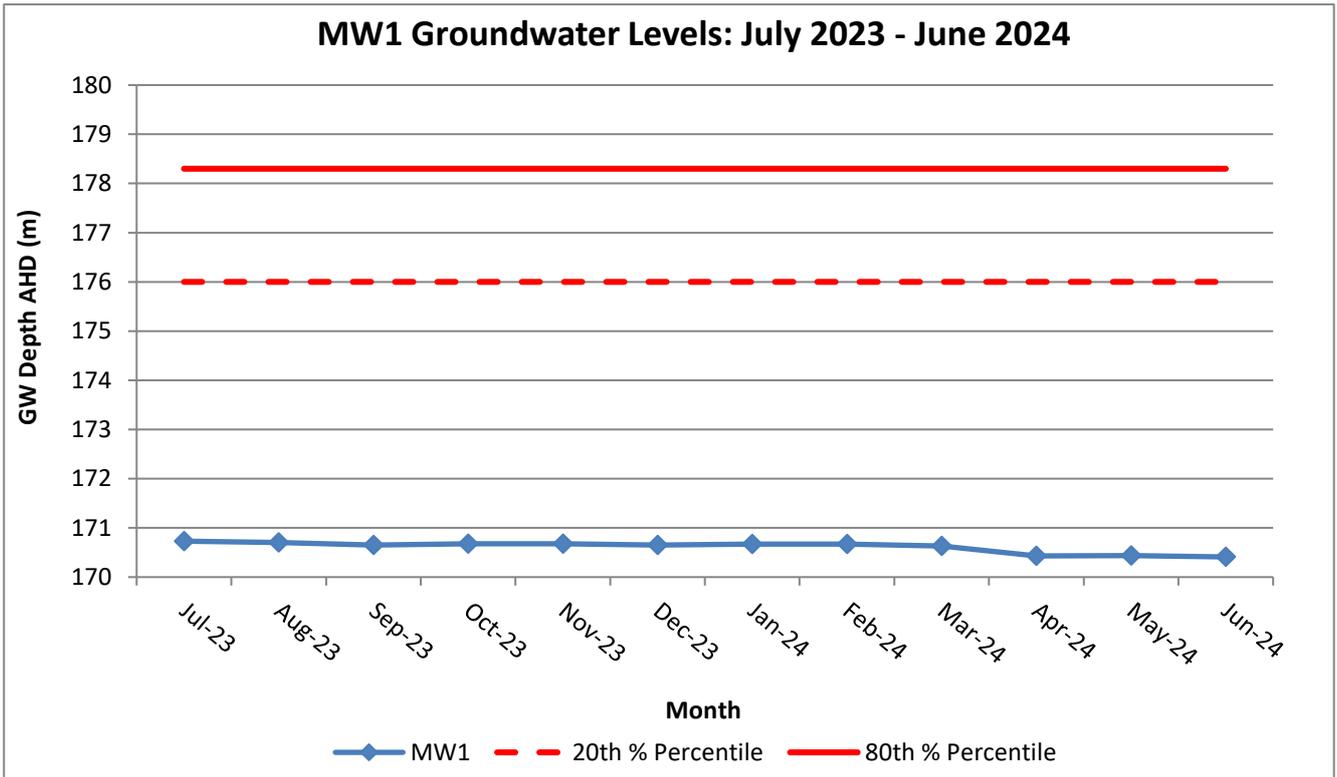


Chart 20: MW1 Groundwater Levels for July 2023 – June 2024.

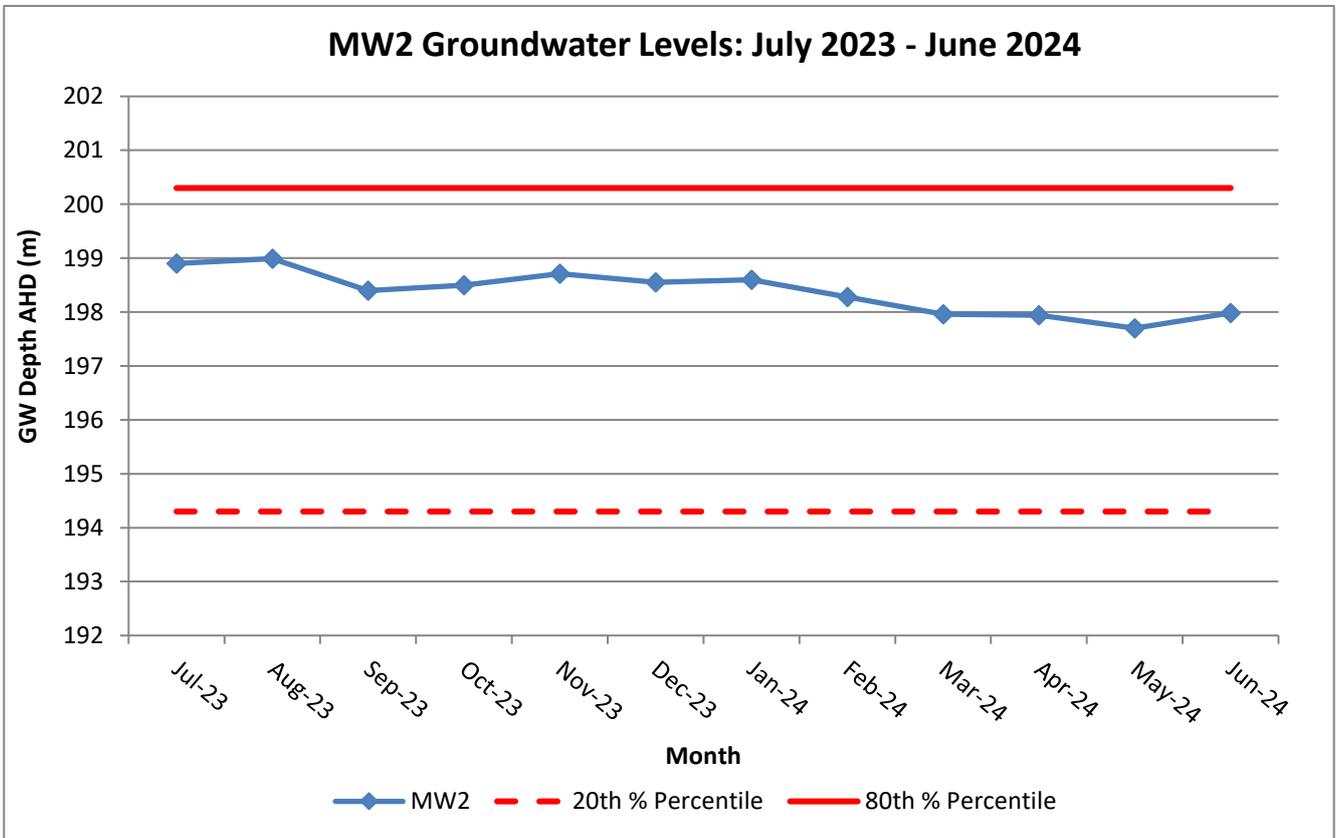


Chart 21: MW2 Groundwater Levels for July 2023 – June 2024.

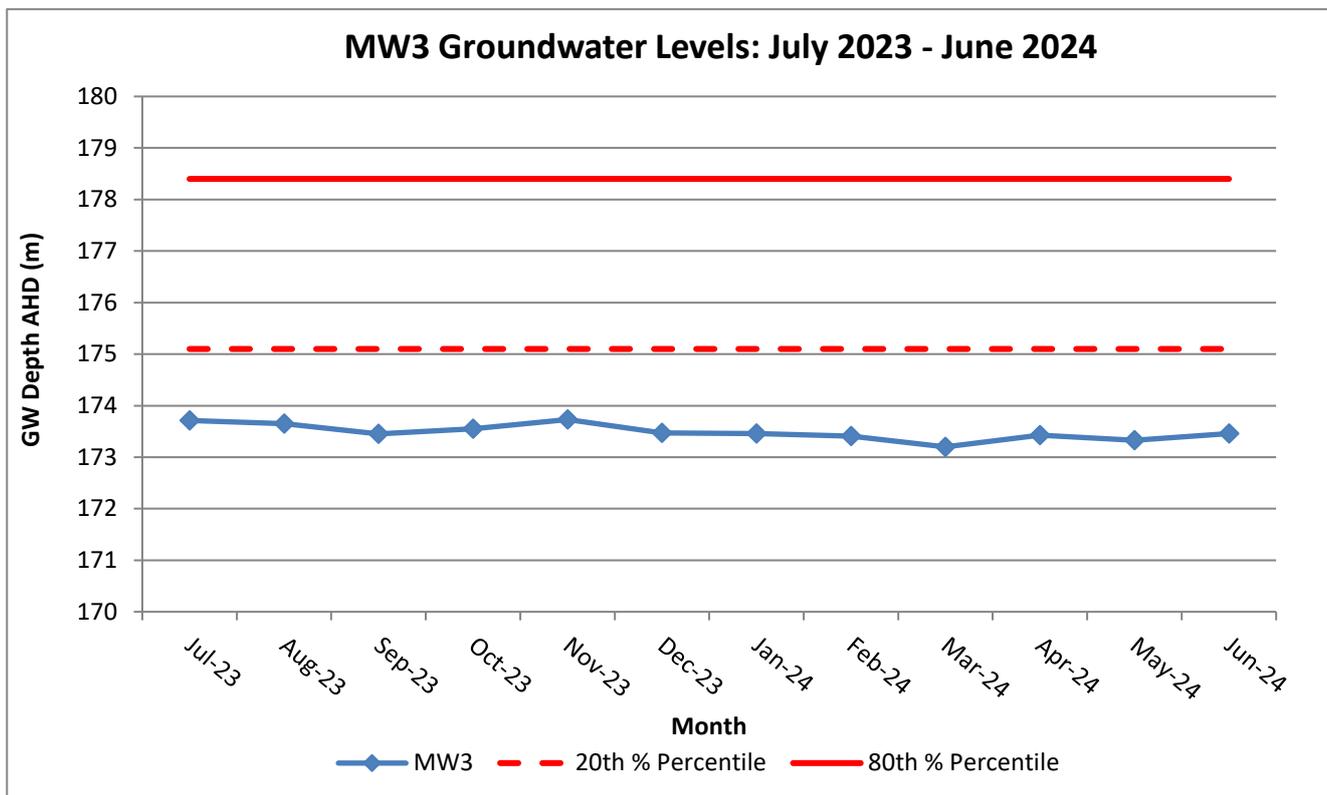


Chart 22: MW3 Groundwater Levels for July 2023 – June 2024.

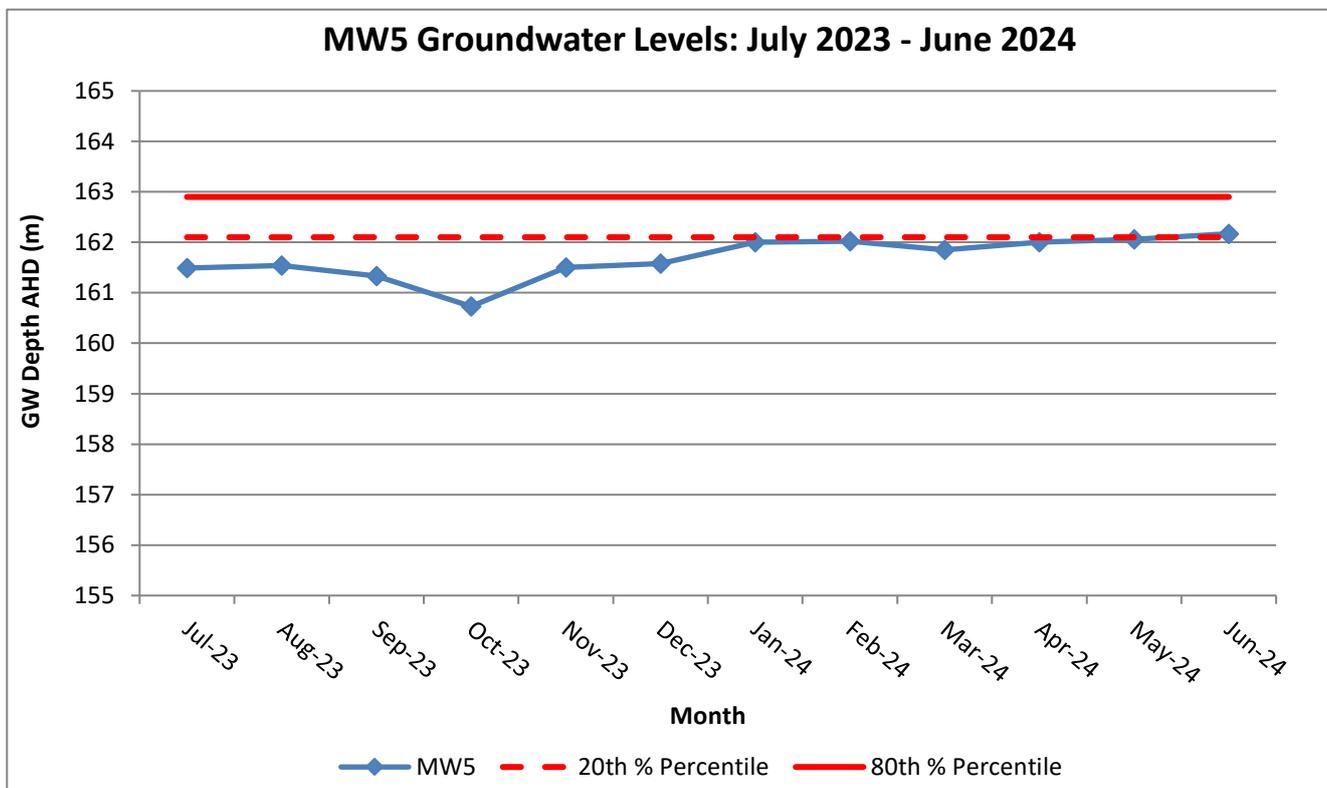


Chart 23: MW5 Groundwater Levels for July 2023 – June 2024.

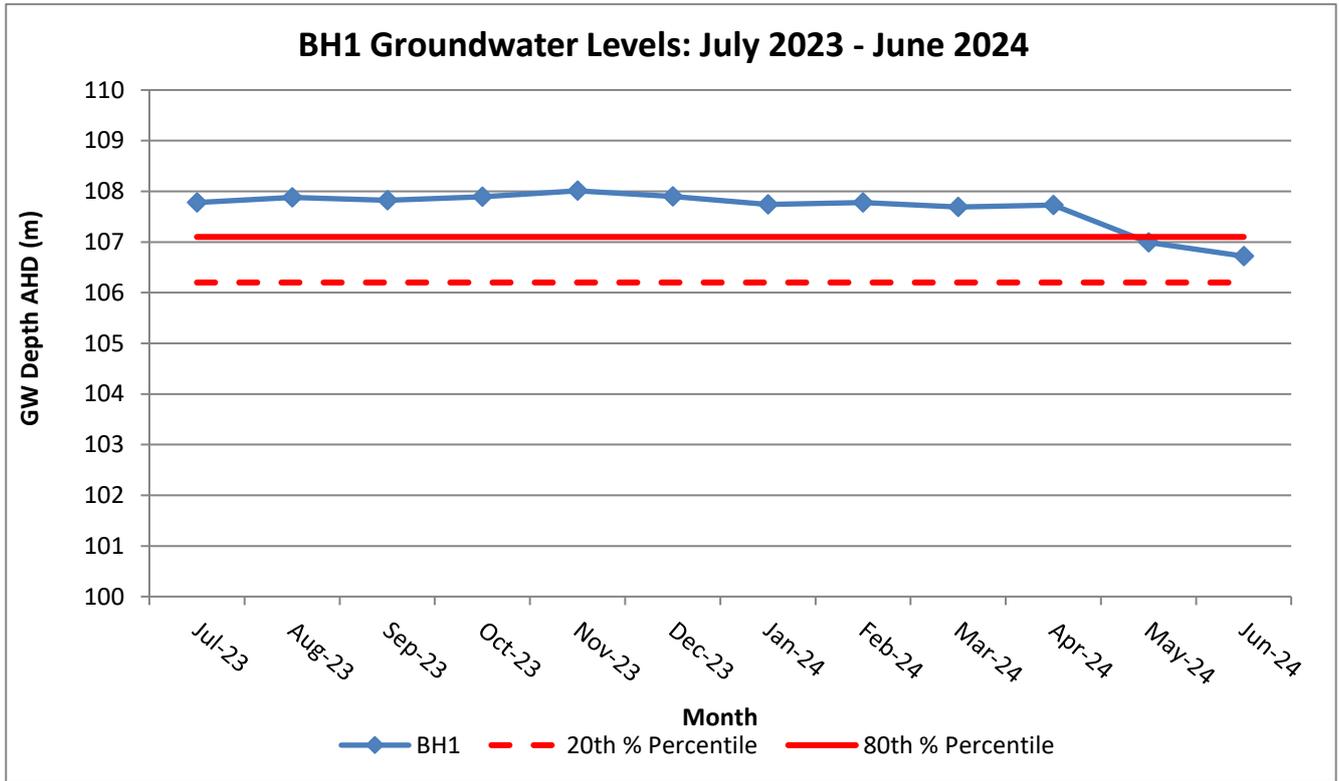


Chart 24: BH1 Groundwater Levels for July 2023 – June 2024.

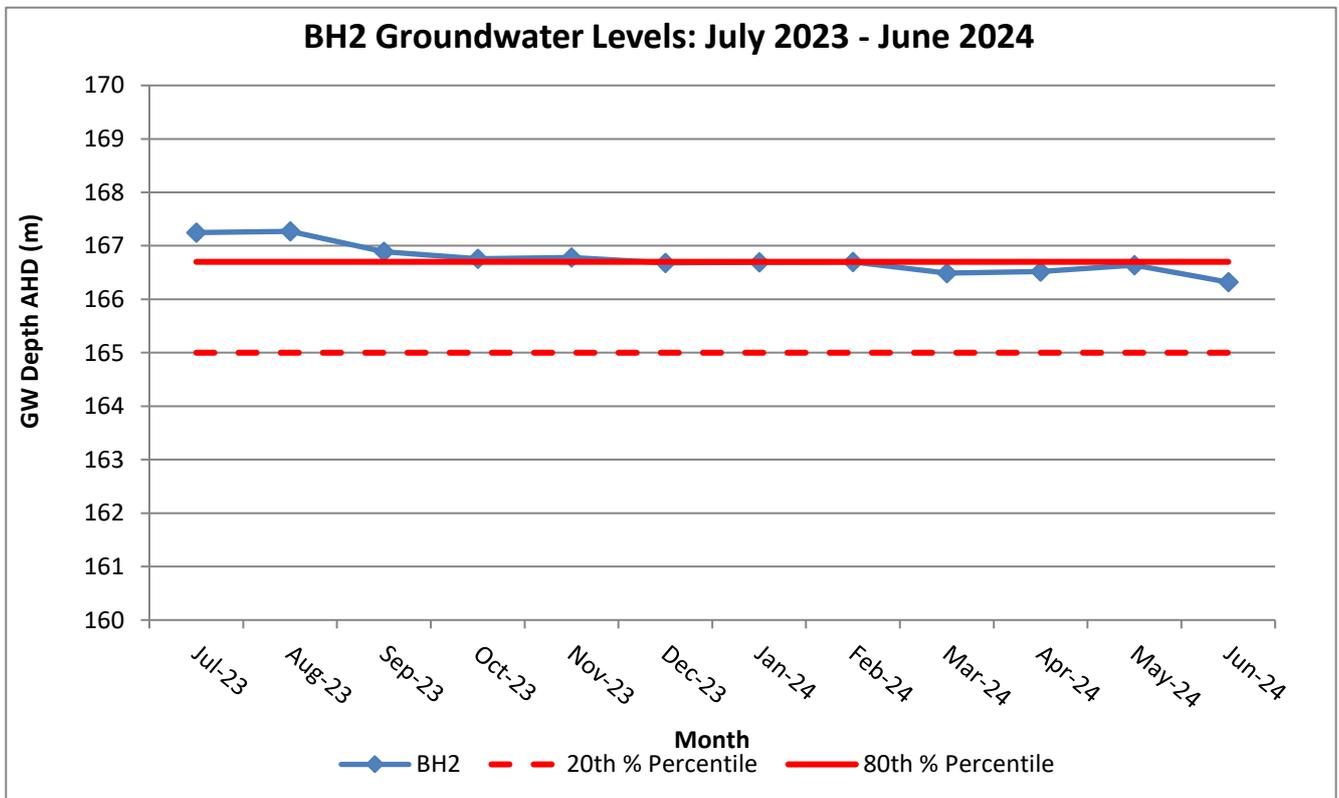


Chart 25: BH2 Groundwater Levels for July 2023 – June 2024.

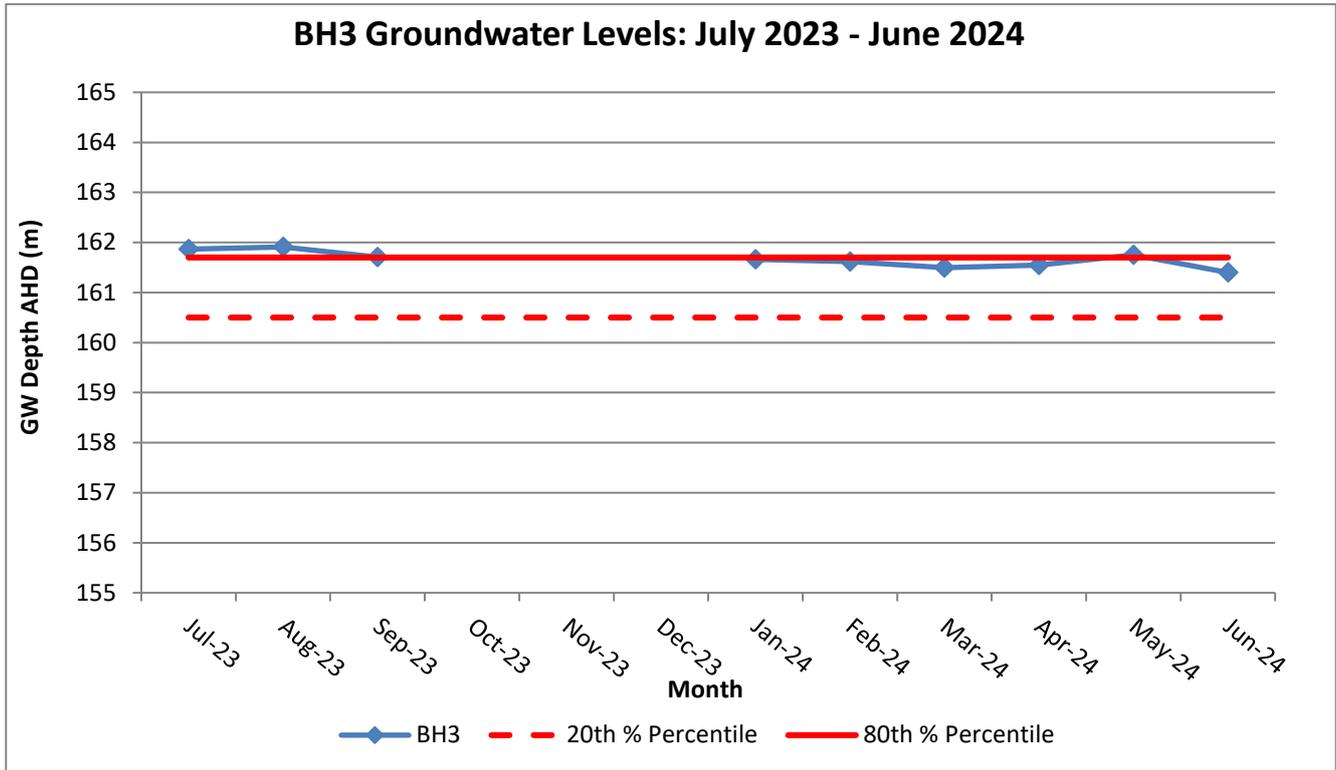


Chart 26: BH3 Groundwater Levels for July 2023 – June 2024.

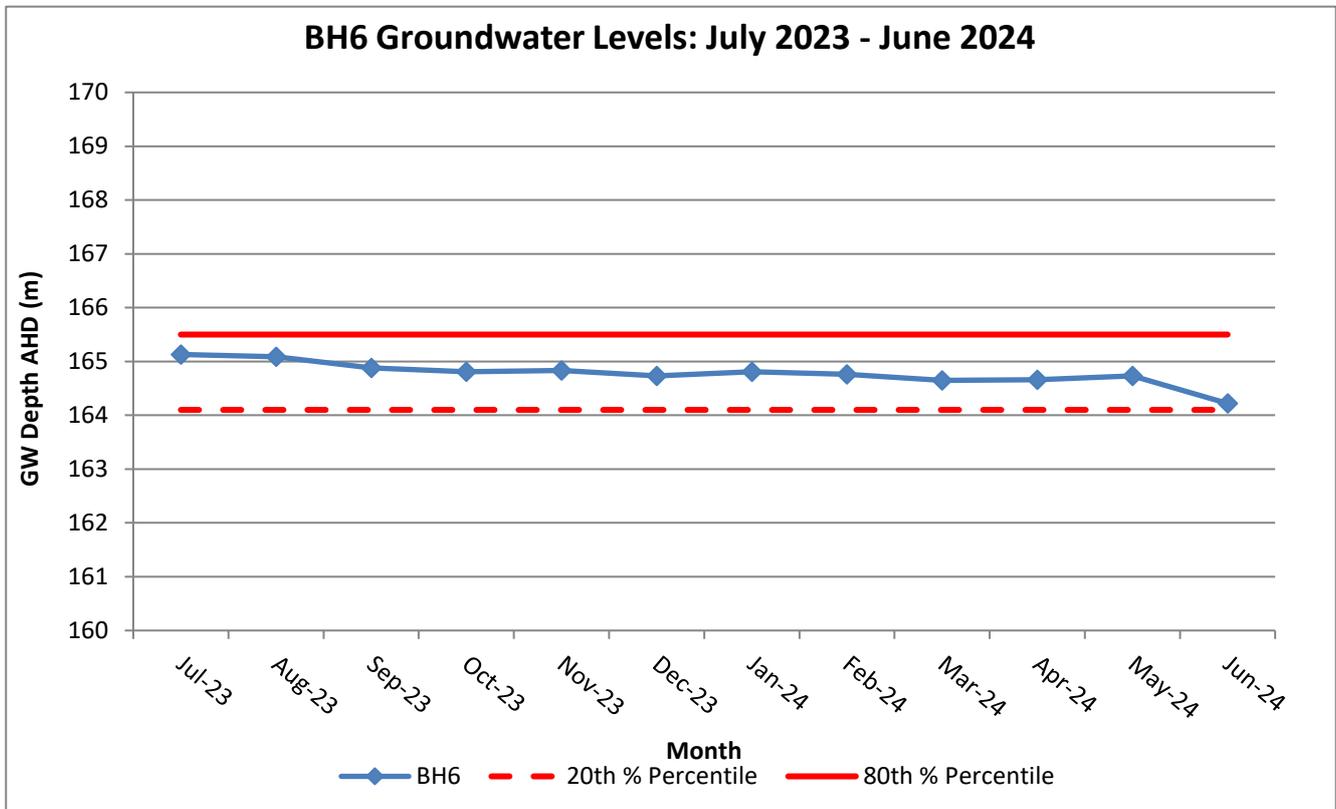


Chart 27: BH6 Groundwater Levels for July 2023 – June 2024.

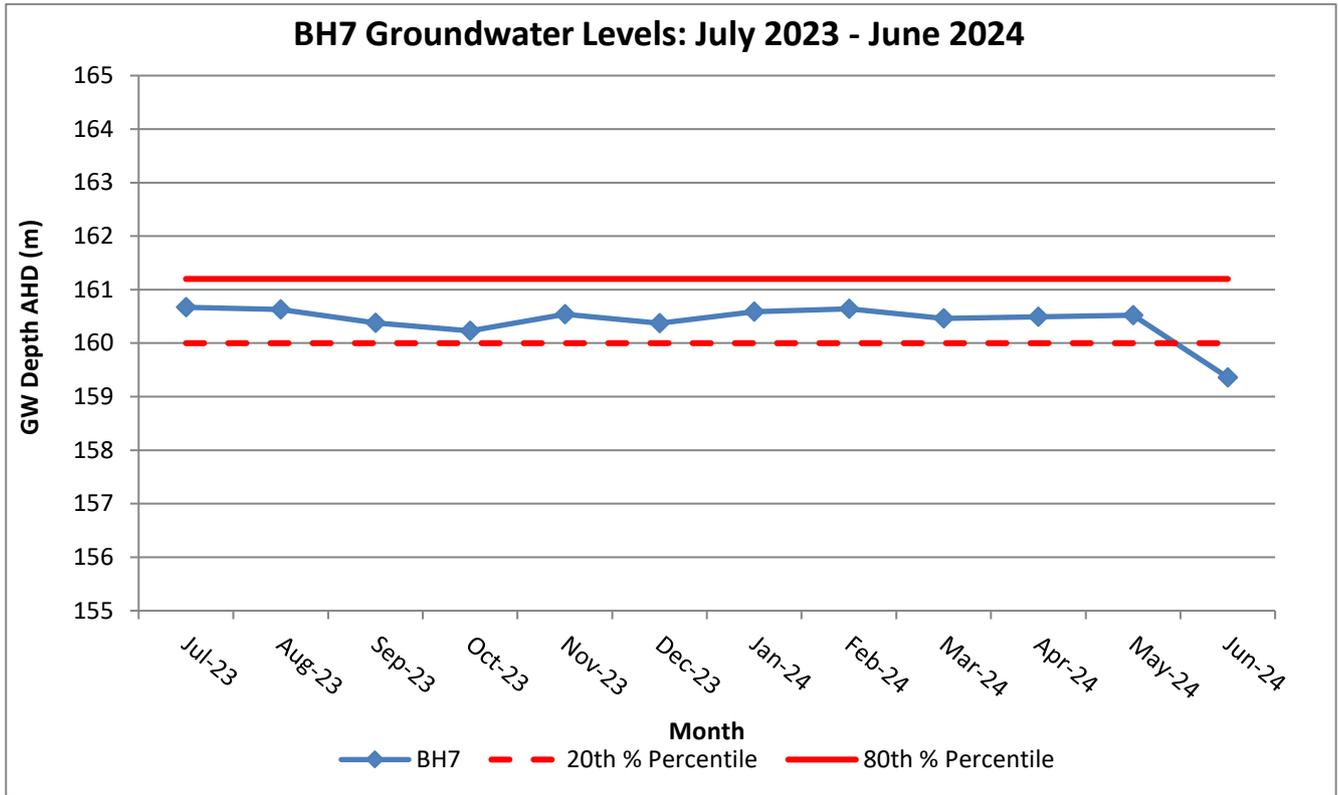


Chart 28: BH7 Groundwater Levels for July 2023 – June 2024.

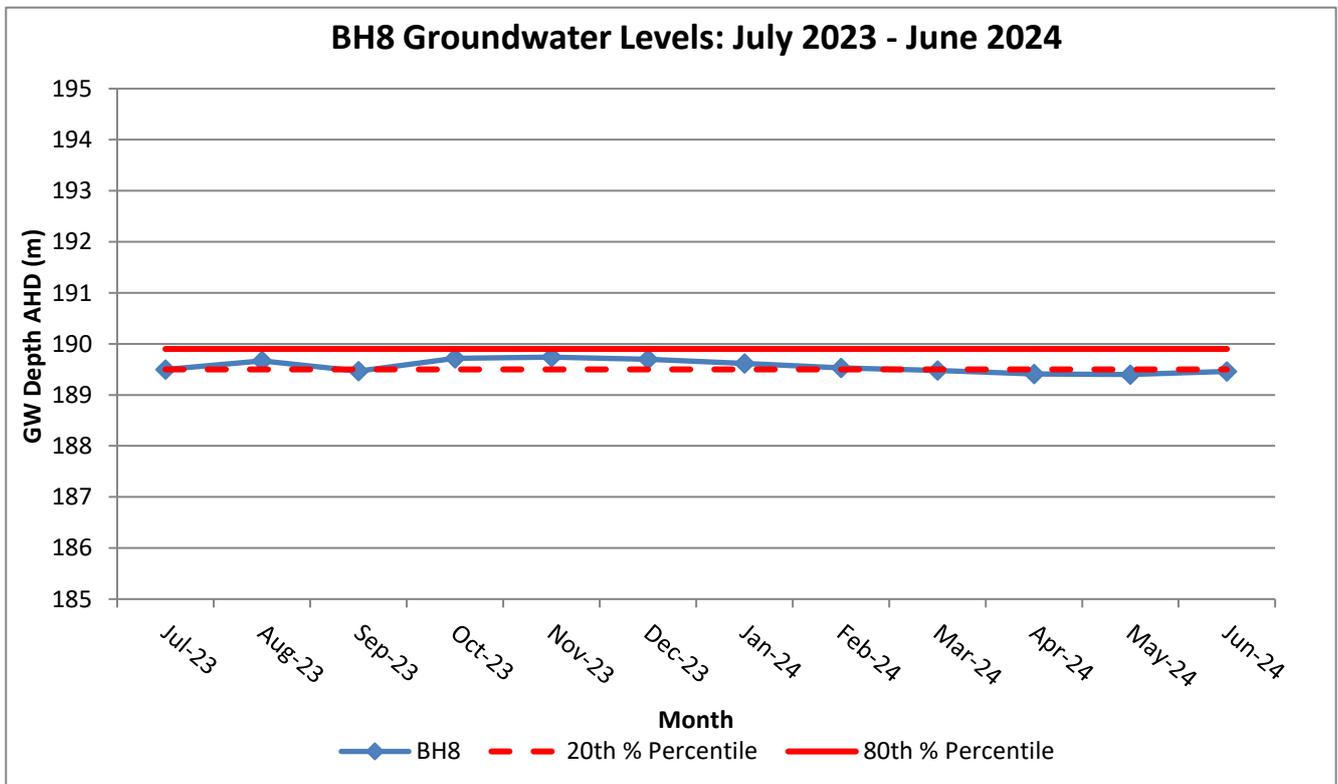


Chart 29: BH8 Groundwater Levels for July 2023 – June 2024.

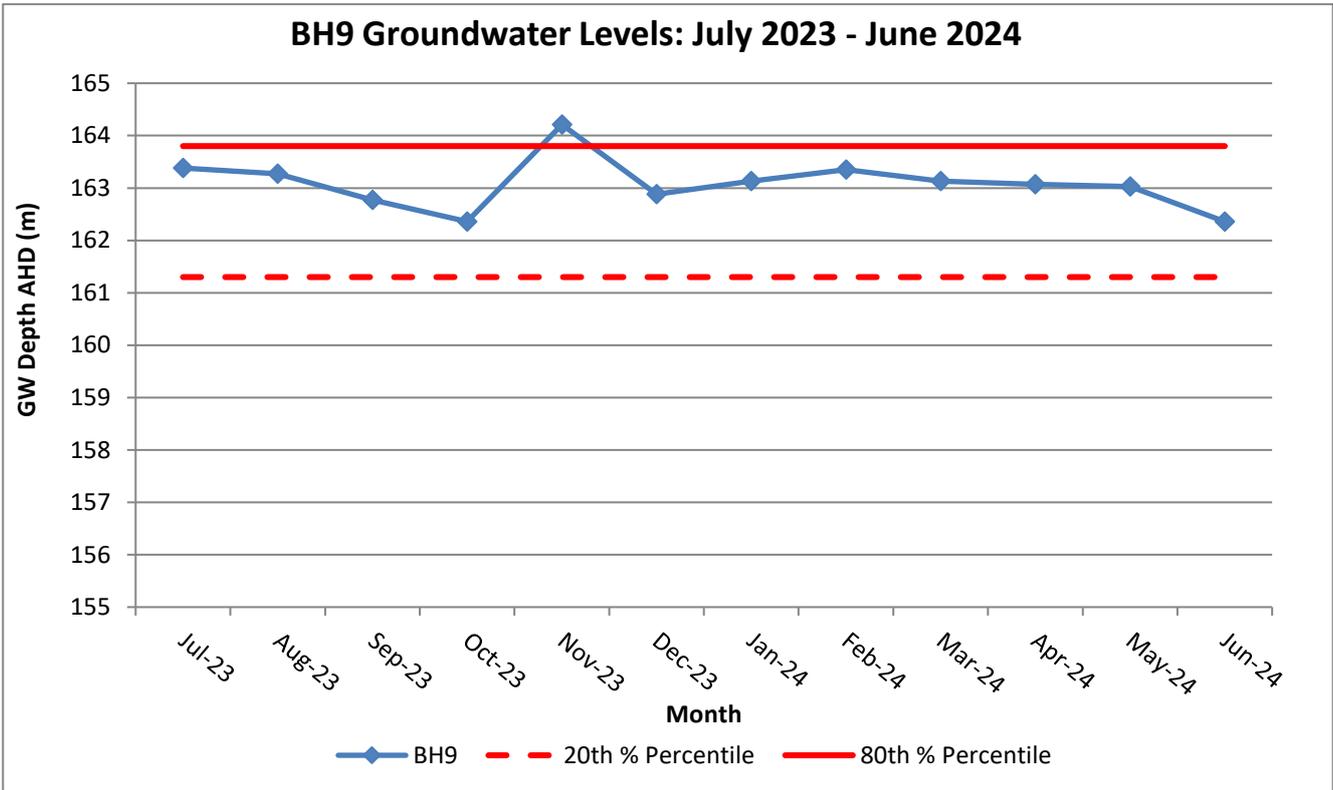


Chart 30: BH9 Groundwater Levels for July 2023 – June 2024.

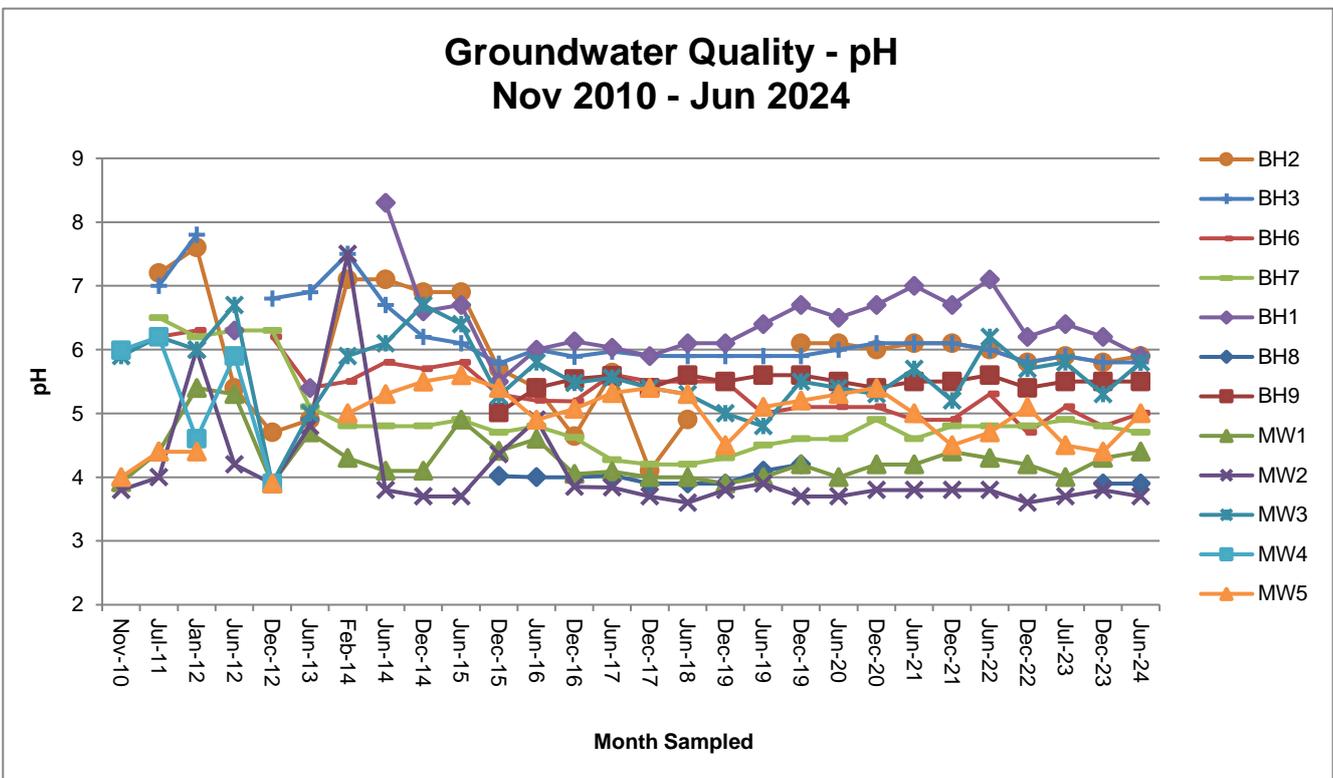


Chart 31: Long term pH results.

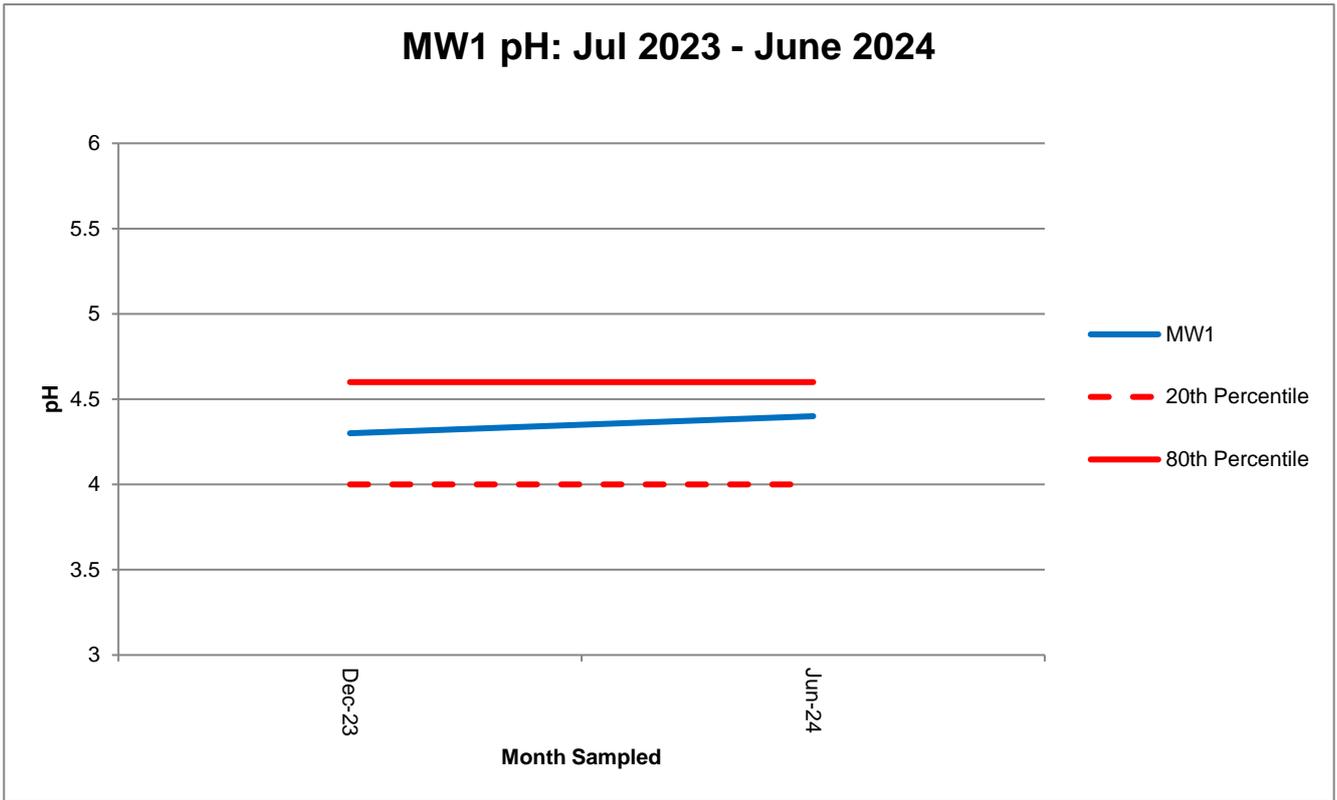


Chart 32: MW1 pH Results July 2023 – June 2024.

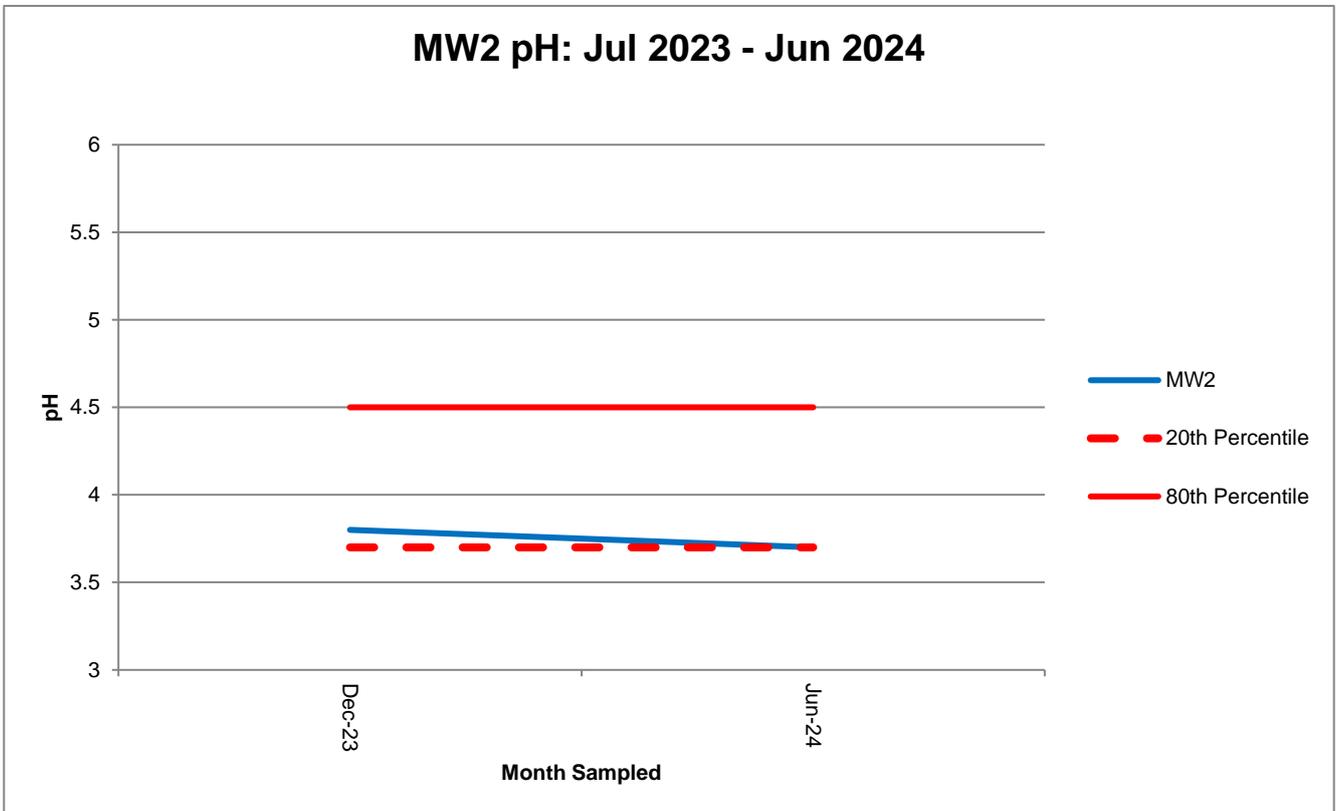


Chart 33: MW2 pH Results July 2023 – June 2024.

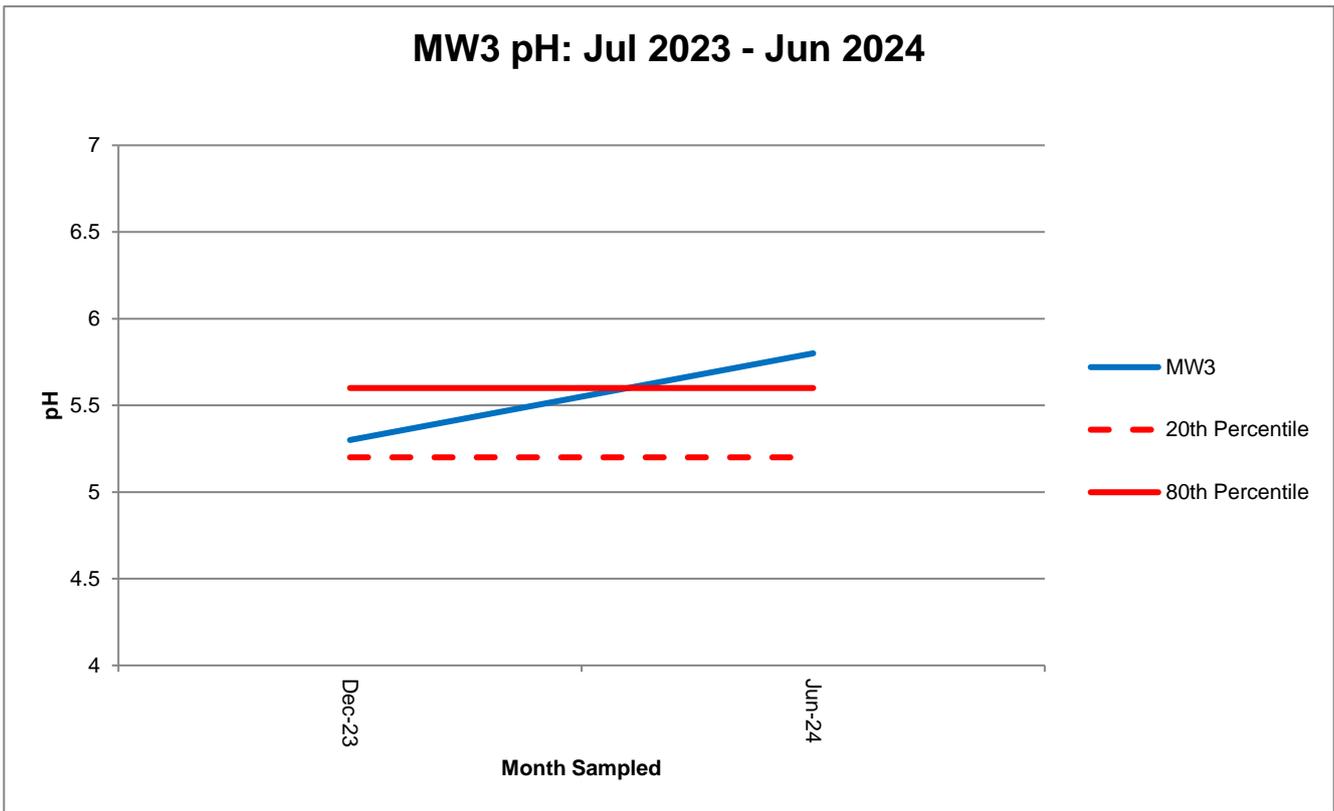


Chart 34: MW3 pH Results July 2023 – June 2024.

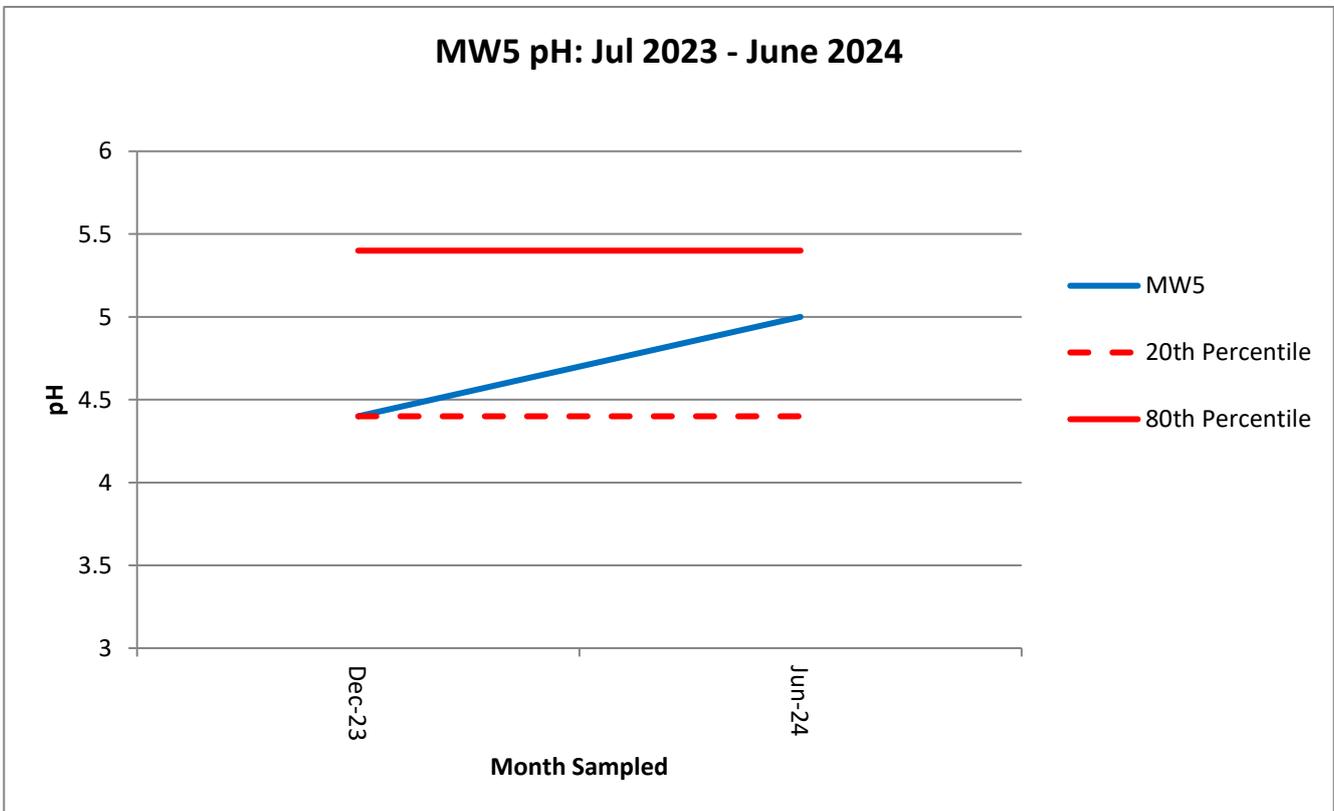


Chart 35: MW5 pH Results July 2023 – June 2024.

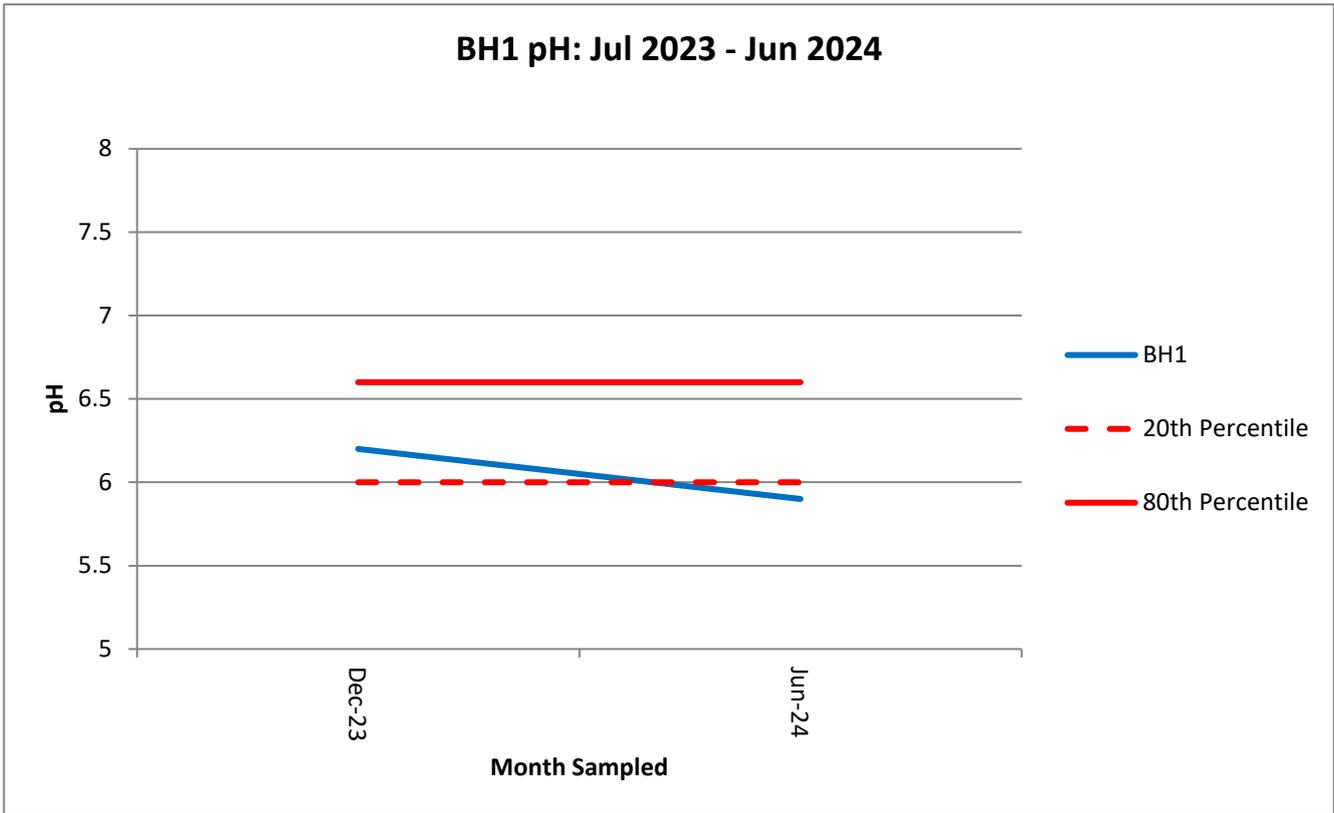


Chart 36: BH1 pH Results July 2023 – June 2024.

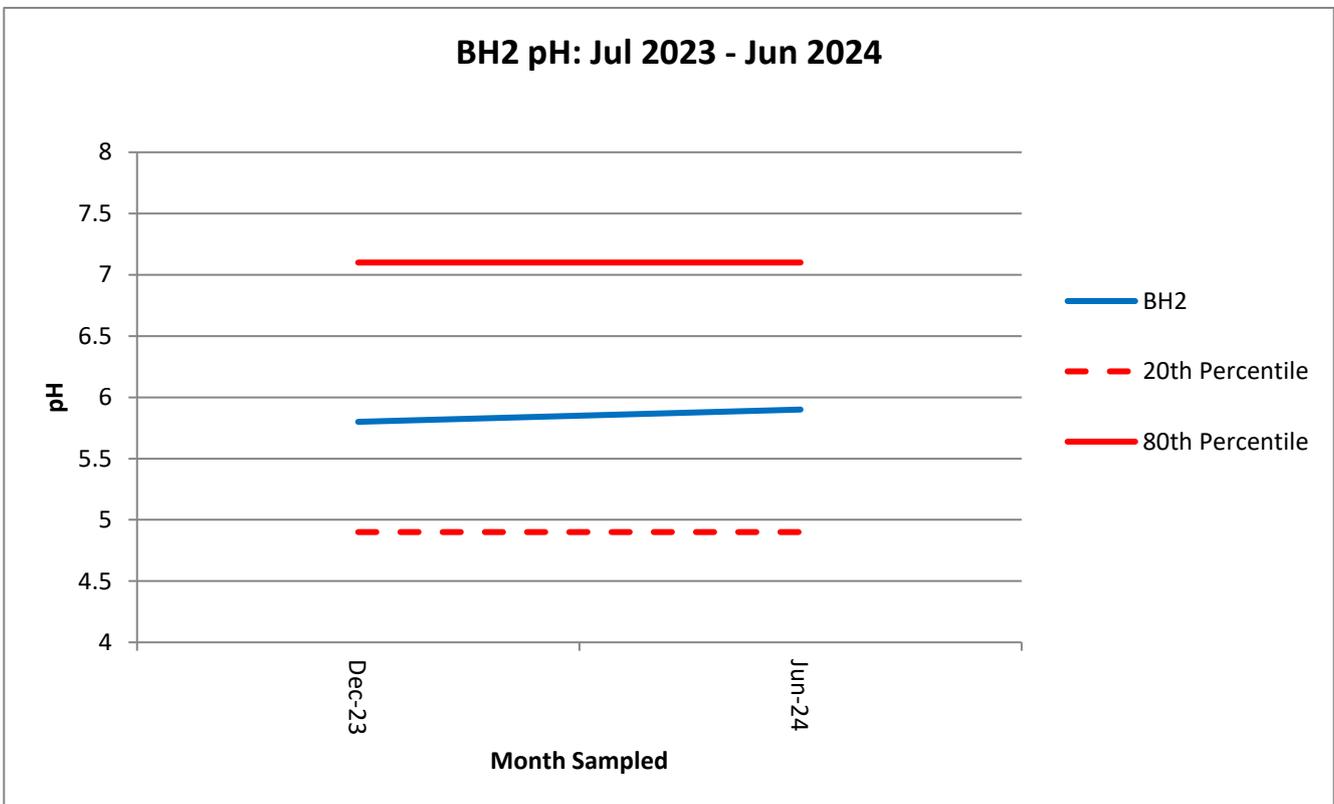


Chart 37: BH2 pH Results July 2023 – June 2024.

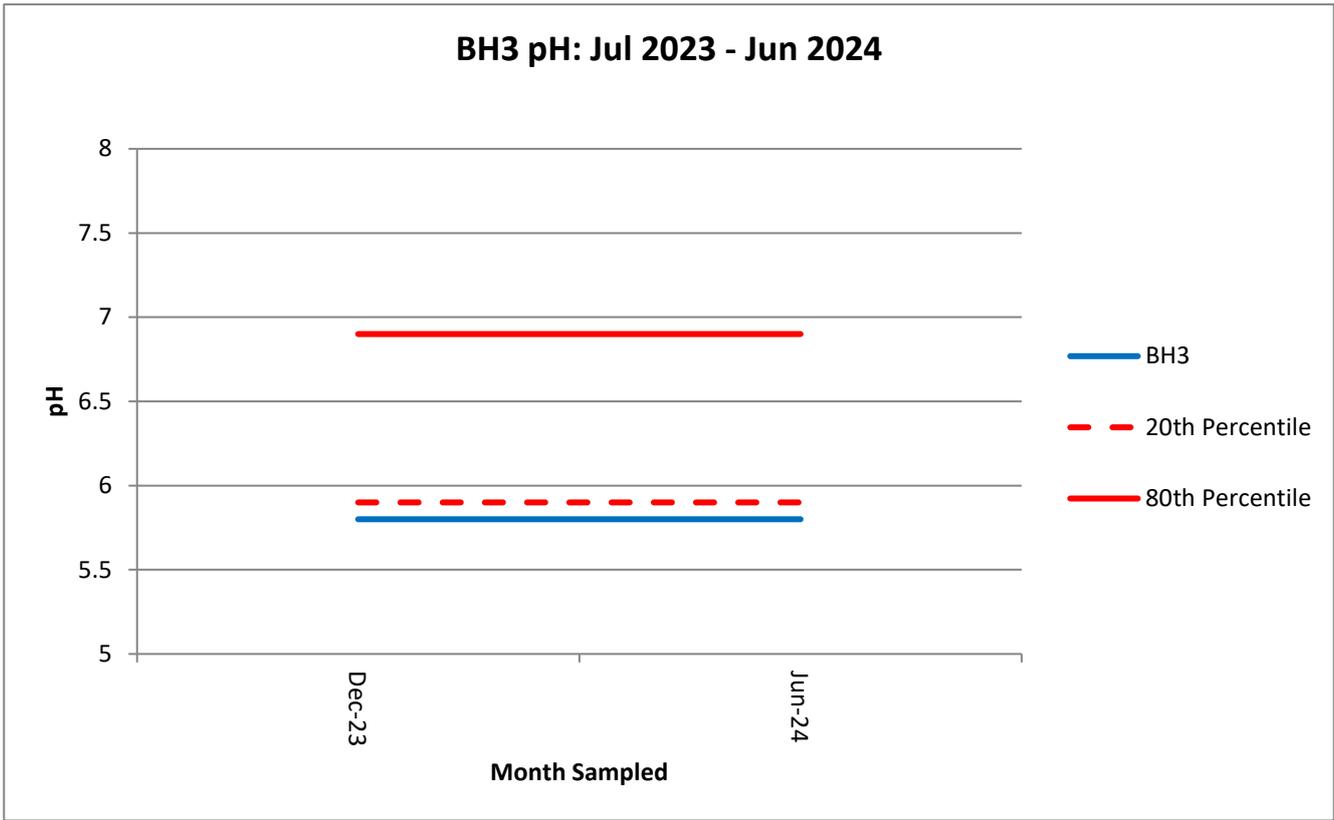


Chart 38: BH3 pH Results July 2023 – June 2024.

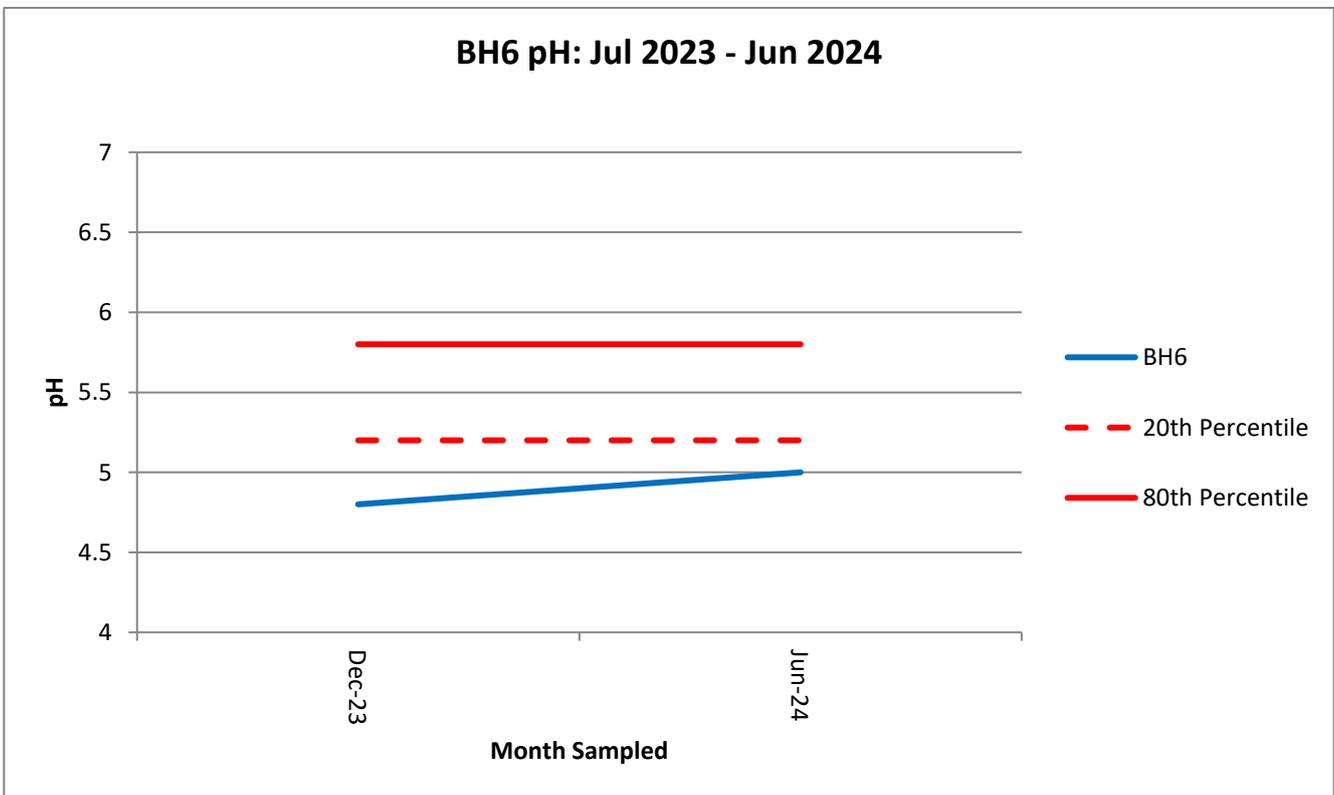


Chart 39: BH6 pH Results July 2023 – June 2024.

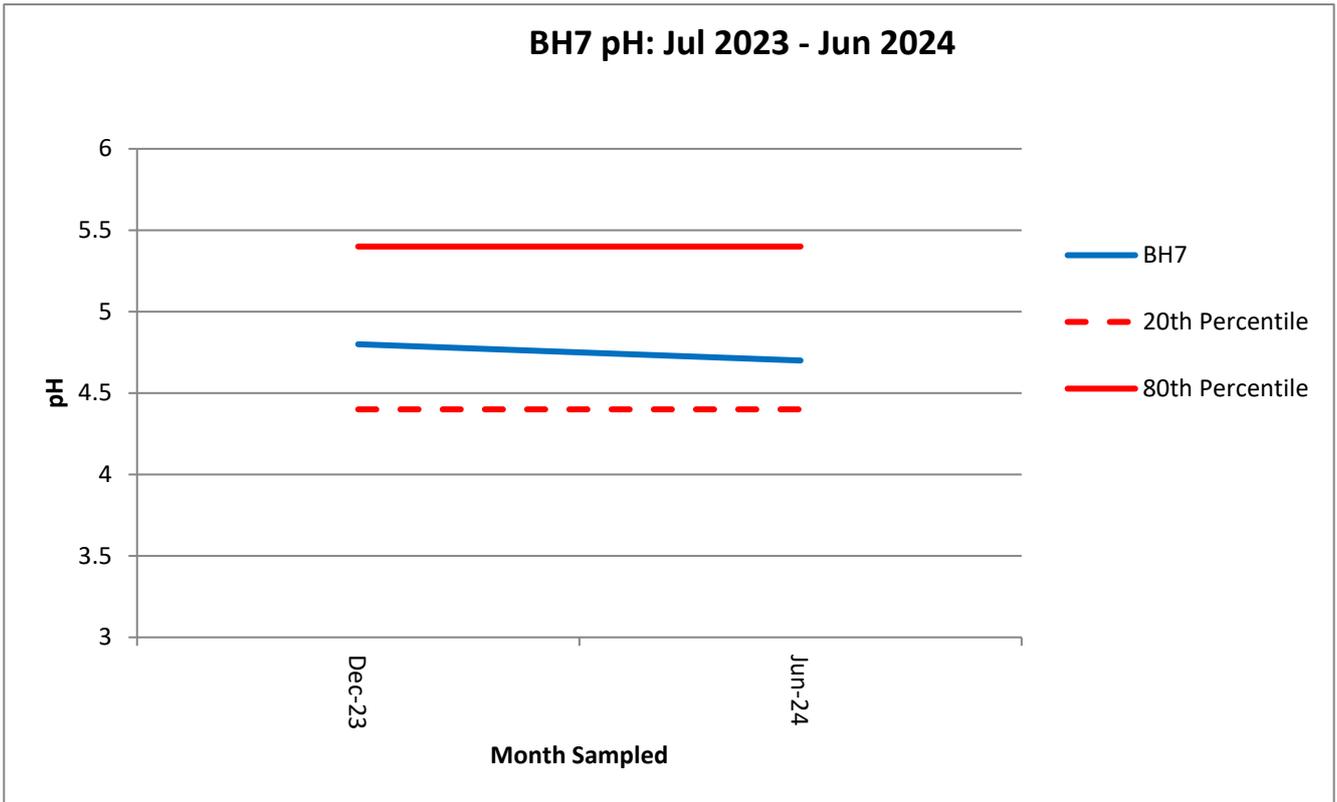


Chart 40: BH7 pH Results July 2023 – June 2024.

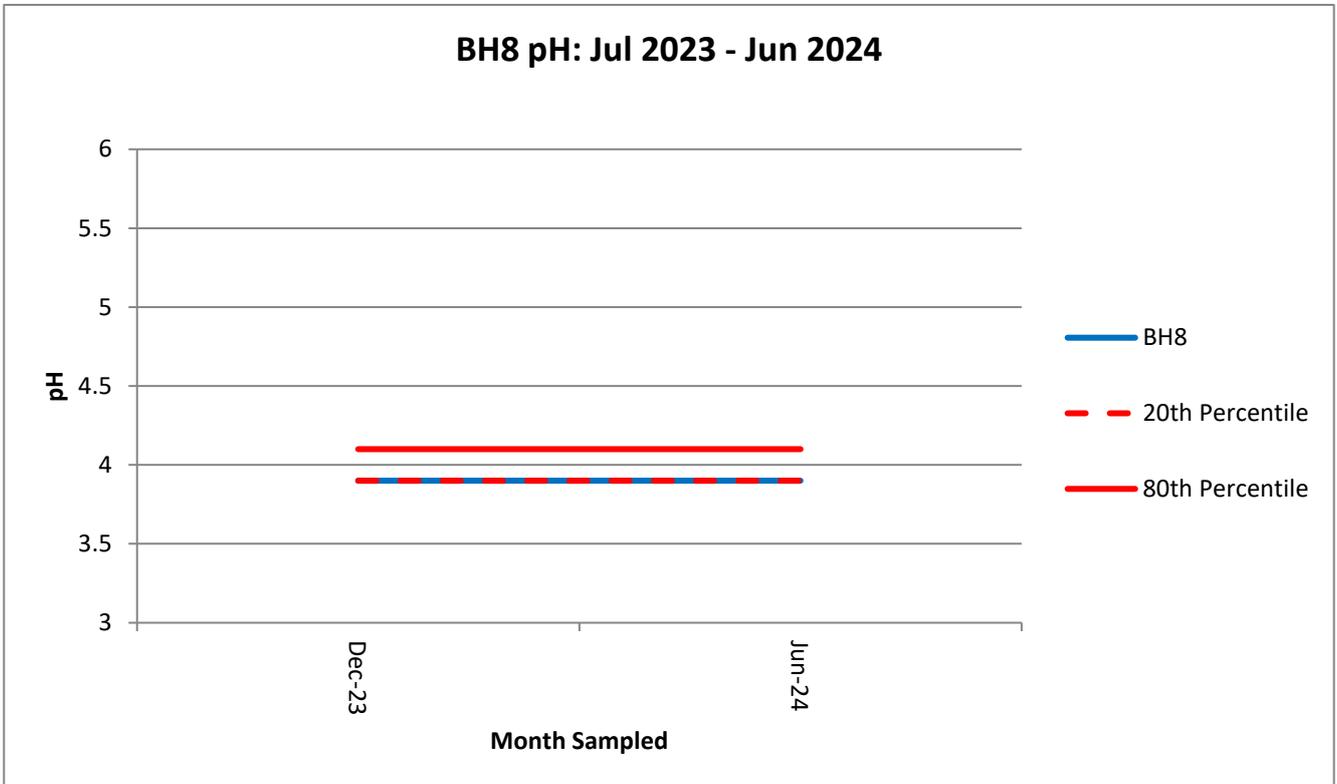


Chart 41: BH8 pH Results July 2023 – June 2024.

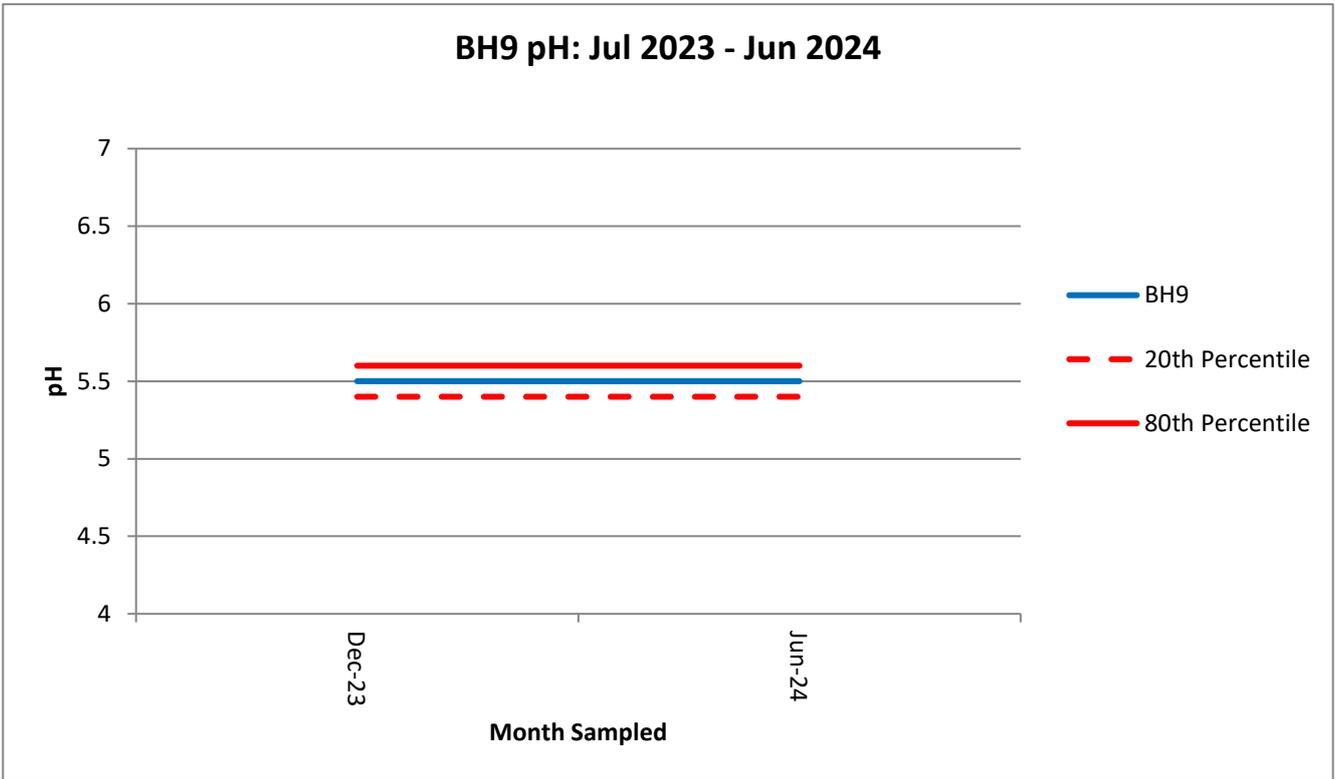


Chart 42: BH9 pH Results July 2023 – June 2024.

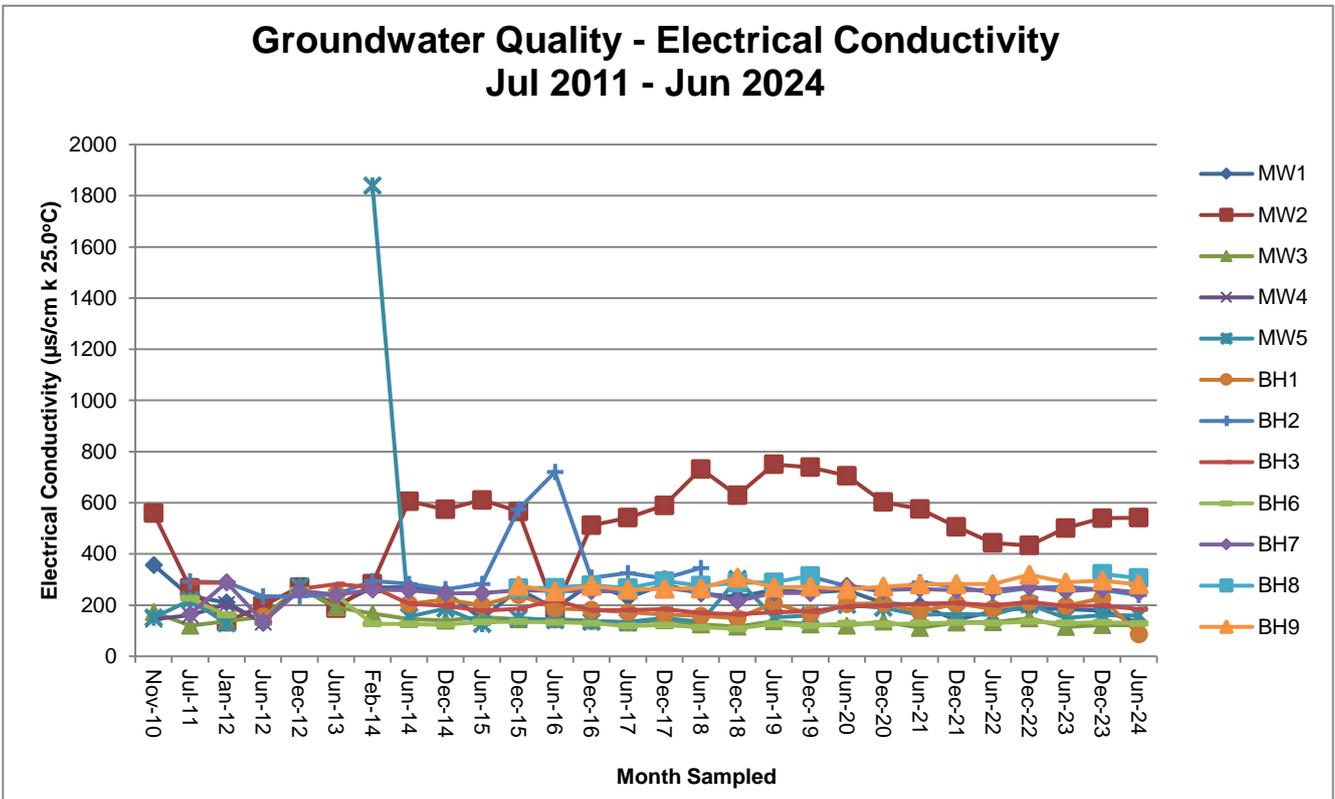


Chart 43: Long term Electrical Conductivity Results.

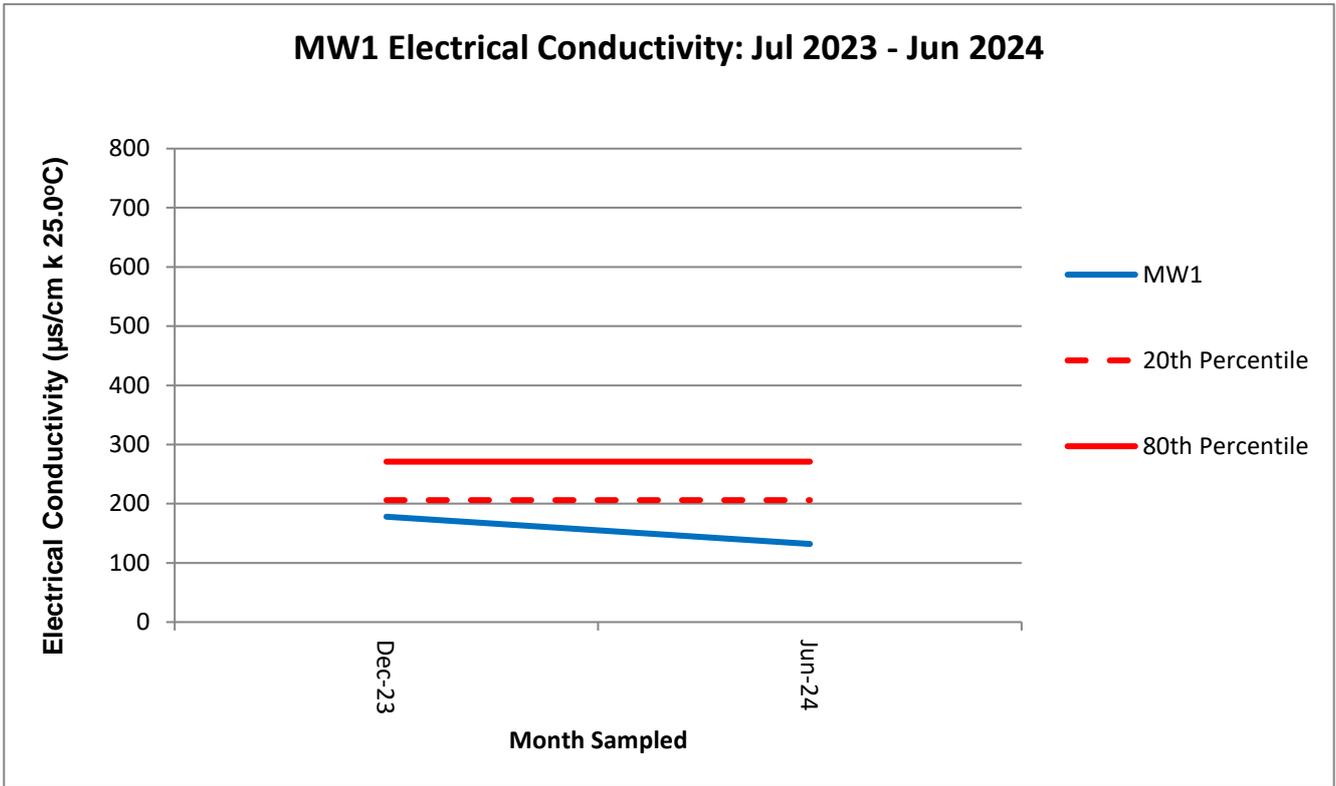


Chart 44: MW1 Electrical Conductivity Results July 2023 – June 2024.

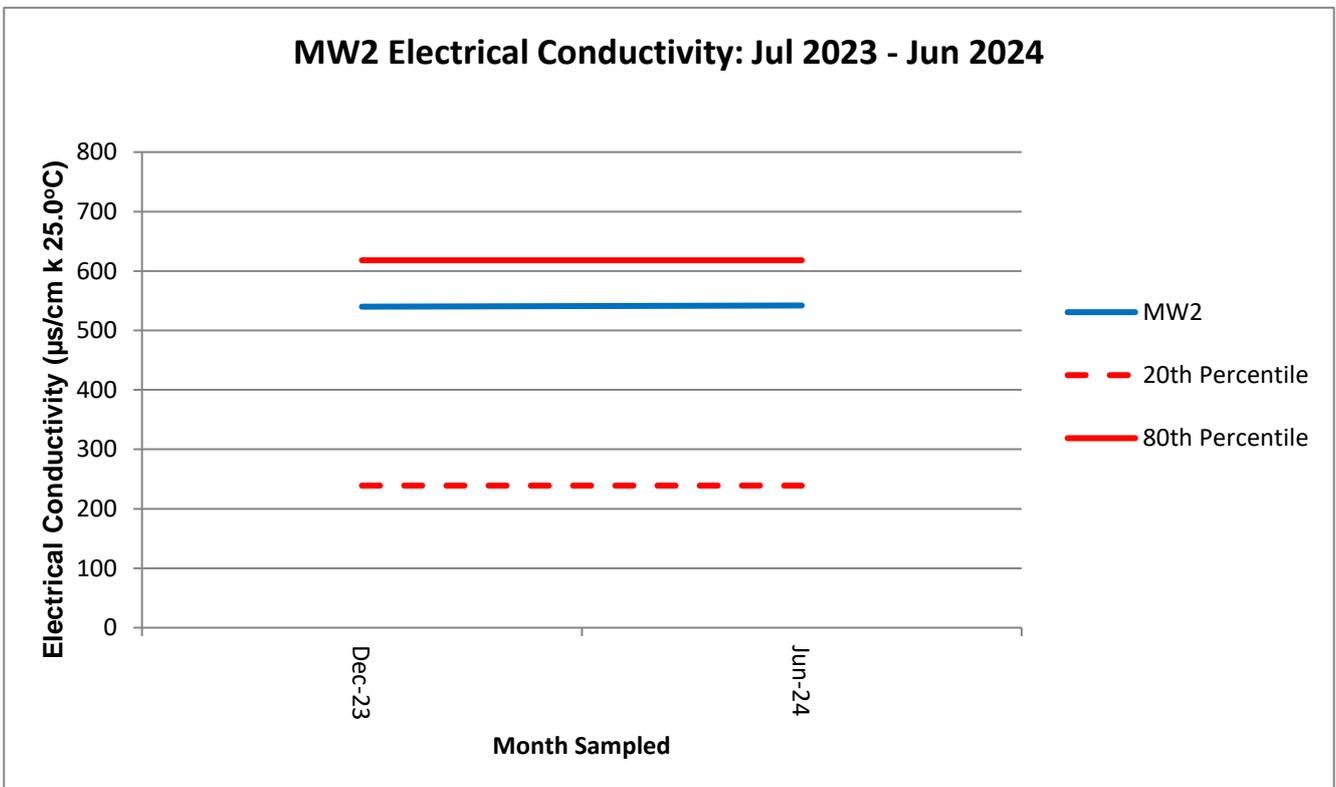


Chart 45: MW2 Electrical Conductivity Results July 2023 – June 2024.

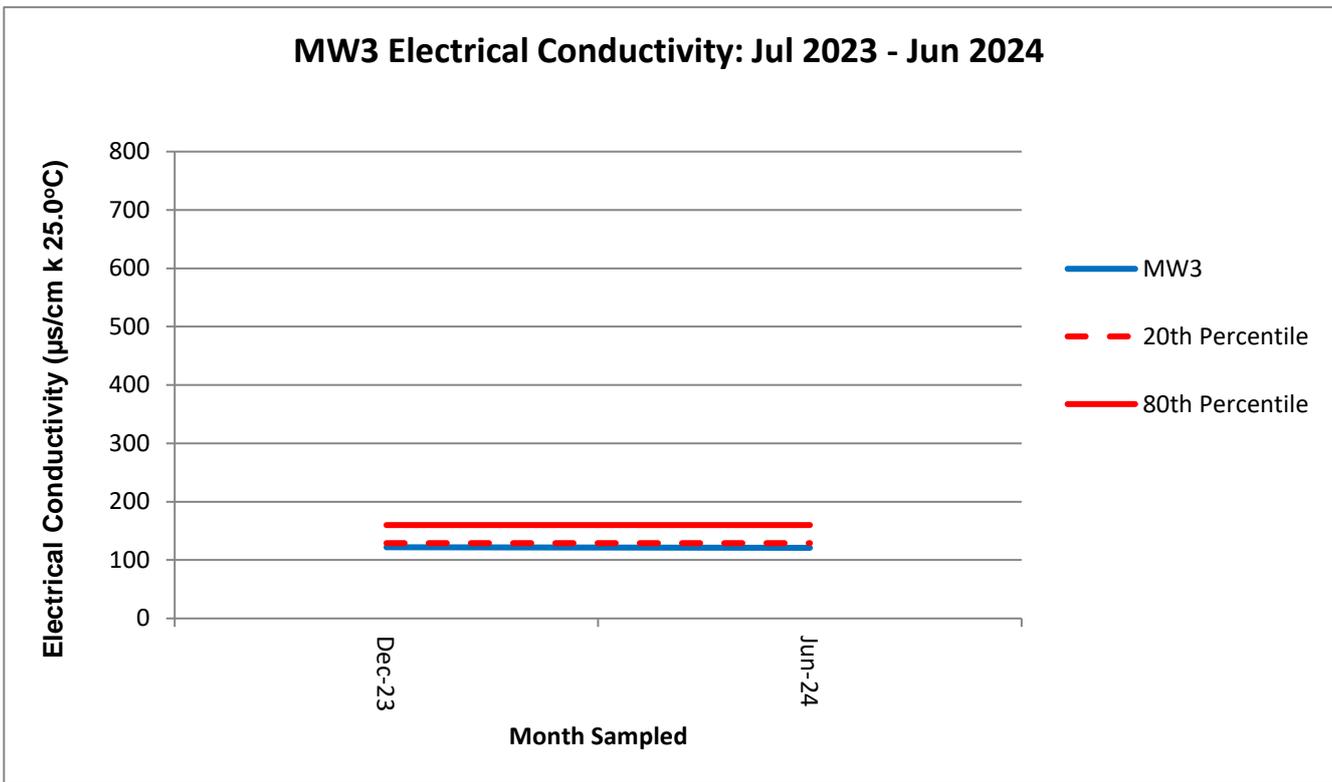


Chart 46: MW3 Electrical Conductivity Results July 2023 – June 2024.

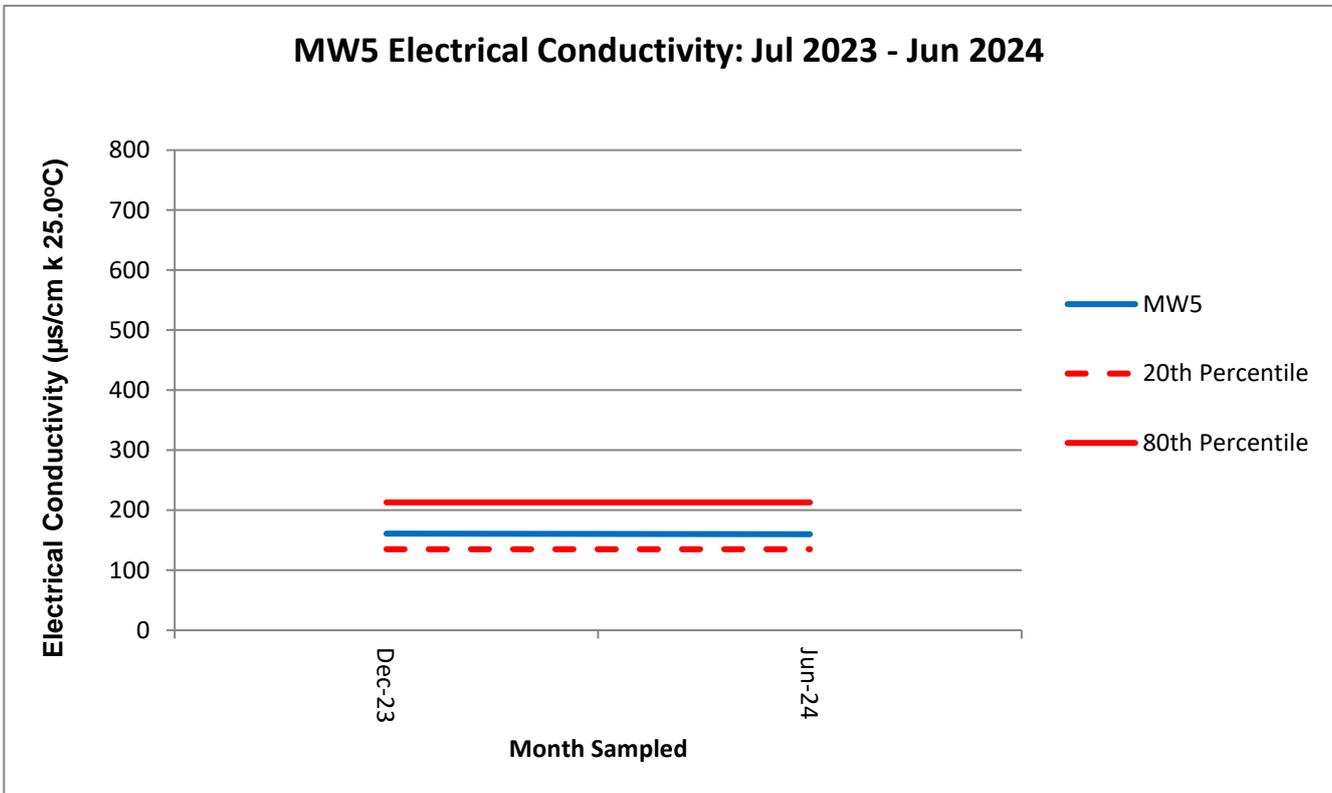


Chart 47: MW5 Electrical Conductivity Results July 2023 – June 2024.

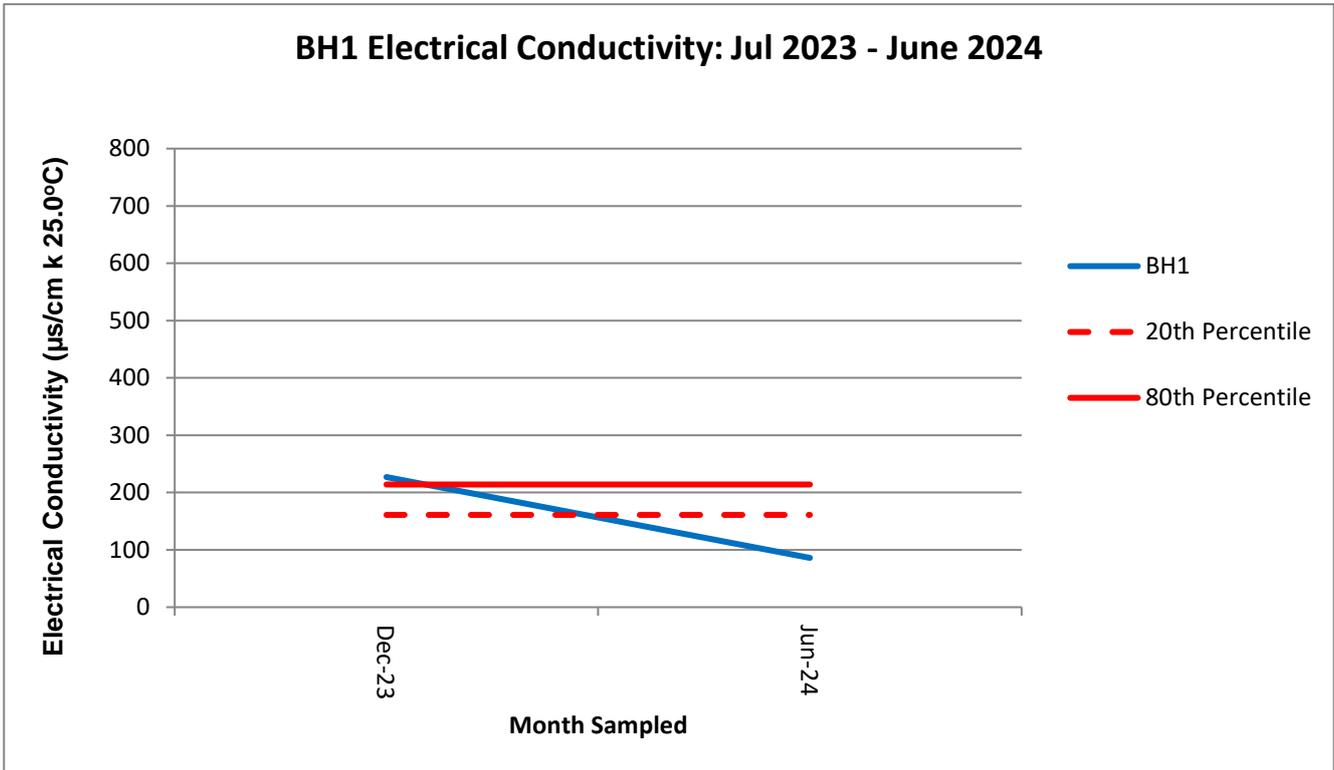


Chart 48: BH1 Electrical Conductivity Results July 2023 - June 2024.

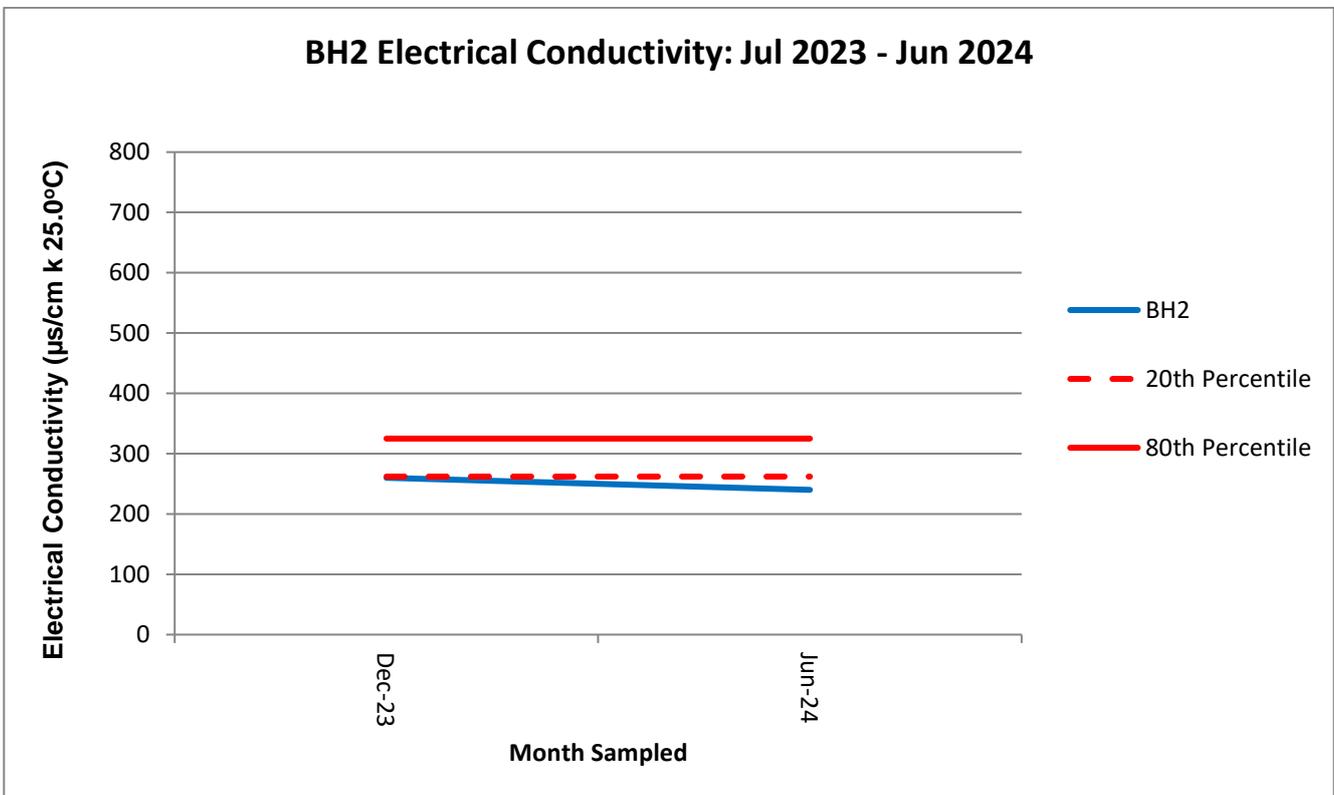


Chart 49: BH2 Electrical Conductivity Results July 2023 – June 2024.

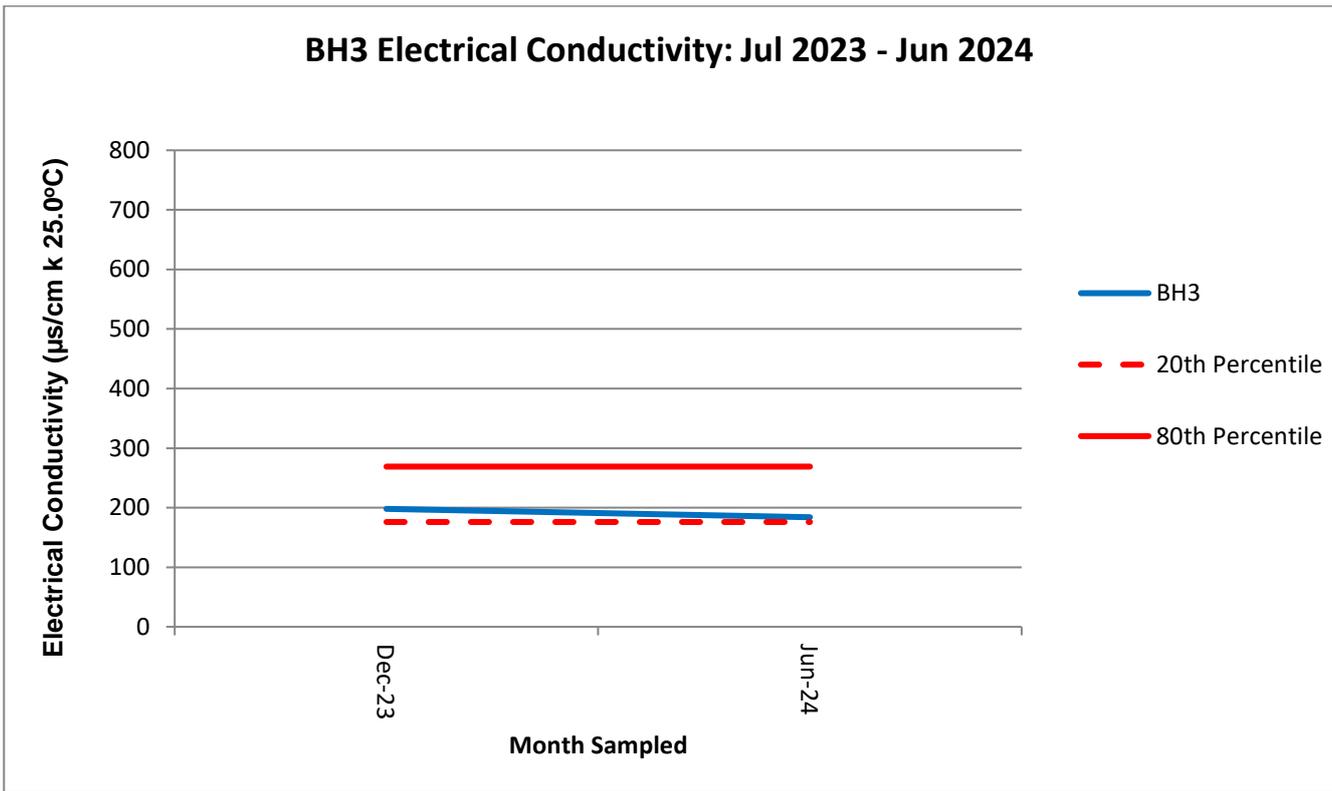


Chart 50: BH3 Electrical Conductivity Results July 2023 – June 2024.

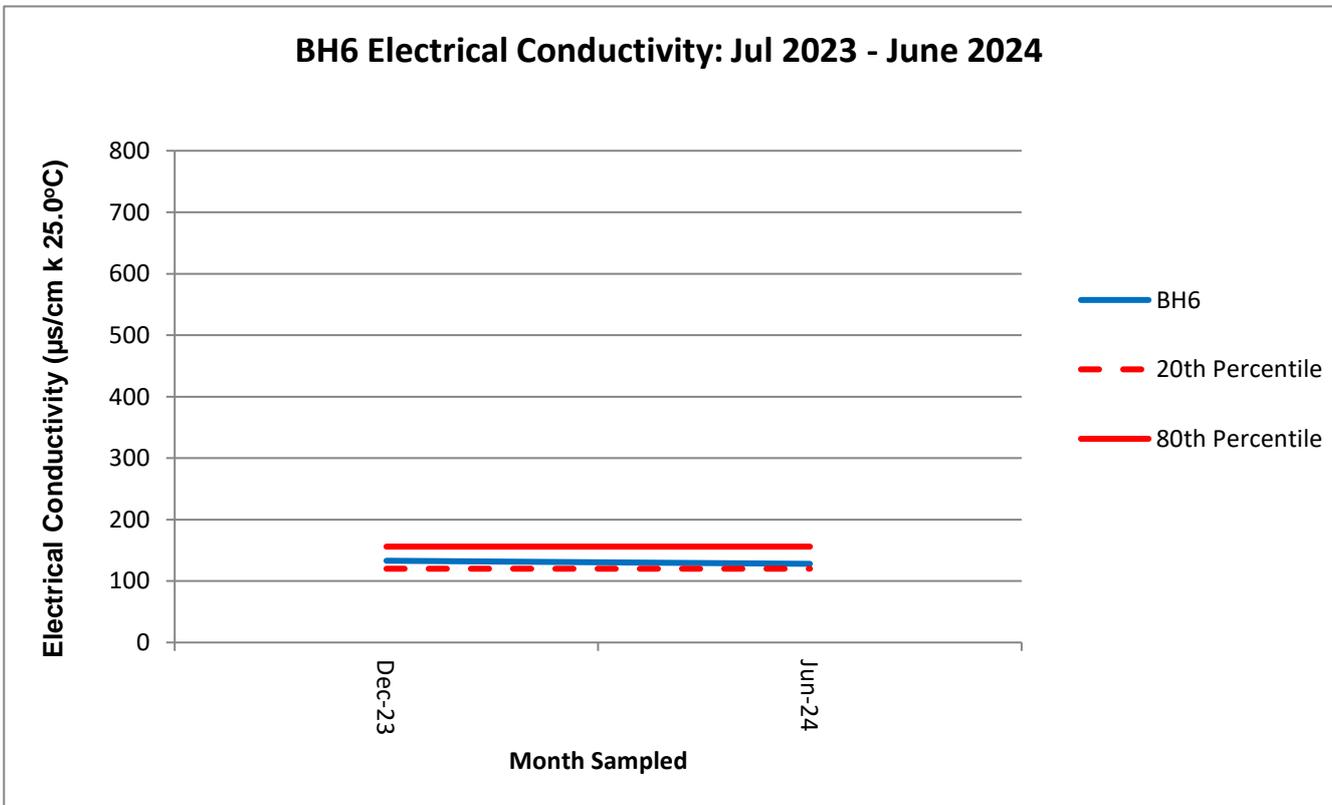


Chart 51: BH6 Electrical Conductivity Results July 2023 – June 2024.

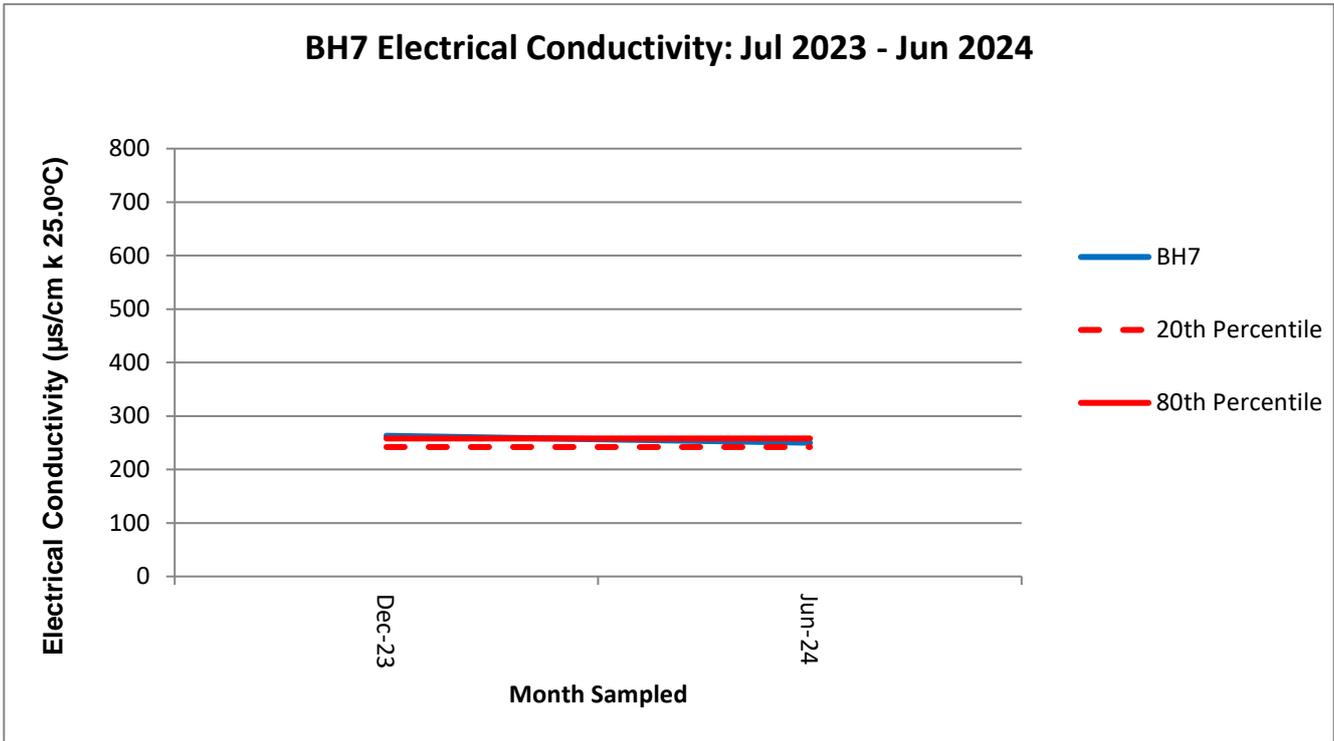


Chart 52: BH7 Electrical Conductivity Results July 2023 – June 2024.

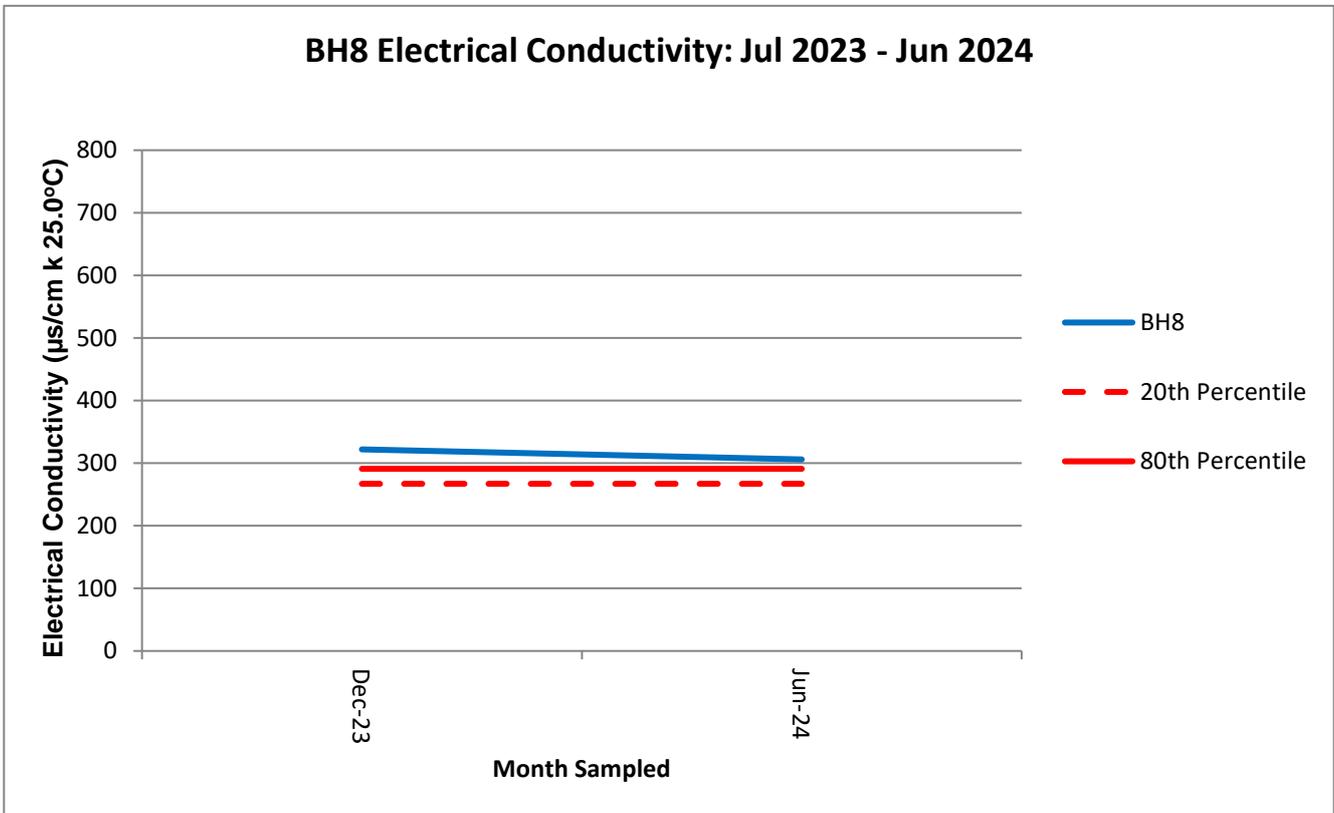


Chart 53: BH8 Electrical Conductivity Results July 2023 – June 2024.

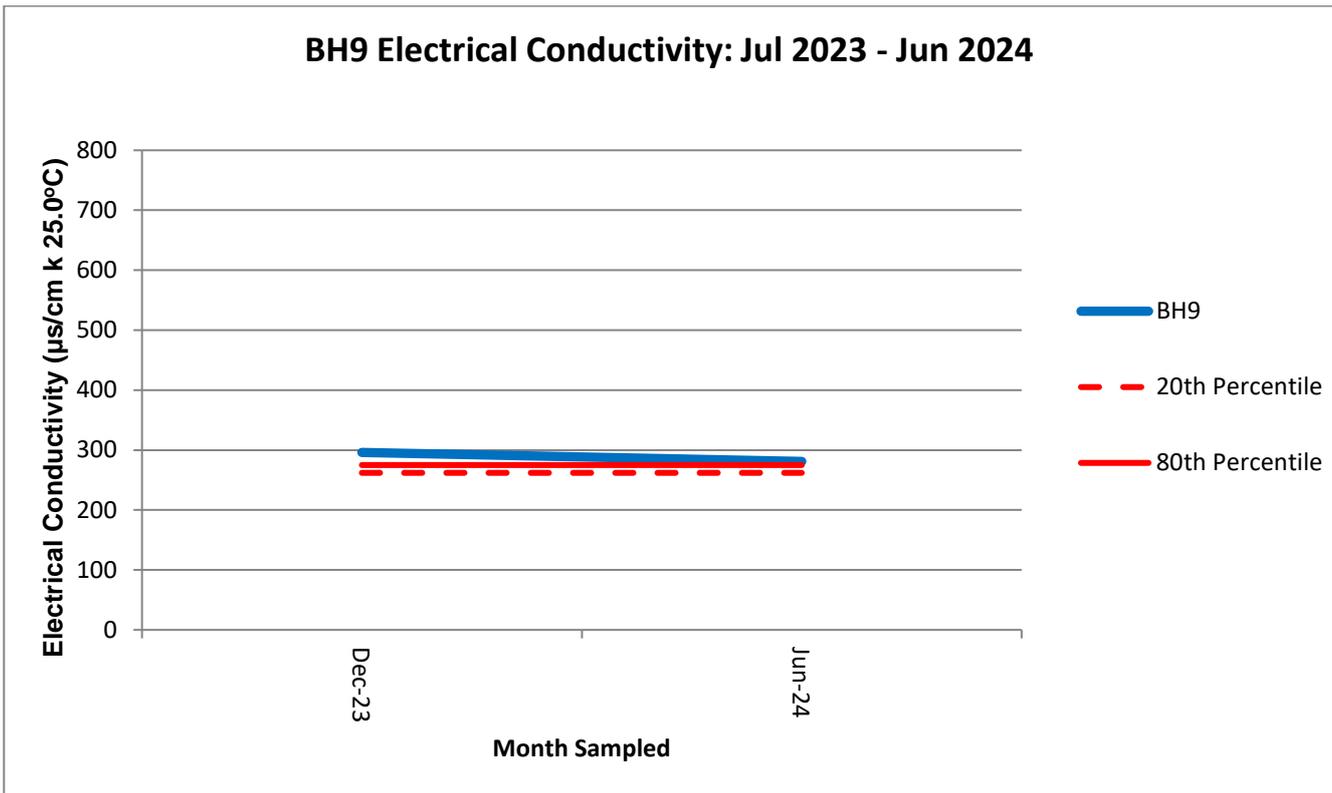


Chart 54: BH9 Electrical Conductivity Results July 2023 – June 2024.

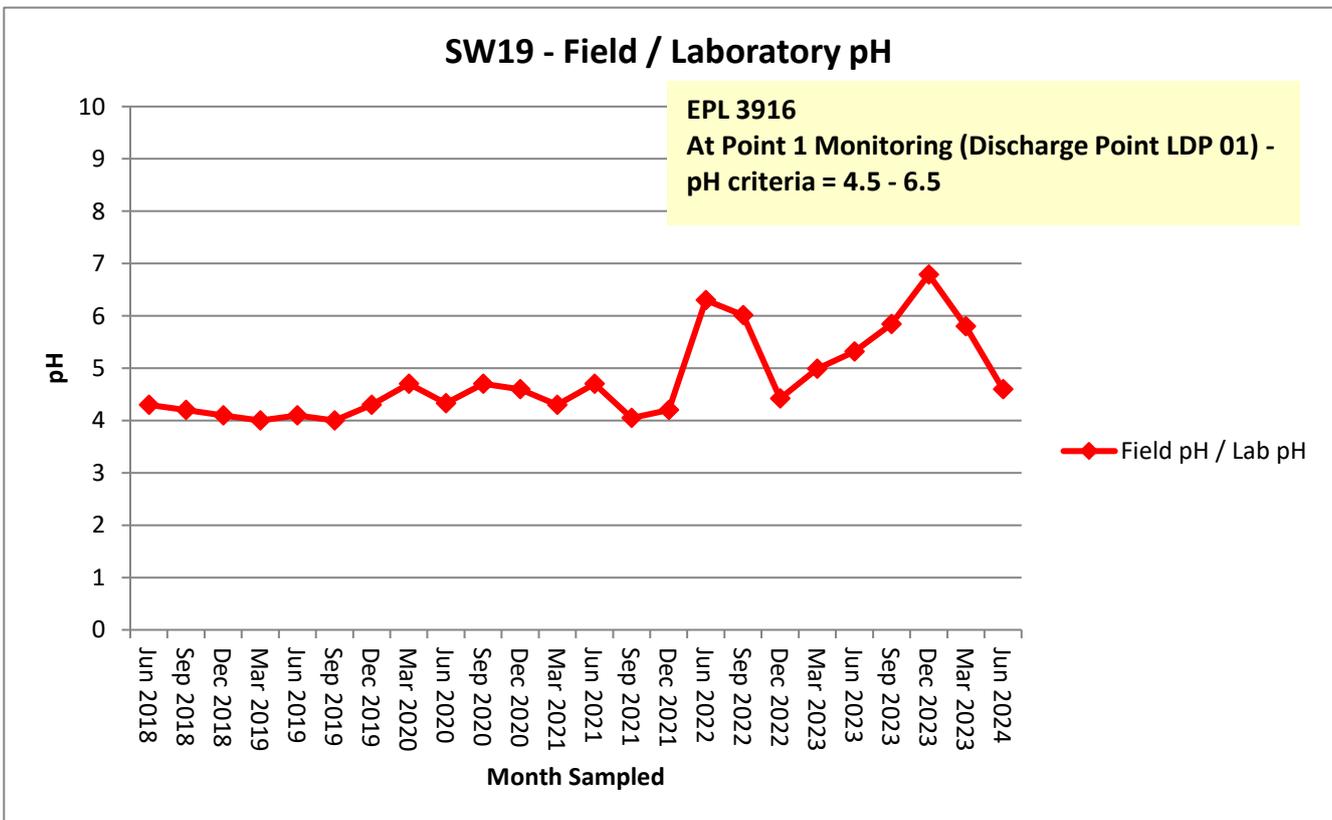


Chart 55: SW19 Field pH June 2018 – June 2024.

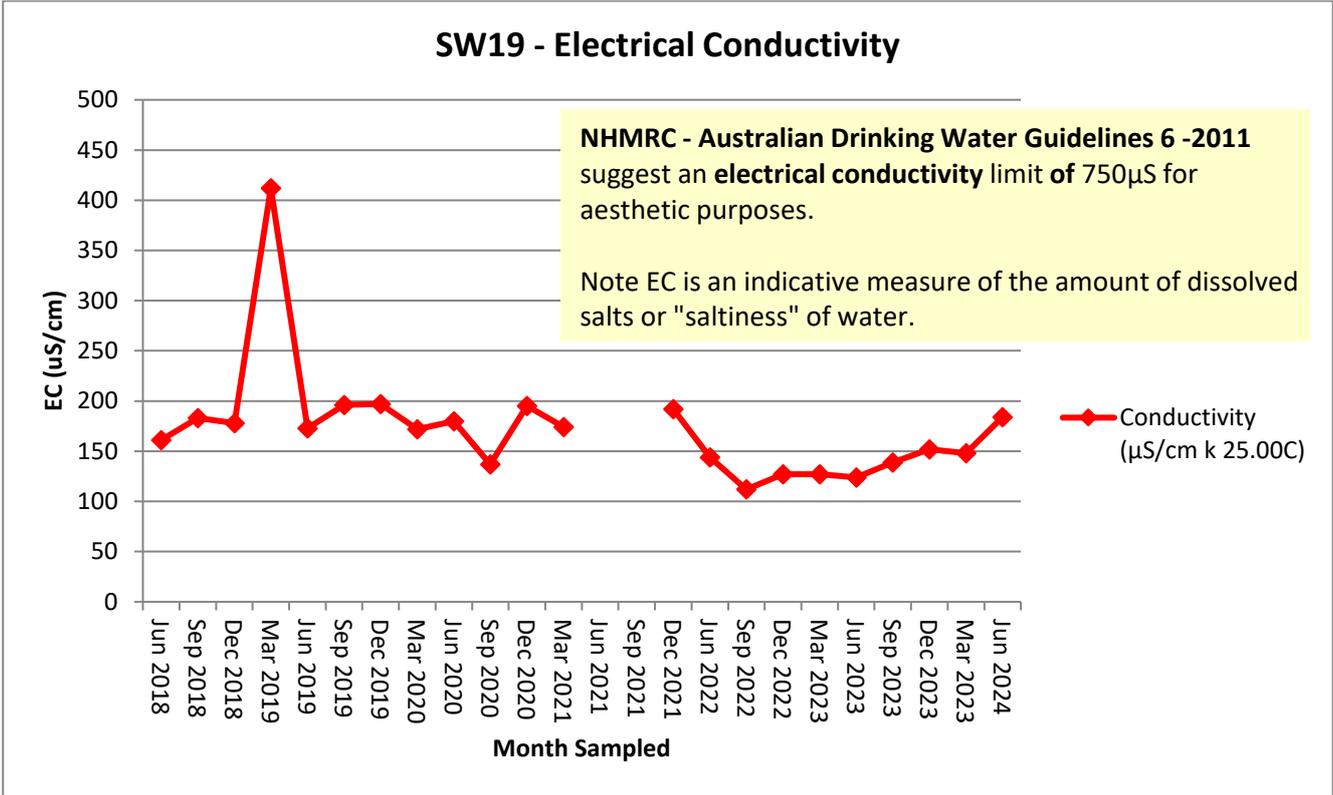


Chart 56: SW19 Electrical Conductivity June 2018 – June 2024.

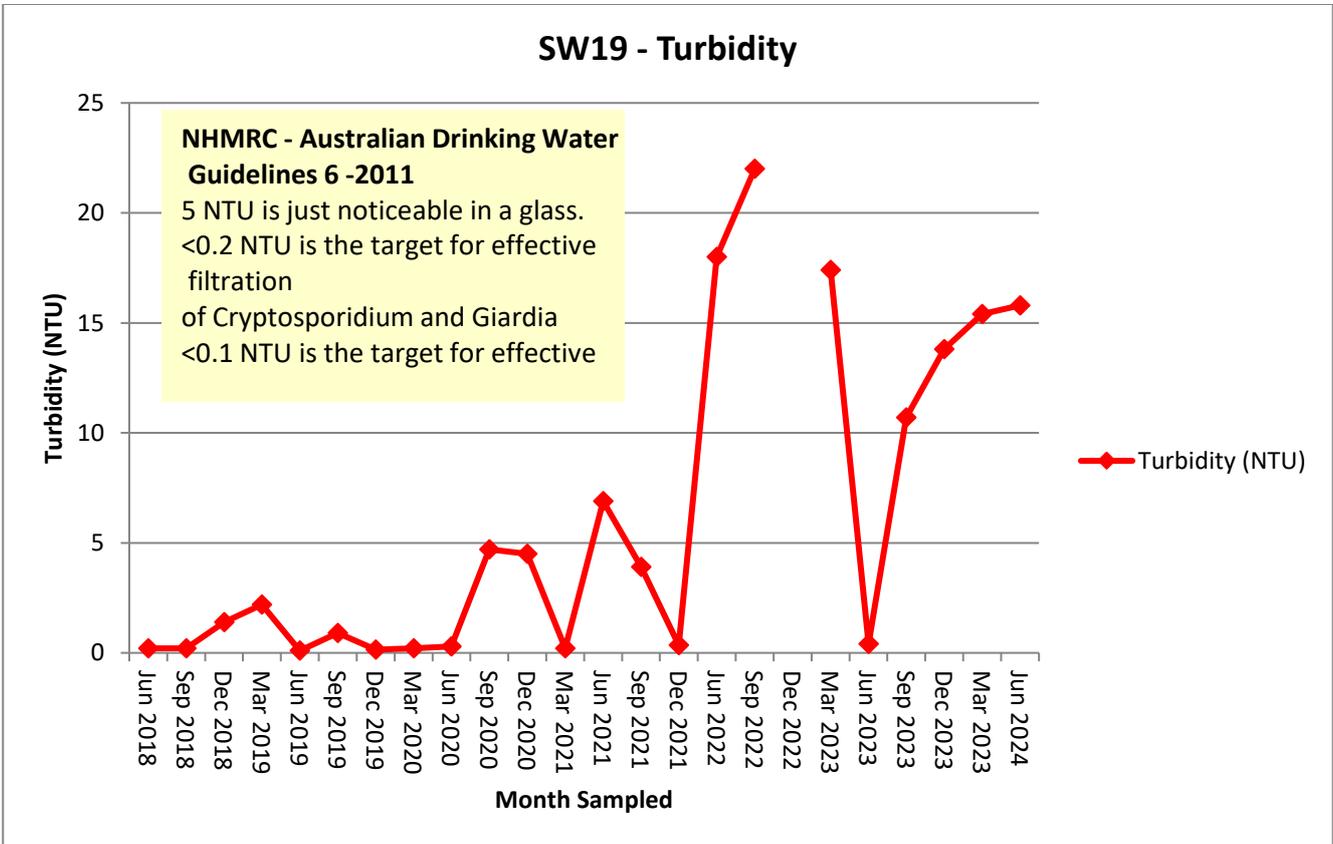


Chart 57: SW19 Turbidity June 2018 – June 2024.

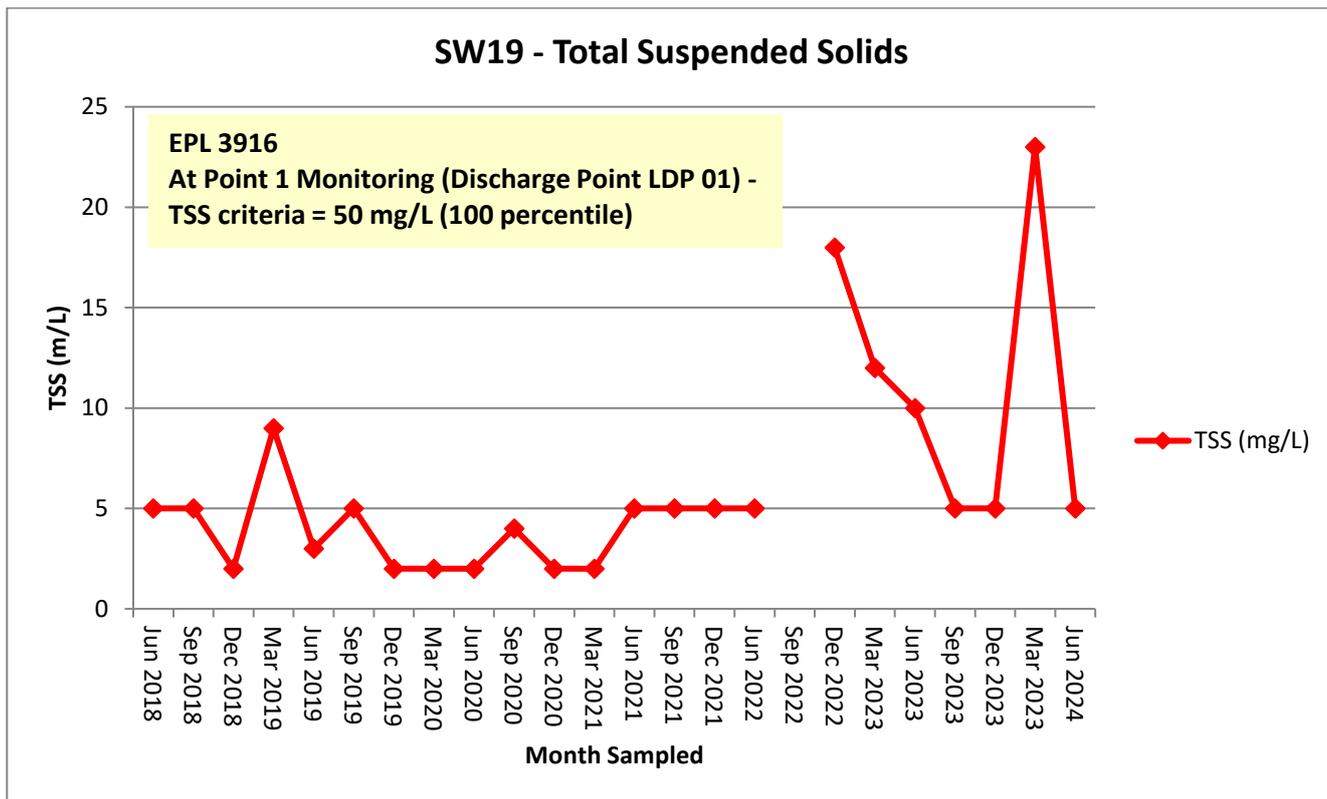


Chart 58: SW19 Total Suspended Solids June 2018 – June 2024.

Table 28: LDP01 laboratory results, relevant water criteria and compliance for discharge.

Sample Date	pH			Total Suspended Solids (mg/L)			Turbidity (NTU)		
	Laboratory Result	EPL Criteria	Criteria met	Laboratory Result	EPL Criteria	Criteria met	Laboratory Result	EPL Criteria	Criteria met
No discharge at LDP01 during this reporting period.									

## 6.4 Analyses

### 6.4.1 Groundwater Levels

Groundwater level results for bores which monitor localised perched groundwater aquifers (MW series and BH8) indicate some fluctuations between water levels across the monitoring months. The majority of the measured groundwater levels in perched aquifer bores displaying a trend below the 20<sup>th</sup> percentiles (except MW2 and BH8) which are the lower limit of the adopted trigger levels in the Soil and Water Management Plan. An investigation into the monitoring results indicate that these water level fluctuations are directly correlated to the amount of aquifer recharge of water through ground infiltration and percolation. Perched aquifers have been shown to be more responsive to surface water infiltration and percolation from rainfall events. With the return of the average rainfall,

water levels in the perched aquifers have declined during this period, in comparison to the previous 2021 – 2022 monitoring period which experienced wetter climatic conditions due to La Nina influences.

Water level results for boreholes which monitor the Sydney Basin Central Groundwater Source aquifer (BH1, BH2, BH3, BH6, BH7 and BH9) depict a strong trend across the monitoring months. Groundwater levels in BH6, BH7 and BH9 during this reporting period fell within the 20<sup>th</sup> and 80<sup>th</sup> percentile. Water levels in BH2 and BH3 were recorded to be closer to their 80<sup>th</sup> percentile levels whilst water levels in BH1 were mainly above the 8<sup>th</sup> percentile level. Similar to the previous reporting period, the slight reduction in groundwater level trends is directly correlated to the return of the average rainfall.

## 6.4.2 Groundwater Quality

Greater fluctuations of pH values in groundwater were recorded during the 2010 to 2015 period. Relatively more stable pH values were recorded from 2015 to date, with the exception of BH2 which was struck by a vehicle late 2018. BH2 was rectified and groundwater quality monitoring recommenced in December 2019. pH values for MW1, MW2, MW5, BH2, BH7, BH8 and BH9 fall within the 20<sup>th</sup> and 80<sup>th</sup> percentile trigger values during the reporting period. pH values for MW3 were on and slightly above the 8<sup>th</sup> percentile whilst pH for BH1, BH3 and BH6 were slightly below the 20<sup>th</sup> percentile.

Electrical conductivity (EC) values in groundwater have been relatively stable from 2010 to the current reporting period, showing some fluctuations which were considered anomalies.

Electrical conductivity in MW2 showed greater fluctuations between 2010 and 2015 and started to stabilise from 2016 onwards. Elevated electrical conductivity value in MW5 was recorded in 2014 which then returned to stabilised values thereafter. Electrical conductivity values in BH2 showed greater fluctuations in 2015 to 2016 which subsequently stabilised thereafter. During this monitoring period, electrical conductivity values for the majority of boreholes fall within the 20<sup>th</sup> and 80<sup>th</sup> percentile trigger values. Electrical conductivity values in MW1, MW3, BH1, BH2 and BH9 were recorded slightly above or below the range.

In both instances, the variations in pH and electrical conductivity values over the years were likely to be influenced by prolonged drought conditions and the wetter condition experienced during this monitoring period, with the return of average annual rainfall during this reporting period.

## 6.4.3 Assessment of Surface Water Quality and Discharge Event

SW19 represents the receiving water downstream of the discharge point (LDP01 which is Monitoring Point 1 of EPL 3916). Quarterly sampling and analysis of surface water quality at SW19 re-commenced in June 2018.

Greater fluctuations of pH at SW19 have been recorded since the wetter climatic conditions experienced during the previous reporting period, pH ranged from 4.6 to 6.8 during this reporting period which generally comply with the EPL pH criteria of 4.5 – 6.5

Electrical Conductivity (EC) values fluctuated between 139 and 184  $\mu\text{S}/\text{cm}$  during this reporting period. EC at SW19 were well below the *NHMRC - Australian Drinking Water Guidelines 6 - 2011* which suggests an electrical conductivity limit of 750 $\mu\text{S}$  for aesthetic purposes.

Turbidity values from SW19 varied between 10.7 and 15.8 NTU. According to the *NHMRC - Australian Drinking Water Guidelines 6*, a turbidity of 2 NTU implies that water samples were mostly clear to some fine particles being visible whilst 5 NTU will have some visible fine particles and 60 NTU implies the water cannot be see through.

Total suspended solids (TSS) at SW19 varied between 5 – 23 mg/L which are significantly lower than the EPL 3916 TSS criteria of 50 mg/L.

The receiving surface water quality monitoring at SW19 was undertaken on a quarterly basis during this monitoring period in September 2023, December 2023, March 2024 and June 2024.

Table 29 presents the baseline surface water (SW19) quality and trigger values contained in the **Soil and Water Management Plan (v5, November 2020)** (SWMP). The trigger values adopted in the SWMP are as follow:

- pH: 20<sup>th</sup> and 80<sup>th</sup> percentile
- TSS: 80<sup>th</sup> percentile
- Turbidity: 80<sup>th</sup> percentile

Table 30 presents the surface water (SW19) quality results yielded during this monitoring period.

**Table 29: Baseline Surface Water (SW19) Quality and Trigger Values (June 2018 to June 2020).**

Parameter	Minimum	20 <sup>th</sup> Percentile	50 <sup>th</sup> Percentile	80 <sup>th</sup> Percentile	Maximum
pH	4.0	4.1	4.2	4.3	4.7
TSS (mg/L)	2.0	2.0	3.0	5.0	9.0
Turbidity (NTU)	0.1	0.2	0.2	1.1	2.2

**Table 30: Surface Water (SW19) Quality Results 2023 - 2024.**

Parameter	Sep 2023	Dec 2023	Mar 2024	Jun 2024
pH	5.8	6.8	5.8	4.6
TSS (mg/L)	5	5	23	2
Turbidity (NTU)	10.7	13.8	15.4	15.8
SW19 quality results fall within the Trigger Values (SWMP, V5, Nov 2020)	No (pH and Turbidity above 80 <sup>th</sup> percentile)	No (pH and Turbidity above 80 <sup>th</sup> percentile)	No (pH, TSS and Turbidity above 80 <sup>th</sup> percentile)	No (pH and Turbidity above 80 <sup>th</sup> percentile)

The surface water (SW19) quality results contained in Table 30 indicate that higher readings have been recorded since the June 2023 (previous reporting period). High rainfall events may have resulted in higher creek flows within the creek which would likely to have caused some of the parameters to fall outside the trigger value thresholds of Table 29. The water quality results for this reporting period, although higher than historic results and trigger levels, the majority of the parameters sit below the EPL 3916 criteria. A close monitoring of the water quality at SW19 will continue.

No planned water discharge occurred at the licensed discharge point LDP01 (main water channel) during this reporting period.

### 6.4.4 Comparison of Surface Water Discharge Volume and Quality with Historical Data

The long-term discharge volumes and analysed water quality at the EPA licensed discharge point LDP01 are shown in Table 31. A total of 1.50 megalitres of water have been discharged during the discharge events since the 2003 – 2004 monitoring period to date. No ‘planned’ water discharge at the license discharge point LDP01 occurred during this reporting period.

Condition M2.3 of EPL lists the limits of water quality criteria to be met for water discharge which are:

- pH: 4.5 – 6.5
- Total suspended solids: 50 mg/L

Historically, laboratory results indicate that all water quality suites have met the EPL discharge criteria since the commencement of monitoring, except for one discharge event in the 2014 – 2015 monitoring period where the total suspended solids were slightly elevated and exceeded the EPL criteria. There was no discharge during the 2023 – 2024 reporting period.

**Table 31: Long Term Discharged Water Volume at LDP01 (EPL licensed discharged point)**

Annual Review Monitoring Period	Discharge Volume (Megalitre)	pH	Total Suspended Solid (mg/L)	Turbidity (NTU)	EPL Discharge Criteria Met
2003 – 2004	0.062 <sup>*1</sup>	4.9 <sup>*1</sup>	16 <sup>*1</sup>	21 <sup>*1</sup>	Yes <sup>*1</sup>
	0.034 <sup>*2</sup>	5.0 <sup>*2</sup>	31 <sup>*2</sup>	33 <sup>*2</sup>	Yes <sup>*2</sup>
2004 – 2005	0.374 <sup>*1</sup>	5.9 <sup>*1</sup>	33 <sup>*1</sup>	60 <sup>*1</sup>	Yes <sup>*1</sup>
	0.156 <sup>*2</sup>	6.3 <sup>*2</sup>	22 <sup>*2</sup>	6.3 <sup>*2</sup>	Yes <sup>*2</sup>
2005 – 2006	0	-	-	-	-
2006 – 2007	0	-	-	-	-
2007 – 2008	0	-	-	-	-
2008 – 2009	0	-	-	-	-
2009 – 2010	0	-	-	-	-
2010 – 2011	0	-	-	-	-
2011 – 2012	0	-	-	-	-
2012 – 2013	0	-	-	-	-
2013 – 2014	0	-	-	-	-
2014 – 2015	Not measured <sup>*1</sup>	4.7 <sup>*1</sup>	64 <sup>*1</sup>	40 <sup>*1</sup>	No <sup>*1</sup>
	Not measured <sup>*2</sup>	5.5 <sup>*2</sup>	32 <sup>*2</sup>	80 <sup>*2</sup>	Yes <sup>*2</sup>
2015 – 2016	0	-	-	-	-
2016 – 2017	0	-	-	-	-
2017 – 2018	0	-	-	-	-
2018 – 2019	0	-	-	-	-

Annual Review Monitoring Period	Discharge Volume (Megalitre)	pH	Total Suspended Solid (mg/L)	Turbidity (NTU)	EPL Discharge Criteria Met
2019 – 2020	0.350 <sup>*1</sup>	5.79 <sup>*1</sup>	18 <sup>*1</sup>	24.1 <sup>*1</sup>	Yes <sup>*1</sup>
	0.520 <sup>*2</sup>	4.60 <sup>*2</sup>	2 <sup>*2</sup>	4.2 <sup>*2</sup>	Yes <sup>*2</sup>
	0.005 <sup>*3</sup>	no sample <sup>*3</sup>	no sample <sup>*3</sup>	no sample <sup>*3</sup>	No <sup>*3</sup>
2020 – 2021	0	-	-	-	-
2021 – 2022	Not measured <sup>*4</sup>	-	-	-	-
2022 – 2023	0	-	-	-	-
2023 - 2024	0	-	-	-	-
<b>TOTAL Volume Discharged (Megalitre)</b>	<b>1.500</b>				

Note: <sup>\*1</sup> denotes to discharge event number 1 within the monitoring period  
<sup>\*2</sup> denotes to discharge event number 2 within the monitoring period  
<sup>\*3</sup> denotes to discharge event number 3 within the monitoring period  
<sup>\*4</sup> denotes to discharge event number 3 within the monitoring period

## 6.5 Maximum Extraction Depth Map

The Maximum Extraction Depth Map (MEDM) is based on the wet weather groundwater elevation and is determined by the quarry groundwater monitoring network.

An Independent Environmental Audit (IEA) was completed, and the report submitted in January 2023. Condition 23 of Schedule 2 of DA 250-09-01 states that a review and update of the MEDM for the Quarry is to be undertaken within 3 months of the completion of the IEA, to the satisfaction of the Secretary. A review of the MEDM was undertaken by WSP Golder and the reviewed document was submitted to the DPHI on 11 January 2023 for review and approval. The revised MEDM was approved by DPHI on 17 March 2023.

The next revision and update of the MEDM will be undertaken within 3 months of the next IEA which is scheduled to occur late 2025.

## 6.6 Water Access License Usage

The Annual Returns for Water Access License (WAL) 24341 for the 2023 - 2024 reporting period were submitted to WaterNSW in July 2024. The total water usage for the WAL is listed in Table 32 below.

**Table 32: Water usage for Water Access Licences**

Water Access License Number	Annual Water Usage (Megalitres)
WAL 24341	0

## 6.7 Changes to Environmental Procedures

Current groundwater management measures are considered adequate. No changes to environmental procedures are proposed.

Monitoring of the extraction limit will continue in order to ensure compliance. The Maximum Extraction Map for Old Northern Road quarry will require review following the next Independent Environmental Audit scheduled in late 2025.

Continue to monitor groundwater levels and quality, together with observations of any environmental or land use changes.

Any planned surface water discharge at LDP01 main water channel (Monitoring Point 1 of EPL 3916) will require grab samples prior to discharge for laboratory analysis to ensure pH, TSS and turbidity are within the specified EPL concentration limits. Dixon Sand staff to implement the Permit to Discharge procedure which outlines the steps required leading up to the allowable water discharge.

Quarterly sampling of surface water at SW19 to continue as normal.

## 7. Ecological Monitoring and Rehabilitation

### 7.1 Vegetation Clearing

One vegetation clearing event was carried out during this reporting period which was associated with maintenance of pedestrian access track to BH1. All vegetation clearing was undertaken in accordance with the pre-clearing survey and primarily involved removal of weed and shrubby regrowth as the fence line was previously cleared a number of years ago. Appropriate briefings were provided to the relevant staff prior to the commencement of vegetation clearing.

### 7.2 Bush Regeneration and Weed Management

Rehabilitation and weed management at Old Northern Road quarry were undertaken by a bush regeneration contractor Bush-It Pty Ltd with multiple visits each month throughout the reporting period.

A total of 255 hours was spent on bush regeneration works at Old Northern Road Quarry, equating to approximately 47% of the time spent between Old Northern Road Quarry and Haerses Road Quarry scope of works.

Bush regeneration, native vegetation planting and weed management were carried at the following locations:

- Vegetated areas on Lots 1 and 2 excluding areas in the extraction pit and sediment ponds,
- Native Vegetation Corridor on Lot 29,
- Southern border of extraction pit on Lot 196,
- Front embankment along the quarry entrance, and
- Biodiversity Offset Area located at Haerses Road (Lots 176 and 177 DP 752039).

Bush regeneration works involved mechanical and chemical methodologies.

Figures 3 to 6 (inclusive) show the locations where bush regeneration and weed management works have been undertaken at the Old Northern Road Quarry and Biodiversity Offset Area (located at Haerses Road) during this reporting period.

The Annual Bush Regeneration Report provided by the contractor for the 2023 – 2024 reporting period is attached as Appendix G.



Figure 3: Work areas subjected to bush regeneration and weed management at Old Northern Road Quarry (source: BushIT 2024).

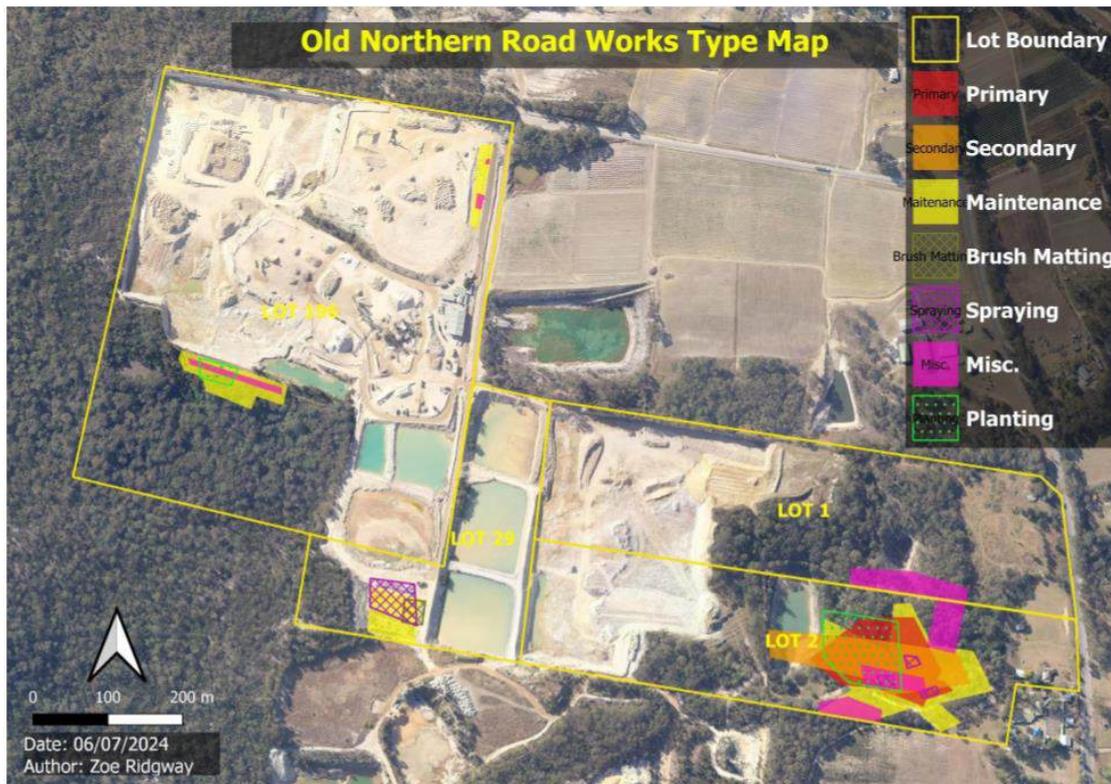


Figure 4: Work types undertaken at Old Northern Road Quarry (source: BushIT 2024).

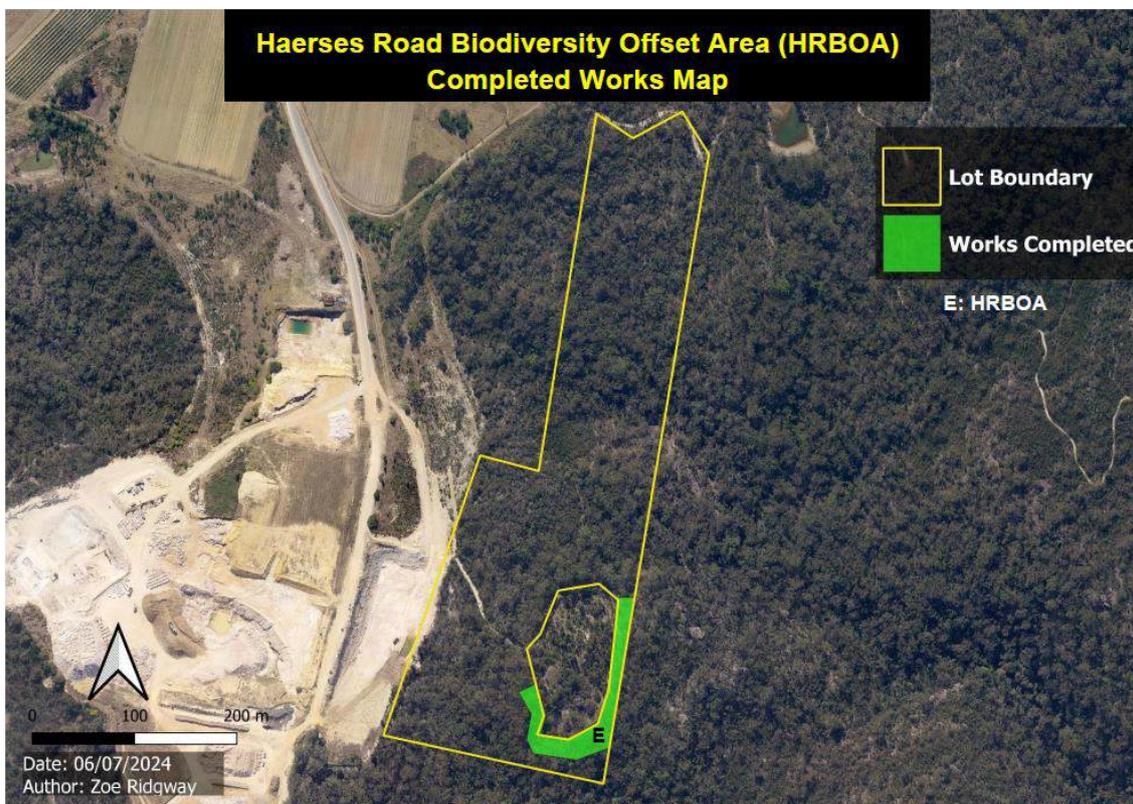


Figure 5: Work areas subjected to bush regeneration and weed management at Haerses Road Biodiversity Offset Area (source: BushIT 2024).

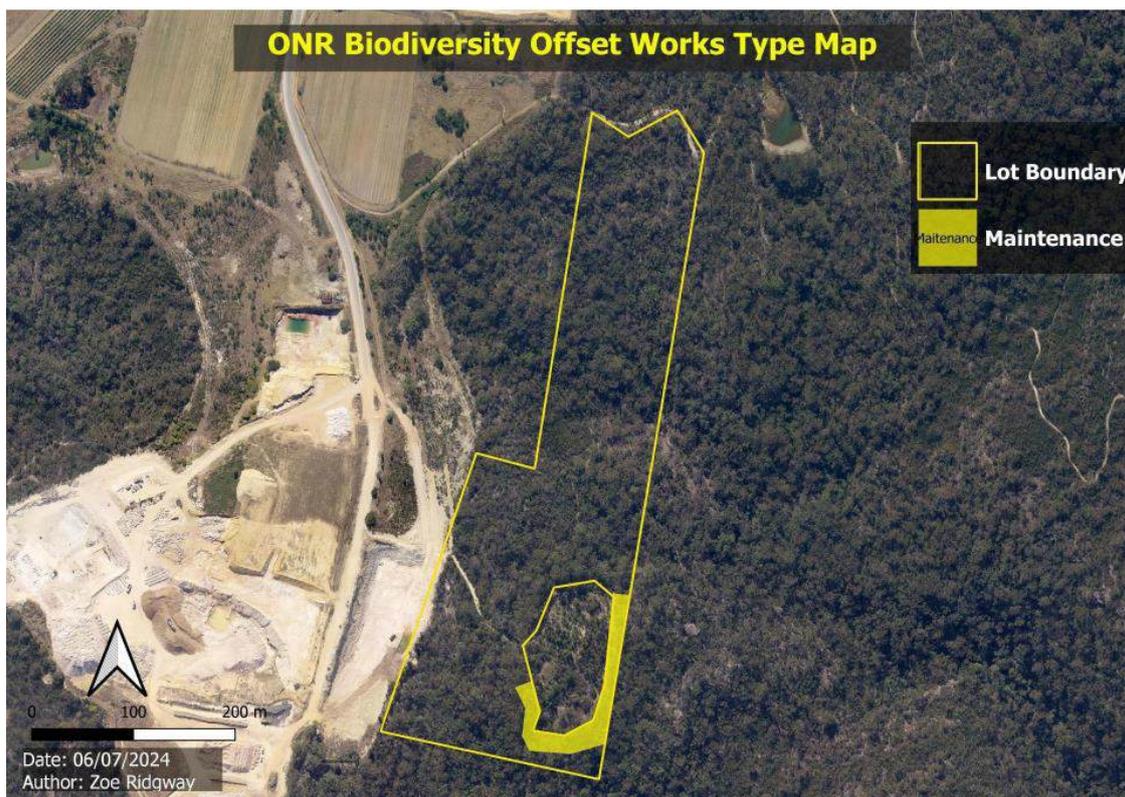


Figure 6: Work types undertaken at Haerses Road Biodiversity Offset Area (source: BushIT 2024).

### 7.3 Biodiversity and Rehabilitation

Dixon Sand engaged South East Environmental to undertake the annual biodiversity and rehabilitation monitoring and reporting for Old Northern Road Quarry. Progress assessments were made against the commitments in Old Northern Road Quarry Biodiversity and Rehabilitation Management Plan (BRMP). The Biodiversity and Rehabilitation Management Report (South East Environmental, 2024) aimed to:

- Identify native flora and fauna species, populations and ecological communities known to or likely to occur within the Native Vegetation Corridor (NVC) and Haerses Road Biodiversity Offset Area (HRBOA),
- describe the native vegetation and habitats within the NVC and HRBOA,
- describe the current condition of the threatened flora and its habitat found outside of the NVC at Old Northern Road,
- discuss the ongoing monitoring of threatened flora and fauna previously recorded at both ONR and HRBOA,
- determine the legislative and conservation significance of species, populations and ecological communities known or likely to occur within the NVC and HRBOA with reference to the Commonwealth *EPBC Act 1999* and the *NSW BC Act 2016*,
- recommend appropriate biodiversity and environmental management measures that should be implemented to reach criteria for monitoring success set by the Old Northern Road Quarry Biodiversity and Rehabilitation Management Plan (2018), and
- provide an independent monitoring report for inclusion as part of the external reporting for the quarry Annual Review.

Field surveys were conducted over July and August 2024 throughout the established monitoring sites across the quarry. Specific survey methodologies were adopted including the 20m x 50m quadrats, 2m x 20m subplot, 1m x 1m line plots and random meandering. Fauna survey methods included general searches for indirect evidence of native fauna including scratches, scats, nests, hollows in use, camps, roosts, den sites etc. in the study area, including diurnal and nocturnal call identifications. Opportunistic sightings of all fauna species were recorded throughout the survey period. Early morning dedicated bird surveys undertaken. Unbaited motion detection infra-red digital camera for 30 nights and Anabat recording device for 30 nights were also utilised for the fauna survey.

It was noted that the flora survey was conducted over a short timeframe during winter and therefore some plant species may have been undetected and not identified due to their dormancy or lack of flower status. The study was limited by the timing and frequency of survey.

Sections 7.3.1 to 7.3.10 describe the findings at each nominated rehabilitation and monitoring area, assessment against completion criteria, together with discussion and recommendations. The full Biodiversity and Rehabilitation Management Report (South East Environmental, 2024) is contained in Appendix H.

### 7.3.1 Native Vegetation Corridor

The Native Vegetation Corridor (NVC) comprises an area of 6.83 hectares, extending from the south-western corner of Lot 29 and extending along the southern boundary of Lot 2 to the area located between the 250m buffer and the Maroota Public School.

Five out of nine vegetation monitoring sites are located within the NVC.

The location of the NVC and vegetation monitoring sites are shown in Figure 7.

Rehabilitation of native vegetation in the NVC commenced in late 2017 on the south-western boundary of Lot 29, comprising an area of approximately 0.8 hectares and utilising three rehabilitation methods. Parts of the current NVC are utilised as haul road, sediment ponds and active extraction area. The remaining area are existing areas containing native vegetation and disturbed areas which are remnants of orchard plantation, grazing land and farm dams.

#### Rehabilitation Area – Planted

The planted area in the NVC is approximately 0.4 hectares in size. One vegetation monitoring site, as specified by the BRMP, is located in this area. Native nursery tube stocks were planted in this location. Two of the species, *Melaleuca deanei* (vulnerable) and *Darwinia fascicularis* ssp. *oligantha* (endangered population) under the *Biodiversity Conservation Act 2016*, were propagated from onsite specimens, grown in commercial nurseries and replanted in the NVC.

A total of 47 native species have been planted in this area, including the abovementioned propagated threatened species. The ecological survey during this monitoring period identified an additional 68 native species which have emerged from seed bank storage from the sub-soil, including the vulnerable species *Tetratheca glandulosa*. This is an increase of 3 additional species since the previous monitoring year. The increased number of species observed can be attributed to ideal weather for growing conditions, the available abundant seed bank stored in the soil in the rehabilitation and neighbouring bushland, together with the thinning of native species by Bush Regenerators to alleviate plant overcrowding and limitation of sunlight reaching the ground stratum.

One weed species being Whiskey Grass (*Andropogon virginicus*) was identified and present within this planted rehabilitation area in very low density.

There were 22 live specimens of *Melaleuca deanei*, 12 *Darwinia fascicularis* ssp. *oligantha* and 9 *Tetratheca glandulosa* located this reporting period. No *Acacia bynoeana* was identified during this period which is likely due to wet conditions in 2020-2022 causing unfavourable condition for the species to grow.

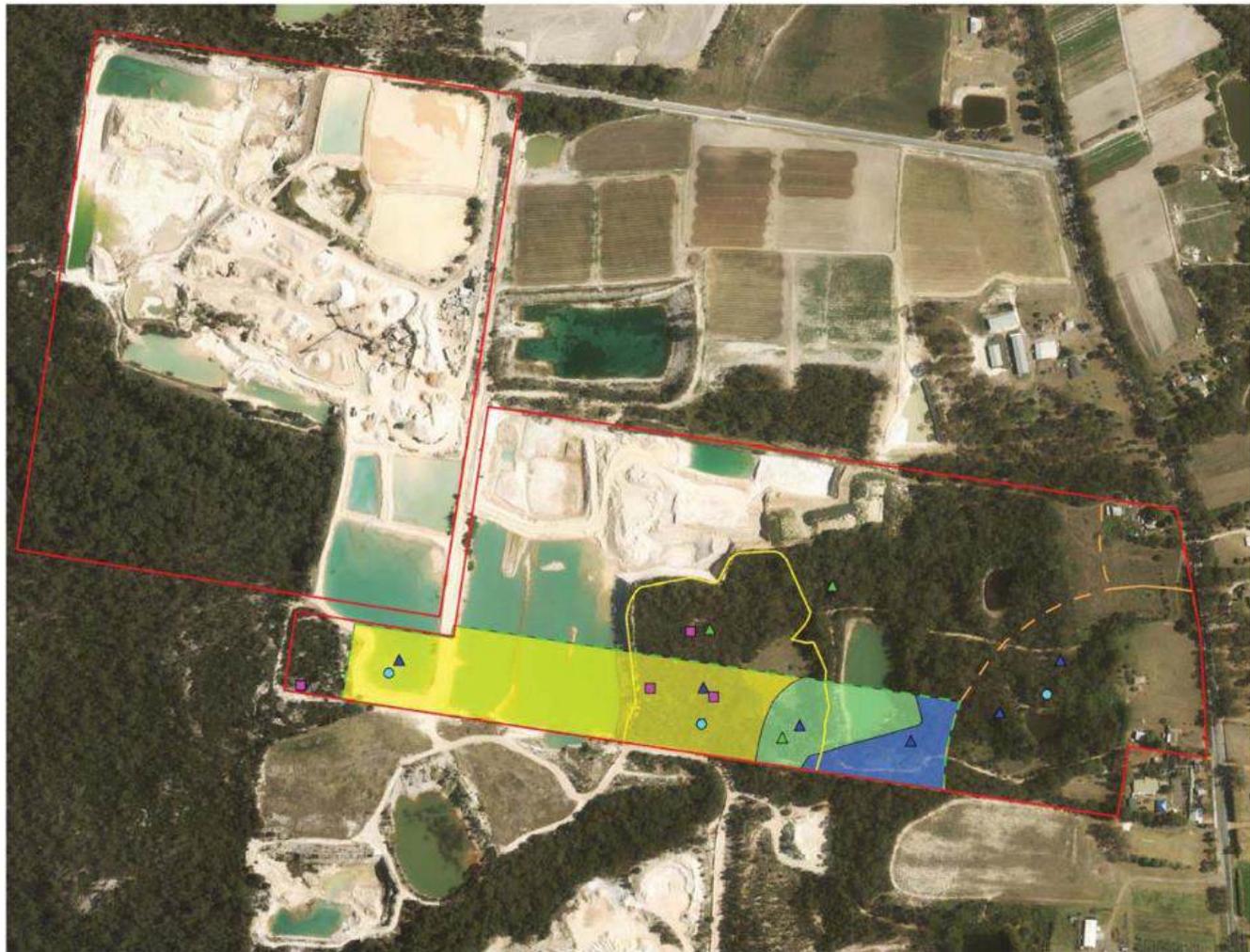
Plates 1 and 2 shows the view of the planted rehabilitation area from the north-west corner looking east by comparing images from 2021 and 2024.

Plates 3 and 4 shows the view of the planted rehabilitation area from the south-east corner looking west by comparing images from 2021 and 2024.

Plates 5 and 6 contains the current status of one of the propagated *Melaleuca deanei* and *Darwinia fascicularis* ssp *oligantha* cuttings planted in 2017.

Plate 7 shows the *Tetratheca glandulosa* within the planted rehabilitation area.

The annual survey indicates that the overall condition of the planted rehabilitation area is very good with canopy trees reaching reproductive maturity with flowering buds present during the survey event in July 2024. An increased in species diversity was noted in shrub and ground cover species. Native mammals observed include macropods, bandicoots and possums. An increased in bird diversity was observed with 10 species recorded during the survey period in 2024.



- Legend**
- The Site
  - Modification Area
  - Rehabilitation Offset
  - Buffer Area
- Vegetation Community**
- Euoalyptus punctata Woodland
  - Angophora costata Woodland
  - Banksia Heath
- Monitoring Sites**
- Vegetation reference site
  - Vegetation
  - Threatened Flora
  - Threatened Fauna



0 50 100 200m

**Figure 7**

**Location of Ecological Monitoring Sites  
Old Northern Road Quarry**

Image Source: Cumberland Ecology (2015)  
File Name (A4): RD6/4209\_020.dgn  
20180220 17:30



**Plate 1: View of planted rehabilitation area from north-west corner looking east, 2021 (source: South East Environmental, 2023).**



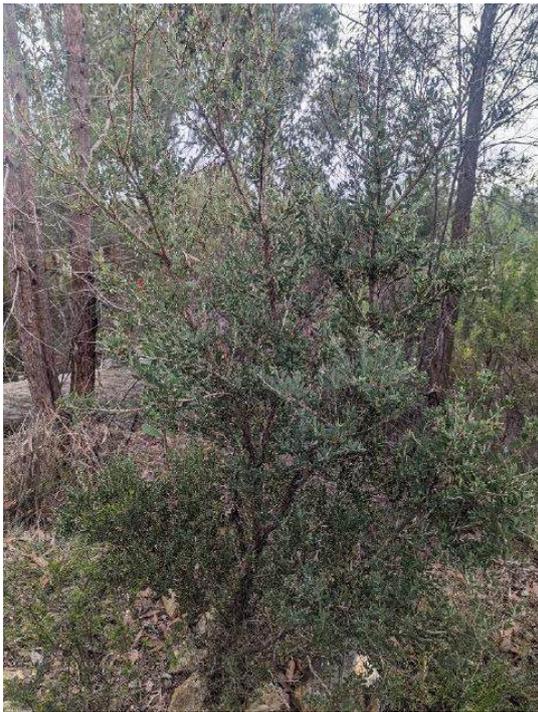
**Plate 2: View of planted rehabilitation area from north-west corner looking east, 2024 (source: South East Environmental, 2024).**



**Plate 3: View of planted rehabilitation area from south-east corner looking west, 2021 (source: South East Environmental, 2024).**



**Plate 4: View of planted rehabilitation area from south-east corner looking west, 2024 (source: South East Environmental, 2024).**



**Plate 5: *Melaleuca deanei* planted in 2017 within the planted rehabilitation area 2024 (source: South East Environmental, 2024).**



**Plate 6: *Darwinia fascicularis* ssp *oligantha* planted in 2017 within the planted rehabilitation area 2024 (source: South East Environmental, 2024).**



**Plate 7: *Tetratheca glandulosa* within the planted rehabilitation area 2024 (source: South East Environmental, 2024).**

### Rehabilitation Area – Translocated

This area involved direct translation of material from Lots 1 and 2 vegetation clearing. Continued recruitment from seed bank storage were observed to be ample. All age classes ranging from small seedlings to adult shrubs were observed from small seedlings to adult shrubs which had limited flower during the survey. Shrubs and ground cover species were reasonably abundant throughout the area. The canopy stratum is yet to fully establish however, *Eucalyptus sp.*, *Corymbia sp.* and *Angophora hispida* recruits were observed.

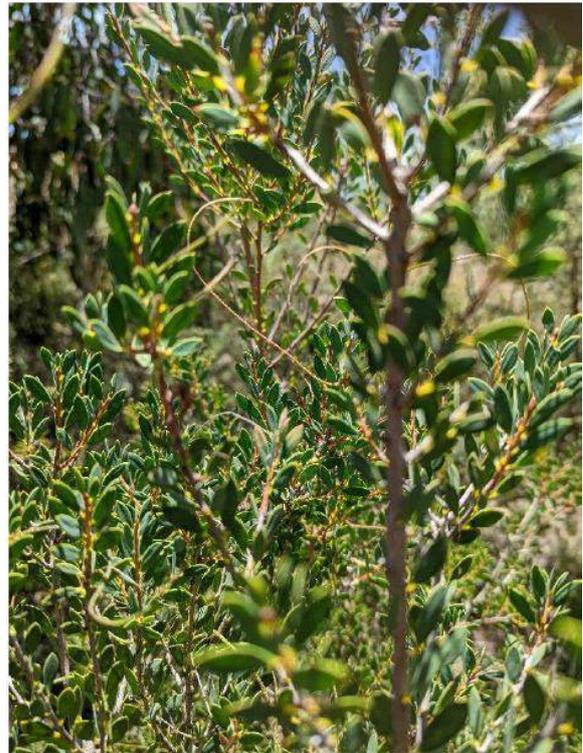
Translocated *Darwinia fascicularis ssp. oligantha* is numerous, particularly on the western section of the area. One single translocated *Tetratheca glandulosa* were observed to be in a healthy state with flowers present during July 2024 survey suggesting that flowering will continue over the coming months. Another *Tetratheca glandulosa* specimen was located which has grown from seed bank within the soil.

Three *Melaleuca deanei* which were planted in 2017 are still present and observed to be in a healthy state. A further 26 *M. deanei* individuals have been planted within this area during the 2020 – 2021 reporting period. All plants appear to be doing well with some showing signs of active growth. The parent plant was translocated to this area after the 2:1 targeted species offset ratio was achieved. The mother plant was translocated using a loader with a large bucket with the aim of collecting as much soil and root ball as possible. Unfortunately, the main tap root was broken during the process causing the plant material died back. At the location of this translocated parent plant, a single seedling of *M. deanei* were observed to have emerged from the soil mounds. There will be on-going monitoring of these seedlings over the coming months.

Plate 8 shows the translocated *Tetratheca glandulosa* flowering within the translocation area 2024. Plate 9 contains a specimen of *M. deanei* which was planted in the translocation area in 2017. Plate 10 shows another *Darwinia fascicularis ssp oligantha* specimen within this area. Plate 11 shows the *M. deanei* seedling emerging from parent plant root ball. A bird's nest was observed within the rehabilitation area as shown in Plate 12.



**Plate 8:** Translocated *Tetratheca glandulosa* flowering within the translocation area 2024 (source: South East Environmental, 2024)



**Plate 9:** *M. deanei* planted in 2021 within the translocation area 2024 (source: South East Environmental, 2024).



**Plate 10:** *Darwinia fascicularis ssp oligantha* within the translocation area 2024 (source: South East Environmental, 2024).



**Plate 11:** *M. deanei* seedling emerging from parent plant root ball within the translocation area 2024 (source: South East Environmental, 2024)



**Plate 12: Birds nest observed within the rehabilitation area 2024 (source: South East Environmental, 2024)**

#### **Rehabilitation Area – Soil Seed Bank**

Ample natural recruitment of native species was observed in this area, including *Darwinia fascicularis* ssp. *oligantha* recruitment. Ground cover and shrub species are present throughout. The canopy stratum is beginning to emerge with *Eucalyptus* sp. and *Corymbia* sp. observed. *Banksia ericifolia* is observed to be to the dominated recovering shrub layer with *Grevillea buxifolia* and *Acacia suaveolens* being widespread. Previously *Acacia suaveolens* had dominated this layer however the *Banksia* has outgrown most of the other species present. Groundcover species are present throughout the area but due to the density of the shrub layer the groundcover is found to be sporadically distributed.

Altogether 23 *Darwinia fascicularis* ssp. *oligantha* have been identified and are scattered throughout the site, some observed to have new recruits. A single planted *Melaleuca deanei* was relocated during this survey period. The density of the shrub regrowth is suspected to be impeding on the efforts to locate other individuals. All the surviving threatened species which were located was observed to be in a healthy state.

Plates 13 and 14 compare the same view of the translocated rehabilitation area from south-west looking east in 2021 and 2024.

Plates 15 and 16 compare the same view of the soil seed bank rehabilitation area from north looking south in 2021 and 2024.

Plates 17 and 18 compare the same view of the soil seed bank rehabilitation area from south looking north in 2021 and 2024.

Plate 19 shows the current status of *M. deanei* planted in 2017 within the seed bank rehabilitation area.

### **Front Gate Rehabilitation**

The area around the front gate of the quarry underwent initial rehabilitation in 2017 with supplementary planting of native species. However, hot dry conditions in 2017 and 2020 have resulted in a number of losses and slow growth of the surviving plants, despite regular watering and maintenance. Since the return of more regular rainfall, vegetation in the area has thrived with many shrubs flowering well and new recruitments observed. Gaps in vegetation occupancy are present but is expected to fill in with time via natural recruitment. Two *M. deanei* propagated from cuttings were planted in this area in 2023 however only one specimen survived.

Plate 20 shows the status of the front gate rehabilitation.



**Plate 12: View of translocated rehabilitation area from south-west looking east, 2021 (source: South East Environmental, 2024).**



**Plate 13: View of translocated rehabilitation area from south-west looking east, 2024 (source: South East Environmental, 2024).**



**Plate 14: View of soil seed bank rehabilitation area from north looking south, 2021 (source: South East Environmental, 2024).**



**Plate 15: View of soil seed bank rehabilitation area from north looking south, 2023 (source: South East Environmental, 2024).**



**Plate 16: View of soil seed bank rehabilitation area from south looking north, 2021 (source: South East Environmental, 2024).**



**Plate 17: View of soil seed bank rehabilitation area from south looking north, 2024 (source: South East Environmental, 2024).**



**Plate 18: *M. deanei* planted in 2017 within the seed bank rehabilitation area 2024 (source: South East Environmental, 2023)**



**Plate 20: Front gate rehabilitation area 2024 (source: South East Environmental, 2024)**

### **Vegetation Monitoring within NVC**

Out of the nine vegetation monitoring sites across the whole Old Northern Road Quarry site, five vegetation monitoring sites are located within the NVC including one site within the planted rehabilitation area previously discussed. From the remaining four sites, one site could be safely accessed for monitoring as the three remaining sites are currently in active quarry extraction area.

The overall health of the vegetation and biodiversity within the NVC is moderate. Historic disturbance was observed in this area and likely to be due to livestock grazing and timber removal. Recent continued rainfall in the local area has assisted in the recovery of vegetation from previous drought conditions.

The remaining areas throughout the NVC are impacted by the presence of *Lantana camara*. An effort to remove and control has been undertaken for a number of years however due to the distribution and density, long term management is required to completely remove the species across the entire site.

During the 2021-2022 reporting period, it was determined that the required number of cloned *Melaleuca deanei* specimens to offset vegetation clearing under DA250-09-01 Modification 4 had been achieved and determined successful, meeting the 2:1 offset ratio. This enabled the parent plant to be removed from the original site on Lot 2 Strip 2. An attempt to translocation the parent plant was made via digging around the root ball and carrying the plant with the attached root ball using a loader bucket. However, the root system of the parent plant was found to be extensive and had coiled around large sandstone boulders and throughout the cracks of others. The parent plant was

translocated and planted in the NVC with the root ball and immediate surrounding soil. Two seedlings have been observed to emerge at the root ball locations where the parent plant was translocated to and the area will be monitored over time for regrowth potential.

### **Vegetation Monitoring outside NVC**

Four vegetation monitoring sites are located outside the NVC. Access to two of the monitoring sites are located in the current extraction areas and therefore cannot be accessed. Access to one other monitoring site was restricted by the presence of *Lantana camara*.

The first accessible survey site is located outside the NVC within the 250m buffer to the Maroota Public School with vegetation determined to be *Smooth barked Apple – Red Bloodwood – Sydney Peppermint heathy open forest on slopes of dry sandstone gullies of western and southern Sydney, Sydney Basin Bioregion*. This area was subjected to historic disturbance, most likely from timber harvesting. Survey indicated there is abundance *Eucalyptus piperita* regenerating within the survey quadrat, all being around the same age which indicates that the area had been previously cleared. Diversity within the survey site was categorised as reasonable and biodiversity values moderate. This survey site will not be subjected to future vegetation clearing for the quarry and therefore presents a good opportunity to monitor the effects of sand extraction in nearby retained vegetation.

The additional survey site is also classified as *Smooth barked Apple – Red Bloodwood – Sydney Peppermint heathy open forest on slopes of dry sandstone gullies of western and southern Sydney, Sydney*. This survey location is located just within the 250m buffer to the Maroota Public School and will not be subjected to future vegetation clearing. Vegetation within this survey plot appears to have had very little disturbance and contains no exotic weeds. This survey location will also provide good baseline data for future reference for rehabilitation.

*Lantana camara* have some impacts on the remaining area outside the NVC. The third survey quadrat could not be accessed due to this. Removal and control of the species have commenced within this section however more efforts are required as progress is slow and favourable conditions for weed growth have affected weed management progress. Survey at this site can commence once *Lantana* thickets are removed or reduced in density.



- Legend**
- Haerses Road Offset Area
  - General Ecosystem Monitoring Site
  - Vegetation Community**
    - Sydney Sandstone Ridgetop Woodland
    - Sydney Hinterland Transition Woodland
    - Sydney Sandstone Gully Forest
    - Sydney Sandstone Heath (Heath/Woodland Complex)

0 25 50 100 m

**Figure 8**  
Location of Ecosystem Monitoring Sites  
Haerses Road Biodiversity Offset Area

Image Source: Cumberland Ecology (2015)  
File Name (A4): R06/4209\_021.dgn  
20180220 17.10

### 7.3.2 Haerses Road Biodiversity Offset Area

The Haerses Road Biodiversity Offset Area (HRBOA) has a minimum area of 8.70 hectares and is located east of Stage 2 extraction at the Haerses Road quarry. Five vegetation monitoring sites are located within the HRBOA. The HRBOA and locations of the monitoring sites are depicted in Figure 8.

Overall, there was a stabilisation to foliage cover and structure cover in most stratus at most survey sites. Grass and groundcover species appear to have decreased slightly in density following the return to average conditions. An increase in forbs density has been observed this year, in comparison to the lower density during last year's survey. Extensive Long-nosed Bandicoot digs were noted in an area close to Quadrat 1, similar to previous years. Bird presence and density has remained consistent from the last survey period, likely due to favourable weather conditions.

### 7.3.3 Threatened Flora Monitoring

Four threatened flora species are being monitored at the Old Northern Road quarry.

#### ***Kunzea rupestris* and *Darwinia fascicularis* ssp. *oligantha***

*Kunzea rupestris* population are located on two distinct area within the far western area of Lot 29, growing on two rock platforms (eastern and western) which are also occupied by *Darwinia fascicularis* ssp. *oligantha*. Much of the surrounding vegetation has suffered die back including *Banksia ericifolia* and *Calytrix tetragona*, likely attributed to the dry conditions during the 2017 – 2019 followed by extreme wet conditions from 2020-2022 however, new seedlings have been observed.

The eastern rock platform contains four individual patches of *Kunzea rupestris* with the presence of *Darwinia fascicularis* ssp. *oligantha*.

The western rock platform contains five patches of *Kunzea rupestris* which was observed to be growing within a vegetation community with far more flora diversity than what is present on the eastern platform with shrubs growing in deeper soil profile in more protected conditions.

The overall health of the *Kunzea rupestris* population is good following the ideal weather conditions in the local area over the past 12 months. During the 2017 – 2019 drought some dieback and plant loss was observed however the remaining plants appear to be in good health and new recruitment is evident, particularly on the western rock platform. New growth on most plants was observed during this survey period with flower buds present on much of the population. Mosses and lichens were present on both rock platforms.

The *Darwinia fascicularis* ssp. *oligantha* was observed to be plentiful in these locations with plants in flower and new recruits evident throughout the area. This species is also very well represented throughout the rehabilitation areas in the NVC.

#### ***Melaleuca deanei* (propagated and plated specimens)**

Since 2017, 57 propagated and planted *Melaleuca deanei* plants are alive and are thriving in various locations around the Old Northern Road quarry premise. Locations include different areas in the NVC and front gate rehabilitation area.

In June 2022, the parent plant of *Melaleuca deanei* located in the Banksia heath plant community on Lot 2 strip 2 had been translocated to the NVC following the success of the 2:1 offset of propagation and planting. The translocated parent plant suffered damaged to the main tap root which caused a die back. However, new recruit or possibly regrowth have been observed growing from the translocated root stock and continual monitoring of these specimens and the surrounding area will be carried out.

The 2:1 offset ratio requires 36 plants to be propagated and planted. This offset ratio has been achieved and currently, a total of 57 *Melaleuca deanei* specimens are present on site and showing signs of active growth.

#### ***Tetratheca glandulosa***

Several *Tetratheca glandulosa* plants have been identified in Quadrat 2 during this period including an abundance of flowering *Pimelea curviflora var curviflora*.

### **7.3.4 Threatened Fauna Monitoring**

#### **Old Northern Road Quarry**

Feed trees for Glossy Black Cockatoo are confirmed to be present in transect 2 of the NVC and within the 250m buffer to the Maroota Public School. It is common for this species to return to the same stand of feed trees repetitively. However, there were no birds observed feeding in these trees during this reporting period. However, the Glossy Black Cockatoos have been noted flying overhead at other times throughout the year.

The AnaBat Express sound recorder and infra-red motion detection camera were installed and left in place for 30 survey days and nights. However, the equipment had been stolen and no results could be reported. The ideal survey period for bats had ended and therefore bat and fauna survey will recommence during the upcoming summer surveying season. Live trapping of bats was not conducted to reduce unnecessary stress on the fauna.

A pair of resident Wedge-tailed eagles were again observed flying over the site several times during this monitoring period. A White Breasted Sea Eagle was also observed flying over the quarry during this reporting period.

#### **Haerses Road Biodiversity Offset Area**

There is a historic Bionet record of a Koala and Glossy Black Cockatoo sighting to the north of HRBOA towards Hitchcock Road.

A search for Koala scat under *Eucalyptus punctata* within all survey quadrats at the HRBOA were undertaken and no scats were present. However, Koala sightings in the local area, particularly in Glenorie, have increased since the Wollemi/Yengo mega bushfire over the spring-summer of 2019 – 2020.

Glossy Black Cockatoo feed trees were recorded in Quadrat 1.

Several Brown Treecreepers were again observed foraging at various locations which indicate their permanent presence and residents within the site.

Infra-red motion detection camera was installed within the HRBOA for 30 days and nights. Images of the Swamp Wallaby was captured during this survey.

Survey utilising AnaBat Express sound recorder was undertaken in February 2024 for 22 nights which identified the presence of two species as follow:

- *Mormopterus norfolkensis* (Eastern Coastal Free-tailed Bat) identified for 2 nights, and
- *Chalinolobus dwyeri* (Large-eared Pied Bat) identified for 5 nights.

AnaBat results also indicated the potential occurrence of the following 7 bat species:

- *Falsistrellus tasmaniensis* (Eastern Falsistrelle),
- *Scoteanax rueppellii* (Greater Broad-nosed Bat),
- *Myotis Macropus* (Southern Myotis),
- *Miniopterus orianae* (Large Bent-winged Bat),
- *Miniopterus australis* (Little Bent-winged Bat),
- *Vespadelus trougtoni* (Eastern Cave Bat), and
- *Saccolaimus flaviventris* (Yellow-bellied Sheath-tailed Bat).

The presence of a large number of bat species being detected during this reporting period suggests that quarry activities in the nearby area do not appear to impact upon local distribution of bats.

The Dural Land Snail (*Pommerhelix duralensis*) was identified during this 2024 flora survey within the HRBOA. This suggests that the species population is present and inhabiting in the immediate area.



**Plate 21: Dural Land Snail shell found in the leaf litter within the HRBOA Quadrat 3 (source: South East Environmental, 2024)**

### 7.3.5 Exotic Flora

The weed distribution map has been reviewed during this reporting period. Weed species identified on this map will be the focus of weed management priority over the next reporting period. The map will continue to be reviewed and revised as required on an annual basis. There are no changes to the weed distribution map from last year. Figure 9 shows the up-to-date weed distribution map.

The following weed species were identified within the 250m buffer area, NVC and Lot 196 at the Old Northern Road Quarry:

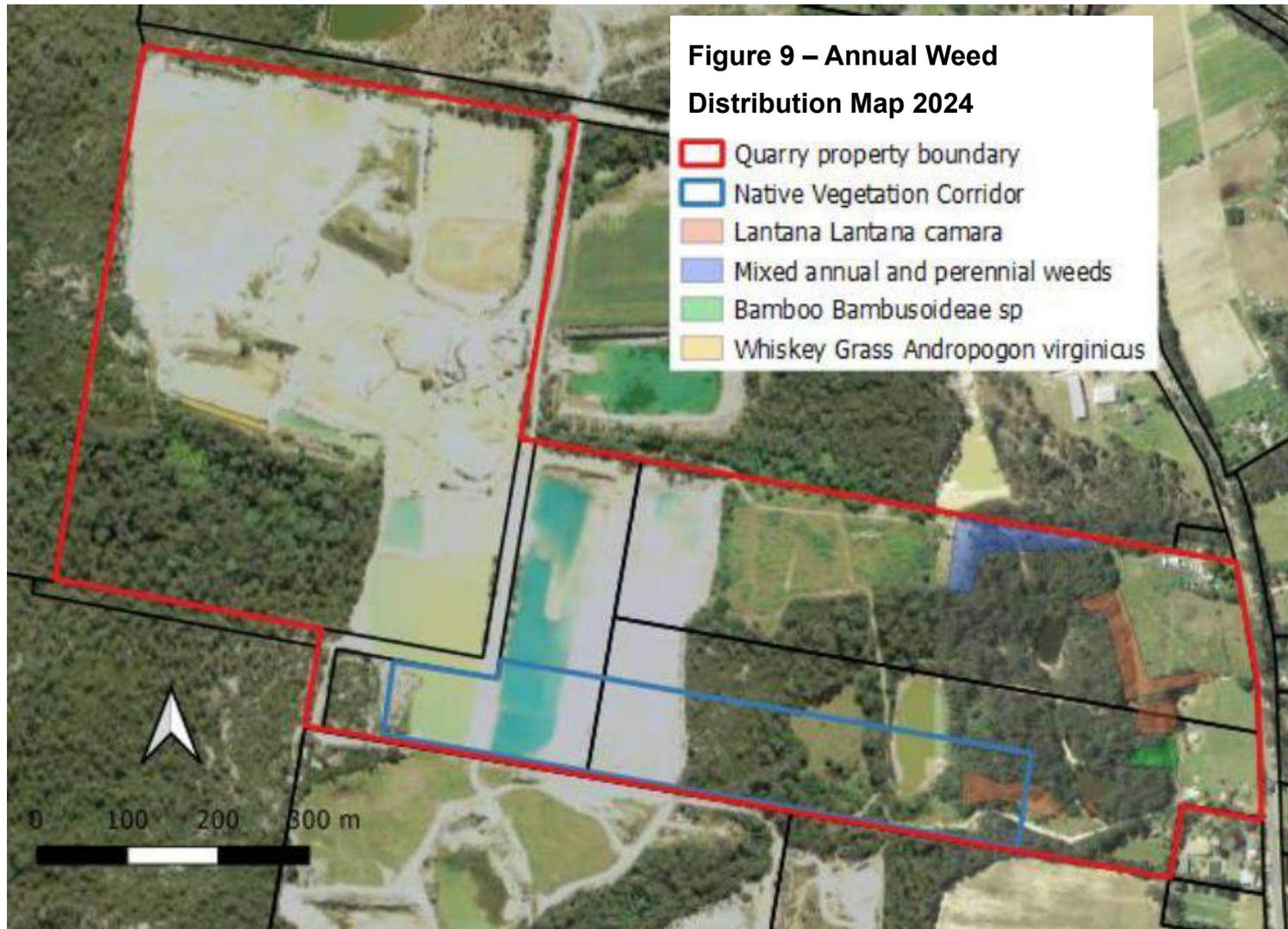
- *Ageratina adenophora* (Crofton Weed),
- *Andropogon virginicus* (Whiskey Grass)
- *Bidens Pilosa* (Coblers Pegs),
- *Paspalum dilatatum* (Paspalum Grass),
- *Senecio madagascariensis* (Fireweed),
- *Lantana camara* (Lantana), and
- *Bambusoideae sp.* (Bamboo)

Fireweed and Lantana are listed as Weeds of National Significance (WoNS) under the NSW *Biosecurity Act* 2015 and a weed management program is currently put in place for these species throughout the life of the rehabilitation plan.

One High Threat Weeds (HTW) has been identified within the HRBOA, Whiskey Grass (*Andropogon virginicus*).

Current progress of rehabilitation corresponds to the 'Mid stage 2016 – 2023' staging of rehabilitation and rehabilitation strategy contained in Table 7.1 of the BRMP which includes:

- completion of rehabilitation on selected extracted areas on Lots 196 and 29,
- commencement of rehabilitation on strip 1,
- continual extraction on strips 2 and 3, and
- maintenance of previous revegetation, setbacks, buffer zones and bunds.



### 7.3.6 Pest Species Monitoring and Control

Feral pest species monitoring was undertaken by South East Environmental utilising infrared cameras, sand plots, direct observation of prints and burrows, scat identification and digs.

The following feral pest species were identified to be present on the quarry premise:

- European Red Fox – identified through sand plot prints
- Noisy Minor – identified through on-site observation,
- Dog – identified through prints
- European Rabbit – identified through scats

European rabbit scats were observed in several locations within the NVC in low density. Carnivore scats observed on site were highly likely to be those of European Red Fox. No rabbits were observed to be feeding during the day, scats were not in high density and warrens were not observed. The population of rabbits is therefore, considered to be low to moderate, and likely to be kept under control by biological means such as predation from foxes, dogs, cats and birds of preys such as Wedge-tailed Eagle that are present nearby. Should the number of rabbits become problematic, it may be necessary to engage in a control program to reduce or eliminate the population.

Noisy minors, although a native species, was observed within the NVC and the 250m buffer area. Noisy minors are considered a pest if present in high density and is a key threatening process to a number of threatened native species of small birds such as the Brown Tree Creeper which is present in the HRBOA. The population of the Noisy Minor was considered to be small, and the presence of other small native bird species was observed on site. The population of the Noisy Minor is to be monitored over time and management strategy to be implemented to prevent the species from becoming dominant which can lead to elimination and displacement of other native bird species.

Overall, occurrences of fauna pest species are not at a level considered to require active management and on-going monitoring will be undertaken to determine appropriate dynamic management strategy.

### 7.3.7 Progressive Rehabilitation

Progressive rehabilitation of the quarry during this reporting period included:

- Continued capping and compaction of the silt ponds located on Lot 196 directly north of the current Native Vegetation Corridor (NVC). Part of the silt pond will form the northern boundary of the NVC, and the remainder will be revegetated to Class 4 Agriculture.
- Continued capping and compaction of the silt pond located on Lot 29 directly east of the current haul road separating Lots 29 and 196. Once optimal status is obtained, stockpiled windrows of material and topsoil will be applied to this area for rehabilitation of Banksia Heath Community, extending east from the current NVC on Lot 29.

The locations of the silt ponds undergoing capping and compaction are shown in Figure 10 below.

No revegetation was carried out for rehabilitation during this reporting period as further settlement, stabilisation and compaction of the silt ponds are required in order to support top dressing of topsoil and revegetation material.

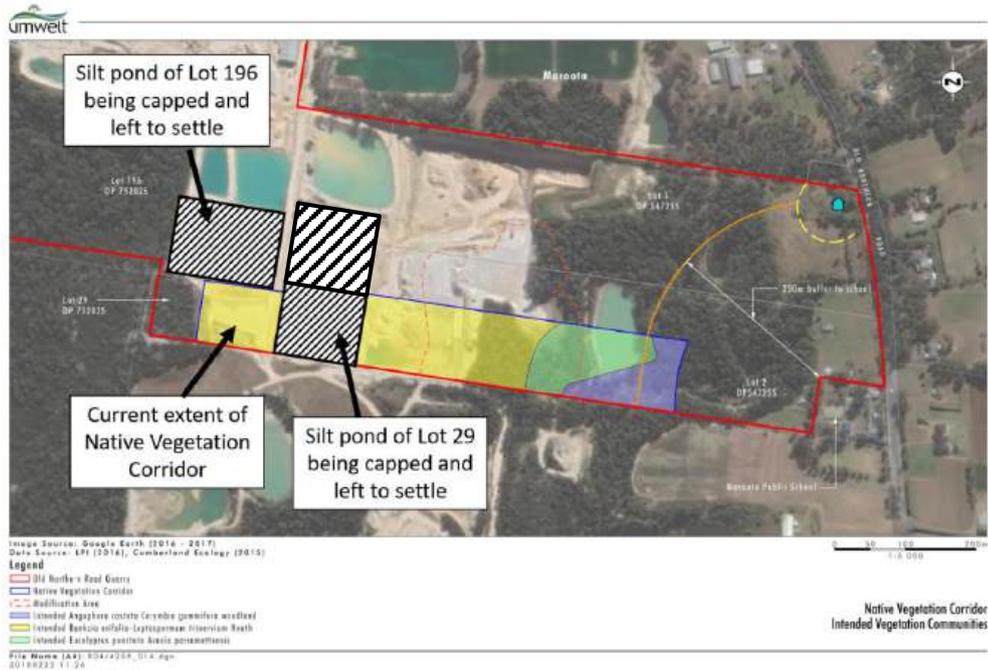


Figure 10: Locations of silt ponds undergoing capping and compaction, in preparation for future rehabilitation.

### 7.3.8 Progressive Achievement of Completion Criteria

Section 5.2 of the BRMP contains the preliminary rehabilitation performance and completion criteria. The status of targets being achieved against the preliminary rehabilitation performance and completion criteria are contained in Table 33.

Table 33: Assessment against criteria to monitor success of rehabilitation.

Aspect	Preliminary Rehabilitation Performance and Completion Criteria	Target Achieved	Comments
Decommissioning	All surface infrastructure will be decommissioned and removed.	N/A	Noted – completion criteria not yet triggered
Soil	Rehabilitated slopes are stable	Yes	Complied with – managed through a combination of weekly and monthly inspections by Quarry Managers and Environmental Officer, or Delegates. Aspects managed through mitigation measures contained in the Soil and Water Management.
	No significant erosion is present that would constitute a safety hazard or compromise the capability of supporting the end land use.		
	Contour banks are stable and there is no evidence of overtopping or significant scouring as a result of runoff.		
	Surface layer is free of any hazardous materials.		

Aspect	Preliminary Rehabilitation Performance and Completion Criteria	Target Achieved	Comments
Water	Runoff water quality from the site does not pose a threat to downstream water quality.	Yes	Complied with - aspect managed through downstream surface water monitoring, and other mitigation measures contained in the Soil and Water Management.
Native Vegetation	Revegetation areas contain flora species assemblages characteristic of the desired native vegetation communities.	N/A	At this stage it is too early in the rehabilitation process to determine if the desired vegetation community is being established. Species planted in the NVC have been specifically chosen to recreate a Banksia Heath community.
	Second generation tree seedlings are present or likely to be, based on monitoring in comparable older rehabilitation sites (i.e., evidence of fruiting of native species observed).	N/A	It is too early in the rehabilitation process for second generation tree seedlings. Fruiting of tree species has only just commenced therefore this KPI is likely to be achieved within the next 2-3 years.
	More than 75 per cent of trees are healthy and growing as indicated by long term monitoring.	Yes	More than 75% of the native vegetation within the active rehabilitation area is healthy and is growing as expected for long term survival. All shrub and ground cover species have reached maturity with flowering and seed production observed. Some species have begun self-propagation within rehabilitation sites. <i>Eucalyptus</i> , <i>Angophora</i> and <i>Corymbia</i> species have not yet reached maturity.
	More than 50 per cent of translocated or propagated threatened flora species survive as indicated by long term monitoring.	Yes	More than 50% of translocated and planted propagated threatened flora species has survived despite the extreme weather conditions of the past reporting periods to date, at least <b>45</b> propagated <i>Darwinia fascicularis subsp. Oligantha</i> and <b>52</b> propagated <i>Melaleuca deanei</i> have survived transplanting in the rehabilitation area. A complete count of translocated <i>Darwinia fascicularis subsp. Oligantha</i> was not undertaken at the time of relocation however it appears that any losses that may have occurred were minimal and new recruits are now visible throughout much of the area.

Aspect	Preliminary Rehabilitation Performance and Completion Criteria	Target Achieved	Comments
	There is no significant weed infestation such that weeds do not comprise a significant proportion of species in any stratum.	Yes	There is no significant weed infestation within the rehabilitation area. Significant weed infestations are located within the NVC outside of the rehabilitation area. These areas are being actively addressed by weed management contractors.
Stream and Riparian Zone Restoration	Drainage line stable displaying no signs of erosion	N/A	Noted – aspect not yet triggered.
	Weed species densities no greater than surrounding vegetation		
	Access to riparian zone is restricted		
	Riparian zone established to a width of 20 metres		
	Riparian zone is considered self-sustaining and exhibits 60% or more of the control site scores for each riparian condition monitoring attribute		
Weed and Pests	Regular inspections indicate a decline weed diversity, density and abundance and a decline in signs of feral animal activity.	Yes	There were very few weed species identified within the rehabilitation area. There are no signs of feral animal activity.
	There is no significant weed infestation such that weeds do not comprise a significant proportion of species in any stratum.	Yes	There is no significant weed infestation within the rehabilitation area. Significant weed infestations are located within the NVC outside of the rehabilitation area. These areas are being actively addressed by weed management contractors.
	There is no evidence of significant damage resulting from feral animal activity	Yes	There is no evidence of significant damage caused from feral animal activity within the rehabilitation area.
Bushfire Hazard	Appropriate bushfire hazard controls have been implemented.	Yes	Complied with – bushfire hazards are managed through the Bushfire Management Plan (Parts 1 and 2).
Ongoing Public Safety	Appropriate mechanisms are established to control access and manage public safety post-closure.	N/A	Noted – aspect not yet triggered

### 7.3.9 Stream Restoration

Riparian stream restoration has not commenced. The areas where the riparian stream was to be reinstated are either still being extracted or yet to be extracted.

### 7.3.10 Discussion and Recommendations

The annual biodiversity monitoring and rehabilitation management report undertaken by South East Environmental for this reporting period marks the seventh year of monitoring and reporting for the quarry. The average rainfall over this reporting period of facilitated ideal growing conditions for the rehabilitation areas of the NVC. Vegetation within all strata have shown an increase in size, maturity and density over the last twelve months. New juvenile recruits can be observed within the shrub and groundcover species, and an increase in diversity was recorded. Canopy species are growing well and have reached reproductive maturity during this reporting period.

Other vegetation within the Old Northern Road quarry have shown to recover well from previous drought conditions from the 2017-2019. The average rainfall over the past 12 months provided ideal growing conditions for groundcover species particularly forbs, grasses and ferns. Native vegetation within areas of no weedy growth have proven resilient with no new weed growth or establishment of weed following the return of regular rainfall events.

Vegetation changes within the HRBOA is observed to be minimal which provides a good demonstration of the hardiness of native vegetation stand with minimal historic disturbances. A slight increase in shrub and forb species density since the previous reporting period has been observed, likely attributed to average weather conditions.

The threatened *Kunzea rupestris* located west of the NVC have been affected by the prolonged drought conditions of 2017 to 2019. The *Kunzea rupestris* was adversely impacted by the drought, particularly from radiant heat reflection from the surrounding sandstone outcrop. New juvenile recruits have been recorded since the return of regular rainfall.

Other threatened species previously recorded on site were located and appear to be in a healthy state.

Management of Lantana within the NVC and 250m school buffer area at the Old Northern Road Quarry will be the priority for bush regeneration contractors to prohibit the spread of the weed into new areas which can form potential habitat for exotic fauna such as the European Red Fox and European Rabbit.

A silt pond directly east of the NVC rehabilitation area is the designated area for continuing the NVC rehabilitation. Rehabilitation was scheduled to commence this reporting period however due to the prolonged wet weather conditions experienced previously, there has been a delay in the silt pond final capping, sufficient evaporation and stabilisation. It is anticipated that rehabilitation in this area can commence during the next reporting period. Rehabilitation will also focus on the western embankment at the front entrance to the quarry site.

Continue with supplementary planting within the rehabilitation area and locations within the NVC and 250m buffer to the school where Lantana has been removed.

## 7.4 Change in Environmental Procedures

### Old Northern Road NVC Rehabilitation Area

- Continue with routine weed control and monitoring of regenerating native species, and
- Supplementary planting on the southern boundary to prevent weed encroachment.

### Old Northern Road Lots 1 and 2

- Continued management of *Lantana camera* and review techniques recommended in the Ecological Monitoring Report (South East Environmental, 2024),
- Continued management of other weed species including exotic grasses, and

- Supplementary planting or similar treatment in identified areas as required.

**Old Northern Road other areas**

- Continue with routine weed management along the southern boundary of Cons Hill (Lot 196) and carry out direct seeding or supplementary planting of remnant canopy species and competitive native grasses (such as *Imperata cylindrica*) to revegetate compacted areas, exposed areas and edge areas.

**Haerses Road Biodiversity Offset Area**

- Continue with management of invasive grass and annual species along the North-western border of the HRBOA.

**Front Gate Embankment**

- Supplementary planting with some remnant canopy and shrub species to occupy areas prone to the spread of invasive grasses.

## 8. Community and Social Impacts

### 8.1 Compliance

Dixon Sand is required to adhere to the following community related consent conditions:

**Table 34: Community related consent conditions**

Development Consent	Consent Condition	Requirement	Compliance
DA250-09-01	Condition 8 of Schedule 5	<p>The Applicant must establish and operate a Community Consultative Committee (CCC) for the development to the satisfaction of the Secretary. The CCC must be established by 10 October 2018 and operated in general accordance with the Department’s Community Consultative Committee Guidelines, November 2016 (or later version).</p> <p>Notes:</p> <ul style="list-style-type: none"> <li>• The CCC is an advisory committee. The Department and other relevant agencies are responsible for ensuring that the Applicant complies with this consent.</li> <li>• In accordance with the guidelines, the Committee should comprise an independent chair and appropriate representation from the Applicant, Council and the local community.</li> <li>• The CCC established and operated prior to the approval of Modification 5 must continue to be operated in accordance with the procedures required by the consent prior to the approval of Modification 5 until such time as the CCC required by this condition is established.</li> </ul>	<p>The current CCC members were re-appointed by the DP&amp;E on 1<sup>st</sup> March 2018 (note joint CCC for the Old Northern Road and Haerses Road quarries). Additional members have been endorsed by the Chair Person after this date.</p>
DA250-09-01	Condition 1(e) of Schedule 5	<p>describe the procedures to be implemented to:</p> <ul style="list-style-type: none"> <li>• keep the local community and relevant agencies informed about the operation and environmental performance of the development;</li> <li>• receive, record, handle and respond to complaints;</li> <li>• resolve any disputes that may arise during the course of the development;</li> <li>• respond to any non-compliance;</li> <li>• respond to emergencies; and</li> </ul>	<p>Refer to the Environmental Management Systems</p>
DA165-7-2005	Condition 1(e) of Schedule 5		
DA250-09-01	Condition 1(f) of Schedule 5	<p>include a Community Relations Plan, developed in consultation with Council, the CCC, and the Maroota Public School, which includes:</p>	<p>The Community Relations Plan is included as Appendix 11 of the Environmental Management System</p>

Development Consent	Consent Condition	Requirement	Compliance
		<ul style="list-style-type: none"> <li>• identification of stakeholders potentially affected by the development;</li> <li>• detailed strategies to ensure open communication between the Applicant, the community and Maroota Public School;</li> <li>• detailed strategies to monitor and evaluate social impacts of the development on the local community and Maroota Public School; and</li> <li>• measures to improve community relations including:                             <ul style="list-style-type: none"> <li>○ quarry open days and education sessions to promote better understanding of quarry operations in the wider community;</li> <li>○ participation in community activities; and</li> <li>○ strategies involving in-kind exchanges of expertise and resources for activities such as bush regeneration, Landcare, Streamwatch, and other community-based environmental programs;</li> </ul> </li> </ul>	
DA165-7-2005	Condition 8 of Schedule 5	<p>The Applicant must establish and operate a Community Consultative Committee (CCC) for the development to the satisfaction of the Secretary. The CCC must be established by 30 June 2018 and operated in general accordance with the Department’s Community Consultative Committee Guidelines, November 2016 (or later version).</p> <p>Notes:</p> <ul style="list-style-type: none"> <li>• The CCC is an advisory committee. The Department and other relevant agencies are responsible for ensuring that the Applicant complies with this consent.</li> <li>• In accordance with the guidelines, the Committee should comprise an independent chair and appropriate</li> <li>• representation from the Applicant, Council and the local community.</li> <li>• The CCC established and operated prior to the approval of Modification 1 must continue to be operated in accordance with the procedures required by the consent prior to the approval of Modification 1 until such time as the CCC required by this condition is established.</li> </ul>	<p>The current CCC members were re-appointed by the DP&amp;E on 1<sup>st</sup> March 2018 (note joint CCC for the Old Northern Road and Haerses Road quarries). Additional members have been endorsed by the Chair Person after this date.</p>

Development Consent	Consent Condition	Requirement	Compliance
		<ul style="list-style-type: none"> <li>The Applicant may, with the approval of the Secretary, combine the function of this CCC with the functions of other CCCs in the area.</li> </ul>	

## 8.2 Complaints and Follow-up Actions

No complaints were received for the Old Northern Road Quarry during the 2023 – 2024 reporting period.

**Table 35: Complaints received during the reporting period**

Complaint	
Date complaint received	Not Applicable – no complaint received during this reporting period.
Issue	
Recommended Action(s)	
Outcome	
Close out Date	

A copy of the complaints register for this reporting period is contained in Appendix K.

## 8.3 Long Term Complaints Trend

Long term complaints monitoring data commencing since the 2003 – 2004 monitoring period is depicted in Chart 59 below. It must be noted that complaints were recorded for the Old Northern Road and Haerses Road quarries combined from the 2006 – 2007 to 2017 – 2018 monitoring periods, with complaints recorded separately for individual quarries from hereon.

A total of twenty-four complaints have been received by Dixon sand since the 2003 – 2004 monitoring period to date. The number complaints were between nil and up to three from the 2003 - 2004 to 2007 – 2008 monitoring periods, all of which were associated with haulage trucks driving in a dangerous manner or exceeding the speed limit. During the 2008 – 2009 monitoring period, the number of complaints increased to six, with the majority associated with trucks driving in a dangerous manner or exceeding the school zone speed limit. One complaint was in regards to excessive noise generation where the source of noise was identified to be caused by a different operation.

From 2009 – 2010 to 2016 – 2017 monitoring periods, the number of complaints were minimal and fluctuated between

nil and two. These complaints were associated with haulage trucks driving in a dangerous manner or exceeding the speed limit.

The 2016 – 2017 monitoring period recorded an increase in number of complaints to eight complaints which were associated with haulage trucks driving in a dangerous manner, excessive noise generation, operation outside of approved hours and excessive dust generation.

From this point, a downward trend in number of complaints was observed. The number of complaints received reduced to five haulage truck related complaints during the 2018 – 2019 monitoring period. The number of complaints further reduced to two truck related complaints (exceedance of speed limit) during this 2019 – 2020 monitoring period.

One haulage truck complaint (dangerous driving) was received during the 2019 - 2020 monitoring period.

Three complaints were received during the 2020 - 2021 reporting period which were related to noise, sediment and haulage truck.

The majority of the complaints were made by residents of Maroota, residents of neighbouring suburbs or local road users. One complaint was made by Dixon Sand Quarry Manager. Timing of events leading to complaints were mainly during quarry operation hours with the exception of complaints associated with operations outside of consented hours.

The locations of haulage trucks driving in a dangerous manner, exceeding the speed limit or excessively using engine brakes were mainly on Old Northern Road and Wisemans Ferry Road in the local areas.

All complaints have been closed out.

Dixon Sand did not receive any complaints during the 2022 - 2023 and 2023 – 2024 monitoring periods.

Dixon Sand implemented the steps to identify the validity of the complaints received and employed appropriate actions outlined in the complaints procedure and the Maroota Local Traffic Management Policy (inter-pit policy).

Several complaints were identified to have been associated with other operations within or outside the local areas.

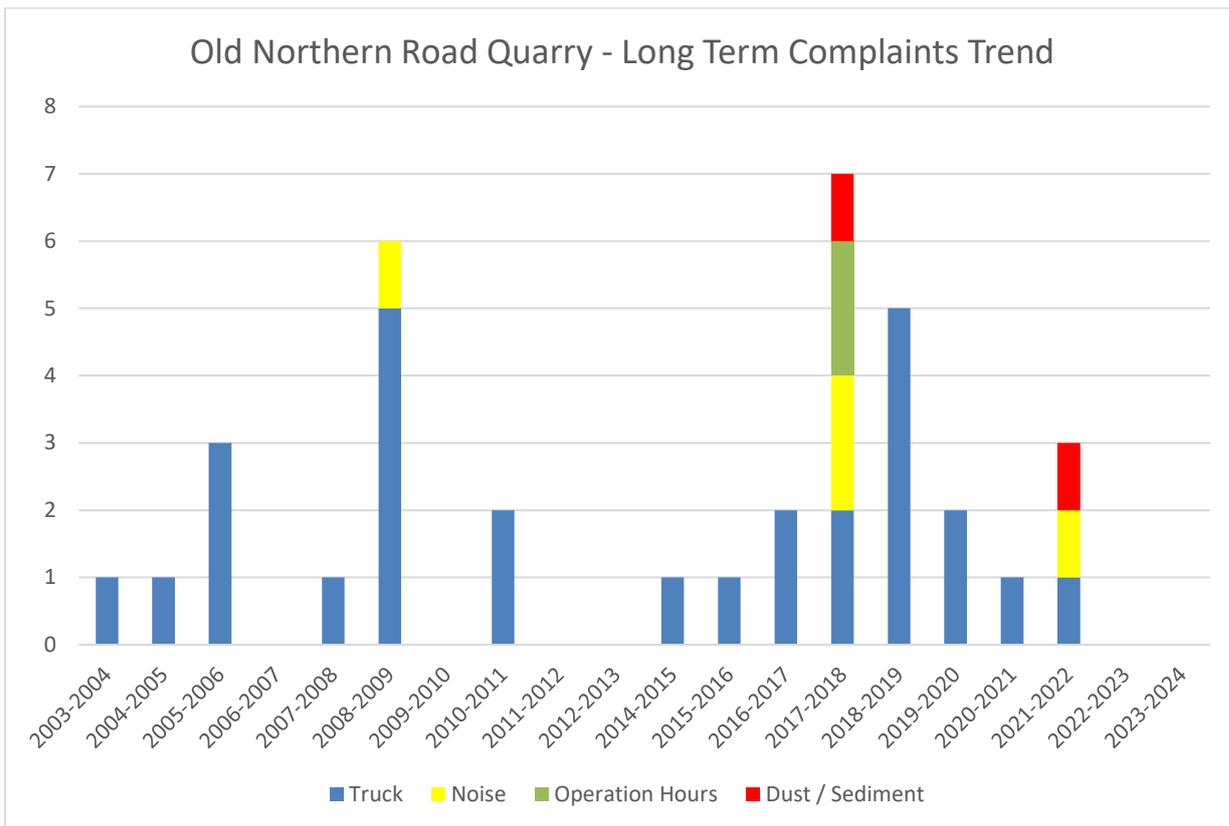


Chart 59: Long term complaints trend.

## 8.4 Community Consultative Committee, Meetings and Guidelines

Two CCC meetings were held in the 2023 - 2024 reporting period, in accordance with the consent conditions and CCC Guidelines (2023). The ordinary bi-annual CCC meetings were held on 8<sup>th</sup> November 2023 and 28<sup>th</sup> May 2024. The minutes from the ordinary CCC meeting are provided in Appendix J.

## 8.5 Community and Stakeholder Liaison

In addition to engaging with the Community Representatives of the CCC, the local community is provided with an opportunity to comment on Dixon Sand’s environmental performance through direct contact with quarry staff or through the contact portal via the company’s website.

### Stakeholder Liaison and Correspondences

Dixon Sand staff made contact with local community members on a number of occasions. These include:

- Notifying the Maroota Public School regarding noise monitoring undertaken in December 2023 and June 2024 and other matters relating to ground maintenance on school ground or in proximity to the school,
- Liaising with the neighbouring property owner to the Old Northern Road quarry regarding general maintenance, and

- Bi-annual CCC meetings in November 2023 and May 2024

### **Local Initiatives**

Dixon Sand regularly makes monetary and resource contributions to a number of community initiatives and charities such as:

- monetary donation and participation in the Maroota Public School's Annual Maroota Muster Festival,
- monetary donation to Cattai Public School,
- monetary donation to Royal Flying Doctor Service,
- monetary donation to Last Post @ Wisemans Ferry for Anzac Day
- monetary donation to Castlereagh Christian Conference Centre
- monetary sponsorship of Nepean Area Disabilities Organisation
- monetary sponsorship of Sporting Individuals
- publication of environmental monitoring data, and provision of all current consents and site management plans for public viewing on the Dixon Sand website.

## **8.6 Ecologically Sustainable Development**

Ecologically Sustainable Development (ESD) can be defined as “using, conserving and enhancing the community’s resources so that the ecological processes, on which life depends, are maintained and the total quality of life, now and in the future, can be increased” (Commonwealth of Australia, 1992).

The four principles of ESD are listed in Schedule 2 of the *Environmental Planning and Assessment Regulation 2021* as follows:

- the precautionary principle;
- inter-generational equity;
- conservation of biological diversity and ecological integrity; and
- Improved valuation, pricing and incentive mechanisms.

Dixon Sand’s Old Northern Road Quarry continue to manage all potential threats to the quality of the environment, determined with a reasonable degree of certainty through the use of scientific investigation and analysis of the individual and cumulative environmental impacts of the proposal.

Long-term environmental fluctuations have been, and will continue to be, monitored for the duration of extraction such as groundwater levels and quality, noise, air quality and threatened flora and fauna.

Threatened flora and fauna present on site are monitored annually to ensure they are not impacted by quarry activities. Similarly, noise and air quality monitoring will continue throughout the life of the developments. Mitigation measures are in place to minimise the potential adverse impacts likely to affect social and intergenerational equity. These measures relate to erosion and sediment control, surface and groundwater management, air quality control, and noise and waste management. Continual community relation strategies will ensure the community is well informed and has an effective means of voicing concerns and receiving feedback.

Dixon Sand aims to protect the biological diversity and ecological integrity of the sites through;

- progressive rehabilitation of the extracted areas using agricultural and native species;

- monitoring and maintenance of buffer areas to ecologically sensitive sites;
- establishment of native vegetation offset areas, biodiversity offset area and native rehabilitation areas to maximise native fauna habitats and enhance vegetation corridor for flora and fauna migration, and
- providing a final landform that integrates elements of the local area.

The value placed on environmental resources by Dixon Sand is represented as costs associated with the implementation of monitoring and mitigation measures throughout the life of the development consents.

## 8.7 Changes to Social Monitoring Procedures

No changes are proposed for the social management procedures.

## 9. Bushfire Management

### 9.1 Compliance

DA250-09-01 requires Dixon Sand to ensure that the Quarry is suitably equipped to respond to any fires on site. The Quarry is to assist the Rural Fire Service and emergency services to the extent practicable if there is a fire in the vicinity of the site.

A Bushfire Management Plan has been prepared for the Quarry.

## 10. Competency, Training and Awareness

The quarry management team is responsible for ensuring all personnel, including contractors, are provided with appropriate environmental training and awareness to ensure they understand their environmental awareness, responsibilities and how to mitigate the impacts. Training is undertaken using the following avenues:

- Compulsory site environmental induction for employees and contractors,
- Truck driver induction training,
- Pollution Incident Response Management Plan (PIRMP) and mock scenario training,
- Two-stage pre-clearing procedures and fauna handling and rescue procedures training,
- Permit to discharge protocols,
- Job Safety and Environmental Analysis,
- Environmental hazard identification workshop,
- Regular toolbox talks, and
- Bushfire Management and Emergency evacuation training.

# 11. Incidents and Non-Compliances

## 11.1 Environmental Incidents and Non-Compliances

Details of incidents and non-compliance are listed in Table 36 below.

**Table 36: Incidents and Non-compliances**

Event No.	Date of Incident	Applicable Condition(s)	Details, Cause and Mitigation of Incident
1	Submission of 2023 - 2024 Annual Review after March 2024	Condition 12 of Schedule 5 of DA 250-09-01	<p>Dixon Sand is required to submit the Annual Review for the Quarry by the end of March each year. The submission of this Annual Review at the end of September is technically non-compliant with the deadline required by the consent condition. However, Dixon Sand requested approval from the DPE for the submission deadline of the Annual Review to be adjusted to reflect the financial year reporting. Approval was granted by the DPE on 9 February 2018 to submit the Annual Review by the end of September each year.</p> <p>DPHI determined no breach of consent condition.</p>
2	26 July 2023 - 23 August 2023	Condition 7 of Schedule 3 of DA 250-09-01	<p>DPHI Notification and Reporting: <b>DA-250-09-01-PA-32</b></p> <p>During this monitoring period, the monthly dust deposition result at D1A was 3.6 g/m<sup>2</sup>/month and the rolling annual average dust deposition was 4.7 g/m<sup>2</sup>/month which exceeded the annual criteria of 4.0 g/m<sup>2</sup>/month.</p> <p>The exceeded rolling annual average dust deposition at D1A was a result of the isolated high monthly dust deposition result (33.6 g/m<sup>2</sup>/month during the April 2023 period) which was not attributed to quarry operations but neighbouring farming activities. The isolated high monthly dust result was considered an “extra-ordinary event” and a notification previously provided to the Department (Project # DA-250-09-01-PA-29). The Department determined no consent condition has been breached and the incident was subsequently closed out.</p> <p>No consent breached. No further action required by DPHI. Incident closed out.</p>
3	23 August 2023 - 20 September 2023	Condition 7 of Schedule 3 of DA 250-09-01	<p>DPHI Notification and Reporting: <b>DA-250-09-01-PA-34</b></p> <p>During this monitoring period, the monthly dust deposition result at D1A was 2.4 g/m<sup>2</sup>/month and the rolling annual average dust deposition was 4.7 g/m<sup>2</sup>/month which exceeded the annual criteria of 4.0 g/m<sup>2</sup>/month.</p>

Event No.	Date of Incident	Applicable Condition(s)	Details, Cause and Mitigation of Incident
			<p>The exceeded rolling annual average dust deposition at D1A was a result of the isolated high monthly dust deposition result (33.6 g/m<sup>2</sup>/month during the April 2023 period) which was not attributed to quarry operations but neighbouring farming activities. The isolated high monthly dust result was considered an “extra-ordinary event” and a notification previously provided to the Department (Project # DA-250-09-01-PA-29). The Department determined no consent condition has been breached and the incident was subsequently closed out.</p> <p>No consent breached. No further action required by DPHI. Incident closed out.</p>
4	20 September 2023 - 18 October 2023	Condition 7 of Schedule 3 of DA 250-09-01	<p>DPHI Notification and Reporting: <b>DA-250-09-01-PA-35</b></p> <p>During this monitoring period, the monthly dust deposition result at D1A was 2.2 g/m<sup>2</sup>/month and the rolling annual average dust deposition was 4.7 g/m<sup>2</sup>/month which exceeded the annual criteria of 4.0 g/m<sup>2</sup>/month.</p> <p>The exceeded rolling annual average dust deposition at D1A was a result of the isolated high monthly dust deposition result (33.6 g/m<sup>2</sup>/month during the April 2023 period) which was not attributed to quarry operations but neighbouring farming activities. The isolated high monthly dust result was considered an “extra-ordinary event” and a notification previously provided to the Department (Project # DA-250-09-01-PA-29). The Department determined no consent condition has been breached and the incident was subsequently closed out.</p> <p>No consent breached. No further action required by DPHI. Incident closed out.</p>
5	18 October 2023 - 15 November 2023	Condition 7 of Schedule 3 of DA 250-09-01	<p>DPHI Notification and Reporting not required as advised by DPHI.</p> <p>During this monitoring period, the monthly dust deposition result at D1A was 2.1 g/m<sup>2</sup>/month and the rolling annual average dust deposition was 4.7 g/m<sup>2</sup>/month which exceeded the annual criteria of 4.0 g/m<sup>2</sup>/month.</p> <p>The exceeded rolling annual average dust deposition at D1A was a result of the isolated high monthly dust deposition result (33.6 g/m<sup>2</sup>/month during the April 2023 period) which was not attributed to quarry operations but neighbouring farming activities. The isolated high monthly dust result was considered an “extra-ordinary event” and a notification previously</p>

Event No.	Date of Incident	Applicable Condition(s)	Details, Cause and Mitigation of Incident
			<p>provided to the Department (Project # DA-250-09-01-PA-29). The Department determined no consent condition has been breached and the incident was subsequently closed out.</p> <p>No consent breached. No further action required by DPHI. Incident closed out.</p>
6	15 November 2023 – 13 December 2023	Condition 7 of Schedule 3 of DA 250-09-01	<p>DPHI Notification and Reporting not required as advised by DPHI.</p> <p>During this monitoring period, the monthly dust deposition result at D1A was 1.7 g/m<sup>2</sup>/month and the rolling annual average dust deposition was 4.8 g/m<sup>2</sup>/month which exceeded the annual criteria of 4.0 g/m<sup>2</sup>/month.</p> <p>The exceeded rolling annual average dust deposition at D1A was a result of the isolated high monthly dust deposition result (33.6 g/m<sup>2</sup>/month during the April 2023 period) which was not attributed to quarry operations but neighbouring farming activities. The isolated high monthly dust result was considered an “extra-ordinary event” and a notification previously provided to the Department (Project # DA-250-09-01-PA-29). The Department determined no consent condition has been breached and the incident was subsequently closed out.</p> <p>No consent breached. No further action required by DPHI. Incident closed out.</p>
7	13 December 2023 - 10 January 2024	Condition 7 of Schedule 3 of DA 250-09-01	<p>DPHI Notification and Reporting: <b>DA-250-09-01-PA-38</b></p> <p>During this monitoring period:</p> <ul style="list-style-type: none"> <li>• the monthly dust deposition result at D1A was 13.7 g/m<sup>2</sup>/month and the rolling annual average dust deposition was 5.8 g/m<sup>2</sup>/month which exceeded the annual criteria of 4.0 g/m<sup>2</sup>/month, and</li> <li>• the monthly dust deposition result at D5 was 23.1 g/m<sup>2</sup>/month and the rolling annual average dust deposition was 4.1 g/m<sup>2</sup>/month which exceeded the annual criteria of 4.0 g/m<sup>2</sup>/month, and</li> </ul> <p>The exceeded rolling annual average dust deposition at D1A was a result of neighbouring farming activities. The exceeded rolling annual average dust deposition at D5 was due to potentially a combination of neighbouring farming activities and bund wall maintenance. D5 is located quarry premise, and not at a private residence.</p>

Event No.	Date of Incident	Applicable Condition(s)	Details, Cause and Mitigation of Incident
			<p>The Department determined no consent condition has been breached and the incident was subsequently closed out.</p> <p>No consent breached. No further action required by DPHI. Incident closed out.</p>
8	10 January 2024 - 7 February 2024		<p>DPHI Notification and Reporting: <b>DA-250-09-01-PA-40</b></p> <p>During this monitoring period:</p> <ul style="list-style-type: none"> <li>• the monthly dust deposition result at D1A was 2.7 g/m<sup>2</sup>/month and the rolling annual average dust deposition was 5.9 g/m<sup>2</sup>/month which exceeded the annual criteria of 4.0 g/m<sup>2</sup>/month, and</li> <li>• the monthly dust deposition result at D5 was 5.2 g/m<sup>2</sup>/month and the rolling annual average dust deposition was 4.4 g/m<sup>2</sup>/month which exceeded the annual criteria of 4.0 g/m<sup>2</sup>/month, and</li> </ul> <p>The exceeded rolling annual average dust deposition at D1A was a result of neighbouring farming activities. The exceeded rolling annual average dust deposition at D5 was due to potentially a combination of neighbouring farming activities and bund wall maintenance which was previously reported. D5 is located quarry premise, and not at a private residence.</p> <p>The Department determined no consent condition has been breached and the incident was subsequently closed out.</p>
9	7 February 2024 - 6 March 2024	Condition 7 of Schedule 3 of DA 250-09-01	<p>DPHI Notification and Reporting not required</p> <p>During this monitoring period:</p> <ul style="list-style-type: none"> <li>• the monthly dust deposition result at D1A was 2.2 g/m<sup>2</sup>/month and the rolling annual average dust deposition was 5.9 g/m<sup>2</sup>/month which exceeded the annual criteria of 4.0 g/m<sup>2</sup>/month, and</li> <li>• the monthly dust deposition result at D5 was 3.6 g/m<sup>2</sup>/month and the rolling annual average dust deposition was 4.6 g/m<sup>2</sup>/month which exceeded the annual criteria of 4.0 g/m<sup>2</sup>/month, and</li> </ul> <p>The exceeded rolling annual average dust deposition results at D1A and D5 were a result from the previous elevated monthly dust results as notified to DPHI. The Department acknowledged that the annual averages for the subsequent months may be elevated and did not require continued notifications of the rolling annual average dust criteria related to the current</p>

Event No.	Date of Incident	Applicable Condition(s)	Details, Cause and Mitigation of Incident
			<p>exceedances. Therefore, the Department was not notified of this ongoing rolling annual average exceedance for this monitoring period.</p> <p>The Department previously determined no consent condition has been breached and the incident was subsequently closed out.</p>
10	6 March 2024 - 3 April 2024	Condition 7 of Schedule 3 of DA 250-09-01	<p>DPHI Notification and Reporting not required</p> <p>During this monitoring period the monthly dust deposition result at D5 was 3.1 g/m<sup>2</sup>/month and the rolling annual average dust deposition was 4.8 g/m<sup>2</sup>/month which exceeded the annual criteria of 4.0 g/m<sup>2</sup>/month.</p> <p>The exceeded rolling annual average dust deposition at D5 was due to the previous exceedance events. DPHI did not require continued notifications of the rolling annual average dust criteria related to the current exceedances.</p> <p>No consent breached. No further action required by DPHI. Incident closed out.</p>
11	3 April 2024 - 1 May 2024	Condition 7 of Schedule 3 of DA 250-09-01	<p>DPHI Notification and Reporting not required</p> <p>During this monitoring period the monthly dust deposition result at D5 was 1.4 g/m<sup>2</sup>/month and the rolling annual average dust deposition was 4.9 g/m<sup>2</sup>/month which exceeded the annual criteria of 4.0 g/m<sup>2</sup>/month.</p> <p>The exceeded rolling annual average dust deposition at D5 was due to the previous exceedance events. DPHI did not require continued notifications of the rolling annual average dust criteria related to the current exceedances.</p> <p>No consent breached. No further action required by DPHI. Incident closed out.</p>
12	1 May 2024 - 29 May 2024	Condition 7 of Schedule 3 of DA 250-09-01	<p>DPHI Notification and Reporting: <b>DA-250-09-01-PA-41</b></p> <p>During this monitoring period the monthly dust deposition result at D5 was 7.2 g/m<sup>2</sup>/month and the rolling annual average dust deposition was 5.4 g/m<sup>2</sup>/month which exceeded the annual criteria of 4.0 g/m<sup>2</sup>/month.</p> <p>The exceeded rolling annual average dust deposition at D5 was due to adjacent farming activities.</p>

Event No.	Date of Incident	Applicable Condition(s)	Details, Cause and Mitigation of Incident
			No consent breached. No further action required by DPHI. Incident closed out.
13	29 May 2024 - 26 June 2024	Condition 7 of Schedule 3 of DA 250-09-01	<p>DPHI Notification and Reporting: <b>DA-250-09-01-PA-42</b></p> <p>During this monitoring period the monthly dust deposition result at D5 was 5.8 g/m<sup>2</sup>/month and the rolling annual average dust deposition was 5.9 g/m<sup>2</sup>/month which exceeded the annual criteria of 4.0 g/m<sup>2</sup>/month.</p> <p>The exceeded rolling annual average dust deposition at D5 was due to adjacent farming activities.</p> <p>No consent breached. No further action required by DPHI. Incident closed out.</p>

## 11.2 Notices issued by DPIRD

Dixon Sand received four notices under the *Work Health and Safety Act 2011* from DPIRD (Resources Regulator) as detailed in Table 37 below.

**Table 37: Notices issued by DPIRD (Resources Regulator)**

Date Issued	Notice Reference	Issues	Status
15 Aug 2023	NTCE0012662 - Section 23 Notice of Concern	Assessment of the Legislation Gap	Closed out
15 Aug 2023	NTCE0012665 - Section 191 Improvement Notice	Formal Fault Procedure, steering on prestart, safety critical component criteria to be identified	Closed out
19 Dec 2023	NTCE0013391 - Section 191 Improvement Notice	RA missing from Dust HCP and no controls listed in PHMP	Closed out
13 May 2024	NTCE0014141 - Section 191 Improvement Notice	Risk assessment for Physcosocial hazards	Closed out

## 12. Independent Environmental Audit

### 12.1 Independent Environmental Audit Requirements

Condition 14 of Schedule 5 of DA 250-09-01 requires:

*Within 12 weeks of commencing this audit, or as otherwise agreed by the Secretary, the Applicant must submit a copy of the audit report to the Secretary and any other NSW agency that requests it, together with its response to any recommendations contained in the audit report, and a timetable for the implementation of these recommendations as required. The Applicant must implement these recommendations, to the satisfaction of the Secretary.*

The appointment of R.W. Corkery and Co Pty Ltd (RWC) to carry out the Independent Environmental Audit (IEA) for Old Northern Road Quarry was approved by DPE on 8<sup>th</sup> September 2022.

The IEA commenced on 18 October 2022 which covers the 3-year audit period between 23 October 2019 and 18 October 2022. The *Independent Environmental Audit: Old Northern Road Report* (RW Corkery & Co, December 2022, Document No. 1021/02) was issued to Dixon Sand on 14<sup>th</sup> December 2022.

The *Response and Action Plan for the Independent Environmental Audit 2022, Old Northern Road Quarry* document was prepared to provide Dixon Sand's response and proposed actions addressing the IEA findings, recommendations for non-compliances and suggested improvements as identified in *the Independent Environmental Audit: Old Northern Road Report* (RW Corkery & Co, December 2022, Document No. 1021/02).

The IEA report and Response and Action Plan report were submitted to the DPE on 16<sup>th</sup> January 2023. The CCC members were provided a link to the reports published on Dixon Sand's website.

All proposed actions from the 2022 IEA have been implemented and closed out except for one item as is listed in Table 37 below. The matter of application to enact the Positive Public Covenant for the Haerses Road Biodiversity Offset Area is still on-going and terms of agreement still in negotiation between Dixon Sand and the DPHI.

The next IEA is scheduled to be undertaken late 2025.

**Table 38: Outstanding non-compliance item identified during the 2022 IEA.**

Consent Condition	Conditional Requirement	Compliance Status	IEA Comments and Recommendations	IEA Recommendation, Dixon Sand's Proposed Action and Implementation Timeframe
3(25)(c)	provide appropriate long term security for the Haerses Road Biodiversity Offset Area; and	Non-compliant	<p>Proposed terms for a Public Positive Covenant were submitted by Dixon Sand to DPIE on 24 August 2019. However, confirmation of these terms is awaited and once confirmed, Dixon Sand will seek to register the Haerses Road Biodiversity Offset Area under this arrangement.</p> <p>See <b>Recommendation ONR R9/22</b>.</p>	<p><b>Recommendation ONR R9/22</b></p> <p>Continue to follow up with the DPE to ensure that the Positive Public Covenant to provide long-term security of the Haerses Road Biodiversity Offset Area is fully processed to enable it to be implemented.  <i>Dixon Sand has submitted all required information regarding the Positive Public Covenant to DPE and awaits the Department's response in order for this matter to be finalised.</i></p> <p><b>Proposed Action:</b>                      Dixon Sand will contact DPE to continue with the review of the proposed draft conditions in order to finalise the Positive Public Covenant registration.</p> <p><b>Status</b>                      Open – Dixon Sand contacted DPPI on 31 January 2023, awaiting response. Dixon recently contact DPPI and submitted the draft terms of the Public Positive Covenant instrument (DA-250-09-01-PA-44). The matter is subject on on-going liaison between Dixon Sand and DPPI.</p>

## 13. Proposed Actions to be completed in the next Reporting Period

### 13.1 Air Quality Monitoring

Undertake consultation with the EPA regarding the review (and revision if required) of the current air quality monitoring locations. The Air Quality Management Plan will be updated accordingly.

### 13.2 Vegetation Clearing and Extraction

Vegetation clearing will be undertaken in accordance with the Pre-clearing procedures.

### 13.3 Rehabilitation and Bush Regeneration

#### Old Northern Road NVC Rehabilitation Area

- Continue with routine weed control and monitoring of regenerating native species, and
- Supplementary planting on the southern boundary to prevent weed encroachment.

#### Old Northern Road Lots 1 and 2

- Continued management of *Lantana camera* and review techniques recommended in the Ecological Monitoring Report (South East Environmental, 2024),
- Continued management of other weed species including exotic grasses, and
- Supplementary planting or similar treatment in identified areas as required.

#### Old Northern Road other areas

- Continue with routine weed management along the southern boundary of Cons Hill (Lot 196) and carry out direct seeding or supplementary planting of remnant canopy species and competitive native grasses (such as *Imperata cylindrica*) to revegetate compacted areas, exposed areas and edge areas.
- Supplementary planting at Front Embankment with some remnant canopy and shrub species to occupy areas prone to the spread of invasive grasses.

#### Haerses Road Biodiversity Offset Area

- Continue with management of invasive grass and annual species along the North-western border of the HRBOA.

## 14. Conclusion

A number of recommendations and change in environmental procedures have been proposed throughout this Annual Review covering the 2023 - 2024 reporting period.

In general, Dixon Sand has maintained acceptable environmental performance outcomes throughout the reporting period. The company has committed to ongoing endeavours to minimise environmental impacts and potential exceedances related to quarry operations.

## **Appendix A – Dust Deposition Reports**

## Sampling Report Number: 14909

Date Issued: 4/08/2023

Revision No: 00

Sampling Conditions: Fine, 9°- 19°C

Lab ID	Client Sample Reference	Licence/Reference	Sampler	Date Sampled	Method of Sampling	Pre-treatment / Preservation
14909/1	D08&9 Hitchcock Rd Olive Grove		T.Walker	26/07/2023 11:23	AS3580.10.1	CuSO4
14909/2	D10 Hearses Rd		T.Walker	26/07/2023 11:51	AS3580.10.1	CuSO4
14909/3	D06 School		T.Walker	26/07/2023 09:58	AS3580.10.1	CuSO4
14909/4	D05 Bund		T.Walker	26/07/2023 10:12	AS3580.10.1	CuSO4
14909/5	D04 Rehab		T.Walker	26/07/2023 10:54	AS3580.10.1	CuSO4
14909/6	D07 Mullock		T.Walker	26/07/2023 11:08	AS3580.10.1	CuSO4
14909/7	D01(A) Front Gate		T.Walker	26/07/2023 10:22	AS3580.10.1	CuSO4
14909/8	D11 Goldstien		T.Walker	26/07/2023 10:36	AS3580.10.1	CuSO4
14909/9	D12 Ram		T.Walker	26/07/2023 11:36	AS3580.10.1	CuSO4

Lab ID	Client Sample Reference	GPS-Easting	GPS-Northing	Sampling Observations
14909/1	D08&9 Hitchcock Rd Olive Grove	313058	6295137	
14909/2	D10 Hearses Rd	312538	6294576	Major bird droppings, algae
14909/3	D06 School	313518	6296537	Minor insects
14909/4	D05 Bund	313160	6296838	Minor vegetation
14909/5	D04 Rehab	312385	6296932	
14909/6	D07 Mullock	312579	6296676	
14909/7	D01(A) Front Gate	313290	6297176	Minor dust, visible dust in funnel. Crop farming/tilling in adjacent paddock
14909/8	D11 Goldstien	312034	6294213	
14909/9	D12 Ram	311750	6294159	

Sampling procedures have been approved and report finalised on 4/08/2023.

Where method is "unknown" sampling procedures are not endorsed



## Report Number: 14985

Date Issued: 31/08/2023

Revision Number: 00

### Site/Job: Dixon Maroota - Dusts

Client: Dixon Sand (No.1) Pty Ltd  
 Address: PO Box 4019  
 PITT TOWN NSW 2756  
 Contact: David Dixon

The following Dust Deposition sample(s) were received on 23/08/2023

Client Sample Reference	Date On	Date Off	Lab ID	Matrix	Comments or Non-Compliances
D08&9 Hitchcock Rd Olive Grove	26/07/2023 11:23	23/08/2023 11:22	14985/1	Dust	
D10 Hearses Rd	26/07/2023 11:51	23/08/2023 11:52	14985/2	Dust	
D06 School	26/07/2023 09:58	23/08/2023 10:12	14985/3	Dust	
D05 Bund	26/07/2023 10:12	23/08/2023 10:24	14985/4	Dust	
D04 Rehab	26/07/2023 10:54	23/08/2023 10:56	14985/5	Dust	
D07 Mullock	26/07/2023 11:08	23/08/2023 11:10	14985/6	Dust	
D01(A) Front Gate	26/07/2023 10:22	23/08/2023 10:37	14985/7	Dust	
D11 Goldstien	26/07/2023 10:36	23/08/2023 12:46	14985/8	Dust	
D12 Ram	26/07/2023 11:36	23/08/2023 11:36	14985/9	Dust	

The sample(s) have been tested as received and results relate specifically to the samples tested.

The following reports are included:

- Test Report
- Sampling Report
- Chain of Custody (if available)



Liane Peyra  
 Technical Officer

Authorised by:



Anthony Crane  
 Laboratory Manager

Results have been approved and report finalised on 31/08/2023.



## Test Report Number: 14985

Date Issued: 31/08/2023

Revision No: 00

### Results

Deposited Matter	Method	Lab ID Sample Date Sample ID	14985/1 23/08/2023 D08&9 Hitchcock Rd Olive Grove	14985/2 23/08/2023 D10 Hearses Rd	14985/3 23/08/2023 D06 School	14985/4 23/08/2023 D05 Bund	14985/5 23/08/2023 D04 Rehab
<b>Date Tested</b>	--	--	25/08/2023	25/08/2023	25/08/2023	25/08/2023	25/08/2023
Number of Days	AS 3580.10.1	days	28	28	28	28	28
Insoluble Solids	AS 3580.10.1	g/m2/mth	0.8	3.2	0.7	1.2	0.5
Ash	AS 3580.10.1	g/m2/mth	0.6	1.7	0.2	0.8	0.1
Combustible Matter	AS 3580.10.1	g/m2/mth	0.2	1.5	0.5	0.4	0.4
Calculated Rain	AS 3580.10.1	mm	30	28	28	28	27

Deposited Matter	Method	Lab ID Sample Date Sample ID	14985/6 23/08/2023 D07 Mullock	14985/7 23/08/2023 D01(A) Front Gate	14985/8 23/08/2023 D11 Goldstien	14985/9 23/08/2023 D12 Ram
<b>Date Tested</b>	--	--	25/08/2023	25/08/2023	25/08/2023	25/08/2023
Number of Days	AS 3580.10.1	days	28	28	28	28
Insoluble Solids	AS 3580.10.1	g/m2/mth	0.5	3.6	0.5	0.2
Ash	AS 3580.10.1	g/m2/mth	0.2	3.1	0.1	0.2
Combustible Matter	AS 3580.10.1	g/m2/mth	0.3	0.5	0.4	<0.1
Calculated Rain	AS 3580.10.1	mm	28	29	28	30



## Report Comments:

# Where present, indicates NATA accreditation does not cover the performance of this service.

Results in **bold** indicate an exceedance of the relevant guideline.

When considering the pass or fail of tests the measurement of uncertainty of each parameter must be considered.

<https://www.vgt.com.au/measurement-uncertainty>

[NT]: Not tested

Location Analysed : 4/30 Glenwood Dr Thornton NSW 2322.

## Sampling Report Number: 14985

Date Issued: 31/08/2023

Revision No: 00

Sampling Conditions: Fine, 16°- 20°C

Lab ID	Client Sample Reference	Licence/Reference	Sampler	Date Sampled	Method of Sampling	Pre-treatment / Preservation
14985/1	D08&9 Hitchcock Rd Olive Grove		T.Walker	23/08/2023 11:22	AS3580.10.1	CuSO4
14985/2	D10 Hearses Rd		T.Walker	23/08/2023 11:52	AS3580.10.1	CuSO4
14985/3	D06 School		T.Walker	23/08/2023 10:12	AS3580.10.1	CuSO4
14985/4	D05 Bund		T.Walker	23/08/2023 10:24	AS3580.10.1	CuSO4
14985/5	D04 Rehab		T.Walker	23/08/2023 10:56	AS3580.10.1	CuSO4
14985/6	D07 Mullock		T.Walker	23/08/2023 11:10	AS3580.10.1	CuSO4
14985/7	D01(A) Front Gate		T.Walker	23/08/2023 10:37	AS3580.10.1	CuSO4
14985/8	D11 Goldstien		T.Walker	23/08/2023 12:46	AS3580.10.1	CuSO4
14985/9	D12 Ram		T.Walker	23/08/2023 11:36	AS3580.10.1	CuSO4

Lab ID	Client Sample Reference	GPS-Easting	GPS-Northing	Sampling Observations
14985/1	D08&9 Hitchcock Rd Olive Grove	313058	6295137	
14985/2	D10 Hearses Rd	312538	6294576	Insects
14985/3	D06 School	313518	6296537	Minor vegetation
14985/4	D05 Bund	313160	6296838	
14985/5	D04 Rehab	312385	6296932	
14985/6	D07 Mullock	312579	6296676	
14985/7	D01(A) Front Gate	313290	6297176	Dust, minor insects - bare loose earth in adjacent crop paddocks
14985/8	D11 Goldstien	312034	6294213	Minor vegetation
14985/9	D12 Ram	311750	6294159	Minor insects

Sampling procedures have been approved and report finalised on 31/08/2023.

Where method is "unknown" sampling procedures are not endorsed



## Report Number: 15102

Date Issued: 28/09/2023

Revision Number: 00

### Site/Job: Dixon Maroota - Dusts

Client: Dixon Sand (No.1) Pty Ltd  
Address: PO Box 4019  
PITT TOWN NSW 2756  
Contact: David Dixon

The following Dust Deposition sample(s) were received on 20/09/2023

Client Sample Reference	Date On	Date Off	Lab ID	Matrix	Comments or Non-Compliances
D08&9 Hitchcock Rd Olive Grove	23/08/2023 11:22	20/09/2023 12:06	15102/1	Dust	
D10 Hearses Rd	23/08/2023 11:52	20/09/2023 12:38	15102/2	Dust	
D06 School	23/08/2023 10:12	20/09/2023 10:58	15102/3	Dust	
D05 Bund	23/08/2023 10:24	20/09/2023 11:12	15102/4	Dust	
D04 Rehab	23/08/2023 10:56	20/09/2023 11:38	15102/5	Dust	
D07 Mullock	23/08/2023 11:10	20/09/2023 11:52	15102/6	Dust	
D01(A) Front Gate	23/08/2023 10:37	20/09/2023 11:21	15102/7	Dust	
D11 Goldstien	23/08/2023 12:46	20/09/2023 13:28	15102/8	Dust	
D12 Ram	23/08/2023 11:36	20/09/2023 12:26	15102/9	Dust	

The sample(s) have been tested as received and results relate specifically to the samples tested.

The following reports are included:

- Test Report
- Sampling Report
- Chain of Custody (if available)



Anthony Crane  
Laboratory Manager

Authorised by:

Results have been approved and report finalised on 28/09/2023.

## Test Report Number: 15102

Date Issued: 28/09/2023

Revision No: 00

### Results

Deposited Matter	Method	Lab ID Sample Date Sample ID	15102/1 20/09/2023 D08&9 Hitchcock Rd Olive Grove	15102/2 20/09/2023 D10 Hearses Rd	15102/3 20/09/2023 D06 School	15102/4 20/09/2023 D05 Bund	15102/5 20/09/2023 D04 Rehab
<b>Date Tested</b>	--	--	26/09/2023	26/09/2023	26/09/2023	26/09/2023	26/09/2023
Number of Days	AS 3580.10.1	days	28	28	28	28	28
Insoluble Solids	AS 3580.10.1	g/m2/mth	0.6	<b>8.5</b>	0.3	0.6	0.2
Ash	AS 3580.10.1	g/m2/mth	0.6	3.4	0.3	0.6	0.2
Combustible Matter	AS 3580.10.1	g/m2/mth	<0.1	5.1	<0.1	<0.1	<0.1
Calculated Rain	AS 3580.10.1	mm	21	21	18	16	18

Deposited Matter	Method	Lab ID Sample Date Sample ID	15102/6 20/09/2023 D07 Mullock	15102/7 20/09/2023 D01(A) Front Gate	15102/8 20/09/2023 D11 Goldstien	15102/9 20/09/2023 D12 Ram
<b>Date Tested</b>	--	--	26/09/2023	26/09/2023	26/09/2023	26/09/2023
Number of Days	AS 3580.10.1	days	28	28	28	28
Insoluble Solids	AS 3580.10.1	g/m2/mth	0.3	2.4	0.4	0.6
Ash	AS 3580.10.1	g/m2/mth	0.3	2.4	0.2	0.2
Combustible Matter	AS 3580.10.1	g/m2/mth	<0.1	<0.1	0.2	0.4
Calculated Rain	AS 3580.10.1	mm	18	18	20	22



## Report Comments:

# Where present, indicates NATA accreditation does not cover the performance of this service.

Results in **bold** indicate an exceedance of the relevant guideline.

When considering the pass or fail of tests the measurement of uncertainty of each parameter must be considered.

<https://www.vgt.com.au/measurement-uncertainty>

[NT]: Not tested

Location Analysed : 4/30 Glenwood Dr Thornton NSW 2322.

## Sampling Report Number: 15102

Date Issued: 28/09/2023

Revision No: 00

Sampling Conditions: Fine, 31°- 34°C

Lab ID	Client Sample Reference	Licence/Reference	Sampler	Date Sampled	Method of Sampling	Pre-treatment / Preservation
15102/1	D08&9 Hitchcock Rd Olive Grove		T.Walker	20/09/2023 12:06	AS3580.10.1	CuSO4
15102/2	D10 Hearses Rd		T.Walker	20/09/2023 12:38	AS3580.10.1	CuSO4
15102/3	D06 School		T.Walker	20/09/2023 10:58	AS3580.10.1	CuSO4
15102/4	D05 Bund		T.Walker	20/09/2023 11:12	AS3580.10.1	CuSO4
15102/5	D04 Rehab		T.Walker	20/09/2023 11:38	AS3580.10.1	CuSO4
15102/6	D07 Mullock		T.Walker	20/09/2023 11:52	AS3580.10.1	CuSO4
15102/7	D01(A) Front Gate		T.Walker	20/09/2023 11:21	AS3580.10.1	CuSO4
15102/8	D11 Goldstien		T.Walker	20/09/2023 13:28	AS3580.10.1	CuSO4
15102/9	D12 Ram		T.Walker	20/09/2023 12:26	AS3580.10.1	CuSO4

Lab ID	Client Sample Reference	GPS-Easting	GPS-Northing	Sampling Observations
15102/1	D08&9 Hitchcock Rd Olive Grove	313058	6295137	Insects
15102/2	D10 Hearses Rd	312538	6294576	Major vegetation/seeds
15102/3	D06 School	313518	6296537	Minor insects
15102/4	D05 Bund	313160	6296838	Minor insects
15102/5	D04 Rehab	312385	6296932	
15102/6	D07 Mullock	312579	6296676	Minor vegetation
15102/7	D01(A) Front Gate	313290	6297176	Minor dust - Bare earth/sandy crop paddocks adjacent
15102/8	D11 Goldstien	312034	6294213	Minor vegetation
15102/9	D12 Ram	311750	6294159	

Sampling procedures have been approved and report finalised on 28/09/2023.

Where method is "unknown" sampling procedures are not endorsed



## Report Number: 15245

Date Issued: 26/10/2023

Revision Number: 00

### Site/Job: Dixon Maroota - Dusts

Client: Dixon Sand (No.1) Pty Ltd  
Address: PO Box 4019  
PITT TOWN NSW 2756  
Contact: David Dixon

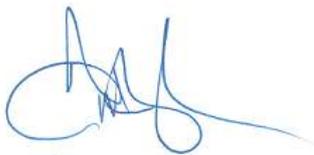
The following 9 Dust Deposition sample(s) were received on 18/10/2023

Client Sample Reference	Date On	Date Off	Lab ID	Matrix	Comments or Non-Compliances
D08&9 Hitchcock Rd Olive Grove	20/09/2023 12:06	18/10/2023 11:49	15245/1	Dust	
D10 Hearses Rd	20/09/2023 12:38	18/10/2023 12:13	15245/2	Dust	
D06 School	20/09/2023 10:58	18/10/2023 10:45	15245/3	Dust	
D05 Bund	20/09/2023 11:12	18/10/2023 11:00	15245/4	Dust	
D04 Rehab	20/09/2023 11:38	18/10/2023 11:25	15245/5	Dust	
D07 Mullock	20/09/2023 11:52	18/10/2023 11:37	15245/6	Dust	
D01(A) Front Gate	20/09/2023 11:21	18/10/2023 11:11	15245/7	Dust	
D11 Goldstien	20/09/2023 13:28	18/10/2023 12:23	15245/8	Dust	
D12 Ram	20/09/2023 12:26	18/10/2023 12:02	15245/9	Dust	

The sample(s) have been tested as received and results relate specifically to the samples tested.

The following reports are included:

- Test Report
- Sampling Report
- Chain of Custody (if available)



Anthony Crane  
Laboratory Manager

Authorised by:

Results have been approved and report finalised on 26/10/2023.

## Test Report Number: 15245

Date Issued: 26/10/2023

Revision No: 00

### Results

Deposited Matter	Method	Lab ID Sample Date Sample ID	15245/1 18/10/2023 D08&9 Hitchcock Rd Olive Grove	15245/2 18/10/2023 D10 Hearses Rd	15245/3 18/10/2023 D06 School	15245/4 18/10/2023 D05 Bund	15245/5 18/10/2023 D04 Rehab
<i>Date Tested</i>	AS 3580.10.1	--	24/10/2023	24/10/2023	24/10/2023	24/10/2023	24/10/2023
Number of Days	AS 3580.10.1	days	28	28	28	28	28
Insoluble Solids	AS 3580.10.1	g/m2/mth	1.1	0.6	1.0	3.2	0.7
Ash	AS 3580.10.1	g/m2/mth	0.6	0.4	0.6	2.6	0.4
Combustible Matter	AS 3580.10.1	g/m2/mth	0.5	0.2	0.4	0.6	0.3
Calculated Rain	AS 3580.10.1	mm	44	43	50	52	53

Deposited Matter	Method	Lab ID Sample Date Sample ID	15245/6 18/10/2023 D07 Mullock	15245/7 18/10/2023 D01(A) Front Gate	15245/8 18/10/2023 D11 Goldstien	15245/9 18/10/2023 D12 Ram
<i>Date Tested</i>	AS 3580.10.1	--	24/10/2023	24/10/2023	24/10/2023	24/10/2023
Number of Days	AS 3580.10.1	days	28	28	28	28
Insoluble Solids	AS 3580.10.1	g/m2/mth	0.7	2.2	0.7	0.5
Ash	AS 3580.10.1	g/m2/mth	0.4	1.9	0.4	0.3
Combustible Matter	AS 3580.10.1	g/m2/mth	0.3	0.3	0.3	0.2
Calculated Rain	AS 3580.10.1	mm	52	51	46	46



## Report Comments:

# Where present, indicates NATA accreditation does not cover the performance of this service.

Results in **bold** indicate an exceedance of the relevant guideline.

When considering the pass or fail of tests the measurement of uncertainty of each parameter must be considered.

<https://www.vgt.com.au/measurement-uncertainty>

[NT]: Not tested

Location Analysed : 4/30 Glenwood Dr Thornton NSW 2322.

## Sampling Report Number: 15245

Date Issued: 26/10/2023

Revision No: 00

Sampling Conditions: Cloudy, light rain, 16 - 20 °C

Lab ID	Client Sample Reference	Licence/ Reference	Sampler	Date Sampled	Method of Sampling	Pre-treatment / Preservation
15245/1	D08&9 Hitchcock Rd Olive Grove		D.Walker	18/10/2023 11:49	AS3580.10.1	CuSO4
15245/2	D10 Hearses Rd		D.Walker	18/10/2023 12:13	AS3580.10.1	CuSO4
15245/3	D06 School		D.Walker	18/10/2023 10:45	AS3580.10.1	CuSO4
15245/4	D05 Bund		D.Walker	18/10/2023 11:00	AS3580.10.1	CuSO4
15245/5	D04 Rehab		D.Walker	18/10/2023 11:25	AS3580.10.1	CuSO4
15245/6	D07 Mullock		D.Walker	18/10/2023 11:37	AS3580.10.1	CuSO4
15245/7	D01(A) Front Gate		D.Walker	18/10/2023 11:11	AS3580.10.1	CuSO4
15245/8	D11 Goldstien		D.Walker	18/10/2023 12:23	AS3580.10.1	CuSO4
15245/9	D12 Ram		D.Walker	18/10/2023 12:02	AS3580.10.1	CuSO4

Lab ID	Client Sample Reference	GPS-Easting	GPS-Northing	Sampling Observations
15245/1	D08&9 Hitchcock Rd Olive Grove	313058	6295137	Minor insects
15245/2	D10 Hearses Rd	312538	6294576	Minor insects
15245/3	D06 School	313518	6296537	Insects
15245/4	D05 Bund	313160	6296838	Minor insects
15245/5	D04 Rehab	312385	6296932	
15245/6	D07 Mullock	312579	6296676	Minor sand, minor vegetation
15245/7	D01(A) Front Gate	313290	6297176	Minor sand
15245/8	D11 Goldstien	312034	6294213	
15245/9	D12 Ram	311750	6294159	

Sampling procedures have been approved and report finalised on 26/10/2023.

Where method is "unknown" sampling procedures are not endorsed



## Report Number: 15325

Date Issued: 24/11/2023

Revision Number: 00

### Site/Job: Dixon Maroota - Dusts

Client: Dixon Sand (No.1) Pty Ltd  
 Address: PO Box 4019  
 PITT TOWN NSW 2756  
 Contact: David Dixon

The following 9 Dust Deposition sample(s) were received on 15/11/2023

Client Sample Reference	Date On	Date Off	Lab ID	Matrix	Comments or Non-Compliances
D08&9 Hitchcock Rd Olive Grove	18/10/2023 11:49	15/11/2023 11:53	15325/1	Dust	
D10 Hearses Rd	18/10/2023 12:13	15/11/2023 12:24	15325/2	Dust	
D06 School	18/10/2023 10:45	15/11/2023 10:42	15325/3	Dust	
D05 Bund	18/10/2023 11:00	15/11/2023 10:54	15325/4	Dust	
D04 Rehab	18/10/2023 11:25	15/11/2023 11:23	15325/5	Dust	
D07 Mullock	18/10/2023 11:37	15/11/2023 11:37	15325/6	Dust	
D01(A) Front Gate	18/10/2023 11:11	15/11/2023 11:06	15325/7	Dust	
D11 Goldstien	18/10/2023 12:23	15/11/2023 13:26	15325/8	Dust	
D12 Ram	18/10/2023 12:02	15/11/2023 12:09	15325/9	Dust	

The sample(s) have been tested as received and results relate specifically to the samples tested.

The following reports are included:

- Test Report
- Sampling Report
- Chain of Custody (if available)



Anthony Crane  
 Laboratory Manager

Authorised by:

Results have been approved and report finalised on 24/11/2023.

## Test Report Number: 15325

Date Issued: 24/11/2023

Revision No: 00

### Results

Deposited Matter	Method	Lab ID Sample Date Sample ID	15325/1 15/11/2023 D08&9 Hitchcock Rd Olive Grove	15325/2 15/11/2023 D10 Hearses Rd	15325/3 15/11/2023 D06 School	15325/4 15/11/2023 D05 Bund	15325/5 15/11/2023 D04 Rehab
<i>Date Tested</i>	AS 3580.10.1	--	23/11/2023	23/11/2023	23/11/2023	23/11/2023	23/11/2023
Number of Days	AS 3580.10.1	days	28	28	28	28	28
Insoluble Solids	AS 3580.10.1	g/m2/mth	1.3	2.4	1.4	<b>4.5</b>	0.5
Ash	AS 3580.10.1	g/m2/mth	0.6	2.1	0.7	3.9	0.3
Combustible Matter	AS 3580.10.1	g/m2/mth	0.7	0.3	0.7	0.6	0.2
Calculated Rain	AS 3580.10.1	mm	61	67	52	49	48

Deposited Matter	Method	Lab ID Sample Date Sample ID	15325/6 15/11/2023 D07 Mullock	15325/7 15/11/2023 D01(A) Front Gate	15325/8 15/11/2023 D11 Goldstien	15325/9 15/11/2023 D12 Ram
<i>Date Tested</i>	AS 3580.10.1	--	23/11/2023	23/11/2023	23/11/2023	23/11/2023
Number of Days	AS 3580.10.1	days	28	28	28	28
Insoluble Solids	AS 3580.10.1	g/m2/mth	1.3	2.1	0.5	0.9
Ash	AS 3580.10.1	g/m2/mth	1.1	1.7	0.3	0.5
Combustible Matter	AS 3580.10.1	g/m2/mth	0.2	0.4	0.2	0.4
Calculated Rain	AS 3580.10.1	mm	51	51	73	84



## Report Comments:

# Where present, indicates NATA accreditation does not cover the performance of this service.

Results in **bold** indicate an exceedance of the relevant guideline.

When considering the pass or fail of tests the measurement of uncertainty of each parameter must be considered.

<https://www.vgt.com.au/measurement-uncertainty>

[NT]: Not tested

Location Analysed : 4/30 Glenwood Dr Thornton NSW 2322.

## Sampling Report Number: 15325

Date Issued: 24/11/2023

Revision No: 00

Sampling Conditions: Cloudy, 25°- 29°C

Lab ID	Client Sample Reference	Licence/Reference	Sampler	Date Sampled	Method of Sampling	Pre-treatment / Preservation
15325/1	D08&9 Hitchcock Rd Olive Grove		T & D.Walker	15/11/2023 11:53	AS3580.10.1	CuSO4
15325/2	D10 Hearses Rd		T & D.Walker	15/11/2023 12:24	AS3580.10.1	CuSO4
15325/3	D06 School		T & D.Walker	15/11/2023 10:42	AS3580.10.1	CuSO4
15325/4	D05 Bund		T & D.Walker	15/11/2023 10:54	AS3580.10.1	CuSO4
15325/5	D04 Rehab		T & D.Walker	15/11/2023 11:23	AS3580.10.1	CuSO4
15325/6	D07 Mullock		T & D.Walker	15/11/2023 11:37	AS3580.10.1	CuSO4
15325/7	D01(A) Front Gate		T & D.Walker	15/11/2023 11:06	AS3580.10.1	CuSO4
15325/8	D11 Goldstien		T & D.Walker	15/11/2023 13:26	AS3580.10.1	CuSO4
15325/9	D12 Ram		T & D.Walker	15/11/2023 12:09	AS3580.10.1	CuSO4

Lab ID	Client Sample Reference	GPS-Easting	GPS-Northing	Sampling Observations
15325/1	D08&9 Hitchcock Rd Olive Grove	313058	6295137	Minor vegetation
15325/2	D10 Hearses Rd	312538	6294576	Minor sand, minor vegetation
15325/3	D06 School	313518	6296537	Insects
15325/4	D05 Bund	313160	6296838	Minor sand
15325/5	D04 Rehab	312385	6296932	
15325/6	D07 Mullock	312579	6296676	
15325/7	D01(A) Front Gate	313290	6297176	
15325/8	D11 Goldstien	312034	6294213	Minor vegetation
15325/9	D12 Ram	311750	6294159	

Sampling procedures have been approved and report finalised on 24/11/2023.

Where method is "unknown" sampling procedures are not endorsed



## Report Number: 15467

Date Issued: 19/12/2023

Revision Number: 00

### Site/Job: Dixon Maroota - Dusts

Client: Dixon Sand (No.1) Pty Ltd  
 Address: PO Box 4019  
 PITT TOWN NSW 2756  
 Contact: David Dixon

The following 9 Dust Deposition sample(s) were received on 13/12/2023

Client Sample Reference	Date On	Date Off	Lab ID	Matrix	Comments or Non-Compliances
D08&9 Hitchcock Rd Olive Grove	15/11/2023 11:53	13/12/2023 12:10	15467/1	Dust	
D10 Hearses Rd	15/11/2023 12:24	13/12/2023 12:41	15467/2	Dust	
D06 School	15/11/2023 10:42	13/12/2023 10:56	15467/3	Dust	
D05 Bund	15/11/2023 10:54	13/12/2023 11:13	15467/4	Dust	
D04 Rehab	15/11/2023 11:23	13/12/2023 11:40	15467/5	Dust	
D07 Mullock	15/11/2023 11:37	13/12/2023 11:55	15467/6	Dust	
D01(A) Front Gate	15/11/2023 11:06	13/12/2023 11:28	15467/7	Dust	
D11 Goldstien	15/11/2023 13:26	13/12/2023 14:08	15467/8	Dust	
D12 Ram	15/11/2023 12:09	13/12/2023 12:25	15467/9	Dust	

The sample(s) have been tested as received and results relate specifically to the samples tested.

The following reports are included:

- Test Report
- Sampling Report
- Chain of Custody (if available)



Anthony Crane  
Laboratory Manager



Liane Peyra  
Technical Officer

Authorised by:

Results have been approved and report finalised on 19/12/2023.

## Test Report Number: 15467

Date Issued: 19/12/2023

Revision No: 00

### Results

Deposited Matter	Method	Lab ID Sample Date Sample ID	15467/1 13/12/2023 D08&9 Hitchcock Rd Olive Grove	15467/2 13/12/2023 D10 Hearses Rd	15467/3 13/12/2023 D06 School	15467/4 13/12/2023 D05 Bund	15467/5 13/12/2023 D04 Rehab
<i>Date Tested</i>	AS 3580.10.1	--	15/12/2023	15/12/2023	15/12/2023	15/12/2023	15/12/2023
Number of Days	AS 3580.10.1	days	28	28	28	28	28
Insoluble Solids	AS 3580.10.1	g/m2/mth	1.4	2.4	3.6	<b>11.4</b>	1.1
Ash	AS 3580.10.1	g/m2/mth	0.9	1.6	1.3	9.3	0.5
Combustible Matter	AS 3580.10.1	g/m2/mth	0.5	0.8	2.3	2.1	0.6
Calculated Rain	AS 3580.10.1	mm	96	90	105	119	85

Deposited Matter	Method	Lab ID Sample Date Sample ID	15467/6 13/12/2023 D07 Mullock	15467/7 13/12/2023 D01(A) Front Gate	15467/8 13/12/2023 D11 Goldstien	15467/9 13/12/2023 D12 Ram
<i>Date Tested</i>	AS 3580.10.1	--	15/12/2023	15/12/2023	15/12/2023	15/12/2023
Number of Days	AS 3580.10.1	days	28	28	28	28
Insoluble Solids	AS 3580.10.1	g/m2/mth	1.1	1.7	1.9	1.0
Ash	AS 3580.10.1	g/m2/mth	0.7	1.2	0.6	0.3
Combustible Matter	AS 3580.10.1	g/m2/mth	0.4	0.5	1.3	0.7
Calculated Rain	AS 3580.10.1	mm	94	100	80	79



## Report Comments:

# Where present, indicates NATA accreditation does not cover the performance of this service.

Results in **bold** indicate an exceedance of the relevant guideline.

When considering the pass or fail of tests the measurement of uncertainty of each parameter must be considered.

<https://www.vgt.com.au/measurement-uncertainty>

[NT]: Not tested

Location Analysed : 4/30 Glenwood Dr Thornton NSW 2322.

## Sampling Report Number: 15467

Date Issued: 19/12/2023

Revision No: 00

Sampling Conditions: Cloudy, 26°- 34°C

Lab ID	Client Sample Reference	Licence/Reference	Sampler	Date Sampled	Method of Sampling	Pre-treatment / Preservation
15467/1	D08&9 Hitchcock Rd Olive Grove		D.Walker	13/12/2023 12:10	AS3580.10.1	CuSO4
15467/2	D10 Hearses Rd		D.Walker	13/12/2023 12:41	AS3580.10.1	CuSO4
15467/3	D06 School		D.Walker	13/12/2023 10:56	AS3580.10.1	CuSO4
15467/4	D05 Bund		D.Walker	13/12/2023 11:13	AS3580.10.1	CuSO4
15467/5	D04 Rehab		D.Walker	13/12/2023 11:40	AS3580.10.1	CuSO4
15467/6	D07 Mullock		D.Walker	13/12/2023 11:55	AS3580.10.1	CuSO4
15467/7	D01(A) Front Gate		D.Walker	13/12/2023 11:28	AS3580.10.1	CuSO4
15467/8	D11 Goldstien		D.Walker	13/12/2023 14:08	AS3580.10.1	CuSO4
15467/9	D12 Ram		D.Walker	13/12/2023 12:25	AS3580.10.1	CuSO4

Lab ID	Client Sample Reference	GPS-Easting	GPS-Northing	Sampling Observations
15467/1	D08&9 Hitchcock Rd Olive Grove	313058	6295137	Minor vegetation, minor insects
15467/2	D10 Hearses Rd	312538	6294576	Minor sand - earthworks at adjacent crop paddock
15467/3	D06 School	313518	6296537	Insects, minor bird droppings
15467/4	D05 Bund	313160	6296838	Dust, minor insects. Land clearing - loose exposed earth
15467/5	D04 Rehab	312385	6296932	Minor vegetation, minor insects
15467/6	D07 Mullock	312579	6296676	Minor insects
15467/7	D01(A) Front Gate	313290	6297176	Minor sand
15467/8	D11 Goldstien	312034	6294213	Minor insects, minor vegetation
15467/9	D12 Ram	311750	6294159	Minor insects

Sampling procedures have been approved and report finalised on 19/12/2023.

Where method is "unknown" sampling procedures are not endorsed



## Report Number: 15566

Date Issued: 18/01/2024 Revision Number: 00

### Site/Job: Dixon Maroota - Dusts

Client: Dixon Sand (No.1) Pty Ltd  
 Address: PO Box 4019  
 PITT TOWN NSW 2756  
 Contact: David Dixon

The following 9 Dust Deposition sample(s) were received on 10/01/2024

Client Sample Reference	Date On	Date Off	Lab ID	Matrix	Comments or Non-Compliances
D08&9 Hitchcock Rd Olive Grove	13/12/2023 12:10	10/01/2024 12:08	15566/1	Dust	
D10 Hearses Rd	13/12/2023 12:41	10/01/2024 12:34	15566/2	Dust	
D06 School	13/12/2023 10:56	10/01/2024 10:45	15566/3	Dust	
D05 Bund	13/12/2023 11:13	10/01/2024 10:59	15566/4	Dust	
D04 Rehab	13/12/2023 11:40	10/01/2024 11:27	15566/5	Dust	
D07 Mullock	13/12/2023 11:55	10/01/2024 11:47	15566/6	Dust	
D01(A) Front Gate	13/12/2023 11:28	10/01/2024 11:11	15566/7	Dust	
D11 Goldstien	13/12/2023 14:08	10/01/2024 12:52	15566/8	Dust	
D12 Ram	13/12/2023 12:25	10/01/2024 12:15	15566/9	Dust	

The sample(s) have been tested as received and results relate specifically to the samples tested.

The following reports are included:

- Test Report
- Sampling Report
- Chain of Custody (if available)



Anthony Crane  
 Laboratory Manager

Authorised by:

Results have been approved and report finalised on 18/01/2024.



## Test Report Number: 15566

Date Issued: 18/01/2024

Revision No: 00

### Results

Deposited Matter	Method	Lab ID Sample Date Sample ID	15566/1 10/01/2024 D08&9 Hitchcock Rd Olive Grove	15566/2 10/01/2024 D10 Hearses Rd	15566/3 10/01/2024 D06 School	15566/4 10/01/2024 D05 Bund	15566/5 10/01/2024 D04 Rehab
<i>Date Tested</i>	AS 3580.10.1	--	16/01/2024	16/01/2024	16/01/2024	16/01/2024	16/01/2024
Number of Days	AS 3580.10.1	days	28	28	28	28	28
Insoluble Solids	AS 3580.10.1	g/m2/mth	1.4	1.3	3.5	<b>23.1</b>	1.5
Ash	AS 3580.10.1	g/m2/mth	0.8	0.8	1.7	22.0	0.7
Combustible Matter	AS 3580.10.1	g/m2/mth	0.6	0.5	1.8	1.1	0.8
Calculated Rain	AS 3580.10.1	mm	187	180	148	165	115

Deposited Matter	Method	Lab ID Sample Date Sample ID	15566/6 10/01/2024 D07 Mullock	15566/7 10/01/2024 D01(A) Front Gate	15566/8 10/01/2024 D11 Goldstien	15566/9 10/01/2024 D12 Ram
<i>Date Tested</i>	AS 3580.10.1	--	16/01/2024	16/01/2024	16/01/2024	16/01/2024
Number of Days	AS 3580.10.1	days	28	28	28	28
Insoluble Solids	AS 3580.10.1	g/m2/mth	1.2	<b>13.7</b>	1.8	0.8
Ash	AS 3580.10.1	g/m2/mth	0.7	11.5	0.8	0.3
Combustible Matter	AS 3580.10.1	g/m2/mth	0.5	2.2	1.0	0.5
Calculated Rain	AS 3580.10.1	mm	96	116	84	175



## Report Comments:

# Where present, indicates NATA accreditation does not cover the performance of this service.

Results in **bold** indicate an exceedance of the relevant guideline.

When considering the pass or fail of tests the measurement of uncertainty of each parameter must be considered.

<https://www.vgt.com.au/measurement-uncertainty>

[NT]: Not tested

Location Analysed : 4/30 Glenwood Dr Thornton NSW 2322.

## Sampling Report Number: 15566

Date Issued: 18/01/2024

Revision No: 00

Sampling Conditions: Cloudy, 26 - 28 °C

Lab ID	Client Sample Reference	Licence/ Reference	Sampler	Date Sampled	Method of Sampling	Pre-treatment / Preservation
15566/1	D08&9 Hitchcock Rd Olive Grove		D.Walker	10/01/2024 12:08	AS3580.10.1	CuSO4
15566/2	D10 Hearses Rd		D.Walker	10/01/2024 12:34	AS3580.10.1	CuSO4
15566/3	D06 School		D.Walker	10/01/2024 10:45	AS3580.10.1	CuSO4
15566/4	D05 Bund		D.Walker	10/01/2024 10:59	AS3580.10.1	CuSO4
15566/5	D04 Rehab		D.Walker	10/01/2024 11:27	AS3580.10.1	CuSO4
15566/6	D07 Mullock		D.Walker	10/01/2024 11:47	AS3580.10.1	CuSO4
15566/7	D01(A) Front Gate		D.Walker	10/01/2024 11:11	AS3580.10.1	CuSO4
15566/8	D11 Goldstien		D.Walker	10/01/2024 12:52	AS3580.10.1	CuSO4
15566/9	D12 Ram		D.Walker	10/01/2024 12:15	AS3580.10.1	CuSO4

Lab ID	Client Sample Reference	GPS-Easting	GPS-Northing	Sampling Observations
15566/1	D08&9 Hitchcock Rd Olive Grove	313058	6295137	
15566/2	D10 Hearses Rd	312538	6294576	Minor insects
15566/3	D06 School	313518	6296537	Minor insects, vegetation
15566/4	D05 Bund	313160	6296838	Sand, minor insects
15566/5	D04 Rehab	312385	6296932	Minor vegetation, minor insects, glass in bottle. Funnel broken / replaced
15566/6	D07 Mullock	312579	6296676	Glass in bottle. Funnel broken / replaced
15566/7	D01(A) Front Gate	313290	6297176	Full, minor sand, minor vegetation
15566/8	D11 Goldstien	312034	6294213	Glass in bottle. Funnel cracked / chipped
15566/9	D12 Ram	311750	6294159	

Sampling procedures have been approved and report finalised on 18/01/2024.

Where method is "unknown" sampling procedures are not endorsed

## Report Number: 15691

Date Issued: 15/02/2024

Revision Number: 00

### Site/Job: Dixon Maroota - Dusts

Client: Dixon Sand (No.1) Pty Ltd  
Address: PO Box 4019  
PITT TOWN NSW 2756  
Contact: David Dixon

The following 9 Dust Deposition sample(s) were received on 7/02/2024

Client Sample Reference	Date On	Date Off	Lab ID	Matrix	Comments or Non-Compliances
D08&9 Hitchcock Rd Olive Grove	10/01/2024 12:08	7/02/2024 11:44	15691/1	Dust	
D10 Hearses Rd	10/01/2024 12:34	7/02/2024 12:21	15691/2	Dust	
D06 School	10/01/2024 10:45	7/02/2024 10:41	15691/3	Dust	
D05 Bund	10/01/2024 10:59	7/02/2024 10:52	15691/4	Dust	
D04 Rehab	10/01/2024 11:27	7/02/2024 11:19	15691/5	Dust	
D07 Mullock	10/01/2024 11:47	7/02/2024 11:33	15691/6	Dust	
D01(A) Front Gate	10/01/2024 11:11	7/02/2024 11:02	15691/7	Dust	
D11 Goldstien	10/01/2024 12:52	7/02/2024 13:22	15691/8	Dust	
D12 Ram	10/01/2024 12:15	7/02/2024 12:04	15691/9	Dust	

The sample(s) have been tested as received and results relate specifically to the samples tested.

The following reports are included:

- Test Report
- Sampling Report
- Chain of Custody (if available)



Anthony Crane  
Laboratory Manager

Authorised by:

Results have been approved and report finalised on 15/02/2024.

## Test Report Number: 15691

Date Issued: 15/02/2024

Revision No: 00

### Results

Deposited Matter	Method	Lab ID Sample Date Sample ID	15691/1 7/02/2024 D08&9 Hitchcock Rd Olive Grove	15691/2 7/02/2024 D10 Hearses Rd	15691/3 7/02/2024 D06 School	15691/4 7/02/2024 D05 Bund	15691/5 7/02/2024 D04 Rehab
<i>Date Tested</i>	AS 3580.10.1	--	13/02/2024	13/02/2024	13/02/2024	13/02/2024	13/02/2024
Number of Days	AS 3580.10.1	days	28	28	28	28	28
Insoluble Solids	AS 3580.10.1	g/m2/mth	0.7	<b>12.8</b>	1.1	<b>5.2</b>	1.6
Ash	AS 3580.10.1	g/m2/mth	0.4	7.0	0.7	4.2	1.1
Combustible Matter	AS 3580.10.1	g/m2/mth	0.3	5.8	0.4	1.0	0.5
Calculated Rain	AS 3580.10.1	mm	117	110	115	122	114

Deposited Matter	Method	Lab ID Sample Date Sample ID	15691/6 7/02/2024 D07 Mullock	15691/7 7/02/2024 D01(A) Front Gate	15691/8 7/02/2024 D11 Goldstien	15691/9 7/02/2024 D12 Ram
<i>Date Tested</i>	AS 3580.10.1	--	13/02/2024	13/02/2024	13/02/2024	13/02/2024
Number of Days	AS 3580.10.1	days	28	28	28	28
Insoluble Solids	AS 3580.10.1	g/m2/mth	2.1	2.7	1.0	0.6
Ash	AS 3580.10.1	g/m2/mth	1.2	2.3	0.5	0.2
Combustible Matter	AS 3580.10.1	g/m2/mth	0.9	0.4	0.5	0.4
Calculated Rain	AS 3580.10.1	mm	124	114	122	111



## Report Comments:

# Where present, indicates NATA accreditation does not cover the performance of this service.

Results in **bold** indicate an exceedance of the relevant guideline.

When considering the pass or fail of tests the measurement of uncertainty of each parameter must be considered.

<https://www.vgt.com.au/measurement-uncertainty>

[NT]: Not tested

Location Analysed : 4/30 Glenwood Dr Thornton NSW 2322.

## Sampling Report Number: 15691

Date Issued: 15/02/2024

Revision No: 00

Sampling Conditions: Cloudy, 20°- 23°C

Lab ID	Client Sample Reference	Licence/Reference	Sampler	Date Sampled	Method of Sampling	Pre-treatment / Preservation
15691/1	D08&9 Hitchcock Rd Olive Grove		T & D.Walker	7/02/2024 11:44	AS3580.10.1	CuSO4
15691/2	D10 Hearses Rd		T & D.Walker	7/02/2024 12:21	AS3580.10.1	CuSO4
15691/3	D06 School		T & D.Walker	7/02/2024 10:41	AS3580.10.1	CuSO4
15691/4	D05 Bund		T & D.Walker	7/02/2024 10:52	AS3580.10.1	CuSO4
15691/5	D04 Rehab		T & D.Walker	7/02/2024 11:19	AS3580.10.1	CuSO4
15691/6	D07 Mullock		T & D.Walker	7/02/2024 11:33	AS3580.10.1	CuSO4
15691/7	D01(A) Front Gate		T & D.Walker	7/02/2024 11:02	AS3580.10.1	CuSO4
15691/8	D11 Goldstien		T & D.Walker	7/02/2024 13:22	AS3580.10.1	CuSO4
15691/9	D12 Ram		T & D.Walker	7/02/2024 12:04	AS3580.10.1	CuSO4

Lab ID	Client Sample Reference	GPS-Easting	GPS-Northing	Sampling Observations
15691/1	D08&9 Hitchcock Rd Olive Grove	313058	6295137	Minor insects
15691/2	D10 Hearses Rd	312538	6294576	Sand, vegetation, algae. Recent paddock slashing & landscaping works.
15691/3	D06 School	313518	6296537	Minor insects
15691/4	D05 Bund	313160	6296838	Minor insects
15691/5	D04 Rehab	312385	6296932	
15691/6	D07 Mullock	312579	6296676	
15691/7	D01(A) Front Gate	313290	6297176	Minor sand, minor insects. - Visible dust from truck movements on entry/exit road. Active farming in adjacent paddock.
15691/8	D11 Goldstien	312034	6294213	Replaced cracked funnel
15691/9	D12 Ram	311750	6294159	Minor insects

Sampling procedures have been approved and report finalised on 15/02/2024.

Where method is "unknown" sampling procedures are not endorsed



## Report Number: 15754

Date Issued: 14/03/2024

Revision Number: 00

### Site/Job: Dixon Maroota - Dusts

Client: Dixon Sand (No.1) Pty Ltd  
 Address: PO Box 4019  
 PITT TOWN NSW 2756  
 Contact: David Dixon

The following 9 Dust Deposition sample(s) were received on 6/03/2024

Client Sample Reference	Date On	Date Off	Lab ID	Matrix	Comments or Non-Compliances
D08&9 Hitchcock Rd Olive Grove	07/02/2024 11:44	6/03/2024 11:47	15754/1	Dust	
D10 Hearses Rd	07/02/2024 12:21	6/03/2024 12:10	15754/2	Dust	
D06 School	07/02/2024 10:41	6/03/2024 10:45	15754/3	Dust	
D05 Bund	07/02/2024 10:52	6/03/2024 10:57	15754/4	Dust	
D04 Rehab	07/02/2024 11:19	6/03/2024 11:21	15754/5	Dust	
D07 Mullock	07/02/2024 11:33	6/03/2024 11:35	15754/6	Dust	
D01(A) Front Gate	07/02/2024 11:02	6/03/2024 11:09	15754/7	Dust	
D11 Goldstien	07/02/2024 13:22	6/03/2024 13:10	15754/8	Dust	
D12 Ram	07/02/2024 12:04	6/03/2024 12:01	15754/9	Dust	

The sample(s) have been tested as received and results relate specifically to the samples tested.

The following reports are included:

- Test Report
- Sampling Report
- Chain of Custody (if available)



Liane Peyra  
 Technical Officer

Authorised by:



Anthony Crane  
 Laboratory Manager

Results have been approved and report finalised on 14/03/2024.

## Test Report Number: 15754

Date Issued: 14/03/2024

Revision No: 00

### Results

Deposited Matter	Method	Lab ID Sample Date Sample ID	15754/1 6/03/2024 D08&9 Hitchcock Rd Olive Grove	15754/2 6/03/2024 D10 Hearses Rd	15754/3 6/03/2024 D06 School	15754/4 6/03/2024 D05 Bund	15754/5 6/03/2024 D04 Rehab
		Units					
<i>Date Tested</i>	AS 3580.10.1	--	12/03/2024	12/03/2024	12/03/2024	12/03/2024	12/03/2024
Number of Days	AS 3580.10.1	days	28	28	28	28	28
Insoluble Solids	AS 3580.10.1	g/m2/mth	0.6	<b>19.6</b>	2.9	3.6	0.3
Ash	AS 3580.10.1	g/m2/mth	0.4	18.3	2.0	3.7	0.3
Combustible Matter	AS 3580.10.1	g/m2/mth	0.2	1.3	0.9	<0.1	<0.1
Calculated Rain	AS 3580.10.1	mm	57	57	55	60	50

Deposited Matter	Method	Lab ID Sample Date Sample ID	15754/6 6/03/2024 D07 Mullock	15754/7 6/03/2024 D01(A) Front Gate	15754/8 6/03/2024 D11 Goldstien	15754/9 6/03/2024 D12 Ram
		Units				
<i>Date Tested</i>	AS 3580.10.1	--	12/03/2024	12/03/2024	12/03/2024	12/03/2024
Number of Days	AS 3580.10.1	days	28	28	28	28
Insoluble Solids	AS 3580.10.1	g/m2/mth	0.3	2.2	1.2	0.9
Ash	AS 3580.10.1	g/m2/mth	0.4	2.4	1.0	0.6
Combustible Matter	AS 3580.10.1	g/m2/mth	<0.1	<0.1	0.2	0.3
Calculated Rain	AS 3580.10.1	mm	52	54	46	56



## Report Comments:

# Where present, indicates NATA accreditation does not cover the performance of this service.

Results in **bold** indicate an exceedance of the relevant guideline.

When considering the pass or fail of tests the measurement of uncertainty of each parameter must be considered.

<https://www.vgt.com.au/measurement-uncertainty>

[NT]: Not tested

Location Analysed : 4/30 Glenwood Dr Thornton NSW 2322.

## Sampling Report Number: 15754

Date Issued: 14/03/2024

Revision No: 00

Sampling Conditions: Fine, 26°- 31°C

Lab ID	Client Sample Reference	Licence/Reference	Sampler	Date Sampled	Method of Sampling	Pre-treatment / Preservation
15754/1	D08&9 Hitchcock Rd Olive Grove		T & D.Walker	6/03/2024 11:47	AS3580.10.1	CuSO4
15754/2	D10 Hearses Rd		T & D.Walker	6/03/2024 12:10	AS3580.10.1	CuSO4
15754/3	D06 School		T & D.Walker	6/03/2024 10:45	AS3580.10.1	CuSO4
15754/4	D05 Bund		T & D.Walker	6/03/2024 10:57	AS3580.10.1	CuSO4
15754/5	D04 Rehab		T & D.Walker	6/03/2024 11:21	AS3580.10.1	CuSO4
15754/6	D07 Mullock		T & D.Walker	6/03/2024 11:35	AS3580.10.1	CuSO4
15754/7	D01(A) Front Gate		T & D.Walker	6/03/2024 11:09	AS3580.10.1	CuSO4
15754/8	D11 Goldstien		T & D.Walker	6/03/2024 13:10	AS3580.10.1	CuSO4
15754/9	D12 Ram		T & D.Walker	6/03/2024 12:01	AS3580.10.1	CuSO4

Lab ID	Client Sample Reference	GPS-Easting	GPS-Northing	Sampling Observations
15754/1	D08&9 Hitchcock Rd Olive Grove	313058	6295137	
15754/2	D10 Hearses Rd	312538	6294576	Major sand, bird droppings, minor vegetation. - Paddock slashed recently
15754/3	D06 School	313518	6296537	Minor sand, insects, minor vegetation
15754/4	D05 Bund	313160	6296838	Minor sand
15754/5	D04 Rehab	312385	6296932	Minor vegetation
15754/6	D07 Mullock	312579	6296676	
15754/7	D01(A) Front Gate	313290	6297176	Minor sand
15754/8	D11 Goldstien	312034	6294213	
15754/9	D12 Ram	311750	6294159	Minor insects

Sampling procedures have been approved and report finalised on 14/03/2024.

Where method is "unknown" sampling procedures are not endorsed



## Report Number: 15917

Date Issued: 11/04/2024

Revision Number: 00

### Site/Job: Dixon Maroota - Dusts

Client: Dixon Sand (No.1) Pty Ltd  
Address: PO Box 4019  
PITT TOWN NSW 2756  
Contact: David Dixon

The following 9 Dust Deposition sample(s) were received on 3/04/2024

Client Sample Reference	Date On	Date Off	Lab ID	Matrix	Comments or Non-Compliances
D08&9 Hitchcock Rd Olive Grove	06/03/2024 11:47	3/04/2024 14:03	15917/1	Dust	
D10 Hearses Rd	06/03/2024 12:10	3/04/2024 14:30	15917/2	Dust	
D06 School	06/03/2024 10:45	3/04/2024 12:58	15917/3	Dust	
D05 Bund	06/03/2024 10:57	3/04/2024 13:14	15917/4	Dust	
D04 Rehab	06/03/2024 11:21	3/04/2024 13:37	15917/5	Dust	
D07 Mullock	06/03/2024 11:35	3/04/2024 13:51	15917/6	Dust	
D01(A) Front Gate	06/03/2024 11:09	3/04/2024 13:25	15917/7	Dust	
D11 Goldstien	06/03/2024 13:10	3/04/2024 14:54	15917/8	Dust	
D12 Ram	06/03/2024 12:01	3/04/2024 14:16	15917/9	Dust	

The sample(s) have been tested as received and results relate specifically to the samples tested.

The following reports are included:

- Test Report
- Sampling Report
- Chain of Custody (if available)



Anthony Crane  
Laboratory Manager

Authorised by:

Results have been approved and report finalised on 11/04/2024.

## Test Report Number: 15917

Date Issued: 11/04/2024

Revision No: 00

### Results

Deposited Matter	Method	Lab ID Sample Date Sample ID	15917/1 3/04/2024 D08&9 Hitchcock Rd Olive Grove	15917/2 3/04/2024 D10 Hearses Rd	15917/3 3/04/2024 D06 School	15917/4 3/04/2024 D05 Bund	15917/5 3/04/2024 D04 Rehab
		Units					
<i>Date Tested</i>	AS 3580.10.1	--	08/04/2024	08/04/2024	08/04/2024	08/04/2024	08/04/2024
Number of Days	AS 3580.10.1	days	28	28	28	28	28
Insoluble Solids	AS 3580.10.1	g/m2/mth	0.8	<b>10.5</b>	<b>4.9</b>	3.1	0.9
Ash	AS 3580.10.1	g/m2/mth	0.6	9.7	1.2	2.6	0.5
Combustible Matter	AS 3580.10.1	g/m2/mth	0.2	0.8	3.7	0.5	0.4
Calculated Rain	AS 3580.10.1	mm	24	22	23	23	20

Deposited Matter	Method	Lab ID Sample Date Sample ID	15917/6 3/04/2024 D07 Mullock	15917/7 3/04/2024 D01(A) Front Gate	15917/8 3/04/2024 D11 Goldstien	15917/9 3/04/2024 D12 Ram
		Units				
<i>Date Tested</i>	AS 3580.10.1	--	08/04/2024	08/04/2024	08/04/2024	08/04/2024
Number of Days	AS 3580.10.1	days	28	28	28	28
Insoluble Solids	AS 3580.10.1	g/m2/mth	0.6	2.0	1.1	0.7
Ash	AS 3580.10.1	g/m2/mth	0.3	1.4	0.2	0.2
Combustible Matter	AS 3580.10.1	g/m2/mth	0.3	0.6	0.9	0.5
Calculated Rain	AS 3580.10.1	mm	20	22	20	23



## Report Comments:

# Where present, indicates NATA accreditation does not cover the performance of this service.

Results in **bold** indicate an exceedance of the relevant guideline.

When considering the pass or fail of tests the measurement of uncertainty of each parameter must be considered.

<https://www.vgt.com.au/measurement-uncertainty>

[NT]: Not tested

Location Analysed : 4/30 Glenwood Dr Thornton NSW 2322.

## Sampling Report Number: 15917

Date Issued: 11/04/2024

Revision No: 00

Sampling Conditions: Cloudy, 24 - 26 °C

Lab ID	Client Sample Reference	Licence/Reference	Sampler	Date Sampled	Method of Sampling	Pre-treatment / Preservation
15917/1	D08&9 Hitchcock Rd Olive Grove		T & D.Walker	3/04/2024 14:03	AS3580.10.1	CuSO4
15917/2	D10 Hearses Rd		T & D.Walker	3/04/2024 14:30	AS3580.10.1	CuSO4
15917/3	D06 School		T & D.Walker	3/04/2024 12:58	AS3580.10.1	CuSO4
15917/4	D05 Bund		T & D.Walker	3/04/2024 13:14	AS3580.10.1	CuSO4
15917/5	D04 Rehab		T & D.Walker	3/04/2024 13:37	AS3580.10.1	CuSO4
15917/6	D07 Mullock		T & D.Walker	3/04/2024 13:51	AS3580.10.1	CuSO4
15917/7	D01(A) Front Gate		T & D.Walker	3/04/2024 13:25	AS3580.10.1	CuSO4
15917/8	D11 Goldstien		T & D.Walker	3/04/2024 14:54	AS3580.10.1	CuSO4
15917/9	D12 Ram		T & D.Walker	3/04/2024 14:16	AS3580.10.1	CuSO4

Lab ID	Client Sample Reference	GPS-Easting	GPS-Northing	Sampling Observations
15917/1	D08&9 Hitchcock Rd Olive Grove	313058	6295137	
15917/2	D10 Hearses Rd	312538	6294576	Sand. Paddock slashed
15917/3	D06 School	313518	6296537	Vegetation
15917/4	D05 Bund	313160	6296838	Minor sand, minor insects
15917/5	D04 Rehab	312385	6296932	Minor vegetation
15917/6	D07 Mullock	312579	6296676	
15917/7	D01(A) Front Gate	313290	6297176	Minor insects
15917/8	D11 Goldstien	312034	6294213	Minor vegetation
15917/9	D12 Ram	311750	6294159	

Sampling procedures have been approved and report finalised on 11/04/2024.

Where method is "unknown" sampling procedures are not endorsed

## Report Number: 16042

Date Issued: 9/05/2024

Revision Number: 00

### Site/Job: Dixon Maroota - Dusts

Client: Dixon Sand (No.1) Pty Ltd  
 Address: PO Box 4019  
 PITT TOWN NSW 2756  
 Contact: David Dixon

The following Dust Deposition sample(s) were received on 1/05/2024

Client Sample Reference	Date On	Date Off	Lab ID	Matrix	Comments or Non-Compliances
D08&9 Hitchcock Rd Olive Grove	03/04/2024 14:03	1/05/2024 11:37	16042/1	Dust	
D10 Hearses Rd	03/04/2024 14:30	1/05/2024 12:04	16042/2	Dust	No Sample
D06 School	03/04/2024 12:58	1/05/2024 10:36	16042/3	Dust	
D05 Bund	03/04/2024 13:14	1/05/2024 10:51	16042/4	Dust	
D04 Rehab	03/04/2024 13:37	1/05/2024 11:14	16042/5	Dust	
D07 Mullock	03/04/2024 13:51	1/05/2024 11:26	16042/6	Dust	
D01(A) Front Gate	03/04/2024 13:25	1/05/2024 11:01	16042/7	Dust	
D11 Goldstien	03/04/2024 14:54	1/05/2024 13:12	16042/8	Dust	
D12 Ram	03/04/2024 14:16	1/05/2024 11:49	16042/9	Dust	

The sample(s) have been tested as received and results relate specifically to the samples tested.

The following reports are included:

- Test Report
- Sampling Report
- Chain of Custody (if available)



Liane Peyra  
 Technical Officer

Authorised by:



Anthony Crane  
 Laboratory Manager

Results have been approved and report finalised on 9/05/2024.

## Test Report Number: 16042

Date Issued: 9/05/2024

Revision No: 00

### Results

Deposited Matter	Method	Lab ID Sample Date Sample ID	16042/1 1/05/2024 D08&9 Hitchcock Rd Olive Grove	16042/3 1/05/2024 D06 School	16042/4 1/05/2024 D05 Bund	16042/5 1/05/2024 D04 Rehab	16042/6 1/05/2024 D07 Mullock
		Units					
<i>Date Tested</i>	AS 3580.10.1	--	07/05/2024	07/05/2024	07/05/2024	07/05/2024	07/05/2024
Number of Days	AS 3580.10.1	days	28	28	28	28	28
Insoluble Solids	AS 3580.10.1	g/m2/mth	1.9	3.5	1.4	0.6	0.9
Ash	AS 3580.10.1	g/m2/mth	0.9	1.9	1.2	0.2	0.4
Combustible Matter	AS 3580.10.1	g/m2/mth	1.0	1.6	0.2	0.4	0.5
Calculated Rain	AS 3580.10.1	mm	176	172	188	163	174

Deposited Matter	Method	Lab ID Sample Date Sample ID	16042/7 1/05/2024 D01(A) Front Gate	16042/8 1/05/2024 D11 Goldstien	16042/9 1/05/2024 D12 Ram
		Units			
<i>Date Tested</i>	AS 3580.10.1	--	07/05/2024	07/05/2024	07/05/2024
Number of Days	AS 3580.10.1	days	28	28	28
Insoluble Solids	AS 3580.10.1	g/m2/mth	1.6	0.9	0.7
Ash	AS 3580.10.1	g/m2/mth	1.2	0.2	0.2
Combustible Matter	AS 3580.10.1	g/m2/mth	0.4	0.7	0.5
Calculated Rain	AS 3580.10.1	mm	116	184	183



## Report Comments:

# Where present, indicates NATA accreditation does not cover the performance of this service.

Results in **bold** indicate an exceedance of the relevant guideline.

When considering the pass or fail of tests the measurement of uncertainty of each parameter must be considered.

<https://www.vgt.com.au/measurement-uncertainty>

[NT]: Not tested

Location Analysed : 4/30 Glenwood Dr Thornton NSW 2322.

## Sampling Report Number: 16042

Date Issued: 9/05/2024

Revision No: 00

Sampling Conditions: Cloudy, 17°- 19 °C

Lab ID	Client Sample Reference	Licence/Reference	Sampler	Date Sampled	Method of Sampling	Pre-treatment / Preservation
16042/1	D08&9 Hitchcock Rd Olive Grove		T & D.Walker	1/05/2024 11:37	AS3580.10.1	CuSO4
16042/2	D10 Hearses Rd		T & D.Walker	1/05/2024 12:04	AS3580.10.1	CuSO4
16042/3	D06 School		T & D.Walker	1/05/2024 10:36	AS3580.10.1	CuSO4
16042/4	D05 Bund		T & D.Walker	1/05/2024 10:51	AS3580.10.1	CuSO4
16042/5	D04 Rehab		T & D.Walker	1/05/2024 11:14	AS3580.10.1	CuSO4
16042/6	D07 Mullock		T & D.Walker	1/05/2024 11:26	AS3580.10.1	CuSO4
16042/7	D01(A) Front Gate		T & D.Walker	1/05/2024 11:01	AS3580.10.1	CuSO4
16042/8	D11 Goldstien		T & D.Walker	1/05/2024 13:12	AS3580.10.1	CuSO4
16042/9	D12 Ram		T & D.Walker	1/05/2024 11:49	AS3580.10.1	CuSO4

Lab ID	Client Sample Reference	GPS-Easting	GPS-Northing	Sampling Observations
16042/1	D08&9 Hitchcock Rd Olive Grove	313058	6295137	Minor algae
16042/2	D10 Hearses Rd	312538	6294576	No sample, funnel & bottle smashed by slasher. Bottle & Funnel replaced by Vgt.
16042/3	D06 School	313518	6296537	Sand, insects
16042/4	D05 Bund	313160	6296838	Minor sand
16042/5	D04 Rehab	312385	6296932	
16042/6	D07 Mullock	312579	6296676	
16042/7	D01(A) Front Gate	313290	6297176	
16042/8	D11 Goldstien	312034	6294213	
16042/9	D12 Ram	311750	6294159	

Sampling procedures have been approved and report finalised on 9/05/2024.

Where method is "unknown" sampling procedures are not endorsed

## Report Number: 16212

Date Issued: 5/06/2024

Revision Number: 00

### Site/Job: Dixon Maroota - Dusts

Client: Dixon Sand (No.1) Pty Ltd  
Address: PO Box 4019  
PITT TOWN NSW 2756  
Contact: David Dixon

The following Dust Deposition sample(s) were received on 29/05/2024

Client Sample Reference	Date On	Date Off	Lab ID	Matrix	Comments or Non-Compliances
D08&9 Hitchcock Rd Olive Grove	01/05/2024 11:37	29/05/2024 12:29	16212/1	Dust	
D10 Hearses Rd	01/05/2024 12:04	29/05/2024 13:17	16212/2	Dust	
D06 School	01/05/2024 10:36	29/05/2024 10:48	16212/3	Dust	
D05 Bund	01/05/2024 10:51	29/05/2024 11:19	16212/4	Dust	
D04 Rehab	01/05/2024 11:14	29/05/2024 11:47	16212/5	Dust	
D07 Mullock	01/05/2024 11:26	29/05/2024 12:03	16212/6	Dust	
D01(A) Front Gate	01/05/2024 11:01	29/05/2024 11:29	16212/7	Dust	
D11 Goldstien	01/05/2024 13:12	29/05/2024 14:33	16212/8	Dust	
D12 Ram	01/05/2024 11:49	29/05/2024 12:49	16212/9	Dust	

The sample(s) have been tested as received and results relate specifically to the samples tested.

The following reports are included:

- Test Report
- Sampling Report
- Chain of Custody (if available)



Liane Peyra  
Authorised by: Technical Officer

Results have been approved and report finalised on 5/06/2024.

## Test Report Number: 16212

Date Issued: 5/06/2024

Revision No: 00

### Results

Deposited Matter	Method	Lab ID Sample Date Sample ID	16212/1 29/05/2024 D08&9 Hitchcock Rd Olive Grove	16212/2 29/05/2024 D10 Hearses Rd	16212/3 29/05/2024 D06 School	16212/4 29/05/2024 D05 Bund	16212/5 29/05/2024 D04 Rehab
		Units					
<i>Date Tested</i>	AS 3580.10.1	--	31/05/2024	31/05/2024	31/05/2024	31/05/2024	31/05/2024
Number of Days	AS 3580.10.1	days	28	28	28	28	28
Insoluble Solids	AS 3580.10.1	g/m2/mth	0.8	15.4	3.3	7.2	0.1
Ash	AS 3580.10.1	g/m2/mth	0.5	9.4	0.9	7.0	0.1
Combustible Matter	AS 3580.10.1	g/m2/mth	0.3	6.0	2.4	0.2	<0.1
Calculated Rain	AS 3580.10.1	mm	93	88	104	107	106

Deposited Matter	Method	Lab ID Sample Date Sample ID	16212/6 29/05/2024 D07 Mullock	16212/7 29/05/2024 D01(A) Front Gate	16212/8 29/05/2024 D11 Goldstien	16212/9 29/05/2024 D12 Ram
		Units				
<i>Date Tested</i>	AS 3580.10.1	--	31/05/2024	31/05/2024	31/05/2024	31/05/2024
Number of Days	AS 3580.10.1	days	28	28	28	28
Insoluble Solids	AS 3580.10.1	g/m2/mth	0.4	1.0	0.2	0.7
Ash	AS 3580.10.1	g/m2/mth	0.3	0.9	0.1	0.4
Combustible Matter	AS 3580.10.1	g/m2/mth	0.1	0.1	0.1	0.3
Calculated Rain	AS 3580.10.1	mm	103	102	94	102



## Report Comments:

# Where present, indicates NATA accreditation does not cover the performance of this service.

Results in **bold** indicate an exceedance of the relevant guideline.

When considering the pass or fail of tests the measurement of uncertainty of each parameter must be considered.

<https://www.vgt.com.au/measurement-uncertainty>

[NT]: Not tested

Location Analysed : 4/30 Glenwood Dr Thornton NSW 2322.

## Sampling Report Number: 16212

Date Issued: 5/06/2024

Revision No: 00

Sampling Conditions: Fine, 17°- 22 °C

Lab ID	Client Sample Reference	Licence/Reference	Sampler	Date Sampled	Method of Sampling	Pre-treatment / Preservation
16212/1	D08&9 Hitchcock Rd Olive Grove		T.Walker	29/05/2024 12:29	AS3580.10.1	CuSO4
16212/2	D10 Hearses Rd		T.Walker	29/05/2024 13:17	AS3580.10.1	CuSO4
16212/3	D06 School		T.Walker	29/05/2024 10:48	AS3580.10.1	CuSO4
16212/4	D05 Bund		T.Walker	29/05/2024 11:19	AS3580.10.1	CuSO4
16212/5	D04 Rehab		T.Walker	29/05/2024 11:47	AS3580.10.1	CuSO4
16212/6	D07 Mullock		T.Walker	29/05/2024 12:03	AS3580.10.1	CuSO4
16212/7	D01(A) Front Gate		T.Walker	29/05/2024 11:29	AS3580.10.1	CuSO4
16212/8	D11 Goldstien		T.Walker	29/05/2024 14:33	AS3580.10.1	CuSO4
16212/9	D12 Ram		T.Walker	29/05/2024 12:49	AS3580.10.1	CuSO4

Lab ID	Client Sample Reference	GPS-Easting	GPS-Northing	Sampling Observations
16212/1	D08&9 Hitchcock Rd Olive Grove	313058	6295137	
16212/2	D10 Hearses Rd	312538	6294576	Major bird droppings, insects. Bird droppings in funnel.
16212/3	D06 School	313518	6296537	Vegetation
16212/4	D05 Bund	313160	6296838	Minor dust (loam), minor insects. Active farm paddock ploughing adjacent dust gauge whilst on site. Funnel neck broken.
16212/5	D04 Rehab	312385	6296932	
16212/6	D07 Mullock	312579	6296676	
16212/7	D01(A) Front Gate	313290	6297176	Minor insects
16212/8	D11 Goldstien	312034	6294213	
16212/9	D12 Ram	311750	6294159	Minor insects, bird droppings in funnel

Sampling procedures have been approved and report finalised on 5/06/2024.

Where method is "unknown" sampling procedures are not endorsed



## Report Number: 16361

Date Issued: 5/07/2024

Revision Number: 00

### Site/Job: Dixon Maroota - Dusts

Client: Dixon Sand (No.1) Pty Ltd  
 Address: PO Box 4019  
 PITT TOWN NSW 2756  
 Contact: David Dixon

The following Dust Deposition sample(s) were received on 26/06/2024

Client Sample Reference	Date On	Date Off	Lab ID	Matrix	Comments or Non-Compliances
D08&9 Hitchcock Rd Olive Grove	29/05/2024 12:29	26/06/2024 11:39	16361/1	Dust	
D10 Hearses Rd	29/05/2024 13:17	26/06/2024 12:54	16361/2	Dust	
D06 School	29/05/2024 10:48	26/06/2024 10:26	16361/3	Dust	
D05 Bund	29/05/2024 11:19	26/06/2024 10:43	16361/4	Dust	
D04 Rehab	29/05/2024 11:47	26/06/2024 11:12	16361/5	Dust	
D07 Mullock	29/05/2024 12:03	26/06/2024 11:26	16361/6	Dust	
D01(A) Front Gate	29/05/2024 11:29	26/06/2024 10:57	16361/7	Dust	
D11 Goldstien	29/05/2024 14:33	26/06/2024 12:23	16361/8	Dust	
D12 Ram	29/05/2024 12:49	26/06/2024 12:01	16361/9	Dust	

The sample(s) have been tested as received and results relate specifically to the samples tested.

The following reports are included:

- Test Report
- Sampling Report
- Chain of Custody (if available)



Liane Peyra  
 Technical Officer

Authorised by:



Anthony Crane  
 Laboratory Manager

Results have been approved and report finalised on 5/07/2024.

## Test Report Number: 16361

Date Issued: 5/07/2024

Revision No: 00

### Results

Deposited Matter	Method	Lab ID Sample Date Sample ID	16361/1 26/06/2024 D08&9 Hitchcock Rd Olive Grove	16361/2 26/06/2024 D10 Hearses Rd	16361/3 26/06/2024 D06 School	16361/4 26/06/2024 D05 Bund	16361/5 26/06/2024 D04 Rehab
		Units					
<i>Date Tested</i>	AS 3580.10.1	--	2/07/2024	2/07/2024	2/07/2024	2/07/2024	2/07/2024
Number of Days	AS 3580.10.1	days	28	28	28	28	28
Insoluble Solids	AS 3580.10.1	g/m2/mth	0.5	5.2	0.5	5.8	<0.1
Ash	AS 3580.10.1	g/m2/mth	0.4	4.4	0.3	4.7	<0.1
Combustible Matter	AS 3580.10.1	g/m2/mth	0.1	0.8	0.2	1.1	<0.1
Calculated Rain	AS 3580.10.1	mm	93	92	95	83	97

Deposited Matter	Method	Lab ID Sample Date Sample ID	16361/6 26/06/2024 D07 Mullock	16361/7 26/06/2024 D01(A) Front Gate	16361/8 26/06/2024 D11 Goldstien	16361/9 26/06/2024 D12 Ram
		Units				
<i>Date Tested</i>	AS 3580.10.1	--	2/07/2024	2/07/2024	2/07/2024	2/07/2024
Number of Days	AS 3580.10.1	days	28	28	28	28
Insoluble Solids	AS 3580.10.1	g/m2/mth	0.2	2.2	0.7	<0.1
Ash	AS 3580.10.1	g/m2/mth	0.2	2.0	0.2	<0.1
Combustible Matter	AS 3580.10.1	g/m2/mth	<0.1	0.2	0.5	<0.1
Calculated Rain	AS 3580.10.1	mm	96	94	97	102



## Report Comments:

# Where present, indicates NATA accreditation does not cover the performance of this service.

Results in **bold** indicate an exceedance of the relevant guideline.

When considering the pass or fail of tests the measurement of uncertainty of each parameter must be considered.

<https://www.vgt.com.au/measurement-uncertainty>

[NT]: Not tested

Location Analysed : 4/30 Glenwood Dr Thornton NSW 2322.

## Sampling Report Number: 16361

Date Issued: 5/07/2024

Revision No: 00

Sampling Conditions: Fine, 14 °- 19 °C

Lab ID	Client Sample Reference	Licence/Reference	Sampler	Date Sampled	Method of Sampling	Pre-treatment / Preservation
16361/1	D08&9 Hitchcock Rd Olive Grove		T & D.Walker	26/06/2024 11:39	AS3580.10.1	CuSO4
16361/2	D10 Hearses Rd		T & D.Walker	26/06/2024 12:54	AS3580.10.1	CuSO4
16361/3	D06 School		T & D.Walker	26/06/2024 10:26	AS3580.10.1	CuSO4
16361/4	D05 Bund		T & D.Walker	26/06/2024 10:43	AS3580.10.1	CuSO4
16361/5	D04 Rehab		T & D.Walker	26/06/2024 11:12	AS3580.10.1	CuSO4
16361/6	D07 Mullock		T & D.Walker	26/06/2024 11:26	AS3580.10.1	CuSO4
16361/7	D01(A) Front Gate		T & D.Walker	26/06/2024 10:57	AS3580.10.1	CuSO4
16361/8	D11 Goldstien		T & D.Walker	26/06/2024 12:23	AS3580.10.1	CuSO4
16361/9	D12 Ram		T & D.Walker	26/06/2024 12:01	AS3580.10.1	CuSO4

Lab ID	Client Sample Reference	GPS-Easting	GPS-Northing	Sampling Observations
16361/1	D08&9 Hitchcock Rd Olive Grove	313058	6295137	
16361/2	D10 Hearses Rd	312538	6294576	Minor sand, bird droppings, insects, algae
16361/3	D06 School	313518	6296537	
16361/4	D05 Bund	313160	6296838	Minor sand, bird droppings, algae. Funnel neck broken in bottle again - Funnel replaced.
16361/5	D04 Rehab	312385	6296932	
16361/6	D07 Mullock	312579	6296676	
16361/7	D01(A) Front Gate	313290	6297176	Minor sand
16361/8	D11 Goldstien	312034	6294213	Minor bird droppings
16361/9	D12 Ram	311750	6294159	

Sampling procedures have been approved and report finalised on 5/07/2024.

Where method is "unknown" sampling procedures are not endorsed



## **Appendix B – PM10, TSP and Weather Station Reports**



**CBased Environmental  
Pty Limited**

ABN 62 611 924 264

**Dixon Sand Quarry**

**Environmental Monitoring  
Air Quality**

**Tapered Element Oscillating Microbalance  
(TEOM) (PM<sub>10</sub>) and Meteorological Data**

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**JULY 2023**

A handwritten signature in black ink that reads "Colin Davies".

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Colin Davies BSc MEIA CENVP  
Environmental Scientist  
Date: 22 August 2023

CBased Environmental Pty Ltd  
Unit 3, 2 Enterprise Crescent SINGLETON NSW 2330  
☎ (02) 65713334

## 1.0 Summary

CBased Environmental Pty Limited is contracted by Dixon Sand to conduct continuous Tapered Element Oscillating Microbalance (TEOM) for fine particulates (PM<sub>10</sub>) and meteorological monitoring for the Dixon Sand Quarry. The information is required to assess air quality levels. The results for the TEOM and meteorological site are included in this report.

The monitoring programme includes:

- One continuous TEOM PM<sub>10</sub> monitor; and
- One continuous meteorological station.

This monthly report for July 2023 was prepared by CBased Environmental and includes the following:

- TEOM (PM<sub>10</sub>) monitoring results; and
- Meteorological results.

In accordance with Schedule 3, Condition 7 of the Dixon Sand development Consent and the Dixon Sand EPL;

- 24-hour average results were below the NEPM 24-hour maximum criteria of 50ug/m<sup>3</sup>;
- 24-hour average results were below the Dixon Sand Quarry EPL limit of 42ug/m<sup>3</sup>;
- The annual average is below the Dixon Sand Quarry consent annual average criteria of 30ug/m<sup>3</sup>; and
- The calculated TSP is below the Dixon Sand Quarry annual average criteria of 90ug/m<sup>3</sup>.

Note: Based on the available data, statements in **green** indicate current conformance to Dixon Sand Quarry Air Quality Impact Assessment criteria, statements in **red** indicate possible non-conformance. Year to date annual average for PM<sub>10</sub> is calculated from 1 July 2023 for TEOM's coinciding with the Dixon Sand project year. An annual amount of data has not yet been collected.

Approximately 100% of valid meteorological data was recorded for July 2023.

Approximately 100% of valid TEOM data was available for July 2023.

## 2.0 Sampling Programme

The TEOM is sited and operated to the applicable Australian Standard and/or OEH (EPA) approved methods. The following Australian Standards were used:

- AS3580.9.8 - “Methods for Sampling and Analysis of Ambient Air. Determination of Suspended Particulates—PM<sub>10</sub> continuous direct mass method using a tapered element oscillating microbalance analyser”; and
- AS/NZS 3580.1.1 - “Methods for Sampling and Analysis of Ambient Air Part 1.1 Guide to Siting Air Monitoring Equipment”.

TEOM PM<sub>10</sub> results are 24-hour averages at midnight and are reported as µg/m<sup>3</sup> corrected to 0 degrees C and 101.3kPa.

All laboratory analysis was conducted by a National Association of Testing Authorities (NATA) accredited laboratory.

Air Quality monitoring site descriptions and locations are provided in **Table 1**.

**Table 1:** Dixon Sand Air Quality Monitoring Description and Locations

Monitor	Site Code	Location Description
TEOM PM <sub>10</sub>	TEOM	Old North Road, Maroota NSW
Meteorological Station	MET	Old North Road, Maroota NSW

## 3.0 Results

### 3.1 TEOM PM<sub>10</sub>

24-hour average TEOM PM<sub>10</sub> results from the AQMS data collection software are provided in **Table 2** and a chart of the data is provided in **Figure 1**.

During the monitoring period, individual 24-hour TEOM PM<sub>10</sub> results were below the National Environment Protection Measure (NEPM) short-term (24hr) impact criteria of 50ug/m<sup>3</sup> and the Dixon Sand Quarry EPL limit of 42ug/m<sup>3</sup>.

Approximately 100% of valid TEOM data was available for July 2023.

At present, the current TEOM PM<sub>10</sub> annual average is below the Dixon Sand Quarry annual average PM<sub>10</sub> criteria of 30ug/m<sup>3</sup>. The current annual average for calculated Total Suspended Particulates (TSP) is below the annual average criterion of 90ug/m<sup>3</sup>. The TSP is calculated by multiplying the PM<sub>10</sub> by 2.5. Note: the annual average is calculated from 1 July 2023 and therefore an annual amount of data has not yet been collected.

The quarterly TEOM calibration was conducted in June 2023 with the next calibration due to be completed in September 2023. The calibration certificate is provided in **Appendix 1** (when required).

**Table 2:** Average Daily 24-hr TEOM PM<sub>10</sub> and TSP Results for July 2023 from AQMS and Annual Average PM<sub>10</sub> calculated from the 1 July 2023.

Date	PM <sub>10</sub> 24-hr Average (µg/m <sup>3</sup> )	PM <sub>10</sub> Annual Average (µg/m <sup>3</sup> )	24-hr Average TSP* (µg/m <sup>3</sup> )	Annual Average TSP** (µg/m <sup>3</sup> )
1/07/2023	6.0	6.0	15.0	15.0
2/07/2023	10.5	8.3	26.3	20.6
3/07/2023	14.0	10.2	35.0	25.4
4/07/2023	8.8	9.8	22.0	24.6
5/07/2023	5.5	9.0	13.8	22.4
6/07/2023	7.0	8.6	17.5	21.6
7/07/2023	5.4	8.2	13.5	20.4
8/07/2023	9.1	8.3	22.8	20.7
9/07/2023	8.0	8.3	20.0	20.6
10/07/2023	7.2	8.2	18.0	20.4
11/07/2023	11.2	8.4	28.0	21.1
12/07/2023	13.4	8.8	33.5	22.1
13/07/2023	13.2	9.2	33.0	22.9
14/07/2023	20.7	10.0	51.8	25.0
15/07/2023	11.6	10.1	29.0	25.3
16/07/2023	13.3	10.3	33.3	25.8
17/07/2023	10.2	10.3	25.5	25.8
18/07/2023	9.2	10.2	23.0	25.6
19/07/2023	12.0	10.3	30.0	25.8
20/07/2023	9.7	10.3	24.3	25.8
21/07/2023	11.9	10.4	29.8	25.9
22/07/2023	11.1	10.4	27.8	26.0
23/07/2023	12.7	10.5	31.8	26.3
24/07/2023	13.2	10.6	33.0	26.6
25/07/2023	10.3	10.6	25.8	26.5
26/07/2023	9.8	10.6	24.5	26.4
27/07/2023	16.4	10.8	41.0	27.0
28/07/2023	10.3	10.8	25.8	26.9
29/07/2023	9.5	10.7	23.8	26.8
30/07/2023	8.3	10.7	20.8	26.6
31/07/2023	8.7	10.6	21.8	26.5

\*Calculated from PM<sub>10</sub>

\*\*Calculated from PM<sub>10</sub> Annual Average

Note: results above the Dixon Sand EPL criteria limit of 42 µg/m<sup>3</sup> highlighted in yellow, when applicable

No Data (ND) = <18hrs hour of valid data to calculate a 24hr average

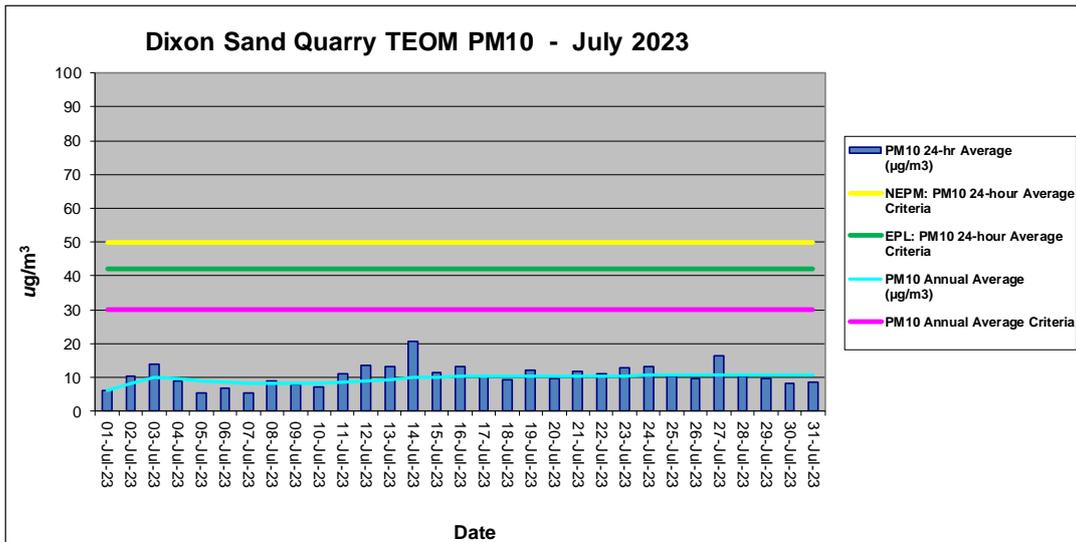


Figure 1: TEOM PM<sub>10</sub> 24 hr, Annual Average and Criteria

### 3.2 Meteorological Data

The weather station logs data at 5-minute intervals and sends the data to a web database by NextG telemetry. The data is accessible from the web site <http://console.teledata.com.au/index.html>.

A summary of monthly results is presented in **Table 3**. Charts of meteorological parameters are presented in **Figures 2 and 3**. A windrose is provided in **Figure 4**. This provides the frequency distribution of wind speed and direction during the month to display dominant wind directions.

A 6-monthly physical screening and system check of the meteorological station was conducted in March 2023 and is next due in September 2023. The screening and system check certificates are provided in **Appendix 1** (when required).

Approximately 100% of valid meteorological data was recorded for July 2023.

**Table 3:** Meteorological Data Summary for July 2023

Date	Min Temp	Avg Temp	Max Temp	RAIN mm	Min WS	Avg WS	Max WS	Min Humidity	Avg Humidity	Max Humidity	Min Pressure	Avg Pressure	Max Pressure
1/07/2023	6.8	10.9	16.5	0.0	0.2	3.8	13.2	45.4	63.2	77.7	998.1	1001.0	1006.6
2/07/2023	6.3	10.4	16.0	0.0	0.0	3.0	9.9	50.7	73.0	94.5	1006.5	1009.5	1011.9
3/07/2023	6.5	11.4	15.3	0.0	0.0	1.8	8.7	69.4	84.4	99.9	1004.4	1008.6	1011.5
4/07/2023	10.6	12.0	13.0	3.6	0.0	1.7	8.5	86.2	98.2	99.9	992.8	998.2	1004.5
5/07/2023	11.8	14.6	19.3	0.0	0.4	3.8	13.1	65.7	84.3	100.0	991.1	992.6	994.1
6/07/2023	8.8	11.6	14.7	0.0	0.3	4.5	17.6	43.3	67.8	89.4	990.6	992.5	994.9
7/07/2023	9.2	11.7	16.2	0.0	0.0	4.9	19.6	41.2	60.1	77.6	989.1	992.1	995.9
8/07/2023	8.5	12.6	17.2	0.0	0.5	6.6	20.9	32.1	49.8	67.0	991.3	993.9	995.9
9/07/2023	9.9	12.7	16.3	0.0	0.1	5.2	20.8	42.5	54.1	69.7	993.3	997.5	1000.3
10/07/2023	8.4	12.1	18.7	0.0	0.0	2.9	9.4	42.0	63.0	78.1	999.7	1001.6	1003.5
11/07/2023	4.9	11.0	17.8	0.0	0.0	2.7	8.4	36.3	61.4	88.7	1003.0	1005.2	1007.8
12/07/2023	6.7	12.1	18.0	0.0	0.0	3.2	13.3	47.9	68.9	91.0	1007.0	1008.4	1010.8
13/07/2023	7.5	13.7	20.6	0.0	0.6	4.0	14.6	30.7	59.4	89.9	1004.3	1006.5	1008.2
14/07/2023	11.3	15.5	21.0	0.0	0.5	5.6	23.5	34.8	49.0	60.8	1001.2	1003.4	1005.5
15/07/2023	12.9	16.7	21.4	0.0	0.9	5.7	21.8	31.8	47.7	63.4	999.3	1001.3	1002.8
16/07/2023	10.6	13.3	15.6	0.6	0.1	2.0	8.7	46.0	81.6	100.0	1002.6	1006.9	1009.8
17/07/2023	10.8	12.7	16.7	0.8	0.0	1.9	7.2	80.1	96.3	99.9	1006.2	1008.6	1010.9
18/07/2023	9.8	13.8	20.3	0.2	0.2	3.0	8.9	32.6	73.3	100.0	999.0	1002.2	1006.2
19/07/2023	6.8	10.4	15.0	0.0	0.1	3.3	11.1	27.6	54.5	78.4	1000.3	1002.2	1003.9
20/07/2023	3.7	10.6	17.9	0.0	0.1	4.3	17.6	24.2	52.8	88.4	994.4	998.3	1002.6
21/07/2023	8.7	11.7	16.5	0.0	0.0	3.3	13.8	32.9	55.4	78.3	994.8	997.2	1001.0
22/07/2023	4.8	9.7	15.3	0.0	0.2	2.6	13.6	41.1	67.1	88.9	1000.2	1001.3	1002.9
23/07/2023	4.7	9.7	16.5	0.0	0.1	3.1	11.6	51.6	81.4	100.0	1000.3	1002.8	1006.3
24/07/2023	8.6	11.3	16.0	3.6	0.0	3.3	10.9	67.2	90.8	100.0	1005.9	1008.6	1012.1
25/07/2023	6.5	11.3	17.3	0.2	0.0	2.4	12.1	49.2	85.4	100.0	1012.0	1014.6	1016.5
26/07/2023	8.2	12.9	19.0	0.2	0.0	3.2	17.2	44.9	76.4	100.0	1010.7	1013.4	1016.2
27/07/2023	8.2	13.3	19.4	0.0	0.0	3.0	12.3	45.2	69.3	100.0	1004.7	1008.6	1011.9
28/07/2023	11.9	16.2	21.7	0.0	0.4	4.8	16.2	37.1	51.3	66.2	999.3	1002.0	1004.7
29/07/2023	14.0	17.6	22.6	0.0	0.2	3.4	11.3	41.7	55.6	64.9	999.8	1001.6	1003.7
30/07/2023	12.5	17.3	22.5	0.0	0.4	4.7	17.2	39.9	59.2	76.5	997.4	999.8	1001.6
31/07/2023	11.9	15.8	21.2	0.0	0.1	3.0	9.9	31.8	51.1	71.6	1000.1	1002.0	1004.2
<b>Monthly</b>	<b>3.7</b>	<b>12.8</b>	<b>22.6</b>	<b>9.2</b>	<b>0.0</b>	<b>3.6</b>	<b>23.5</b>	<b>24.2</b>	<b>67.3</b>	<b>100.0</b>	<b>989.1</b>	<b>1002.7</b>	<b>1016.5</b>

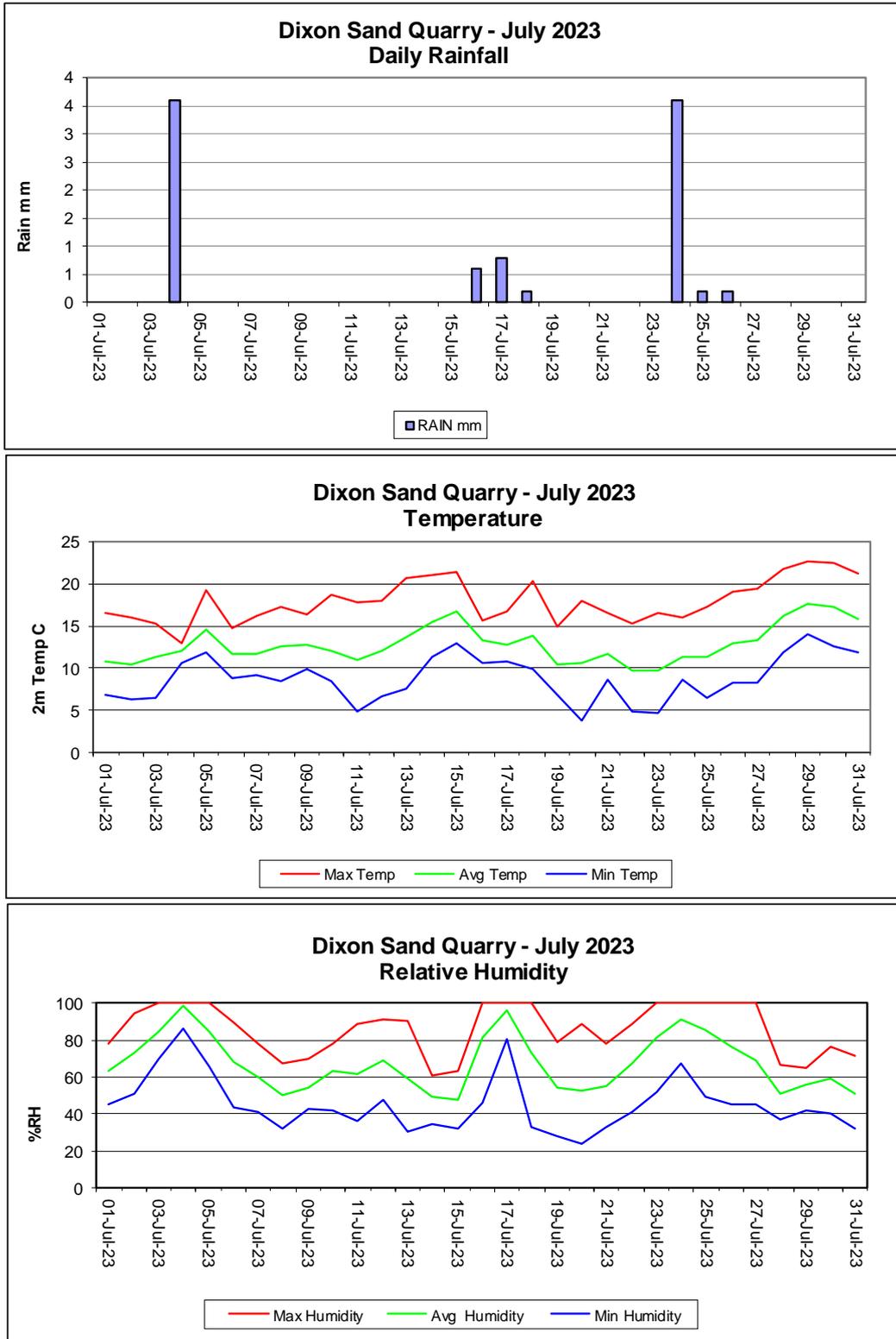


Figure 2: Daily Rainfall, Temperature and Relative Humidity Charts

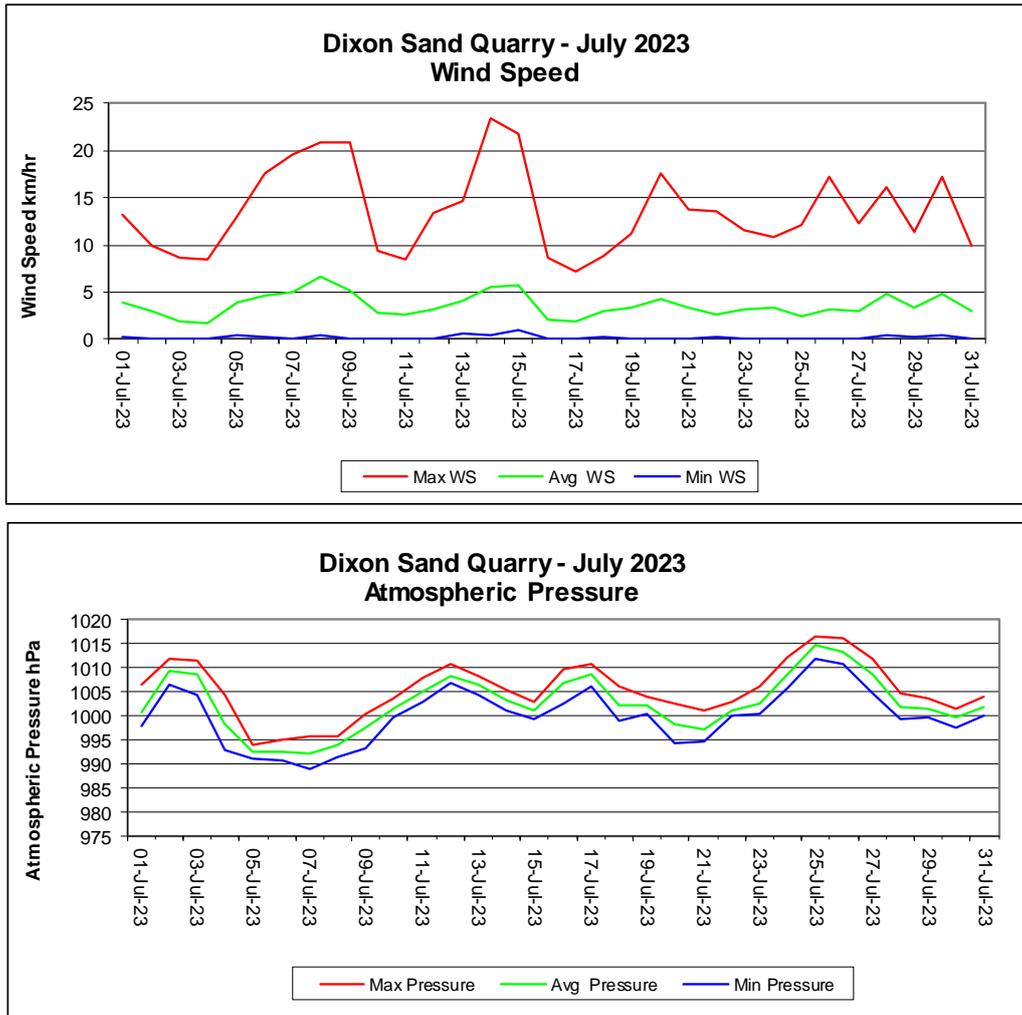


Figure 3: Wind Speed and Atmospheric Pressure Charts

### Dixon Sand Quarry - Windrose JULY 2023

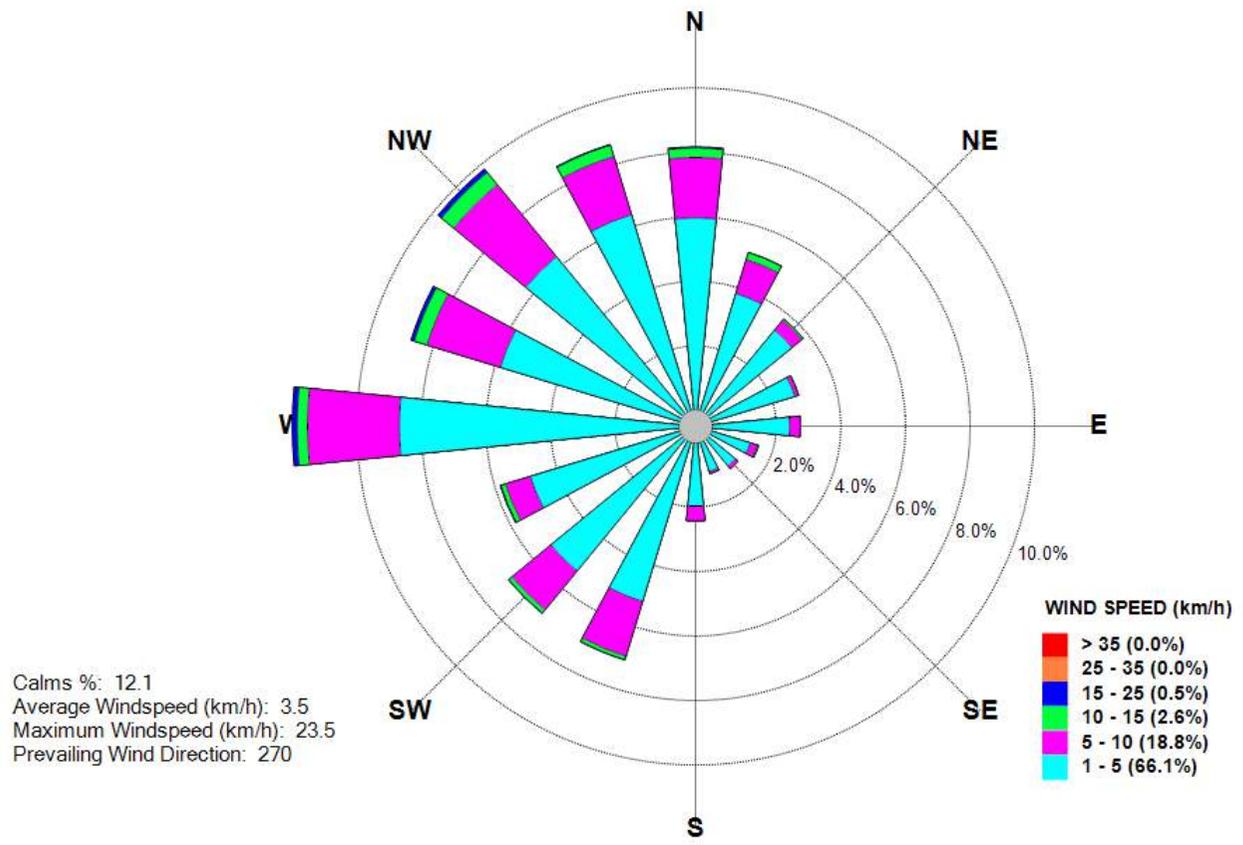


Figure 4: Monthly Windrose

## **Appendix 1**

Calibration Documents (when required)



**CBased Environmental  
Pty Limited**

ABN 62 611 924 264

**Dixon Sand Quarry**

**Environmental Monitoring  
Air Quality**

**Tapered Element Oscillating Microbalance  
(TEOM) (PM<sub>10</sub>) and Meteorological Data**

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**AUGUST 2023**

Amendment 1

A handwritten signature in black ink that reads "Colin Davies".

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Colin Davies BSc MEIA CENVP  
Environmental Scientist  
Date: 22 September 2023

CBased Environmental Pty Ltd  
Unit 3, 2 Enterprise Crescent SINGLETON NSW 2330  
☎ (02) 65713334

## 1.0 Summary

CBased Environmental Pty Limited is contracted by Dixon Sand to conduct continuous Tapered Element Oscillating Microbalance (TEOM) for fine particulates (PM<sub>10</sub>) and meteorological monitoring for the Dixon Sand Quarry. The information is required to assess air quality levels. The results for the TEOM and meteorological site are included in this report.

The monitoring programme includes:

- One continuous TEOM PM<sub>10</sub> monitor; and
- One continuous meteorological station.

This monthly report for August 2023 was prepared by CBased Environmental and includes the following:

- TEOM (PM<sub>10</sub>) monitoring results; and
- Meteorological results.

In accordance with Schedule 3, Condition 7 of the Dixon Sand development Consent and the Dixon Sand EPL;

- 24-hour average results were below the NEPM 24-hour maximum criteria of 50ug/m<sup>3</sup>;
- 24-hour average results were below the Dixon Sand Quarry EPL limit of 42ug/m<sup>3</sup>;
- The annual average is below the Dixon Sand Quarry consent annual average criteria of 30ug/m<sup>3</sup>; and
- The calculated TSP is below the Dixon Sand Quarry annual average criteria of 90ug/m<sup>3</sup>.

Note: Based on the available data, statements in **green** indicate current conformance to Dixon Sand Quarry Air Quality Impact Assessment criteria, statements in **red** indicate possible non-conformance. Year to date annual average for PM<sub>10</sub> is calculated from 1 July 2023 for TEOM's coinciding with the Dixon Sand project year. An annual amount of data has not yet been collected.

Approximately 100% of valid meteorological data was recorded for August 2023.

Approximately 99% of valid TEOM data was available for August 2023.

## 2.0 Sampling Programme

The TEOM is sited and operated to the applicable Australian Standard and/or OEH (EPA) approved methods. The following Australian Standards were used:

- AS3580.9.8 - “*Methods for Sampling and Analysis of Ambient Air. Determination of Suspended Particulates—PM<sub>10</sub> continuous direct mass method using a tapered element oscillating microbalance analyser*”; and
- AS/NZS 3580.1.1 - “*Methods for Sampling and Analysis of Ambient Air Part 1.1 Guide to Siting Air Monitoring Equipment*”.

TEOM PM<sub>10</sub> results are 24-hour averages at midnight and are reported as µg/m<sup>3</sup> corrected to 0 degrees C and 101.3kPa.

All laboratory analysis was conducted by a National Association of Testing Authorities (NATA) accredited laboratory.

Air Quality monitoring site descriptions and locations are provided in **Table 1**.

**Table 1:** Dixon Sand Air Quality Monitoring Description and Locations

Monitor	Site Code	Location Description
TEOM PM <sub>10</sub>	TEOM	Old North Road, Maroota NSW
Meteorological Station	MET	Old North Road, Maroota NSW

## 3.0 Results

### 3.1 TEOM PM<sub>10</sub>

24-hour average TEOM PM<sub>10</sub> results from the AQMS data collection software are provided in **Table 2** and a chart of the data is provided in **Figure 1**.

During the monitoring period, individual 24-hour TEOM PM<sub>10</sub> results were below the National Environment Protection Measure (NEPM) short-term (24hr) impact criteria of 50ug/m<sup>3</sup> and the Dixon Sand Quarry EPL limit of 42ug/m<sup>3</sup>.

Approximately 99% of valid TEOM data was available for August 2023.

At present, the current TEOM PM<sub>10</sub> annual average is below the Dixon Sand Quarry annual average PM<sub>10</sub> criteria of 30ug/m<sup>3</sup>. The current annual average for calculated Total Suspended Particulates (TSP) is below the annual average criterion of 90ug/m<sup>3</sup>. The TSP is calculated by multiplying the PM<sub>10</sub> by 2.5. Note: the annual average is calculated from 1 July 2023 and therefore an annual amount of data has not yet been collected.

The quarterly TEOM calibration was conducted in June 2023 with the next calibration due to be completed in September 2023. The calibration certificate is provided in **Appendix 1** (when required).

**Table 2:** Average Daily 24-hr TEOM PM<sub>10</sub> and TSP Results for August 2023 from AQMS and Annual Average PM<sub>10</sub> calculated from the 1 July 2023.

Date	PM <sub>10</sub> 24-hr Average (µg/m <sup>3</sup> )	PM <sub>10</sub> Annual Average (µg/m <sup>3</sup> )	24-hr Average TSP* (µg/m <sup>3</sup> )	Annual Average TSP** (µg/m <sup>3</sup> )
1/08/2023	13.3	10.7	33.3	26.7
2/08/2023	20.1	11.0	50.3	27.4
3/08/2023	14.8	11.1	37.0	27.7
4/08/2023	18.8	11.3	47.0	28.2
5/08/2023	17.0	11.5	42.5	28.6
6/08/2023	12.7	11.5	31.8	28.7
7/08/2023	11.1	11.5	27.8	28.7
8/08/2023	11.3	11.5	28.3	28.7
9/08/2023	14.0	11.5	35.0	28.8
10/08/2023	15.4	11.6	38.5	29.1
11/08/2023	9.8	11.6	24.5	29.0
12/08/2023	16.6	11.7	41.5	29.3
13/08/2023	12.6	11.7	31.5	29.3
14/08/2023	7.7	11.6	19.3	29.1
15/08/2023	9.0	11.6	22.5	28.9
16/08/2023	7.9	11.5	19.8	28.7
17/08/2023	8.7	11.4	21.8	28.6
18/08/2023	5.9	11.3	14.8	28.3
19/08/2023	7.7	11.3	19.3	28.1
20/08/2023	5.0	11.1	12.5	27.8
21/08/2023	12.8	11.2	32.0	27.9
22/08/2023	9.9	11.1	24.8	27.8
23/08/2023	10.0	11.1	25.0	27.8
24/08/2023	18.6	11.3	46.5	28.1
25/08/2023	39.1	11.8	97.8	29.4
26/08/2023	13.7	11.8	34.3	29.5
27/08/2023	10.3	11.8	25.8	29.4
28/08/2023	11.0	11.7	27.5	29.4
29/08/2023	18.7	11.9	46.8	29.7
30/08/2023	17.2	11.9	43.0	29.9
31/08/2023	10.0	11.9	25.0	29.8

\*Calculated from PM<sub>10</sub>

\*\*Calculated from PM<sub>10</sub> Annual Average

Note: results above the Dixon Sand EPL criteria limit of 42 µg/m<sup>3</sup> highlighted in yellow, when applicable

No Data (ND) = <18hrs hour of valid data to calculate a 24hr average

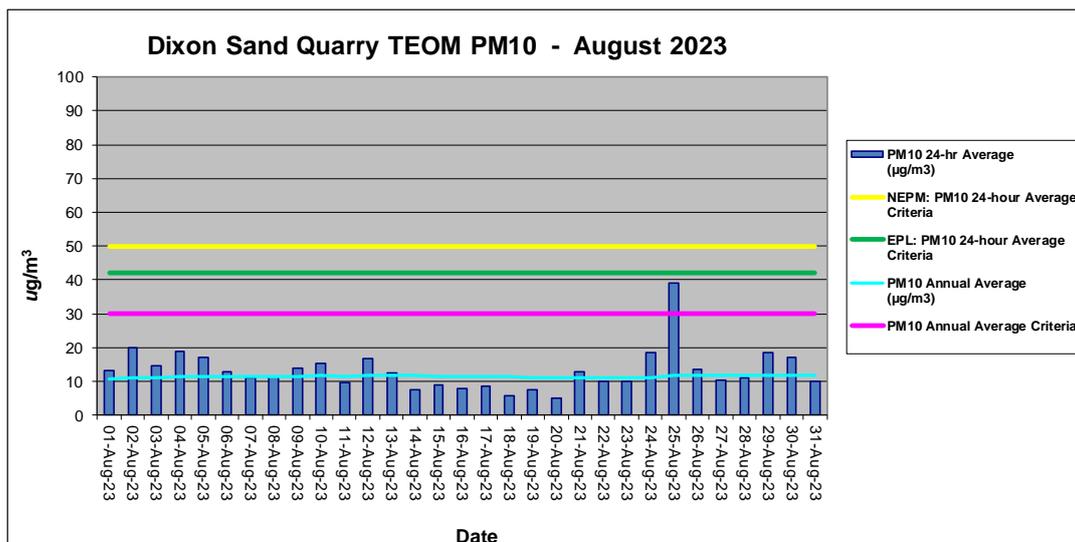


Figure 1: TEOM PM<sub>10</sub> 24 hr, Annual Average and Criteria

### 3.2 Meteorological Data

The weather station logs data at 5-minute intervals and sends the data to a web database by NextG telemetry. The data is accessible from the web site <http://console.teledata.com.au/index.html>.

A summary of monthly results is presented in **Table 3**. Charts of meteorological parameters are presented in **Figures 2** and **3**. A windrose is provided in **Figure 4**. This provides the frequency distribution of wind speed and direction during the month to display dominant wind directions.

A 6-monthly physical screening and system check of the meteorological station was conducted in March 2023 and is next due in September 2023. The screening and system check certificates are provided in **Appendix 1** (when required).

Approximately 100% of valid meteorological data was recorded for August 2023.

**Table 3:** Meteorological Data Summary for August 2023

Date	Min Temp	Avg Temp	Max Temp	RAIN mm	Min WS	Avg WS	Max WS	Min Humidity	Avg Humidity	Max Humidity	Min Pressure	Avg Pressure	Max Pressure
1/08/2023	8.2	13.4	19.9	0.0	0.1	3.1	12.8	30.5	55.9	78.2	1003.6	1006.7	1011.8
2/08/2023	9.0	12.5	16.8	0.0	0.2	2.4	11.0	70.4	84.7	100.0	1011.8	1014.2	1016.0
3/08/2023	9.7	14.5	20.6	0.2	0.0	3.7	15.0	46.0	78.4	100.0	1011.3	1013.3	1015.6
4/08/2023	10.6	16.5	22.6	0.0	0.5	4.5	13.2	32.1	54.6	81.9	1008.6	1011.0	1013.6
5/08/2023	11.9	14.8	16.9	0.0	0.3	3.5	12.3	45.7	63.0	100.0	1008.3	1009.5	1011.0
6/08/2023	10.6	11.9	14.1	0.2	0.0	3.0	8.9	78.1	95.1	100.0	1010.6	1011.6	1013.1
7/08/2023	8.9	11.7	15.0	0.0	0.2	2.8	9.4	69.2	85.9	100.0	1009.3	1010.5	1011.6
8/08/2023	9.3	12.6	17.8	0.2	0.2	2.8	13.3	46.9	85.3	99.9	1009.4	1010.7	1012.5
9/08/2023	8.6	13.4	18.9	0.0	0.0	3.3	14.6	41.0	72.7	100.0	1004.7	1008.7	1011.9
10/08/2023	10.2	15.4	22.0	0.0	0.4	5.6	18.2	26.8	45.0	79.1	996.7	1000.9	1004.8
11/08/2023	7.5	12.7	18.2	0.0	0.2	3.0	9.1	31.6	50.7	67.2	999.6	1001.3	1003.6
12/08/2023	7.7	14.1	21.3	0.0	0.2	3.4	12.9	27.6	49.1	69.2	995.4	998.0	999.6
13/08/2023	10.9	13.1	15.6	3.4	0.1	2.8	11.3	49.1	74.0	100.0	997.4	998.6	1000.5
14/08/2023	9.7	11.4	14.9	13.4	0.2	3.2	11.8	84.1	98.8	100.0	994.5	996.6	999.1
15/08/2023	6.9	10.6	15.7	0.2	0.0	3.3	15.1	62.2	89.4	100.0	997.5	1000.3	1003.4
16/08/2023	6.7	11.0	16.1	0.0	0.1	3.3	13.7	52.9	85.8	100.0	997.5	1000.7	1003.6
17/08/2023	7.4	12.7	20.0	2.6	0.0	3.1	10.3	29.5	73.3	100.0	987.8	992.3	997.4
18/08/2023	8.0	12.0	15.9	3.4	0.4	5.9	24.0	34.4	69.7	100.0	982.7	986.0	991.8
19/08/2023	6.5	11.3	17.3	0.0	0.2	3.8	14.9	35.1	55.3	71.5	991.9	996.2	999.7
20/08/2023	9.4	14.1	20.3	0.0	0.2	3.5	13.3	34.5	60.0	78.7	999.7	1002.0	1003.8
21/08/2023	8.7	14.1	20.4	0.0	0.2	3.2	17.1	35.7	63.9	84.4	1000.2	1002.2	1004.1
22/08/2023	10.7	17.1	23.7	0.0	0.2	4.0	16.6	26.8	52.6	82.2	996.7	998.5	1001.4
23/08/2023	9.0	13.4	18.2	0.0	0.0	4.0	13.3	43.6	75.4	100.0	997.8	1003.1	1008.1
24/08/2023	8.9	12.9	18.1	0.0	0.2	3.1	11.2	53.2	77.2	100.0	1006.6	1007.9	1009.8
25/08/2023	8.4	13.7	21.2	0.0	0.0	3.3	12.4	25.2	67.2	96.7	1004.4	1006.2	1007.4
26/08/2023	9.2	13.3	19.5	0.0	0.0	2.8	17.0	42.6	85.0	100.0	1006.3	1007.8	1009.5
27/08/2023	10.1	14.3	21.1	0.0	0.0	3.2	15.6	41.3	81.9	100.0	1005.2	1007.2	1008.9
28/08/2023	8.8	14.3	19.9	0.0	0.0	3.6	19.0	43.0	80.2	100.0	1001.9	1004.8	1006.9
29/08/2023	10.0	15.5	22.6	0.0	0.2	4.2	14.9	31.2	74.8	100.0	996.0	999.2	1003.5
30/08/2023	11.1	16.0	24.7	9.0	0.3	4.9	19.6	27.1	67.1	100.0	990.6	994.2	996.4
31/08/2023	9.6	13.5	19.7	0.2	0.1	3.3	13.9	49.3	89.3	100.0	993.6	995.5	997.7
<b>Monthly</b>	<b>6.5</b>	<b>13.5</b>	<b>24.7</b>	<b>32.8</b>	<b>0.0</b>	<b>3.5</b>	<b>24.0</b>	<b>25.2</b>	<b>72.3</b>	<b>100.0</b>	<b>982.7</b>	<b>1003.1</b>	<b>1016.0</b>

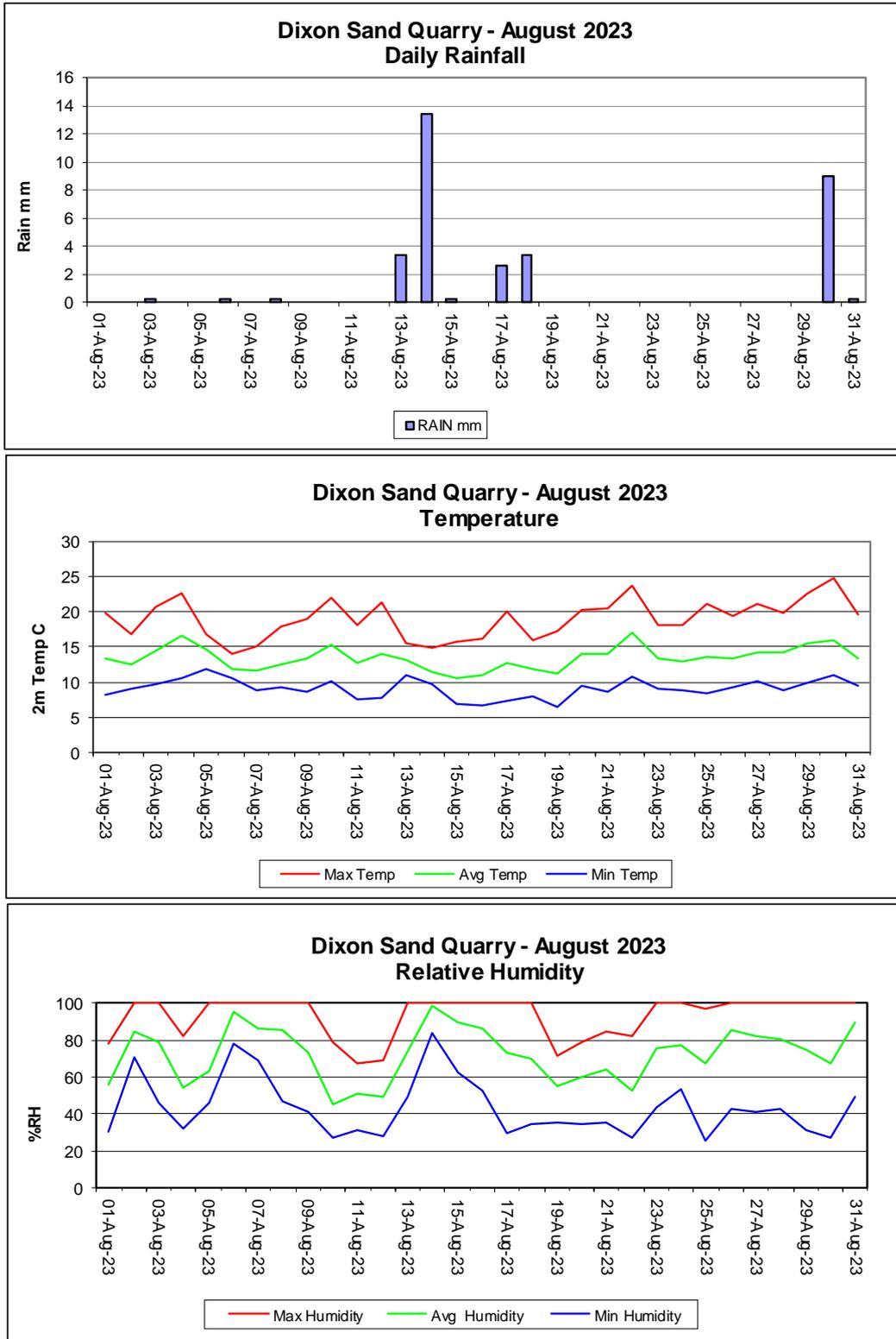


Figure 2: Daily Rainfall, Temperature and Relative Humidity Charts

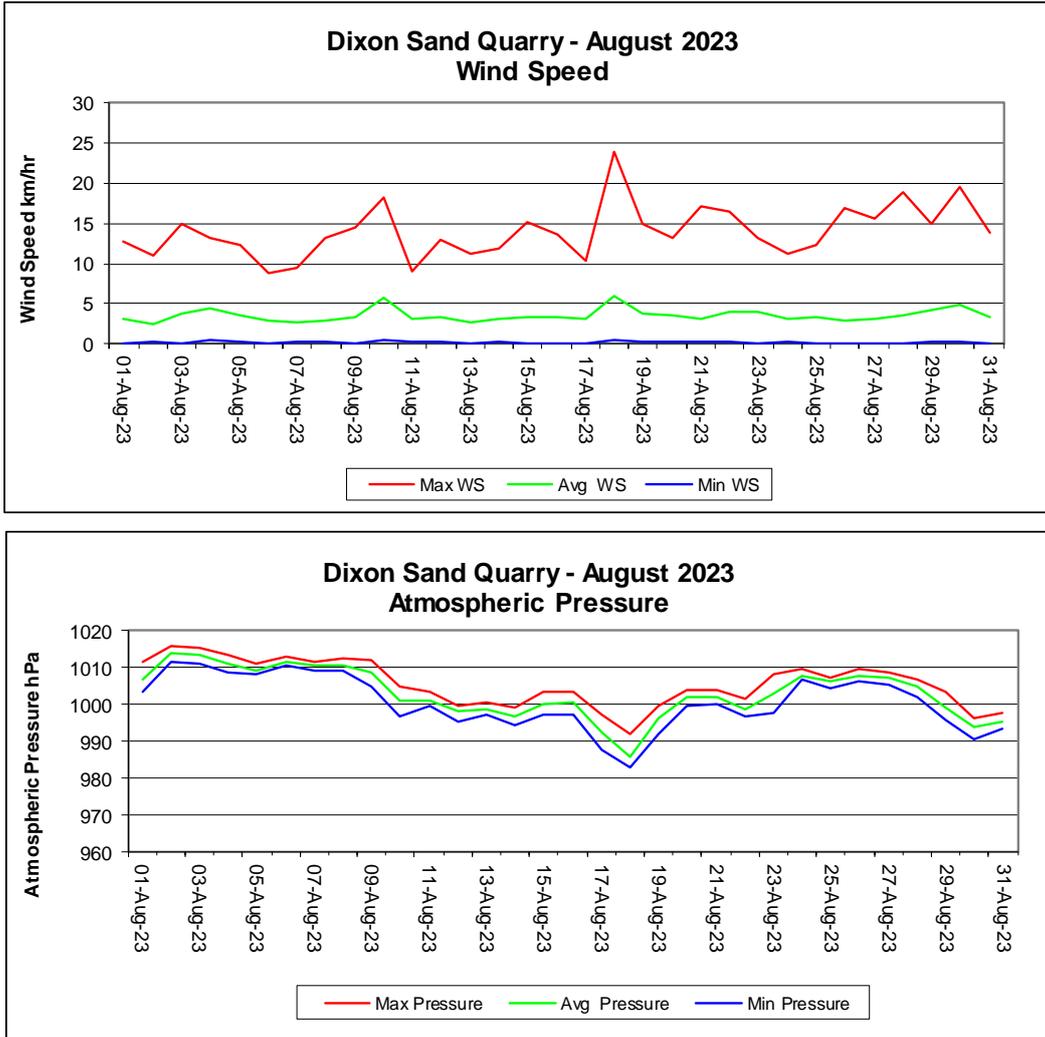


Figure 3: Wind Speed and Atmospheric Pressure Charts

### Dixon Sand Quarry - Windrose AUGUST 2023

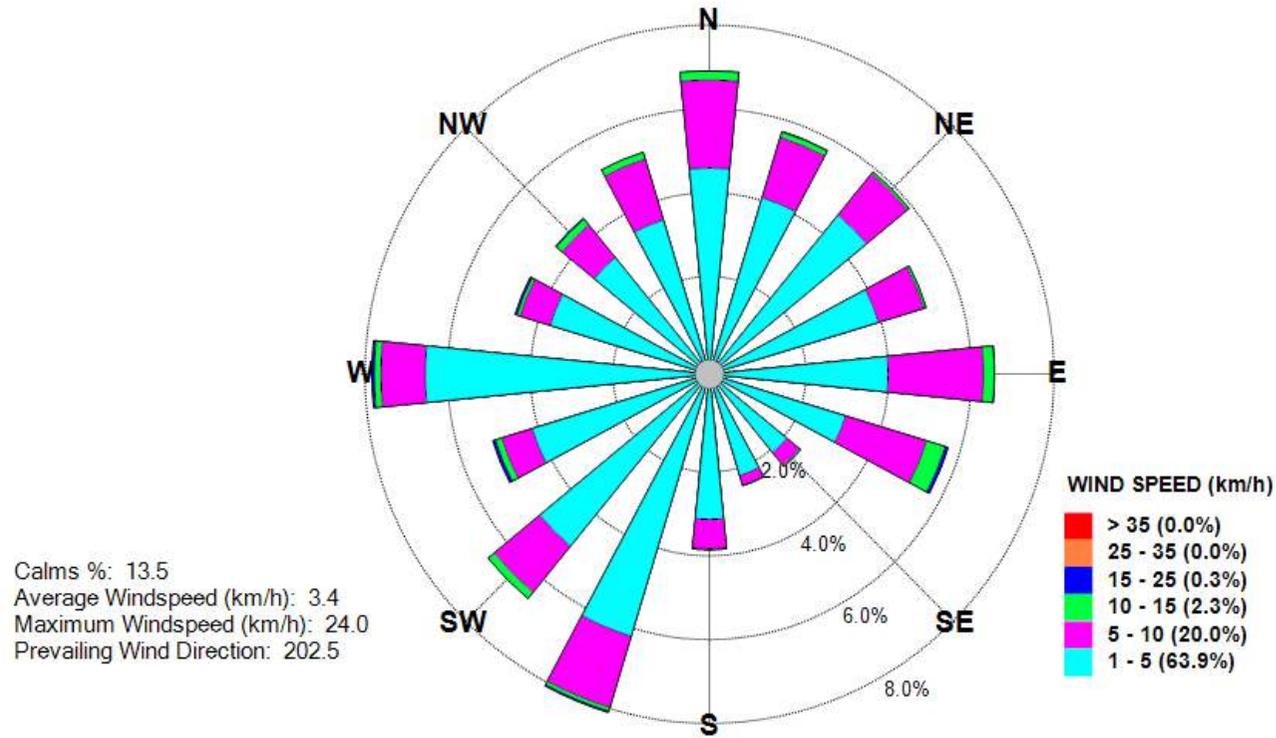


Figure 4: Monthly Windrose

## **Appendix 1**

Calibration Documents (when required)



**CBased Environmental  
Pty Limited**

ABN 62 611 924 264

**Dixon Sand Quarry**

**Environmental Monitoring  
Air Quality**

**Tapered Element Oscillating Microbalance  
(TEOM) (PM<sub>10</sub>) and Meteorological Data**

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**SEPTEMBER 2023**

A handwritten signature in black ink that reads "Colin Davies".

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Colin Davies BSc MEIA CENVP  
Environmental Scientist  
Date: 19 October 2023

CBased Environmental Pty Ltd  
Unit 3, 2 Enterprise Crescent SINGLETON NSW 2330  
☎ (02) 65713334

## 1.0 Summary

CBased Environmental Pty Limited is contracted by Dixon Sand to conduct continuous Tapered Element Oscillating Microbalance (TEOM) for fine particulates (PM<sub>10</sub>) and meteorological monitoring for the Dixon Sand Quarry. The information is required to assess air quality levels. The results for the TEOM and meteorological site are included in this report.

The monitoring programme includes:

- One continuous TEOM PM<sub>10</sub> monitor; and
- One continuous meteorological station.

This monthly report for September 2023 was prepared by CBased Environmental and includes the following:

- TEOM (PM<sub>10</sub>) monitoring results; and
- Meteorological results.

In accordance with Schedule 3, Condition 7 of the Dixon Sand development Consent and the Dixon Sand EPL;

- 24-hour average results were below the NEPM 24-hour maximum criteria of 50ug/m<sup>3</sup>;
- 24-hour average results were below the Dixon Sand Quarry EPL limit of 42ug/m<sup>3</sup>;
- The annual average is below the Dixon Sand Quarry consent annual average criteria of 30ug/m<sup>3</sup>; and
- The calculated TSP is below the Dixon Sand Quarry annual average criteria of 90ug/m<sup>3</sup>.

Note: Based on the available data, statements in **green** indicate current conformance to Dixon Sand Quarry Air Quality Impact Assessment criteria, statements in **red** indicate possible non-conformance. Year to date annual average for PM<sub>10</sub> is calculated from 1 July 2023 for TEOM's coinciding with the Dixon Sand project year. An annual amount of data has not yet been collected.

Approximately 100% of valid meteorological data was recorded for September 2023.

Approximately 100% of valid TEOM data was available for September 2023.

## 2.0 Sampling Programme

The TEOM is sited and operated to the applicable Australian Standard and/or OEH (EPA) approved methods. The following Australian Standards were used:

- AS3580.9.8 - “*Methods for Sampling and Analysis of Ambient Air. Determination of Suspended Particulates—PM<sub>10</sub> continuous direct mass method using a tapered element oscillating microbalance analyser*”; and
- AS/NZS 3580.1.1 - “*Methods for Sampling and Analysis of Ambient Air Part 1.1 Guide to Siting Air Monitoring Equipment*”.

TEOM PM<sub>10</sub> results are 24-hour averages at midnight and are reported as µg/m<sup>3</sup> corrected to 0 degrees C and 101.3kPa.

All laboratory analysis was conducted by a National Association of Testing Authorities (NATA) accredited laboratory.

Air Quality monitoring site descriptions and locations are provided in **Table 1**.

**Table 1:** Dixon Sand Air Quality Monitoring Description and Locations

Monitor	Site Code	Location Description
TEOM PM <sub>10</sub>	TEOM	Old North Road, Maroota NSW
Meteorological Station	MET	Old North Road, Maroota NSW

## 3.0 Results

### 3.1 TEOM PM<sub>10</sub>

24-hour average TEOM PM<sub>10</sub> results from the AQMS data collection software are provided in **Table 2** and a chart of the data is provided in **Figure 1**.

During the monitoring period, individual 24-hour TEOM PM<sub>10</sub> results were below the National Environment Protection Measure (NEPM) short-term (24hr) impact criteria of 50ug/m<sup>3</sup> and the Dixon Sand Quarry EPL limit of 42ug/m<sup>3</sup>.

Approximately 99% of valid TEOM data was available for September 2023.

At present, the current TEOM PM<sub>10</sub> annual average is below the Dixon Sand Quarry annual average PM<sub>10</sub> criteria of 30ug/m<sup>3</sup>. The current annual average for calculated Total Suspended Particulates (TSP) is below the annual average criterion of 90ug/m<sup>3</sup>. The TSP is calculated by multiplying the PM<sub>10</sub> by 2.5. Note: the annual average is calculated from 1 July 2023 and therefore an annual amount of data has not yet been collected.

The quarterly TEOM calibration was conducted 25 September 2023 with the next calibration due to be completed in December 2023. The calibration certificate is provided in **Appendix 1** (when required).

**Table 2:** Average Daily 24-hr TEOM PM<sub>10</sub> and TSP Results for September 2023 from AQMS and Annual Average PM<sub>10</sub> calculated from the 1 July 2023.

Date	PM <sub>10</sub> 24-hr Average (µg/m <sup>3</sup> )	PM <sub>10</sub> Annual Average (µg/m <sup>3</sup> )	24-hr Average TSP* (µg/m <sup>3</sup> )	Annual Average TSP** (µg/m <sup>3</sup> )
1/09/2023	11.0	11.9	27.5	29.8
2/09/2023	10.5	11.9	26.3	29.7
3/09/2023	9.9	11.9	24.8	29.6
4/09/2023	15.5	11.9	38.8	29.8
5/09/2023	12.4	11.9	31.0	29.8
6/09/2023	15.9	12.0	39.8	29.9
7/09/2023	23.9	12.1	59.8	30.4
8/09/2023	7.3	12.1	18.3	30.2
9/09/2023	9.5	12.0	23.8	30.1
10/09/2023	10.7	12.0	26.8	30.1
11/09/2023	21.2	12.1	53.0	30.4
12/09/2023	31.3	12.4	78.3	31.0
13/09/2023	19.0	12.5	47.5	31.2
14/09/2023	23.0	12.6	57.5	31.6
15/09/2023	23.4	12.8	58.5	31.9
16/09/2023	14.4	12.8	36.0	32.0
17/09/2023	10.8	12.8	27.0	31.9
18/09/2023	19.5	12.9	48.8	32.1
19/09/2023	26.0	13.0	65.0	32.5
20/09/2023	32.7	13.3	81.8	33.1
21/09/2023	22.5	13.4	56.3	33.4
22/09/2023	11.2	13.3	28.0	33.3
23/09/2023	12.6	13.3	31.5	33.3
24/09/2023	8.2	13.3	20.5	33.2
25/09/2023	11.4	13.2	28.5	33.1
26/09/2023	22.8	13.4	57.0	33.4
27/09/2023	17.0	13.4	42.5	33.5
28/09/2023	11.8	13.4	29.5	33.5
29/09/2023	13.5	13.4	33.8	33.5
30/09/2023	16.1	13.4	40.3	33.5

\*Calculated from PM<sub>10</sub>

\*\*Calculated from PM<sub>10</sub> Annual Average

Note: results above the Dixon Sand EPL criteria limit of 42 µg/m<sup>3</sup> highlighted in yellow, when applicable

No Data (ND) = <18hrs hour of valid data to calculate a 24hr average

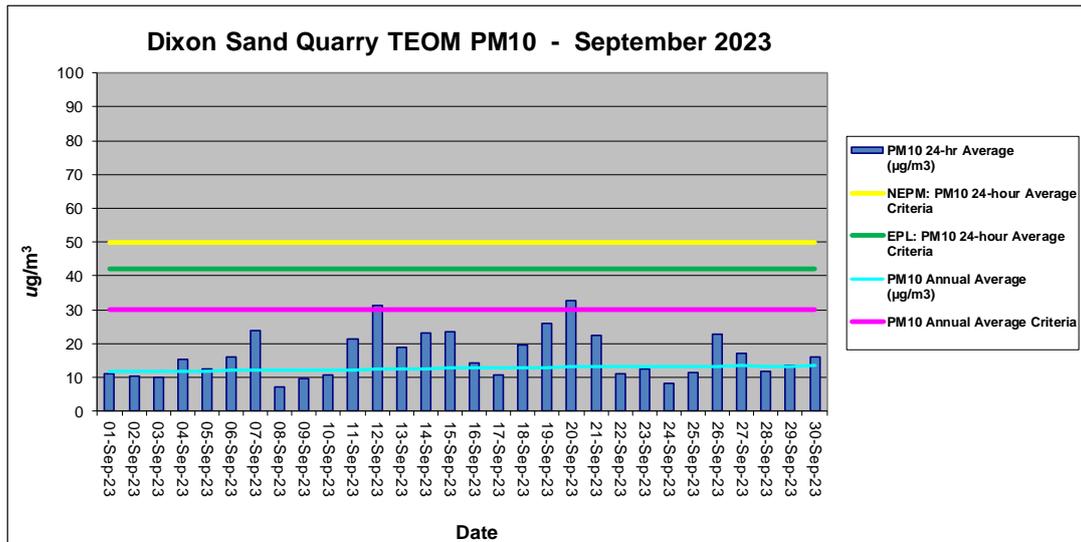


Figure 1: TEOM PM<sub>10</sub> 24 hr, Annual Average and Criteria

### 3.2 Meteorological Data

The weather station logs data at 5-minute intervals and sends the data to a web database by NextG telemetry. The data is accessible from the web site <http://console.teledata.com.au/index.html>.

A summary of monthly results is presented in **Table 3**. Charts of meteorological parameters are presented in **Figures 2** and **3**. A windrose is provided in **Figure 4**. This provides the frequency distribution of wind speed and direction during the month to display dominant wind directions.

A 6-monthly physical screening and system check of the meteorological station was conducted on 25 September 2023 and is next due in March 2024. The screening and system check certificates are provided in **Appendix 1** (when required).

Approximately 100% of valid meteorological data was recorded for September 2023.

**Table 3:** Meteorological Data Summary for September 2023

Date	Min Temp	Avg Temp	Max Temp	RAIN mm	Min WS	Avg WS	Max WS	Min Humidity	Avg Humidity	Max Humidity	Min Pressure	Avg Pressure	Max Pressure
1/09/2023	8.2	12.2	18.0	0.0	0.1	3.6	13.4	34.9	73.6	100.0	996.8	999.5	1002.9
2/09/2023	6.9	11.6	18.2	0.0	0.1	3.6	12.8	38.0	74.1	99.3	999.8	1002.0	1003.9
3/09/2023	9.6	13.3	19.6	0.0	0.0	3.3	21.1	39.7	78.8	100.0	997.6	1000.4	1002.5
4/09/2023	9.4	14.8	21.1	0.0	0.0	3.7	18.1	53.1	84.4	100.0	989.0	994.2	999.3
5/09/2023	11.8	17.0	23.0	0.0	0.2	4.6	14.5	13.3	49.8	100.0	986.6	992.6	999.7
6/09/2023	10.2	15.2	22.5	0.0	0.2	4.8	22.2	17.1	47.5	80.7	998.9	1000.8	1003.2
7/09/2023	8.6	18.6	27.9	0.0	0.0	5.9	22.7	26.2	57.2	98.0	993.5	997.2	1001.1
8/09/2023	9.0	14.2	20.7	5.2	0.6	6.3	23.9	24.7	67.4	100.0	992.7	997.2	1003.1
9/09/2023	6.6	11.2	18.0	0.2	0.0	4.0	16.5	22.3	50.5	74.1	1002.4	1004.8	1008.0
10/09/2023	5.1	10.9	17.4	0.0	0.1	3.2	14.6	23.5	55.7	88.0	1007.1	1008.7	1010.4
11/09/2023	6.6	12.0	19.2	0.0	0.1	3.0	12.6	36.5	71.5	94.6	1008.8	1010.4	1012.1
12/09/2023	8.7	13.5	20.3	0.0	0.0	3.3	12.6	32.1	74.8	96.9	1007.0	1009.0	1011.1
13/09/2023	9.7	15.3	22.8	0.0	0.0	3.9	16.8	25.8	67.4	97.3	1005.2	1007.2	1008.9
14/09/2023	10.1	17.2	25.3	0.0	0.1	3.1	12.7	18.9	54.2	92.9	1005.4	1007.1	1009.1
15/09/2023	13.2	20.9	29.4	0.0	0.3	4.6	13.9	13.7	35.6	61.2	1001.1	1004.0	1006.4
16/09/2023	17.3	24.3	32.1	0.0	0.5	5.1	18.8	13.9	27.1	41.7	998.5	1001.2	1003.5
17/09/2023	19.3	24.5	31.3	0.0	0.7	4.3	17.5	11.8	22.7	36.5	999.5	1001.4	1003.5
18/09/2023	15.5	25.3	33.6	0.0	0.5	4.0	16.0	11.5	22.9	40.2	996.9	999.8	1002.6
19/09/2023	20.2	26.0	32.0	0.0	0.3	6.9	21.3	14.5	22.2	30.8	992.6	995.6	998.9
20/09/2023	20.6	26.3	32.5	0.0	0.4	8.0	26.7	12.8	21.6	33.9	987.4	990.5	993.1
21/09/2023	11.5	16.4	22.8	0.0	0.0	5.3	30.6	15.5	68.9	100.0	990.8	997.4	1006.2
22/09/2023	9.4	12.7	17.1	0.0	0.0	4.6	17.7	47.6	73.6	99.9	1006.0	1008.1	1010.0
23/09/2023	7.5	12.7	17.7	0.2	0.0	3.6	16.1	48.6	72.7	99.0	1006.7	1008.7	1010.6
24/09/2023	10.0	13.9	19.4	0.0	0.0	3.9	22.0	44.0	71.1	94.5	1004.3	1006.7	1009.3
25/09/2023	10.4	17.5	26.7	0.0	0.1	4.0	13.6	26.3	58.5	91.3	998.7	1001.9	1004.7
26/09/2023	13.0	16.8	23.1	6.8	0.1	4.4	22.5	49.6	72.6	99.9	998.4	1000.3	1002.9
27/09/2023	12.5	16.8	23.2	0.2	0.2	4.0	24.3	59.0	88.4	100.0	997.8	1000.2	1004.6
28/09/2023	13.7	15.7	19.2	18.0	0.0	3.2	9.3	78.3	95.6	100.0	1003.6	1006.2	1009.1
29/09/2023	12.8	19.3	29.1	0.0	0.3	4.8	17.5	20.8	70.4	100.0	1000.5	1003.6	1006.2
30/09/2023	13.0	20.8	29.9	0.0	0.2	4.1	18.7	26.0	67.3	100.0	995.9	1000.1	1004.7
<b>Monthly</b>	<b>5.1</b>	<b>16.9</b>	<b>33.6</b>	<b>30.6</b>	<b>0.0</b>	<b>4.4</b>	<b>30.6</b>	<b>11.5</b>	<b>59.9</b>	<b>100.0</b>	<b>986.6</b>	<b>1001.9</b>	<b>1012.1</b>

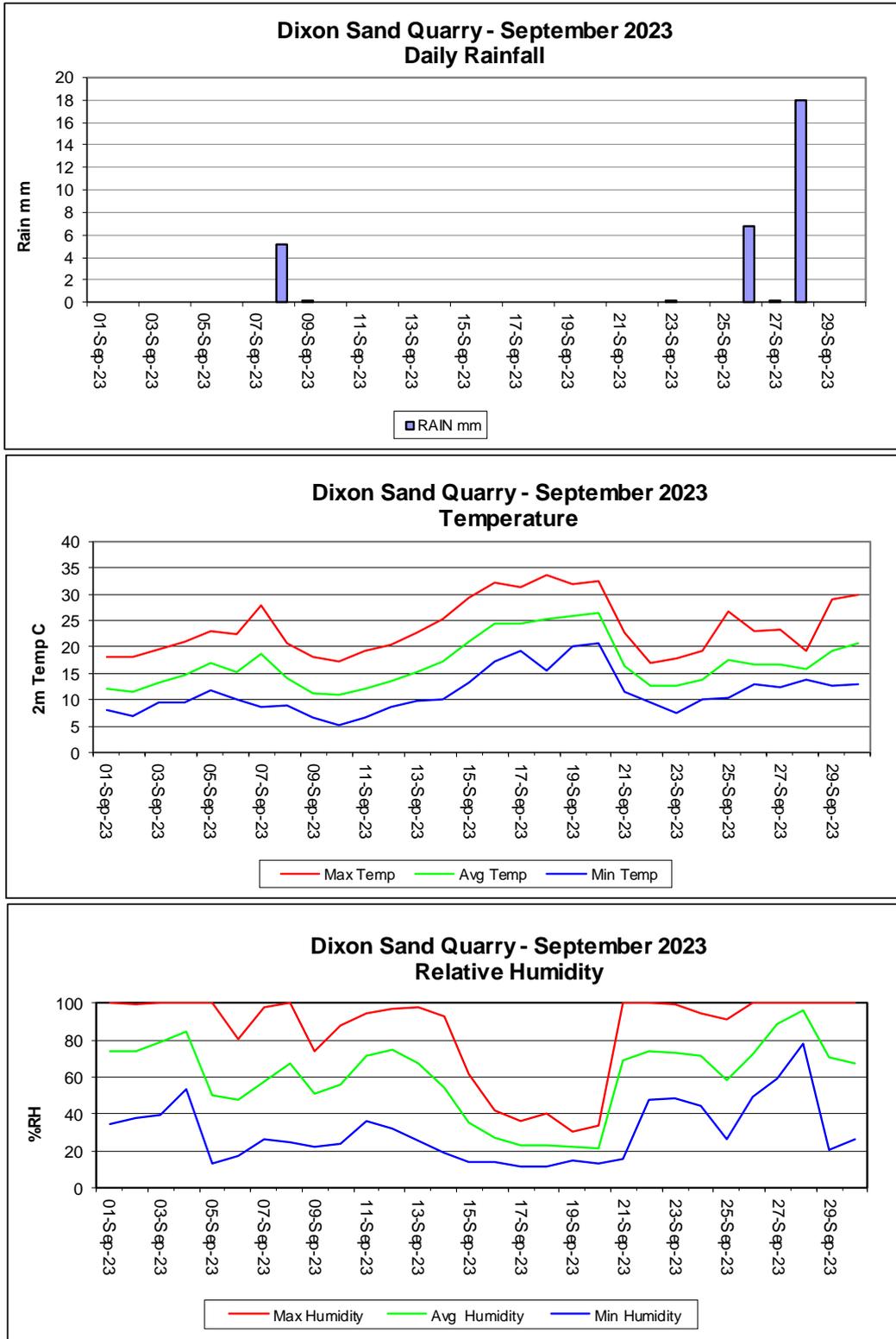


Figure 2: Daily Rainfall, Temperature and Relative Humidity Charts

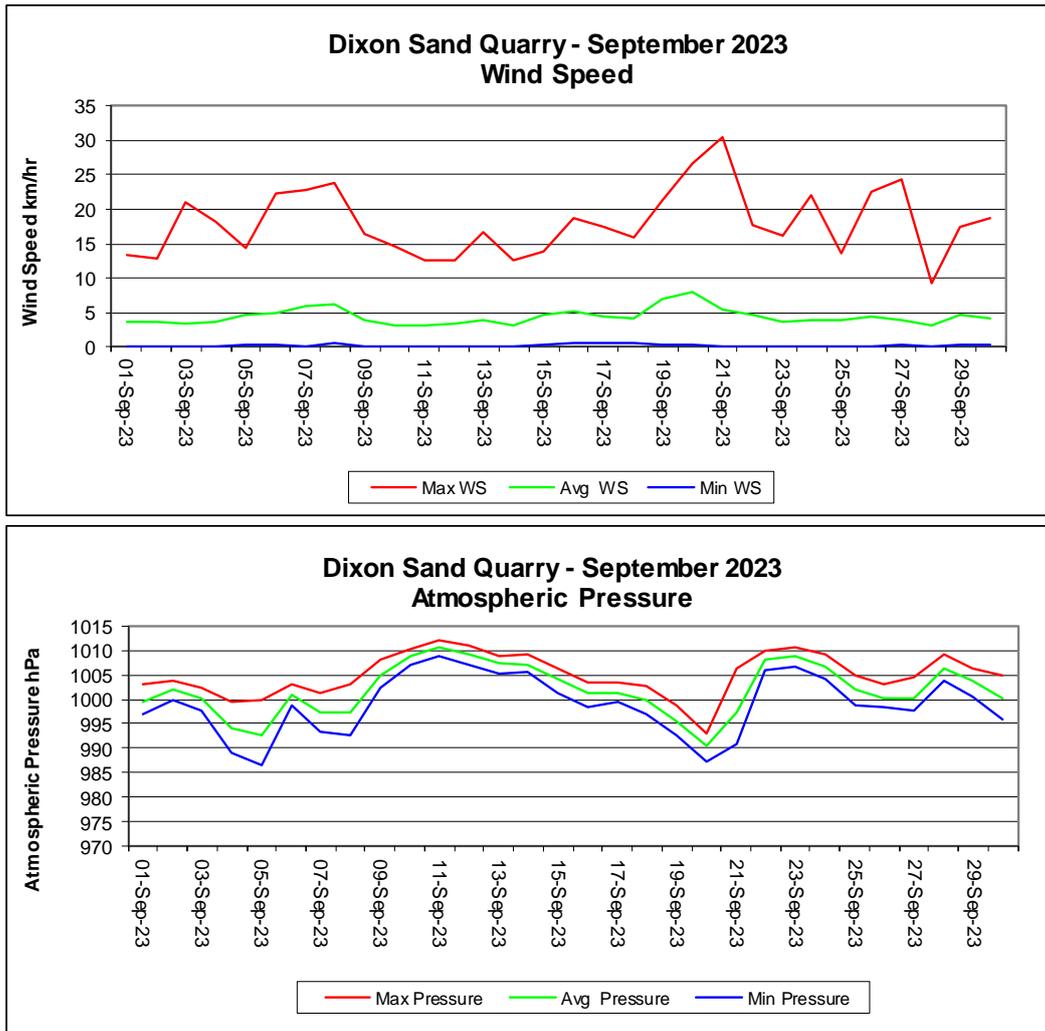


Figure 3: Wind Speed and Atmospheric Pressure Charts

## Dixon Sand Quarry - Windrose SEPTEMBER 2023

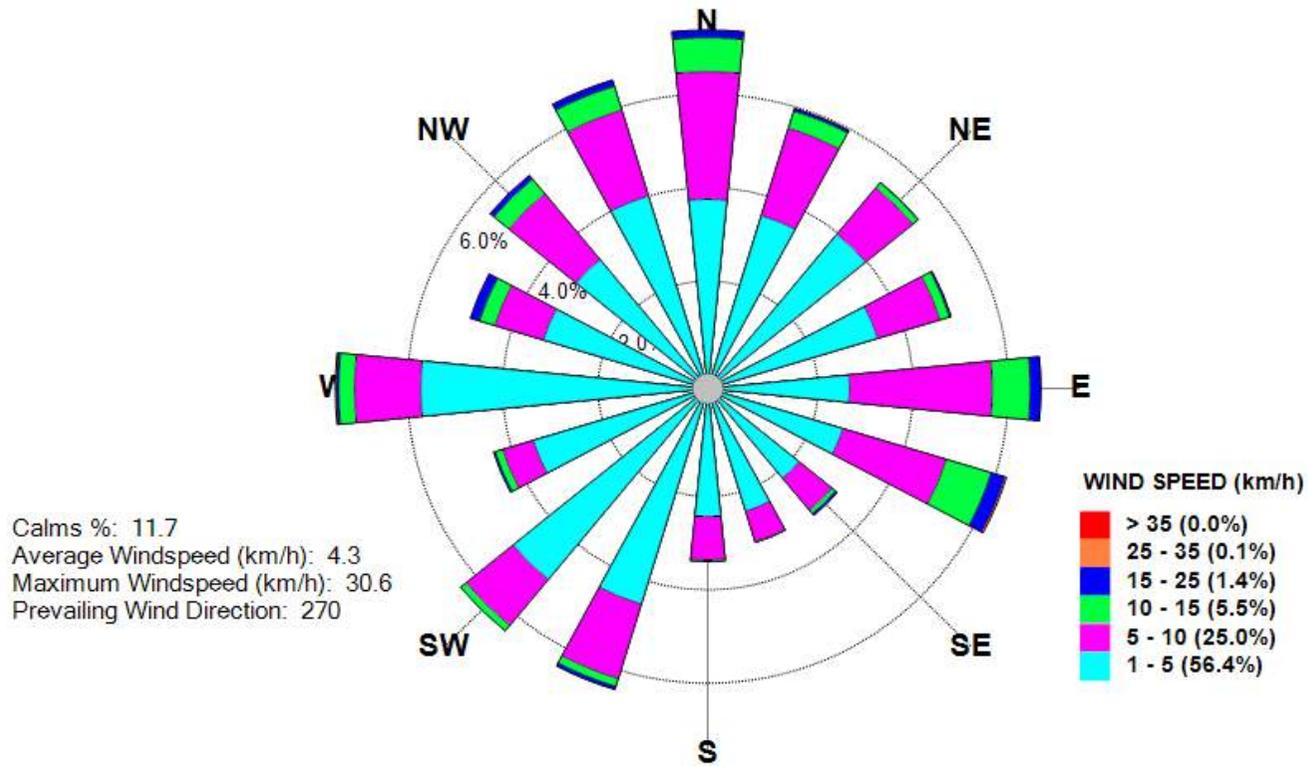


Figure 4: Monthly Windrose

## **Appendix 1**

Calibration Documents (when required)



# CBased Environmental Pty Limited

ABN 62 611 924 264

## Weather Station Physical Screening Field Check

Client Dixon Sands Site Name: TEOM/VET

Date: 25/9/2023 Time: 11:00 - 12:00

	Yes (Pass)	No (Fail)	Comments
<b>Grass / Vegetation Impacts</b>			
Compound Grass height <10cm	/		
No objects within impact area (10 x height of object)		/	Trees/buildings nearby
<b>Ground Anchor / Guy Wires / Mast Condition</b>			
Bottom guy wires tight (correct tension = 35-50mm deflection, with only moderate hand force at 1.5 metres up the guy wire)	NA		fixed mast
Top Guy wires tensioned (correct tension = 60-75mm deflection, with only moderate hand force at 1.5 metres up the guy wire)	NA		fixed mast
Mast Vertical and in good condition	/		
Ground anchors/star pickets tight in ground	NA		fixed mast
Guy Wires insignificant corrosion	/		
Ground anchors/D shackles/ winders insignificant corrosion	↓		↓
Bolts/hinge points in mast are secure	↓		↓
<b>Cables / Connectors / Logger Cabinet / Solar Panel</b>			
Cables attached to mast/guy wires via ties are secure	/		loose wires due to design
Insignificant corrosion to plugs/connectors	/		
No water ingress in logger/battery cabinet	/		
Wiring/plugs in cabinet OK, Logger OK	/		
Battery terminals and condition OK	NA		Battery Volts = N/A 240V system
Battery volts (charging >13V, not charging >12V)	NA		
Solar panel undamaged and clean	NA		
Sensor shields clean	OK		↓
<b>Sensor Check</b>			
Wind direction aligned True North/ <del>Magnetic North</del> (strike out N/A)	/		Compass Bearing: 350 degrees
Rain gauge cleaned, working OK (1 tip check) or 100ml Cal	/		100ml check completed
Rain gauge level OK	/		
Anemometer/wind vane moving freely (analogue sensors)	NA		will attract
Other sensors visually checked and OK	/		
Last months data checked and OK / Logging data OK	/		

Checked By: Name COLIN DANIEL Signed Colin

CBased Environmental Pty Limited  
 Unit 3, 2 Enterprise Crescent  
 SINGLETON NSW 2330  
 P: (02) 6571 3334

**CBased Environmental Pty Limited**

ABN 62 611 924 264

**Weather Station Field Check**Site: Dixon SandsDate/Time: 25/09/2023 11:00-12:00**Measured Against Reference Sensors**

Parameter	Units	Site	Reference	Difference	Pass/Fail	Reference Description
Temperature 10m	°C	22.3	22.6	-0.3	Pass	Ref Thermometer
Humidity	%RH	34.6	36	-1.5	Pass	Ref RH sensor
Rainfall	mm	3.2	3.2	0.0	Pass	Glass Pipette
Wind Speed	km/hr	3.0	3.0	0.0	Pass	Ref Anemometer
Wind Direction	Degrees	267	270	-3.0	Pass	Sighting compass

**Reference Instruments Specifications:**

\*Calibration expires:

10/02/2024

Sensor	Serial Number	Specifications	Accuracy
*Temperature	230210N04	-40 to 65°C	+/- 0.3°C
*Barometer	BF230207001	20 to 30" Hg	+/- 1.1hPa
*Humidity	230210N04	10 to 90%RH	+/- 2%RH
*Anemometer	230210N06	0 to 64km/hr	+/- 3.6km/hr or 5%
**Rainfall	Standard number of tips	3.2mm	+/- 0.2mm
Compass	Sighting Compass	0 to 360 degrees	+/- 5 Deg

\*\* 100mL used.

Reference sensors were certified by Davis Instruments USA using a reference traceable to National Institute of Standards and Technology (NIST) and were "in calibration" when used.

**Comments:**

The weatherstation was in conformance with the reference instruments at the monitored levels. Wind direction is referenced to true north. The calibration check of the raingauge involved adding water to the raingauge. Rain total of 3.2mm should be deleted from site records on the 25/9/2023.

**NA=Not Available**

The meteorological station meets the requirements of the Approved Methods for the Sampling and Analysis of Air Pollutants in NSW.

The weather station has Passed the field check. Next annual field check due:

Mar-24

Checked by: Colin Davies

25/09/2023

CBased Environmental Pty Limited  
Unit 3, 2 Enterprise Crescent  
SINGLETON NSW 2330  
P: 65 713 334



# Continuous Air Quality Monthly/Quarterly/Six Monthly/Annual TEOM Maintenance and Calibration – 1400AB



TEOM Client/Site: Dixan Sandi / TEOM1

Date: 25/9/23

1. TEOM Data Screen SERIAL No: 25570

Firmware: N/A AB model

Condition	Current Data	Acceptable Data	Pass (Tick)	Fail (Tick)
Operating Condition	OK ✓	Green - Normal	✓	
Date/time	TEOM: 25/9/23 11:05 Actual: 25/9/23 11:07	Current Date/time correct within 5 minutes	✓	
PM-10 24hr av	8.9	Positive values	✓	
Filter loading PM10	71	<80 %	✓	
Frequency PM-10	0.036	200-300 Hz	✓	
Noise PM-10	253.2428	<0.100ug	✓	

Comment: If filter load >80% but <90% and if flows Ok then data is OK

**Comments:**

## 2. System Status

Condition	Current Data	Acceptable Data	Pass (Tick)	Fail (Tick)
Vacuum pump pressure	NA OK	<0.50 atm	✓	
Warnings	NIL	No Warnings	✓	
If any warnings list:				

**Comments:**

Data Downloaded: YES/**(NO)** (circle)

Technician Name : COLIN DAVEY Signed [Signature]



**3. Instrument Conditions Ambient Conditions and Temperatures**

Condition	Current Data	Acceptable Data	Pass (Tick)	Fail (Tick)
Ambient Temperature	22.3	-10 to 50 C	✓	
Ambient Dew Point	NA	-10 to 50 C	—	—
Ambient Pressure	0.985	0.9-1.1 atm	✓	
Ambient Relative Humidity	NA	10-100 %RH	—	—
Cap temperature	50.00	50.00 +/- 0.10 C	✓	
Case temperature	50.01	50.00 +/- 0.10 C	✓	
Main (PM-10) Air Tube temp	50.00	50.00 +/- 0.10 C	✓	

Comments:

**4. Instrument Conditions – Flows**

Condition	Current Data	Acceptable Data	Pass (Tick)	Fail (Tick)
Main (PM-10) Flow rate	2.90	2.82 – 3.18 lpm	✓	
Bypass Flow rate	13.68	12.95 – 14.39 lpm	✓	
Total Flow rate	16.48	15.67 – 17.67 lpm	✓	

Comments:

Fadj man = 1.060  
 Fadj avx = 1.000 ✓ OK

**Results: (Tick box)**

- There were NO equipment faults found. No action required – (file report)**
- There were faults found (Fails) – Were these fixed on site: YES/NO (circle)**  
**Any Fails that cannot be repaired on site must be reported to CBased:**  
**Office: 65713334 or email [cbased@bigpond.com](mailto:cbased@bigpond.com)**  
**Date faults notified to CBased: \_\_\_\_\_**

Comments/Action Required:



**Calibration/Maintenance**

- 1. 1405A: Were Filters replaced  YES/ NO
- 2. PM10 Inlet head cleaned  YES/ NO
- 3. If measurement filters were replaced, confirm stable results after change. Stable particulate results confirmed  YES/ NO

Channel	Filter Load %	Frequency Hz initial	Frequency check 1min	Frequency check 3min	Frequency check 5min
PM10	16	255.63560	255.63561	255.63562	255.63562

✓ good.

Frequency should not drift by more than 0.0010 between readings (if instrument is thermodynamically stable)  
Pass/Fail – if Fail – install new filter and redo stability test.

- 4. Instrument clock verified (Refer Section 1)  YES/ NO.  
If Time changed – clock reset OK YES/NO or  NA (not changed)  
Comments:

- 5. Were TEOM in line and rear TEOM filters checked for cleanliness and replaced if necessary.  YES/ NO.  
Comments if changed:

- 6. TEOM Cleaned and Air Conditioner checked  YES/ NO. Air Conditioner settings or operational status: 5 low cool

**Tetracal Flow/Temp/Pressure Calibrator Serial No:** 1009 Refer to calibration corrections for Temperature/Pressure and Flows and apply to all readings.

**Quarterly or Six Monthly Calibration**

- 1. Flow Verification – Conducted  YES/ NO

PM10 Flow verified Flow l/min 2.95 Error % 1.7 (allowed error <6%)  PASS/ FAIL

Bypass Flow verified Flow l/min 13.45 Error % 1.6 (allowed error <6%)  PASS/ FAIL

If fail then complete a full multipoint recalibration and review previous data from last good flow check. **Comments if Flows recalibrated:**

- 2. Leak Check – Conducted  YES/ NO

PM10 actual 0.14 < Limit 0.15

Bypass actual 0.50 < Limit 0.60

Leak check  PASS/ FAIL – If fail then find leak and retest.

Comments: slight leak null transducer but OK ✓



**Annual Calibration/Maintenance**

**1. Temperature and Pressure Calibration – Conducted YES/NO**

Reference Temperature: \_\_\_\_\_ C TEOM Temperature \_\_\_\_\_ C  
if difference +/- 1 C recalibrate sensor. Sensor recalibrated YES/NO

Reference Pressure: \_\_\_\_\_ atm TEOM Pressure \_\_\_\_\_ atm  
if difference +/- 0.010 atm recalibrate sensor. Sensor recalibrated YES/NO

Note: Tetralcal measures Atmospheric Pressure in mm Hg or mb or hPa  
For mb or hPa divide tetralcal result by 1013.25 to change units to atm.  
For mmHg divide tetralcal result by 760 to change units to atm.

NA

**2. Flow Calibration – Conducted YES/NO**

**PM10**

Set point 2.4 Actual: \_\_\_\_\_  
Set point 3.6 Actual: \_\_\_\_\_  
Set point 3.0 Actual: \_\_\_\_\_ After calibration Final: \_\_\_\_\_ l/min

**BYPASS**

Set point 10.9 Actual: \_\_\_\_\_  
Set point 16.4 Actual: \_\_\_\_\_  
Set point 13.67 Actual: \_\_\_\_\_ After calibration Final: \_\_\_\_\_ l/min

**3. Mass calibration (K0) Verification – Conducted YES/NO**

Actual measured K0 = \_\_\_\_\_ TEOM stated K0 \_\_\_\_\_ Error %: \_\_\_\_\_  
Allowed Error +/- 2.5%. PASS/FAIL  
If Error +/- 2.5% repeat. If confirmed consult manufacturer.  
Second Error % = \_\_\_\_\_ PASS/FAIL. Comments:  
If second test fails consult manufacturer.

**4. Annual Noise check - Conducted YES/NO**

Zero filter applied to TEOM and TEOM operated for at least 12 hours:  
Start date/time: \_\_\_\_\_ Finish date/time: \_\_\_\_\_  
Standard deviation of all recorded data (min 30 min averages) = \_\_\_\_\_ ug/m<sup>3</sup>  
Noise was less than 5ug/m<sup>3</sup> YES/NO

**5. Maintenance**

Air Inlet system cleaned YES/NO  
Pump Reconditioned YES/NO  
Check Waterproofing YES/NO  
Comments:





**CBased Environmental  
Pty Limited**

ABN 62 611 924 264

**Dixon Sand Quarry**

**Environmental Monitoring  
Air Quality**

**Tapered Element Oscillating Microbalance  
(TEOM) (PM<sub>10</sub>) and Meteorological Data**

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**OCTOBER 2023**

A handwritten signature in black ink that reads "Colin Davies".

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Colin Davies BSc MEIA CENVP  
Environmental Scientist  
Date: 28 November 2023

CBased Environmental Pty Ltd  
Unit 3, 2 Enterprise Crescent SINGLETON NSW 2330  
☎ (02) 65713334

## 1.0 Summary

CBased Environmental Pty Limited is contracted by Dixon Sand to conduct continuous Tapered Element Oscillating Microbalance (TEOM) for fine particulates (PM<sub>10</sub>) and meteorological monitoring for the Dixon Sand Quarry. The information is required to assess air quality levels. The results for the TEOM and meteorological site are included in this report.

The monitoring programme includes:

- One continuous TEOM PM<sub>10</sub> monitor; and
- One continuous meteorological station.

This monthly report for October 2023 was prepared by CBased Environmental and includes the following:

- TEOM (PM<sub>10</sub>) monitoring results; and
- Meteorological results.

In accordance with Schedule 3, Condition 7 of the Dixon Sand development Consent and the Dixon Sand EPL;

- 24-hour average results were below the NEPM 24-hour maximum criteria of 50ug/m<sup>3</sup>;
- 24-hour average results were below the Dixon Sand Quarry EPL limit of 42ug/m<sup>3</sup>;
- The annual average is below the Dixon Sand Quarry consent annual average criteria of 30ug/m<sup>3</sup>; and
- The calculated TSP is below the Dixon Sand Quarry annual average criteria of 90ug/m<sup>3</sup>.

Note: Based on the available data, statements in **green** indicate current conformance to Dixon Sand Quarry Air Quality Impact Assessment criteria, statements in **red** indicate possible non-conformance. Year to date annual average for PM<sub>10</sub> is calculated from 1 July 2023 for TEOM's coinciding with the Dixon Sand project year. An annual amount of data has not yet been collected.

Approximately 100% of valid meteorological data was recorded for October 2023.

Approximately 100% of valid TEOM data was available for October 2023.

## 2.0 Sampling Programme

The TEOM is sited and operated to the applicable Australian Standard and/or OEH (EPA) approved methods. The following Australian Standards were used:

- AS3580.9.8 - “*Methods for Sampling and Analysis of Ambient Air. Determination of Suspended Particulates—PM<sub>10</sub> continuous direct mass method using a tapered element oscillating microbalance analyser*”; and
- AS/NZS 3580.1.1 - “*Methods for Sampling and Analysis of Ambient Air Part 1.1 Guide to Siting Air Monitoring Equipment*”.

TEOM PM<sub>10</sub> results are 24-hour averages at midnight and are reported as µg/m<sup>3</sup> corrected to 0 degrees C and 101.3kPa.

All laboratory analysis was conducted by a National Association of Testing Authorities (NATA) accredited laboratory.

Air Quality monitoring site descriptions and locations are provided in **Table 1**.

**Table 1:** Dixon Sand Air Quality Monitoring Description and Locations

Monitor	Site Code	Location Description
TEOM PM <sub>10</sub>	TEOM	Old North Road, Maroota NSW
Meteorological Station	MET	Old North Road, Maroota NSW

## 3.0 Results

### 3.1 TEOM PM<sub>10</sub>

24-hour average TEOM PM<sub>10</sub> results from the AQMS data collection software are provided in **Table 2** and a chart of the data is provided in **Figure 1**.

During the monitoring period, individual 24-hour TEOM PM<sub>10</sub> results were below the National Environment Protection Measure (NEPM) short-term (24hr) impact criteria of 50ug/m<sup>3</sup> and the Dixon Sand Quarry EPL limit of 42ug/m<sup>3</sup>.

Approximately 100% of valid TEOM data was available for October 2023.

At present, the current TEOM PM<sub>10</sub> annual average is below the Dixon Sand Quarry annual average PM<sub>10</sub> criteria of 30ug/m<sup>3</sup>. The current annual average for calculated Total Suspended Particulates (TSP) is below the annual average criterion of 90ug/m<sup>3</sup>. The TSP is calculated by multiplying the PM<sub>10</sub> by 2.5. Note: the annual average is calculated from 1 July 2023 and therefore an annual amount of data has not yet been collected.

The quarterly TEOM calibration was conducted in September 2023 with the next calibration due to be completed in December 2023. The calibration certificate is provided in **Appendix 1** (when required).

**Table 2:** Average Daily 24-hr TEOM PM<sub>10</sub> and TSP Results for October 2023 from AQMS and Annual Average PM<sub>10</sub> calculated from the 1 July 2023.

Date	PM <sub>10</sub> 24-hr Average (µg/m <sup>3</sup> )	PM <sub>10</sub> Annual Average (µg/m <sup>3</sup> )	24-hr Average TSP* (µg/m <sup>3</sup> )	Annual Average TSP** (µg/m <sup>3</sup> )
1/10/2023	20.0	13.5	50.0	33.7
2/10/2023	33.6	13.7	84.0	34.2
3/10/2023	27.1	13.8	67.8	34.6
4/10/2023	17.5	13.9	43.8	34.7
5/10/2023	6.2	13.8	15.5	34.5
6/10/2023	11.7	13.8	29.3	34.4
7/10/2023	11.2	13.7	28.0	34.4
8/10/2023	8.0	13.7	20.0	34.2
9/10/2023	11.3	13.7	28.3	34.2
10/10/2023	19.5	13.7	48.8	34.3
11/10/2023	17.2	13.8	43.0	34.4
12/10/2023	27.7	13.9	69.3	34.7
13/10/2023	8.3	13.8	20.8	34.6
14/10/2023	8.1	13.8	20.3	34.5
15/10/2023	9.7	13.7	24.3	34.4
16/10/2023	19.7	13.8	49.3	34.5
17/10/2023	13.2	13.8	33.0	34.5
18/10/2023	8.6	13.8	21.5	34.4
19/10/2023	15.5	13.8	38.8	34.4
20/10/2023	22.7	13.8	56.8	34.6
21/10/2023	21.4	13.9	53.5	34.8
22/10/2023	14.6	13.9	36.5	34.8
23/10/2023	14.4	13.9	36.0	34.8
24/10/2023	21.2	14.0	53.0	35.0
25/10/2023	31.9	14.1	79.8	35.3
26/10/2023	17.6	14.2	44.0	35.4
27/10/2023	10.5	14.1	26.3	35.3
28/10/2023	8.2	14.1	20.5	35.2
29/10/2023	9.9	14.1	24.8	35.1
30/10/2023	19.1	14.1	47.8	35.2
31/10/2023	23.1	14.2	57.8	35.4

\*Calculated from PM<sub>10</sub>

\*\*Calculated from PM<sub>10</sub> Annual Average

Note: results above the Dixon Sand EPL criteria limit of 42 µg/m<sup>3</sup> highlighted in yellow, when applicable

No Data (ND) = <18hrs hour of valid data to calculate a 24hr average

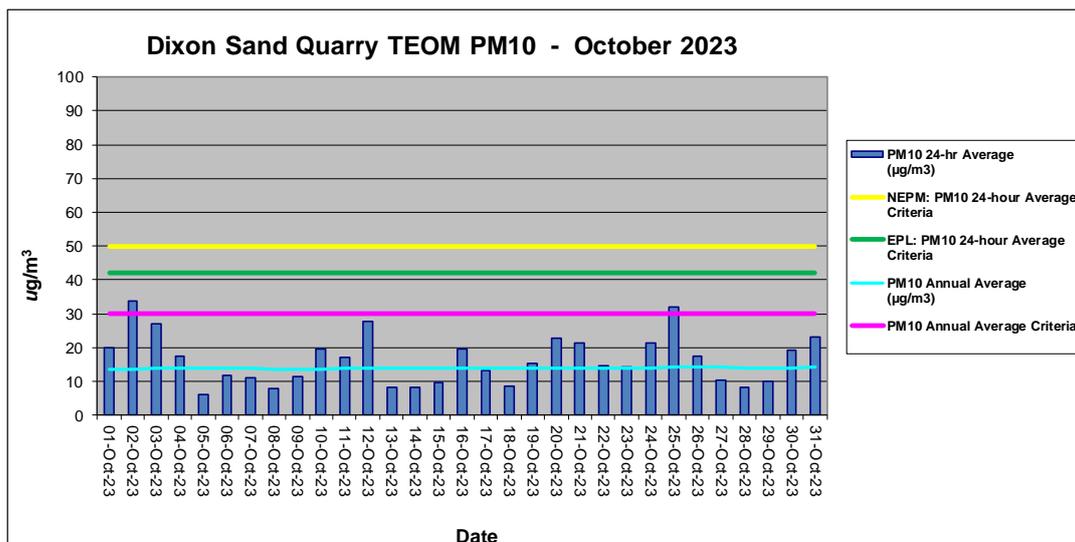


Figure 1: TEOM PM<sub>10</sub> 24 hr, Annual Average and Criteria

### 3.2 Meteorological Data

The weather station logs data at 5-minute intervals and sends the data to a web database by NextG telemetry. The data is accessible from the web site <http://console.teledata.com.au/index.html>.

A summary of monthly results is presented in **Table 3**. Charts of meteorological parameters are presented in **Figures 2** and **3**. A windrose is provided in **Figure 4**. This provides the frequency distribution of wind speed and direction during the month to display dominant wind directions.

A 6-monthly physical screening and system check of the meteorological station was conducted in September 2023 and is next due in March 2024. The screening and system check certificates are provided in **Appendix 1** (when required).

Approximately 100% of valid meteorological data was recorded for October 2023.

**Table 3:** Meteorological Data Summary for October 2023

Date	Min Temp	Avg Temp	Max Temp	RAIN mm	Min WS	Avg WS	Max WS	Min Humidity	Avg Humidity	Max Humidity	Min Pressure	Avg Pressure	Max Pressure
1/10/2023	17.9	26.2	33.8	0.0	0.4	7.0	29.7	12.2	34.1	77.1	989.7	993.4	998.5
2/10/2023	13.8	18.1	23.3	0.0	0.4	4.8	25.3	52.2	75.1	100.0	998.5	1001.0	1004.2
3/10/2023	15.4	25.4	33.6	0.0	1.2	7.4	35.4	14.2	45.4	100.0	992.4	995.8	1000.6
4/10/2023	11.0	21.2	26.1	14.6	0.8	8.6	28.0	16.9	52.9	100.0	984.5	990.8	993.6
5/10/2023	11.2	14.8	19.6	0.2	0.2	7.2	29.5	19.0	46.0	98.0	989.1	995.8	1002.5
6/10/2023	9.9	13.8	20.7	2.0	0.3	3.7	19.9	35.5	61.9	99.9	1001.7	1004.9	1009.7
7/10/2023	9.8	12.8	17.6	0.4	0.1	4.3	18.4	46.6	79.0	100.0	1009.0	1010.3	1012.0
8/10/2023	9.2	13.8	20.8	0.0	0.1	3.7	23.3	37.5	75.4	100.0	1007.2	1009.9	1012.9
9/10/2023	10.6	17.3	26.1	0.0	0.4	3.9	19.8	19.7	55.6	87.2	1000.2	1004.4	1008.3
10/10/2023	11.2	16.3	22.1	0.0	0.2	5.8	20.9	52.2	80.0	99.9	1000.5	1002.7	1005.3
11/10/2023	13.7	18.4	26.0	0.0	0.1	3.3	17.7	26.5	77.0	100.0	1000.2	1003.1	1005.3
12/10/2023	14.3	22.4	32.0	0.0	0.5	6.3	30.7	16.2	54.0	100.0	987.5	995.3	1002.4
13/10/2023	10.6	16.9	24.7	0.0	0.1	4.4	16.4	20.6	40.7	59.4	994.1	997.0	999.8
14/10/2023	12.7	19.2	26.8	0.0	0.1	3.9	22.0	23.1	43.5	61.6	993.2	996.6	999.6
15/10/2023	12.8	19.3	28.3	0.0	0.2	4.5	13.9	16.5	45.2	66.9	991.8	995.9	999.0
16/10/2023	10.1	16.6	24.2	0.0	0.2	5.5	37.9	22.5	54.9	82.8	989.5	993.7	1001.4
17/10/2023	9.2	12.3	17.2	0.4	0.5	6.1	22.2	49.8	70.7	100.0	1001.4	1006.4	1010.6
18/10/2023	10.5	13.9	20.1	0.6	0.2	4.4	16.8	45.9	82.5	99.9	1007.1	1008.9	1010.7
19/10/2023	11.1	15.6	21.3	0.0	0.0	3.6	18.0	44.2	73.3	94.3	999.7	1003.8	1008.2
20/10/2023	12.0	18.7	27.3	0.0	0.1	4.4	27.3	30.8	72.8	100.0	994.7	998.2	1001.7
21/10/2023	13.1	19.3	27.6	0.0	0.0	5.3	30.8	47.7	84.7	100.0	990.1	994.6	998.0
22/10/2023	15.2	22.0	30.7	0.0	0.4	4.0	16.7	9.7	54.1	100.0	987.6	989.9	993.5
23/10/2023	13.8	19.6	27.8	0.0	0.2	4.3	23.6	16.3	40.1	71.2	990.4	993.1	996.0
24/10/2023	11.2	21.5	33.9	0.0	0.0	3.9	21.3	11.4	54.3	97.6	988.5	992.6	995.9
25/10/2023	15.5	21.4	26.2	0.0	0.2	6.0	21.8	15.0	47.9	78.7	987.6	992.0	999.1
26/10/2023	10.6	12.8	15.4	1.4	1.1	5.5	13.1	57.0	77.0	98.6	998.6	1002.3	1007.5
27/10/2023	8.8	12.1	17.4	2.8	0.8	5.7	16.2	47.8	86.2	100.0	1006.8	1009.3	1011.7
28/10/2023	8.5	13.5	19.2	0.0	0.1	4.3	20.2	41.3	75.0	99.9	1004.4	1007.6	1011.2
29/10/2023	10.4	18.0	27.2	0.0	0.6	4.8	18.9	18.7	57.5	91.2	995.1	999.3	1004.9
30/10/2023	14.7	24.1	32.7	0.0	0.3	6.1	20.5	13.9	35.2	77.8	987.1	991.8	996.4
31/10/2023	14.0	22.7	28.8	0.0	0.2	5.1	22.7	6.1	34.2	72.8	987.8	992.3	1000.3
<b>Monthly</b>	<b>8.5</b>	<b>18.1</b>	<b>33.9</b>	<b>22.4</b>	<b>0.0</b>	<b>5.1</b>	<b>37.9</b>	<b>6.1</b>	<b>60.2</b>	<b>100.0</b>	<b>984.5</b>	<b>999.1</b>	<b>1012.9</b>

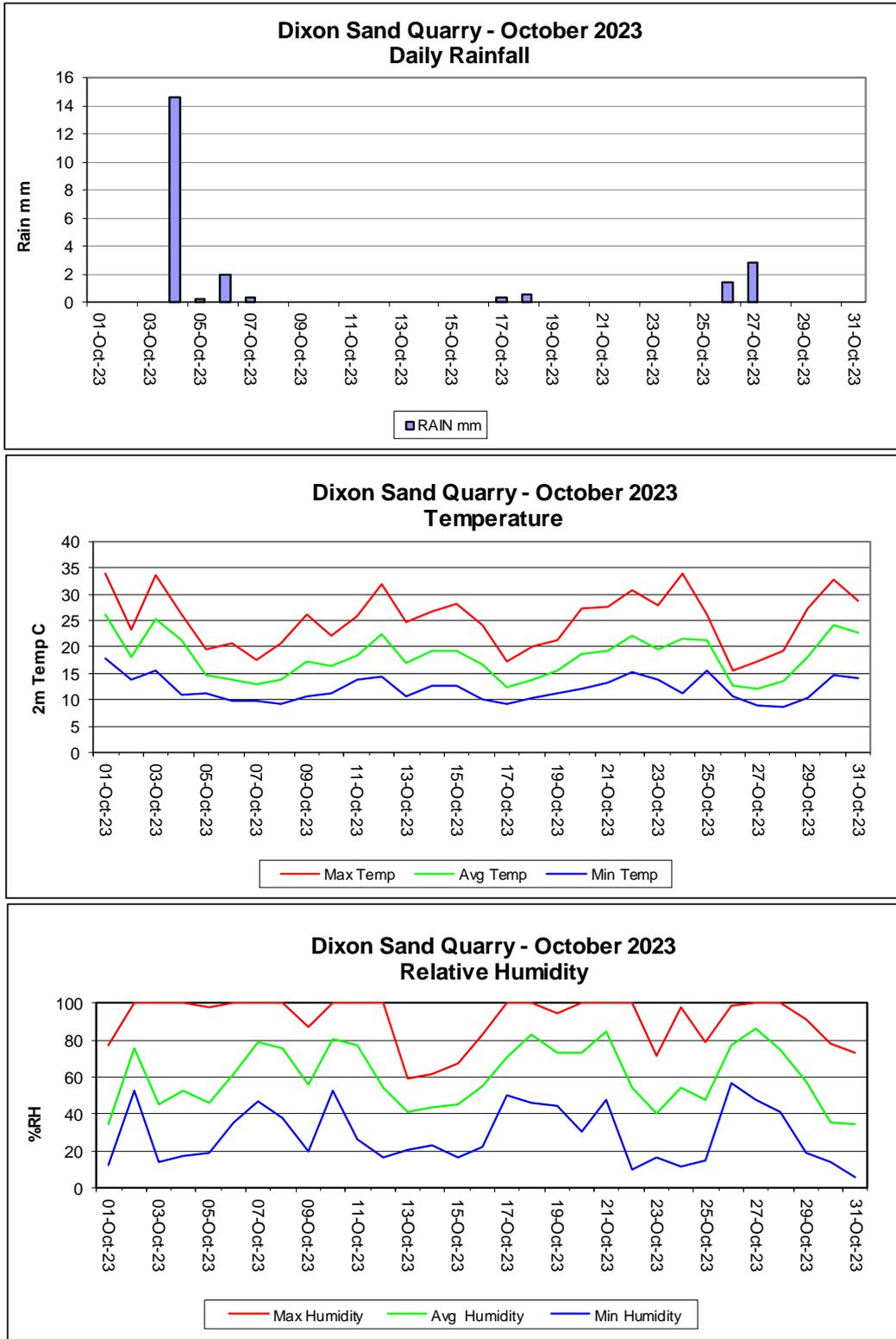
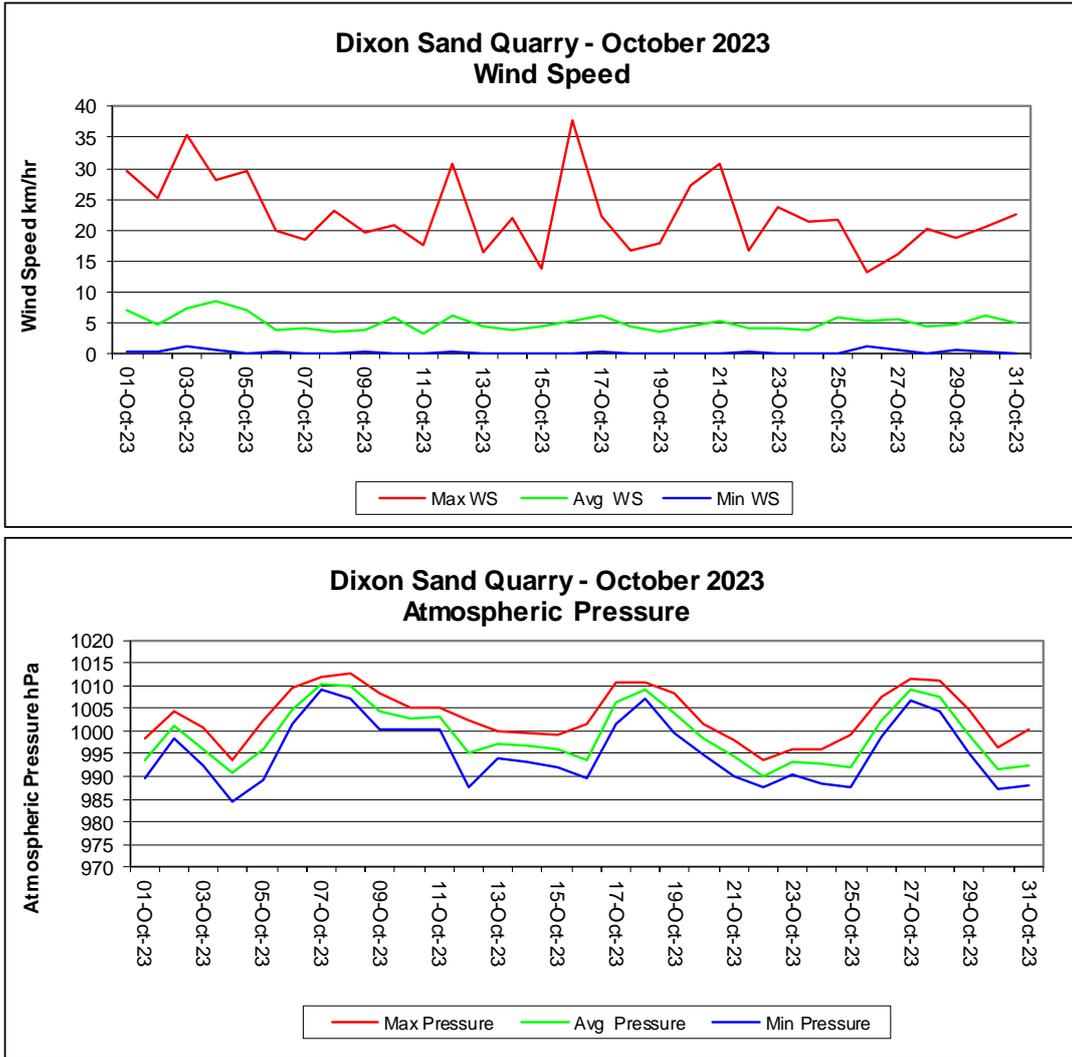


Figure 2: Daily Rainfall, Temperature and Relative Humidity Charts



**Figure 3:** Wind Speed and Atmospheric Pressure Charts

## Dixon Sand Quarry - Windrose OCTOBER 2023

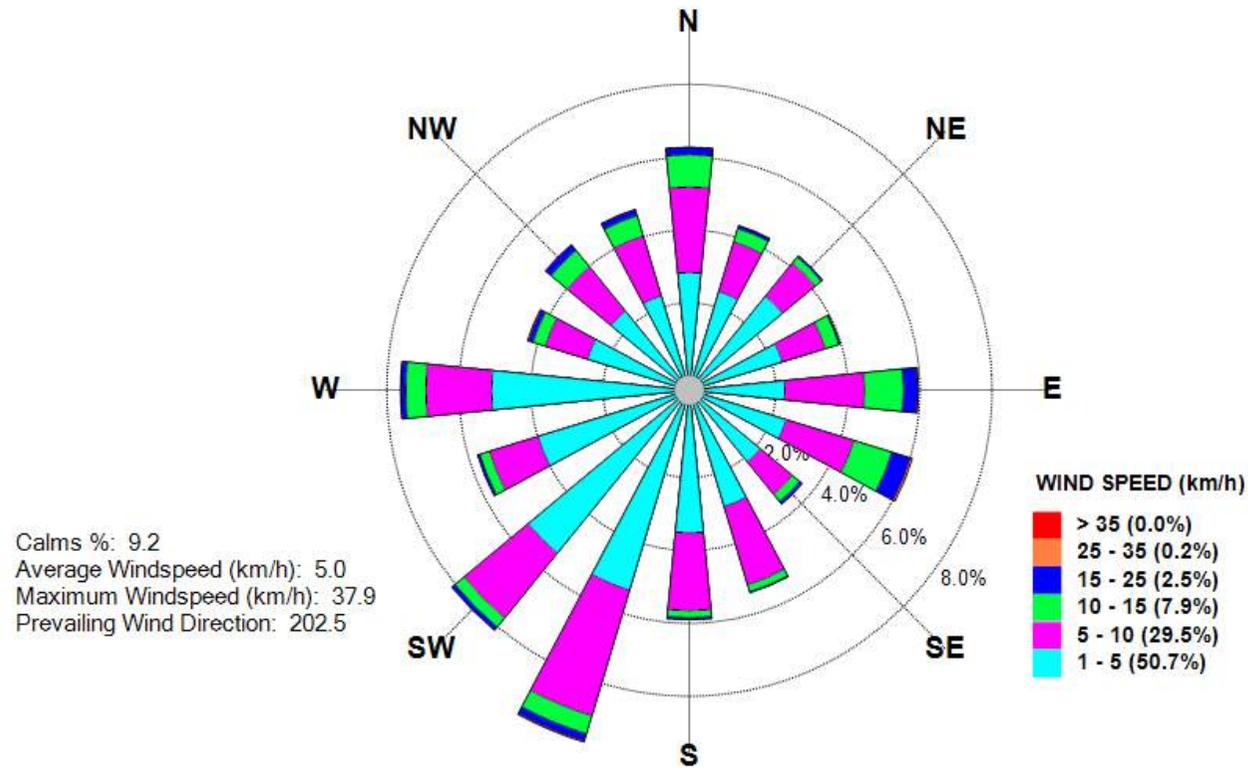


Figure 4: Monthly Windrose

## **Appendix 1**

Calibration Documents (when required)



**CBased Environmental  
Pty Limited**

ABN 62 611 924 264

**Dixon Sand Quarry**

**Environmental Monitoring  
Air Quality**

**Tapered Element Oscillating Microbalance  
(TEOM) (PM<sub>10</sub>) and Meteorological Data**

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**NOVEMBER 2023**

A handwritten signature in black ink that reads "Colin Davies".

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Colin Davies BSc MEIA CENVP  
Environmental Scientist  
Date: 21 December 2023

CBased Environmental Pty Ltd  
Unit 3, 2 Enterprise Crescent SINGLETON NSW 2330  
☎ (02) 65713334

## 1.0 Summary

CBased Environmental Pty Limited is contracted by Dixon Sand to conduct continuous Tapered Element Oscillating Microbalance (TEOM) for fine particulates (PM<sub>10</sub>) and meteorological monitoring for the Dixon Sand Quarry. The information is required to assess air quality levels. The results for the TEOM and meteorological site are included in this report.

The monitoring programme includes:

- One continuous TEOM PM<sub>10</sub> monitor; and
- One continuous meteorological station.

This monthly report for November 2023 was prepared by CBased Environmental and includes the following:

- TEOM (PM<sub>10</sub>) monitoring results; and
- Meteorological results.

In accordance with Schedule 3, Condition 7 of the Dixon Sand development Consent and the Dixon Sand EPL;

- 24-hour average results were below the NEPM 24-hour maximum criteria of 50ug/m<sup>3</sup>;
- 24-hour average results were below the Dixon Sand Quarry EPL limit of 42ug/m<sup>3</sup>;
- The annual average is below the Dixon Sand Quarry consent annual average criteria of 30ug/m<sup>3</sup>; and
- The calculated TSP is below the Dixon Sand Quarry annual average criteria of 90ug/m<sup>3</sup>.

Note: Based on the available data, statements in **green** indicate current conformance to Dixon Sand Quarry Air Quality Impact Assessment criteria, statements in **red** indicate possible non-conformance. Year to date annual average for PM<sub>10</sub> is calculated from 1 July 2023 for TEOM's coinciding with the Dixon Sand project year. An annual amount of data has not yet been collected.

Approximately 100% of valid meteorological data was recorded for November 2023.

Approximately 100% of valid TEOM data was available for November 2023.

## 2.0 Sampling Programme

The TEOM is sited and operated to the applicable Australian Standard and/or OEH (EPA) approved methods. The following Australian Standards were used:

- AS3580.9.8 - “*Methods for Sampling and Analysis of Ambient Air. Determination of Suspended Particulates—PM<sub>10</sub> continuous direct mass method using a tapered element oscillating microbalance analyser*”; and
- AS/NZS 3580.1.1 - “*Methods for Sampling and Analysis of Ambient Air Part 1.1 Guide to Siting Air Monitoring Equipment*”.

TEOM PM<sub>10</sub> results are 24-hour averages at midnight and are reported as µg/m<sup>3</sup> corrected to 0 degrees C and 101.3kPa.

All laboratory analysis was conducted by a National Association of Testing Authorities (NATA) accredited laboratory.

Air Quality monitoring site descriptions and locations are provided in **Table 1**.

**Table 1:** Dixon Sand Air Quality Monitoring Description and Locations

Monitor	Site Code	Location Description
TEOM PM <sub>10</sub>	TEOM	Old North Road, Maroota NSW
Meteorological Station	MET	Old North Road, Maroota NSW

## 3.0 Results

### 3.1 TEOM PM<sub>10</sub>

24-hour average TEOM PM<sub>10</sub> results from the AQMS data collection software are provided in **Table 2** and a chart of the data is provided in **Figure 1**.

During the monitoring period, individual 24-hour TEOM PM<sub>10</sub> results were below the National Environment Protection Measure (NEPM) short-term (24hr) impact criteria of 50ug/m<sup>3</sup> and the Dixon Sand Quarry EPL limit of 42ug/m<sup>3</sup>.

Approximately 100% of valid TEOM data was available for November 2023.

At present, the current TEOM PM<sub>10</sub> annual average is below the Dixon Sand Quarry annual average PM<sub>10</sub> criteria of 30ug/m<sup>3</sup>. The current annual average for calculated Total Suspended Particulates (TSP) is below the annual average criterion of 90ug/m<sup>3</sup>. The TSP is calculated by multiplying the PM<sub>10</sub> by 2.5. Note: the annual average is calculated from 1 July 2023 and therefore an annual amount of data has not yet been collected.

The quarterly TEOM calibration was conducted in September 2023 with the next calibration due to be completed in December 2023. The calibration certificate is provided in **Appendix 1** (when required).

**Table 2:** Average Daily 24-hr TEOM PM<sub>10</sub> and TSP Results for November 2023 from AQMS and Annual Average PM<sub>10</sub> calculated from the 1 July 2023.

Date	PM <sub>10</sub> 24-hr Average (µg/m <sup>3</sup> )	PM <sub>10</sub> Annual Average (µg/m <sup>3</sup> )	24-hr Average TSP* (µg/m <sup>3</sup> )	Annual Average TSP** (µg/m <sup>3</sup> )
1/11/2023	23.3	14.2	58.3	35.6
2/11/2023	19.8	14.3	49.5	35.7
3/11/2023	16.3	14.3	40.8	35.8
4/11/2023	10.5	14.3	26.3	35.7
5/11/2023	8.4	14.2	21.0	35.6
6/11/2023	10.5	14.2	26.3	35.5
7/11/2023	12.2	14.2	30.5	35.5
8/11/2023	15.0	14.2	37.5	35.5
9/11/2023	12.3	14.2	30.8	35.4
10/11/2023	10.6	14.1	26.5	35.4
11/11/2023	13.5	14.1	33.8	35.4
12/11/2023	30.5	14.3	76.2	35.7
13/11/2023	21.7	14.3	54.3	35.8
14/11/2023	22.7	14.4	56.8	35.9
15/11/2023	20.8	14.4	52.0	36.1
16/11/2023	16.0	14.4	40.0	36.1
17/11/2023	11.7	14.4	29.3	36.0
18/11/2023	11.5	14.4	28.7	36.0
19/11/2023	14.4	14.4	36.0	36.0
20/11/2023	17.6	14.4	44.0	36.0
21/11/2023	11.5	14.4	28.8	36.0
22/11/2023	13.6	14.4	34.0	36.0
23/11/2023	12.7	14.4	31.8	36.0
24/11/2023	7.8	14.3	19.5	35.8
25/11/2023	8.0	14.3	20.0	35.7
26/11/2023	9.4	14.3	23.5	35.7
27/11/2023	17.8	14.3	44.5	35.7
28/11/2023	14.4	14.3	36.0	35.7
29/11/2023	14.2	14.3	35.4	35.7
30/11/2023	7.4	14.2	18.5	35.6

\*Calculated from PM<sub>10</sub>

\*\*Calculated from PM<sub>10</sub> Annual Average

Note: results above the Dixon Sand EPL criteria limit of 42 ug/m<sup>3</sup> highlighted in yellow, when applicable

No Data (ND) = <18hrs hour of valid data to calculate a 24hr average

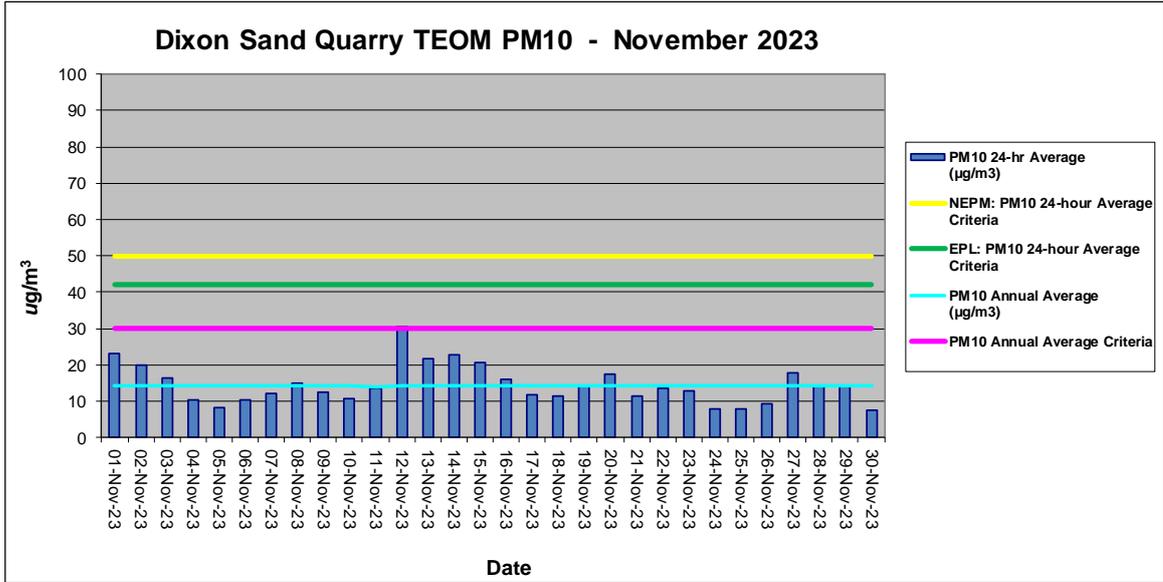


Figure 1: TEOM PM<sub>10</sub> 24 hr, Annual Average and Criteria

### 3.2 Meteorological Data

The weather station logs data at 5-minute intervals and sends the data to a web database by NextG telemetry. The data is accessible from the web site <http://console.teledata.com.au/index.html>.

A summary of monthly results is presented in **Table 3**. Charts of meteorological parameters are presented in **Figures 2** and **3**. A windrose is provided in **Figure 4**. This provides the frequency distribution of wind speed and direction during the month to display dominant wind directions.

A 6-monthly physical screening and system check of the meteorological station was conducted in September 2023 and is next due in March 2024. The screening and system check certificates are provided in **Appendix 1** (when required).

Approximately 100% of valid meteorological data was recorded for November 2023.

**Table 3:** Meteorological Data Summary for November 2023

Date	Min Temp	Avg Temp	Max Temp	RAIN mm	Min WS	Avg WS	Max WS	Min Humidity	Avg Humidity	Max Humidity	Min Pressure	Avg Pressure	Max Pressure
1/11/2023	11.4	16.1	21.3	0.0	0.0	4.7	26.1	39.0	66.2	89.9	998.6	1000.3	1002.9
2/11/2023	11.7	16.7	22.3	0.0	0.0	4.2	19.9	41.4	66.8	85.6	998.0	1000.7	1002.8
3/11/2023	13.6	17.9	24.2	0.0	0.1	4.4	23.4	45.7	73.8	94.5	995.6	998.8	1000.8
4/11/2023	14.8	16.6	19.9	5.2	0.1	2.3	8.8	71.5	94.4	100.0	998.3	1001.1	1003.8
5/11/2023	13.8	15.1	16.9	10.6	0.0	4.6	19.3	74.4	92.6	100.0	1003.0	1005.7	1008.1
6/11/2023	11.9	15.8	20.6	0.0	0.0	3.5	15.6	47.5	76.7	100.0	1002.5	1005.0	1007.6
7/11/2023	13.2	18.1	24.8	0.0	0.1	4.1	21.0	40.0	72.1	92.3	997.7	1001.1	1004.1
8/11/2023	12.7	19.6	27.4	0.0	0.0	4.1	18.9	30.5	71.8	100.0	995.1	998.2	1000.6
9/11/2023	14.4	18.8	27.8	18.8	0.2	4.3	20.8	35.7	83.3	99.9	992.9	996.1	997.9
10/11/2023	13.8	18.6	25.8	0.0	0.1	5.4	27.5	50.2	86.6	100.0	995.6	997.2	999.5
11/11/2023	14.6	22.9	33.2	0.0	0.0	5.5	22.0	24.3	71.4	99.9	993.5	997.0	999.9
12/11/2023	16.5	21.8	29.4	0.0	0.2	5.3	21.2	50.2	82.3	100.0	991.4	994.9	997.5
13/11/2023	16.3	18.3	21.6	0.0	0.4	5.3	20.4	58.7	82.8	100.0	996.0	997.6	999.4
14/11/2023	14.6	20.0	28.8	0.0	0.2	4.7	27.6	35.3	78.0	100.0	991.1	994.2	997.5
15/11/2023	17.0	20.6	27.3	0.0	0.0	3.7	17.0	47.7	83.6	100.0	989.5	992.0	994.6
16/11/2023	17.6	21.0	29.5	0.6	0.2	4.1	20.4	31.3	80.1	100.0	986.9	990.3	992.5
17/11/2023	13.6	16.4	21.7	17.4	0.0	4.4	20.2	42.2	81.4	100.0	991.5	997.1	1002.0
18/11/2023	13.1	17.8	23.9	0.0	0.0	4.2	22.9	43.3	73.1	100.0	998.3	1000.5	1002.1
19/11/2023	13.6	20.2	28.9	0.0	0.2	5.5	21.3	25.8	68.5	95.6	995.9	999.4	1001.6
20/11/2023	16.3	20.3	25.5	0.0	0.1	3.6	18.0	43.6	77.6	100.0	997.3	999.0	1001.3
21/11/2023	16.0	19.7	26.2	0.0	0.2	4.5	15.6	48.4	88.3	100.0	995.7	998.9	1000.6
22/11/2023	16.3	19.7	24.5	0.0	0.1	3.9	23.9	62.9	86.3	100.0	998.8	1000.9	1003.0
23/11/2023	16.1	18.8	23.6	1.6	0.5	4.1	13.3	71.5	96.2	100.0	1000.9	1002.5	1004.0
24/11/2023	16.7	18.7	21.8	8.0	0.3	3.7	13.3	89.1	98.7	100.0	998.4	1000.3	1002.5
25/11/2023	17.1	18.5	20.1	11.0	0.1	3.2	13.1	99.9	99.9	100.0	991.2	994.6	998.7
26/11/2023	18.2	23.3	30.6	0.0	0.4	4.5	13.2	30.5	70.8	100.0	988.8	990.6	992.3
27/11/2023	16.9	21.1	25.9	0.0	0.1	5.8	30.1	56.2	83.7	100.0	990.0	992.6	995.9
28/11/2023	18.1	19.2	20.7	1.0	0.0	5.3	17.1	96.9	99.9	100.0	991.0	994.1	996.3
29/11/2023	15.7	20.1	28.1	50.0	0.1	4.1	18.4	54.1	92.6	100.0	980.6	985.4	990.9
30/11/2023	16.2	21.3	27.1	0.4	0.2	3.3	14.7	43.4	70.3	100.0	981.3	983.1	985.2
<b>Monthly</b>	<b>11.4</b>	<b>19.1</b>	<b>33.2</b>	<b>124.6</b>	<b>0.0</b>	<b>4.3</b>	<b>30.1</b>	<b>24.3</b>	<b>81.6</b>	<b>100.0</b>	<b>980.6</b>	<b>997.0</b>	<b>1008.1</b>

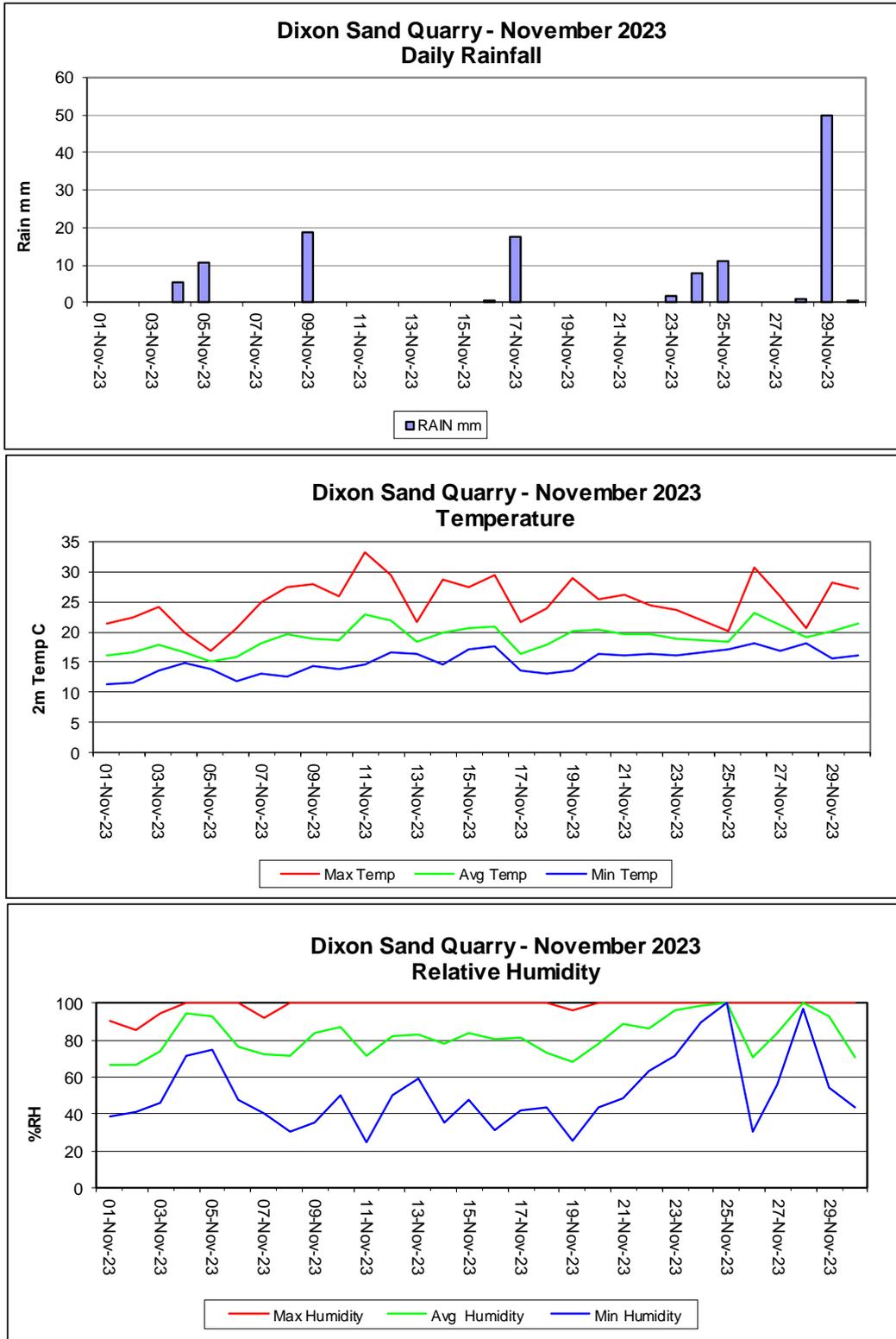


Figure 2: Daily Rainfall, Temperature and Relative Humidity Charts

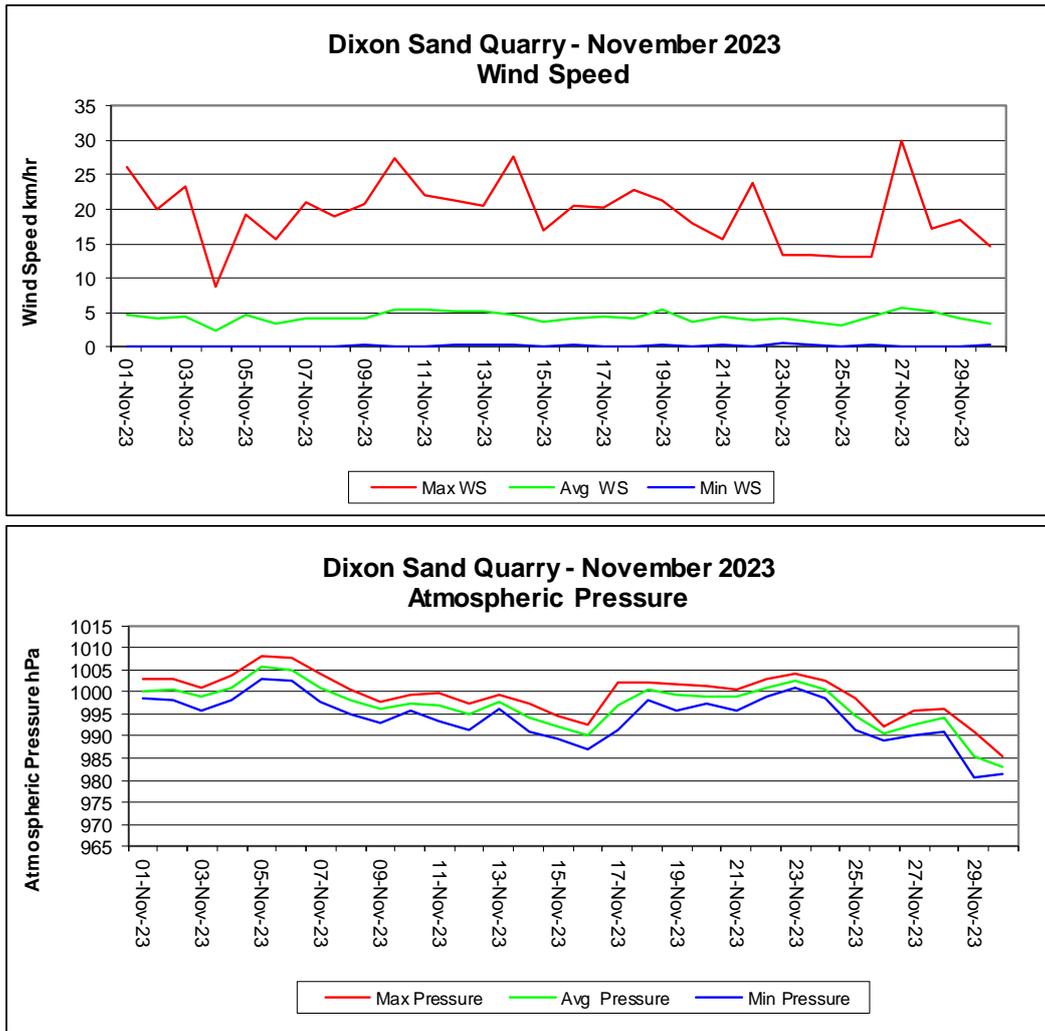


Figure 3: Wind Speed and Atmospheric Pressure Charts

## Dixon Sand Quarry - Windrose NOVEMBER 2023

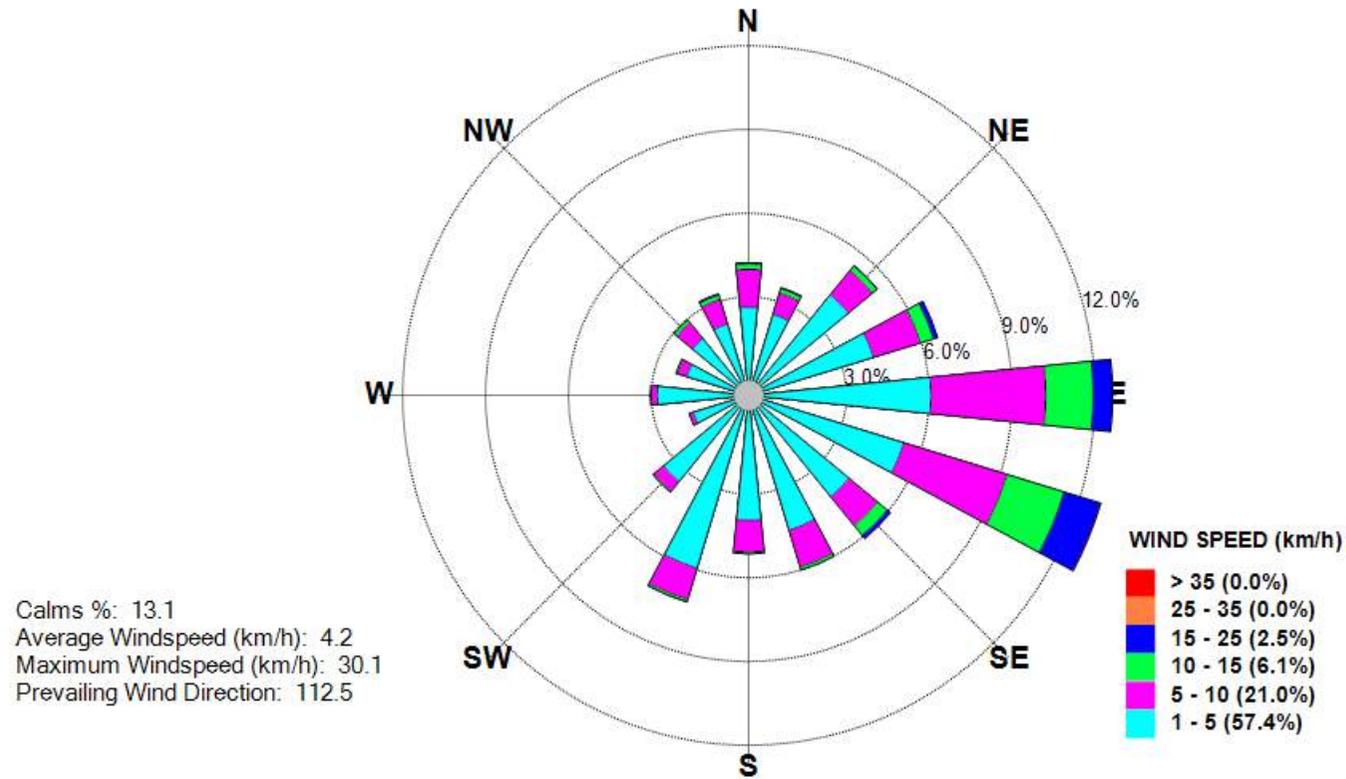


Figure 4: Monthly Windrose

## **Appendix 1**

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**CBased Environmental  
Pty Limited**

ABN 62 611 924 264

**Dixon Sand Quarry**

**Environmental Monitoring  
Air Quality**

**Tapered Element Oscillating Microbalance  
(TEOM) (PM<sub>10</sub>) and Meteorological Data**

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**DECEMBER 2023**

A handwritten signature in black ink that reads "Colin Davies".

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Colin Davies BSc MEIA CENVP  
Environmental Scientist  
Date: 24 January 2024

CBased Environmental Pty Ltd  
Unit 3, 2 Enterprise Crescent SINGLETON NSW 2330  
☎ (02) 65713334

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- AS3580.9.8 - “*Methods for Sampling and Analysis of Ambient Air. Determination of Suspended Particulates—PM<sub>10</sub> continuous direct mass method using a tapered element oscillating microbalance analyser*”; and
- AS/NZS 3580.1.1 - “*Methods for Sampling and Analysis of Ambient Air Part 1.1 Guide to Siting Air Monitoring Equipment*”.

TEOM PM<sub>10</sub> results are 24-hour averages at midnight and are reported as µg/m<sup>3</sup> corrected to 0 degrees C and 101.3kPa.

All laboratory analysis was conducted by a National Association of Testing Authorities (NATA) accredited laboratory.

Air Quality monitoring site descriptions and locations are provided in **Table 1**.

**Table 1:** Dixon Sand Air Quality Monitoring Description and Locations

Monitor	Site Code	Location Description
TEOM PM <sub>10</sub>	TEOM	Old North Road, Maroota NSW
Meteorological Station	MET	Old North Road, Maroota NSW

## 3.0 Results

### 3.1 TEOM PM<sub>10</sub>

24-hour average TEOM PM<sub>10</sub> results from the AQMS data collection software are provided in **Table 2** and a chart of the data is provided in **Figure 1**.

During the monitoring period, individual 24-hour TEOM PM<sub>10</sub> results were below the National Environment Protection Measure (NEPM) short-term (24hr) impact criteria of 50ug/m<sup>3</sup> and the Dixon Sand Quarry EPL limit of 42ug/m<sup>3</sup>.

Approximately 100% of valid TEOM data was available for December 2023.

At present, the current TEOM PM<sub>10</sub> annual average is below the Dixon Sand Quarry annual average PM<sub>10</sub> criteria of 30ug/m<sup>3</sup>. The current annual average for calculated Total Suspended Particulates (TSP) is below the annual average criterion of 90ug/m<sup>3</sup>. The TSP is calculated by multiplying the PM<sub>10</sub> by 2.5. Note: the annual average is calculated from 1 July 2023 and therefore an annual amount of data has not yet been collected.

The quarterly TEOM calibration was conducted on 9 January 2024 for December 2023. The next calibration is due to be completed in March 2024. The calibration certificate is provided in **Appendix 1** (when required).

**Table 2:** Average Daily 24-hr TEOM PM<sub>10</sub> and TSP Results for December 2023 from AQMS and Annual Average PM<sub>10</sub> calculated from the 1 July 2023.

Date	PM <sub>10</sub> 24-hr Average (µg/m <sup>3</sup> )	PM <sub>10</sub> Annual Average (µg/m <sup>3</sup> )	24-hr Average TSP* (µg/m <sup>3</sup> )	Annual Average TSP** (µg/m <sup>3</sup> )
1/12/2023	13.8	14.2	34.5	35.6
2/12/2023	10.0	14.2	25.0	35.5
3/12/2023	8.4	14.2	21.0	35.4
4/12/2023	8.8	14.1	22.0	35.3
5/12/2023	17.2	14.2	43.0	35.4
6/12/2023	24.5	14.2	61.3	35.6
7/12/2023	25.5	14.3	63.8	35.7
8/12/2023	21.0	14.3	52.5	35.8
9/12/2023	26.8	14.4	67.0	36.0
10/12/2023	11.8	14.4	29.5	36.0
11/12/2023	24.0	14.5	60.0	36.1
12/12/2023	14.9	14.5	37.3	36.1
13/12/2023	20.7	14.5	51.8	36.2
14/12/2023	17.4	14.5	43.5	36.3
15/12/2023	21.9	14.6	54.8	36.4
16/12/2023	19.7	14.6	49.3	36.5
17/12/2023	20.3	14.6	50.8	36.5
18/12/2023	28.1	14.7	70.3	36.7
19/12/2023	41.0	14.9	102.5	37.1
20/12/2023	6.6	14.8	16.5	37.0
21/12/2023	14.2	14.8	35.5	37.0
22/12/2023	19.3	14.8	48.3	37.1
23/12/2023	12.0	14.8	30.0	37.0
24/12/2023	12.7	14.8	31.8	37.0
25/12/2023	11.0	14.8	27.5	36.9
26/12/2023	16.7	14.8	41.8	37.0
27/12/2023	11.5	14.8	28.8	36.9
28/12/2023	10.7	14.7	26.8	36.9
29/12/2023	10.8	14.7	27.1	36.8
30/12/2023	10.4	14.7	26.0	36.8
31/12/2023	16.7	14.7	41.8	36.8

\*Calculated from PM<sub>10</sub>

\*\*Calculated from PM<sub>10</sub> Annual Average

Note: results above the Dixon Sand EPL criteria limit of 42 ug/m<sup>3</sup> highlighted in yellow, when applicable

No Data (ND) = <18hrs hour of valid data to calculate a 24hr average

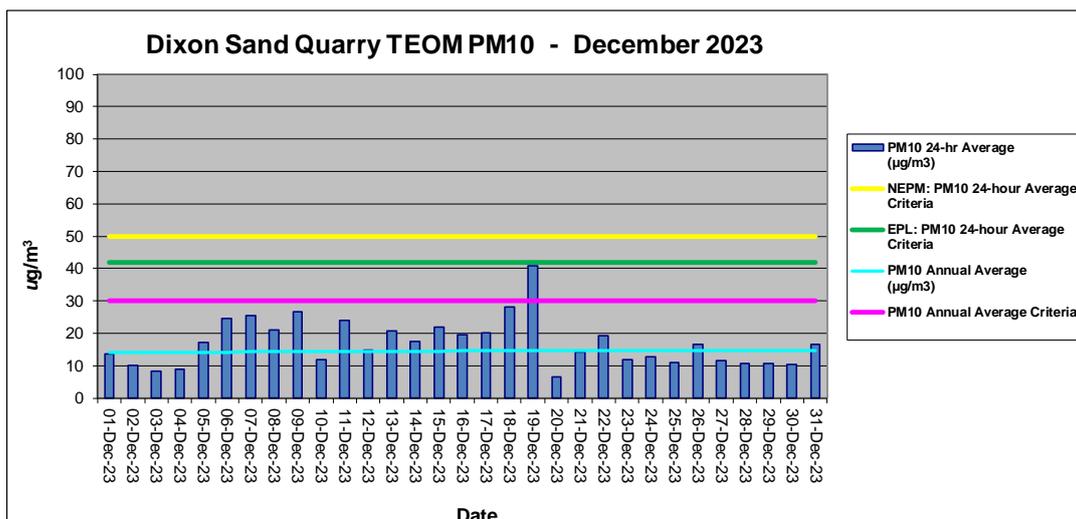


Figure 1: TEOM PM<sub>10</sub> 24 hr, Annual Average and Criteria

### 3.2 Meteorological Data

The weather station logs data at 5-minute intervals and sends the data to a web database by NextG telemetry. The data is accessible from the web site <http://console.teledata.com.au/index.html>.

A summary of monthly results is presented in **Table 3**. Charts of meteorological parameters are presented in **Figures 2** and **3**. A windrose is provided in **Figure 4**. This provides the frequency distribution of wind speed and direction during the month to display dominant wind directions.

A 6-monthly physical screening and system check of the meteorological station was conducted in September 2023 and is next due in March 2024. The screening and system check certificates are provided in **Appendix 1** (when required).

Approximately 100% of valid meteorological data was recorded for December 2023.

**Table 3:** Meteorological Data Summary for December 2023

Date	Min Temp	Avg Temp	Max Temp	RAIN mm	Min WS	Avg WS	Max WS	Min Humidity	Avg Humidity	Max Humidity	Min Pressure	Avg Pressure	Max Pressure
1/12/2023	16.8	21.6	29.8	0.0	0.1	4.3	21.9	32.9	74.2	100.0	983.9	985.9	988.9
2/12/2023	17.3	20.2	25.8	4.2	0.0	2.8	20.9	57.7	90.5	100.0	987.5	989.0	992.4
3/12/2023	14.7	19.7	29.1	2.6	0.0	3.8	23.8	29.0	79.5	100.0	991.3	993.8	998.9
4/12/2023	15.4	18.7	24.5	1.2	0.1	3.7	26.1	54.3	84.1	99.9	996.2	998.5	1000.4
5/12/2023	15.2	25.1	35.9	0.0	0.3	5.5	16.1	20.1	59.7	99.9	992.3	995.9	999.0
6/12/2023	17.6	24.0	28.8	0.0	0.2	6.4	24.5	31.7	58.9	100.0	992.6	996.9	1000.3
7/12/2023	16.5	21.7	31.6	0.0	0.0	4.4	22.9	41.3	82.8	100.0	996.2	998.5	1001.4
8/12/2023	19.2	27.7	36.8	0.0	0.5	5.6	25.9	26.2	58.4	100.0	992.0	996.1	1000.2
9/12/2023	22.6	30.9	40.5	0.0	0.2	5.5	16.7	20.1	47.7	94.3	989.7	992.5	999.3
10/12/2023	18.9	21.3	27.6	0.4	0.3	5.3	19.6	68.3	94.9	100.0	995.8	998.3	1000.0
11/12/2023	18.5	23.5	32.0	0.0	0.1	3.4	18.1	50.2	84.6	100.0	995.5	997.3	1000.6
12/12/2023	19.2	22.9	27.6	0.0	0.1	5.1	24.9	52.9	80.8	100.0	996.0	999.0	1001.0
13/12/2023	18.5	23.6	31.3	10.0	0.1	4.3	24.0	47.6	81.8	100.0	988.8	994.1	998.7
14/12/2023	20.7	28.5	37.1	0.0	0.0	5.0	27.2	17.0	55.1	100.0	983.0	987.0	991.4
15/12/2023	19.1	22.1	26.1	0.0	0.0	5.0	31.9	59.3	77.5	95.5	987.0	989.5	991.8
16/12/2023	17.3	25.1	34.2	0.0	0.1	4.5	17.6	11.3	57.2	100.0	984.6	987.1	992.5
17/12/2023	18.3	21.4	25.3	0.0	0.2	6.2	29.7	60.1	80.5	94.5	992.6	994.4	997.5
18/12/2023	18.2	22.6	29.9	0.0	0.1	4.2	23.4	61.0	91.3	100.0	990.2	993.9	996.9
19/12/2023	20.7	25.0	31.0	0.0	0.0	4.6	15.7	38.9	78.0	100.0	988.0	991.2	994.3
20/12/2023	14.6	17.0	20.6	42.4	0.0	4.4	17.3	99.9	99.9	100.0	992.4	994.7	997.0
21/12/2023	14.6	17.3	20.8	1.6	0.7	5.1	17.1	61.5	88.4	100.0	994.8	996.6	998.7
22/12/2023	15.5	18.9	23.8	0.0	0.0	4.2	25.4	43.9	68.1	84.6	994.2	996.4	998.4
23/12/2023	14.9	19.4	25.7	0.0	0.0	4.1	25.7	45.4	77.8	97.9	988.2	992.3	995.9
24/12/2023	16.8	19.3	23.1	0.6	0.1	2.8	15.1	73.2	94.5	100.0	985.0	987.8	990.0
25/12/2023	16.9	20.4	26.2	3.2	0.0	4.4	28.5	58.8	89.3	100.0	984.1	986.8	988.8
26/12/2023	15.5	20.9	28.1	65.4	0.1	3.7	34.7	57.4	90.5	100.0	984.4	987.6	989.3
27/12/2023	17.1	20.5	25.3	2.6	0.0	2.5	9.6	56.2	81.9	100.0	987.8	989.6	991.9
28/12/2023	18.3	23.2	32.0	0.0	0.2	4.1	18.7	27.7	65.7	97.4	988.8	990.9	993.6
29/12/2023	18.6	22.5	26.5	0.0	0.0	2.9	11.3	45.3	76.2	100.0	990.4	992.0	993.5
30/12/2023	18.9	21.9	28.4	0.0	0.0	6.4	29.2	39.1	63.6	93.7	988.6	991.1	996.7
31/12/2023	15.6	17.6	19.8	1.0	0.3	3.3	14.1	71.2	89.1	100.0	996.7	1000.8	1003.6
<b>Monthly</b>	<b>14.6</b>	<b>22.1</b>	<b>40.5</b>	<b>135.2</b>	<b>0.0</b>	<b>4.4</b>	<b>34.7</b>	<b>11.3</b>	<b>77.5</b>	<b>100.0</b>	<b>983.0</b>	<b>993.1</b>	<b>1003.6</b>

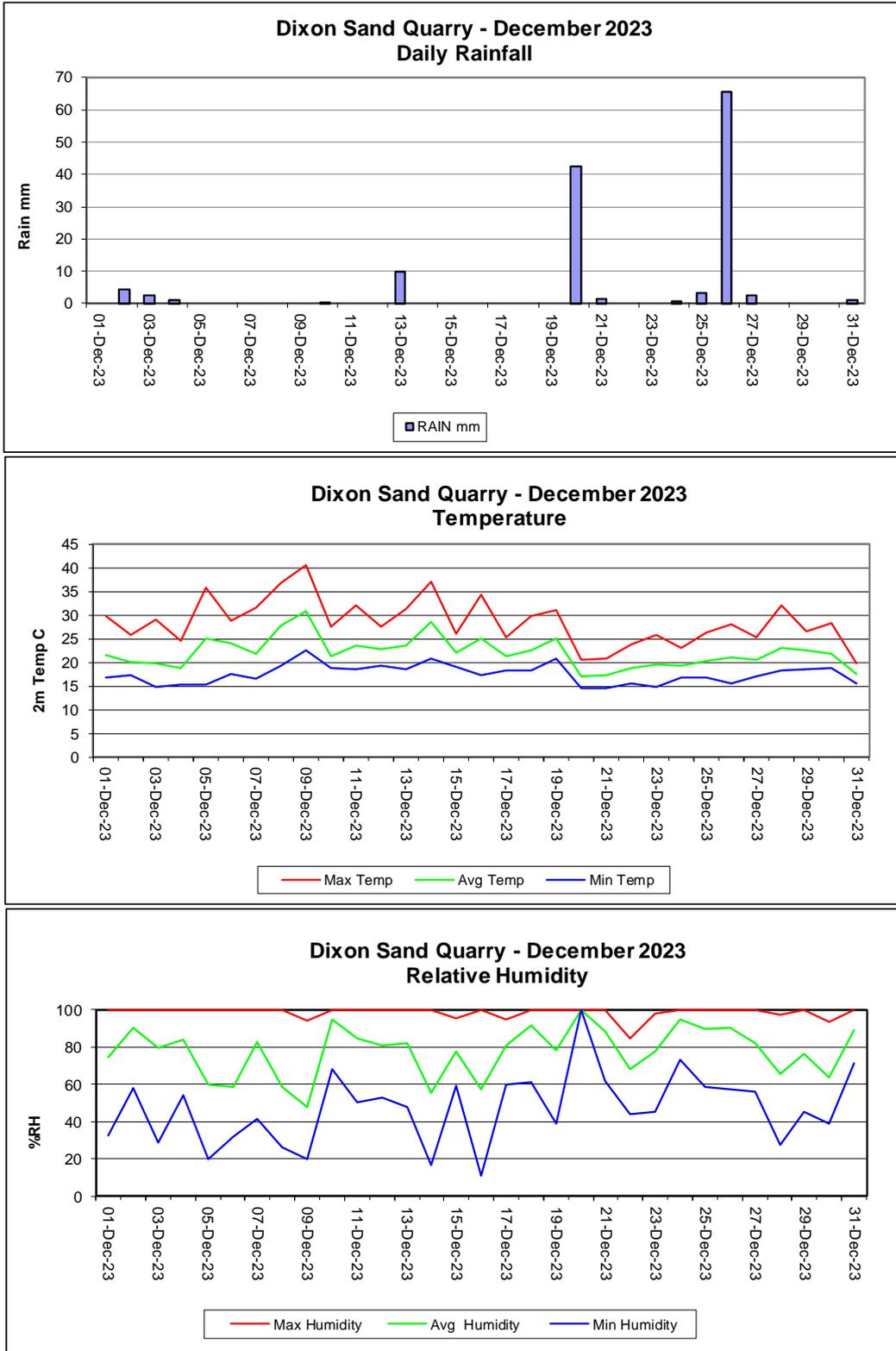


Figure 2: Daily Rainfall, Temperature and Relative Humidity Charts

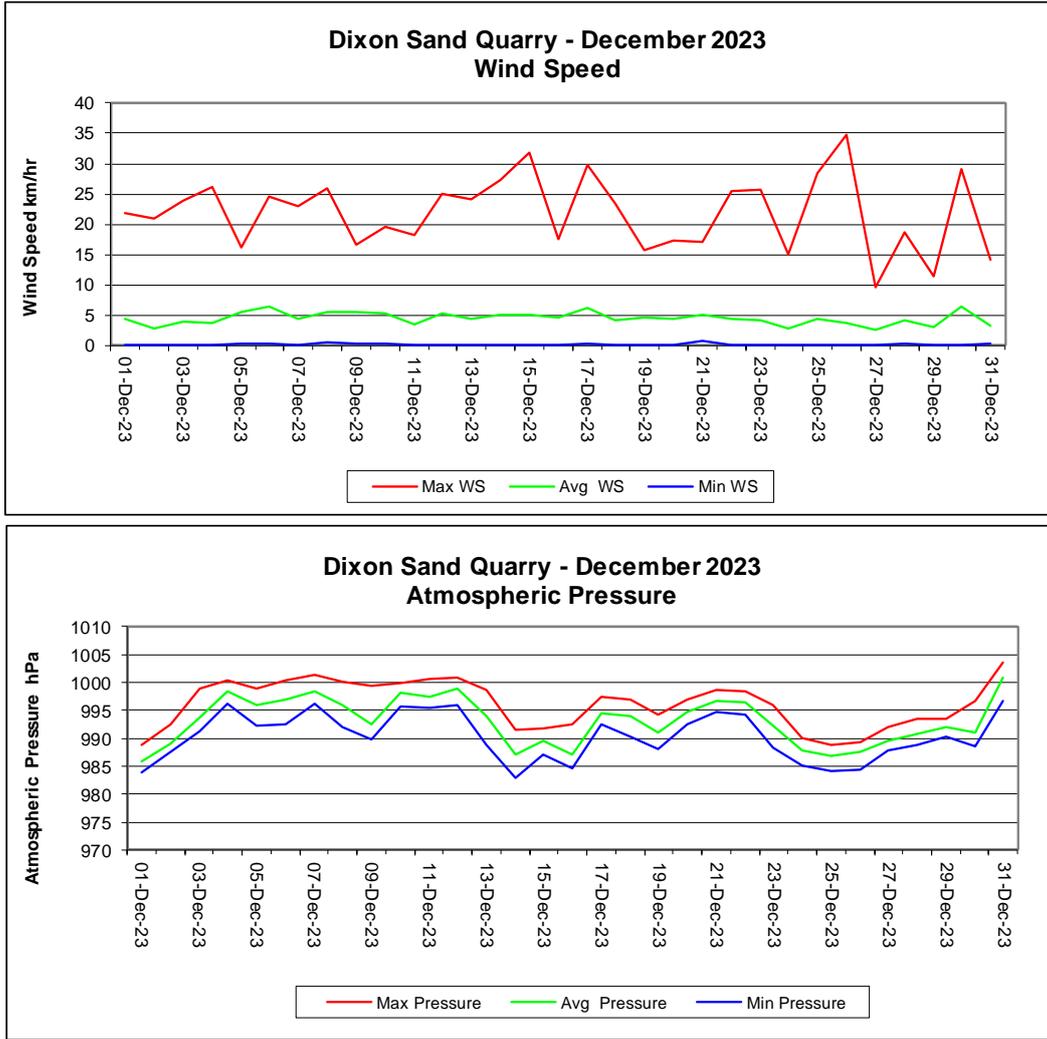


Figure 3: Wind Speed and Atmospheric Pressure Charts

## Dixon Sand Quarry - Windrose DECEMBER 2023

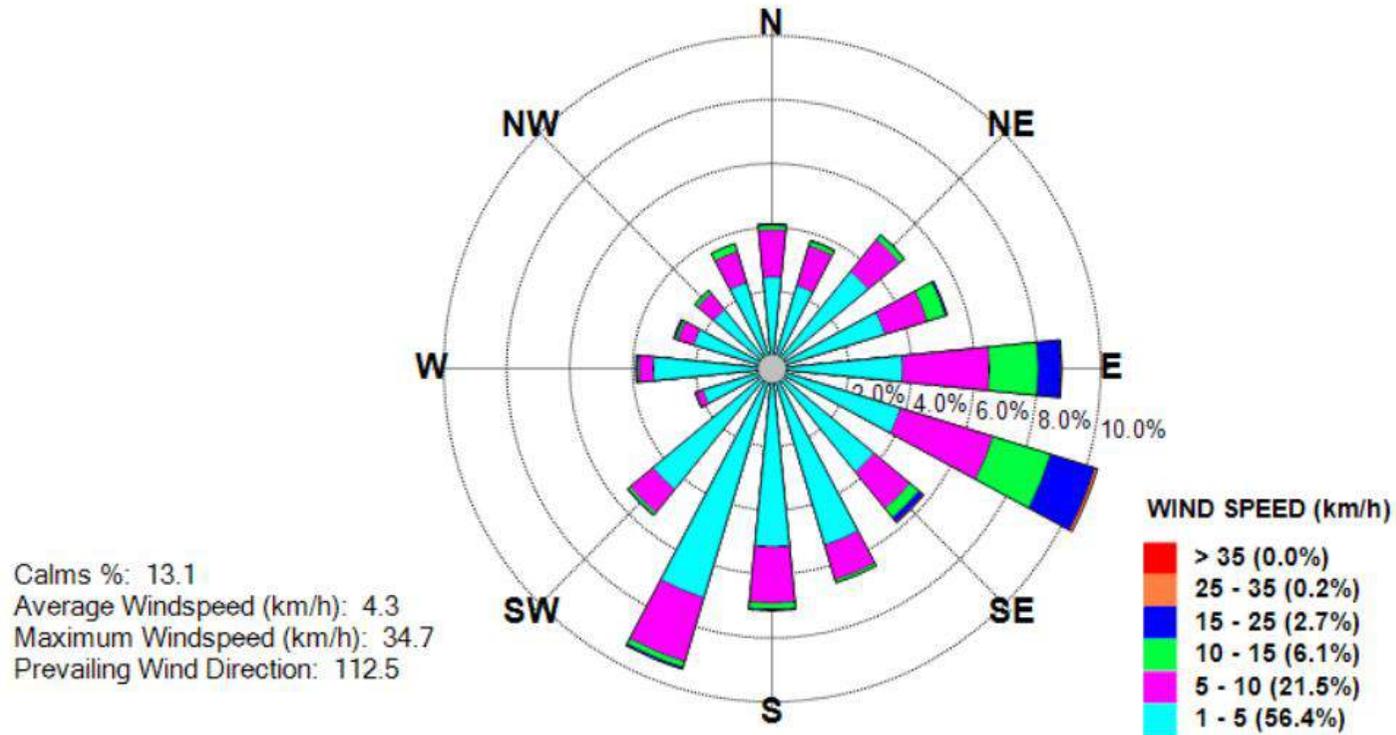


Figure 4: Monthly Windrose

## **Appendix 1**

Calibration Documents (when required)



# Continuous Air Quality Monthly/Quarterly/Six Monthly/Annual TEOM Maintenance and Calibration – 1400AB



TEOM Client/Site: Dixon Sands / TEOM 1

Date: 8+9/1/24

1. TEOM Data Screen SERIAL No: 25570 Firmware: NA/AB version.

Condition	Current Data	Acceptable Data	Pass (Tick)	Fail (Tick)
Operating Condition	Full of 4	Green - Normal	✓	
Date/time	TEOM: 8.1.24 11.07 Actual: 8.1.24 12.07	Current Date/time correct within 5 minutes	✓ EST.	
PM-10 24hr av	22.2	Positive values	/	
Filter loading PM10	56	<80 %	/	
Frequency PM-10	252.60937	200-300 Hz	/	
Noise PM-10	0.049	<0.100ug	/	

Comment: If filter load >80% but <90% and if flows Ok then data is OK

**Comments:**

## 2. System Status

Condition	Current Data	Acceptable Data	Pass (Tick)	Fail (Tick)
Vacuum pump pressure	NA OK	<0.50 atm	✓	
Warnings	NIL	No Warnings	✓	
If any warnings list:				

**Comments:**

Data Downloaded: YES/NO (circle)

Technician Name : COLIN DAVIES Signed 8/1/24



**3. Instrument Conditions Ambient Conditions and Temperatures**

Condition	Current Data	Acceptable Data	Pass (Tick)	Fail (Tick)
Ambient Temperature	22.8	-10 to 50 C	✓	
Ambient Dew Point	NA	-10 to 50 C	✓	✓
Ambient Pressure	1.000	0.9-1.1 atm	✓	
Ambient Relative Humidity	NA	10-100 %RH	✓	✓
Cap temperature	50.00	50.00 +/- 0.10 C	✓	
Case temperature	50.00	50.00 +/- 0.10 C	✓	
Main (PM-10) Air Tube temp	50.00	50.00 +/- 0.10 C	✓	

Comments:

**4. Instrument Conditions – Flows**

Condition	Current Data	Acceptable Data	Pass (Tick)	Fail (Tick)
Main (PM-10) Flow rate	3.00	2.82 – 3.18 lpm	✓	
Bypass Flow rate	13.67	12.95 – 14.39 lpm	✓	
Total Flow rate	16.67	15.67 – 17.67 lpm	✓	

Comments:

**Results: (Tick box)**

- There were NO equipment faults found. No action required – (file report)
- There were faults found (Fails) – Were these fixed on site: YES/NO (circle)  
Any Fails that cannot be repaired on site must be reported to CBased:  
Office: 65713334 or email [cbased@bigpond.com](mailto:cbased@bigpond.com)  
Date faults notified to CBased: \_\_\_\_\_

Comments/Action Required:



**Calibration/Maintenance**

- 1. 1405A: Were Filters replaced YES/NO
- 2. PM10 Inlet head cleaned YES/NO
- 3. If measurement filters were replaced, confirm stable results after change. Stable particulate results confirmed YES/NO

Channel	Filter Load %	Frequency Hz initial	Frequency check 1min	Frequency check 3min	Frequency check 5min
PM10	17	255-68435	255-68438	255-68440	255-68441

✓OK

Frequency should not drift by more than 0.0010 between readings (if instrument is thermodynamically stable)  
 Pass/Fail – if Fail – install new filter and redo stability test.

- 4. Instrument clock verified (Refer Section 1) YES/NO.  
 If Time changed – clock reset OK YES/NO or NA (not changed)  
 Comments:

- 5. Were TEOM in line and rear TEOM filters checked for cleanliness and replaced if necessary. YES/NO.  
 Comments if changed:

- 6. TEOM Cleaned and Air Conditioner checked YES/NO. Air Conditioner settings or operational status: OK

**Tetralcal Flow/Temp/Pressure Calibrator Serial No:** 1009 Refer to calibration corrections for Temperature/Pressure and Flows and apply to all readings.

**Quarterly or Six Monthly Calibration**

- 1. Flow Verification – Conducted YES/NO

PM10 Flow verified Flow l/min 3.05 Error % 1.7 (allowed error <6%) PASS/FAIL

Bypass Flow verified Flow l/min 13.84 Error % 1.2 (allowed error <6%) PASS/FAIL

If fail then complete a full multipoint recalibration and review previous data from last good flow check. **Comments if Flows recalibrated:** Fadj recal → see over

- 2. Leak Check – Conducted YES/NO

PM10 actual 0.13 < Limit 0.15

Bypass actual 0.46 < Limit 0.60

Leak check PASS/FAIL – If fail then find leak and retest.

**Comments:** Slight leak OK ✓



**Annual Calibration/Maintenance**

**1. Temperature and Pressure Calibration – Conducted YES/NO**

Reference Temperature: 22.5 C TEOM Temperature 22.7 C  
 if difference +/- 1 C recalibrate sensor. Sensor recalibrated (YES)/NO

Reference Pressure: 1.001 atm TEOM Pressure 1.000 atm  
 if difference +/- 0.010 atm recalibrate sensor. Sensor recalibrated (YES)/NO

**Note: Tetral measures Atmospheric Pressure in mm Hg or mb or hPa  
 For mb or hPa divide tetral result by 1013.25 to change units to atm.  
 For mmHg divide tetral result by 760 to change units to atm.**

**2. Flow Calibration – Conducted (YES)/NO**  
**PM10**

Set point 2.4 Actual: \_\_\_\_\_  
 Set point 3.6 Actual: \_\_\_\_\_  
 Set point 3.0 Actual: \_\_\_\_\_ After calibration Final: \_\_\_\_\_ l/min

Hardware Cal	Pre	Post
Fadj main	1.055	1.050
Fadj aux	1.005	1.005

**BYPASS**

Set point 10.9 Actual: \_\_\_\_\_  
 Set point 16.4 Actual: \_\_\_\_\_  
 Set point 13.67 Actual: \_\_\_\_\_ After calibration Final: \_\_\_\_\_ l/min

**3. Mass calibration (KO) Verification – Conducted (YES)/NO**

Actual measured KO = 13825 TEOM stated KO 13748 Error %: 0.56 .  
 Allowed Error +/- 2.5%. (PASS)/FAIL  
 If Error +/- 2.5% repeat. If confirmed consult manufacturer.  
 Second Error % = \_\_\_\_\_ (PASS)/FAIL. Comments: \_\_\_\_\_  
 If second test fails consult manufacturer.

**4. Annual Noise check - Conducted (YES)/NO**

Zero filter applied to TEOM and TEOM operated for at least 12 hours:  
 Start date/time: 8/1/24 22:35 Finish date/time: 9/1/24 11:20  
 Standard deviation of all recorded data (min 30 min averages) = 1.4 ug/m<sup>3</sup>  
 Noise was less than 5ug/m<sup>3</sup> (YES)/NO

**5. Maintenance**

Air Inlet system cleaned (YES)/NO  
 Pump Reconditioned (YES)/NO  
 Check Waterproofing (YES)/NO OK  
 Comments:





**CBased Environmental  
Pty Limited**

ABN 62 611 924 264

**Dixon Sand Quarry**

**Environmental Monitoring  
Air Quality**

**Tapered Element Oscillating Microbalance  
(TEOM) (PM<sub>10</sub>) and Meteorological Data**

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**JANUARY 2024**

A handwritten signature in black ink that reads "Colin Davies".

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Colin Davies BSc MEIA CENVP  
Environmental Scientist  
Date: 20 February 2024

CBased Environmental Pty Ltd  
Unit 3, 2 Enterprise Crescent SINGLETON NSW 2330  
☎ (02) 65713334

## 1.0 Summary

CBased Environmental Pty Limited is contracted by Dixon Sand to conduct continuous Tapered Element Oscillating Microbalance (TEOM) for fine particulates (PM<sub>10</sub>) and meteorological monitoring for the Dixon Sand Quarry. The information is required to assess air quality levels. The results for the TEOM and meteorological site are included in this report.

The monitoring programme includes:

- One continuous TEOM PM<sub>10</sub> monitor; and
- One continuous meteorological station.

This monthly report for January 2024 was prepared by CBased Environmental and includes the following:

- TEOM (PM<sub>10</sub>) monitoring results; and
- Meteorological results.

In accordance with Schedule 3, Condition 7 of the Dixon Sand development Consent and the Dixon Sand EPL;

- 24-hour average results were below the NEPM 24-hour maximum criteria of 50ug/m<sup>3</sup>;
- 24-hour average results were below the Dixon Sand Quarry EPL limit of 42ug/m<sup>3</sup>;
- The annual average is below the Dixon Sand Quarry consent annual average criteria of 30ug/m<sup>3</sup>; and
- The calculated TSP is below the Dixon Sand Quarry annual average criteria of 90ug/m<sup>3</sup>.

Note: Based on the available data, statements in green indicate current conformance to Dixon Sand Quarry Air Quality Impact Assessment criteria, statements in red indicate possible non-conformance. Year to date annual average for PM<sub>10</sub> is calculated from 1 July 2023 for TEOM's coinciding with the Dixon Sand project year. An annual amount of data has not yet been collected.

Approximately 81% of valid meteorological data was recorded for January 2024.

Approximately 96% of valid TEOM data was available for January 2024.

## 2.0 Sampling Programme

The TEOM is sited and operated to the applicable Australian Standard and/or OEH (EPA) approved methods. The following Australian Standards were used:

- AS3580.9.8 - “*Methods for Sampling and Analysis of Ambient Air. Determination of Suspended Particulates—PM<sub>10</sub> continuous direct mass method using a tapered element oscillating microbalance analyser*”; and
- AS/NZS 3580.1.1 - “*Methods for Sampling and Analysis of Ambient Air Part 1.1 Guide to Siting Air Monitoring Equipment*”.

TEOM PM<sub>10</sub> results are 24-hour averages at midnight and are reported as µg/m<sup>3</sup> corrected to 0 degrees C and 101.3kPa.

All laboratory analysis was conducted by a National Association of Testing Authorities (NATA) accredited laboratory.

Air Quality monitoring site descriptions and locations are provided in **Table 1**.

**Table 1:** Dixon Sand Air Quality Monitoring Description and Locations

Monitor	Site Code	Location Description
TEOM PM <sub>10</sub>	TEOM	Old North Road, Maroota NSW
Meteorological Station	MET	Old North Road, Maroota NSW

## 3.0 Results

### 3.1 TEOM PM<sub>10</sub>

24-hour average TEOM PM<sub>10</sub> results from the AQMS data collection software are provided in **Table 2** and a chart of the data is provided in **Figure 1**.

During the monitoring period, individual 24-hour TEOM PM<sub>10</sub> results were below the National Environment Protection Measure (NEPM) short-term (24hr) impact criteria of 50ug/m<sup>3</sup> and the Dixon Sand Quarry EPL limit of 42ug/m<sup>3</sup>.

Approximately 96% of valid TEOM data was available for January 2024, due to power outages and routine calibration and maintenance.

At present, the current TEOM PM<sub>10</sub> annual average is below the Dixon Sand Quarry annual average PM<sub>10</sub> criteria of 30ug/m<sup>3</sup>. The current annual average for calculated Total Suspended Particulates (TSP) is below the annual average criterion of 90ug/m<sup>3</sup>. The TSP is calculated by multiplying the PM<sub>10</sub> by 2.5. Note: the annual average is calculated from 1 July 2023 and therefore an annual amount of data has not yet been collected.

The quarterly TEOM calibration was conducted on 9 January 2024 for December 2023. The next calibration is due to be completed in March 2024. The calibration certificate is provided in **Appendix 1** (when required).

**Table 2:** Average Daily 24-hr TEOM PM<sub>10</sub> and TSP Results for January 2024 from AQMS and Annual Average PM<sub>10</sub> calculated from the 1 July 2023.

Date	PM <sub>10</sub> 24-hr Average (µg/m <sup>3</sup> )	PM <sub>10</sub> Annual Average (µg/m <sup>3</sup> )	24-hr Average TSP* (µg/m <sup>3</sup> )	Annual Average TSP** (µg/m <sup>3</sup> )
1/01/2024	15.7	14.7	39.3	36.8
2/01/2024	15.5	14.7	38.8	36.8
3/01/2024	13.2	14.7	33.0	36.8
4/01/2024	14.8	14.7	37.0	36.8
5/01/2024	11.1	14.7	27.8	36.7
6/01/2024	12.8	14.7	32.0	36.7
7/01/2024	18.4	14.7	46.0	36.8
8/01/2024	No Data	14.7	No Data	36.8
9/01/2024	No Data	14.7	No Data	36.8
10/01/2024	16.3	14.7	40.8	36.8
11/01/2024	14.0	14.7	35.0	36.8
12/01/2024	13.4	14.7	33.5	36.8
13/01/2024	16.9	14.7	42.3	36.8
14/01/2024	12.8	14.7	32.0	36.8
15/01/2024	13.0	14.7	32.5	36.7
16/01/2024	17.8	14.7	44.5	36.8
17/01/2024	18.0	14.7	45.0	36.8
18/01/2024	10.2	14.7	25.5	36.8
19/01/2024	12.3	14.7	30.8	36.7
20/01/2024	18.2	14.7	45.5	36.8
21/01/2024	12.5	14.7	31.3	36.7
22/01/2024	30.9	14.8	77.3	36.9
23/01/2024	13.2	14.8	33.0	36.9
24/01/2024	16.7	14.8	41.8	37.0
25/01/2024	21.1	14.8	52.8	37.0
26/01/2024	19.9	14.8	49.7	37.1
27/01/2024	15.3	14.8	38.3	37.1
28/01/2024	16.5	14.8	41.3	37.1
29/01/2024	18.9	14.9	47.3	37.2
30/01/2024	21.7	14.9	54.3	37.2
31/01/2024	15.4	14.9	38.5	37.2

\*Calculated from PM<sub>10</sub>

\*\*Calculated from PM<sub>10</sub> Annual Average

Note: results above the Dixon Sand EPL criteria limit of 42 ug/m<sup>3</sup> highlighted in yellow, when applicable

No Data (ND) = <18hrs hour of valid data to calculate a 24hr average

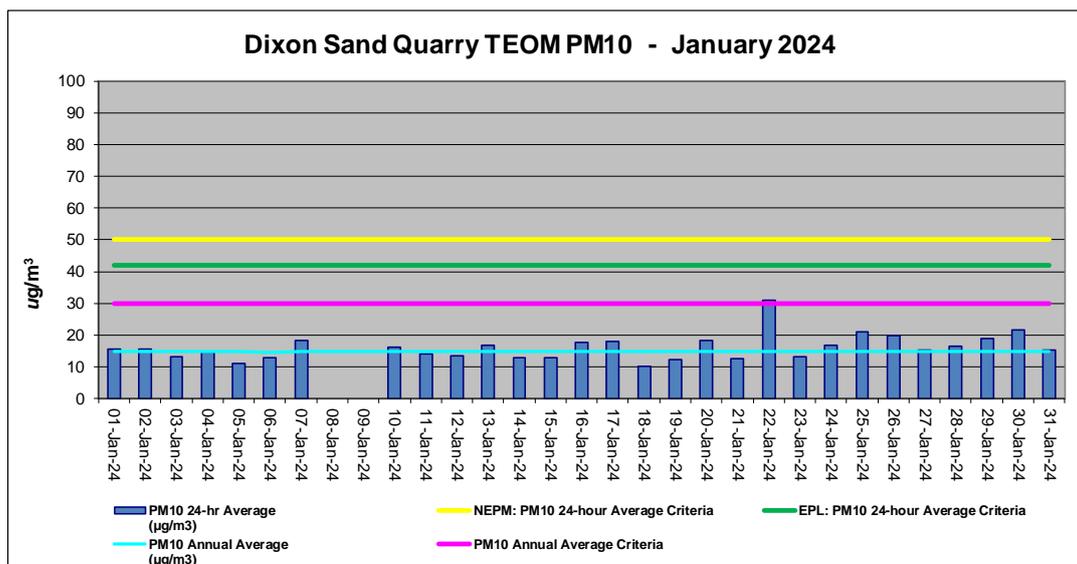


Figure 1: TEOM PM<sub>10</sub> 24 hr, Annual Average and Criteria

### 3.2 Meteorological Data

The weather station logs data at 5-minute intervals and sends the data to a web database by NextG telemetry. The data is accessible from the web site <http://console.teledata.com.au/index.html>.

A summary of monthly results is presented in **Table 3**. Charts of meteorological parameters are presented in **Figures 2** and **3**. A windrose is provided in **Figure 4**. This provides the frequency distribution of wind speed and direction during the month to display dominant wind directions.

A 6-monthly physical screening and system check of the meteorological station was conducted in September 2023 and is next due in March 2024. The screening and system check certificates are provided in **Appendix 1** (when required).

Approximately 81% of valid meteorological data was recorded for January 2024 due to an issue with the data logger communication.

**Table 3:** Meteorological Data Summary for January 2024

Date	Min Temp	Avg Temp	Max Temp	RAIN mm	Min WS	Avg WS	Max WS	Min Humidity	Avg Humidity	Max Humidity	Min Pressure	Avg Pressure	Max Pressure
1/01/2024	15.8	19.1	21.9	1.0	0.0	3.5	18.7	81.1	92.8	100.0	999.8	1002.2	1004.0
2/01/2024	18.5	22.5	27.7	0.0	0.3	4.9	19.3	60.5	82.7	100.0	996.4	999.1	1001.4
3/01/2024	18.8	23.1	29.8	0.0	0.2	4.1	19.1	42.1	78.5	99.9	994.7	997.0	999.4
4/01/2024	19.1	21.2	28.4	5.6	0.2	2.9	12.1	64.7	93.7	100.0	993.9	997.2	1001.0
5/01/2024	15.8	19.6	23.7	0.2	0.6	3.9	22.5	63.1	82.9	100.0	1000.0	1001.9	1004.2
6/01/2024	13.7	19.5	24.7	0.0	0.1	4.2	18.6	42.6	75.0	100.0	999.3	1001.5	1003.8
7/01/2024	16.0	22.1	27.6	0.0	0.0	4.3	19.5	52.5	74.3	95.5	994.2	997.6	1000.6
8/01/2024	19.4	21.5	24.4	4.2	0.3	4.8	19.3	69.8	86.8	100.0	990.0	992.3	995.0
9/01/2024	20.3	22.4	25.9	0.0	0.2	5.3	22.8	69.3	84.0	95.1	990.5	993.2	996.2
10/01/2024	19.3	23.0	29.9	0.2	0.0	4.0	18.4	60.1	87.3	100.0	992.7	995.1	996.5
11/01/2024	20.8	24.0	29.4	0.0	0.1	5.1	24.7	60.8	88.2	100.0	995.5	999.1	1002.2
12/01/2024	20.2	23.5	27.7	14.0	0.1	6.0	24.8	58.2	83.6	100.0	997.9	1000.4	1002.3
13/01/2024	19.3	24.1	31.6	0.0	0.0	4.0	19.2	39.8	79.1	99.1	992.8	996.3	999.2
14/01/2024	17.9	20.8	26.9	20.8	0.2	4.0	15.5	70.1	94.6	100.0	996.5	998.3	1000.0
15/01/2024	17.3	19.0	20.4	27.8	0.0	3.5	16.7	72.6	93.8	100.0	998.8	1001.0	1002.6
16/01/2024	17.0	19.8	24.0	2.8	0.2	2.9	12.1	75.2	92.9	100.0	993.8	997.2	1001.0
17/01/2024	19.5	22.4	27.9	10.0	0.1	3.0	11.7	66.8	92.1	100.0	985.4	989.1	993.6
18/01/2024	20.5	25.3	31.5	0.2	0.1	3.9	13.9	25.2	65.8	100.0	982.0	984.1	986.2
19/01/2024	17.6	21.7	29.5	0.0	0.1	4.4	25.4	25.7	52.8	86.8	985.7	988.5	993.6
20/01/2024													
21/01/2024													
22/01/2024													
23/01/2024													
24/01/2024													
25/01/2024													
26/01/2024	20.9	28.0	37.5	0.0	0.2	4.6	23.9	24.7	63.6	88.3	981.4	984.6	989.2
27/01/2024	18.4	20.0	22.9	2.6	0.0	3.1	19.1	73.4	92.2	100.0	985.0	987.9	989.3
28/01/2024	17.5	21.1	27.2	0.0	0.1	4.3	21.1	55.2	85.7	100.0	987.5	991.4	995.1
29/01/2024	18.6	24.1	32.4	0.2	0.0	4.5	24.5	51.0	83.0	100.0	988.3	992.0	995.0
30/01/2024	21.5	23.6	28.1	0.0	0.0	3.8	15.2	69.3	91.9	100.0	992.1	993.5	994.8
31/01/2024	20.3	22.6	27.6	0.4	0.0	2.7	13.2	69.6	91.4	100.0	991.5	993.6	995.7
<b>Monthly</b>	<b>13.7</b>	<b>22.2</b>	<b>37.5</b>	<b>90.0</b>	<b>0.0</b>	<b>4.1</b>	<b>25.4</b>	<b>24.7</b>	<b>83.6</b>	<b>100.0</b>	<b>981.4</b>	<b>995.0</b>	<b>1004.2</b>

20-25 January 2024 no valid data - datalogger communication issues

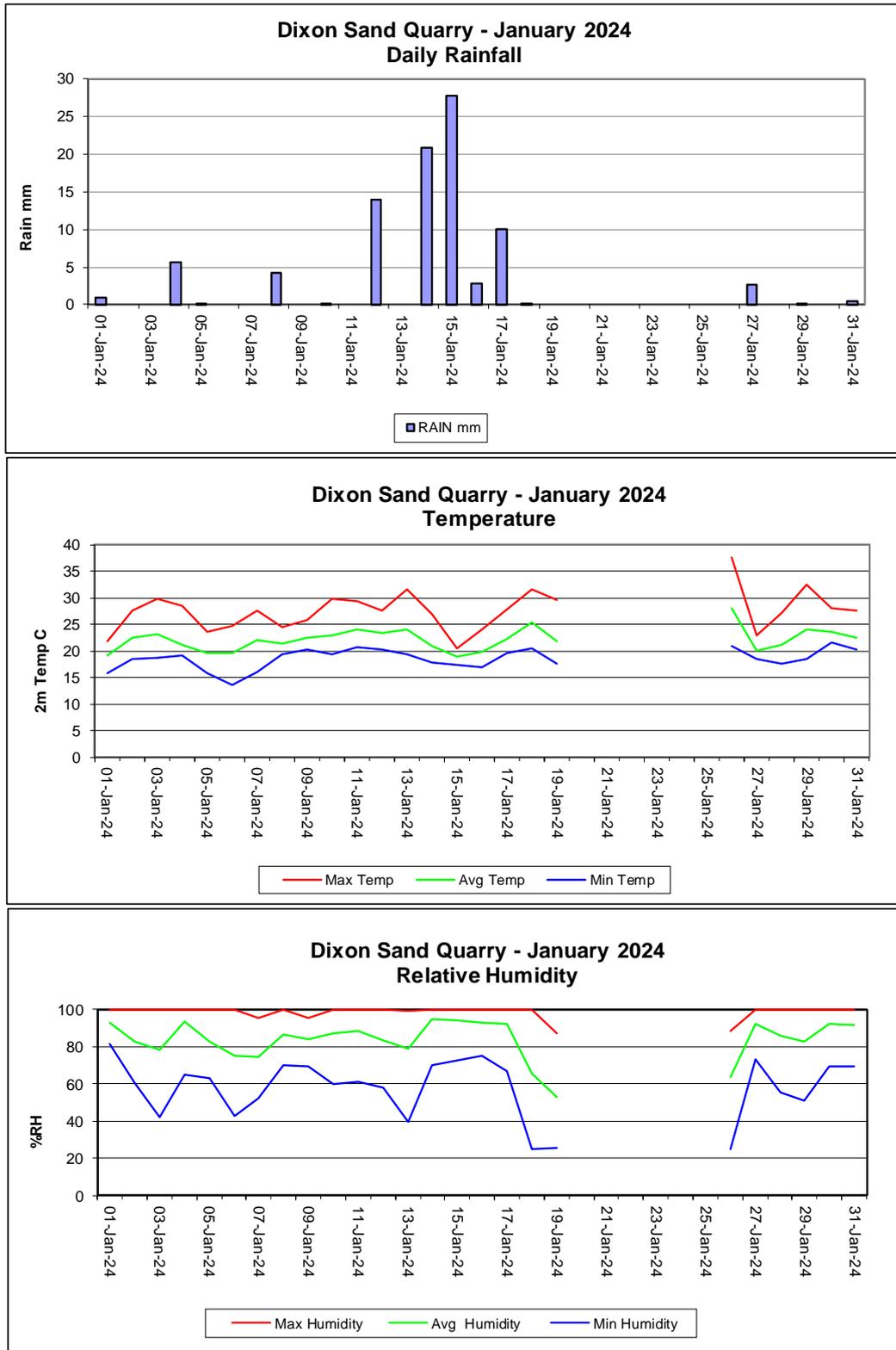
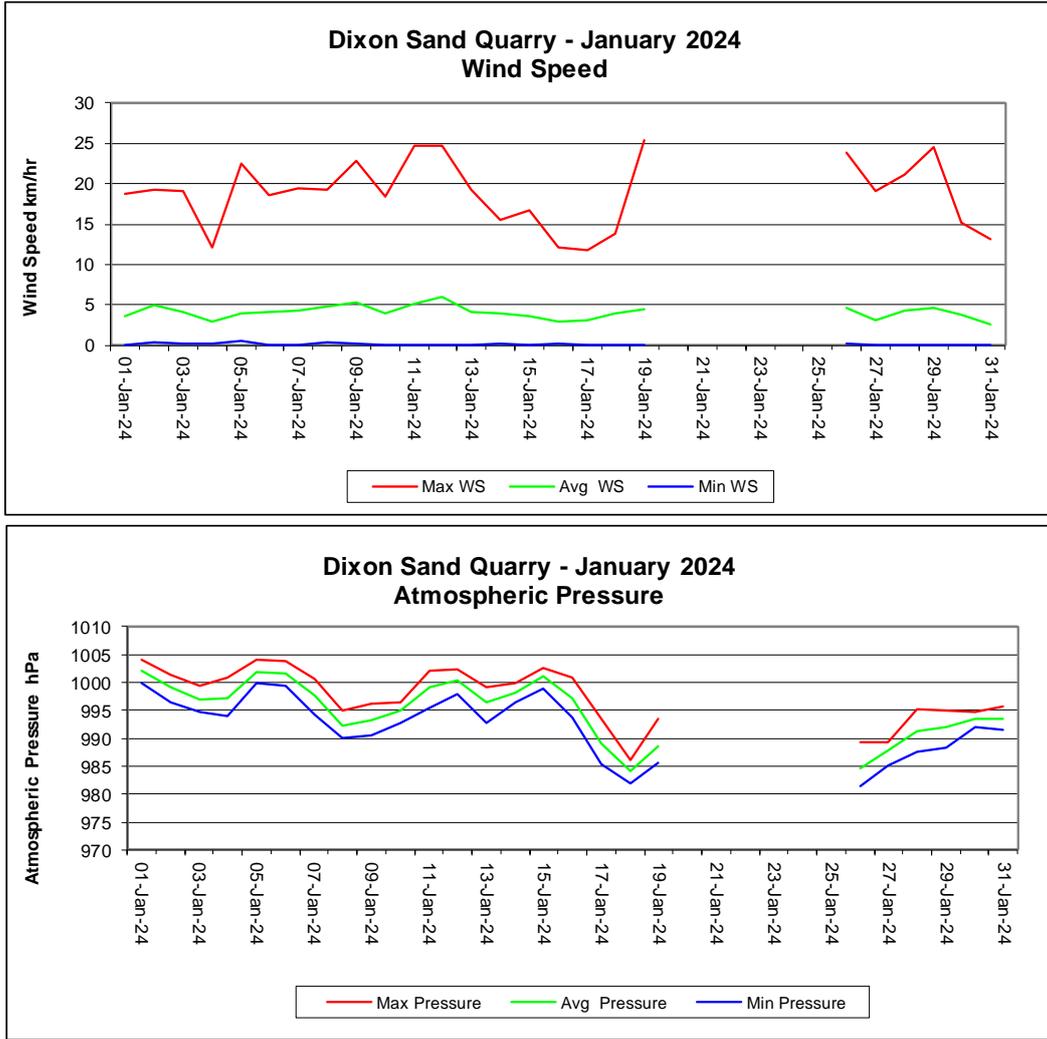


Figure 2: Daily Rainfall, Temperature and Relative Humidity Charts



**Figure 3:** Wind Speed and Atmospheric Pressure Charts

## Dixon Sand Quarry - Windrose JANUARY 1st-20th & 26th-31st 2024

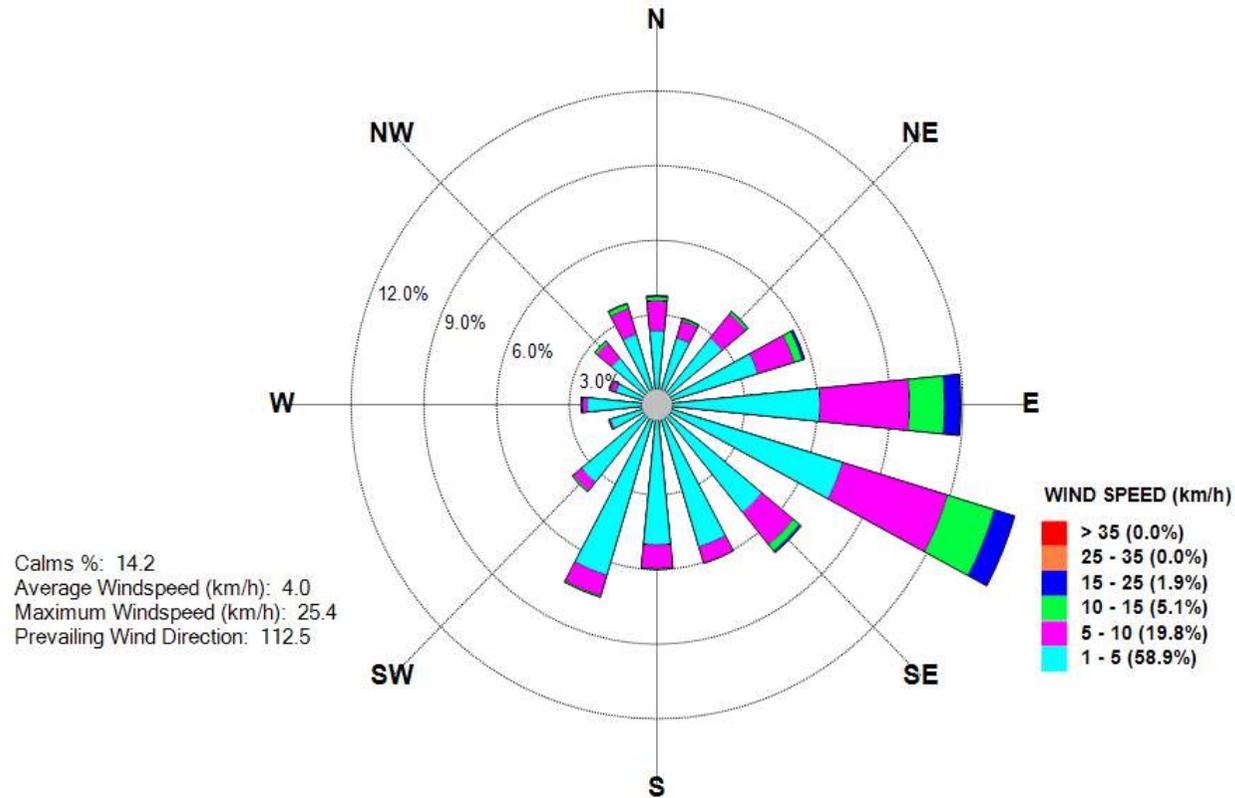


Figure 4: Monthly Windrose

## **Appendix 1**

Calibration Documents (when required)



# Continuous Air Quality Monthly/Quarterly/Six Monthly/Annual TEOM Maintenance and Calibration – 1400AB



TEOM Client/Site: Dixon Sands / TEOM 1

Date: 8+9/1/24

1. TEOM Data Screen SERIAL No: 25570 Firmware: NA/AB version.

Condition	Current Data	Acceptable Data	Pass (Tick)	Fail (Tick)
Operating Condition	Full of 4	Green - Normal	✓	
Date/time	TEOM: 8.1.24 11.07 Actual: 8.1.24 12.07	Current Date/time correct within 5 minutes	✓ EST.	
PM-10 24hr av	22.2	Positive values	/	
Filter loading PM10	56	<80 %	/	
Frequency PM-10	252.60937	200-300 Hz	/	
Noise PM-10	0.049	<0.100ug	/	

Comment: If filter load >80% but <90% and if flows Ok then data is OK

**Comments:**

## 2. System Status

Condition	Current Data	Acceptable Data	Pass (Tick)	Fail (Tick)
Vacuum pump pressure	NA OK	<0.50 atm	✓	
Warnings	NIL	No Warnings	✓	
If any warnings list:				

**Comments:**

Data Downloaded: YES/NO (circle)

Technician Name : COLIN DAVIES Signed 8/1/24



**3. Instrument Conditions Ambient Conditions and Temperatures**

Condition	Current Data	Acceptable Data	Pass (Tick)	Fail (Tick)
Ambient Temperature	22.8	-10 to 50 C	✓	
Ambient Dew Point	NA	-10 to 50 C	✓	✓
Ambient Pressure	1.000	0.9-1.1 atm	✓	
Ambient Relative Humidity	NA	10-100 %RH	✓	✓
Cap temperature	50.00	50.00 +/- 0.10 C	✓	
Case temperature	50.00	50.00 +/- 0.10 C	✓	
Main (PM-10) Air Tube temp	50.00	50.00 +/- 0.10 C	✓	

Comments:

**4. Instrument Conditions – Flows**

Condition	Current Data	Acceptable Data	Pass (Tick)	Fail (Tick)
Main (PM-10) Flow rate	3.00	2.82 – 3.18 lpm	✓	
Bypass Flow rate	13.67	12.95 – 14.39 lpm	✓	
Total Flow rate	16.67	15.67 – 17.67 lpm	✓	

Comments:

**Results: (Tick box)**

- There were NO equipment faults found. No action required – (file report)
- There were faults found (Fails) – Were these fixed on site: YES/NO (circle)  
Any Fails that cannot be repaired on site must be reported to CBased:  
Office: 65713334 or email [cbased@bigpond.com](mailto:cbased@bigpond.com)  
Date faults notified to CBased: \_\_\_\_\_

Comments/Action Required:



**Calibration/Maintenance**

- 1. 1405A: Were Filters replaced YES/NO
- 2. PM10 Inlet head cleaned YES/NO
- 3. If measurement filters were replaced, confirm stable results after change. Stable particulate results confirmed YES/NO

Channel	Filter Load %	Frequency Hz initial	Frequency check 1min	Frequency check 3min	Frequency check 5min
PM10	17	255-68435	255-68438	255-68440	255-68441

✓OK

Frequency should not drift by more than 0.0010 between readings (if instrument is thermodynamically stable)  
Pass/Fail – if Fail – install new filter and redo stability test.

- 4. Instrument clock verified (Refer Section 1) YES/NO.  
If Time changed – clock reset OK YES/NO or NA (not changed)  
Comments:

- 5. Were TEOM in line and rear TEOM filters checked for cleanliness and replaced if necessary. YES/NO.  
Comments if changed:

- 6. TEOM Cleaned and Air Conditioner checked YES/NO. Air Conditioner settings or operational status: OK

**Tetralcal Flow/Temp/Pressure Calibrator Serial No:** 1009 Refer to calibration corrections for Temperature/Pressure and Flows and apply to all readings.

**Quarterly or Six Monthly Calibration**

- 1. Flow Verification – Conducted YES/NO

PM10 Flow verified Flow l/min 3.05 Error % 1.7 (allowed error <6%) PASS/FAIL

Bypass Flow verified Flow l/min 13.84 Error % 1.2 (allowed error <6%) PASS/FAIL

If fail then complete a full multipoint recalibration and review previous data from last good flow check. **Comments if Flows recalibrated:** Fadj recal → see over

- 2. Leak Check – Conducted YES/NO

PM10 actual 0.13 < Limit 0.15

Bypass actual 0.46 < Limit 0.60

Leak check PASS/FAIL – If fail then find leak and retest.

**Comments:** Slight leak OK ✓



**Annual Calibration/Maintenance**

**1. Temperature and Pressure Calibration – Conducted YES/NO**

Reference Temperature: 22.5 C TEOM Temperature 22.7 C  
 if difference +/- 1 C recalibrate sensor. Sensor recalibrated (YES)/NO

Reference Pressure: 1.001 atm TEOM Pressure 1.000 atm  
 if difference +/- 0.010 atm recalibrate sensor. Sensor recalibrated (YES)/NO

**Note: Tetral measures Atmospheric Pressure in mm Hg or mb or hPa  
 For mb or hPa divide tetral result by 1013.25 to change units to atm.  
 For mmHg divide tetral result by 760 to change units to atm.**

**2. Flow Calibration – Conducted (YES)/NO**  
**PM10**

Set point 2.4 Actual: \_\_\_\_\_  
 Set point 3.6 Actual: \_\_\_\_\_  
 Set point 3.0 Actual: \_\_\_\_\_ After calibration Final: \_\_\_\_\_ l/min

Hardware Cal	Pre	Post
Fadj main	1.055	1.050
Fadj aux	1.005	1.005

**BYPASS**

Set point 10.9 Actual: \_\_\_\_\_  
 Set point 16.4 Actual: \_\_\_\_\_  
 Set point 13.67 Actual: \_\_\_\_\_ After calibration Final: \_\_\_\_\_ l/min

**3. Mass calibration (KO) Verification – Conducted (YES)/NO**

Actual measured KO = 13825 TEOM stated KO 13748 Error %: 0.56 .  
 Allowed Error +/- 2.5%. (PASS)/FAIL  
 If Error +/- 2.5% repeat. If confirmed consult manufacturer.  
 Second Error % = \_\_\_\_\_ PASS/FAIL. Comments: \_\_\_\_\_  
 If second test fails consult manufacturer.

**4. Annual Noise check - Conducted (YES)/NO**

Zero filter applied to TEOM and TEOM operated for at least 12 hours:  
 Start date/time: 8/1/24 22:35 Finish date/time: 9/1/24 11:20  
 Standard deviation of all recorded data (min 30 min averages) = 1.4 ug/m<sup>3</sup>  
 Noise was less than 5ug/m<sup>3</sup> (YES)/NO

**5. Maintenance**

Air Inlet system cleaned (YES)/NO  
 Pump Reconditioned (YES)/NO  
 Check Waterproofing (YES)/NO OK  
 Comments:





**CBased Environmental  
Pty Limited**

ABN 62 611 924 264

**Dixon Sand Quarry**

**Environmental Monitoring  
Air Quality**

**Tapered Element Oscillating Microbalance  
(TEOM) (PM<sub>10</sub>) and Meteorological Data**

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**FEBRUARY 2024**

A handwritten signature in black ink that reads "Colin Davies".

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Colin Davies BSc MEIA CENVP  
Environmental Scientist  
Date: 21 March 2024

CBased Environmental Pty Ltd  
Unit 3, 2 Enterprise Crescent SINGLETON NSW 2330  
☎ (02) 65713334

## 1.0 Summary

CBased Environmental Pty Limited is contracted by Dixon Sand to conduct continuous Tapered Element Oscillating Microbalance (TEOM) for fine particulates (PM<sub>10</sub>) and meteorological monitoring for the Dixon Sand Quarry. The information is required to assess air quality levels. The results for the TEOM and meteorological site are included in this report.

The monitoring programme includes:

- One continuous TEOM PM<sub>10</sub> monitor; and
- One continuous meteorological station.

This monthly report for February 2024 was prepared by CBased Environmental and includes the following:

- TEOM (PM<sub>10</sub>) monitoring results; and
- Meteorological results.

In accordance with Schedule 3, Condition 7 of the Dixon Sand development Consent and the Dixon Sand EPL;

- 24-hour average results were below the NEPM 24-hour maximum criteria of 50ug/m<sup>3</sup>;
- 24-hour average results were below the Dixon Sand Quarry EPL limit of 42ug/m<sup>3</sup>;
- The annual average is below the Dixon Sand Quarry consent annual average criteria of 30ug/m<sup>3</sup>; and
- The calculated TSP is below the Dixon Sand Quarry annual average criteria of 90ug/m<sup>3</sup>.

Note: Based on the available data, statements in **green** indicate current conformance to Dixon Sand Quarry Air Quality Impact Assessment criteria, statements in **red** indicate possible non-conformance. Year to date annual average for PM<sub>10</sub> is calculated from 1 July 2023 for TEOM's coinciding with the Dixon Sand project year. An annual amount of data has not yet been collected.

Approximately 100% of valid meteorological data was recorded for February 2024.

Approximately 100% of valid TEOM data was available for February 2024.

## 2.0 Sampling Programme

The TEOM is sited and operated to the applicable Australian Standard and/or NSW EPA approved methods. The following Australian Standards were used:

- AS3580.9.8 - “*Methods for Sampling and Analysis of Ambient Air. Determination of Suspended Particulates—PM<sub>10</sub> continuous direct mass method using a tapered element oscillating microbalance analyser*”; and
- AS/NZS 3580.1.1 - “*Methods for Sampling and Analysis of Ambient Air Part 1.1 Guide to Siting Air Monitoring Equipment*”.

TEOM PM<sub>10</sub> results are 24-hour averages at midnight and are reported as µg/m<sup>3</sup> corrected to 0 degrees C and 101.3kPa.

All laboratory analysis was conducted by a National Association of Testing Authorities (NATA) accredited laboratory.

Air Quality monitoring site descriptions and locations are provided in **Table 1**.

**Table 1:** Dixon Sand Air Quality Monitoring Description and Locations

Monitor	Site Code	Location Description
TEOM PM <sub>10</sub>	TEOM	Old North Road, Maroota NSW
Meteorological Station	MET	Old North Road, Maroota NSW

## 3.0 Results

### 3.1 TEOM PM<sub>10</sub>

24-hour average TEOM PM<sub>10</sub> results from the AQMS data collection software are provided in **Table 2** and a chart of the data is provided in **Figure 1**.

During the monitoring period, individual 24-hour TEOM PM<sub>10</sub> results were below the National Environment Protection Measure (NEPM) short-term (24hr) impact criteria of 50ug/m<sup>3</sup> and the Dixon Sand Quarry EPL limit of 42ug/m<sup>3</sup>.

Approximately 100% of valid TEOM data was available for February 2024.

At present, the current TEOM PM<sub>10</sub> annual average is below the Dixon Sand Quarry annual average PM<sub>10</sub> criteria of 30ug/m<sup>3</sup>. The current annual average for calculated Total Suspended Particulates (TSP) is below the annual average criterion of 90ug/m<sup>3</sup>. The TSP is calculated by multiplying the PM<sub>10</sub> by 2.5. Note: the annual average is calculated from 1 July 2023 and therefore an annual amount of data has not yet been collected.

The quarterly TEOM calibration was conducted in January 2024 for December 2023. The next calibration is due to be completed in March 2024. The calibration certificate is provided in **Appendix 1** (when required).

**Table 2:** Average Daily 24-hr TEOM PM<sub>10</sub> and TSP Results for February 2024 from AQMS and Annual Average PM<sub>10</sub> calculated from the 1 July 2023.

Date	PM <sub>10</sub> 24-hr Average (µg/m <sup>3</sup> )	PM <sub>10</sub> Annual Average (µg/m <sup>3</sup> )	24-hr Average TSP* (µg/m <sup>3</sup> )	Annual Average TSP** (µg/m <sup>3</sup> )
1/02/2024	16.3	14.9	40.8	37.3
2/02/2024	20.2	14.9	50.5	37.3
3/02/2024	38.7	15.0	96.8	37.6
4/02/2024	31.1	15.1	77.8	37.8
5/02/2024	32.0	15.2	80.0	38.0
6/02/2024	12.6	15.2	31.5	38.0
7/02/2024	17.7	15.2	44.3	38.0
8/02/2024	13.9	15.2	34.8	38.0
9/02/2024	14.1	15.2	35.3	38.0
10/02/2024	13.0	15.2	32.5	37.9
11/02/2024	16.6	15.2	41.5	37.9
12/02/2024	18.0	15.2	45.0	38.0
13/02/2024	15.6	15.2	39.0	38.0
14/02/2024	20.6	15.2	51.5	38.0
15/02/2024	7.7	15.2	19.3	38.0
16/02/2024	14.4	15.2	36.0	37.9
17/02/2024	15.3	15.2	38.3	37.9
18/02/2024	16.3	15.2	40.8	38.0
19/02/2024	14.2	15.2	35.4	38.0
20/02/2024	10.4	15.2	26.0	37.9
21/02/2024	9.4	15.1	23.5	37.8
22/02/2024	13.3	15.1	33.3	37.8
23/02/2024	19.9	15.1	49.8	37.9
24/02/2024	14.0	15.1	35.0	37.9
25/02/2024	13.4	15.1	33.5	37.8
26/02/2024	20.3	15.2	50.8	37.9
27/02/2024	16.8	15.2	42.0	37.9
28/02/2024	18.9	15.2	47.3	37.9
29/02/2024	16.4	15.2	41.0	38.0

\*Calculated from PM<sub>10</sub>

\*\*Calculated from PM<sub>10</sub> Annual Average

Note: results above the Dixon Sand EPL criteria limit of 42 ug/m<sup>3</sup> highlighted in yellow, when applicable

No Data (ND) = <18hrs hour of valid data to calculate a 24hr average

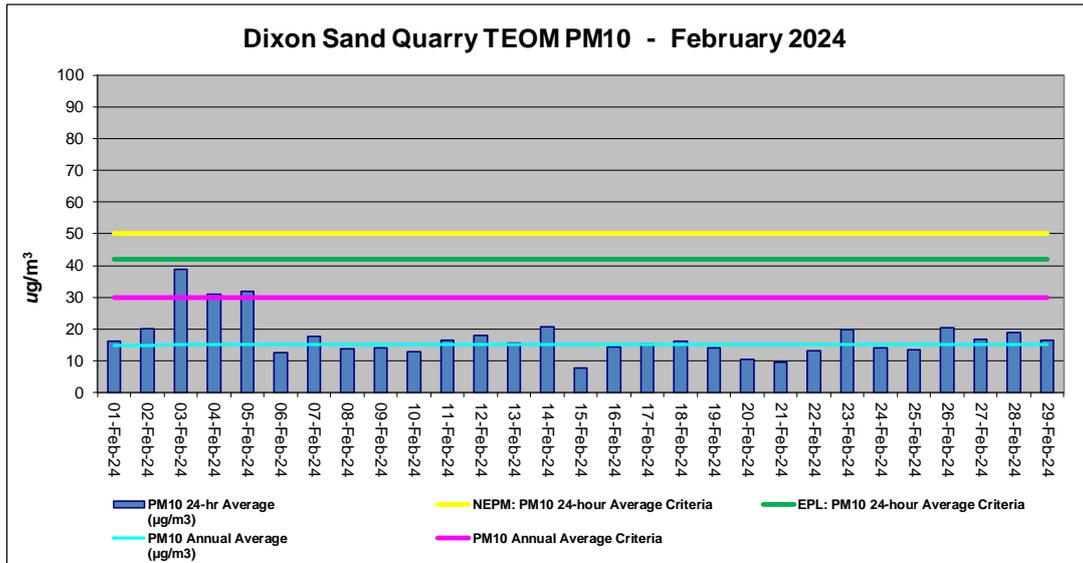


Figure 1: TEOM PM<sub>10</sub> 24 hr, Annual Average and Criteria

### 3.2 Meteorological Data

The weather station logs data at 5-minute intervals and sends the data to a web database by NextG telemetry. The data is accessible from the web site <http://console.teledata.com.au/index.html>.

A summary of monthly results is presented in **Table 3**. Charts of meteorological parameters are presented in **Figures 2** and **3**. A windrose is provided in **Figure 4**. This provides the frequency distribution of wind speed and direction during the month to display dominant wind directions.

A 6-monthly physical screening and system check of the meteorological station was conducted in September 2023 and is next due in March 2024. The screening and system check certificates are provided in **Appendix 1** (when required).

Approximately 100% of valid meteorological data was recorded for February 2024.

**Table 3:** Meteorological Data Summary for February 2024

Date	Min Temp	Avg Temp	Max Temp	RAIN mm	Min WS	Avg WS	Max WS	Min Humidity	Avg Humidity	Max Humidity	Min Pressure	Avg Pressure	Max Pressure
1/02/2024	18.2	22.2	30.0	1.6	0.3	4.2	17.2	53.7	87.4	100.0	988.2	992.3	995.5
2/02/2024	20.3	23.8	31.5	0.0	0.1	5.6	29.4	29.0	81.0	100.0	986.8	988.8	993.4
3/02/2024	18.2	22.1	26.8	0.0	0.1	5.1	19.6	58.9	75.2	90.5	990.8	993.2	995.1
4/02/2024	19.0	26.3	37.1	0.0	0.1	4.4	20.3	29.1	70.7	97.6	986.4	989.6	992.5
5/02/2024	24.2	28.3	33.6	0.0	0.2	3.5	14.1	48.1	72.1	97.1	986.7	988.7	990.8
6/02/2024	18.4	21.1	24.2	26.2	0.3	3.5	18.2	73.0	93.4	100.0	987.2	992.7	1000.0
7/02/2024	16.0	18.7	23.3	0.0	0.1	4.2	19.3	66.7	78.0	98.4	999.0	1001.5	1004.6
8/02/2024	16.2	19.0	23.5	0.2	0.2	3.2	19.8	56.0	76.7	96.3	1003.3	1004.6	1005.9
9/02/2024	14.8	19.4	24.6	0.0	0.4	3.6	11.1	59.4	77.8	92.0	1000.1	1002.3	1004.9
10/02/2024	17.3	19.4	24.2	4.2	0.5	3.9	18.1	48.2	86.1	100.0	1002.0	1004.3	1005.8
11/02/2024	15.2	19.4	22.6	0.2	0.0	3.2	11.7	67.1	84.3	100.0	1001.2	1003.4	1005.4
12/02/2024	18.5	23.2	30.4	0.0	0.0	4.4	18.9	44.8	76.6	94.5	996.5	1000.0	1002.6
13/02/2024	19.5	25.2	33.1	0.0	0.1	3.5	11.9	34.4	74.5	100.0	991.3	995.1	998.5
14/02/2024	18.0	23.3	31.7	3.0	0.2	3.9	16.4	45.8	78.0	100.0	989.7	993.8	1000.4
15/02/2024	16.2	17.6	19.1	5.4	0.0	3.2	9.5	99.9	99.9	99.9	999.5	1001.6	1003.5
16/02/2024	17.3	21.2	27.6	0.2	0.4	3.6	16.5	70.4	93.2	99.9	1000.1	1002.1	1003.4
17/02/2024	20.3	23.9	31.0	0.2	0.4	3.3	15.5	46.2	85.1	100.0	998.6	1001.0	1002.6
18/02/2024	18.5	23.0	29.8	0.2	0.0	2.4	11.4	53.5	88.9	100.0	997.0	999.1	1001.1
19/02/2024	17.6	19.7	24.9	6.8	0.1	2.2	15.0	77.3	95.7	100.0	996.8	999.1	1001.0
20/02/2024	17.9	19.1	21.8	17.0	0.1	2.9	11.8	83.0	96.0	100.0	997.6	999.0	1000.9
21/02/2024	17.8	20.5	25.2	4.2	0.0	2.7	15.6	73.3	93.9	100.0	995.3	997.1	998.7
22/02/2024	19.1	23.4	31.8	0.0	0.1	3.1	17.2	44.4	84.7	100.0	990.5	993.9	997.3
23/02/2024	22.4	27.4	36.4	0.0	0.4	5.3	19.0	28.9	66.6	92.4	985.9	989.3	993.3
24/02/2024	16.9	18.5	22.1	3.2	0.3	3.0	9.9	81.7	93.9	100.0	993.2	997.4	1001.5
25/02/2024	13.8	20.5	27.5	0.0	0.0	3.4	13.7	53.6	80.9	100.0	993.6	997.4	1001.0
26/02/2024	18.8	22.7	31.1	0.0	0.1	3.0	25.3	40.2	79.0	96.6	993.5	995.7	999.6
27/02/2024	18.0	19.9	21.9	0.4	0.1	2.6	10.7	77.9	92.1	100.0	998.3	999.5	1000.8
28/02/2024	19.6	23.0	29.2	0.0	0.0	3.8	16.1	64.4	89.4	100.0	996.0	998.6	1001.0
29/02/2024	21.5	28.9	39.5	0.0	0.3	4.8	17.2	27.9	65.2	99.8	992.2	994.6	997.6
<b>Monthly</b>	<b>13.8</b>	<b>22.1</b>	<b>39.5</b>	<b>73.0</b>	<b>0.0</b>	<b>3.6</b>	<b>29.4</b>	<b>27.9</b>	<b>83.3</b>	<b>100.0</b>	<b>985.9</b>	<b>997.1</b>	<b>1005.9</b>

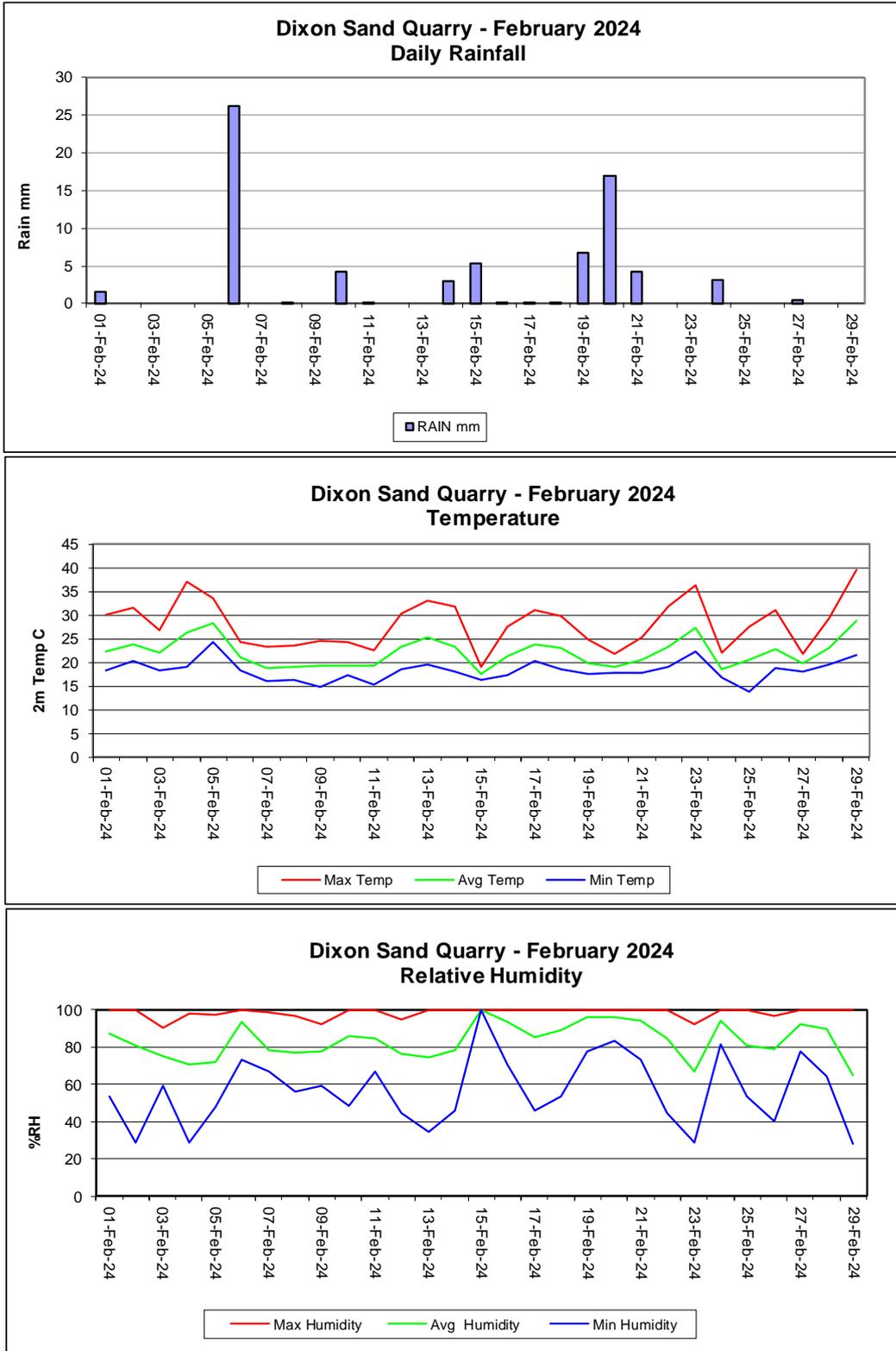
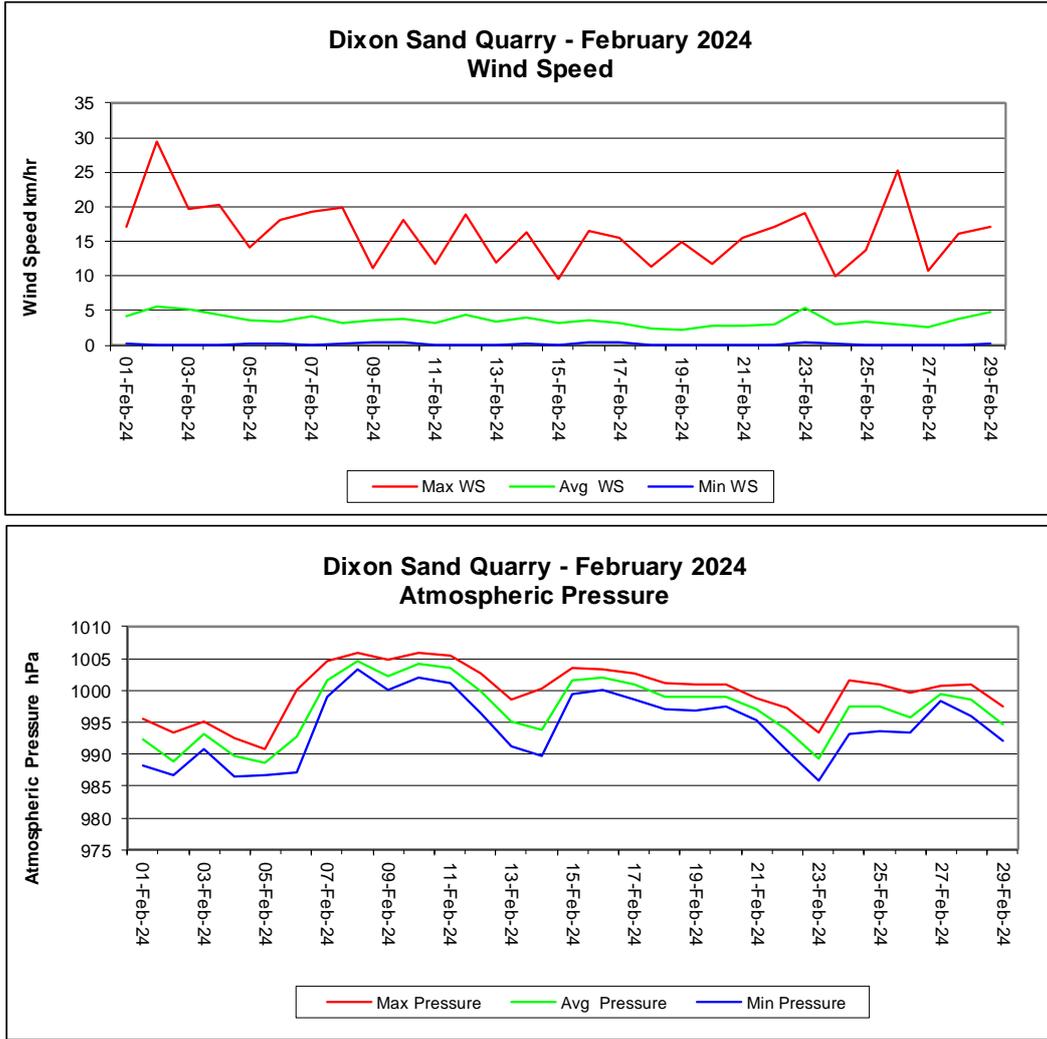
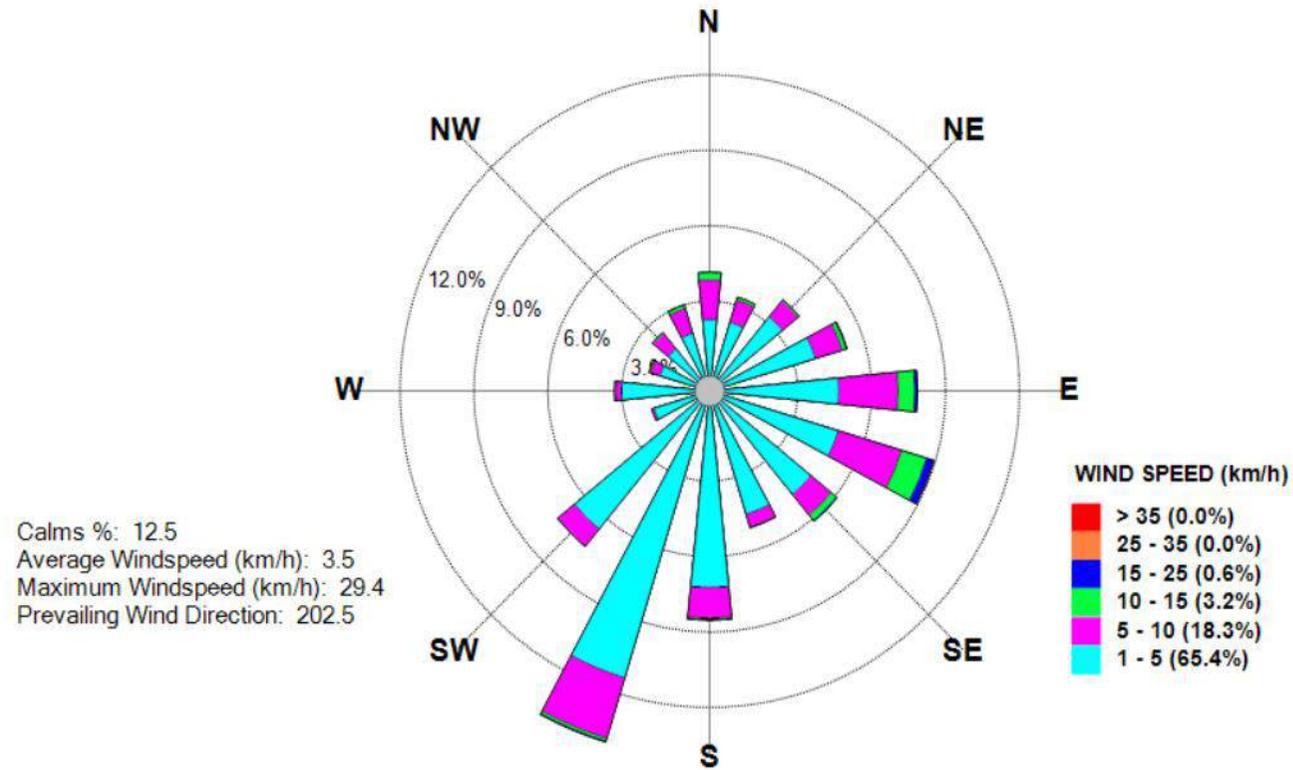


Figure 2: Daily Rainfall, Temperature and Relative Humidity Charts



**Figure 3:** Wind Speed and Atmospheric Pressure Charts

## Dixon Sand Quarry - Windrose FEBRUARY 2024



**Figure 4:** Monthly Windrose

## **Appendix 1**

Calibration Documents (when required)



**CBased Environmental  
Pty Limited**

ABN 62 611 924 264

**Dixon Sand Quarry**

**Environmental Monitoring  
Air Quality**

**Tapered Element Oscillating Microbalance  
(TEOM) (PM<sub>10</sub>) and Meteorological Data**

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**MARCH 2024**

A handwritten signature in black ink that reads "Colin Davies".

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Colin Davies BSc MEIA CENVP  
Environmental Scientist  
Date: 24 April 2024

CBased Environmental Pty Ltd  
Unit 3, 2 Enterprise Crescent SINGLETON NSW 2330  
☎ (02) 65713334

## 1.0 Summary

CBased Environmental Pty Limited is contracted by Dixon Sand to conduct continuous Tapered Element Oscillating Microbalance (TEOM) for fine particulates (PM<sub>10</sub>) and meteorological monitoring for the Dixon Sand Quarry. The information is required to assess air quality levels. The results for the TEOM and meteorological site are included in this report.

The monitoring programme includes:

- One continuous TEOM PM<sub>10</sub> monitor; and
- One continuous meteorological station.

This monthly report for March 2024 was prepared by CBased Environmental and includes the following:

- TEOM (PM<sub>10</sub>) monitoring results; and
- Meteorological results.

In accordance with Schedule 3, Condition 7 of the Dixon Sand development Consent and the Dixon Sand EPL;

- 24-hour average results were below the NEPM 24-hour maximum criteria of 50ug/m<sup>3</sup>;
- 24-hour average results were below the Dixon Sand Quarry EPL limit of 42ug/m<sup>3</sup>;
- The annual average is below the Dixon Sand Quarry consent annual average criteria of 30ug/m<sup>3</sup>; and
- The calculated TSP is below the Dixon Sand Quarry annual average criteria of 90ug/m<sup>3</sup>.

Note: Based on the available data, statements in **green** indicate current conformance to Dixon Sand Quarry Air Quality Impact Assessment criteria, statements in **red** indicate possible non-conformance. Year to date annual average for PM<sub>10</sub> is calculated from 1 July 2023 for TEOM's coinciding with the Dixon Sand project year. An annual amount of data has not yet been collected.

Approximately 100% of valid meteorological data was recorded for March 2024.

Approximately 100% of valid TEOM data was available for March 2024.

## 2.0 Sampling Programme

The TEOM is sited and operated to the applicable Australian Standard and/or NSW EPA approved methods. The following Australian Standards were used:

- AS3580.9.8 - “Methods for Sampling and Analysis of Ambient Air. Determination of Suspended Particulates—PM<sub>10</sub> continuous direct mass method using a tapered element oscillating microbalance analyser”; and
- AS/NZS 3580.1.1 - “Methods for Sampling and Analysis of Ambient Air Part 1.1 Guide to Siting Air Monitoring Equipment”.

TEOM PM<sub>10</sub> results are 24-hour averages at midnight and are reported as µg/m<sup>3</sup> corrected to 0 degrees C and 101.3kPa.

All laboratory analysis was conducted by a National Association of Testing Authorities (NATA) accredited laboratory.

Air Quality monitoring site descriptions and locations are provided in **Table 1**.

**Table 1:** Dixon Sand Air Quality Monitoring Description and Locations

Monitor	Site Code	Location Description
TEOM PM <sub>10</sub>	TEOM	Old North Road, Maroota NSW
Meteorological Station	MET	Old North Road, Maroota NSW

## 3.0 Results

### 3.1 TEOM PM<sub>10</sub>

24-hour average TEOM PM<sub>10</sub> results from the AQMS data collection software are provided in **Table 2** and a chart of the data is provided in **Figure 1**.

During the monitoring period, individual 24-hour TEOM PM<sub>10</sub> results were below the National Environment Protection Measure (NEPM) short-term (24hr) impact criteria of 50ug/m<sup>3</sup> and the Dixon Sand Quarry EPL limit of 42ug/m<sup>3</sup>.

Approximately 100% of valid TEOM data was available for March 2024.

At present, the current TEOM PM<sub>10</sub> annual average is below the Dixon Sand Quarry annual average PM<sub>10</sub> criteria of 30ug/m<sup>3</sup>. The current annual average for calculated Total Suspended Particulates (TSP) is below the annual average criterion of 90ug/m<sup>3</sup>. The TSP is calculated by multiplying the PM<sub>10</sub> by 2.5. Note: the annual average is calculated from 1 July 2023 and therefore an annual amount of data has not yet been collected.

The quarterly TEOM calibration was conducted on 7 March 2024. The next calibration is due to be completed in June 2024. The calibration certificate is provided in **Appendix 1** (when required).

**Table 2:** Average Daily 24-hr TEOM PM<sub>10</sub> and TSP Results for March 2024 from AQMS and Annual Average PM<sub>10</sub> calculated from the 1 July 2023.

Date	PM <sub>10</sub> 24-hr Average (µg/m <sup>3</sup> )	PM <sub>10</sub> Annual Average (µg/m <sup>3</sup> )	24-hr Average TSP* (µg/m <sup>3</sup> )	Annual Average TSP** (µg/m <sup>3</sup> )
1/03/2024	31.8	15.3	79.5	38.1
2/03/2024	21.6	15.3	54.0	38.2
3/03/2024	14.1	15.3	35.2	38.2
4/03/2024	22.0	15.3	55.0	38.3
5/03/2024	18.4	15.3	46.0	38.3
6/03/2024	20.0	15.3	50.0	38.3
7/03/2024	29.3	15.4	73.3	38.5
8/03/2024	14.7	15.4	36.8	38.5
9/03/2024	16.5	15.4	41.3	38.5
10/03/2024	14.2	15.4	35.5	38.5
11/03/2024	19.4	15.4	48.5	38.5
12/03/2024	22.3	15.4	55.8	38.6
13/03/2024	27.0	15.5	67.5	38.7
14/03/2024	24.7	15.5	61.8	38.8
15/03/2024	12.5	15.5	31.3	38.7
16/03/2024	10.1	15.5	25.3	38.7
17/03/2024	6.7	15.4	16.8	38.6
18/03/2024	11.8	15.4	29.5	38.6
19/03/2024	11.6	15.4	29.0	38.5
20/03/2024	15.5	15.4	38.8	38.5
21/03/2024	17.6	15.4	44.0	38.6
22/03/2024	13.2	15.4	33.0	38.5
23/03/2024	16.3	15.4	40.8	38.5
24/03/2024	12.5	15.4	31.3	38.5
25/03/2024	16.2	15.4	40.5	38.5
26/03/2024	23.9	15.4	59.8	38.6
27/03/2024	22.0	15.5	55.0	38.7
28/03/2024	16.8	15.5	42.0	38.7
29/03/2024	12.3	15.5	30.8	38.6
30/03/2024	14.3	15.5	35.8	38.6
31/03/2024	9.1	15.4	22.8	38.6

\*Calculated from PM<sub>10</sub>

\*\*Calculated from PM<sub>10</sub> Annual Average

Note: results above the Dixon Sand EPL criteria limit of 42 ug/m<sup>3</sup> highlighted in yellow, when applicable

No Data (ND) = <18hrs hour of valid data to calculate a 24hr average

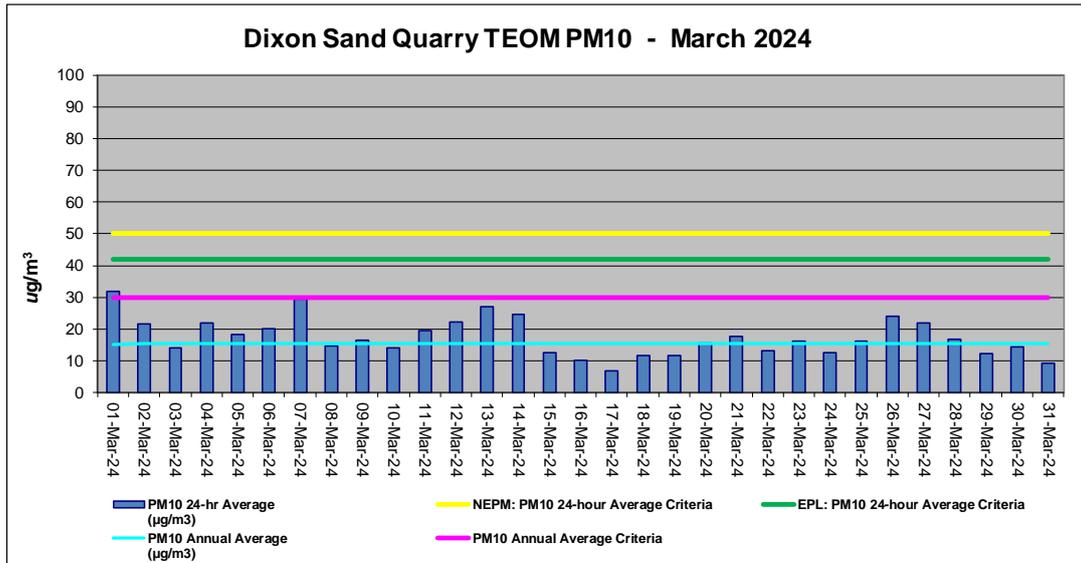


Figure 1: TEOM PM<sub>10</sub> 24 hr, Annual Average and Criteria

### 3.2 Meteorological Data

The weather station logs data at 5-minute intervals and sends the data to a web database by NextG telemetry. The data is accessible from the web site <http://console.teledata.com.au/index.html>.

A summary of monthly results is presented in **Table 3**. Charts of meteorological parameters are presented in **Figures 2** and **3**. A windrose is provided in **Figure 4**. This provides the frequency distribution of wind speed and direction during the month to display dominant wind directions.

A 6-monthly physical screening and system check of the meteorological station was conducted on 7 March 2024 and is next due in September 2024. The screening and system check certificates are provided in **Appendix 1** (when required).

Approximately 100% of valid meteorological data was recorded for March 2024.

**Table 3:** Meteorological Data Summary for March 2024

Date	Min Temp	Avg Temp	Max Temp	RAIN mm	Min WS	Avg WS	Max WS	Min Humidity	Avg Humidity	Max Humidity	Min Pressure	Avg Pressure	Max Pressure
1/03/2024	21.0	23.9	28.1	0.0	0.1	4.4	13.3	66.7	89.1	97.6	992.6	995.1	997.3
2/03/2024	19.7	23.2	27.3	1.4	0.0	2.5	9.6	79.7	92.6	99.1	990.3	994.2	998.4
3/03/2024	17.2	22.9	31.9	0.0	0.0	2.9	14.8	24.2	77.2	100.0	991.2	994.6	998.1
4/03/2024	16.2	19.6	22.8	0.0	0.2	3.0	18.6	56.8	76.8	99.8	997.2	1001.8	1004.8
5/03/2024	14.4	19.4	25.3	0.0	0.1	3.2	14.5	48.9	70.1	89.0	1000.2	1002.7	1005.2
6/03/2024	16.7	22.6	30.3	0.0	0.1	3.8	16.1	39.8	72.8	92.9	997.2	999.9	1002.3
7/03/2024	19.7	23.5	28.9	0.0	0.2	2.9	22.6	61.0	83.8	100.0	998.3	1001.8	1006.0
8/03/2024	19.5	22.7	27.9	0.0	0.1	4.0	20.5	51.1	80.2	99.9	1003.5	1005.0	1006.4
9/03/2024	17.9	22.6	28.3	0.0	0.0	4.0	18.4	43.5	76.4	99.2	1004.5	1006.0	1007.8
10/03/2024	17.9	22.5	28.3	0.0	0.1	4.4	22.1	40.9	78.1	100.0	1006.0	1007.4	1009.1
11/03/2024	18.5	22.4	28.0	0.0	0.0	3.9	19.0	41.4	75.3	98.9	1002.6	1005.5	1008.1
12/03/2024	17.2	24.0	33.8	0.0	0.0	3.2	23.6	25.2	64.2	96.3	995.3	998.7	1003.0
13/03/2024	16.8	22.3	28.2	0.0	0.1	3.7	20.9	47.4	74.5	100.0	994.4	996.7	998.9
14/03/2024	17.9	23.4	34.8	2.2	0.1	3.9	11.9	26.6	75.1	100.0	988.5	992.2	996.7
15/03/2024	15.2	18.1	22.9	2.0	0.1	4.4	23.2	57.9	84.0	100.0	996.8	1000.4	1003.9
16/03/2024	13.7	17.8	23.4	0.2	0.0	3.3	21.6	62.4	83.8	100.0	998.9	1001.4	1003.8
17/03/2024	16.6	18.2	21.2	4.8	0.1	2.7	12.8	77.7	93.4	100.0	994.7	996.9	999.1
18/03/2024	16.8	19.5	25.5	0.0	0.0	2.6	17.4	62.7	90.8	100.0	994.9	996.0	997.4
19/03/2024	18.1	21.7	28.2	0.0	0.0	3.3	13.9	55.6	86.7	100.0	994.6	996.6	998.9
20/03/2024	17.0	21.2	25.5	0.0	0.1	3.2	16.4	71.8	86.5	100.0	993.4	997.8	1006.2
21/03/2024	12.2	16.2	20.7	0.4	0.0	3.2	18.1	49.2	67.9	90.9	1006.1	1007.8	1010.1
22/03/2024	13.5	17.0	21.5	0.0	0.2	2.5	8.9	67.5	82.7	95.6	1002.7	1005.1	1007.5
23/03/2024	14.0	18.5	24.4	0.0	0.1	3.0	12.8	51.1	81.9	99.8	1001.3	1003.0	1004.8
24/03/2024	16.5	19.9	26.8	0.4	0.0	3.0	12.7	44.4	83.0	100.0	998.0	1000.6	1003.1
25/03/2024	15.9	21.7	29.5	0.0	0.2	2.8	12.4	18.2	68.0	100.0	996.9	999.0	1000.5
26/03/2024	14.6	19.9	28.8	0.0	0.2	3.3	21.9	37.3	80.5	100.0	997.9	1000.1	1002.4
27/03/2024	16.4	19.8	25.1	0.0	0.0	4.3	24.1	53.3	86.9	100.0	1002.1	1003.6	1005.3
28/03/2024	16.7	18.9	24.0	2.2	0.0	3.0	17.2	66.3	93.3	100.0	1003.4	1005.1	1007.0
29/03/2024	16.4	19.0	24.5	0.2	0.0	3.0	16.8	62.3	85.8	100.0	1005.5	1007.0	1009.2
30/03/2024	15.8	20.7	28.4	0.0	0.1	3.8	18.2	39.3	75.5	99.7	1003.1	1005.4	1007.3
31/03/2024	15.6	19.5	26.6	0.0	0.1	2.8	15.8	48.2	85.8	100.0	1000.7	1002.9	1005.4
<b>Monthly</b>	<b>12.2</b>	<b>20.7</b>	<b>34.8</b>	<b>13.8</b>	<b>0.0</b>	<b>3.4</b>	<b>24.1</b>	<b>18.2</b>	<b>80.7</b>	<b>100.0</b>	<b>988.5</b>	<b>1001.0</b>	<b>1010.1</b>

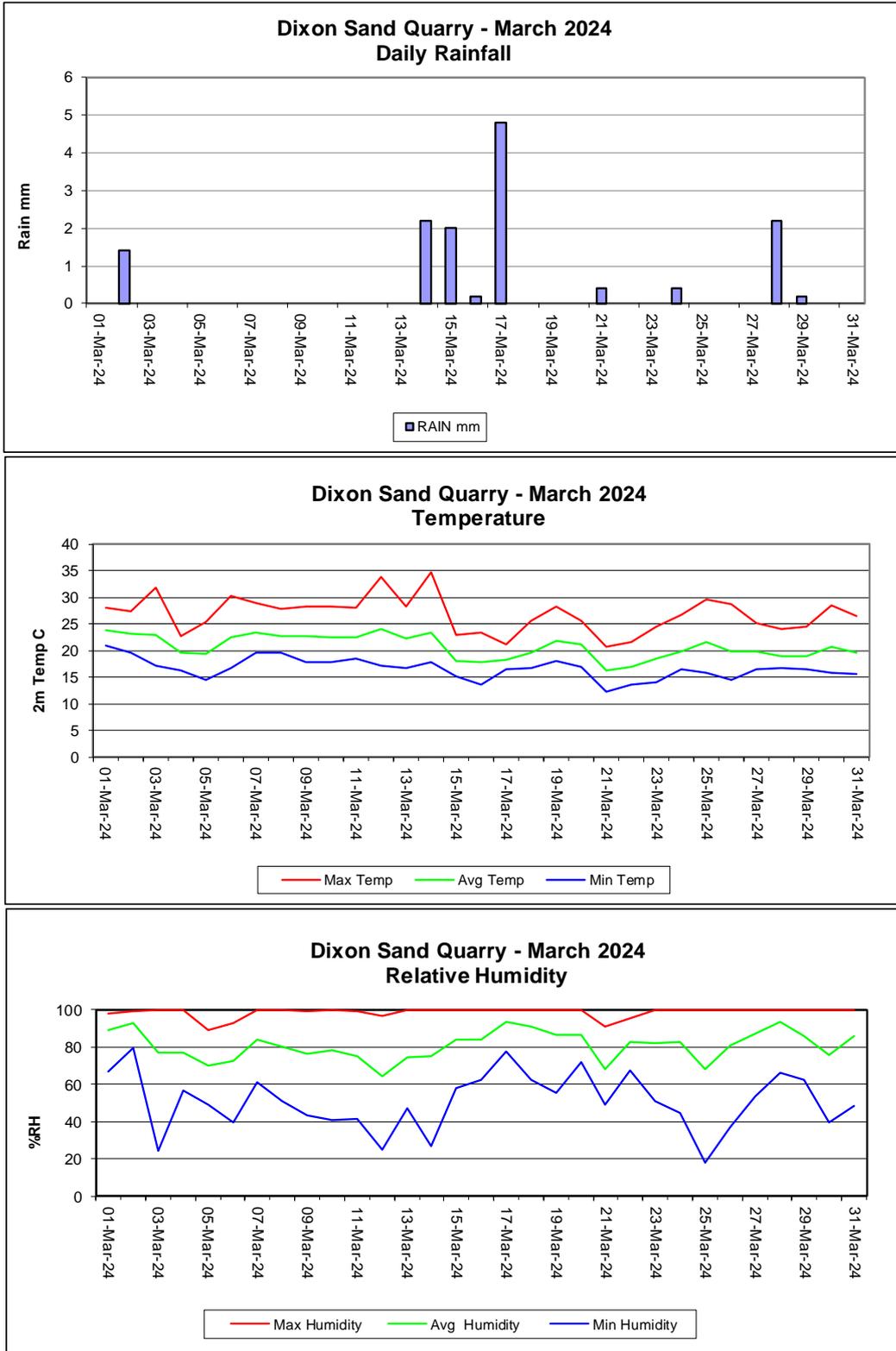


Figure 2: Daily Rainfall, Temperature and Relative Humidity Charts

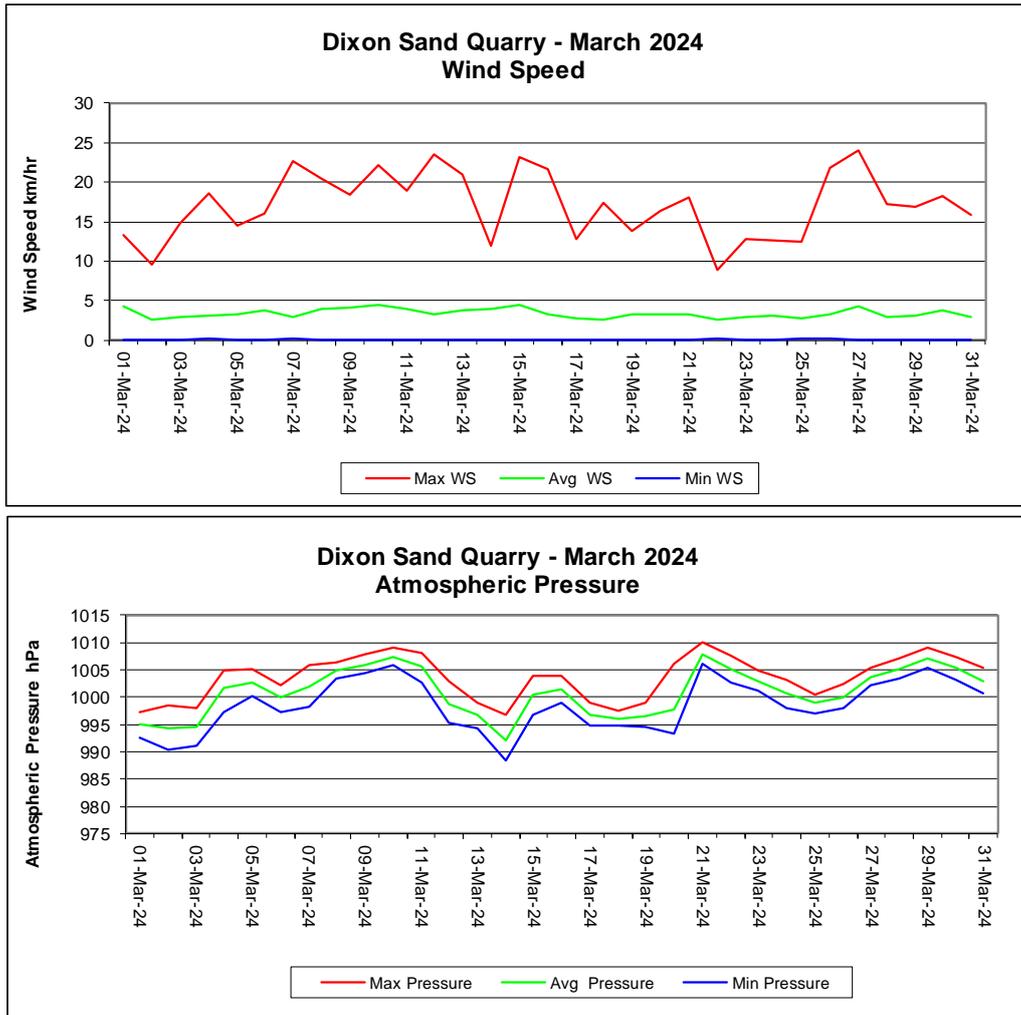


Figure 3: Wind Speed and Atmospheric Pressure Charts

## Dixon Sand Quarry - Windrose MARCH 2024

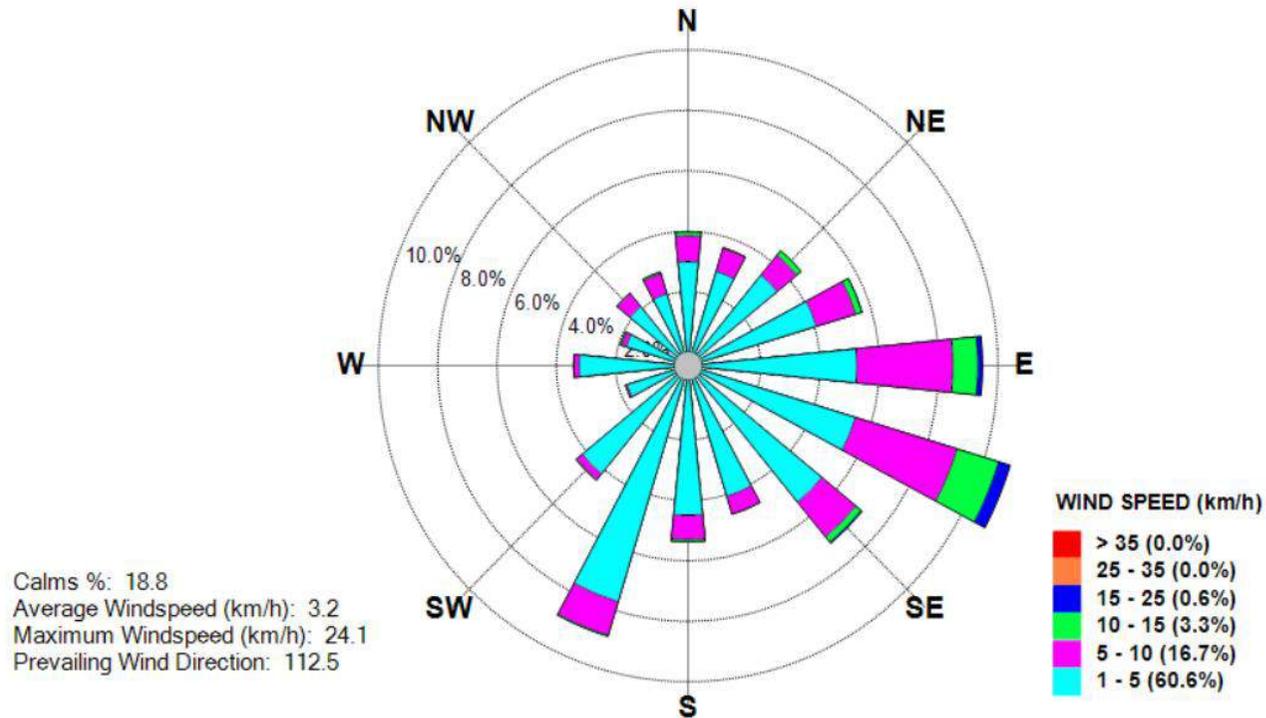


Figure 4: Monthly Windrose

## **Appendix 1**

Calibration Documents (when required)



# Continuous Air Quality Monthly/Quarterly/Six Monthly/Annual TEOM Maintenance and Calibration – 1400AB



TEOM Client/Site: Dixon Sands / TEOM

Date: 7/3/24

1. TEOM Data Screen SERIAL No: 25570 Firmware: N/A

Condition	Current Data	Acceptable Data	Pass (Tick)	Fail (Tick)
Operating Condition	<u>OK</u>	Green - Normal	✓	
Date/time	TEOM: <u>14:05</u> Actual: <u>14:07</u>	Current Date/time correct within 5 minutes	✓ <u>OK</u>	
PM-10 24hr av	<u>27.4</u>	Positive values	✓	
Filter loading PM10	<u>39</u>	<80 %	✓	
Frequency PM-10	<u>253.87649</u>	200-300 Hz	✓	
Noise PM-10	<u>0.036</u>	<0.100ug	✓	

Comment: If filter load >80% but <90% and if flows Ok then data is OK

**Comments:**

## 2. System Status

Condition	Current Data	Acceptable Data	Pass (Tick)	Fail (Tick)
Vacuum pump pressure	<u>NA OK</u>	<0.50 atm	✓	
Warnings	<u>NIL</u>	No Warnings	✓	
If any warnings list:				

**Comments:**

Data Downloaded: YES/**NO** (circle)

Technician Name : COLIN DAVIES Signed [Signature]



**3. Instrument Conditions Ambient Conditions and Temperatures**

Condition	Current Data	Acceptable Data	Pass (Tick)	Fail (Tick)
Ambient Temperature	30.7	-10 to 50 C	/	
Ambient Dew Point	NA	-10 to 50 C	/	
Ambient Pressure	0.970	0.9-1.1 atm	/	
Ambient Relative Humidity	NA	10-100 %RH	/	
Cap temperature	50.00	50.00 +/- 0.10 C	/	
Case temperature	50.00	50.00 +/- 0.10 C	/	
Main (PM-10) Air Tube temp	50.00	50.00 +/- 0.10 C	/	

Comments:

**4. Instrument Conditions – Flows**

Condition	Current Data	Acceptable Data	Pass (Tick)	Fail (Tick)
Main (PM-10) Flow rate	3.00	2.82 – 3.18 lpm	/	
Bypass Flow rate	13.68	12.95 – 14.39 lpm	/	
Total Flow rate	16.68	15.67 – 17.67 lpm	/	

Comments:

**Results: (Tick box)**

- There were NO equipment faults found. No action required – (file report)**
- There were faults found (Fails) – Were these fixed on site: YES/NO (circle)**  
**Any Fails that cannot be repaired on site must be reported to CBased:**  
**Office: 65713334 or email [cbased@bigpond.com](mailto:cbased@bigpond.com)**  
**Date faults notified to CBased: \_\_\_\_\_**

Comments/Action Required:



**Calibration/Maintenance**

- 1. 1405A: Were Filters replaced  YES/NO
- 2. PM10 Inlet head cleaned  YES/NO
- 3. If measurement filters were replaced, confirm stable results after change. Stable particulate results confirmed  YES/NO

Channel	Filter Load %	Frequency Hz initial	Frequency check 1min	Frequency check 3min	Frequency check 5min
PM10	16	253.52859	253.52862	253.52864	253.52864

Frequency should not drift by more than 0.0010 between readings (if instrument is thermodynamically stable)  OK  
 Pass/Fail – if Fail – install new filter and redo stability test.

- 4. Instrument clock verified (Refer Section 1)  YES/NO.  
 If Time changed – clock reset OK  YES/ NO or NA (not changed)  
 Comments:

- 5. Were TEOM in line and rear TEOM filters checked for cleanliness and replaced if necessary.  YES/NO.  
 Comments if changed:

- 6. TEOM Cleaned and Air Conditioner checked  YES/NO. Air Conditioner settings or operational status: \_\_\_\_\_

**Tetracal Flow/Temp/Pressure Calibrator Serial No:** 1009 Refer to calibration corrections for Temperature/Pressure and Flows and apply to all readings.

Quarterly or Six Monthly Calibration

- 1. Flow Verification – Conducted  YES/NO

PM10 Flow verified Flow l/min 3.03 Error % 1.0 (allowed error <6%)  PASS/FAIL  
 Bypass Flow verified Flow l/min 13.69 Error % 0.1 (allowed error <6%)  PASS/FAIL  
 If fail then complete a full multipoint recalibration and review previous data from last good flow check. **Comments if Flows recalibrated:**

- 2. Leak Check – Conducted  YES/NO

PM10 actual 0.13 < Limit 0.15  
 Bypass actual 0.45 < Limit 0.60

Leak check  PASS/ FAIL – If fail then find leak and retest.  
**Comments:**



**Annual Calibration/Maintenance**

**1. Temperature and Pressure Calibration – Conducted YES/NO**

Reference Temperature: \_\_\_\_\_ C TEOM Temperature \_\_\_\_\_ C

if difference +/- 1 C recalibrate sensor. Sensor recalibrated YES/NO

Reference Pressure: \_\_\_\_\_ atm TEOM Pressure \_\_\_\_\_ atm

if difference +/- 0.010 atm recalibrate sensor. Sensor recalibrated YES/NO

**Note: Tetralcal measures Atmospheric Pressure in mm Hg or mb or hPa  
For mb or hPa divide tetralcal result by 1013.25 to change units to atm.  
For mmHg divide tetralcal result by 760 to change units to atm.**

**2. Flow Calibration – Conducted YES/NO**

**PM10**

Set point 2.4 Actual: \_\_\_\_\_

Set point 3.6 Actual: \_\_\_\_\_

Set point 3.0 Actual: \_\_\_\_\_ After calibration Final: \_\_\_\_\_ l/min

*MA*

**BYPASS**

Set point 10.9 Actual: \_\_\_\_\_

Set point 16.4 Actual: \_\_\_\_\_

Set point 13.67 Actual: \_\_\_\_\_ After calibration Final: \_\_\_\_\_ l/min

**3. Mass calibration (KO) Verification – Conducted YES/NO**

Actual measured KO = \_\_\_\_\_ TEOM stated KO \_\_\_\_\_ Error %: \_\_\_\_\_

Allowed Error +/- 2.5%. PASS/FAIL

If Error +/- 2.5% repeat. If confirmed consult manufacturer.

Second Error % = \_\_\_\_\_ PASS/FAIL. Comments:

If second test fails consult manufacturer.

**4. Annual Noise check - Conducted YES/NO**

Zero filter applied to TEOM and TEOM operated for at least 12 hours:

Start date/time: \_\_\_\_\_ Finish date/time: \_\_\_\_\_

Standard deviation of all recorded data (min 30 min averages) = \_\_\_\_\_ ug/m<sup>3</sup>

Noise was less than 5ug/m<sup>3</sup> YES/NO

**5. Maintenance**

Air Inlet system cleaned YES/NO

Pump Reconditioned YES/NO

Check Waterproofing YES/NO

Comments:





**CBased Environmental Pty Limited**  
 ABN 62 611 924 264

**Weather Station Field Check**

Site: Dixon Sands  
 Date/Time: 7/03/2024 15:00

**Measured Against Reference Sensors**

Parameter	Units	Site	Reference	Difference	Pass/Fail	Reference Description
Temperature 10m	°C	27.8	28.0	-0.2	Pass	Ref Thermometer
Humidity	%RH	64	65	-1.0	Pass	Ref RH sensor
Rainfall	mm	3.0	3.0	0.0	Pass	Glass Pipette
Wind Speed	km/hr	5.9	6.0	-0.1	Pass	Ref Anemometer
Wind Direction	Degrees	140	143	-3.0	Pass	Sighting compass

Reference Instruments Specifications: \*Calibration expires: 10/02/2025

Sensor	Serial Number	Specifications	Accuracy
*Temperature	230210N04	-40 to 65°C	+/- 0.3°C
*Barometer	BF230207001	20 to 30" Hg	+/- 1.1hPa
*Humidity	230210N04	10 to 90%RH	+/- 2%RH
*Anemometer	230210N06	0 to 64km/hr	+/- 3.6km/hr or 5%
**Rainfall	Standard number of tips	3.2mm	+/- 0.2mm
Compass	Sighting Compass	0 to 360 degrees	+/- 5 Deg

\*\* 100mL used.

Reference sensors were certified by Davis Instruments USA using a reference traceable to National Institute of Standards and Technology (NIST) and were "in calibration" when used.

**Comments:**

The weatherstation was in conformance with the reference instruments at the monitored levels. Wind direction is referenced to true north. The calibration check of the raingauge involved adding water to the raingauge. Rain total of 3.0mm should be deleted from site records on the 7/3/2024.

**NA=Not Available**

The meteorological station meets the requirements of the Approved Methods for the Sampling and Analysis of Air Pollutants in NSW.

The weather station has Passed the field check. Next annual field check due: Sep-24

Checked by: Colin Davies *Colin Davies*  
 10/03/2024

**CBased Environmental Pty Limited**  
 Unit 3, 2 Enterprise Crescent  
 SINGLETON NSW 2330  
 P: 65 713 334



# CBased Environmental Pty Limited

ABN 62 611 924 264

## Weather Station Physical Screening Field Check

Client DIXON SANDS

Site Name: DIXON SANDS AWS

Date: 7/3/24

Time: 15:00

	Yes (Pass)	No (Fail)	Comments
<b>Grass / Vegetation Impacts</b>			
Compound Grass height <10cm	✓		
No objects within impact area (10 x height of object)		✓	Trees/buildings nearby
<b>Ground Anchor / Guy Wires / Mast Condition</b>			
Bottom guy wires tight (correct tension = 35-50mm deflection, with only moderate hand force at 1.5 metres up the guy wire)	NA		fixed mast
Top Guy wires tensioned (correct tension = 60-75mm deflection, with only moderate hand force at 1.5 metres up the guy wire)	NA		" "
Mast Vertical and in good condition	✓		✓ OK
Ground anchors/star pickets tight in ground	NA		fix mast
Guy Wires insignificant corrosion	NA		" "
Ground anchors/D shackles/ winders insignificant corrosion	NA		" "
Bolts/hinge points in mast are secure	NA		" "
<b>Cables / Connectors / Logger Cabinet / Solar Panel</b>			
Cables attached to mast/guy wires via ties are secure	NA		mast design -> cant attach
Insignificant corrosion to plugs/connectors	✓		
No water ingress in logger/battery cabinet	✓		
Wiring/plugs in cabinet OK, Logger OK	✓		
Battery terminals and condition OK	NA		Battery Volts = 240V System
Battery volts (charging >13V, not charging >12V)	NA		No solar
Solar panel undamaged and clean	NA		No solar
Sensor shields clean	✓		
<b>Sensor Check</b>			
Wind direction aligned True North/Magnetic North (strike out N/A)	✓		Compass Bearing: 348 degrees
Rain gauge cleaned, working OK (1 tip check) or 100ml Cal	✓		100ml cal check
Rain gauge level OK	✓		
Anemometer/wind vane moving freely (analogue sensors)	NA		gill
Other sensors visually checked and OK	✓		
Last months data checked and OK / Logging data OK	✓		

Checked By: Name Colin David Signed [Signature]

CBased Environmental Pty Limited  
Unit 3, 2 Enterprise Crescent  
SINGLETON NSW 2330  
P: (02) 6571 3334



**CBased Environmental  
Pty Limited**

ABN 62 611 924 264

**Dixon Sand Quarry**

**Environmental Monitoring  
Air Quality**

**Tapered Element Oscillating Microbalance  
(TEOM) (PM<sub>10</sub>) and Meteorological Data**

---

**APRIL 2024**

A handwritten signature in black ink that reads "Colin Davies".

---

Colin Davies BSc MEIA CENVP  
Environmental Scientist  
Date: 28 May 2024

CBased Environmental Pty Ltd  
Unit 3, 2 Enterprise Crescent SINGLETON NSW 2330  
☎ (02) 65713334

## 1.0 Summary

CBased Environmental Pty Limited is contracted by Dixon Sand to conduct continuous Tapered Element Oscillating Microbalance (TEOM) for fine particulates (PM<sub>10</sub>) and meteorological monitoring for the Dixon Sand Quarry. The information is required to assess air quality levels. The results for the TEOM and meteorological site are included in this report.

The monitoring programme includes:

- One continuous TEOM PM<sub>10</sub> monitor; and
- One continuous meteorological station.

This monthly report for April 2024 was prepared by CBased Environmental and includes the following:

- TEOM (PM<sub>10</sub>) monitoring results; and
- Meteorological results.

In accordance with Schedule 3, Condition 7 of the Dixon Sand development Consent and the Dixon Sand EPL;

- 24-hour average results were below the NEPM 24-hour maximum criteria of 50ug/m<sup>3</sup>;
- 24-hour average results were below the Dixon Sand Quarry EPL limit of 42ug/m<sup>3</sup>;
- The annual average is below the Dixon Sand Quarry consent annual average criteria of 30ug/m<sup>3</sup>; and
- The calculated TSP is below the Dixon Sand Quarry annual average criteria of 90ug/m<sup>3</sup>.

Note: Based on the available data, statements in **green** indicate current conformance to Dixon Sand Quarry Air Quality Impact Assessment criteria, statements in **red** indicate possible non-conformance. Year to date annual average for PM<sub>10</sub> is calculated from 1 July 2023 for TEOM's coinciding with the Dixon Sand project year. An annual amount of data has not yet been collected.

Approximately 100% of valid meteorological data was recorded for April 2024.

Approximately 100% of valid TEOM data was available for April 2024.

## 2.0 Sampling Programme

The TEOM is sited and operated to the applicable Australian Standard and/or NSW EPA approved methods. The following Australian Standards were used:

- AS3580.9.8 - “*Methods for Sampling and Analysis of Ambient Air. Determination of Suspended Particulates—PM<sub>10</sub> continuous direct mass method using a tapered element oscillating microbalance analyser*”; and
- AS/NZS 3580.1.1 - “*Methods for Sampling and Analysis of Ambient Air Part 1.1 Guide to Siting Air Monitoring Equipment*”.

TEOM PM<sub>10</sub> results are 24-hour averages at midnight and are reported as µg/m<sup>3</sup> corrected to 0 degrees C and 101.3kPa.

All laboratory analysis was conducted by a National Association of Testing Authorities (NATA) accredited laboratory.

Air Quality monitoring site descriptions and locations are provided in **Table 1**.

**Table 1:** Dixon Sand Air Quality Monitoring Description and Locations

Monitor	Site Code	Location Description
TEOM PM <sub>10</sub>	TEOM	Old North Road, Maroota NSW
Meteorological Station	MET	Old North Road, Maroota NSW

## 3.0 Results

### 3.1 TEOM PM<sub>10</sub>

24-hour average TEOM PM<sub>10</sub> results from the AQMS data collection software are provided in **Table 2** and a chart of the data is provided in **Figure 1**.

During the monitoring period, individual 24-hour TEOM PM<sub>10</sub> results were below the National Environment Protection Measure (NEPM) short-term (24hr) impact criteria of 50ug/m<sup>3</sup> and the Dixon Sand Quarry EPL limit of 42ug/m<sup>3</sup>.

Approximately 100% of valid TEOM data was available for April 2024.

At present, the current TEOM PM<sub>10</sub> annual average is below the Dixon Sand Quarry annual average PM<sub>10</sub> criteria of 30ug/m<sup>3</sup>. The current annual average for calculated Total Suspended Particulates (TSP) is below the annual average criterion of 90ug/m<sup>3</sup>. The TSP is calculated by multiplying the PM<sub>10</sub> by 2.5. Note: the annual average is calculated from 1 July 2023 and therefore an annual amount of data has not yet been collected.

The quarterly TEOM calibration was conducted in March 2024. The next calibration is due to be completed in June 2024. The calibration certificate is provided in **Appendix 1** (when required).

**Table 2:** Average Daily 24-hr TEOM PM<sub>10</sub> and TSP Results for April 2024 from AQMS and Annual Average PM<sub>10</sub> calculated from the 1 July 2023.

Date	PM <sub>10</sub> 24-hr Average (µg/m <sup>3</sup> )	PM <sub>10</sub> Annual Average (µg/m <sup>3</sup> )	24-hr Average TSP* (µg/m <sup>3</sup> )	Annual Average TSP** (µg/m <sup>3</sup> )
1/04/2024	12.9	15.4	32.3	38.6
2/04/2024	12.8	15.4	32.0	38.5
3/04/2024	16.1	15.4	40.3	38.5
4/04/2024	9.6	15.4	24.0	38.5
5/04/2024	6.0	15.4	15.0	38.4
6/04/2024	3.4	15.3	8.5	38.3
7/04/2024	6.2	15.3	15.5	38.2
8/04/2024	9.8	15.3	24.4	38.2
9/04/2024	11.1	15.3	27.8	38.1
10/04/2024	10.5	15.2	26.3	38.1
11/04/2024	14.9	15.2	37.3	38.1
12/04/2024	13.3	15.2	33.3	38.1
13/04/2024	18.2	15.2	45.5	38.1
14/04/2024	17.6	15.2	44.0	38.1
15/04/2024	22.3	15.3	55.8	38.2
16/04/2024	25.7	15.3	64.3	38.3
17/04/2024	17.7	15.3	44.3	38.3
18/04/2024	13.6	15.3	34.0	38.3
19/04/2024	16.7	15.3	41.8	38.3
20/04/2024	9.1	15.3	22.8	38.2
21/04/2024	12.6	15.3	31.5	38.2
22/04/2024	12.0	15.3	30.0	38.2
23/04/2024	9.3	15.3	23.3	38.1
24/04/2024	13.9	15.2	34.8	38.1
25/04/2024	16.1	15.2	40.3	38.1
26/04/2024	13.8	15.2	34.5	38.1
27/04/2024	14.6	15.2	36.5	38.1
28/04/2024	10.6	15.2	26.5	38.1
29/04/2024	14.6	15.2	36.5	38.1
30/04/2024	16.0	15.2	40.0	38.1

\*Calculated from PM<sub>10</sub>

\*\*Calculated from PM<sub>10</sub> Annual Average

Note: results above the Dixon Sand EPL criteria limit of 42 µg/m<sup>3</sup> highlighted in yellow, when applicable

No Data (ND) = <18hrs hour of valid data to calculate a 24hr average

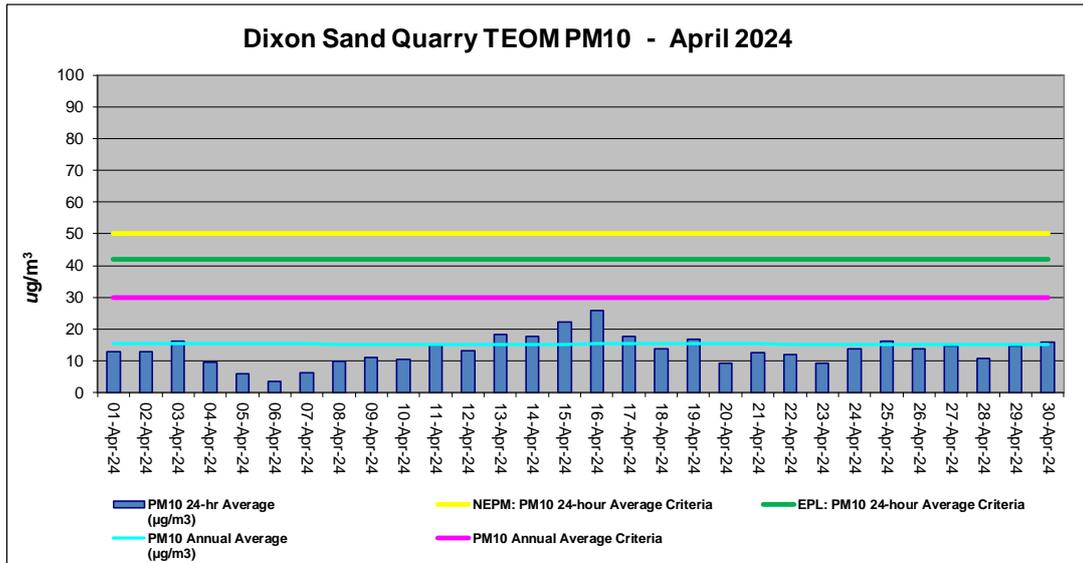


Figure 1: TEOM PM<sub>10</sub> 24 hr, Annual Average and Criteria

### 3.2 Meteorological Data

The weather station logs data at 5-minute intervals and sends the data to a web database by NextG telemetry. The data is accessible from the web site <http://console.teledata.com.au/index.html>.

A summary of monthly results is presented in **Table 3**. Charts of meteorological parameters are presented in **Figures 2** and **3**. A windrose is provided in **Figure 4**. This provides the frequency distribution of wind speed and direction during the month to display dominant wind directions.

A 6-monthly physical screening and system check of the meteorological station was conducted in March 2024 and is next due in September 2024. The screening and system check certificates are provided in **Appendix 1** (when required).

Approximately 100% of valid meteorological data was recorded for April 2024.

**Table 3:** Meteorological Data Summary for April 2024

Date	Min Temp	Avg Temp	Max Temp	RAIN mm	Min WS	Avg WS	Max WS	Min Humidity	Avg Humidity	Max Humidity	Min Pressure	Avg Pressure	Max Pressure
1/04/2024	16.7	22.1	29.7	0.0	0.3	4.4	18.7	32.1	69.9	94.7	996.2	999.3	1002.1
2/04/2024	16.5	20.1	24.7	4.4	0.5	4.7	20.3	42.8	76.8	98.8	990.3	993.5	997.2
3/04/2024	13.4	17.9	24.9	0.0	0.0	3.2	16.9	43.9	71.9	97.5	996.1	999.2	1003.3
4/04/2024	15.8	16.5	17.4	15.0	0.2	2.4	11.7	88.4	98.2	100.0	1002.0	1004.0	1006.1
5/04/2024	15.9	17.2	18.7	90.0	0.1	5.3	28.1	96.7	99.8	100.0	997.7	1002.4	1005.4
6/04/2024	17.2	21.2	26.2	30.8	0.6	5.0	18.4	46.8	75.9	100.0	992.9	994.9	997.6
7/04/2024	16.5	20.9	26.9	0.0	0.1	3.5	13.0	42.1	67.0	85.9	988.9	991.5	994.5
8/04/2024	15.9	18.4	25.3	0.0	0.1	2.9	15.7	48.9	80.6	96.5	989.8	991.1	992.7
9/04/2024	10.1	15.0	20.9	0.0	0.1	3.8	18.6	42.5	84.0	100.0	989.5	991.4	994.3
10/04/2024	10.6	14.8	19.6	0.0	0.0	5.4	20.3	43.3	58.7	72.4	993.6	996.0	998.1
11/04/2024	9.8	15.5	21.7	0.0	0.1	3.9	13.0	42.8	70.1	95.3	998.0	1000.2	1001.6
12/04/2024	11.6	17.6	23.1	0.0	0.0	4.4	11.9	44.8	72.6	100.0	998.7	1000.9	1003.3
13/04/2024	13.0	17.7	24.2	0.0	0.0	3.1	21.3	51.3	85.3	100.0	999.8	1001.4	1003.6
14/04/2024	14.5	18.6	25.3	0.0	0.0	2.8	16.1	45.6	86.3	100.0	1000.6	1002.6	1004.3
15/04/2024	14.3	18.5	26.3	0.0	0.1	2.4	17.6	29.8	78.4	100.0	1000.8	1002.8	1004.6
16/04/2024	13.2	17.6	24.2	0.0	0.1	3.3	17.2	55.2	86.5	99.3	1001.4	1003.4	1005.3
17/04/2024	14.7	17.6	23.6	0.8	0.2	3.1	18.6	71.0	94.0	100.0	1001.1	1003.2	1005.7
18/04/2024	14.2	17.2	23.5	2.2	0.0	2.1	10.3	58.1	92.0	100.0	994.4	997.4	1001.1
19/04/2024	10.9	14.8	18.9	0.2	0.0	2.2	8.9	50.7	80.4	99.9	995.5	998.4	1002.6
20/04/2024	13.2	14.6	17.7	3.8	0.8	5.5	14.2	76.4	93.1	100.0	1002.0	1004.9	1007.8
21/04/2024	12.6	15.4	20.1	0.2	0.1	3.8	14.0	67.5	84.9	100.0	1007.0	1008.3	1009.6
22/04/2024	12.1	16.0	21.6	0.0	0.0	2.7	8.1	62.8	87.7	100.0	1006.2	1008.0	1009.9
23/04/2024	12.7	18.4	23.9	0.0	0.0	3.6	11.6	49.7	74.4	100.0	999.5	1003.2	1006.6
24/04/2024	14.1	18.4	24.4	0.0	0.0	4.5	20.1	50.8	70.2	84.0	995.9	998.2	1001.0
25/04/2024	11.9	15.0	20.3	0.0	0.3	4.0	11.3	38.8	69.0	83.6	999.0	1000.5	1002.3
26/04/2024	8.8	13.8	20.0	0.0	0.0	3.2	10.5	40.4	74.4	98.3	1001.7	1003.7	1006.0
27/04/2024	9.1	14.8	21.0	0.0	0.0	2.4	8.8	59.6	87.0	100.0	1005.4	1006.8	1008.6
28/04/2024	12.1	17.0	23.4	0.0	0.0	2.4	11.0	45.4	84.6	100.0	1003.6	1005.9	1008.2
29/04/2024	13.7	18.9	25.0	0.0	0.0	3.2	10.9	37.1	67.9	97.3	1001.9	1003.5	1005.5
30/04/2024	12.8	14.9	16.8	2.8	0.3	3.7	10.2	80.8	90.3	100.0	1002.9	1005.8	1008.4
<b>Monthly</b>	<b>8.8</b>	<b>17.2</b>	<b>29.7</b>	<b>150.2</b>	<b>0.0</b>	<b>3.6</b>	<b>28.1</b>	<b>29.8</b>	<b>80.4</b>	<b>100.0</b>	<b>988.9</b>	<b>1000.7</b>	<b>1009.9</b>

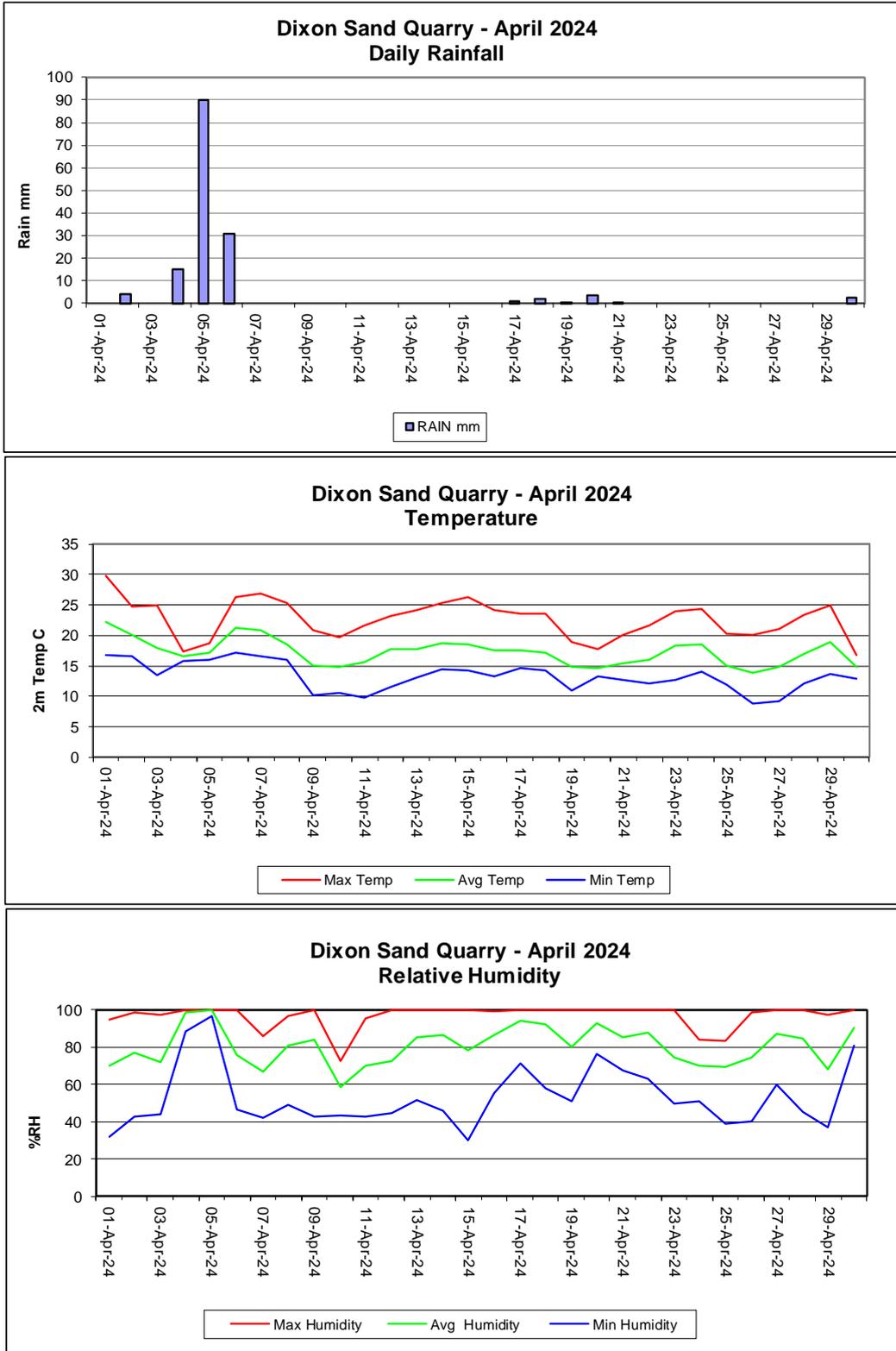
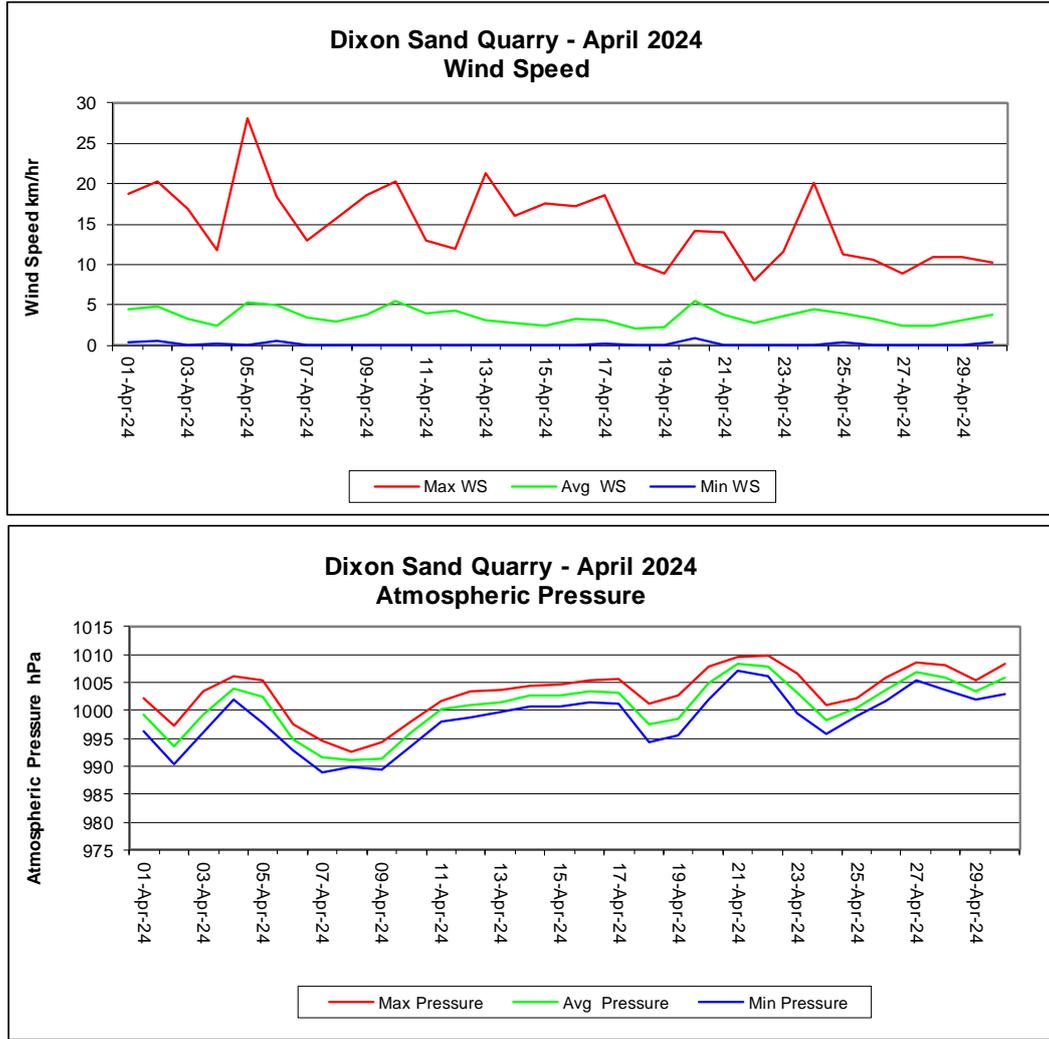


Figure 2: Daily Rainfall, Temperature and Relative Humidity Charts



**Figure 3:** Wind Speed and Atmospheric Pressure Charts

### Dixon Sand Quarry - Windrose APRIL 2024

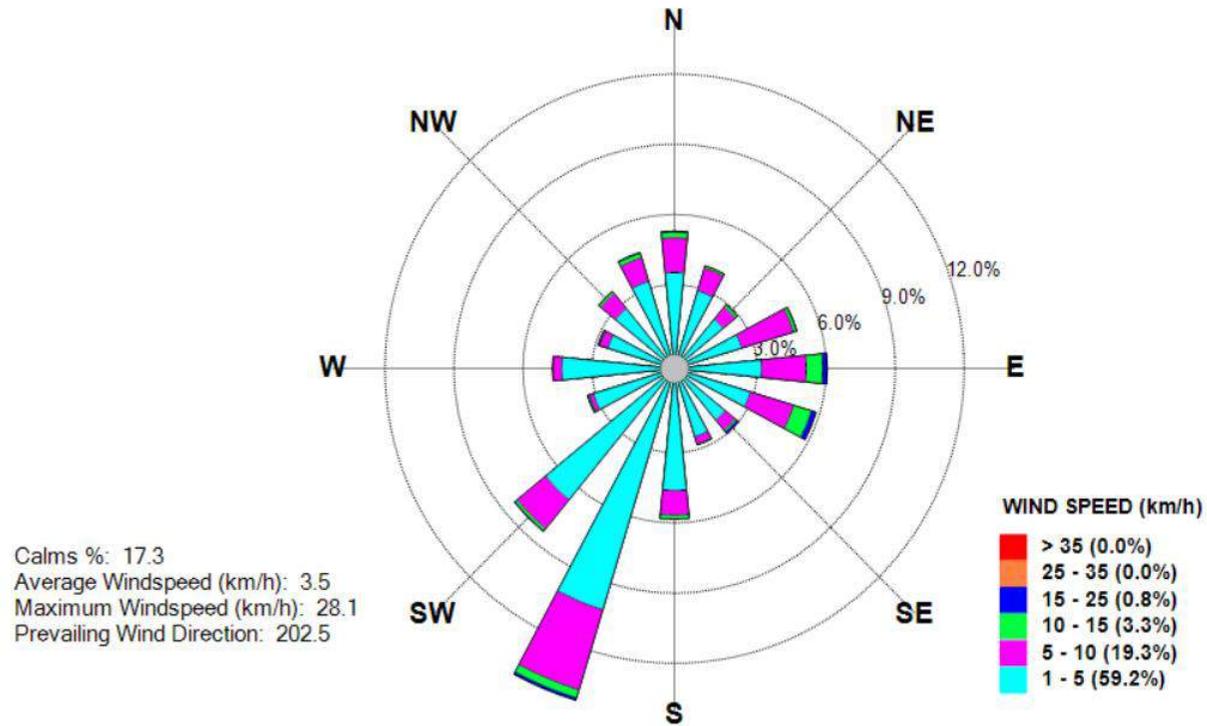


Figure 4: Monthly Windrose

## **Appendix 1**

Calibration Documents (when required)



**CBased Environmental  
Pty Limited**

ABN 62 611 924 264

**Dixon Sand Quarry**

**Environmental Monitoring  
Air Quality**

**Tapered Element Oscillating Microbalance  
(TEOM) (PM<sub>10</sub>) and Meteorological Data**

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**MAY 2024**

A handwritten signature in black ink that reads "Colin Davies".

---

Colin Davies BSc MEIA CENVP  
Environmental Scientist  
Date: 28 June 2024

CBased Environmental Pty Ltd  
Unit 3, 2 Enterprise Crescent SINGLETON NSW 2330  
☎ (02) 65713334

## 1.0 Summary

CBased Environmental Pty Limited is contracted by Dixon Sand to conduct continuous Tapered Element Oscillating Microbalance (TEOM) for fine particulates (PM<sub>10</sub>) and meteorological monitoring for the Dixon Sand Quarry. The information is required to assess air quality levels. The results for the TEOM and meteorological site are included in this report.

The monitoring programme includes:

- One continuous TEOM PM<sub>10</sub> monitor; and
- One continuous meteorological station.

This monthly report for May 2024 was prepared by CBased Environmental and includes the following:

- TEOM (PM<sub>10</sub>) monitoring results; and
- Meteorological results.

In accordance with Schedule 3, Condition 7 of the Dixon Sand development Consent and the Dixon Sand EPL;

- 24-hour average PM<sub>10</sub> results were below the NEPM 24-hour maximum criteria of 50ug/m<sup>3</sup>;
- 24-hour average PM<sub>10</sub> results were below the Dixon Sand Quarry EPL limit of 42ug/m<sup>3</sup>;
- The PM<sub>10</sub> annual average is below the Dixon Sand Quarry consent annual average criteria of 30ug/m<sup>3</sup>; and
- The calculated TSP is below the Dixon Sand Quarry annual average criteria of 90ug/m<sup>3</sup>.

Note: Based on the available data, statements in green indicate current conformance to Dixon Sand Quarry Air Quality Impact Assessment criteria, statements in red indicate possible non-conformance. Year to date annual average for PM<sub>10</sub> is calculated from 1 July 2023 for TEOM's coinciding with the Dixon Sand project year. An annual amount of data has not yet been collected.

Approximately 100% of valid meteorological data was recorded for May 2024.

Approximately 100% of valid TEOM data was available for May 2024.

## 2.0 Sampling Programme

The TEOM is sited and operated to the applicable Australian Standard and/or NSW EPA approved methods. The following Australian Standards were used:

- AS3580.9.8 - “Methods for Sampling and Analysis of Ambient Air. Determination of Suspended Particulates—PM<sub>10</sub> continuous direct mass method using a tapered element oscillating microbalance analyser”; and
- AS/NZS 3580.1.1 - “Methods for Sampling and Analysis of Ambient Air Part 1.1 Guide to Siting Air Monitoring Equipment”.

TEOM PM<sub>10</sub> results are 24-hour averages at midnight and are reported as µg/m<sup>3</sup> corrected to 0 degrees C and 101.3kPa.

All laboratory analysis was conducted by a National Association of Testing Authorities (NATA) accredited laboratory.

Air Quality monitoring site descriptions and locations are provided in **Table 1**.

**Table 1:** Dixon Sand Air Quality Monitoring Description and Locations

Monitor	Site Code	Location Description
TEOM PM <sub>10</sub>	TEOM	Old North Road, Maroota NSW
Meteorological Station	MET	Old North Road, Maroota NSW

## 3.0 Results

### 3.1 TEOM PM<sub>10</sub>

24-hour average TEOM PM<sub>10</sub> results from the AQMS data collection software are provided in **Table 2** and a chart of the data is provided in **Figure 1**.

During the monitoring period, individual 24-hour TEOM PM<sub>10</sub> results were below the National Environment Protection Measure (NEPM) short-term (24hr) impact criteria of 50ug/m<sup>3</sup> and the Dixon Sand Quarry EPL limit of 42ug/m<sup>3</sup>.

Approximately 100% of valid TEOM data was available for May 2024.

At present, the current TEOM PM<sub>10</sub> annual average is below the Dixon Sand Quarry annual average PM<sub>10</sub> criteria of 30ug/m<sup>3</sup>. The current annual average for calculated Total Suspended Particulates (TSP) is below the annual average criterion of 90ug/m<sup>3</sup>. The TSP is calculated by multiplying the PM<sub>10</sub> by 2.5. Note: the annual average is calculated from 1 July 2023 and therefore an annual amount of data has not yet been collected.

The quarterly TEOM calibration was conducted on 23 May 2024 (for June). The next calibration is due to be completed in September 2024. The calibration certificate is provided in **Appendix 1** (when required).

**Table 2:** Average Daily 24-hr TEOM PM<sub>10</sub> and TSP Results for May 2024 from AQMS and Annual Average PM<sub>10</sub> calculated from the 1 July 2023.

Date	PM <sub>10</sub> 24-hr Average (µg/m <sup>3</sup> )	PM <sub>10</sub> Annual Average (µg/m <sup>3</sup> )	24-hr Average TSP* (µg/m <sup>3</sup> )	Annual Average TSP** (µg/m <sup>3</sup> )
1/05/2024	11.1	15.2	27.8	38.0
2/05/2024	9.1	15.2	22.8	38.0
3/05/2024	9.9	15.2	24.8	37.9
4/05/2024	10.4	15.2	26.0	37.9
5/05/2024	7.0	15.1	17.5	37.8
6/05/2024	9.5	15.1	23.8	37.8
7/05/2024	10.0	15.1	25.0	37.8
8/05/2024	12.2	15.1	30.5	37.7
9/05/2024	10.5	15.1	26.3	37.7
10/05/2024	11.0	15.1	27.5	37.7
11/05/2024	8.0	15.0	20.0	37.6
12/05/2024	6.9	15.0	17.3	37.5
13/05/2024	13.7	15.0	34.3	37.5
14/05/2024	16.2	15.0	40.5	37.5
15/05/2024	18.0	15.0	45.0	37.6
16/05/2024	20.7	15.0	51.8	37.6
17/05/2024	17.8	15.1	44.5	37.6
18/05/2024	9.6	15.0	24.0	37.6
19/05/2024	9.0	15.0	22.5	37.5
20/05/2024	15.5	15.0	38.8	37.5
21/05/2024	11.3	15.0	28.3	37.5
22/05/2024	12.7	15.0	31.8	37.5
23/05/2024	10.6	15.0	26.4	37.5
24/05/2024	20.8	15.0	52.0	37.5
25/05/2024	16.5	15.0	41.3	37.5
26/05/2024	18.3	15.0	45.8	37.5
27/05/2024	20.8	15.0	52.0	37.6
28/05/2024	20.1	15.0	50.3	37.6
29/05/2024	19.6	15.1	49.0	37.7
30/05/2024	16.0	15.1	40.0	37.7
31/05/2024	11.5	15.1	28.8	37.6

\*Calculated from PM<sub>10</sub>

\*\*Calculated from PM<sub>10</sub> Annual Average

Note: results above the Dixon Sand EPL criteria limit of 42 ug/m<sup>3</sup> highlighted in yellow, when applicable

No Data (ND) = <18hrs hour of valid data to calculate a 24hr average

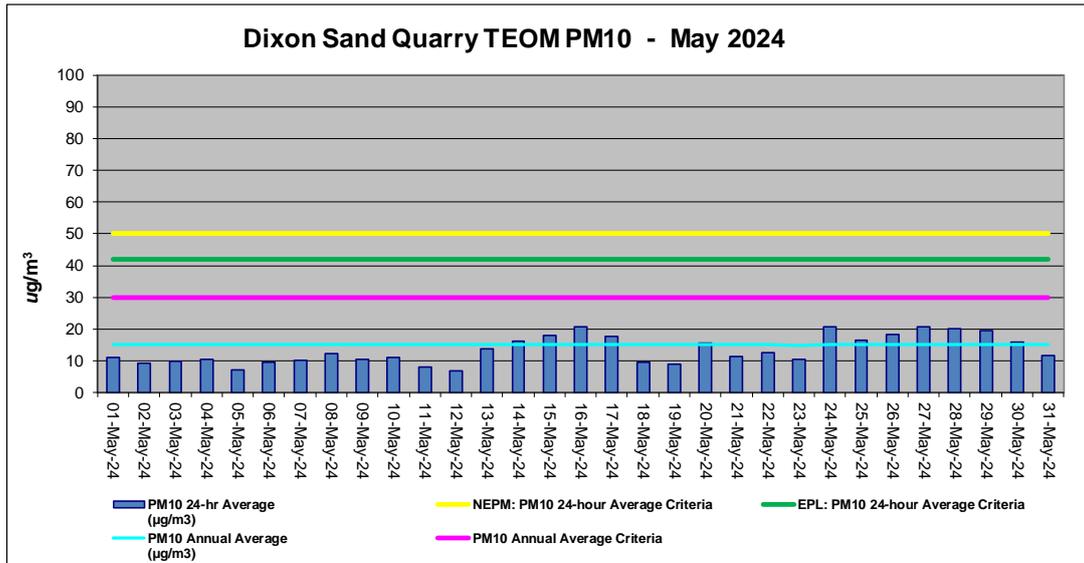


Figure 1: TEOM PM<sub>10</sub> 24 hr, Annual Average and Criteria

### 3.2 Meteorological Data

The weather station logs data at 5-minute intervals and sends the data to a web database by NextG telemetry. The data is accessible from the web site <http://console.teledata.com.au/index.html>.

A summary of monthly results is presented in **Table 3**. Charts of meteorological parameters are presented in **Figures 2** and **3**. A windrose is provided in **Figure 4**. This provides the frequency distribution of wind speed and direction during the month to display dominant wind directions.

A 6-monthly physical screening and system check of the meteorological station was conducted in March 2024 and is next due in September 2024. The screening and system check certificates are provided in **Appendix 1** (when required).

Approximately 100% of valid meteorological data was recorded for May 2024.

**Table 3:** Meteorological Data Summary for May 2024

Date	Min Temp	Avg Temp	Max Temp	RAIN mm	Min WS	Avg WS	Max WS	Min Humidity	Avg Humidity	Max Humidity	Min Pressure	Avg Pressure	Max Pressure
1/05/2024	11.2	13.4	17.0	1.4	0.4	4.8	16.3	76.4	90.1	100.0	1007.5	1009.5	1011.0
2/05/2024	11.1	13.7	18.2	0.6	0.2	3.3	13.9	68.5	92.5	100.0	1009.2	1010.4	1012.0
3/05/2024	11.3	13.3	16.2	10.2	0.2	2.5	9.7	86.0	98.1	100.0	1006.6	1008.5	1010.4
4/05/2024	12.5	14.4	18.1	3.8	0.1	2.0	7.4	83.9	98.1	100.0	1001.9	1004.1	1006.4
5/05/2024	12.8	13.8	16.0	13.4	0.1	3.7	11.6	98.0	99.9	100.0	1000.6	1002.0	1004.1
6/05/2024	11.4	14.4	19.0	32.6	0.2	4.7	19.0	60.9	90.3	100.0	1003.9	1007.3	1010.2
7/05/2024	11.4	14.0	18.5	0.4	0.1	2.8	9.6	67.9	94.1	100.0	1009.0	1010.1	1011.7
8/05/2024	11.5	14.0	17.7	7.2	0.1	1.9	5.6	92.0	99.5	100.0	1008.8	1010.4	1012.2
9/05/2024	13.1	14.8	19.1	1.0	0.1	2.0	7.9	80.0	98.2	100.0	1009.7	1010.9	1012.5
10/05/2024	13.5	14.9	18.5	0.2	0.0	2.0	13.7	73.9	96.4	100.0	1007.9	1009.6	1011.2
11/05/2024	13.6	14.6	16.1	15.6	0.0	3.0	14.9	90.5	99.1	100.0	1002.7	1005.4	1008.2
12/05/2024	13.1	14.6	19.8	1.8	0.1	3.3	14.8	72.6	95.1	100.0	998.4	1000.3	1002.7
13/05/2024	13.4	15.8	19.2	0.8	0.2	4.1	18.9	76.6	91.8	100.0	997.6	1000.3	1003.3
14/05/2024	11.9	15.9	21.5	0.0	0.1	2.4	9.1	44.9	79.5	100.0	1003.1	1005.5	1008.7
15/05/2024	11.5	15.7	20.4	0.0	0.0	2.8	12.0	62.8	88.4	100.0	1006.1	1008.2	1010.2
16/05/2024	11.5	15.1	19.5	0.0	0.0	1.8	6.2	75.2	92.5	100.0	1006.7	1008.4	1010.6
17/05/2024	11.8	15.9	21.7	0.0	0.0	1.6	6.6	52.8	84.0	99.9	1001.0	1003.5	1006.7
18/05/2024	9.2	11.4	14.0	0.2	0.3	7.4	23.2	60.1	75.4	92.6	1000.8	1003.0	1004.3
19/05/2024	6.9	11.3	16.9	0.0	0.0	3.1	13.3	38.0	62.3	83.8	1000.0	1001.7	1003.3
20/05/2024	6.8	11.4	16.7	0.0	0.0	3.2	11.4	54.6	68.7	81.8	1000.8	1003.1	1005.6
21/05/2024	10.4	13.0	17.9	0.0	0.2	4.5	13.9	56.9	76.1	92.6	1005.1	1006.4	1007.8
22/05/2024	8.0	12.2	17.8	0.0	0.1	2.6	8.6	47.8	75.0	99.2	1004.2	1006.1	1007.8
23/05/2024	7.8	12.5	19.1	0.0	0.0	1.9	8.7	45.5	77.8	99.9	1005.5	1006.6	1008.3
24/05/2024	8.3	12.9	19.1	0.0	0.0	2.0	7.5	51.7	86.3	100.0	1005.3	1006.8	1008.1
25/05/2024	10.1	12.8	16.8	0.0	0.0	1.4	5.1	71.1	92.3	100.0	1005.9	1007.1	1008.9
26/05/2024	9.9	14.1	20.0	0.0	0.0	2.1	7.5	51.1	84.2	100.0	1003.2	1005.1	1006.5
27/05/2024	8.6	13.1	19.5	0.0	0.1	1.9	7.4	50.7	83.1	100.0	1004.0	1005.3	1007.3
28/05/2024	8.4	14.0	20.7	0.0	0.1	2.4	8.0	47.1	76.8	100.0	1006.7	1007.8	1009.3
29/05/2024	8.7	14.8	22.0	0.2	0.2	3.2	11.0	52.2	80.6	100.0	1006.0	1007.9	1009.6
30/05/2024	10.2	16.3	22.0	0.0	0.2	4.3	15.8	50.3	71.7	97.3	1000.7	1004.7	1007.5
31/05/2024	15.5	17.7	19.7	0.0	0.6	7.1	22.5	59.4	72.1	95.1	996.3	998.5	1000.6
<b>Monthly</b>	<b>6.8</b>	<b>14.1</b>	<b>22.0</b>	<b>89.4</b>	<b>0.0</b>	<b>3.1</b>	<b>23.2</b>	<b>38.0</b>	<b>86.1</b>	<b>100.0</b>	<b>996.3</b>	<b>1005.9</b>	<b>1012.5</b>

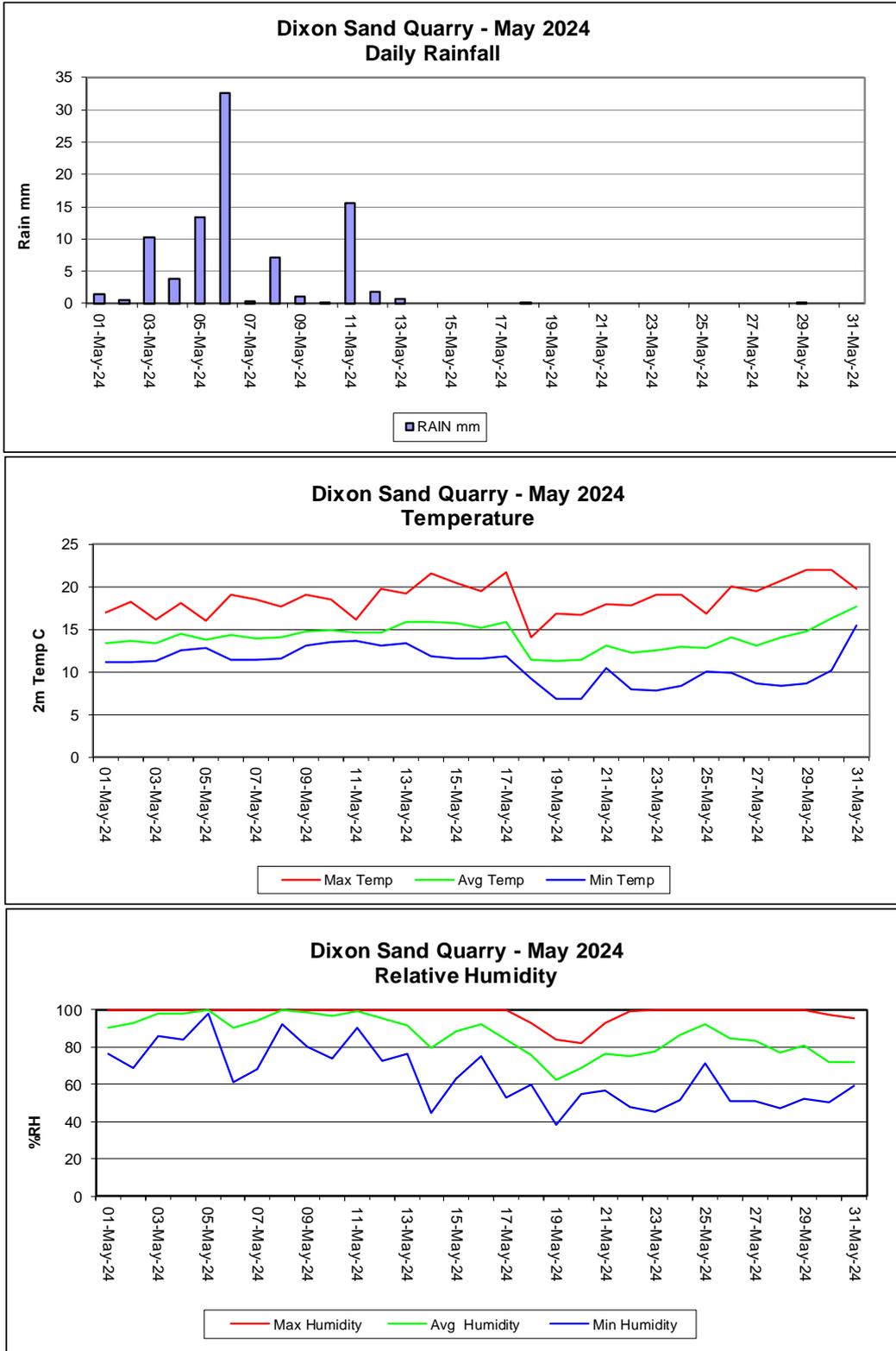


Figure 2: Daily Rainfall, Temperature and Relative Humidity Charts

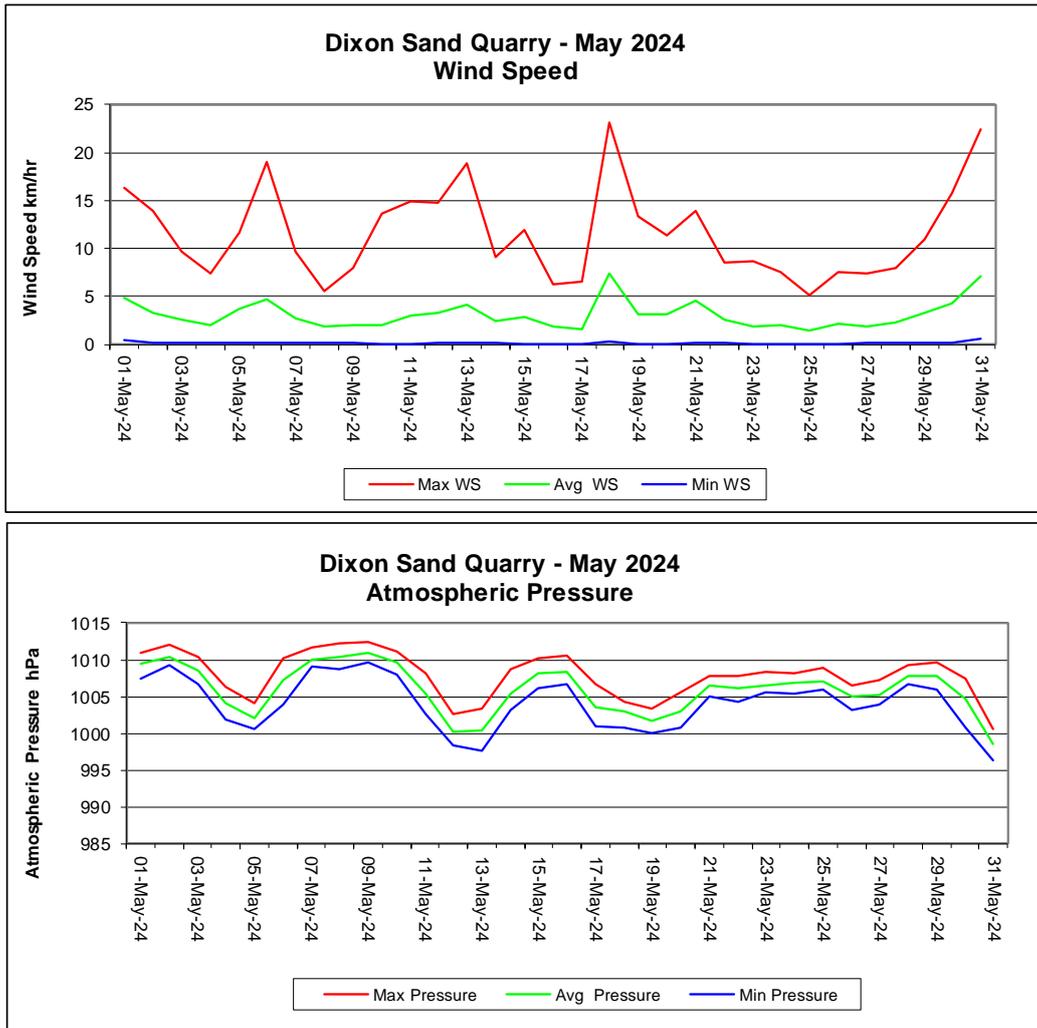


Figure 3: Wind Speed and Atmospheric Pressure Charts

## Dixon Sand Quarry - Windrose MAY 2024

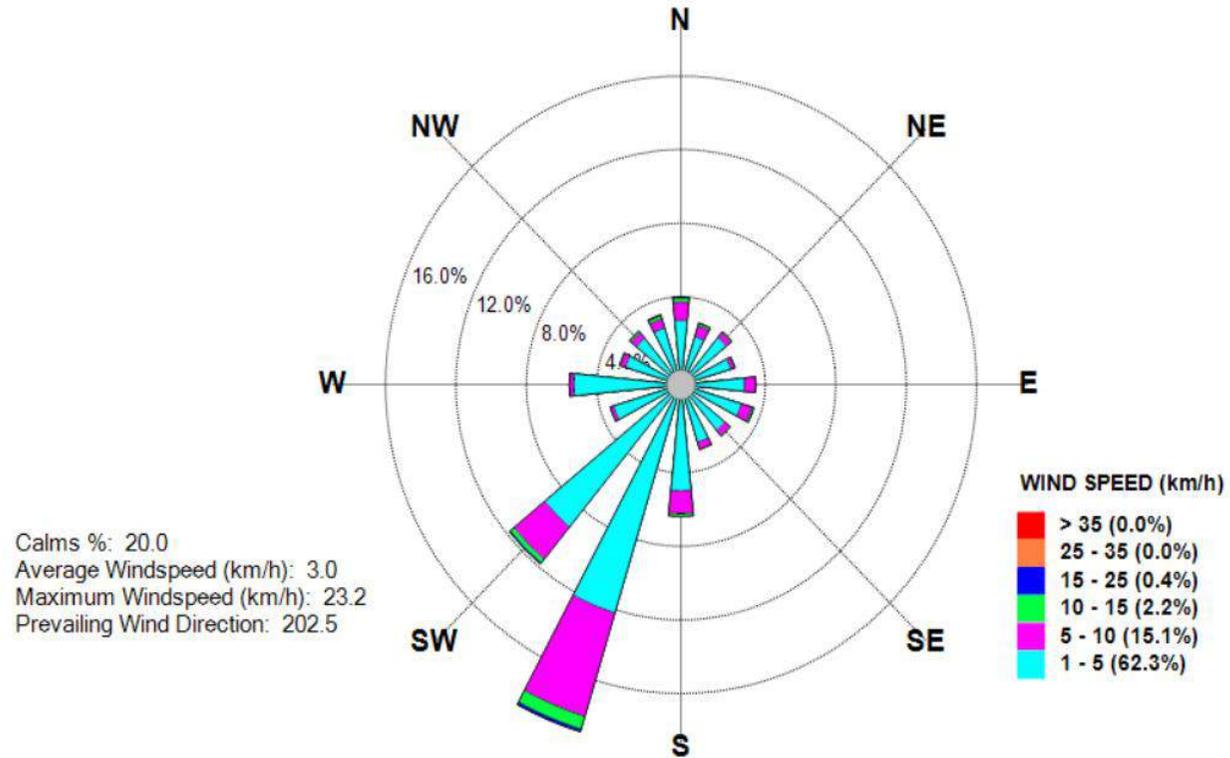


Figure 4: Monthly Windrose

## **Appendix 1**

Calibration Documents (when required)



# Continuous Air Quality Monthly/Quarterly/Six Monthly/Annual TEOM Maintenance and Calibration – 1400AB



TEOM Client/Site: Dixon Sudd Teom1

Date: 23/5/24

1. TEOM Data Screen SERIAL No: 25570 Firmware: AB version

Condition	Current Data	Acceptable Data	Pass (Tick)	Fail (Tick)
Operating Condition	<u>OK</u>	Green - Normal	✓	
Date/time	TEOM: <u>16-26</u> Actual: <u>15-30</u>	Current Date/time correct within 5 minutes	✓ DST	
PM-10 24hr av	<u>12.2</u>	Positive values	✓	
Filter loading PM10	<u>56</u>	<80 %	✓	
Frequency PM-10	<u>253.62831</u>	200-300 Hz	✓	
Noise PM-10	<u>0.034</u>	<0.100ug	✓	

Comment: If filter load >80% but <90% and if flows Ok then data is OK

**Comments:**

## 2. System Status

Condition	Current Data	Acceptable Data	Pass (Tick)	Fail (Tick)
Vacuum pump pressure	<u>NA: OK</u>	<0.50 atm	✓	
Warnings	<u>NIL</u>	No Warnings	✓	
If any warnings list:				

**Comments:**

Data Downloaded: YES/NO (circle)

Technician Name : COLIN DAVIS Signed [Signature]



**3. Instrument Conditions Ambient Conditions and Temperatures**

Condition	Current Data	Acceptable Data	Pass (Tick)	Fail (Tick)
Ambient Temperature	17.3	-10 to 50 C	✓	
Ambient Dew Point	NA	-10 to 50 C		
Ambient Pressure	0.981	0.9-1.1 atm	✓	
Ambient Relative Humidity	NA	10-100 %RH		
Cap temperature	50.00	50.00 +/- 0.10 C	✓	
Case temperature	50.00	50.00 +/- 0.10 C	✓	
Main (PM-10) Air Tube temp	50.00	50.00 +/- 0.10 C	✓	

Comments:

**4. Instrument Conditions – Flows**

Condition	Current Data	Acceptable Data	Pass (Tick)	Fail (Tick)
Main (PM-10) Flow rate	3.00	2.82 – 3.18 lpm	✓	
Bypass Flow rate	13.68	12.95 – 14.39 lpm	✓	
Total Flow rate	16.68	15.67 – 17.67 lpm	✓	

Comments:

**Results: (Tick box)**

- There were NO equipment faults found. No action required – (file report)
- There were faults found (Fails) – Were these fixed on site: YES/NO (circle)  
**Any Fails that cannot be repaired on site must be reported to CBased:**  
**Office: 65713334 or email [cbased@bigpond.com](mailto:cbased@bigpond.com)**  
**Date faults notified to CBased: \_\_\_\_\_**

Comments/Action Required:



**Calibration/Maintenance**

- 1. 1405A: Were Filters replaced  YES /  NO
- 2. PM10 Inlet head cleaned  YES /  NO
- 3. If measurement filters were replaced, confirm stable results after change. Stable particulate results confirmed  YES /  NO

Channel	Filter Load %	Frequency Hz initial	Frequency check 1min	Frequency check 3min	Frequency check 5min
PM10	18	255.56541	255.56538	255.56539	255.56538

✓OK

Frequency should not drift by more than 0.0010 between readings (if instrument is thermodynamically stable)  
 Pass/Fail – if Fail – install new filter and redo stability test.

- 4. Instrument clock verified (Refer Section 1)  YES /  NO.  
 If Time changed – clock reset OK YES/NO or  NA (not changed)  
 Comments:

- 5. Were TEOM in line and rear TEOM filters checked for cleanliness and replaced if necessary.  YES /  NO.  
 Comments if changed:

- 6. TEOM Cleaned and Air Conditioner checked  YES /  NO. Air Conditioner settings or operational status: 5 med cool

**Tetralcal Flow/Temp/Pressure Calibrator Serial No:** 1007 Refer to calibration corrections for Temperature/Pressure and Flows and apply to all readings.

**Quarterly or Six Monthly Calibration**

- 1. Flow Verification – Conducted  YES /  NO

PM10 Flow verified Flow l/min 3.05 Error % 1.7 (allowed error <6%)  PASS /  FAIL

Bypass Flow verified Flow l/min 13.95 Error % 2.0 (allowed error <6%)  PASS /  FAIL  
 If fail then complete a full multipoint recalibration and review previous data from last good flow check. **Comments if Flows recalibrated:**

- 2. Leak Check – Conducted  YES /  NO

PM10 actual 0.13 < Limit 0.15

Bypass actual 0.42 < Limit 0.60

Leak check  PASS /  FAIL – If fail then find leak and retest.  
 Comments: OK



Annual Calibration/Maintenance

**1. Temperature and Pressure Calibration – Conducted YES/NO**

Reference Temperature: \_\_\_\_\_ C TEOM Temperature \_\_\_\_\_ C  
if difference +/- 1 C recalibrate sensor. Sensor recalibrated YES/NO

Reference Pressure: \_\_\_\_\_ atm TEOM Pressure \_\_\_\_\_ atm  
if difference +/- 0.010 atm recalibrate sensor. Sensor recalibrated YES/NO

**Note: Tetralcal measures Atmospheric Pressure in mm Hg or mb or hPa  
For mb or hPa divide tetralcal result by 1013.25 to change units to atm.  
For mmHg divide tetralcal result by 760 to change units to atm.**

**2. Flow Calibration – Conducted YES/NO**

**PM10**

Set point 2.4 Actual: \_\_\_\_\_  
Set point 3.6 Actual: \_\_\_\_\_  
Set point 3.0 Actual: \_\_\_\_\_ After calibration Final: \_\_\_\_\_ l/min

NA

**BYPASS**

Set point 10.9 Actual: \_\_\_\_\_  
Set point 16.4 Actual: \_\_\_\_\_  
Set point 13.67 Actual: \_\_\_\_\_ After calibration Final: \_\_\_\_\_ l/min

**3. Mass calibration (K0) Verification – Conducted YES/NO**

Actual measured KO = \_\_\_\_\_ TEOM stated KO \_\_\_\_\_ Error %: \_\_\_\_\_  
Allowed Error +/- 2.5%. PASS/FAIL  
If Error +/- 2.5% repeat. If confirmed consult manufacturer.  
Second Error % = \_\_\_\_\_ PASS/FAIL. Comments:  
If second test fails consult manufacturer.

**4. Annual Noise check - Conducted YES/NO**

Zero filter applied to TEOM and TEOM operated for at least 12 hours:  
Start date/time: \_\_\_\_\_ Finish date/time: \_\_\_\_\_  
Standard deviation of all recorded data (min 30 min averages) = \_\_\_\_\_ ug/m<sup>3</sup>  
Noise was less than 5ug/m<sup>3</sup> YES/NO

**5. Maintenance**

Air Inlet system cleaned YES/NO  
Pump Reconditioned YES/NO  
Check Waterproofing YES/NO  
Comments:





**CBased Environmental  
Pty Limited**

ABN 62 611 924 264

**Dixon Sand Quarry**

**Environmental Monitoring  
Air Quality**

**Tapered Element Oscillating Microbalance  
(TEOM) (PM<sub>10</sub>) and Meteorological Data**

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**JUNE 2024**

A handwritten signature in black ink that reads "Colin Davies".

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Colin Davies BSc MEIA CENVP  
Environmental Scientist  
Date 24 July 2024

CBased Environmental Pty Ltd  
Unit 3, 2 Enterprise Crescent SINGLETON NSW 2330  
☎ (02) 65713334

## 1.0 Summary

CBased Environmental Pty Limited is contracted by Dixon Sand to conduct continuous Tapered Element Oscillating Microbalance (TEOM) for fine particulates (PM<sub>10</sub>) and meteorological monitoring for the Dixon Sand Quarry. The information is required to assess air quality levels. The results for the TEOM and meteorological site are included in this report.

The monitoring programme includes:

- One continuous TEOM PM<sub>10</sub> monitor; and
- One continuous meteorological station.

This monthly report for June 2024 was prepared by CBased Environmental and includes the following:

- TEOM (PM<sub>10</sub>) monitoring results; and
- Meteorological results.

In accordance with Schedule 3, Condition 7 of the Dixon Sand development Consent and the Dixon Sand EPL;

- 24-hour average PM<sub>10</sub> results were below the NEPM 24-hour maximum criteria of 50ug/m<sup>3</sup>;
- 24-hour average PM<sub>10</sub> results were below the Dixon Sand Quarry EPL limit of 42ug/m<sup>3</sup>;
- The PM<sub>10</sub> annual average is below the Dixon Sand Quarry consent annual average criteria of 30ug/m<sup>3</sup>; and
- The calculated TSP is below the Dixon Sand Quarry annual average criteria of 90ug/m<sup>3</sup>.

Note: Based on the available data, statements in green indicate current conformance to Dixon Sand Quarry Air Quality Impact Assessment criteria, statements in red indicate possible non-conformance. Year to date annual average for PM<sub>10</sub> is calculated from 1 July 2023 for TEOM's coinciding with the Dixon Sand project year.

Approximately 100% of valid meteorological data was recorded for June 2024.

Approximately 100% of valid TEOM data was available for June 2024.

## 2.0 Sampling Programme

The TEOM is sited and operated to the applicable Australian Standard and/or NSW EPA approved methods. The following Australian Standards were used:

- AS3580.9.8 - “Methods for Sampling and Analysis of Ambient Air. Determination of Suspended Particulates—PM<sub>10</sub> continuous direct mass method using a tapered element oscillating microbalance analyser”; and
- AS/NZS 3580.1.1 - “Methods for Sampling and Analysis of Ambient Air Part 1.1 Guide to Siting Air Monitoring Equipment”.

TEOM PM<sub>10</sub> results are 24-hour averages at midnight and are reported as µg/m<sup>3</sup> corrected to 0 degrees C and 101.3kPa.

All laboratory analysis was conducted by a National Association of Testing Authorities (NATA) accredited laboratory.

Air Quality monitoring site descriptions and locations are provided in **Table 1**.

**Table 1:** Dixon Sand Air Quality Monitoring Description and Locations

Monitor	Site Code	Location Description
TEOM PM <sub>10</sub>	TEOM	Old North Road, Maroota NSW
Meteorological Station	MET	Old North Road, Maroota NSW

## 3.0 Results

### 3.1 TEOM PM<sub>10</sub>

24-hour average TEOM PM<sub>10</sub> results from the AQMS data collection software are provided in **Table 2** and a chart of the data is provided in **Figure 1**.

During the monitoring period, individual 24-hour TEOM PM<sub>10</sub> results were below the National Environment Protection Measure (NEPM) short-term (24hr) impact criteria of 50ug/m<sup>3</sup> and the Dixon Sand Quarry EPL limit of 42ug/m<sup>3</sup>.

Approximately 100% of valid TEOM data was available for June 2024.

At present, the current TEOM PM<sub>10</sub> annual average is below the Dixon Sand Quarry annual average PM<sub>10</sub> criteria of 30ug/m<sup>3</sup>. The current annual average for calculated Total Suspended Particulates (TSP) is below the annual average criterion of 90ug/m<sup>3</sup>. The TSP is calculated by multiplying the PM<sub>10</sub> by 2.5. Note: the annual average is calculated from 1 July 2023 and therefore an annual amount of data has now been collected.

The quarterly TEOM calibration was conducted in May 2024 (for June). The next calibration is due to be completed in September 2024. The calibration certificate is provided in **Appendix 1** (when required).

**Table 2:** Average Daily 24-hr TEOM PM<sub>10</sub> and TSP Results for June 2024 from AQMS and Annual Average PM<sub>10</sub> calculated from the 1 July 2023.

Date	PM <sub>10</sub> 24-hr Average (µg/m <sup>3</sup> )	PM <sub>10</sub> Annual Average (µg/m <sup>3</sup> )	24-hr Average TSP* (µg/m <sup>3</sup> )	Annual Average TSP** (µg/m <sup>3</sup> )
1/06/2024	8.9	15.0	22.3	37.6
2/06/2024	5.4	15.0	13.5	37.5
3/06/2024	12.4	15.0	31.0	37.5
4/06/2024	12.9	15.0	32.3	37.5
5/06/2024	14.8	15.0	37.0	37.5
6/06/2024	12.8	15.0	32.0	37.5
7/06/2024	5.0	15.0	12.5	37.4
8/06/2024	7.6	14.9	19.0	37.3
9/06/2024	6.6	14.9	16.5	37.3
10/06/2024	7.3	14.9	18.3	37.2
11/06/2024	9.0	14.9	22.5	37.2
12/06/2024	12.7	14.9	31.8	37.2
13/06/2024	10.4	14.9	26.0	37.1
14/06/2024	14.1	14.9	35.3	37.1
15/06/2024	7.1	14.8	17.8	37.1
16/06/2024	5.3	14.8	13.3	37.0
17/06/2024	9.3	14.8	23.3	37.0
18/06/2024	12.9	14.8	32.3	37.0
19/06/2024	8.2	14.8	20.5	36.9
20/06/2024	13.9	14.8	34.8	36.9
21/06/2024	12.2	14.8	30.5	36.9
22/06/2024	7.9	14.7	19.8	36.8
23/06/2024	6.5	14.7	16.3	36.8
24/06/2024	10.6	14.7	26.5	36.7
25/06/2024	10.8	14.7	27.0	36.7
26/06/2024	13.3	14.7	33.3	36.7
27/06/2024	12.9	14.7	32.3	36.7
28/06/2024	13.9	14.7	34.8	36.7
29/06/2024	9.6	14.7	24.0	36.7
30/06/2024	8.1	14.6	20.3	36.6

\*Calculated from PM<sub>10</sub>

\*\*Calculated from PM<sub>10</sub> Annual Average

Note: results above the Dixon Sand EPL criteria limit of 42 µg/m<sup>3</sup> highlighted in yellow, when applicable

No Data (ND) = <18hrs hour of valid data to calculate a 24hr average

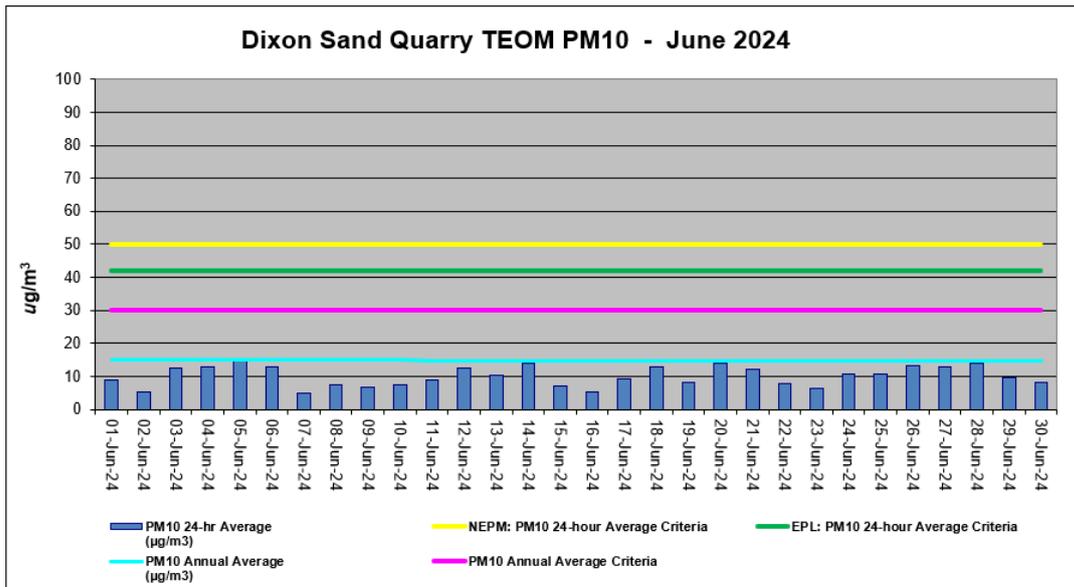


Figure 1: TEOM PM<sub>10</sub> 24 hr, Annual Average and Criteria

### 3.2 Meteorological Data

The weather station logs data at 5-minute intervals and sends the data to a web database by NextG telemetry. The data is accessible from the web site <http://console.teledata.com.au/index.html>.

A summary of monthly results is presented in **Table 3**. Charts of meteorological parameters are presented in **Figures 2** and **3**. A windrose is provided in **Figure 4**. This provides the frequency distribution of wind speed and direction during the month to display dominant wind directions.

A 6-monthly physical screening and system check of the meteorological station was conducted in March 2024 and is next due in September 2024. The screening and system check certificates are provided in **Appendix 1** (when required).

Approximately 100% of valid meteorological data was recorded for June 2024.

**Table 3:** Meteorological Data Summary for June 2024

Date	Min Temp	Avg Temp	Max Temp	RAIN mm	Min WS	Avg WS	Max WS	Min Humidity	Avg Humidity	Max Humidity	Min Pressure	Avg Pressure	Max Pressure
1/06/2024	10.3	12.7	15.5	39.2	0.4	4.8	20.0	75.3	94.1	100.0	998.1	999.5	1000.7
2/06/2024	9.6	11.4	14.1	8.0	0.4	3.8	15.6	67.4	85.1	100.0	995.0	997.0	999.1
3/06/2024	8.6	11.3	15.5	0.0	0.3	3.6	18.7	41.4	65.5	82.6	991.1	992.9	995.0
4/06/2024	7.6	10.6	15.2	0.0	0.0	2.6	9.6	60.4	73.7	87.0	992.8	995.9	999.2
5/06/2024	8.2	11.8	15.9	0.0	0.1	2.7	9.4	68.1	89.9	100.0	997.1	998.6	999.9
6/06/2024	10.9	12.3	16.2	17.2	0.2	2.7	8.9	86.7	98.4	100.0	996.7	998.3	999.7
7/06/2024	11.2	12.6	15.3	5.6	0.2	4.3	13.7	83.4	96.7	100.0	992.3	993.9	996.7
8/06/2024	11.1	14.1	19.5	0.0	0.1	2.6	12.5	55.0	80.7	100.0	991.1	992.9	995.3
9/06/2024	8.9	13.8	19.8	0.0	0.0	3.1	11.4	47.2	69.6	86.4	995.1	997.2	1000.7
10/06/2024	8.0	11.2	15.8	0.0	0.3	2.9	18.9	46.9	70.0	81.7	999.9	1001.6	1003.8
11/06/2024	7.5	12.0	16.3	0.0	0.6	5.1	20.3	45.6	67.8	92.3	991.5	998.0	1003.1
12/06/2024	8.5	13.6	17.2	0.0	0.1	5.3	21.7	38.5	58.8	80.6	988.8	992.5	999.2
13/06/2024	6.9	9.8	13.6	0.0	0.4	3.9	15.0	53.0	67.5	91.3	998.9	1000.3	1001.6
14/06/2024	7.5	10.0	12.5	3.2	0.1	2.2	7.9	72.2	87.9	100.0	997.7	999.3	1000.7
15/06/2024	9.2	10.3	13.2	3.2	0.7	5.0	15.5	84.9	94.1	100.0	995.9	997.1	998.2
16/06/2024	6.5	9.8	14.8	0.2	0.1	3.5	13.1	44.9	68.9	89.4	993.5	995.1	996.7
17/06/2024	7.2	10.8	15.4	0.0	0.2	4.6	18.2	55.6	67.1	93.1	992.8	994.7	997.0
18/06/2024	6.6	10.3	15.2	0.0	0.0	2.5	16.9	47.2	72.3	94.6	994.8	996.4	997.8
19/06/2024	4.5	9.0	13.9	0.0	0.1	2.5	8.1	42.2	64.9	93.1	994.8	996.5	997.9
20/06/2024	5.0	10.0	15.0	0.0	0.1	2.6	9.9	41.6	62.9	82.6	996.1	997.0	998.5
21/06/2024	6.9	10.6	15.7	2.6	0.0	2.2	10.5	52.2	77.6	97.9	996.0	998.7	1002.7
22/06/2024	6.7	9.1	11.9	11.4	0.1	4.1	12.9	83.5	96.5	100.0	1002.4	1004.7	1006.2
23/06/2024	8.6	10.8	14.3	0.2	0.3	4.2	12.1	81.3	92.1	100.0	1001.4	1003.7	1005.8
24/06/2024	6.1	10.8	16.3	0.2	0.2	2.8	7.0	59.0	86.2	99.9	998.3	1000.1	1001.4
25/06/2024	7.2	11.9	17.4	0.0	0.0	3.3	10.9	46.7	75.2	96.9	999.8	1001.1	1003.1
26/06/2024	9.5	14.2	19.9	0.0	0.2	3.5	16.6	48.2	70.2	94.8	997.8	999.9	1001.5
27/06/2024	8.4	12.4	17.5	0.0	0.2	2.3	7.6	44.4	60.0	74.7	1000.7	1002.2	1004.1
28/06/2024	7.0	11.7	18.0	0.0	0.0	2.3	9.4	34.9	60.8	79.0	1003.5	1004.7	1007.3
29/06/2024	6.3	13.6	20.7	0.0	0.4	6.0	15.9	47.9	65.1	85.3	994.5	999.3	1003.4
30/06/2024	7.5	11.6	16.1	9.8	0.2	4.2	12.9	75.6	95.4	100.0	992.0	995.7	1000.6
<b>Monthly</b>	<b>4.5</b>	<b>11.5</b>	<b>20.7</b>	<b>100.8</b>	<b>0.0</b>	<b>3.5</b>	<b>21.7</b>	<b>34.9</b>	<b>77.2</b>	<b>100.0</b>	<b>988.8</b>	<b>998.2</b>	<b>1007.3</b>

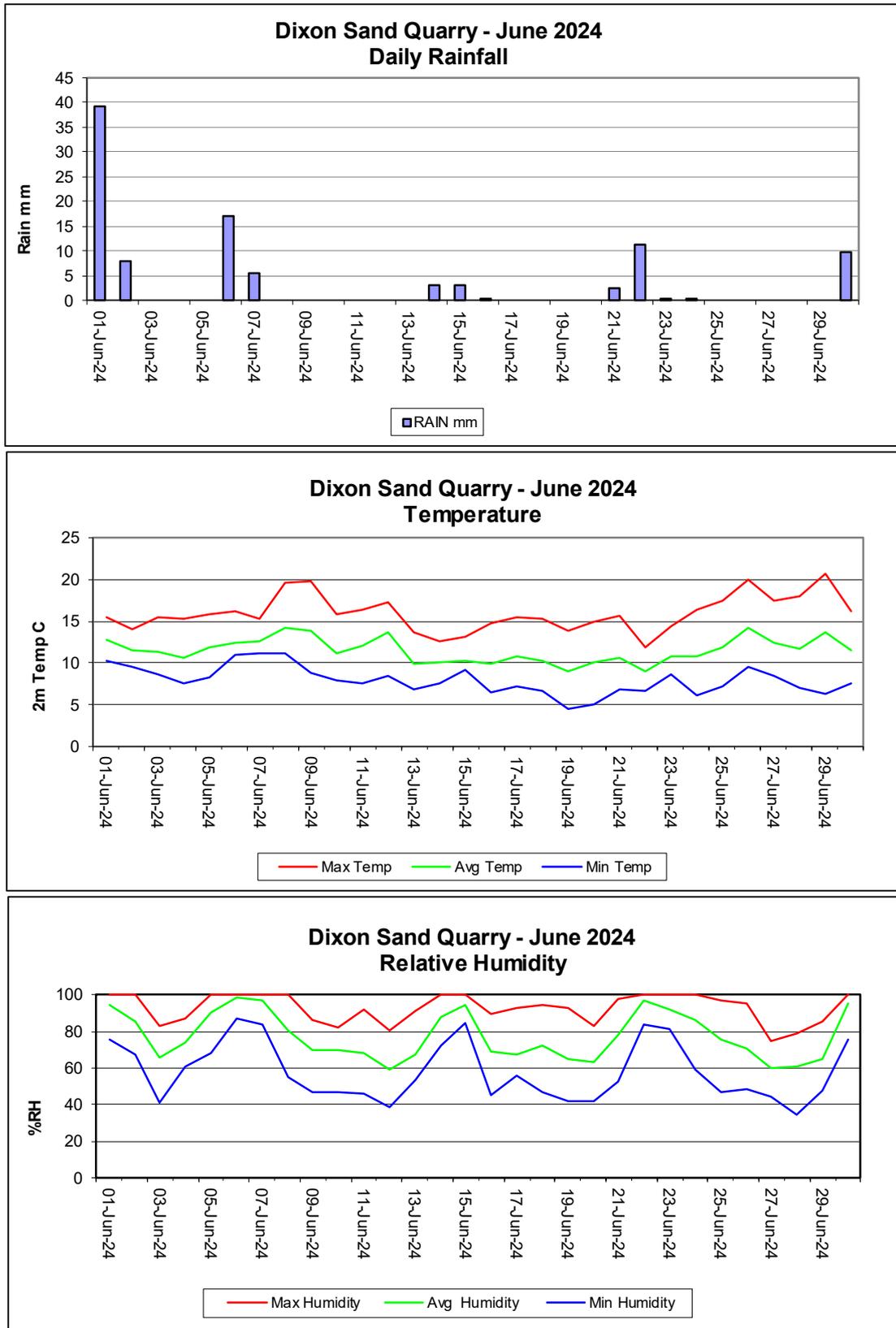


Figure 2: Daily Rainfall, Temperature and Relative Humidity Charts

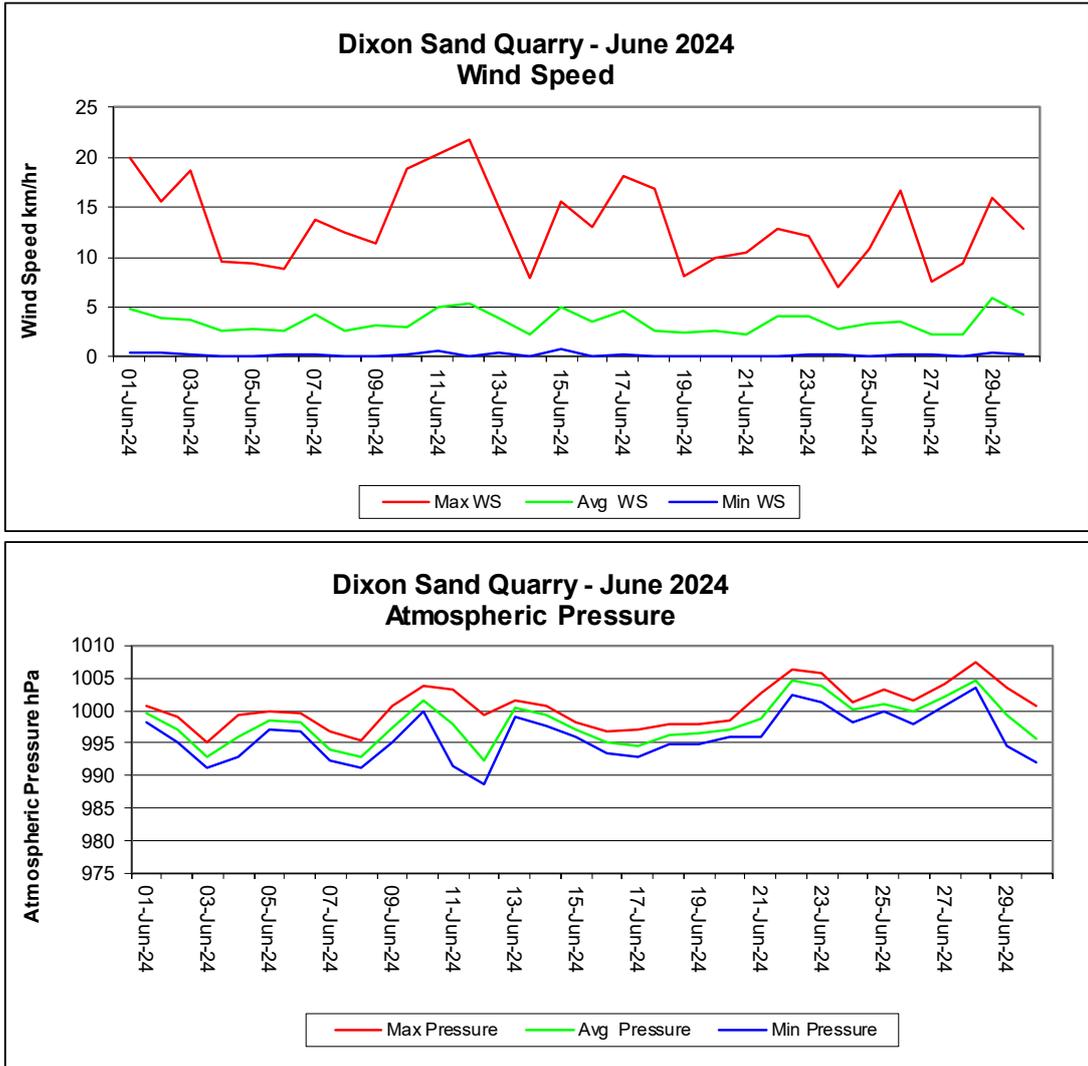


Figure 3: Wind Speed and Atmospheric Pressure Charts

### Dixon Sand Quarry - Windrose JUNE 2024

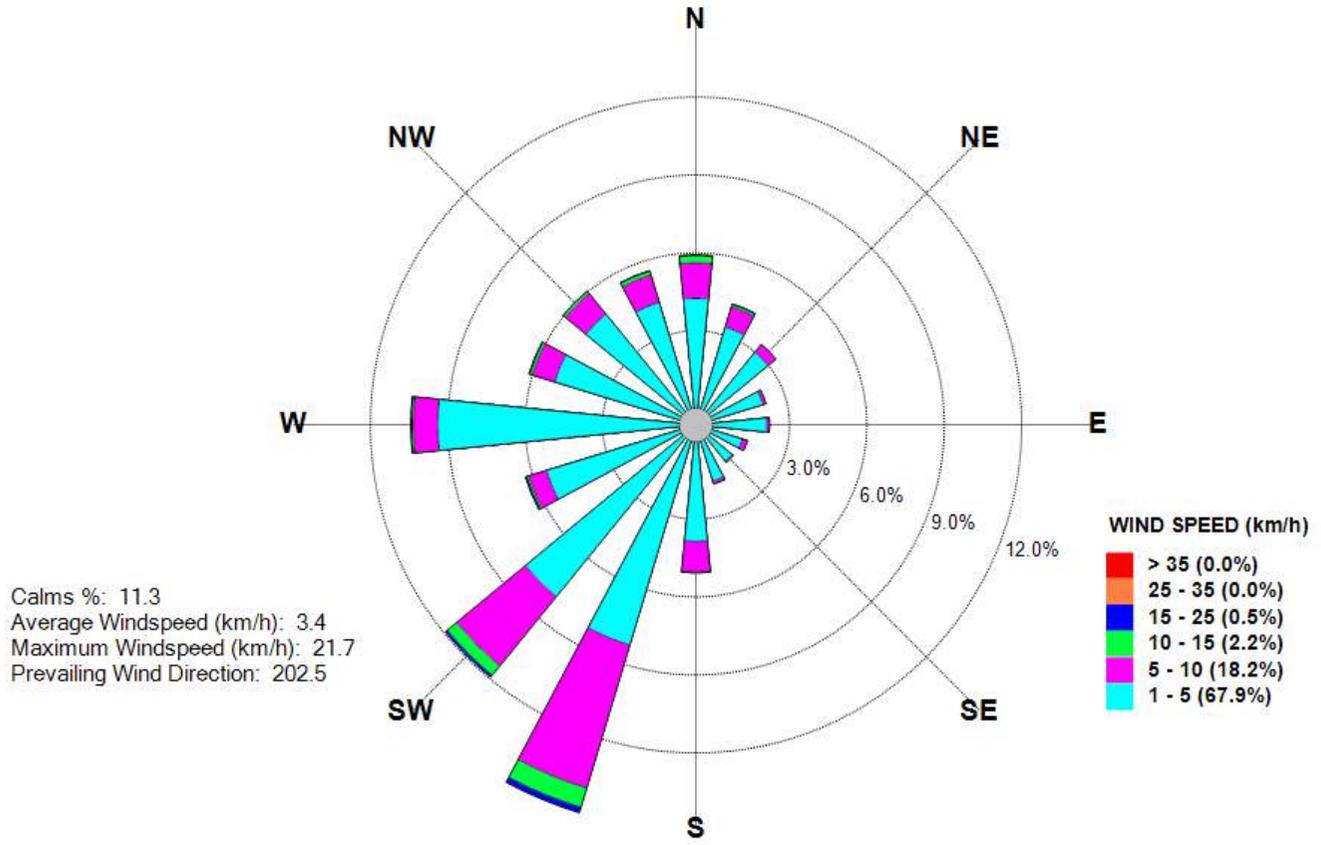


Figure 4: Monthly Windrose

## **Appendix C – Groundwater and Surface Water Monitoring Results**

# Groundwater Quality

## Report Number: 15477

Date Issued: 11/01/2024

Revision Number: 00

**Site/Job: Old Northern Rd 6 Mnth Ground Water**

Client: Dixon Sand Pty Ltd  
Address: PO Box 4019  
Pitt Town NSW 2756  
Contact: David Dixon

The following 11 groundwater sample(s) were received on 19/12/2023

Client Sample Reference	Date Sampled	Lab ID	Matrix	General Comments
BH1	19/12/2023	15477/1	Water	
BH2	19/12/2023	15477/2	Water	
BH3	19/12/2023	15477/3	Water	
BH6	19/12/2023	15477/4	Water	
BH7	19/12/2023	15477/5	Water	
BH8	19/12/2023	15477/6	Water	
BH9	19/12/2023	15477/7	Water	
MW1	19/12/2023	15477/8	Water	
MW2	19/12/2023	15477/9	Water	
MW3	19/12/2023	15477/10	Water	
MW5	19/12/2023	15477/11	Water	

The sample(s) have been tested as received and results relate specifically to the samples tested.  
The following reports are included:

- Test Report
- Sampling Report
- Chain of Custody (if available)



Anthony Crane  
Laboratory Manager



Liane Peyra  
Technical Officer

Authorised by:

Results have been approved and report finalised on 11/01/2024.

## Test Report Number: 15477

Date Issued: 11/01/2024

Revision No: 00

### Results

Field Analysis	Method	Lab ID Sample Date Sample ID Units	15477/1 19/12/2023 BH1	15477/2 19/12/2023 BH2	15477/3 19/12/2023 BH3	15477/4 19/12/2023 BH6	15477/5 19/12/2023 BH7
Depth to Water (TOM)	AS5667.11	m(bTOM)	58.33	35.27	32.00	30.69	21.15
Temperature	Temp	°C	22.0	20.9	20.7	21.0	20.9
pH	APHA 4500-H B	pH Units	6.2	5.8	5.8	4.8	4.8
Electrical Conductivity	APHA 2510 B	µS/cm	227	260	198	133	263

Field Analysis	Method	Lab ID Sample Date Sample ID Units	15477/6 19/12/2023 BH8	15477/7 19/12/2023 BH9	15477/8 19/12/2023 MW1	15477/9 19/12/2023 MW2	15477/10 19/12/2023 MW3
Depth to Water (TOM)	AS5667.11	m(bTOM)	26.25	33.62	12.33	17.54	22.99
Temperature	Temp	°C	19.2	21.8	22.2	18.2	21.5
pH	APHA 4500-H B	pH Units	3.9	5.5	4.3	3.8	5.3
Electrical Conductivity	APHA 2510 B	µS/cm	322	296	178	540	122

Field Analysis	Method	Lab ID Sample Date Sample ID Units	15477/11 19/12/2023 MW5
Depth to Water (TOM)	AS5667.11	m(bTOM)	5.85
Temperature	Temp	°C	22.9
pH	APHA 4500-H B	pH Units	4.4
Electrical Conductivity	APHA 2510 B	µS/cm	161

Solids	Method	Lab ID Sample Date Sample ID Units	15477/1 19/12/2023 BH1	15477/2 19/12/2023 BH2	15477/3 19/12/2023 BH3	15477/4 19/12/2023 BH6	15477/5 19/12/2023 BH7
Total Dissolved Solids	AS3550.4	mg/L	170	140	140	100	180

Solids	Method	Lab ID Sample Date Sample ID Units	15477/6 19/12/2023 BH8	15477/7 19/12/2023 BH9	15477/8 19/12/2023 MW1	15477/9 19/12/2023 MW2	15477/10 19/12/2023 MW3
Total Dissolved Solids	AS3550.4	mg/L	190	110	120	330	110

Solids	Method	Lab ID Sample Date Sample ID Units	15477/11 19/12/2023 MW5
Total Dissolved Solids	AS3550.4	mg/L	110



Date Tested	Method	Lab ID Sample Date Sample ID Units	15477/1 19/12/2023 BH1	15477/2 19/12/2023 BH2	15477/3 19/12/2023 BH3	15477/4 19/12/2023 BH6	15477/5 19/12/2023 BH7
<i>Date Tested - Field</i>	--	--	19/12/2023	19/12/2023	19/12/2023	19/12/2023	19/12/2023
<i>Date Tested - TDS</i>	AS3550.4	--	9/01/2024	9/01/2024	9/01/2024	9/01/2024	9/01/2024

Date Tested	Method	Lab ID Sample Date Sample ID Units	15477/6 19/12/2023 BH8	15477/7 19/12/2023 BH9	15477/8 19/12/2023 MW1	15477/9 19/12/2023 MW2	15477/10 19/12/2023 MW3
<i>Date Tested - Field</i>	--	--	19/12/2023	19/12/2023	19/12/2023	19/12/2023	19/12/2023
<i>Date Tested - TDS</i>	AS3550.4	--	9/01/2024	10/01/2024	10/01/2024	10/01/2024	10/01/2024

Date Tested	Method	Lab ID Sample Date Sample ID Units	15477/11 19/12/2023 MW5
<i>Date Tested - Field</i>	--	--	19/12/2023
<i>Date Tested - TDS</i>	AS3550.4	--	10/01/2024

## Report Comments:

# Where present, indicates NATA accreditation does not cover the performance of this service.

Results in **bold** indicate an exceedance of the relevant guideline.

When considering the pass or fail of tests the measurement of uncertainty of each parameter must be considered.

<https://www.vgt.com.au/measurement-uncertainty>

[NT]: Not tested

Location Analysed : Field and 4/30 Glenwood Dr Thornton NSW 2322.

## Sampling Report Number: 15477

Date Issued: 11/01/2024

Revision No: 00

Sampling Conditions: Cloudy, 28 - 32 °C

Lab ID	Client Sample Reference	Licence/ Reference	Sampler	Date Sampled	Method of Sampling	Pre-treatment / Preservation
15477/1	BH1		D.Walker/ Liane Peyra	19/12/2023 11:20 AM	AS5667.11, Bail	AS5667.1
15477/2	BH2		D.Walker/ Liane Peyra	19/12/2023 12:50 PM	AS5667.11, Pump	AS5667.1
15477/3	BH3		D.Walker/ Liane Peyra	19/12/2023 12:35 PM	AS5667.11, Pump	AS5667.1
15477/4	BH6		D.Walker/ Liane Peyra	19/12/2023 12:08 PM	AS5667.11, Pump	AS5667.1
15477/5	BH7		D.Walker/ Liane Peyra	19/12/2023 1:48 PM	AS5667.11, Pump	AS5667.1
15477/6	BH8		D.Walker/ Liane Peyra	19/12/2023 1:17 PM	AS5667.11, Bail	AS5667.1
15477/7	BH9		D.Walker/ Liane Peyra	19/12/2023 1:31 PM	AS5667.11, Pump	AS5667.1
15477/8	MW1		D.Walker/ Liane Peyra	19/12/2023 2:04 PM	AS5667.11, Pump	AS5667.1
15477/9	MW2		D.Walker/ Liane Peyra	19/12/2023 1:07 PM	AS5667.11, Bail	AS5667.1
15477/10	MW3		D.Walker/ Liane Peyra	19/12/2023 11:58 AM	AS5667.11, Pump	AS5667.1
15477/11	MW5		D.Walker/ Liane Peyra	19/12/2023 11:35 AM	AS5667.11, Pump	AS5667.1

Lab ID	Client Sample Reference	Sampling Observations
15477/1	BH1	
15477/2	BH2	
15477/3	BH3	
15477/4	BH6	
15477/5	BH7	
15477/6	BH8	shallow, slow recharge, roots
15477/7	BH9	
15477/8	MW1	
15477/9	MW2	
15477/10	MW3	
15477/11	MW5	

Sampling procedures have been approved and report finalised on 11/01/2024.

Where method is "unknown" sampling procedures are not endorsed

## Well Parameters:

Client: Dixon Sand Pty Ltd

Site/Job: Old Northern Rd 6 Mnth Ground Water

Well ID	GPS-Easting	GPS-Northing	Survey Date	Surveyed AHD (m)	Depth to Screen (m)
BH1	312290	6297039			
BH2	313429	6297202			
BH3	313808	6297093			
BH6	313153	6296833			
BH7	313097	6296495			
BH8	313435	6296617			
BH9	313294	6296504			
MW1	313092	6296499			
MW2	313417	6296733			
MW3	313161	6296838			
MW5	312460	6296903			

Well ID	Date Well Measured	Monument Height (TOM) (m)	Depth to Bottom (bTOM) (m)	Recharge Rate	Approximate Volume (L)
BH1	2/12/2019	0.68	>60	Slow	unkown
BH2	2/12/2019	0.57	>60	slow	unkown
BH3	2/12/2019	0.56	>60	Slow	Unkown
BH6	2/12/2019	0.52	>60	Slow	Unkown
BH7	2/12/2019	0.53	>60	Slow	Unknown
BH8	2/12/2019	0.73	27.53	Slow	2
BH9	2/12/2019	0.64	>60	Medium	Unkown
MW1	2/12/2019	0.28	15.53	Medium	12
MW2	2/12/2019	0.45	24.53	Slow	7.5
MW3	2/12/2019	0.88	34.57	Slow	2.5
MW5	2/12/2019	0.70	21.19	Slow	28

Note: NATA accreditation does not cover information provided in this section

\*Where indicated AHD from ground level (m) estimated based on handheld GPS

## Report Number: 16250

Date Issued: 21/06/2024 Revision Number: 00

**Site/Job: Old Northern Rd 6 Mnth Ground Water**

Client: Dixon Sand Pty Ltd  
 Address: PO Box 4019  
 Pitt Town NSW 2756  
 Contact: David Dixon

The following groundwater sample(s) were received on 14/06/2024

Client Sample Reference	Date Sampled	Lab ID	Matrix	General Comments
BH1	14/06/2024	16250/1	Water	
BH2	14/06/2024	16250/2	Water	
BH3	14/06/2024	16250/3	Water	
BH6	14/06/2024	16250/4	Water	
BH7	14/06/2024	16250/5	Water	
BH8	14/06/2024	16250/6	Water	
BH9	14/06/2024	16250/7	Water	
MW1	14/06/2024	16250/8	Water	
MW2	14/06/2024	16250/9	Water	
MW3	14/06/2024	16250/10	Water	
MW5	14/06/2024	16250/11	Water	

The sample(s) have been tested as received and results relate specifically to the samples tested.  
 The following reports are included:

- Test Report
- Sampling Report
- Chain of Custody (if available)



Anthony Crane  
 Laboratory Manager



Liane Peyra  
 Technical Officer

Authorised by:

Results have been approved and report finalised on 21/06/2024.



## Test Report Number: 16250

Date Issued: 21/06/2024

Revision No: 00

### Results

Field Analysis	Method	Lab ID Sample Date Sample ID Units	16250/1 14/06/2024 BH1	16250/2 14/06/2024 BH2	16250/3 14/06/2024 BH3	16250/4 14/06/2024 BH6	16250/5 14/06/2024 BH7
Depth to Water (TOM)	AS5667.11	m(bTOM)	59.56	35.35	31.92	30.92	21.61
Temperature	Temp	°C	17.9	18.2	18.2	18.3	18.3
pH	APHA 4500-H B	pH Units	5.9	5.9	5.8	5.0	4.7
Electrical Conductivity	APHA 2510 B	µS/cm	86.0	240	184	128	250

Field Analysis	Method	Lab ID Sample Date Sample ID Units	16250/6 14/06/2024 BH8	16250/7 14/06/2024 BH9	16250/8 14/06/2024 MW1	16250/9 14/06/2024 MW2	16250/10 14/06/2024 MW3
Depth to Water (TOM)	AS5667.11	m(bTOM)	26.28	35.07	12.50	17.76	23.00
Temperature	Temp	°C	17.8	18.1	19.6	17.3	18.1
pH	APHA 4500-H B	pH Units	3.9	5.5	4.4	3.7	5.8
Electrical Conductivity	APHA 2510 B	µS/cm	306	281	132	542	121

Field Analysis	Method	Lab ID Sample Date Sample ID Units	16250/11 14/06/2024 MW5
Depth to Water (TOM)	AS5667.11	m(bTOM)	5.42
Temperature	Temp	°C	19.5
pH	APHA 4500-H B	pH Units	5.0
Electrical Conductivity	APHA 2510 B	µS/cm	160

Solids	Method	Lab ID Sample Date Sample ID Units	16250/1 14/06/2024 BH1	16250/2 14/06/2024 BH2	16250/3 14/06/2024 BH3	16250/4 14/06/2024 BH6	16250/5 14/06/2024 BH7
Total Dissolved Solids	AS3550.4	mg/L	84	130	96	100	160

Solids	Method	Lab ID Sample Date Sample ID Units	16250/6 14/06/2024 BH8	16250/7 14/06/2024 BH9	16250/8 14/06/2024 MW1	16250/9 14/06/2024 MW2	16250/10 14/06/2024 MW3
Total Dissolved Solids	AS3550.4	mg/L	160	180	130	300	110

Solids	Method	Lab ID Sample Date Sample ID Units	16250/11 14/06/2024 MW5
Total Dissolved Solids	AS3550.4	mg/L	92



Date Tested	Method	Lab ID Sample Date Sample ID Units	16250/1 14/06/2024 BH1	16250/2 14/06/2024 BH2	16250/3 14/06/2024 BH3	16250/4 14/06/2024 BH6	16250/5 14/06/2024 BH7
<i>Date Tested - Field</i>	--	--	14/06/2024	14/06/2024	14/06/2024	14/06/2024	14/06/2024
<i>Date Tested - TDS</i>	AS3550.4	--	19/06/2024	19/06/2024	19/06/2024	19/06/2024	19/06/2024

Date Tested	Method	Lab ID Sample Date Sample ID Units	16250/6 14/06/2024 BH8	16250/7 14/06/2024 BH9	16250/8 14/06/2024 MW1	16250/9 14/06/2024 MW2	16250/10 14/06/2024 MW3
<i>Date Tested - Field</i>	--	--	14/06/2024	14/06/2024	14/06/2024	14/06/2024	14/06/2024
<i>Date Tested - TDS</i>	AS3550.4	--	20/06/2024	20/06/2024	20/06/2024	20/06/2024	20/06/2024

Date Tested	Method	Lab ID Sample Date Sample ID Units	16250/11 14/06/2024 MW5
<i>Date Tested - Field</i>	--	--	14/06/2024
<i>Date Tested - TDS</i>	AS3550.4	--	20/06/2024

## Report Comments:

# Where present, indicates NATA accreditation does not cover the performance of this service.

Results in **bold** indicate an exceedance of the relevant guideline.

When considering the pass or fail of tests the measurement of uncertainty of each parameter must be considered.

<https://www.vgt.com.au/measurement-uncertainty>

[NT]: Not tested

Location Analysed : Field and 4/30 Glenwood Dr Thornton NSW 2322.

## Sampling Report Number: 16250

Date Issued: 21/06/2024

Revision No: 00

Sampling Conditions: Cloudy, 12 °- 15 °C

Lab ID	Client Sample Reference	Licence/Reference	Sampler	Date Sampled	Method of Sampling	Pre-treatment / Preservation
16250/1	BH1		T & D.Walker	14/06/2024 10:43 AM	AS5667.11, Bail	AS5667.1
16250/2	BH2		T & D.Walker	14/06/2024 1:02 PM	AS5667.11, Pump	AS5667.1
16250/3	BH3		T & D.Walker	14/06/2024 12:37 PM	AS5667.11, Pump	AS5667.1
16250/4	BH6		T & D.Walker	14/06/2024 12:01 PM	AS5667.11, Pump	AS5667.1
16250/5	BH7		T & D.Walker	14/06/2024 1:49 PM	AS5667.11, Pump	AS5667.1
16250/6	BH8		T & D.Walker	14/06/2024 2:32 PM	AS5667.11, Bail	AS5667.1
16250/7	BH9		T & D.Walker	14/06/2024 1:31 PM	AS5667.11, Pump	AS5667.1
16250/8	MW1		T & D.Walker	14/06/2024 2:10 PM	AS5667.11, Bail	AS5667.1
16250/9	MW2		T & D.Walker	14/06/2024 12:16 PM	AS5667.11, Bail	AS5667.1
16250/10	MW3		T & D.Walker	14/06/2024 11:45 AM	AS5667.11, Bail	AS5667.1
16250/11	MW5		T & D.Walker	14/06/2024 11:10 AM	AS5667.11, Bail	AS5667.1

Lab ID	Client Sample Reference	Sampling Observations
16250/1	BH1	No vehicle/pump access
16250/2	BH2	
16250/3	BH3	
16250/4	BH6	No vehicle/pump access
16250/5	BH7	
16250/6	BH8	Insufficient recharge to pump
16250/7	BH9	
16250/8	MW1	Insufficient recharge rate to pump
16250/9	MW2	Insufficient recharge rate to pump
16250/10	MW3	No vehicle/pump access
16250/11	MW5	No vehicle/pump access

Sampling procedures have been approved and report finalised on 21/06/2024.

Where method is "unknown" sampling procedures are not endorsed

## Well Parameters:

Client: Dixon Sand Pty Ltd

Site/Job: Old Northern Rd 6 Mnth Ground Water

Well ID	GPS-Easting	GPS-Northing	Survey Date	Surveyed AHD (m)	Depth to Screen (m)
BH1	312290	6297039			
BH2	313429	6297202			
BH3	313808	6297093			
BH6	313153	6296833			
BH7	313097	6296495			
BH8	313435	6296617			
BH9	313294	6296504			
MW1	313092	6296499			
MW2	313417	6296733			
MW3	313161	6296838			
MW5	312460	6296903			

Well ID	Date Well Measured	Monument Height (TOM) (m)	Depth to Bottom (bTOM) (m)	Recharge Rate	Approximate Volume (L)
BH1	2/12/2019	0.68	>60	Slow	unkown
BH2	2/12/2019	0.57	>60	slow	unkown
BH3	2/12/2019	0.56	>60	Slow	Unkown
BH6	2/12/2019	0.52	>60	Slow	Unkown
BH7	2/12/2019	0.53	>60	Slow	Unknown
BH8	2/12/2019	0.73	27.53	Slow	2
BH9	2/12/2019	0.64	>60	Medium	Unkown
MW1	2/12/2019	0.28	15.53	Medium	12
MW2	2/12/2019	0.45	24.53	Slow	7.5
MW3	2/12/2019	0.88	34.57	Slow	2.5
MW5	2/12/2019	0.70	21.19	Slow	28

Note: NATA accreditation does not cover information provided in this section

\*Where indicated AHD from ground level (m) estimated based on handheld GPS

# Surface Water Quality



## CERTIFICATE OF ANALYSIS

Work Order : **ES2333350**  
Client : **DIXON SAND PTY LTD**  
Contact : **HUNNY CHURCHER**  
Address :  
Telephone : **02 4566 8348**  
Project : ----  
Order number : ----  
C-O-C number : ----  
Sampler : ----  
Site : ----  
Quote number : **EN/333**  
No. of samples received : **1**  
No. of samples analysed : **1**

Page : 1 of 2  
Laboratory : Environmental Division Sydney  
Contact : Customer Services ES  
Address : 277-289 Woodpark Road Smithfield NSW Australia 2164  
Telephone : +61-2-8784 8555  
Date Samples Received : 28-Sep-2023 13:55  
Date Analysis Commenced : 28-Sep-2023  
Issue Date : 04-Oct-2023 15:32



Accreditation No. 825  
Accredited for compliance with  
ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

**Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QA/QC Compliance Assessment to assist with Quality Review and Sample Receipt Notification.**

### Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	Position	Accreditation Category
Ankit Joshi	Senior Chemist - Inorganics	Sydney Inorganics, Smithfield, NSW



## General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

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Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contract for details.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.  
 LOR = Limit of reporting  
 ^ = This result is computed from individual analyte detections at or above the level of reporting  
 ø = ALS is not NATA accredited for these tests.  
 ~ = Indicates an estimated value.

## Analytical Results

Sub-Matrix: **WATER**  
 (Matrix: **WATER**)

			Sample ID	SW19	----	----	----	----
			Sampling date / time	28-Sep-2023 09:15	----	----	----	----
Compound	CAS Number	LOR	Unit	ES2333350-001	-----	-----	-----	-----
				Result	----	----	----	----
<b>EA005P: pH by PC Titrator</b>								
pH Value	----	0.01	pH Unit	<b>5.84</b>	----	----	----	----
<b>EA010P: Conductivity by PC Titrator</b>								
Electrical Conductivity @ 25°C	----	1	µS/cm	<b>139</b>	----	----	----	----
<b>EA025: Total Suspended Solids dried at 104 ± 2°C</b>								
Suspended Solids (SS)	----	5	mg/L	<5	----	----	----	----
<b>EA045: Turbidity</b>								
Turbidity	----	0.1	NTU	<b>10.7</b>	----	----	----	----



## CERTIFICATE OF ANALYSIS

Work Order	: <b>ES2343674</b>	Page	: 1 of 2
Client	: <b>DIXON SAND PTY LTD</b>	Laboratory	: Environmental Division Sydney
Contact	: HUNNY CHURCHER	Contact	: Customer Services ES
Address	: 4610 Old Northern Road Maroota	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
Telephone	: 02 4566 8348	Telephone	: +61-2-8784 8555
Project	: Old Northern Road Quarry	Date Samples Received	: 14-Dec-2023 14:00
Order number	: ----	Date Analysis Commenced	: 16-Dec-2023
C-O-C number	: ----	Issue Date	: 21-Dec-2023 14:15
Sampler	: Melissa Mass		
Site	: ----		
Quote number	: ----		
No. of samples received	: 1		
No. of samples analysed	: 1		



This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

**Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QA/QC Compliance Assessment to assist with Quality Review and Sample Receipt Notification.**

### Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	Position	Accreditation Category
Ankit Joshi	Senior Chemist - Inorganics	Sydney Inorganics, Smithfield, NSW



## General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

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 LOR = Limit of reporting  
 ^ = This result is computed from individual analyte detections at or above the level of reporting  
 ø = ALS is not NATA accredited for these tests.  
 ~ = Indicates an estimated value.

## Analytical Results

Sub-Matrix: WATER  
 (Matrix: WATER)

			Sample ID	SW19	----	----	----	----
			Sampling date / time	14-Dec-2023 10:30	----	----	----	----
Compound	CAS Number	LOR	Unit	ES2343674-001	-----	-----	-----	-----
				Result	----	----	----	----
<b>EA005P: pH by PC Titrator</b>								
pH Value	----	0.01	pH Unit	<b>6.79</b>	----	----	----	----
<b>EA010P: Conductivity by PC Titrator</b>								
Electrical Conductivity @ 25°C	----	1	µS/cm	<b>152</b>	----	----	----	----
<b>EA025: Total Suspended Solids dried at 104 ± 2°C</b>								
Suspended Solids (SS)	----	5	mg/L	<5	----	----	----	----
<b>EA045: Turbidity</b>								
Turbidity	----	0.1	NTU	<b>13.8</b>	----	----	----	----



## CERTIFICATE OF ANALYSIS

Work Order	: <b>ES2409908</b>	Page	: 1 of 2
Client	: <b>DIXON SAND PTY LTD</b>	Laboratory	: Environmental Division Sydney
Contact	: <b>HUNNY CHURCHER</b>	Contact	: Customer Services ES
Address	: 4610 Old Northern Road Maroota	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
Telephone	: 02 4566 8348	Telephone	: +61-2-8784 8555
Project	: Old Northern Road Quarry	Date Samples Received	: 26-Mar-2024 15:14
Order number	: ----	Date Analysis Commenced	: 27-Mar-2024
C-O-C number	: ----	Issue Date	: 03-Apr-2024 12:39
Sampler	: MELISSA MASS		
Site	: ----		
Quote number	: ----		
No. of samples received	: 1		
No. of samples analysed	: 1		



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- General Comments
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### Signatories

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Signatories	Position	Accreditation Category
Ankit Joshi	Senior Chemist - Inorganics	Sydney Inorganics, Smithfield, NSW



## General Comments

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## Analytical Results

Sub-Matrix: **WATER**  
 (Matrix: **WATER**)

			Sample ID	SW19	----	----	----	----
			Sampling date / time	26-Mar-2024 09:45	----	----	----	----
Compound	CAS Number	LOR	Unit	ES2409908-001	-----	-----	-----	-----
				Result	----	----	----	----
<b>EA005P: pH by PC Titrator</b>								
pH Value	----	0.01	pH Unit	<b>5.80</b>	----	----	----	----
<b>EA010P: Conductivity by PC Titrator</b>								
Electrical Conductivity @ 25°C	----	1	µS/cm	<b>148</b>	----	----	----	----
<b>EA025: Total Suspended Solids dried at 104 ± 2°C</b>								
Suspended Solids (SS)	----	5	mg/L	<b>23</b>	----	----	----	----
<b>EA045: Turbidity</b>								
Turbidity	----	0.1	NTU	<b>15.4</b>	----	----	----	----



## CERTIFICATE OF ANALYSIS

Work Order : **ES2421199**  
Client : **DIXON SAND PTY LTD**  
Contact : **HUNNY CHURCHER**  
Address :  
Telephone : **02 4566 8348**  
Project : **Old Northern Rd Quarry**  
Order number : ----  
C-O-C number : ----  
Sampler : **Melissa Mass**  
Site : ----  
Quote number : ----  
No. of samples received : **1**  
No. of samples analysed : **1**

Page : 1 of 2  
Laboratory : Environmental Division Sydney  
Contact : Customer Services ES  
Address : 277-289 Woodpark Road Smithfield NSW Australia 2164  
Telephone : +61-2-8784 8555  
Date Samples Received : 27-Jun-2024 12:45  
Date Analysis Commenced : 27-Jun-2024  
Issue Date : 03-Jul-2024 10:35



Accreditation No. 825  
Accredited for compliance with  
ISO/IEC 17025 - Testing

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This Certificate of Analysis contains the following information:

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Ankit Joshi	Senior Chemist - Inorganics	Sydney Inorganics, Smithfield, NSW



## General Comments

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 ~ = Indicates an estimated value.

## Analytical Results

Sub-Matrix: **WATER**  
 (Matrix: **WATER**)

				Sample ID				
				<b>SW19</b>	----	----	----	----
				Sampling date / time	27-Jun-2024 08:00	----	----	----
Compound	CAS Number	LOR	Unit	ES2421199-001	-----	-----	-----	-----
				Result	----	----	----	----
<b>EA005P: pH by PC Titrator</b>								
pH Value	----	0.01	pH Unit	<b>4.58</b>	----	----	----	----
<b>EA010P: Conductivity by PC Titrator</b>								
Electrical Conductivity @ 25°C	----	1	µS/cm	<b>184</b>	----	----	----	----
<b>EA025: Total Suspended Solids dried at 104 ± 2°C</b>								
Suspended Solids (SS)	----	5	mg/L	<5	----	----	----	----
<b>EA045: Turbidity</b>								
Turbidity	----	0.1	NTU	<b>15.8</b>	----	----	----	----

# Discharge Point – Water Quality

(No planned discharge during this reporting period)

## **Appendix D – Noise Compliance Reports**

**Dixon Sand Pty Ltd**

**Old Northern Road Quarry, Maroota**

**Noise monitoring report  
December 2023**

**Doc no. 19020-NV-RP-14-1**





Dixon Sand Pty Ltd  
Old Northern Road Quarry, Maroota

Title                    Noise monitoring report

Document no.        19020-NV-RP-14-1

Revision              1

Date                    6 December 2023

Author                John Hutchison

Reviewer             Scott Hughes

Hutchison Weller Pty Ltd  
ABN 37 001 024 095  
13/357 Military Road  
Mosman NSW 2008

[www.hutchisonweller.com](http://www.hutchisonweller.com)

#### Revision history

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0	16 February 2024	Report issued to client
1	11 May 2024	Updated with client comment

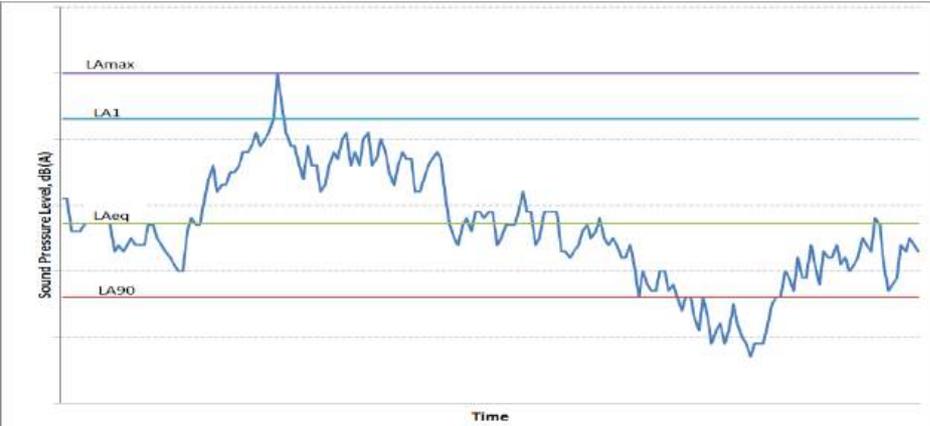


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## Definition of terms

<b>Background noise</b>	The underlying level of noise present in the ambient noise, excluding the noise source under investigation.
<b>Decibel (dB)</b>	A measure of sound equivalent to 20 times the logarithm (to base 10) of the ratio of a given sound pressure to a reference pressure, and 10 times the logarithm (to base 10) of the ratio of a given sound power to a reference power.
<b>dB(A)</b>	Unit used to measure 'A-weighted' sound pressure levels. A-weighting is an adjustment made to sound-level measurement to approximate the response of the human ear.
<b>dB(C)</b>	Unit used to measure 'C-weighted' sound pressure levels, an adjustment made to sound level to approximate low frequency noise between 10 Hz and 200 Hz.
<b>EPA</b>	Environment Protection Authority
<b>Extraneous noise</b>	Noise resulting from activities that are not typical of the area such as construction, and traffic generated by holiday periods or special events such as concerts or sporting events. Normal daily traffic is not considered to be extraneous.
<b>Noise level statistics</b>	<p><math>L_{A90}</math> – The A-weighted sound pressure level exceeded 90% of the monitoring period. This is considered to represent the background noise.</p> <p><math>L_{Aeq}</math> – The equivalent continuous A-weighted noise level—the level of noise equivalent to the energy average of noise levels occurring over a measurement period.</p> <p><math>L_{A1}</math> – The A-weighted sound pressure level exceeded 1% of the monitoring period.</p> <p><math>L_{Amax}</math> – The maximum A-weighted noise level associated with the measurement period.</p> 
<b>RBL</b>	The Rating Background Level for each period is the medium value of the ABL values for the period over all of the days measured. There is therefore an RBL value for each period (day, evening and night)
<b>Receiver</b>	The land use at which noise is heard
<b>SLM</b>	Sound Level Meter
<b>Sound Power Level (SWL)</b>	The A-weighted sound power level is a logarithmic ratio of the acoustic power output of a source relative to $10^{-12}$ watts and expressed in decibels. Sound power level is calculated from measured sound pressure levels and represents the level of total sound power radiated by a sound source.
<b>Sound Pressure Level (SPL)</b>	<p>This is the level of noise, usually expressed in dB(A), as measured by a standard sound level meter (SLM) with a pressure microphone. The sound pressure level in dB(A) gives a close indication of the subjective loudness of noise.</p> <p>A technical definition for the sound pressure level, in decibels, is 20 times the logarithm (base 10) of the ratio of any two quantities related to a given sound pressure to a reference pressure (typically <math>20 \mu\text{Pa}</math> equivalent to 0 dB).</p>
<b>Tonal noise</b>	Noise with perceptible and definite pitch or tone



## 1. Introduction

Dixon Sand Pty Ltd operates the Old Northern Road Quarry in Maroota, NSW (the Quarry). The Quarry is located off Old Northern Road, as illustrated in Figure 1.

Operations at the quarry include extraction of sand and sandstone blocks, processing by screening and grading and direct sales involving loading of trucks for shipment.

The Quarry operates under Development Consent 250-09-01 and Environment Protection Licence (EPL) 3916, which set noise limits for its operation and require noise monitoring to be completed on a six-monthly basis to ensure compliance with the conditions.

Hutchison Weller was commissioned by Dixon Sand to undertake the six-monthly noise monitoring in accordance with the conditions of consent, EPL and requirements of the Noise Management Plan.

This document outlines the consent conditions, monitoring methodology and results of the monitoring undertaken on 6 December 2023.



Figure 1 Location of the Quarry



## 2. Noise compliance criteria

Conditions 1 and 2 of Schedule 3 of development consent DA250-09-01 outline the Quarry operating hours and condition 3 defines the noise criteria for compliance. Environment Protection Licence (EPL) 3916 is consistent with these conditions.

1. The Applicant must comply with the operating hours set out in Table 1.

**Table 1 Operating hours**

Activity	Permissible hours
Quarrying operations (excluding truck arrival, loading and dispatch)	7.00 am to 6.00 pm Monday to Saturday At no time on Sundays or public holidays
Truck arrival (unladen)	5.45 am to 6.00 pm Monday to Saturday At no time on Sundays or public holidays
Truck loading Truck dispatch Truck arrival (laden)	6.00 am to 6.00 pm Monday to Saturday At no time on Sundays or public holidays
Bund construction or rehabilitation works within 250 m of Maroota Public School	7.00 am to 6.00 pm Monday to Friday during school holiday periods unless otherwise approved in writing by the EPA
Maintenance	May be conducted at any time, provided that these activities are not audible at any privately-owned residence

2. The following activities may be carried out outside the hours specified in condition 1 above:
  - (a) delivery or dispatch of materials as requested by the NSW Police Force or other public authorities; and
  - (b) emergency work to avoid the loss of lives, property or to prevent environmental harm.

In such circumstances, the Applicant must notify the Secretary and affected residents prior to undertaking the activities, or as soon as is practical thereafter.

3. The Applicant must ensure that the noise generated by the development does not exceed the criteria in Table 2 at any residence on privately-owned land or at the Maroota Public School.

**Table 2 Noise criteria dB(A)**

Receiver	Averaging period	Shoulder (6.00 am to 7.00 am)	Day (7.00 am to 6.00 pm)
Any residence on privately owned land	LAeq (15 minute)	37	44
Any classroom at Maroota Public School	LAeq (1 hour)	-	45

EPL 3916 requires noise generated by the development to be measured in accordance with relevant requirements and exemptions (including certain meteorological conditions and modification factors) of the NSW Noise Policy for Industry (2017). Appendix 6 sets out the meteorological conditions under which these criteria apply and the requirements for evaluating compliance with these criteria.

However, the noise criteria in Table 2 do not apply if the Applicant has an agreement with the relevant landowner to exceed the noise criteria, and the Applicant has advised the Department in writing of the terms of this agreement.



### 3. Monitoring methodology

Operator-attended noise monitoring was undertaken by Scott Hughes of Hutchison Weller, an independent acoustic specialist. Monitoring locations included those described in the Quarry Noise Management Plan plus additional sensitive receivers, as illustrated in Figure 1 and summarised in Table 3.

**Table 3 Monitoring locations**

Receiver <sup>1</sup>	Address	Description
OR1	Maroota public school	Classroom closest to quarry operations
OR2	4624 Old Northern Road	Private residence
OR3	4634 Old Northern Road	Private residence
R2	4579 Old Northern Road	Private residence
R3	4567 Old Northern Road	Private residence
R4/5	4547 – 4543 Old Northern Road	Mid-point between private residence
OAS1	Lot 196 of the Quarry	At source monitoring, close to operations
OAS2	Lots 1 and 2 of the Quarry	At source monitoring, close to operations
OAS3	Lots 1 and 2 of the Quarry	At source monitoring, close to operations

Note 1: An agreement between Dixon Sand and receiver R1 is in place and, therefore, noise management levels defined by the development consent are not applicable.

Monitoring was conducted in accordance with procedures outlined in the Noise Policy for Industry and Section 6 of the Noise Management Plan.

At-receiver monitoring locations were within 30 metres of residential dwellings, whilst onsite measurement locations were selected for safe access and to be representative of the operations, without extraneous noise from sources such as traffic and insects.

Instrumentation included a Bruel & Kjaer Class 1 sound level meter (SLM), serial no. 3008237, field-calibrated prior to and following monitoring. The SLM was within current calibration, next due January 2024.

Monitoring was undertaken with the SLM set on a tripod at 1.5 metres above ground and measuring A-weighted sound pressure levels under fast response. Each measurement period was 15 minutes and recorded the LAeq, LA90 and LAmx statistics.

Meteorological data was recorded during each monitoring period adjacent to the Maroota public school, including wind speed, direction, temperature, relative humidity and sigma-theta (to establish the Pascall-Guifford stability category). This data was used to establish the meteorological conditions as being suitable for monitoring.

Where extraneous noise such as road traffic and fauna (insects/birds) were the dominant noise sources, making it impractical to discern the contribution of the Quarry to ambient noise levels, noise levels measured at alternative locations closer to the Quarry were utilised, in line with procedures outlined in Noise Policy for Industry (NSW EPA 2017). This involved extrapolation from the near-distance location to the sensitive receiver location, as described in Section 4.3.



## 4. Monitoring results

### 4.1 Attended measurements

Results of noise monitoring for each location are presented in Table 4.

In general, quarry operations were faintly audible from most locations, with traffic the dominant source of noise for residents on the Old Northern Road.

Quarry operations in December 2023 fell into three categories representing the main sources of noise. These were:

- Sand processing and truck loading (main plant, front end loaders, trucks)
- Pit operations with rock breaking and water pumps

Depending on the receiver location, these sources played a varying role in contributing to the total noise level.

Measured results indicated quarry operations during the shoulder period (from 6.00am to 7.00am) were not audible and complied with the noise criteria at all measurement locations.

On-site measurements were taken to determine the noise level of various noise sources without the influence of traffic noise. Measurements were undertaken over 15-minute periods to establish representative sound power levels of the operation to allow extrapolation to receiver locations where background noise was too high to discern quarry noise contributions. This is discussed further in Section 4.3.

During the day (standard hours), measurement at the school and residential receivers established traffic was the dominant source of noise in the area and heavily influenced measured LAeq, 15-minute noise levels. Quarry noise was faintly audible from time to time over the background level.

Estimated contributions of quarry noise on the total noise level indicated compliance with the noise limit. However, due to ambient noise (traffic, birds, breeze in trees), extrapolation from at-source measurements has been undertaken to support this assertion (See Section 4.3.)

### 4.2 Modifying factors

The hi-pressure trash pump was observed to have a tonal component at 63 Hz, measured close to the plant. Measured at the intermediate distance and assessment locations, this tone was no longer present.

No impulsive noise sources were observed.

Low frequency characteristics were observed in the morning shoulder and day periods at a single receiver, OR3. Intermediate measurement at OAS1 also demonstrated a low frequency contribution with LCEq – LAeq greater than 15 dB and a portion of the spectrum between 12Hz and 160Hz exceeding the NPfI (2017) curves. A correction of 2 dB has been added to the modelled result for OR3 in line with the NPfI where the frequency band exceeds the curve by 5 dB or more during the day (See Section 4.3).



**Table 4 Monitoring results**

Time	Location	Noise criterion	Measured 15-minute noise level			Estimated LAeq, 15 min quarry contribution	Observations	Meteorological conditions
			LAeq	LA90	LAmix			
<b>Shoulder (6.00am to 7.00am)</b>								
5.55am	OR3	37	48.5	42.3	60.1	<37	Traffic on access road barely audible ONR traffic dominant and audible for a long distance. Responsible for overall LEq value. Truck pass by Lmax at 60.1 Dog at property occasional barks Insect noise responsible for L90 No activity on site audible.	40% cloud cover and calm to light breeze (4-12 km/h) varied ENE – SSE Temperature 21-22°C Slightly unstable to extremely unstable conditions (A-C class).
6.18am	OR2		52.9	44.2	66.9	<37	Not many vehicles on haul road – 4 out and 1 in ONR dominant ambient noise source at 54-55 for heavy vehicles and truck responsible for Lmax Quarry not audible	
6.40am	R3		66.0	44.0	90.0	<37	Traffic on ONR is dominant noise source LV's ~69-70 with LAmix 90 from HV. Dog barking ~ 63 dBA Quarry not audible	
7.00am	R4/5		54.3	44.7	77.4	<37	Birds and crickets audible ~ 61 dBA for rosella School cleaner audible with vacuum cart ~ 50-55 dBA ONR dominant ~77 dBA for HV (Lamax) Quarry / Processing inaudible Birds	



Time	Location	Noise criterion	Measured 15-minute noise level			Estimated LAeq, 15 min quarry contribution	Observations	Meteorological conditions
			LAeq	LA90	LAmix			
<b>Day period - (7.00am to 6.00pm)</b>								
7.40am	OAS1	N/A	61.3	56.2	74.5	~60	Some natural sounds such as insects Main source is processing area with moxies, screens and conveyors Truck pass-by 68 dBA at 20 m Dumping rock from moxy into screen 70-74 at 9+m Conveyor 64 dBA at 112m FEL ~61 dBA around 100 m	Clear sky and calm to light breeze (1 - 4 km/h) generally from SE Temperature 23-24°C extremely unstable - conditions (A-class).
8.15am	OAS2	N/A	57.0	54.1	67.3	~57	Edge of pit with line of sight to equipment. Excavator idling in pit ~56 dB at 124 m then moving to pit 62 dBA. Gentle infrequent hammering far end of pit, no line of sight 250m+. ~63 dB when gentle 65 dB at some points. Pump audible ~ 54 dB at 250 m Yellow excavator with saw ~ 55 dB 170m	
10.12am	OAS3	N/A	54.7	51.4	67.6	~54	Pump dominant noise at 190 m Bobcat operating behind a stone wall Excavator with saw at 230 metres near conveyors but not audible	



Time	Location	Noise criterion	Measured 15-minute noise level			Estimated LAeq, 15 min quarry contribution	Observations	Meteorological conditions
			LAeq	LA90	LAmx			
10.16am	OR1	45	55.5	45.4	76.0	See Section 4.3	<p>Trucks on ONR ~59 dB avg, Birds (bellbirds, kookaburras) Lawn mower started at school. Hammering from DQ occasionally just audible ~ 43dB-48dB for 25% of measurement. Birds and mower are dominant sources, with mower ending after about 10 minutes. Started again around 30 minutes. Kids and teacher came outside around 20 mins</p>	<p>Breeze from E- =ESE 3-8km/h Temperature 26°C Extremely unstable conditions (A class)</p>
11:33am	R3	44	63.1	38.4	86.7	See Section 4.3	<p>Traffic, especially trucks, is main source of noise. Quarry not perceptible over ambient level. When traffic drops out to levels of around 40 dBA faint hammering is audible, estimate SPL 35 dBA at around 30% of the time. At times, birds are the only audible source ~ 40 dBA</p>	<p>Breeze from E - ENE @ 6 – 25 km/h Temperature 26-27°C Extremely unstable conditions (A class)</p>
11:51am	R4/5	44	58.4	43.8	86.7	See Section 4.3	<p>Crickets, birds and traffic are the main noise sources resulting in LAeq value and trucks result in Lmax value. Hammer occasionally audible, about background level, estimate contribution ~40-43 dB for 25% of measurement.</p>	<p>Breeze from E - ENE @ 6 – 25 km/h Temperature 26-27°C Extremely unstable conditions (A class)</p>



Time	Location	Noise criterion	Measured 15-minute noise level			Estimated LAeq, 15 min quarry contribution	Observations	Meteorological conditions
			LAeq	LA90	LAmix			
12:11pm	R2	44	64.1	40.4	85.2	See Section 4.3	Crickets, birds and traffic are the main noise sources resulting in LAeq value and trucks result in Lmax value. Pump just audible at ~ 40-42 dBA – L90 suitably representative.	
12:33pm	OR2	44	48.6	44.3	60.9	See Section 4.3	Old Northern Road traffic is dominant - average truck ~52 dBA and noisy trucks up to 57 dBA, with Lmax from truck Haul road trucks only faintly audible, 4 out and 3 in ~ 44 dBA Pit noise not audible	
12:58am	OR3	44	58.2	45.6	71.9	See Section 4.3	Tractor in paddock at 67 dBA – resulted in LAeq value. Trucks on ONR dominant with LMax. Quarry not audible	



### 4.3 Extrapolated measurements

A conclusive noise level attributable to the Quarry was not possible in all locations due to ambient noise levels. Therefore, measurements captured on-site without substantial influence from extraneous noise were used to calculate sound pressure levels at each receiver.

Based on observations close to the quarry, the following plant and equipment was in use during the monitoring period.

1. Processing plant - conveyors and drives, screens, front end loaders, moxies (plant to stockpile)
2. Pit – Water pump, excavator-mounted rock saw, hammer

Measurements close to these plant items were undertaken to establish a representative noise model of the quarry operations. A summary of noise emission data for these items is presented in Appendix A.

Predictions of noise at nearby receivers were based on measured onsite noise levels and propagation methods described in ISO 9613-2:1996 *Acoustics – Attenuation of sound during propagation outdoors – Part 2: General method of calculation*, which accounts for geometric spreading, air and ground absorption as well as barrier effects, assuming worst case meteorology of a gentle breeze from source to receiver and stable conditions.

Based on the above, modelled noise levels for each monitoring location are presented in Table 5. Results are shown for equipment operating in the pit, processing plant and stockpiling area (moxy route). Modelled levels are within 2 dB of measured values and are suitably accurate to extrapolate to assessment locations.

**Table 5 Extrapolated monitoring results to intermediate measurement locations**

Location	Modelled noise level, dBA	Measured noise level, LAeq, 15 minute, dBA
OAS1	59	60
OAS2	58	57
OAS3	55	54

Extrapolated levels at assessment locations are presented in Table 6. Results include a 5 dB correction applicable to all locations for impulsivity related to the hammer. No other tonal or low frequency noise corrections have been applied based on predicted levels at sensitive receivers.

Extrapolated results indicate the Quarry meets the noise limit for the day period in all locations.

Noise contour maps from the model are presented in Appendix B and illustrate noise propagation from the Quarry to all surrounding sensitive receiver locations.

**Table 6 Extrapolated monitoring results**

Receiver	Noise criteria		Extrapolated noise level, LAeq, 15 minute	Comment
	Shoulder	Day		
OR1	-	45	42	Predicted levels correlate well with measured levels and all locations shown to meet noise limits during the day period.
OR2	37	44	38	
OR3			38(+5)	
2			40	
3			41	
4/5			41	



#### 4.4 Compliance summary

Results of attended monitoring and extrapolated noise levels demonstrate the following.

1. Observed operations during the day period were compliant with the noise limit at each receiver under the meteorological conditions at the time.
2. Observed operations during the shoulder period were compliant with the noise criteria at all receivers under the meteorological conditions at the time.



## Appendix A. On-site measurements

Location	Plant item	Height, m	Sound Power Level, (third octave, Hz), dBA																													
			Sum	12.5	16	20	25	31.5	40	50	63	80	100	125	160	200	250	315	400	500	630	800	1k	1.25k	1.6k	2k	2.5k	3.15k	4k	5k	6.3k	8k
Process area	Screens, conveyors, FEL	4	<b>110</b>	107	110	106	109	113	115	115	116	115	107	108	107	103	102	103	101	101	101	101	102	101	100	98	96	94	93	91	89	86
	Moxy	2	<b>107</b>	103	105	101	105	109	110	110	112	111	102	104	103	99	98	99	96	97	97	97	98	97	96	94	92	90	88	86	84	82
Pit area	Rock saw	1.5	<b>108</b>	85	95	91	92	95	100	95	101	106	100	110	104	95	94	95	97	98	98	101	100	100	96	95	94	92	87	82	80	76
	Pump	1.5	<b>111</b>	77	89	84	80	84	84	97	114	95	91	98	90	97	90	95	94	93	96	99	99	104	103	101	100	98	96	97	95	92
	Hammer	1	<b>114</b>	-	45	53	58	64	67	73	84	91	91	94	95	90	91	99	99	102	107	105	106	104	102	101	100	99	98	96	94	90

## Appendix B. Noise contours



**Dixon Sand Pty Ltd**

**Old Northern Road Quarry, Maroota**

**Noise monitoring report  
June 2024**

**Doc no. 19020-NV-RP-16-0**





Dixon Sand Pty Ltd  
Old Northern Road Quarry, Maroota

**Title** Noise monitoring report  
**Document no.** 19020-NV-RP-16-0  
**Revision** 0  
**Date** 30 August 2024  
**Author** James Daramola  
**Reviewer** John Hutchison

Hutchison Weller Pty Ltd  
ABN 37 001 024 095  
13/357 Military Road  
Mosman NSW 2008

[www.hutchisonweller.com](http://www.hutchisonweller.com)

#### Revision history

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0	30 August 2024	Report issued to client
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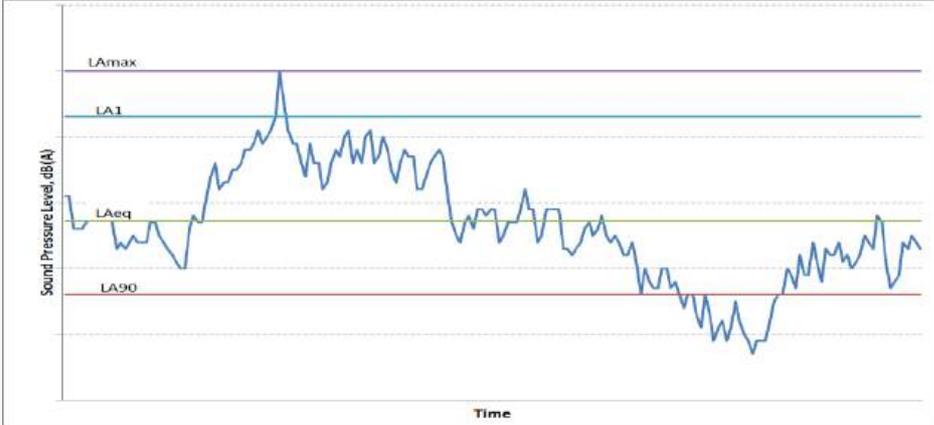


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## Definition of terms

<b>Background noise</b>	The underlying level of noise present in the ambient noise, excluding the noise source under investigation.
<b>Decibel (dB)</b>	A measure of sound equivalent to 20 times the logarithm (to base 10) of the ratio of a given sound pressure to a reference pressure, and 10 times the logarithm (to base 10) of the ratio of a given sound power to a reference power.
<b>dB(A)</b>	Unit used to measure 'A-weighted' sound pressure levels. A-weighting is an adjustment made to sound-level measurement to approximate the response of the human ear.
<b>dB(C)</b>	Unit used to measure 'C-weighted' sound pressure levels, an adjustment made to sound level to approximate low frequency noise between 10 Hz and 200 Hz.
<b>EPA</b>	Environment Protection Authority
<b>Extraneous noise</b>	Noise resulting from activities that are not typical of the area such as construction, and traffic generated by holiday periods or special events such as concerts or sporting events. Normal daily traffic is not considered to be extraneous.
<b>Noise level statistics</b>	<p><math>L_{A90}</math> – The A-weighted sound pressure level exceeded 90% of the monitoring period. This is considered to represent the background noise.</p> <p><math>L_{Aeq}</math> – The equivalent continuous A-weighted noise level—the level of noise equivalent to the energy average of noise levels occurring over a measurement period.</p> <p><math>L_{A1}</math> – The A-weighted sound pressure level exceeded 1% of the monitoring period.</p> <p><math>L_{Amax}</math> – The maximum A-weighted noise level associated with the measurement period.</p> 
<b>RBL</b>	The Rating Background Level for each period is the medium value of the ABL values for the period over all of the days measured. There is therefore an RBL value for each period (day, evening and night)
<b>Receiver</b>	The land use at which noise is heard
<b>SLM</b>	Sound Level Meter
<b>Sound Power Level (SWL)</b>	The A-weighted sound power level is a logarithmic ratio of the acoustic power output of a source relative to $10^{-12}$ watts and expressed in decibels. Sound power level is calculated from measured sound pressure levels and represents the level of total sound power radiated by a sound source.
<b>Sound Pressure Level (SPL)</b>	<p>This is the level of noise, usually expressed in dB(A), as measured by a standard sound level meter (SLM) with a pressure microphone. The sound pressure level in dB(A) gives a close indication of the subjective loudness of noise.</p> <p>A technical definition for the sound pressure level, in decibels, is 20 times the logarithm (base 10) of the ratio of any two quantities related to a given sound pressure to a reference pressure (typically <math>20 \mu\text{Pa}</math> equivalent to 0 dB).</p>
<b>Tonal noise</b>	Noise with perceptible and definite pitch or tone



## 1. Introduction

Dixon Sand Pty Ltd operates the Old Northern Road Quarry in Maroota, NSW (the Quarry). The Quarry is located off Old Northern Road, as illustrated in Figure 1.

Operations at the quarry include extraction of sand and sandstone blocks, processing by screening and grading and direct sales involving loading of trucks for shipment.

The Quarry operates under Development Consent 250-09-01 and Environment Protection Licence (EPL) 3916, which set noise limits for its operation and require noise monitoring to be completed on a six-monthly basis to ensure compliance with the conditions.

Hutchison Weller was commissioned by Dixon Sand to undertake the six-monthly noise monitoring in accordance with the conditions of consent, EPL and requirements of the Noise Management Plan.

This document outlines the consent conditions, monitoring methodology and results of the monitoring undertaken on 14 June 2024.

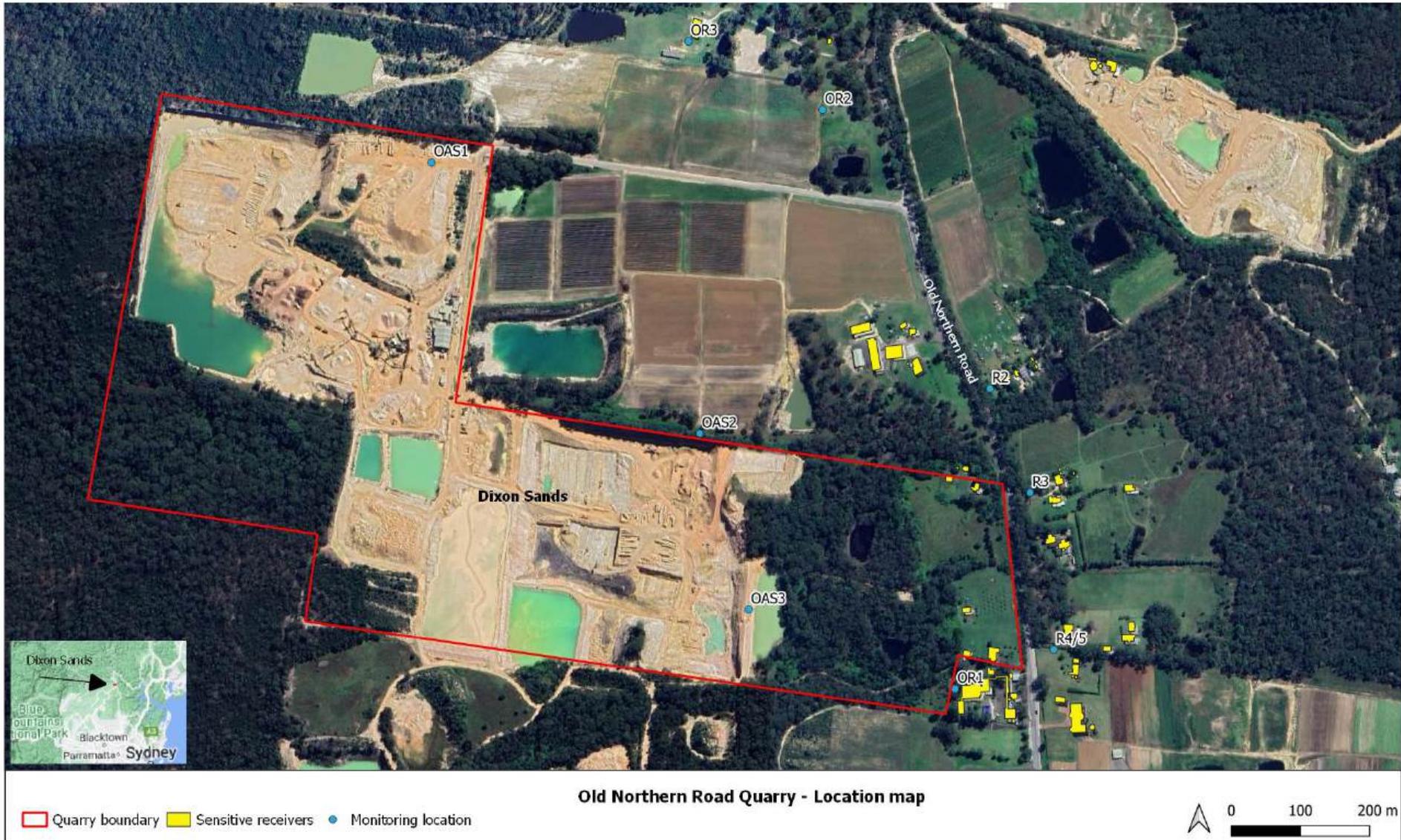


Figure 1 Location of the Quarry



## 2. Noise compliance criteria

Conditions 1 and 2 of Schedule 3 of development consent DA250-09-01 outline the Quarry operating hours and condition 3 defines the noise criteria for compliance. Environment Protection Licence (EPL) 3916

1. The Applicant must comply with the operating hours set out in Table 1.

**Table 1 Operating hours**

Activity	Permissible hours
Quarrying operations (excluding truck arrival, loading and dispatch)	7.00 am to 6.00 pm Monday to Saturday At no time on Sundays or public holidays
Truck arrival (unladen)	5.45 am to 6.00 pm Monday to Saturday At no time on Sundays or public holidays
Truck loading Truck dispatch Truck arrival (laden)	6.00 am to 6.00 pm Monday to Saturday At no time on Sundays or public holidays
Bund construction or rehabilitation works within 250 m of Maroota Public School	7.00 am to 6.00 pm Monday to Friday during school holiday periods unless otherwise approved in writing by the EPA
Maintenance	May be conducted at any time, provided that these activities are not audible at any privately-owned residence

2. The following activities may be carried out outside the hours specified in condition 1 above:
  - (a) delivery or dispatch of materials as requested by the NSW Police Force or other public authorities; and
  - (b) emergency work to avoid the loss of lives, property or to prevent environmental harm.

In such circumstances, the Applicant must notify the Secretary and affected residents prior to undertaking the activities, or as soon as is practical thereafter.

3. The Applicant must ensure that the noise generated by the development does not exceed the criteria in Table 2 at any residence on privately-owned land or at the Maroota Public School.

**Table 2 Noise criteria dB(A)**

Receiver	Averaging period	Shoulder (6.00 am to 7.00 am)	Day (7.00 am to 6.00 pm)
Any residence on privately owned land	LAeq (15 minute)	37	44
Any classroom at Maroota Public School	LAeq (1 hour)	-	45

Noise generated by the development is to be measured in accordance with the relevant requirements and exemptions (including certain meteorological conditions and modification factors) of the NSW Noise Policy for Industry (2017). Appendix 6 sets out the meteorological conditions under which these criteria apply and the requirements for evaluating compliance with these criteria.

However, the noise criteria in Table 2 do not apply if the Applicant has an agreement with the relevant landowner to exceed the noise criteria, and the Applicant has advised the Department in writing of the terms of this agreement.



### 3. Monitoring methodology

Operator-attended noise monitoring was undertaken by Hutchison Weller, an independent acoustic specialist and Member of the Australian Acoustical Society. Monitoring locations included those described in the Quarry Noise Management Plan plus additional sensitive receivers, as illustrated in Figure 1 and summarised in Table 3.

**Table 3 Monitoring locations**

Receiver <sup>1</sup>	Address	Description
OR1	Maroota public school	Classroom closest to quarry operations
OR2	4624 Old Northern Road	Private residence
OR3	4634 Old Northern Road	Private residence
R2	4579 Old Northern Road	Private residence
R3	4567 Old Northern Road	Private residence
R4/5	4547 – 4543 Old Northern Road	Mid-point between private residence
OAS1	Lots 1 and 2 of the Quarry	At source monitoring, close to operations
OAS2	Lot 196 of the Quarry	At source monitoring, close to operations
OAS3	Lot 196 of the Quarry	At source monitoring, close to operations

Note 1: An agreement between Dixon Sand and receiver R1 is in place and, therefore, noise management levels defined by the development consent are not applicable.

Monitoring was conducted in accordance with procedures outlined in the Noise Policy for Industry and Section 6 of the Noise Management Plan.

At-receiver monitoring locations were within 30 metres of residential dwellings, whilst onsite measurement locations were selected for safe access and to be representative of the operations, without extraneous noise from sources such as traffic and insects.

Instrumentation included a Bruel & Kjaer Class 1 sound level meter (SLM), serial no. 3008237, field-calibrated prior to and following monitoring. The SLM was within current calibration, next due January 2025.

Monitoring was undertaken with the SLM set on a tripod at 1.5 metres above ground and measuring A-weighted sound pressure levels under fast response. Each measurement period was 15 minutes and recorded the LAeq, LA90 and LAm<sub>ax</sub> statistics.

Meteorological data was recorded during each monitoring period adjacent to the Maroota public school, including wind speed, direction, temperature, relative humidity and sigma-theta (to establish the Pascall-Guifford stability category). This data was used to establish the meteorological conditions as being suitable for monitoring.

Where extraneous noise such as road traffic and fauna (insects/birds) were the dominant noise sources, making it impractical to discern the contribution of the Quarry to ambient noise levels, noise levels measured at alternative locations closer to the Quarry were utilised, in line with procedures outlined in Noise Policy for Industry (NSW EPA 2017). This involved extrapolation from the near-distance location to the sensitive receiver location, as described in Section 4.2.



## 4. Monitoring results

### 4.1 Attended measurements

Results of noise monitoring for each location are presented in Table 4 and Table 5.

In general, quarry operations were faintly audible from most locations, with traffic the dominant source of noise for residents on the Old Northern Road.

Quarry operations in June 2024 fell into three categories representing the main sources of noise. These were:

- Sand processing and truck loading (main plant, front end loaders, trucks)
- Extraction of bulk sandstone by rock saw
- Stockpile management with articulated dump trucks

Depending on the receiver location, these sources played a varying role in contributing to the total noise level.

Measured results indicated quarry operations during the shoulder period (from 6.00am to 7.00am) were faintly audible during breaks in traffic noise and complied with the noise criteria at all measurement locations.

On-site measurements were taken to determine the noise level of various noise sources without the influence of traffic noise. Measurements were undertaken over 15-minute periods to establish representative sound power levels of the operation to allow extrapolation to receiver locations where background noise was too high to discern quarry noise contributions. This is discussed further in Section 4.2.

During the day (standard hours), measurement at the school and residential receivers established traffic was the dominant source of noise in the area and heavily influenced measured LAeq, 15-minute noise levels. Quarry noise was faintly audible from time to time over the background level.

Estimated contributions of quarry noise on the total noise level indicated compliance with the noise limit. However, due to ambient noise (traffic, birds, breeze in trees), extrapolation from at-source measurements has been undertaken to support this assertion (See Section 4.2.)



**Table 4 Monitoring results – Shoulder Period - 6.00am to 7.00am**

Time	Location	Noise criterion	Measured 15-minute noise level			Estimated LAeq, 15 min quarry contribution	Observations	Meteorological conditions
			LAeq	LA90	LAmx			
5.55am	OR3	37	58.9	34.9	81.7	<37	Site inaudible. Audible noise: Access road (71dBA), old northern road (38 to 45 dBA), and insects.	Overcast sky and calm to light breeze from S to N @ 0.7-1.4 km/h Temperature 7-8°C Neutral to Extremely unstable conditions (A to D class).
6.15am	OR2		48.7	40.9	60.7	<37	Site inaudible. Audible noise: Access road, old northern road, birds (56dBA) and insects.	
6.34am	R3		64.8	40.5	86.6	<37	Site inaudible. Dominant noise: Old Northern Road (defining average and maximums). Other audible noise dominant during lulls in road traffic noise: birds and insects.	
6.52am	R4/5		67.4	49.9	86.2	<37	Site inaudible. Dominant noise: Old Northern Road (defining average and maximums). Birds (52 to 58 dBA) dominant during lulls in road traffic noise. Van idling near sound level meter (SLM) 53 dBA.	



**Table 5 Monitoring results – Day Period - 7.00am to 6.00pm**

Time	Location	Noise criterion	Measured 15-minute noise level			Estimated LAeq, 15 min quarry contribution	Observations	Meteorological conditions
			LAeq	LA90	LAmx			
14/06/2024 8:10	OAS1 (Bottom of ledge West of Shed)	N/A	64.2	57.4	81.3	-	Plant noise (continuous) 80m away. Front end loader dumping sand 85-90m away. Truck passing front of SLM 71dBA, reversing 64 dBA, dumping rocks 70+ dBA. Hammering (sporadic) in workshop audible briefly 60 to 63 dBA. Front end loader dumping 65 to 68 dBA, Front end loader 2 passing by 80+ dBA.	Overcast sky and calm to light breeze. SW @ 3-4 km/h Temperature 8-11°C Slightly unstable to Moderately unstable conditions (B to C Class)
14/06/2024 8:41	OAS1 (Top of ledge NW of carpark)	N/A	65.1	62.7	81.3	-	Plant processing 108m away, 64 to 65 dBA. Truck dumping (impact) 96m away, 76 dBA. Hammering from the shed up to 81.3 dBA. Additional hammering from shed up to 65 dBA. Front end loader passing 43m away, 67 to 69 dBA.	
14/06/2024 9:15	OAS2	N/A	45.2	39.4	64.1	-	Distant plant noise audible for first 3 mins but not influencing the recorded noise level. No machines/equipment operating in the pit. Observed 3 machines idle 150m to 340m away, and staff in the pit. Then Front end loader entered the pit 156m away, 49 dBA. Other extraneous noises audible from the farm behind the SLM. Workers returned to the machinery 9mins into the measurement. Excavator operating and laying down sandstone blocks 300m away, impacts 51 to 58 dBA, general operational noise 46 to 49 dBA. FEL moving blocks around 195m away, 46 to 48 dBA, Cat truck moving 350m away 57dBA.	
14/06/2024 10:11	OAS3	N/A	45.7	43.7	56.6	-	Front end loader only. 160m away. Piling stock. Engine revs 47 dBA. Impacts 50 dBA.	
14/06/2024 10:15	OAS3	N/A	50.1	47.2	66.6	-	Cumulative measurement. First excavator grinding logs 170m away, 50 to 54 dBA, Second excavator popping logs 160m away (impacts) 62 dBA, 57 dBA, 55 dBA, 58 dBA. General engine excavator noise 54 dBA. Advised by Dixon Sands these activities will be conducted the whole day.	



Time	Location	Noise criterion	Measured 15-minute noise level			Estimated LAeq, 15 min quarry contribution	Observations	Meteorological conditions
			LAeq	LA90	LAmix			
14/06/2024 10:45	OR1 (School)	45	49.3	40.1	71.0	<45	Site inaudible. Dominant noise: birds and beep bird 65.8 dBA (coming from different directions). Other audible noise: Old Northern Road. Rustling leaves (wind). Occasional noise from the school.	Overcast sky and calm to light breeze from SW to WSW @ 2-4 km/h. Temperature 11-12°C Neutral to Extremely unstable conditions (A to D class)
14/06/2024 11:01	OR1 (School)	45	53.6	41.9	71.3	<45	Site inaudible. Audible noise: School bell 60 dBA, occasional children noise, continued bird noise, rustling leaves (wind). Old Northern Road 61 dBA, PF site west of SLM (or south of Dixon Sands) audible briefly.	
14/06/2024 11:16	OR1 (School)	45	54.6	42.3	72.1	<45	Site inaudible. Audible noise: birds, rustling leaves (wind), occasional music from school 58 dBA <10seconds, Old Northern Road, Squawker from PF site.	
14/06/2024 11:31	OR1 (School)	45	51.9	39.1	69.6	<45	Site Inaudible. Audible noise: birds, rustling leaves (wind), Old Northern Road, Insects.	
14/06/2024 12:01	OR3	44	44.9	39.0	58.2	39	Site audible - Processing plant near shed approx. 39 dBA. Pit activity inaudible. Other audible noise: Trucks on access road 48 to 50 dBA, distant laughter from the farm audible but not influencing noise levels.	
14/06/2024 12:22	OR2	44	46.7	38.3	59.1	41	Site audible - Processing plant 40 to 41 dBA. Pit activity inaudible. Other audible noise: Old Northern Road, light vehicles on access road 52 dBA, distant birds and insects.	
14/06/2024 12:42	R2	44	72.4	40.7	96.5	<44	Site inaudible. Dominant noise: Old Northern Road. Dual trucks up to 88 and 97 dBA (defining maximums). Other audible noise: birds and insects.	
14/06/2024 13:01	R3	44	70.1	40.6	92.4	<44	Site inaudible. Dominant noise: Old Northern Road. Trucks up to 92.4 dBA (defining maximums). Other audible noise: birds and insects.	



Time	Location	Noise criterion	Measured 15-minute noise level			Estimated LAeq, 15 min quarry contribution	Observations	Meteorological conditions
			LAeq	LA90	LAmx			
14/06/2024 13:19	R4/5	45	64.6	41.5	87.5	<45	Site inaudible. Dominant noise: Old Northern Road. Other audible noise: local civilians, school noise, birds and insects.	Overcast sky and calm to light breeze. Light drizzle towards the end of the 15min measurement. SSW @ 4.3 km/h Temperature 12°C Extremely unstable conditions (A class)



## 4.2 Extrapolated measurements

A conclusive noise level attributable to the Quarry was not possible in all locations due to ambient noise levels. Therefore, measurements captured on-site without substantial influence from extraneous noise were used to calculate sound pressure levels at each receiver.

Based on observations close to the quarry, the following plant and equipment was in use during the monitoring period.

1. Processing plant - conveyors and drives, screens, front end loaders, Moxies (plant to stockpile)
2. Pit – Excavator-mounted rock saw, excavators grinding and popping logs, front end loaders.

Measurements close to these plant items were undertaken to establish a representative noise model of the quarry operations. A summary of noise emission data for these items is presented in Appendix A.

Predictions of noise at nearby receivers were based on measured onsite noise levels and propagation methods described in ISO 9613-2:1996 *Acoustics – Attenuation of sound during propagation outdoors – Part 2: General method of calculation*, which accounts for geometric spreading, air and ground absorption as well as barrier effects, assuming worst case meteorology of a gentle breeze from source to receiver and stable conditions.

Based on the above, modelled noise levels for each monitoring location are presented in Table 6. Results are shown for equipment operating in the pit, processing plant and stockpiling area (Moxy route).

**Table 6 Extrapolated monitoring results to intermediate measurement locations**

Location	Modelled noise level, dBA	Measured noise level, LAeq, 15 minute, dBA
OAS1	64.7	65
OAS2	44.7	45
OAS3	48.5	50

Modelled levels are within 0.5 to 1 dB of measured values and are suitably accurate to extrapolate to assessment locations. Modelled levels at assessment locations are presented in Table 7.

Extrapolated results indicate the Quarry demonstrates a contribution to the ambient noise environment that meets the noise limit for the day period in all locations.

Noise contour maps from the model are presented in Appendix B and illustrate noise propagation from the Quarry to all surrounding sensitive receiver locations.

**Table 7 Extrapolated monitoring results**

Receiver	Noise criteria		Extrapolated noise level, LAeq, 15 minute	Comment
	Shoulder	Day		
OR1	-	45	33	Predicted levels correlate well with measured levels and all locations shown to meet noise limits during the day period.
OR2	37	44	36	
OR3			35	
2			34	
3			33	
4/5			33	



### 4.3 Compliance summary

Results of attended monitoring and extrapolated noise levels demonstrate the following.

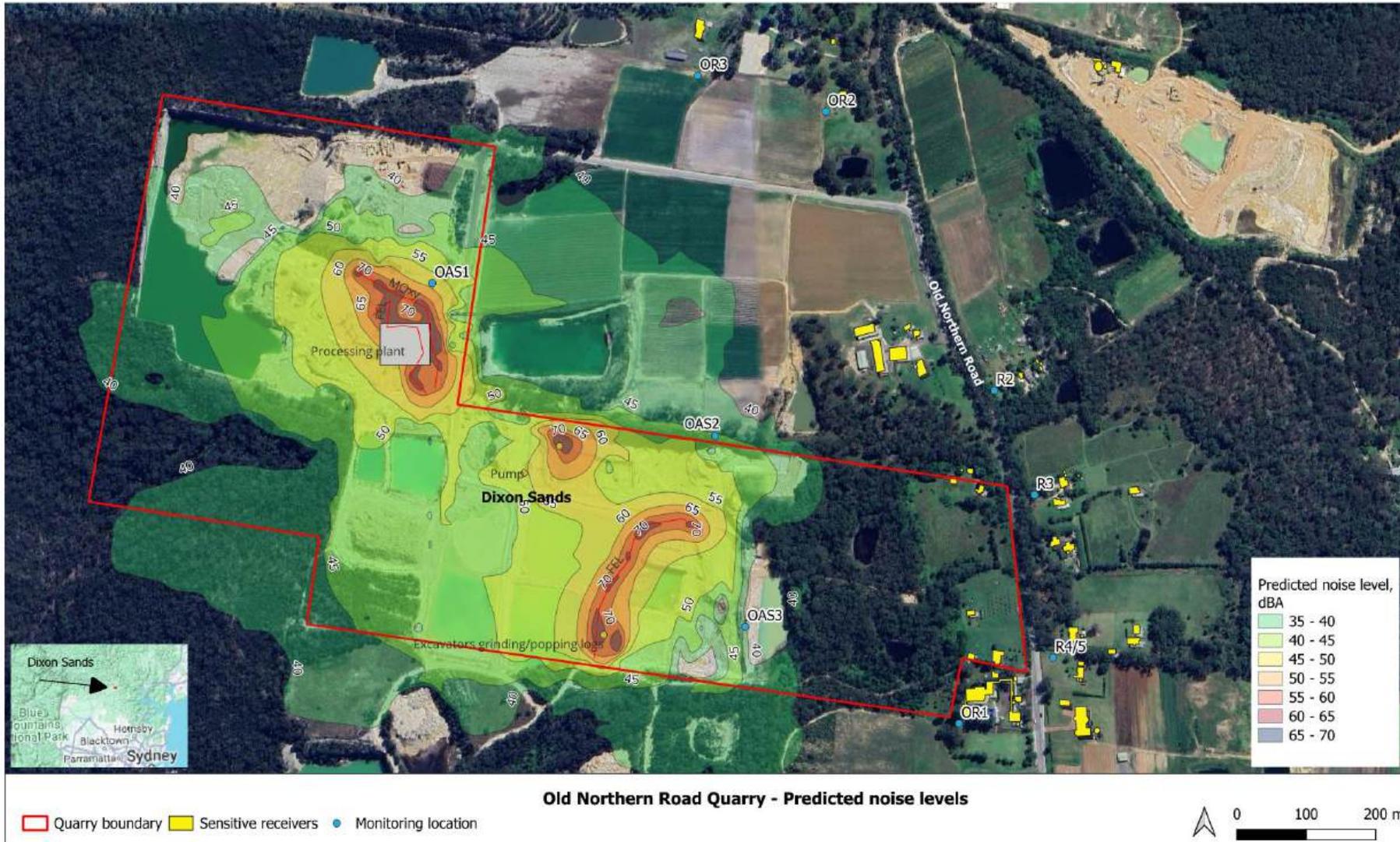
1. Observed operations during the day period were compliant with the noise limit at each receiver under the meteorological conditions at the time.
2. Observed operations during the shoulder period were compliant with the noise criteria at all receivers under the meteorological conditions at the time.



## Appendix A. On-site measurements

Location	Plant item	Height, m	Sound Power Level, (third octave, Hz), dBA																													
			Sum	12.5	16	20	25	31.5	40	50	63	80	100	125	160	200	250	315	400	500	630	800	1k	1.25k	1.6k	2k	2.5k	3.15k	4k	5k	6.3k	8k
Process area	Screens, conveyors, FEL	4	<b>113</b>	40	55	72	65	75	80	88	91	89	91	94	95	95	96	98	100	99	101	102	103	104	103	102	100	99	97	93	89	85
Pit area	Rock saw	1.5	<b>106</b>	22	32	41	45	54	60	68	70	76	86	81	92	84	81	86	94	95	95	97	97	97	98	96	92	90	88	84	80	76
	FEL only	4	<b>98</b>	39	52	52	55	66	67	71	75	77	75	78	78	79	79	81	84	86	88	88	89	90	88	87	85	83	77	72	70	67
	Excavators (2) grinding and popping logs	4	<b>103</b>	39	52	53	56	66	69	71	76	80	82	85	90	88	88	84	89	92	94	93	92	93	93	91	91	88	84	81	75	68

## Appendix B. Noise contours



# Appendix E – Monthly Site Inspection



## OLD NORTHERN ROAD QUARRY DIXON SAND, MAROOTA MONTHLY SITE CONDITION CHECKLIST

This checklist is to be completed monthly by the Environmental Officer.  
Completed checklists are to be retained and included in the Annual Review.

Date of inspection:		30/05/2024		
Inspection by:		Melissa Mass		
Measured monthly rainfall (mm)		30/4/2024 - 30/5/2024 Rainfall = 92.2 mm		
	Yes (✓) No (X) NA	Comments	Actions	Actions Complete (Date/Sign)
<b>SEDIMENT CONTROLS</b>				
Site checked for potential erosion issues or transport of sediment batters, vehicle access points, excavations, haul roads, vegetation clearing etc.	✓	No erosion or transport of sediment noted.		
Effectiveness and capacity of Erosion and Sediment controls checked (drains, basins, filters etc.)	✓	All drains + basins clear		
Stockpiles located and maintained correctly	✓			
Tree clearance restricted to required area	N/A			
<b>WATER QUALITY AND QUANTITY</b>				
Water sample taken daily for quality testing prior to discharge of water. Water quality tested and EPL#3916 criteria for pH, TSS and turbidity complied prior to discharge.	N/A			
Weir: Daily volume of water discharged recorded.	N/A			
Monthly monitoring of surface water quality at SW19.	✓	undertaken on 26/3/2024		
Monthly monitoring of groundwater quality at six bores on Lots 1&2 and two bores on Lots 196.	✓	undertaken by U&T		
Monthly depth measurement of all groundwater bores and comparison with rainfall	✓	undertaken on the 30/5/2024		
Monthly inspection of drainage & sediment controls including water storages, pumps, pipes and dams' walls	✓	undertaken on the 30/5/2024		
Any Fuel or oil spills reported and maintained	✓	No spills reported this period.		
Fuels/chemicals stored in bunded areas	✓	EPA approved bunding		
<b>AIR QUALITY</b>				
Continuous static dust (collected for analysis monthly)	✓	undertaken by U&T		
On site dust suppression	✓	Use of water cart when required.		
Loads covered entering and leaving site	✓	In compliance with TMP.		

No burning of vegetation	N/A			
Wind speed, direction and rainfall recorded	✓	TEOM and weather station managed by EBASED		
<b>NOISE</b>				
Operation only during hours of operation	✓			
No complaints received from school, residences or local community members.	✓			
6 monthly monitoring at Maroota PS	✓	undertaken by Hutchison + Welter		
Bulldozer not being used concurrently with any other plant on strips 4, 5 and 6 of Lots 1 and 2 DP547255 at depths between EGL and 6 metres below EGL	N/A			
Bulldozer being used for clearing, topsoil stripping and bund construction on lots 1 and 2 DP547255 only during low wind conditions	✓			
Excavator-dump truck combination replaced by excavator-dump truck combination to strip overburden on Strips 2-6 inclusive	✓			
Quarrying at ground level on Lot 196 not occurring during southwest to northwest winds	✓	In compliance with EPL		
Construction and rehabilitation of eastern highwall of quarry within 250 metres of Maroota Public School occurring in school holiday periods only	✓			
<b>FLORA &amp; FAUNA/ REHABILITATION</b>				
Sightings of threatened species reported	N/A			
No disturbance of buffer/conservation areas	✓			
Buffer/conservation area fencing/markings intact	✓			
Rehabilitation undertaken to schedule	✓	monthly visit by Bush - It		
Success of rehabilitation of buffers, conservation areas & rehabilitation areas	✓			
Rehabilitation near school during holidays	✓			
Flora and fauna monitoring program undertaken to schedule	✓			
<b>ARCHAEOLOGY</b>				
Stop work if sites located – OEH notified	✓			
<b>WASTE AND SITE CONDITION</b>				
No rubbish visible or buried on site	✓			
Recyclables removed by licensed Contractors	✓	By council contractors		
Putrescible waste covered and regularly removed	✓	By council contractors.		

**EXTRACTION PROGRAM**

Extraction depths from monthly checked control points in accordance with extraction program.	✓			
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**ROADS AND TRANSPORT**

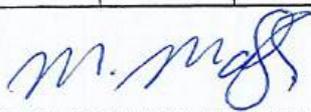
Weekly inspection of Old Northern Rd/Crown Rd intersection and sand/clay removed as necessary.	✓			
Crown Road, Old Northern Road near site, intersection & haul roads in good state of repair.	✓			
Truck movements have not exceeded 180/day, or 40 between 6-7am.	✓	Refer to Hunny to check		
Weighbridge/log book records forwarded to Council monthly	✓	Refer to Hunny to check.		

**REPORTING**

Complaints register maintained	✓	updated and published monthly		
Environmental incidents reported to and DPIE	✓	None this period.		

**PIRMP / SPILL KIT**

Spill kits inspected and used items replaced	✓			
A copy of PIRMP flowchart available in each Spill Kit	✓			

Signed:  (Environmental Officer or Delegate)

## Appendix F – Morning Truck Data

## Dixon Sand - Maroota Quarry Morning Trucks

NOVEMBER 2023 6.00am - 7.00am				Daily Morning Truck No. (laden)
Date	Time in	Docket No.	Tonnes	
1/11/2023	6.09	N7909D\1	38.44 t	
1/11/2023	6.13	N7910D\1	20.30 t	
1/11/2023	6.16	N7911D\1	18.72 t	
1/11/2023	6.23	N7912D\1	19.06 t	
1/11/2023	6.27	N7913D\1	16.88 t	
1/11/2023	6.38	N7914M\1	39.12 t	6
2/11/2023	6.06	N7940D\1	19.06 t	
2/11/2023	6.09	N7941D\1	18.84 t	
2/11/2023	6.13	N7942D\1	16.72 t	3
3/11/2023	6.06	N7959M\1	38.34 t	
3/11/2023	6.11	N7960D\1	18.74 t	
3/11/2023	6.17	N7961D\1	18.92 t	
3/11/2023	6.26	N7962D\1	34.96 t	
3/11/2023	6.28	N7963D\1	18.56 t	
3/11/2023	6.38	N7964M\1	38.58 t	
3/11/2023	6.42	N7965M\1	38.32 t	7
4/11/2023	6.24	N7993M\1	38.78 t	
4/11/2023	6.36	N7994M\1	29.18 t	
4/11/2023	6.45	N7995M\1	37.72 t	3
6/11/2023	6.09	N8004D\1	38.58 t	
6/11/2023	6.13	N8005D\1	14.84 t	
6/11/2023	6.17	N8006M\1	38.80 t	
6/11/2023	6.26	N8007D\1	16.72 t	
6/11/2023	6.34	N8008D\1	18.58 t	
6/11/2023	6.58	N8009D\1	16.98 t	6
7/11/2023	6.06	N8042M\1	39.04 t	
7/11/2023	6.10	N8043D\1	18.66 t	
7/11/2023	6.12	N8044D\1	18.70 t	
7/11/2023	6.15	N8045M\1	31.96 t	
7/11/2023	6.19	N8046D\1	18.46 t	
7/11/2023	6.20	N8047D\1	16.48 t	
7/11/2023	6.23	N8048M\1 & H8049M	30.80 t	7
8/11/2023	6.06	N8082D\1	19.96 t	
8/11/2023	6.11	N8083D\1	15.34 t	
8/11/2023	6.14	N8084M\1	38.74 t	
8/11/2023	6.22	N8085M\1	38.32 t	
8/11/2023	6.24	N8086M\1	38.66 t	
8/11/2023	6.32	N8087D\1	34.62 t	
8/11/2023	6.33	N8088M\1	39.44 t	
8/11/2023	6.37	N8089D\1	16.64 t	
8/11/2023	6.38	N8090D\1	14.90 t	
8/11/2023	6.39	N8091M\1	37.60 t	
8/11/2023	6.45	N8092M\1	37.78 t	11
9/11/2023	6.07	N8122D\1	32.18 t	
9/11/2023	6.13	N8123M\1	38.68 t	
9/11/2023	6.20	N8124M\1	39.26 t	
9/11/2023	6.23	N8125M\1	38.50 t	
9/11/2023	6.25	N8126D\1	18.74 t	
9/11/2023	6.27	N8127D\1	18.66 t	

9/11/2023	6.28	N8128D\1	13.26 t	
9/11/2023	6.29	N8129M\1	37.98 t	
9/11/2023	6.33	N8130D\1	18.88 t	
9/11/2023	6.34	N8131M\1	37.96 t	
9/11/2023	6.38	N8132D\1	17.34 t	
9/11/2023	6.48	N8133M\1	39.14 t	
9/11/2023	6.52	N8134D\1	16.72 t	13
10/11/2023	6.05	N8171D\1	20.34 t	
10/11/2023	6.09	N8172M\1	38.90 t	
10/11/2023	6.22	N8173D\1	33.16 t	
10/11/2023	6.29	N8174D\1	18.48 t	
10/11/2023	6.50	N8175D\1	18.86 t	5
13/11/2023	6.05	N8215D\1	14.44 t	
13/11/2023	6.08	N8216M\1	38.88 t	
13/11/2023	6.15	N8217D\1	18.60 t	
13/11/2023	6.24	N8218D\1	36.65 t	
13/11/2023	6.26	N8219D\1	18.88 t	5
14/11/2023	6.07	N8251D\1	18.92 t	
14/11/2023	6.08	N8252M\1	38.94 t	
14/11/2023	6.14	N8253D\1	19.04 t	
14/11/2023	6.22	N8254D\1	37.01 t	
14/11/2023	6.24	N8255M\1	38.52 t	
14/11/2023	6.27	N8256D\1	17.28 t	
14/11/2023	6.32	N8257D\1	19.26 t	7
15/11/2023	6.05	N8281D\1	20.02 t	
15/11/2023	6.10	N8282M\1	37.78 t	
15/11/2023	6.12	N8283D\1	14.16 t	
15/11/2023	6.14	N8284D\1	18.34 t	
15/11/2023	6.18	N8285M\1	38.32 t	
15/11/2023	6.20	N8286D\1	18.92 t	
15/11/2023	6.23	N8287D\1	16.68 t	
15/11/2023	6.25	N8288M\1	38.24 t	
15/11/2023	6.28	N8289D\1	16.98 t	
15/11/2023	6.34	N8290D\1	19.40 t	
15/11/2023	6.36	N8291D\1	18.70 t	
15/11/2023	6.38	N8292M\1	30.08 t	
15/11/2023	6.43	N8293M\1	38.60 t	13
16/11/2023	6.05	N8323D\1	19.84 t	
16/11/2023	6.08	N8324D\1	14.34 t	
16/11/2023	6.10	N8325M\1	38.56 t	
16/11/2023	6.16	N8326D\1	31.82 t	
16/11/2023	6.18	N8327D\1	16.60 t	
16/11/2023	6.20	N8328M\1	37.52 t	
16/11/2023	6.26	N8329D\1	18.80 t	
16/11/2023	6.27	N8330D\1	18.74 t	
16/11/2023	6.51	N8331D\1	14.48 t	9
17/11/2023	6.06	N8382M\1	37.44 t	
17/11/2023	6.12	N8383D\1	16.66 t	
17/11/2023	6.18	N8384M\1	12.32 t	
17/11/2023	6.21	N8385M\1	24.96 t	
17/11/2023	6.31	N8386D\1	35.12 t	
17/11/2023	6.34	N8387M\1	38.90 t	
17/11/2023	6.41	N8388M\1	29.86 t	
17/11/2023	6.47	N8389M\1	38.22 t	8
18/11/2023	6.07	N8415M\1	39.04 t	1

20/11/2023	6.07	N8421D\1	19.02 t	
20/11/2023	6.10	N8422D\1	18.70 t	
20/11/2023	6.11	N8423M\1	38.72 t	
20/11/2023	6.22	N8424D\1	36.93 t	
20/11/2023	6.13	N8425M\1	38.70 t	
20/11/2023	6.34	N8426M\1	37.44 t	
20/11/2023	6.35	N8427M\1	37.54 t	
20/11/2023	6.39	N8428M\1	38.04 t	
20/11/2023	6.44	N8429D\1	12.02 t	
20/11/2023	6.49	N8430M\1	39.42 t	10
21/11/2023	6.05	N8477M\1	38.84 t	
21/11/2023	6.10	N8478D\1	19.80 t	
21/11/2023	6.13	N8479M\1	39.24 t	
21/11/2023	6.17	N8480D\1	37.03 t	
21/11/2023	6.20	N8481D\1	10.88 t	
21/11/2023	6.21	N8482D\1	18.66 t	
21/11/2023	6.23	N8483D\1	18.76 t	
21/11/2023	6.25	N8484M\1	38.54 t	
21/11/2023	6.29	N8485M\1	37.42 t	
21/11/2023	6.34	N8486\1	8.56 t	
21/11/2023	6.35	N8487M\2	38.82 t	
21/11/2023	6.39	N8488M\1	37.72 t	
21/11/2023	6.40	N8489M\1	37.74 t	
21/11/2023	6.47	N8490D\1	16.82 t	
21/11/2023	6.51	N8491D\1	18.48 t	
21/11/2023	6.57	N8492M\1	38.28 t	16
22/11/2023	6.11	N8531D\1	37.21 t	
22/11/2023	6.14	N8532M\1	38.28 t	
22/11/2023	6.17	N8533D\1	34.58 t	
22/11/2023	6.19	N8534M\1	38.80 t	
22/11/2023	6.22	N8535M\1	37.54 t	
22/11/2023	6.25	N8536D\1	15.14 t	
22/11/2023	6.28	N8537M\1	37.80 t	
22/11/2023	6.31	N8538M\1	37.64 t	
22/11/2023	6.35	N8539D\1	18.42 t	
22/11/2023	6.38	N8540D\1	15.08 t	
22/11/2023	6.43	N8541D\1	19.38 t	
22/11/2023	6.58	N8542\1	27.46 t	12
23/11/2023	6.06	N8588D\1	20.40 t	
23/11/2023	6.14	N8589D\1	37.44 t	
23/11/2023	6.16	N8590D\1	32.08 t	
23/11/2023	6.20	N8591D\1	19.80 t	
23/11/2023	6.21	N8592D\1	18.16 t	
23/11/2023	6.23	N8593D\1	20.44 t	
23/11/2023	6.25	N8594D\1	18.84 t	
23/11/2023	6.27	N8595D\1	18.96 t	
23/11/2023	6.29	N8596M\1	38.78 t	
23/11/2023	6.32	N8597M\1	37.74 t	
23/11/2023	6.37	N8598D\1	14.38 t	
23/11/2023	6.40	N8599R\1	25.24 t	
23/11/2023	6.42	N8600D\1	20.44 t	
23/11/2023	6.46	N8601D\1	16.50 t	
23/11/2023	6.51	N8602R\1	11.30 t	
23/11/2023	6.54	N8603D\1	36.86 t	
23/11/2023	6.56	N8604M\1	39.42 t	17

24/11/2023	6.07	N8655D\1	37.22 t	
24/11/2023	6.15	N8656D\1	37.37 t	
24/11/2023	6.18	N8657M\1	38.34 t	
24/11/2023	6.21	N8658M\1	39.46 t	
24/11/2023	6.22	N8659M\1	38.70 t	
24/11/2023	6.28	N8660D\1	34.80 t	
24/11/2023	6.30	N8661M\1	38.10 t	
24/11/2023	6.33	N8662D\1	18.94 t	
24/11/2023	6.38	N8663D\1	14.92 t	
24/11/2023	6.45	N8664D\1	20.30 t	
24/11/2023	6.48	N8665M\1	39.30 t	
24/11/2023	6.58	N8666M\1	37.80 t	12
27/11/2023	6.04	N8721D\1	19.90 t	
27/11/2023	6.10	N8722D\1	32.18 t	
27/11/2023	6.13	N8723M\1	39.46 t	
27/11/2023	6.17	N8724D\1	36.95 t	
27/11/2023	6.22	N8725M\1	38.12 t	
27/11/2023	6.26	N8726D\1	31.96 t	
27/11/2023	6.29	N8727M\1	37.34 t	
27/11/2023	6.34	N8728M\1	38.86 t	
27/11/2023	6.37	N8729M\1	36.78 t	
27/11/2023	6.41	N8730M\1	37.60 t	
27/11/2023	6.44	N8731M\1	37.50 t	
27/11/2023	6.48	N8732M\1	38.04 t	12
28/11/2023	6.07	N8765D\1	32.46 t	
28/11/2023	6.14	N8766M\1	39.38 t	
28/11/2023	6.17	N8767M\1	38.92 t	
28/11/2023	6.27	N8768M\1	38.12 t	
28/11/2023	6.35	N8769D\1	32.06 t	5
29/11/2023	6.07	N8802M\1	39.16 t	
29/11/2023	6.14	N8803M\1	39.12 t	
29/11/2023	6.16	N8804M\1	37.50 t	
29/11/2023	6.19	N8805M\1	38.52 t	
29/11/2023	6.23	N8806M\1	37.18 t	
29/11/2023	6.28	N8807M\1	37.16 t	
29/11/2023	6.32	N8808M\1	38.68 t	
29/11/2023	6.35	N8809D\1	31.60 t	
29/11/2023	6.38	N8810D\1	14.86 t	
29/11/2023	6.39	N8811M\1	37.40 t	
29/11/2023	6.41	N8812M\1	37.54 t	
29/11/2023	6.46	N8813M\1	37.80 t	
29/11/2023	6.50	N8814M\1	37.42 t	
29/11/2023	6.58	N8815M\1	39.16 t	14
30/11/2023	6.16	N8841M\1	37.72 t	
30/11/2023	6.31	N8842D\1	14.20 t	2

## **Appendix G – Bush Regeneration Report**



Dixon Sand Pty Ltd  
Old Northern Road Quarry  
(Development Consent DA 250-09-01).



## Annual Report

July 2023 – June 2024

Assisted bush regeneration and rehabilitation works

Author: Zoe Ridgway

Date finalised: 07/07/2024

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## INTRODUCTION

This report summarises the assisted bush regeneration work undertaken by Bush-it Pty Ltd for Dixon Sand Pty Ltd between July 2023 and June 2024 as part of the Old Northern Development Consent DA 250-09-01. A total of 255 hours (\$16325.1 excluding GST) were worked throughout the financial year with an average team size of four per visit, not including the preparation of this report. The distribution of hours over the financial year are not uniform, as resources are focused on undertaking primary/planting works in the cooler months and targeting exotic grasses from seeding and spreading at the tail end of summer.

Dixon Sand Pty Ltd operate a mineral sand quarry on the Old Northern Road at Maroota, NSW. On their behalf Bush-it manages the native vegetation of 8.4 hectares at the Old Northern Road (ONR) quarry as illustrated in Figure 1. The area managed by Bush-it at the ONR quarry is comprised of a mix of remnant native vegetation; rehabilitated quarry sand and abandoned agricultural land.

The vegetation at the ONR quarry site is managed according to the operating requirements of the quarry. As the quarry expands its area of extraction, existing native vegetation will be cleared, and the soil translocated to rehabilitate other areas.

In carrying out our work for Dixon Sand, Bush-it:

- Practices low impact weed management techniques such as manual removal in plant communities containing threatened species.
- Regularly identifies and maps the density and extent of weed infestations especially those covering an area of greater than 25 m<sup>2</sup>
- Undertakes appropriate, targeted weed control activities to ensure minimum disturbance to natives and minimum off-target damage.
- Conducts site specific induction training for staff working at the quarry, including field identification of all threatened species.
- Routinely assesses the effectiveness of the control programs and in response makes necessary modifications.
- We undertake monthly inspections noting the presence of weeds in drainage lines, and along access tracks.
- And we follow industry standard protocols for bushland hygiene by ensuring all our tools, boots and equipment are clean before entering the work site.

# OVERVIEW OF MANAGEMENT ZONES AND WORK AREAS

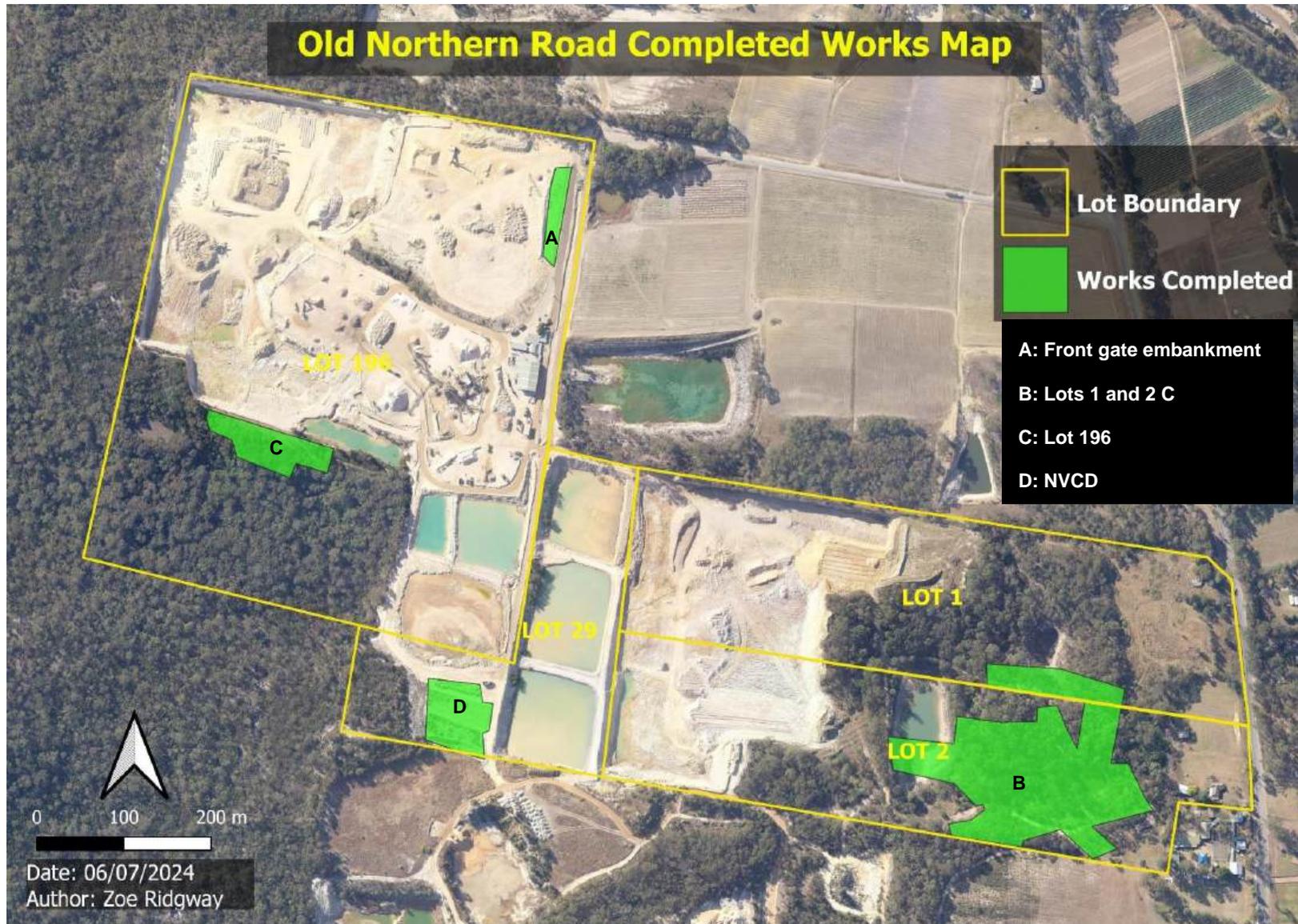


Figure 1a. – Aerial photo showing the areas worked in 2023-24.

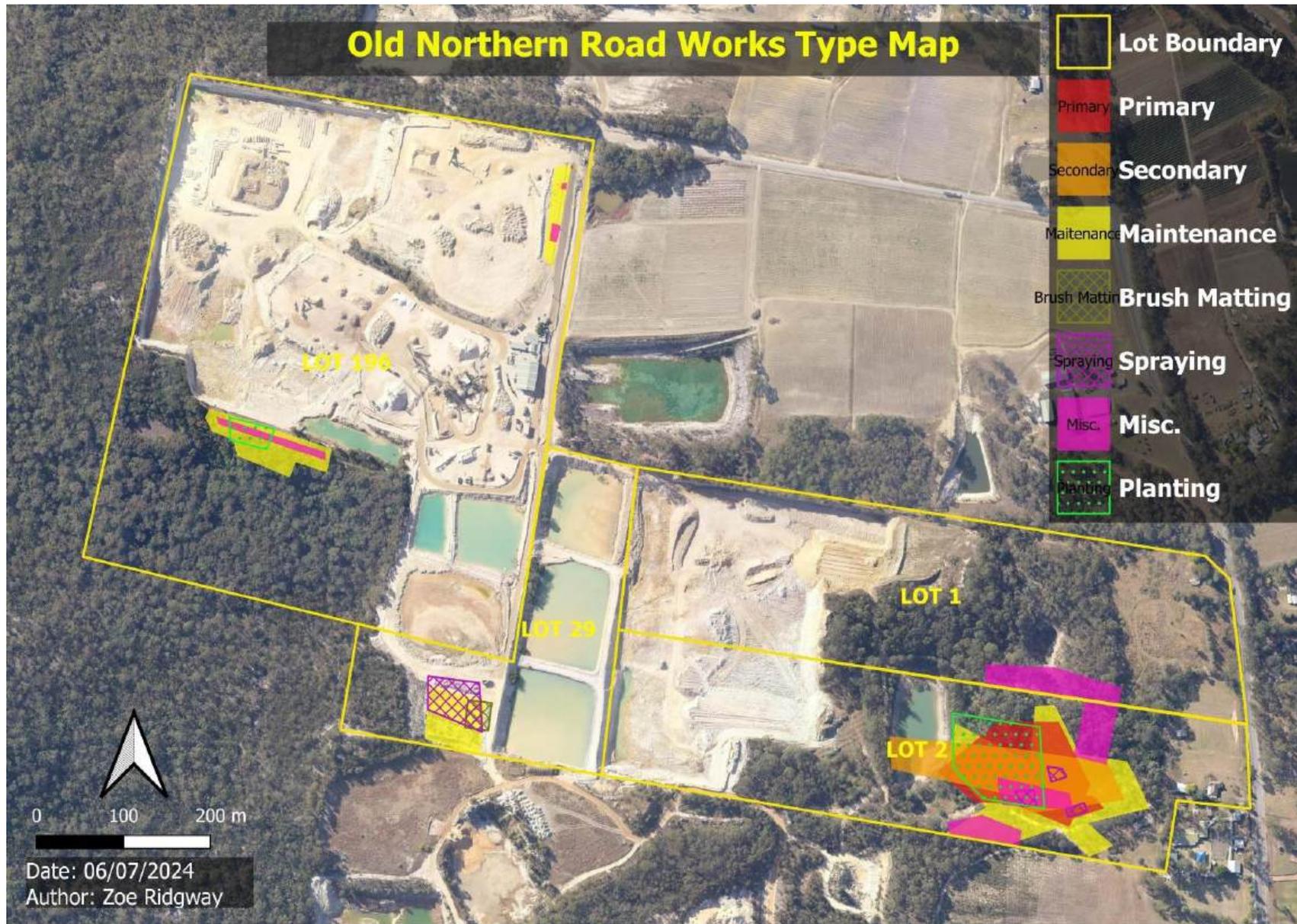


Figure 1b – Aerial photo highlighting the areas where different works activities were undertaken this year.

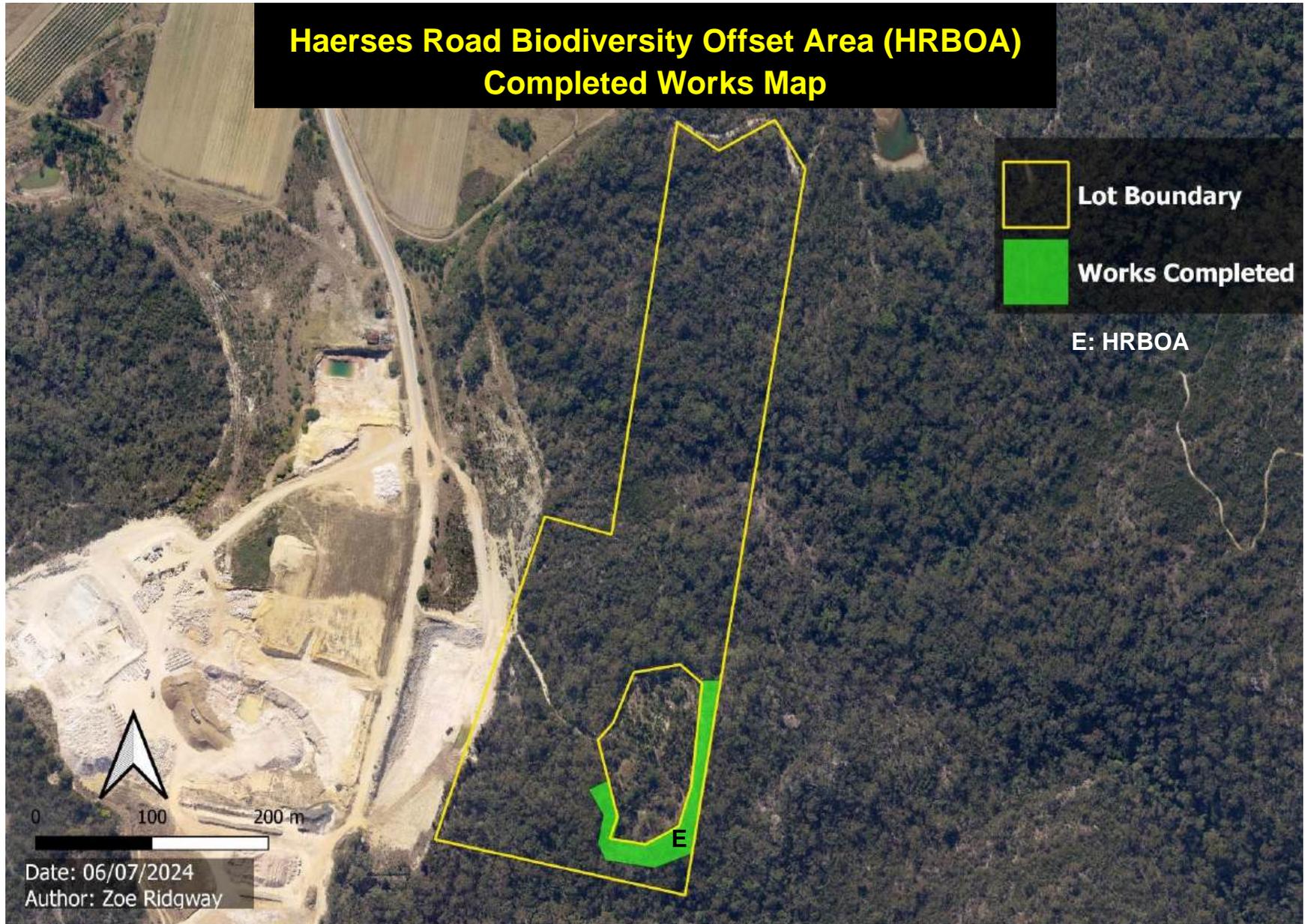
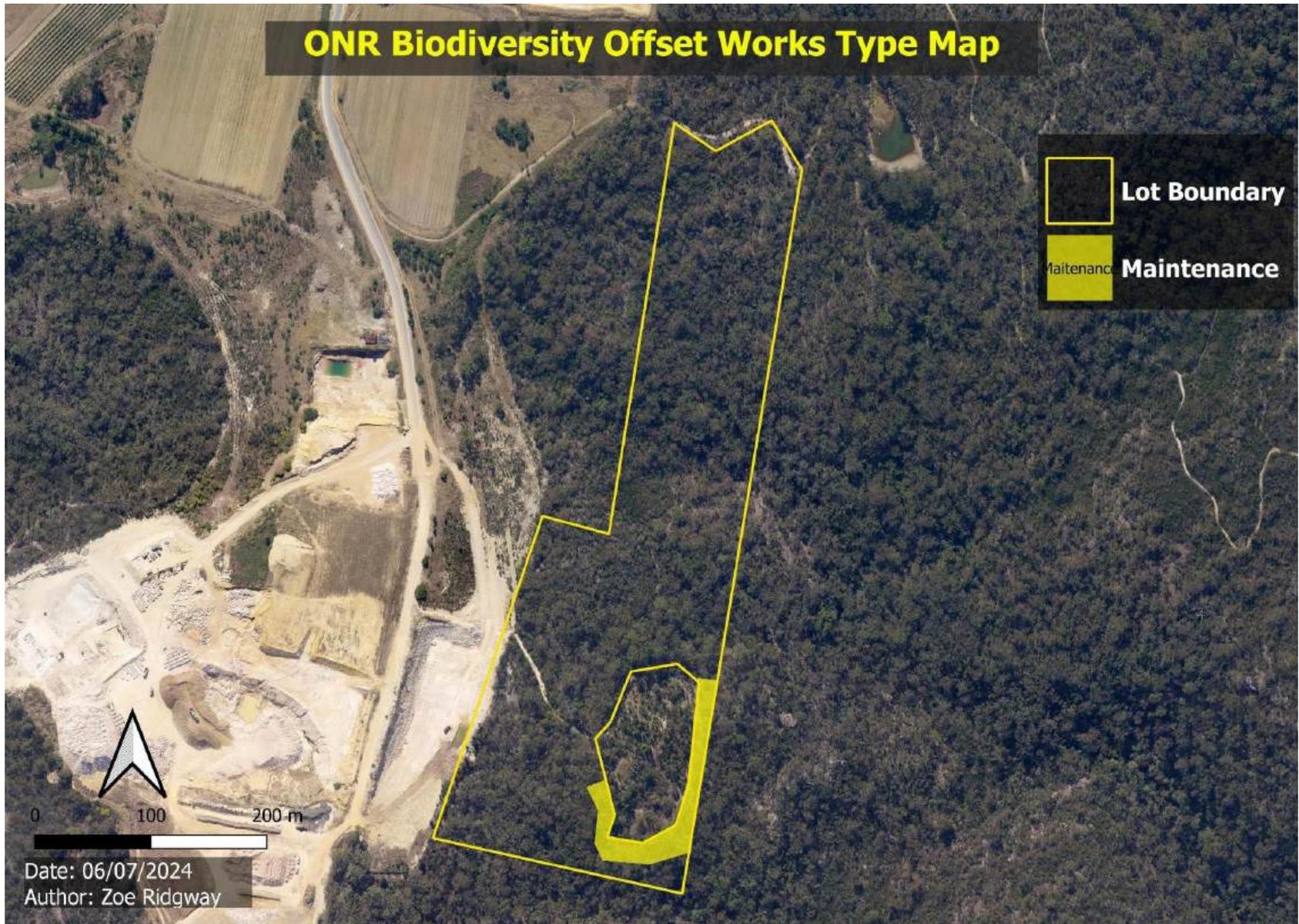


Figure 2a - ONR Biodiversity Offset Area



**Figure 2b** - ONR Biodiversity Offset Area at Haerses Rd - Completed Work 2023-2024

# OLD NORTHERN ROAD QUARRY

## EMBANKMENT AT FRONT GATE

---

### SCOPE

The embankment at the front gate (Area A in Figure 1a) is an exposed area of the quarry located between the roadway and an area used to stockpile quarry products and machinery.

The embankment is roughly 100m long and 20 m wide. A mix of native shrubs have been planted to stabilise the soil and improve the appearance of the mound.

### RESOURCES – 12.5 HOURS

During the last twelve months we have routinely monitored the area from the road checking for obvious infestations of exotic grass and have and treated these with herbicide and/or manually removed them.

We also installed guards around the 2 *Melaleuca deaneis* and regularly watered them, one of two have survived.

### RECOMMENDATIONS

Ongoing maintenance of exotic grassed via brush cut, manual removal and spot spraying before they set seed. A small planting with some remnant canopy and shrub species in the area would also prove beneficial, especially in exposed areas prone to the spread of invasive grasses.

### SCOPE

Lot 1 (Area B in Figure 1a.) is a 1.4ha bush block located on the eastern side of the extraction site. It is an example of Shale-Sandstone Forest with a dry sclerophyll understorey. The canopy consists of red bloodwood (*Corymbia gummifera*) and smooth-barked apple (*Angophora costata*). There are also species here, such as the woody pear (*Xylomellum pyraform*) and the Graceful Bush Pea (*Pultenea gracilis*) that favour residual shale or laterite soils.

As Dixon Sand expands its quarry operations, Lot 1 will be cleared of vegetation and the topsoil will be stored for future rehabilitation or direct along the designated native vegetation corridor to form a connection between existing areas of bushland roughly 6.8ha in size. *Old Northern Road Quarry BRMP (2020)*

In the meantime, the vegetation on Lot 1 is conserved in its current natural state. The work undertaken by Bush-it ensures that the biodiversity of the vegetation remains intact and free from invasive species. Bush-it also works to preserve important habitat elements on the site by minimising soil disturbance or the relocation of deadwood or other plant material.

Lot 2 (Area B in Figure 1a) is a 3.4 ha block also located on the eastern side of the excavation area. The canopy here is composed of grey gums (*Eucalyptus punctata*) and peppermint gums (*Eucalyptus piperita*) intergrading with black she oak (*Allocasuarina littoralis*) and *Acacia parramattensis*.

There are two water storage dams located in Lot 2 and a service trail connecting the quarry and the Old Northern Road runs along the southern side. The core areas of Lot 2 are to be conserved in their current natural state. The abandoned farm and orchards that currently harbors *Lantana camara* and various exotic grass will be steadily revegetated. Areas to be conserved and restored in some places are within the 250m buffer of the school.

The noise bund on the western end of Lot 2 was completed this financial year so works in this area were able to recommence. Due to the substantial break in works during the making of the bund, there was a strong focus on this area for primary and secondary works.



**Figure 3 –Impact of Bell Minors inhabiting area in Lantana and causing native canopy dieback**





**Figure 4 and 5** – Example of areas where plantings were conducted post-lantana clearing.

## RESOURCES – 121 HRS

Works in Lot 1 were very minimal this financial year, as efforts were especially focused on the ongoing reduction of Bell Minor habitat in Lot 2. However semi-regular scans were conducted as well as the seed collection of *Pultenea flexilis*, which were processed at Harvest nursery. Lot 2 also underwent this seed collection for *P. flexilis* and various other native shrub/canopy species. As a result, 250 specimens were planted from this seedbank as well as from other seed collections in the area this financial year. This was implemented as a long-term strategy to rehabilitate the shrub and canopy structures of Lot 2, in particular in areas that were cleared of lantana post-lantana clearing. Other species that were planted included: *Acacia longifolia*, *Acacia linifolia*, *Banksia serrata*, *Allocasuarina littoralis*, *Imperata cylindrica* and *Eucalyptus punctata*.

Primary and secondary follow up works continued into this financial year for the aforementioned removal of Bell Minor habitat, i.e. *Lantana camara*. Various techniques were used, namely drilling, spraying with 9:1 glyphosate and cut/painting as regrowth had also been extensive over the time of no access due to the bund construction.

Exotic grasses such as *Eragrostis curvula*, *Andropogon virginicus* and *Paspalum dilitatum* (as well as flowering *Ageratina adenophora*) were routinely brush-cut and slashed when access to Lot was permitted. A spray of 75:1 round up was also conducted to target these exotic grasses. Other occurring annuals such as Crofton and Thistle were removed manually or with cut-paint method.

## RECOMMENDATIONS

Continued revegetation of Lot 2 with indigenous trees and shrubs from future seed collections. There are many more exposed patches in the area that

would benefit from these works, especially as more lantana is cleared. Waterlogged soils have also been seen to dry out thus extending areas in which to plant into. Translocation of soil-laden seed from Lot 1 with the aid of machinery may also assist the rehabilitation of Lot 2.

A lot of headway was made with the lantana removal this financial year, as the largest stand surrounding the damn was effectively treated. There are still some follow up works here that can be done to complete the process and encourage the Bell Minors to permanently move on, thus hopefully reducing the dieback of established canopy species.

Lot 1 would benefit from continued monitoring and targeted works around areas prone to weed invasion, in particular areas facing the large mounds. The same can be said of the areas close to the bunds in Lot 2, although lantana stands there should be preserved to a narrow buffer to aid in the suppress germination of new invasive specimens.

Exotic grasses should continue to be routinely brush cut and suppressed.

## LOT 196

---

### SCOPE

The vegetation at Lot 196 (Area C in Figure 1a) resembles Coastal Enriched Sandstone Dry Forest intergrading with Sandstone Gully Forest containing *Angophora costata* *Corymbia gummifera*, *Eucalyptus piperita* with scattered *Eucalyptus haemastoma*. The understory is comprised of *Ceratopetalum gummiferum* and *Banksia serata*, and a grove of *Kunzea ambigua* has established itself on the old nursery site.

Most of the maintenance hours spent here, are used to brush cut and spot spray exotic grasses before they set seed.

### RESOURCES – 37 HOURS

Regular brush-cutting and slashing of exotic grasses, primarily *Andropogon virginicus*, was conducted throughout the year in efforts to suppress spread of weed seed throughout the area. Hand removal techniques were also used around more sensitive enrichment nodes comprised of juvenile *Kunzea ambigua*. Hand removal was also conducted for emerging *Ageratina Adenophora* in the area.

Regular watering sessions were conducted for the nine of eleven *Melaleuca deanei* species that were planted in the previous year. Unfortunately, and

despite this, one of two did not survive likely due to the overall dry conditions of that winter planting and heavily compacted soil conditions.

A planting was conducted of 40 *Acacia longifolias* and 10 *Imperata cylindricas* to compete with the exotic grasses that have taken hold of the area. The aim is for these fast-growing shrubs to break up the soil compaction and increase soil enrichment in the area for future revegetation projects.

## RECOMMENDATIONS

The long-term goal is to revegetate the compact and exposed areas of the site. Bush-it recommends that further plantings of remnant canopy species and competitive native grasses such as *Imperata cylindrica* be established along the strip adjoining Lot 196. Such a plantings provide competition for exotic grasses and prevent them spreading into the better areas.

Likewise, the ongoing select felling of branches along the front edge of Lot 196 and their use as brush matting will also suppress exotic grass. Direct seeding of a native grasses and shrubs gathered locally may also enhance the regeneration along this edge, especially if the seed can be pre-treated.

Regular brush cutting sessions are recommended to suppress the exotic grasses in the interim of these longer-term goals.



**Figure 6 – Example of dense enrichment node plantings conducted in May 2024.**

## NATIVE VEGETATION CORRIDOR (NVC)

---

### SCOPE

The native heath in the rehabilitation area (Area D in Figure 1a) continues to flourish and the soil translocation in this area has been very successful. The locally threatened *Darwinia fascicularis subsp. oligantha* has established itself well, as have the *Melaleuca deanei* cuttings that were planted in 2017. The more recent *M. deanei* plantings have put on new growth and some were able to have their guards removed.

The biomass of the mother *Melaleuca deanei* was relocated from a developed area to the NVC. Despite appearing otherwise dead, it had small shoots emerging from it. Although chances of revival are most improbable, this shall be monitored for further evidence of remaining life.

### RESOURCES – 59.5 HOURS

Bush-it has continued targeting whisky and pampas grass in the rehabilitation area. The proliferation of whisky and pampas on the neighbouring properties presents an ever-present source of wind-driven seed that blows in and establishes itself. While the total eradication of pampas and whisky remains a long-term goal, we have successfully prevented any new infestations in the NVC.

Bush-it continued to suppress the spread of common couch, especially in the overburden piles to the North of the translocation site where two spot sprays were conducted. We have also deseeded and sprayed the roadside grasses growing outside the fence and regular careful hand weeding throughout the translocation has prevented the spread of flat weeds.

Further works of thinning out dominating shrubs, namely *Banksia ericifolia*, were conducted to promote biodiversity. The excess material was used to brush mat. exposed bare ground on site, aiming to create microclimates that promote further regeneration from the seed bank.

### RECOMMENDATIONS

Continue to monitor and manage competitive native shrubs and trees in the

translocation, especially where they overshadow and/or encroach on the threatened species. Bush-it will selectively cull or cut back growth to encourage the most diverse assemblage of plants possible.

Establish a buffer planting on the southern boundary that catches wind-driven seed before it reaches the site. Bush-it has regularly picked invasive grasses out of the embankment and brush cut tussocks before they can ripen but, a dense row of *Imperata cylindrica* along this fence line would be ideal.



**Figure 7 – Example of areas where scans for and hand removal of minor exotic grass invasions are regularly conducted.**



**Figure 8 – Areas in which brush matting has been conducted to stimulate the native seed bank with the creation of microclimates.**

### SCOPE

The vegetation communities represented at Haerses Road Biodiversity Offset Area (HRBOA, Area E in Figure 2a) include Sydney Sandstone Ridgetop Woodland, Sydney Sandstone Gully Forest, and Sydney Sandstone Heath.

The dominant canopy species include *Corymbia gummifera* and *Eucalyptus racemosa*. While on the lower portions of the site, *Angophora costata* and *Eucalyptus piperita* overshadow an understorey of *Syncarpia glomulifera* and *Ceratopetalum gummiferum*. The sandstone heath is prominent throughout the areas close to Haerses Road. The dominant species here include *Angophora hispida*, *Banksia ericifolia* and, *Leptospermum trinervium*.

The HRBOA is an example healthy of remnant native vegetation. It connected to an area of natural bushland and evidence suggests the trophic complexity and abundance of characteristic native species is high.

The threats to the HRBOA are well managed. On casual observation the soils on site are undisturbed and capable of supporting a diverse range of plants at various life stages. There is also evidence of colonisation of native plants around the perimeter of the HRBOA in areas that have been previously cleared of vegetation.

Given the protection it receives from the HR offset, the number of non-native invasive or undesirable species is low.

### RESOURCES – 25 HOURS

In the last twelve months Bush-it has undertaken semi-regular inspections of the HRBOA from the perimeter of the HR offset and along the drainage line that bisects the site. These surveys have targeted known infestations of crofton weed and exotic grass and have been timed to coincide with flowering and seeding events.

By limiting the frequency and intensity of these visits, we have sought to limit the physical damage caused by trampling or inadvertent contaminating the HRBOA with invasive seed that might be carried on our clothing etc. Manual treatment and minimal herbicide use has also resulted in a dense buffer of native shrubs and canopy species.

### RECOMMENDATIONS

Continued work in the HRBOA would be assisted by identifying the successional stages of the floristic community and the habitat needs of resident fauna conducive to

an ecological burn. A burn would need to be undertaken in accordance with EHG's guidelines with RFS support.

## APPENDIX

### WEED SPECIES CONTROLLED

<b>Common name</b>	<b>Scientific name</b>
Crofton	<i>Ageratina adenophora</i>
Whiskey Grass	<i>Andropogon virginicus</i>
Moth vine	<i>Araujia sericifera</i>
Asparagus	<i>Asparagus aethiopicus</i>
Bridal creeper	<i>Asparagus asparagoides</i>
Cobblers Pegs	<i>Bidens pilosa</i> var. <i>pilosa</i>
Italian Thistle	<i>Carduus pycnocephalus</i>
Kikuyu Grass	<i>Cenchrus clandestinus</i>
Pampus Grass	<i>Cortaderia selloana</i>
Common Couch	<i>Cynodon dactylon</i> var. <i>dactylon</i>
Fleabane	<i>Conyza</i> sp.
African Lovegrass	<i>Eragrostis curvula</i>
Flatweed	<i>Hypochaeris radicata</i>
Lantana	<i>Lantana camara</i>
Scotch Thistle	<i>Onopordum acanthium</i>
Dallas Grass	<i>Paspalum dilatatum</i>
Vasey's Grass	<i>Paspalum urvillei</i>
Green Cliff Brake	<i>Pellaea viridis</i>
Inkweed	<i>Phytolacca octandra</i>
Castor Oil Plant	<i>Ricinus communis</i>
Blackberry	<i>Rubus fruticosus</i>
Turkey Rhubarb	<i>Rumex sagittatus</i>
Paddy'ss Lucerne	<i>Sida rhombifolia</i>
Wild Tobacco	<i>Solanum mauritianum</i>
Sand Couch	<i>Sporobolus virginicus</i> var. <i>virginicus</i>

## REGISTER OF HERBICIDE RECORDS

Date	Operator name	Herbicide name	Wind speed (km/h)	Direction	Notes	Application method	Qty (ml/g)	Volume (L)	Start time	End time
17/08/2023	Tim	Glyphosate 360g/L	9.3	N	Added chemwet targeting lantana	Spray	0.25	20	12:30:00	13:30:00
23/08/2023	Zoe	Glyphosate 360g/L	9.5	WNW	50:1 targeting couch	Spray	0.1	0.5	7:30:00	15:30:00
6/09/2023	Tim	Glyphosate 360g/L	12	N	Targeted African Lovegrass along track.	Spray	150	10	12:30:00	13:30:00

## DISTRIBUTION OF HOURS ACROSS MANAGEMENT ZONES AND MONTHLY RAINFALL

Zone	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Total
Admin	2.5	15.75	1.5	1	8.5	0.5	3.25	0.5	0.5	2.5	10.25	3.5	<b>50.25</b>
ONR - Biodiversity Offset at Haerses Rd site	2	0	0	5	0	0	12	0	0	6	0	0	<b>25</b>
ONR - Embankment at front gate	12	0.5	0	0	0	0	0	0	0	0	0	0	<b>12.5</b>
ONR - Lot 196	0	1.5	8	0	1	0	2	0	9	13.5	2	0	<b>37</b>
ONR - Lots 1 & 2	0	16	36.5	0	7.5	0	13	15	0	10	23	0	<b>121</b>
ONR - Native Vegetation Corridor - Lot 29	0	13	0	0	15	3.5	2.5	0	5.5	8	0	12	<b>59.5</b>
<b>TOTAL</b>	<b>16.5</b>	<b>46.75</b>	<b>46</b>	<b>6</b>	<b>32</b>	<b>4</b>	<b>32.75</b>	<b>15.5</b>	<b>15</b>	<b>40</b>	<b>35.25</b>	<b>15.5</b>	<b>255</b>

# **Appendix H - Annual Biodiversity & Rehabilitation Management Report**

**ANNUAL  
BIODIVERSITY  
&  
REHABILITATION  
MANAGEMENT  
REPORT  
Old Northern Road  
2024**

**Prepared for Dixon Sand Pty Ltd**

**September 2024 V.1**



Tel: 02 4579 1794

Mob: 0411 812 775

Email: [mmass@southeastenvironmental.com.au](mailto:mmass@southeastenvironmental.com.au)

Website: [www.southeastenvironmental.com.au](http://www.southeastenvironmental.com.au)

**Annual Biodiversity  
&  
Rehabilitation Management  
Report  
Old Northern Road  
2024  
Dixon Sand Pty Ltd**

This assessment has been prepared by

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Melissa Mass

September 2024 V.1

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Date

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## Abbreviations

<b>Abbreviation</b>	<b>Description</b>
BC Act	<i>Biodiversity Conservation Act 2016</i>
EEC	Endangered Ecological Community
EP&A Act	<i>Environmental Planning and Assessment Act 1979</i>
EPBC Act	<i>Environmental Protection and Biodiversity Conservation Act 1999</i>
HRBOA	Haerses Road Biodiversity Offset Area
HTW	High Threat Weed
KPI	Key Performance Indicators
KTP	Key Threatening Process
LEP	Local Environmental Plan
Mod 4	Modification 4
Mod 5	Modification 5
NSW OEH	New South Wales Office of Environment and Heritage
NVC	Native Vegetation Corridor
ONR	Old Northern Road
PCT	Plant Community Type
SEPP	State Environmental Planning Policy
THSC	The Hills Shire Council
VIS	Vegetation Information System
WoNS	Weed of National Significance

# 1 INTRODUCTION

---

This report presents the findings of the annual monitoring of the biodiversity value and rehabilitation effort within the Dixon Sand operation at Old Northern Road Maroota and the biodiversity value of the offset vegetation at Haerses Road Maroota.

## 1.1 BACKGROUND

Dixon Sand Pty Ltd operates a sand extraction and processing operation across 58.4 hectares on Lot 29 DP752025, Lot 196 DP752025, Lot 1 DP547255 and Lot 2 DP547255 Old Northern Road Maroota. The quarry operates in compliance to Development Consent 250-09-01 issued by the Land and Environment Court in 2004.

Several modifications have been made to the Development Consent, the most recent being described as Modification 5. The previous modification, known as Mod 4, involved the clearing of native vegetation for continued sand extraction resulting in consent conditions requiring the management of biodiversity values and impacts. Thus a Biodiversity Offset Strategy for the Old Northern Road quarry site was established which includes a Native Vegetation Corridor (NVC) and the Haerses Road Biodiversity Offset Area (HRBOA).

## 1.2 OBJECTIVES

The objectives of this Annual Biodiversity and Rehabilitation Management Report is to describe the current condition of the NVC and the HRBOA and to advise Dixon Sand on the appropriate management measures required to be implemented in order to meet the expectations of the Old Northern Road Quarry Biodiversity and Rehabilitation Management Plan (2018) prepared by Umwelt (Australia) Pty Ltd.

This report will:

- identify native flora and fauna species, populations and ecological communities known to or likely to occur within the NVC and HRBOA;
- describe the native vegetation and habitats within the NVC and HRBOA;
- describe the current condition of the threatened flora and its habitat found outside of the NVC at Old Northern Road;
- discuss the ongoing monitoring of threatened flora and fauna previously recorded at both ONR and HRBOA;
- determine the legislative and conservation significance of species, populations and ecological communities known or likely to occur within the NVC and HRBOA with reference to the Commonwealth *EPBC Act 1999* and the *NSW BC Act 2016*;
- recommend appropriate biodiversity and environmental management measures that should be implemented to reach criteria for monitoring success set by the Old Northern Road Quarry Biodiversity and Rehabilitation Management Plan (2018);
- provide an independent monitoring report for inclusion as part of the external reporting for the quarry Annual Review.

## 2 METHODOLOGY

---

### 2.1 SITE HISTORY

#### 2.1.1 Old Northern Road Native Vegetation Corridor

The NVC on the Old Northern Road quarry site is 6.83 hectares, approximately 100m wide and 650m in length in an east-west direction. Approximately half the area of the NVC has been, or is currently, disturbed for sand extraction and areas dedicated as silt ponds. Approximately 0.8 hectares is currently under active rehabilitation as will be discussed further in this report.

The remaining vegetation within the NVC is disturbed and modified. Livestock grazing, timber removal and fruit orchards in the immediate and adjacent lands have contributed to the ongoing disturbance over many years within this area. As a result, exotic weed species are prolific and at times dominate the landscape. Farm dams have been dug which once provided irrigation to the fruit orchards and watered livestock. They now provide a water source for native and exotic species which occur in the immediate area.

Unsealed tracks are found throughout the NVC which currently provide easy access for vehicles or pedestrians.

#### 2.1.2 Haerses Road Biodiversity Offset Area

The HRBOA is relatively undisturbed native vegetation which covers an area of 8.7 hectares. Four vegetation communities have been identified within the offset which includes habitat for threatened species known to occur in the area. Old vehicle tracks occur within the site although over time, with very little use, the tracks are now suitable for pedestrian access only.

#### 2.1.3 Threatened flora habitat

An area to the west of the Old Northern Road NVC contains threatened flora habitat which has previously been identified and monitored. This area has had very little disturbance due to its location and unsuitability for grazing, farming or logging. A haul road had previously been constructed adjacent to the site however this road is no longer in use and most likely had very minimal impact upon the threatened flora habitat.

### 2.2 FIELD SURVEY

Botanical surveys of the study area were conducted over several days spread throughout July and August 2024. Fixed quadrat locations from previous annual surveys were revisited for annual flora comparison. Quadrat locations in the HRBOA were each marked with a permanent steel post and a yellow cap in the centre location along the western edge of the quadrat. The Old Northern Road NVC quadrats were marked with flagging tape given that some vegetation within the NVC is still subject to disturbance by sand extraction.

Each quadrat was 20m x 50m which included a subplot of 20m x 20m and 5 line plots of 1m x 1m. A random meander was conducted through most other areas of native vegetation within the study area, to search for threatened flora species, and to record information on habitat condition.

All flora species recorded are listed in Appendix A, B and C of this report.

Vegetation communities were identified and described with reference to the vegetation maps developed by THSC, the NSW Vegetation Information System (VIS), the descriptions in Tozer et al

(2010), and with reference to vegetation descriptions included by the Scientific Committee final determinations to list threatened communities under the *BC Act 2016* and the *EPBC Act 1999*.

An assessment of fauna habitat was conducted within each survey quadrat to identify suitability for potential threatened fauna species known to occur in the local area.

The habitat assessment included the suitability of landscape features, hollow-bearing trees, stags, fallen timber and logs, rocky outcrops and boulders, flowering Eucalypts, specific feed trees for Glossy Black Cockatoo's, Swift Parrot, Koalas, Grey-headed Flying Fox, site connectivity, vegetation structure and vegetation types.

Searches were also undertaken for indirect evidence of native fauna, including scratches, scats, nests, hollows in use, camps, roosts, den sites etc. Opportunistic sightings of all fauna species were recorded throughout the survey period.

The following fauna survey methods were performed to target threatened species known to occur or likely to occur in the local area:

- General search with direct observation of any fauna species present within the study area, including diurnal and nocturnal call identifications;
- Early morning dedicated bird surveys;
- Unbaited motion detection infra-red digital camera left within the NVC and HRBOA for a total of 30 survey nights at each location;
- Anabat recording device left within the NVC and HRBOA for a total of 30 survey nights at each location.

A list of fauna species recorded across all sites is provided in appendix D and E.

Within each 50m x 20m quadrat the following information was recorded:

- centre of western edge GPS location
- aspect and slope of midline
- photograph of midline from western centre edge
- IBRA region
- vegetation class
- Plant Community Type (PCT)
- stem class including recruitment
- standing hollow count
- overall length of logs

The quadrats 20m x 20m recorded:

- every flora species identified
- abundance of each species recorded
- count of stratum richness
- percentage of High Threat Weed (HTW) cover

From within the five 1m x 1m plots the following information was recorded:

- litter cover
- native overstorey foliage cover
- native midstorey foliage cover
- native groundcover foliage cover
- cryptogam cover

- rock cover
- bare ground

Results collected from the 1m x 1m plots at each site is displayed as an average.

### 2.3 CRITERIA TO MONITOR SUCCESS OF REHABILITATION

The Key Performance Indicators (KPI) to measure success of the biodiversity and rehabilitation effort of the Old Northern Road NVC and the vegetation management within the HRBOA have been outlined by Umwelt (Australia) Pty Ltd 2018. The following tables depict the performance and completion criteria for both locations.

**Table 1.** Performance and completion criteria for Old Northern Road NVC (taken from Umwelt Pty Ltd 2018)

<i>Rehabilitation Performance and Completion Criteria</i>	
<i>Native Vegetation</i>	Revegetation areas contain flora species assemblages characteristic of the desired native vegetation communities
	Second generation tree seedlings are present or likely to be, based on monitoring in comparable older rehabilitation sites (i.e. evidence of fruiting of native species observed)
	More than 75 percent of trees are healthy and growing as indicated by long term monitoring
	More than 50 percent of translocated or propagated threatened flora species survive as indicated by long term monitoring
	There is no significant weed infestation such that weeds do not comprise a significant proportion of species in any stratum
<i>Weeds and Pests</i>	Regular inspections indicate a decline in weed diversity, density and abundance and a decline in signs of feral animal activity
	There is no significant weed infestation such that weeds do not comprise a significant proportion of species in any stratum
	There is no evidence of significant damage resulting from feral animal activity

**Table 2.** Performance and measurable indicators for HRBOA (taken from Cumberland Ecology 2016)

<i>Performance and measurable indicators</i>	
<i>Native Vegetation</i>	Maintenance of current level of native species diversity and abundance
	Maintenance of current level of canopy regeneration
	Measurable increase in habitat features
	Measurable decrease in impacts from feral fauna activity
<i>Weeds</i>	Measurable decline in weed density and distribution
	Measurable decline in weed diversity
	Limited recruitment of new weed species
<i>Feral Animals</i>	Observable reduction in decline of native fauna populations due to either predation by feral species, habitat degradation caused by feral fauna or competition with feral fauna
	Limited recruitment of new feral species

<i>General</i>	Measurable increase in the condition of vegetation
	Observable reduction in signs of erosion (if any)
	Evidence of restrictions to site access
	Observable decrease in bushfire risk

Furthermore, threatened flora species KPI for the translocated individuals and the flora species in-situ are to maintain or increase resident species population from the baseline levels which will be determined from this report.

Threatened fauna species previously identified at the Old Northern Road site and HRBOA are to be maintained or increase in population size based on a presence or absence survey each year following the baseline information within the Biodiversity Rehabilitation Management Plan (Umwelt Pty Ltd 2018).

## 2.4 SURVEY LIMITATIONS

The flora survey was conducted within a short timeframe during winter. Therefore some plant species may not have been identified due to the survey being performed when not in flower, or when dormant. It is noted that some flora species are seasonal, and may not have been visible at the time of the surveys. Overall there has been an increase in native abundance and diversity over time, particularly ground cover species such as forbs, grasses and ferns.

The survey limitations have been addressed through:

- consideration of flora and fauna species known to occur in the locality (including number of records from Bionet);
- consideration of habitat suitability present within the study areas and connectivity to other areas of habitat in the local landscape;
- consideration of current weather conditions;
- a conservative approach in assuming the presence of a species that could potentially be present in the study areas.

Where the study area contains potential habitat for threatened fauna species known to occur in the locality, and where survey areas support a likelihood of occurrence, it has been assumed on a conservative approach that such species may occur in the study area.

## 3 RESULTS

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Results from the field surveys conducted over July and August 2024 have been separated into four distinct areas to enable quantification of condition for each specific location and its monitoring objectives.

### 3.1 OLD NORTHERN ROAD

The Old Northern Road NVC is currently in the mid stage of its rehabilitation strategy. Rehabilitation has begun within Lot 29 while extraction continues in Lot 1 and 2. Collection of propagation material from threatened flora species, *Melaleuca deanei* and *Darwinia fascicularis subsp oligantha*, has taken place with enough successful clone individuals been successfully raised to meet the approved quota. The *M. deanei* individuals were required to be established and actively growing in the ground before the removal of the parent plant could be undertaken. This was achieved in May 2022 with a total of 52 closed *M. deanei* successfully transplanted into the rehabilitation area showing signs of active growth. An attempt to translocate the parent plant into the active rehabilitation area was undertaken in June 2022.

Dedicated rehabilitation of native vegetation on Lot 29 begun in late 2017. An area of approximately 0.8 hectares was selected and prepared for three rehabilitation methods to use as a comparison for future reference. The larger area (approximately 0.4 hectares) has been planted out using local provenance stock and plants derived from material collected from threatened species onsite. In total 47 species have been planted within the rehabilitation area, including two threatened species. Artificial habitat structures such as rock, logs and plant debris have been placed around the rehabilitation site to provide habitat for small birds and reptiles.

Two adjacent areas, of approximately similar sizes, have undergone rehabilitation in conjunction with the planted rehabilitation. The area to the immediate south of the planted rehabilitation has undergone translocation of plant material, including root balls of several species together. This is a particularly successful conservation tool when used for threatened species which have little chance of survival in their current location. This approach has been used here to relocate *Darwinia fascicularis subsp. oligantha* along with flora species found within immediate and close proximity of each cluster of the threatened plants. Habitat features such as rocks, logs and plant debris have also been placed around the site to provide habitat for small birds, reptiles and to create microhabitats for dependant flora species.

The far western area of the NVC rehabilitation area has been spread with soil containing native seed bank and supplementary planting of threatened flora species. Habitat features have also been provided in this location.

Monitoring of vegetation condition has begun in other areas of the NVC, including areas which will be subjected to disturbance from sand extraction. The information gained from the pre-disturbance monitoring will provide Dixon Sand with quantitative data which can be used to rehabilitate the NVC back to, or close to, its pre-disturbance state.

Other areas of vegetation monitoring outside of the established rehabilitation corridor has also taken place to determine the effects of the sand extraction project on retained vegetation.

### 3.1.1 Rehabilitation area – Planted

The planted rehabilitation area is approximately 0.4 hectares in size and has been planted with 47 native species including 2 species listed on the *BC Act 2016* as being species of significance, *Melaleuca deanei* (vulnerable) and *Darwinia fascicularis subsp. Oligantha* (endangered population). In addition to the revegetation planting several species have emerged from seed bank storage from the sub-soil which was spread over the rehabilitation site before planting commenced or from seed migration into the site from wind, birds, ants or mammal carriers. In total 65 native species which were not recorded as planted within the rehabilitation site were identified during the 2024 survey period including the vulnerable species *Tetratheca glandulosa*. This is an increase of 14 additional species since last year which could be attributed to ideal weather conditions, species in adjacent bushland and rehabilitation areas having an abundance of seed to disperse from recent weather conditions and the thinning of native species by the Bush Regenerators which were crowding out the site and limiting light availability to the ground stratum. There was one weed species identified within the planted revegetation area in very low density, Whiskey Grass *Andropogon virginicus*.

There were 14 live specimens of *Melaleuca deanei*, 12 live specimens of *Darwinia fascicularis subsp. Oligantha* and 4 live specimens of *Tetratheca glandulosa* located within the planted rehabilitation area. The previously identified threatened species which had self-germinated in 2020, *Acacia bynoeana* and *Pimelea curviflora var. curviflora*, could not be located during the 2024 flora survey. This could suggest the species responded to the abundance of moisture present over the 2020-2022 period and was short lived, or it may have been preyed upon by herbivores which are present within the rehabilitation area.

The overall condition of the planted rehabilitation area is very good. The canopy trees have reached reproductive maturity with flowering buds present during the July survey period. Species diversity has continued to increase with shrub and ground cover species. Native mammal species which have been recorded this year as being present including macropods, bandicoots and possums. Bird diversity is increasing with 10 species recorded again in 2024 within the rehabilitation site during vegetation surveys in the middle of the day.



**Image 1.** View of planted rehabilitation area from north-west corner looking east 2021



**Image 2.** Comparison view of planted rehabilitation area from north-west corner looking east 2024



**Image 3.** View of planted rehabilitation area from south-east corner looking west 2021



**Image 4.** Comparison view of planted rehabilitation area from south-east corner looking west 2024



**Image 5.** *Melaleuca deanei* planted in 2017 within the planted rehabilitation area 2024



**Image 6.** *Darwinia fascicularis subsp. Oligantha* planted in 2017 within the planted rehabilitation area 2024



**Image 7.** *Tetratheca glandulosa* within the planted rehabilitation area 2024

### 3.1.2 Rehabilitation area – Translocated

The translocated rehabilitation area was not subjected to a flora survey as per the vegetation survey site locations suggested in the Biodiversity Rehabilitation Management Plan 2018. However a random meander through the area recording flora species was undertaken. Species identified and recorded can be found in Appendix B. Photo monitoring should, over time, be sufficient to determine the rehabilitation success of this area.

Overall coverage of vegetation from the translocation and continued recruitment from seed bank storage appears to be ample. Translocated *Darwinia fascicularis* subsp. *Oligantha* is numerous, particularly on the western side of the site. All age classes were observed from small seedlings to adult shrubs which had limited flower at the time of the survey period.

A single *Tetratheca glandulosa* which was translocated during the previous reporting period appears in a healthy state with flowers present during July suggesting flowering will continue to occur over the coming months. A further individual was located within the translocation area which has grown from seed bank within the soil.

Three *Melaleuca deanei* which were planted within this area in 2017 are still present and appear healthy. A further 32 *M. deanei* have been planted within this area during 2020-2022. All plants appear to be doing well with most showing signs of active growth. These plants will continue to be closely monitored. The parent plant was translocated into this area following the quota of replacement plants being met. The plant was translocated using a loader with a large bucket picking up as much soil and root ball as possible. Unfortunately the main tap root was broken during this process and the plant material died back. The two soil mounds which remain each have a single seedling emerging which appear to be *M. deanei*. Close monitoring of these seedlings will continue over the coming months.

There is currently no upper canopy within this area however *Eucalyptus sp.*, *Corymbia sp.* and *Angophora hispida* recruits were observed. Shrubs and ground cover plants are abundant throughout the area.



**Image 8.** Translocated *Tetratheca glandulosa* flowering within the translocation area 2024



**Image 9.** *Melaleuca deanei* planted in 2021 within the translocation area 2024



**Image 10.** *Darwinia fascicularis subsp. oligantha* within the translocation area



**Image 11.** *Melaleuca deanei* seedling emerging from parent plant root ball



**Image 12.** Birds nesting in the rehabilitation area

### 3.1.3 Rehabilitation area – Soil seed bank

The soil seed bank rehabilitation area was not subjected to a flora survey as per the vegetation survey site locations suggested in the Biodiversity Rehabilitation Management Plan 2018. A random meander through the area recording flora species was undertaken and a count of living planted threatened species was recorded. Photo monitoring of the area will determine rehabilitation success.

Ample natural recruitment of native species is occurring across the site with recruitment of *Darwinia fascicularis subsp. Oligantha* evident. Canopy stratum is beginning to emerge with *Eucalyptus sp* and *Corymbia sp.* observed. *Banksia ericifolia* dominates the recovering shrub layer with *Grevillea buxifolia* and *Acacia suaveolens* also widespread. Previously *Acacia suaveolens* had dominated this area however the Banksia has outgrown most of the other species present. Ground cover species are present throughout although due to the density of the shrub layer the ground cover is sporadically distributed.

There were 23 *Darwinia fascicularis subsp. oligantha* identified scattered throughout the site, some of which are new recruits. A single planted *Melaleuca deanei* was located during the survey period. The density of the shrub regrowth is suspected of hampering the efforts to locate other individuals. All the surviving threatened species which were located as present appear to be healthy.

### 3.1.4 Front gate rehabilitation

The front gate rehabilitation was initially planted in 2017. The hot dry conditions between 2017 and 2020 resulted in a number of losses and slow growth to the surviving plants despite regular watering and maintenance. Since the return to regular rainfall the front gate rehabilitation area has thrived with many shrubs flowering well and new recruitments evident, although weed density has also increased. Gaps are still present however it is expected these will fill in with time via natural recruitment. Two *Melaleuca deanei* were planted in this area during 2023 however only one has survived due to lack of watering and the compacted ground.



**Image 13.** View of translocated rehabilitation area from south-west looking east 2021



**Image 14.** Comparison view of translocated rehabilitation area from south-west looking east 2024



**Image 15.** View of soil seed bank rehabilitation area from north looking south 2021



**Image 16.** Comparison view of soil seed bank rehabilitation area from north looking south 2024



**Image 17.** View of soil seed bank rehabilitation area from south looking north 2021



**Image 18.** Comparison view of soil seed bank rehabilitation area from south looking north 2024



Image 19. *Melaleuca deanei* planted in 2017 within the seed bank rehabilitation area 2024



Image 20. Front gate rehabilitation area

### 3.1.5 Vegetation monitoring within NVC

The Biodiversity Rehabilitation Management Plan 2018 indicates that nine vegetation monitoring sites should be established across the Old Northern Road site. Five of these sites occur within the NVC including one site within the planted rehabilitation area discussed in 3.1.1 of this report.

From the remaining four sites only one could be safely accessed for monitoring as the other three monitoring sites are currently under sand and sandstone extraction operations.

The vegetation in the surveyed area is described in the Biodiversity Rehabilitation Management Plan 2018 as being *Eucalyptus punctata* woodland. The species recorded within the survey site came to the determination that the VIS classification for this PCT best fit is 1328 - *Yellow Bloodwood - Narrow-leaved Apple heathy woodland on hinterland plateaux of the Central Coast, Sydney Basin Bioregion*. In 2023 the Eastern NSW PCT Classification was officially endorsed by the NSW State Government which oversaw the reclassification of all PCT's along the east coast. PCT1328 was split into several PCT's which had association with the species present. The most relevant and best suited PCT for the NVC survey plot is now considered PCT3622 – Sydney Hinterland Yellow Bloodwood Woodland. Information collected during the survey period has been summarised in Table 3 while a full list of flora recorded can be found in Appendix A.

The overall health of the vegetation and biodiversity within the remaining NVC is moderate. There has been historic disturbance in the area most likely from livestock grazing and timber removal. Recent average rainfall in the local area has assisted in the stabilization of vegetation from the previous drought and then wet conditions.

The remaining areas throughout the NVC continue to be severely impacted from the presence of *Lantana camara*. An effort to remove and control the species has been ongoing for several years however due to the distribution and density it will require further long term management to completely remove the species across the entire site.

During the 2022 reporting period it was determined that the required ratio of clone *Melaleuca deanei* had been successfully transplanted into the rehabilitation area allowing for the removal of the parent plant(s). An attempt was made to translocate the parent plant into the rehabilitation area via digging around the root ball and carrying the plant with the root ball attached in a loader bucket. The root system for the parent plant was extensive and had coiled around large sandstone boulders and through the cracks of others. Therefore during retrieval of the plant much of the root system was unfortunately damaged. The parent plant was placed within the rehabilitation area with the root ball and immediate surrounding soil. Unfortunately the parent plant perished following translocation however two seedlings have emerged and are being monitored closely for their growth and persistence.

**Table 3.** Survey summary from NVC survey site location ONR quadrat 2.

3622- Sydney Hinterland Yellow Bloodwood Woodland				
AGD Zone 56 Easting – 0313182 Northing – 06296257 Midline - 89°				
Vegetation Layer	Height Range	Vegetation Layer		
Trees	15 – 20m	<i>Corymbia gummifera, Eucalyptus punctata, Eucalyptus haemastoma, Angophora bakeri, Allocasuarina littoralis</i>		
Shrubs	0.5 – 2m	<i>Acacia linifolia, Grevillea buxifolia, Hakea sericea, Pimelea linifolia, Bossiaea obcordata, Platysace linearifolia</i>		
Groundcover	0.1 – 0.5m	<i>Pratia purpurascens, Lomandra longifolia, Entolasia stricta, Themeda australis,</i>		
Stem Class	Eucalyptus		Hollows	
Dbh	Eucalyptus	Non-Eucalypt	<20cm	>20cm
80cm+				
50-79cm	✓		1	2
30-49cm	✓		2	
20-29cm	✓			
10-19cm	✓			
5-9cm	✓	✓		
<5cm	✓	✓		
Composition & Structure		Composition Count		Structure cover %
Trees		6		60
Shrubs		25		50
Grasses etc		9		50
Forbs		6		10
Ferns		1		5
Other		3		3
High Threat Weeds		0		0
Ecosystem Functions				
Length of habitat logs		40 m		
Litter cover		50%		
Bare ground cover		0%		
Cryptogam cover		20%		
Rock cover		5%		
Overstorey foliage cover		45%		
Mid-storey foliage cover		40%		
Groundcover foliage cover		50%		



**Image 21.** Midline view of NVC survey quadrat 2 2024

### 3.1.6 Vegetation monitoring outside NVC

There were four monitoring sites identified outside of the NVC which were proposed to be surveyed. Two of these locations were unable to be accessed due to sand extraction currently taking place. Another of the locations was not able to be accessed due to impenetrable thickets of *Lantana camara*. The remaining monitoring site and an additional monitoring site were selected for surveying to provide baseline data for ongoing assessment over the site.

The vegetation within Plot 1 was previously determined to be PCT 1181 – *Smooth-barked Apple – Red Bloodwood – Sydney Peppermint heathy open forest on slopes of dry sandstone gullies of western and southern Sydney, Sydney Basin Bioregion*. The Eastern NSW PCT Classification has split this PCT into several PCT's with PCT 3617 – *Sydney Hinterland Peppermint-Apple Forest* being the best fit for the vegetation located in Plot 1. This survey location is outside of the NVC although within the 250m buffer area to Maroota Public School in the southeast corner of the site. This area has had historic disturbance most likely from timber harvesting. An abundance of *Eucalyptus piperita* are regenerating within this quadrat at around the same age class which suggests at some stage the area was once cleared. Despite this, the diversity within the survey site is reasonable and the biodiversity values are moderate. The area where this quadrat is located will not be subjected to clearing so will therefore provide an opportunity for monitoring the effects of sand extraction in nearby retained vegetation.

The additional survey site, Plot 4, was undertaken within an area of vegetation determined to also be PCT 3617 – *Sydney Hinterland Peppermint-Apple Forest*. This survey location is just within the 250m buffer to the Maroota Public School in the centre of the site and will not be subject to clearing for quarry activities. It is therefore likely to provide good baseline data for rehabilitation of the vegetation community for future reference. The vegetation within the survey plot appears to have very little disturbance and contains no exotic weed species.

The remaining vegetation within the 250m buffer area appeared to have some impacts from the spread and growth of *Lantana camara* therefore a third survey quadrat within the recommended survey area was not undertaken. Efforts have been made to reduce the impacts from the invasive species however the progress is slow and favourable weather conditions for growth have made control difficult. It is expected that as the *Lantana* thickets are removed or reduced in density a further survey plot will be added to the annual monitoring to ensure ample recovery of the area.

**Table 4.** Survey summary for area outside NVC Survey site location ONR quadrat 1

<b>3617 – Sydney Hinterland Peppermint-Apple Forest</b>				
<b>AGD Zone 56 Easting – 0313250 Northing – 06296390 Midline - 230°</b>				
<b>Vegetation Layer</b>	<b>Height Range</b>	<b>Vegetation Layer</b>		
<b>Trees</b>	20 – 30m	<i>Eucalyptus piperita, Eucalyptus punctata, Angophora costata, Allocasuarina littoralis, Ceratopetalum gummiferum</i>		
<b>Shrubs</b>	0.5 – 2m	<i>Leptospermum polygalifolium, Kunzea ambigua, Banksia spinulosa, Acacia ulicifolia, Epacris pulchella</i>		
<b>Groundcover</b>	0.1 – 0.5m	<i>Lomandra filiformis, Xanthosia pilosa, Lomandra longifolia, Themeda australis, Entolasia stricta, Microleana stipoides</i>		
<b>Stem Class</b>			<b>Hollows</b>	
<b>Dbh</b>	<b>Eucalyptus</b>	<b>Non-Eucalypt</b>	<b>&lt;20cm</b>	<b>&gt;20cm</b>
<b>80cm+</b>				
<b>50-79cm</b>				
<b>30-49cm</b>	✓		1	
<b>20-29cm</b>	✓			
<b>10-19cm</b>	✓			
<b>5-9cm</b>	✓	✓		
<b>&lt;5cm</b>	✓	✓		
<b>Composition &amp; Structure</b>		<b>Composition Count</b>		<b>Structure cover %</b>
<b>Trees</b>		6		80
<b>Shrubs</b>		15		45
<b>Grasses etc</b>		10		50
<b>Forbs</b>		6		5
<b>Ferns</b>		2		5
<b>Other</b>		3		3
<b>High Threat Weeds</b>		0		0
<b>Ecosystem Functions</b>				
<b>Length of habitat logs</b>		16.5m		
<b>Litter cover</b>		50%		
<b>Bare ground cover</b>		0%		
<b>Cryptogam cover</b>		30%		
<b>Rock cover</b>		5%		
<b>Overstorey foliage cover</b>		65%		
<b>Mid-storey foliage cover</b>		30%		
<b>Groundcover foliage cover</b>		40%		

Table 5. Survey summary for area outside NVC Survey site location ONR quadrat 4

<b>3617 – Sydney Hinterland Peppermint-Apple Forest</b>				
<b>AGD Zone 56 Easting – 0313263 Northing – 06296592 Midline - 90°</b>				
<b>Vegetation Layer</b>	<b>Height Range</b>	<b>Vegetation Layer</b>		
<b>Trees</b>	20 – 30m	<i>Eucalyptus piperita, Eucalyptus pilularis, Angophora costata, Allocasuarina littoralis, Ceratopetalum gummiferum, Corymbia gummifera</i>		
<b>Shrubs</b>	0.5 – 2m	<i>Banksia spinulosa, Persoonia linearis, Acacia ulicifolia, Bossiaea obcordata, Hakea sericea, Leucopogon parviflorus</i>		
<b>Groundcover</b>	0.1 – 0.5m	<i>Pteridium esculentum, Lomandra multiflora, Themeda australis, Entolasia stricta, Smilax glycyphylla</i>		
<b>Stem Class</b>		<b>Hollows</b>		
<b>Dbh</b>	<b>Eucalyptus</b>	<b>Non-Eucalypt</b>	<b>&lt;20cm</b>	<b>&gt;20cm</b>
<b>80cm+</b>				
<b>50-79cm</b>	✓		2	2
<b>30-49cm</b>	✓		3	
<b>20-29cm</b>	✓			
<b>10-19cm</b>	✓	✓		
<b>5-9cm</b>	✓	✓		
<b>&lt;5cm</b>	✓	✓		
<b>Composition &amp; Structure</b>		<b>Composition Count</b>		<b>Structure cover %</b>
<b>Trees</b>		8		70
<b>Shrubs</b>		26		60
<b>Grasses etc</b>		9		30
<b>Forbs</b>		5		8
<b>Ferns</b>		2		2
<b>Other</b>		6		5
<b>High Threat Weeds</b>		1		1
<b>Ecosystem Functions</b>				
<b>Length of habitat logs</b>	32m			
<b>Litter cover</b>	40%			
<b>Bare ground cover</b>	0%			
<b>Cryptogam cover</b>	20%			
<b>Rock cover</b>	20%			
<b>Overstorey foliage cover</b>	60%			
<b>Mid-storey foliage cover</b>	50%			
<b>Groundcover foliage cover</b>	25%			



**Image 22.** Midline view of ONR quadrat 1 2024



Image 23. Midline view of ONR quadrat 4 2024

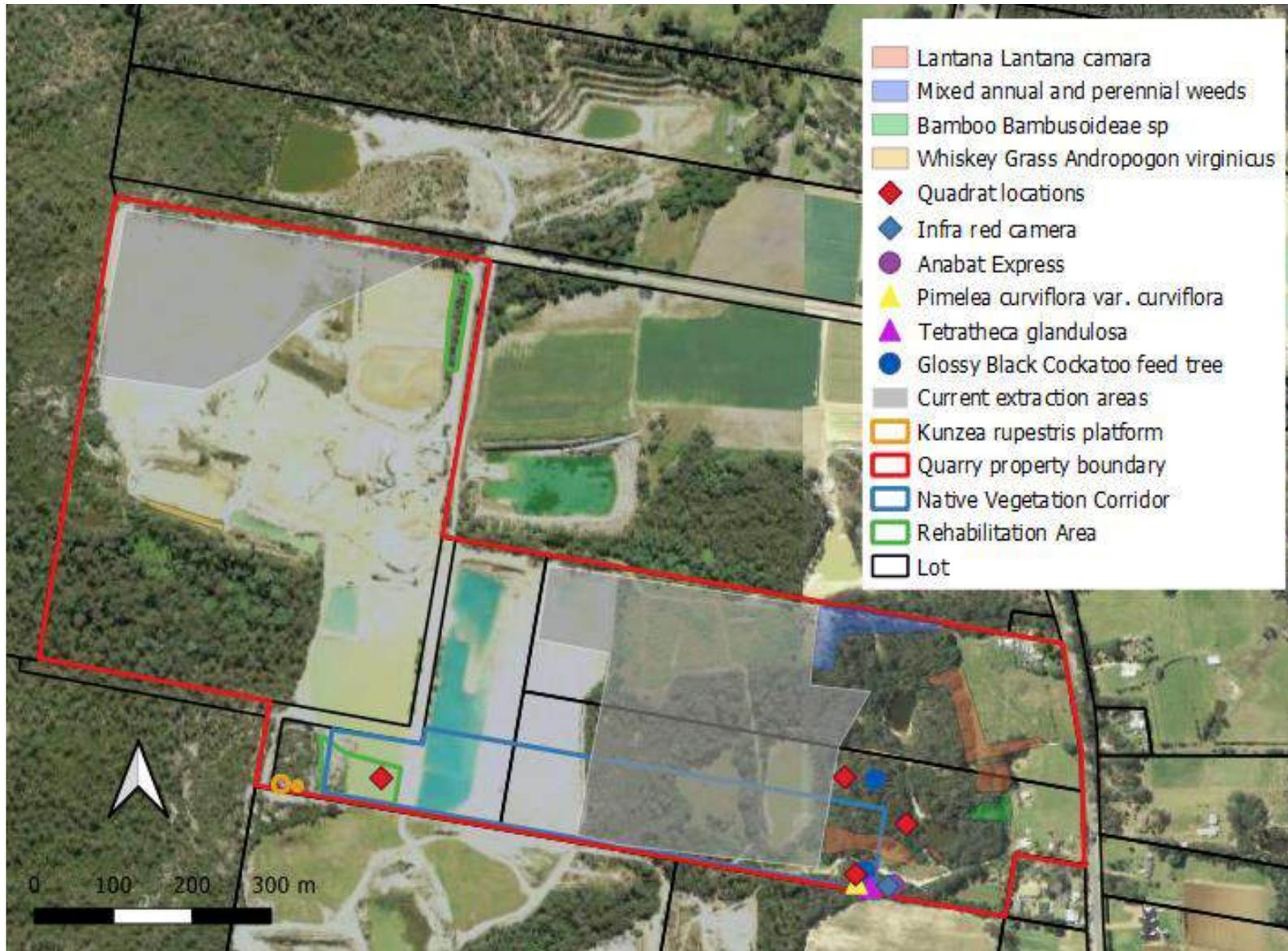


Image 24. ONR survey site locations 2024

### 3.2 HAERSES ROAD BIODIVERSITY OFFSET AREA

The HRBOA has a total of five monitoring sites specifically to provide benchmark values for the vegetation communities found within the site. Baseline data collected and discussed within this report will enable a measurable value of success for management actions which may be implemented over the life of the offset.

It is expected over time there will be an increase in biodiversity, habitat features, ongoing evidence of natural recruitment and a decrease in exotic fauna and flora presence.

Each of the survey locations has been permanently marked with a steel post and yellow cap indicating the plot identification number.

Cumberland Ecology (2016) had previously identified four vegetation communities onsite as Sydney sandstone Ridgetop Woodland, Sydney Hinterland Transition Woodland, Sydney Sandstone Gully Forest and Sydney Sandstone Heath (Heath/Woodland Complex). Each survey location surveyed was given a best fit PCT based on the classification of the VIS which was determined by the native species most abundant throughout the quadrat. Reassigning PCT to the new Eastern NSW PCT Classification has resulted in the following PCT's being identified:

- Plot 1 – (1181) 3617 – Sydney Hinterland Peppermint-Apple Forest
- Plot 2 – (1641) 3807 - Northern Sydney Heath-Mallee
- Plot 3 – (1181) 3617 – Sydney Hinterland Peppermint-Apple Forest
- Plot 4 – (1627) 3621 – Sydney Hinterland Turpentine-Apple Gully Forest
- Plot 5 – (1643) 3593 – Sydney Coastal Sandstone Bloodwood Shrub Forest

These PCT's are in line with the broader definition given in the Cumberland Ecology Biodiversity Management Plan 2016.

Plot 2 had an abundance of the threatened flora species *Darwinia biflora* present. This shrub was noted to be very well represented throughout the entire area of the PCT 3807.

Overall there was a stabilisation to foliage cover and structure cover in most strata at most survey sites. Grass and ground cover species appear to have recovered from the wet conditions with a noticeable increase in density this survey period following the return to average conditions. Forbs had also increased in density this reporting year. Extensive Long-nosed Bandicoot digs were again noted in an area close to Quadrat 1. Bird presence and density has remained consistent from last survey period, likely due to the favourable weather conditions.

The following tables (7 – 11) are a summary of the survey results at each of the plot locations across HRBOA.

**Table 6.** Survey summary for survey site location HRBOA quadrat 1

<b>3617 – Sydney Hinterland Peppermint-Apple Forest</b>				
<b>AGD Zone 56 Easting – 0312740 Northing – 06293489 Midline - 130°</b>				
<b>Vegetation Layer</b>	<b>Height Range</b>	<b>Vegetation Layer</b>		
Trees	20 – 30m	<i>Angophora costata, Corymbia gummifera, Allocasuarina littoralis, Ceratopetalum gummiferum, Banksia Serrata</i>		
Shrubs	0.5 – 2m	<i>Leptospermum trinervium, Persoonia pinifolia, Lambertia Formosa, Boronia floribunda, Grevillea speciosa, Acacia ulicifolia</i>		
Groundcover	0.1 – 0.5m	<i>Caustis flexosa, Pteridium esculentum, Lomandra brevis, Entolasia stricta, Smilax glyciphylla, Xanthorrhoea media</i>		
<b>Stem Class</b>	<b>Hollows</b>			
<b>Dbh</b>	<b>Eucalyptus</b>	<b>Non-Eucalypt</b>	<b>&lt;20cm</b>	<b>&gt;20cm</b>
80cm+				
50-79cm	✓		1	1
30-49cm	✓		1	
20-29cm	✓	✓		
10-19cm	✓	✓		
5-9cm	✓	✓		
<5cm	✓	✓		
<b>Composition &amp; Structure</b>		<b>Composition Count</b>		<b>Structure cover %</b>
Trees		6		50
Shrubs		25		70
Grasses etc		9		25
Forbs		4		5
Ferns		1		5
Other		3		5
High Threat Weeds		0		0
<b>Ecosystem Functions</b>				
Length of habitat logs	8.4m			
Litter cover	79%			
Bare ground cover	0%			
Cryptogam cover	2%			
Rock cover	30%			
Overstorey foliage cover	35%			
Mid-storey foliage cover	40%			
Groundcover foliage cover	20%			



Image 25. Midline view of HRBOA quadrat 1 2024

**Table 7.** Survey summary for survey site location HRBOA quadrat 2

3807 - Northern Sydney Heath-Mallee				
AGD Zone 56 Easting – 0312750 Northing – 06293649 Midline - 100°				
Vegetation Layer	Height Range	Vegetation Layer		
Trees	2 – 10m	<i>Angophora hispida, Eucalyptus haemastoma, Banksia serrata</i>		
Shrubs	0.5 – 2m	<i>Banksia ericifolia, Hakea sericea, Leptospermum trinervium, Dillwynia floribunda, Lambertia Formosa, Calytrix tetragona, Grevillea speciosa, Boronia ledifolia, Persoonia pinifolia</i>		
Groundcover	0.1 – 0.5m	<i>Caustis pentandra, Actinotus minor, Austrostipa pubescens, Mirbelia speciosa, Lepidosperma laterale, Cassytha glabella, Entolasia stricta, Lomandra obliqua</i>		
Stem Class	Eucalyptus		Hollows	
Dbh	Eucalyptus	Non-Eucalypt	<20cm	>20cm
80cm+				
50-79cm	✓		1	
30-49cm		✓		
20-29cm	✓			
10-19cm	✓	✓		
5-9cm	✓	✓		
<5cm	✓	✓		
Composition & Structure		Composition Count		Structure cover %
Trees		3		30
Shrubs		34		100
Grasses etc		10		80
Forbs		5		10
Ferns		2		5
Other		2		4
High Threat Weeds		0		0
Ecosystem Functions				
Length of habitat logs		3.2m		
Litter cover		15%		
Bare ground cover		0%		
Cryptogam cover		10%		
Rock cover		5%		
Overstorey foliage cover		20%		
Mid-storey foliage cover		80%		
Groundcover foliage cover		95%		



Image 26. Midline view of HRBOA quadrat 2 2024



**Image 27.** Flowering *Darwinia biflora* located within HRBOA quadrat 2

**Table 8.** Survey Summary of survey location HRBOA quadrat 3

3617 – Sydney Hinterland Peppermint-Apple Forest				
AGD Zone 56 Easting – 0312877 Northing – 06293628 Midline - 110°				
Vegetation Layer	Height Range	Vegetation Layer		
Trees	20 – 30m	<i>Corymbia gummifera, Eucalyptus piperita, Eucalyptus punctata, Banksia serrata, Ceratopetalum gummiferum, Allocasuarina littoralis</i>		
Shrubs	0.5 – 2m	<i>Leptospermum trinervium, Persoonia levis, Persoonia pinifolia, Bossiaea lenticularis, Epacris pulchella</i>		
Groundcover	0.1 – 0.5m	<i>Dianella caerulea, Pteridium esculentum, Lindsaea microphylla, Lomandra filliformis, Entolasia stricta, Caustis flexosa</i>		
Stem Class			Hollows	
Dbh	Eucalyptus	Non-Eucalypt	<20cm	>20cm
80cm+				
50-79cm	✓		3	
30-49cm	✓		1	
20-29cm	✓			
10-19cm	✓			
5-9cm	✓	✓		
<5cm	✓	✓		
Composition & Structure	Composition Count		Structure cover %	
Trees	6		75	
Shrubs	25		50	
Grasses etc	10		25	
Forbs	7		10	
Ferns	3		10	
Other	4		3	
High Threat Weeds	0		0	
Ecosystem Functions				
Length of habitat logs	14m			
Litter cover	52%			
Bare ground cover	0%			
Cryptogam cover	15%			
Rock cover	20%			
Overstorey foliage cover	50%			
Mid-storey foliage cover	40%			
Groundcover foliage cover	30%			



**Figure 28.** View of midline HRBOA quadrat 3 2024

Table 9. Survey Summary of survey location HRBOA quadrat 4

3621 – Sydney Hinterland Turpentine-Apple Gully Forest				
AGD Zone 56 Easting – 0312847 Northing – 06293808 Midline - 100°				
Vegetation Layer	Height Range	Vegetation Layer		
Trees	20 – 30m	<i>Corymbia gummifera, Eucalyptus resinifera, Angophora costata, Callicoma serratifolia, Ceratopetalum gummiferum, Allocasuarina littoralis</i>		
Shrubs	0.5 – 2m	<i>Leptospermum trinervium, Telopea speciosissima, Persoonia pinifolia, Bossiaea lenticularis, Lambertia formosa, Banksia spinulosa, Acacia linifolia</i>		
Groundcover	0.1 – 0.5m	<i>Pteridium esculentum, Gahnia sieberiana, Lomandra filliformis, Lomandra multiflora, Stylidium lineare, Entolasia stricta, Caustis flexosa</i>		
Stem Class		Hollows		
Dbh	Eucalyptus	Non-Eucalypt	<20cm	>20cm
80cm+	2		2	1
50-79cm	✓		2	3
30-49cm	✓		2	
20-29cm	✓			
10-19cm	✓			
5-9cm	✓	✓		
<5cm	✓	✓		
Composition & Structure		Composition Count		Structure cover %
Trees		6		70
Shrubs		25		80
Grasses etc		13		30
Forbs		7		10
Ferns		3		10
Other		5		3
High Threat Weeds		0		0
Ecosystem Functions				
Length of habitat logs		26.5m		
Litter cover		72%		
Bare ground cover		10%		
Cryptogam cover		40%		
Rock cover		5%		
Overstorey foliage cover		30%		
Mid-storey foliage cover		60%		
Groundcover foliage cover		40%		



Image 29. View of midline HRBOA quadrat 4 2024

Table 10. Survey Summary of survey location HRBOA quadrat 5

3593 – Sydney Coastal Sandstone Bloodwood Shrub Forest				
AGD Zone 56 Easting – 0312938 Northing – 06293983 Midline - 130°				
Vegetation Layer	Height Range	Vegetation Layer		
Trees	20 – 30m	<i>Eucalyptus punctata, Eucalyptus haemastoma, Angophora hispida, Banksia serrata, Allocasuarina littoralis</i>		
Shrubs	0.5 – 2m	<i>Lambertia formosa, Persoonia pinifolia, Bossiaea scolopendra, Woollisia pungens, Banksia ericifolia, Boronia floribunda, Epacris pulchella, Petrophile pulchella, Platysace linearifolia</i>		
Groundcover	0.1 – 0.5m	<i>Actinotus minor, Xanthosia pilosa, Lomandra multiflora, Austrostipa pubescens, Entolasia stricta, Xanthorrhoea resinosa</i>		
Stem Class	Eucalyptus		Non-Eucalypt	
Dbh			Hollows	
			<20cm	>20cm
80cm+				
50-79cm				
30-49cm	✓		3	
20-29cm	✓			
10-19cm	✓	✓		
5-9cm	✓	✓		
<5cm	✓	✓		
Composition & Structure		Composition Count		Structure cover %
Trees		5		20
Shrubs		27		85
Grasses etc		11		60
Forbs		2		10
Ferns		1		5
Other		3		5
High Threat Weeds		0		0
Ecosystem Functions				
Length of habitat logs		2m		
Litter cover		48%		
Bare ground cover		1%		
Cryptogam cover		20%		
Rock cover		30%		
Overstorey foliage cover		10%		
Mid-storey foliage cover		80%		
Groundcover foliage cover		70%		



Image 30. View of midline HRBOA quadrat 5 2024

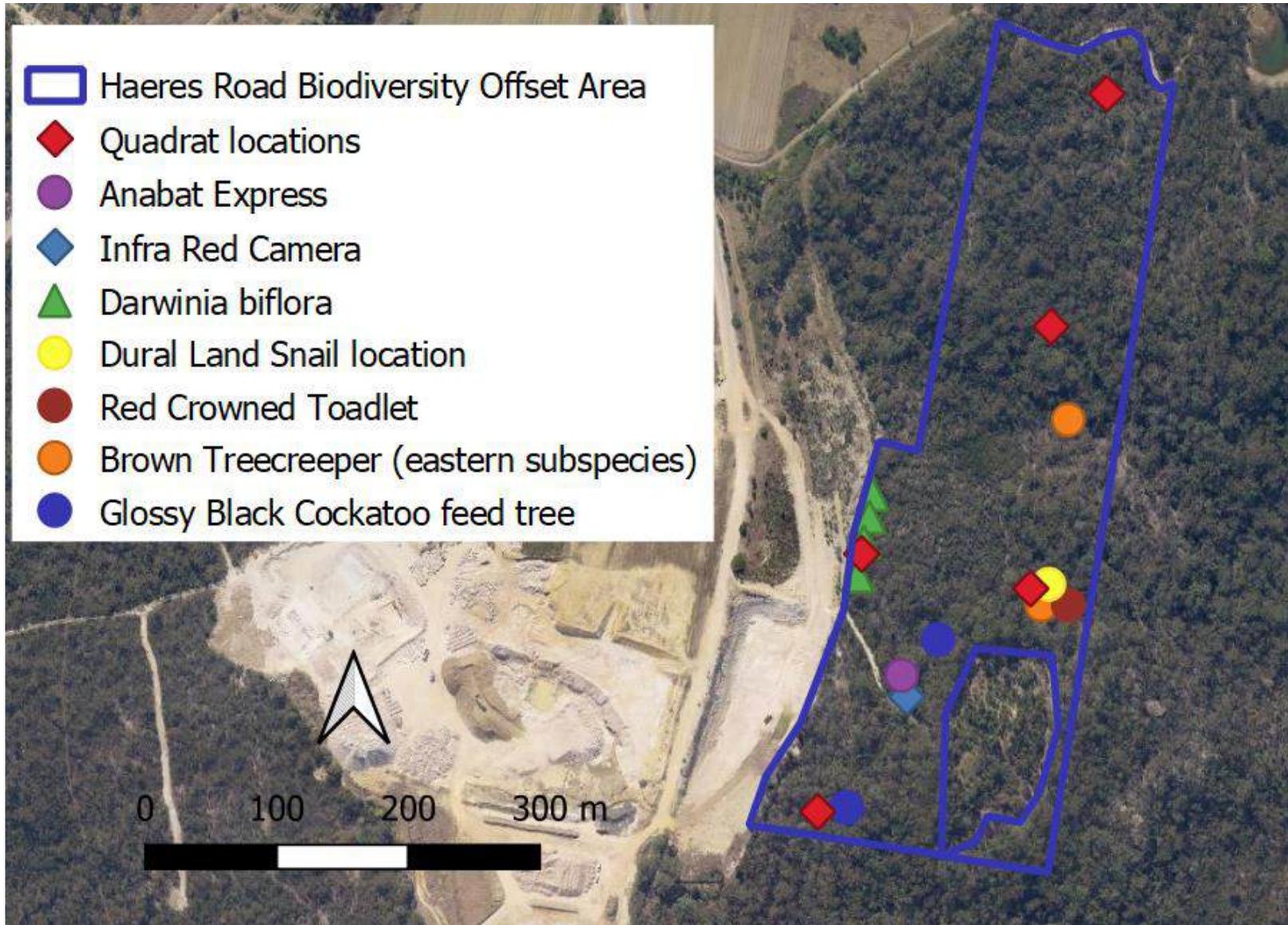


Image 31. HRBOA site location 2024 (note no change to the previous reporting period)

### 3.3 THREATENED FLORA MONITORING

The threatened flora monitoring details the current condition of the four threatened flora species and their immediate habitat which has been previously recorded onsite. The far western area of Lot 29 contains a significant rock platform which supports *Kunzea rupestris* and *Darwinia fascicularis subsp oligantha*. Lot 2 contains *Pimelea curviflora var curviflora* and *Tetratheca glandulosa*.

The overall health of the *Kunzea rupestris* population is good following the ideal weather conditions in the local area over the past 12 months. During the 2017-2019 drought some dieback and plant loss was observed however the remaining plants appear to be in good health and new recruitment is evident, particularly on the western rock platform where vacant soil is available. New growth on most plants was once again observed during the survey period with some flower buds present on some plants. Mosses and lichens were present in each patch on both platforms.

The eastern rock platform has been divided into four individual patches. Much of the surrounding vegetation has suffered die back including the *Banksia ericifolia* and *Calytrix tetragona*. This may be attributed to the dry conditions during the 2017-2019 drought followed by extreme wet conditions from 2020-2022. Some new seedlings from various species are emerging in available soil.

Patch one had previously identified twenty six individual plants. During the July 2024 survey period twenty two individuals were counted. The dry conditions over 2017 and 2019, and in particular the extreme heat days which were experienced during the summer months throughout that time, is the expected cause for loss of plant density. The remaining patch is in relatively good health with flower buds present on mature growth. *Darwinia fascicularis subsp oligantha* is also present within this patch.

Patch two is much smaller with only three plants present. Within patch three the two persistent plants were noted to have flower buds present. In patch four the five *Kunzea rupestris* appear to be in good health with two having flower buds present at the time of surveying.

The western rock platform has been divided into five individual patches which are much more widely distributed than the patches on the eastern rock platform. Within this section the *Kunzea rupestris* grows within a vegetation community with far more flora diversity than what is present on the eastern rock platform. Some of the shrubs are therefore much larger as soil depth and protection from external influences (such as wind and radiant heat) is more readily available.

Patch one has six plants present. *Calytrix tetragona* and *Darwinia fascicularis subsp oligantha* were also present within this patch. Patch two is a long patch which runs down the length of the rock platform. There appears to have been very little change to this patch from last year although new recruits are abundant particularly on the edge of the soil profile. In total forty two individual plants were identified within this patch. All plants in this location are low growing and all appear in good health with the larger individuals having some flower bud present. Additional species identified within this patch included *Calytrix tetragona*, *Acacia hispidula*, *Grevillea buxifolia*, *Caustis flexuosa* and *Darwinia fascicularis subsp oligantha*. Some outlying small patches were noted which appear to be newly created from soil run off during heavy rainfall periods. New recruits have persisted in these locations since 2023 although due to the very shallow soil profile they are not expected to survive should dry or wet weather return.

Patch three does not contain any *Kunzea rupestris* plants. The patch is considered for monitoring over time with the hope that new recruits will eventually appear. A single *Leucopogon parviflorus* is currently the only species within this patch.

Patch four currently has twenty nine *Kunzea rupestris* plants with several of those being juvenile recruits. Mature plants have flower buds present. Other flora species identified within the patch were *Calytrix tetragona*, *Grevillea buxifolia*, *Caustis flexuosa*, *Darwinia fascicularis subsp oligantha*, *Banksia ericifolia*, *Isopogon anethifolius*, *Bossiaea scolopendria* and *Petrophile pulchella*.

Patch five had twenty four *Kunzea rupestris* growing within a diverse mix of shrub species. Several of the counted individuals appear to be new recruits close to the old haul track. It was noted that some *Banksia ericifolia*, *Isopogon anethifolius* and *Calytrix tetragona* had died. Other species within this patch include *Acacia ulicifolia*, *Corymbia eximia*, *Dianella revoluta*, *Grevillea buxifolia*, *Grevillea speciosa*, *Leucopogon parviflorus*, *Angophora hispidula*, *Caustis flexuosa*, *Persoonia levis*, *Isopogon anethifolius* and *Petrophile pulchella*.

Other threatened species located onsite were observed and inspected for current health and condition. As previously mentioned an attempt was made to translocate the original parent plant of the *Melaleuca deanei*. Prior to translocation the plant health was checked and it appeared to not have suffered any ill effects from previous multiple small branch removal during clone recruitment. No flowers were observed throughout the 2021-2022 period before translocation. In total there were 31 stems in 18 clumps covering an area of 25m<sup>2</sup>. The highest peak of the shrub was approximately 2.5m tall. Once removed it appeared that the plant was one individual connected by a single root system, not multiple plants as once thought. New recruits have been observed growing from the translocated root stock bringing the total number of *Melaleuca deanei* individuals being monitored throughout the Dixon Sand ONR site to 57.

*Darwinia fascicularis subsp oligantha* was observed as being plentiful in the location of the *Kunzea rupestris* population and surrounding area. Plants were flowering well and new recruits were evident throughout the area. They were also very well represented throughout the rehabilitation areas. There were several *Tetratheca glandulosa* plants identified within Quadrat 2 during the 2024 flora survey period. In addition to this an abundance of flowering *Pimelea curviflora var curviflora* was also identified within the same quadrat site. The threatened species within this location will continue to be monitored each year they remain present onsite.



**Image 32.** *Kunzea rupestris* monitoring eastern rock platform photo location 1 2024



**Image 33.** *Kunzea rupestris* monitoring eastern rock platform photo location 2 2024



Image 34. 2024 eastern rock platform patch number 1-3, top 1 - bottom 3



Image 35. *Kunzea rupestris* monitoring western rock platform photo location 1 2024



**Image 36.** *Kunzea rupestris* monitoring western rock platform photo location 2 2024



**Image 37.** *Kunzea rupestris* monitoring western rock platform photo location 3 2024



**Image 38.** 2024 western rock platform patch number 1-5, top left 1 top right 2 middle left 3 middle right 4 bottom 5



Image 39. *Kunzea rupestris* juvenile plants western platform July 2024



Image 40. *Darwinia fascicularis* subsp. *oligantha* in flower on eastern rock platform July 2024



**Image 41.** *Tetratheca glandulosa* with flower buds within Quadrat 2 2024



**Image 42.** *Pimelea curviflora* var *curviflora* with flowers within Quadrat 2 2024

### 3.4 THREATENED FAUNA MONITORING

Threatened fauna previously located within the Old Northern Road site included four species of microchiropteran bat and a Glossy Black Cockatoo.

A search was undertaken for Glossy Black Cockatoo feed trees throughout the site. Feed tree location was confirmed within transect 2 of the NVR and within the 250m buffer from Maroota Public School in the same locations as previous years. It is common for this species to return to the same stand of feed trees repetitively. There were no birds observed feeding in trees within the 250m buffer from Maroota Public School during this reporting period however they have been noted flying overhead at various times throughout the year.

An AnaBat Express sound recorder was left in place over 30 survey nights. Unfortunately during this years survey period the AnaBat Express was stolen so no results could be reported. The Narrow window for bat survey had ended at the time the sound recorder was noticed to be missing therefore the window of opportunity to survey had ended within the reporting period. Bat surveys will again be conducted during the summer surveying season as part of the Dixon Sand ongoing commitment to threatened species monitoring on the site.

An infra-red motion detection camera was also installed during the summer months for 30 days and nights to monitor for ground dwelling fauna species and pest species movement such as foxes. Unfortunately the infra-red camera was also stolen so no results could be reported.

No other threatened fauna were observed within or immediately surrounding the Old Northern Road site during the survey period. The resident pair of Wedged-tailed Eagles were observed flying over the site several times throughout the year. A White Breasted Sea Eagle was also observed flying over the site during the reporting period.

The HRBOA previously had two threatened fauna species recorded on the property, although outside of the offset area. A historic Bionet record of a Koala and Glossy Black Cockatoo sighting to the north of the property towards Hitchcock Road was not investigated any further for the purpose of this report. Koala sightings in the area, particularly around Glenorie, have increased since the Wollemi/Yengo mega-bushfire over the spring/summer of 2019/2020. A search for Koala scat under *Eucalyptus punctata* within all survey quadrats at the HRBOA was undertaken. No scats were found.

Glossy Black Cockatoo feed trees were observed within quadrat 1. Several Brown Treecreepers were observed foraging again during the 2024 survey period within the site at various locations indicating these are permanent residents within the site. An infra-red motion detection camera was installed within the HRBOA for 30 days and 30 nights. The camera was successful in capturing images of the Swamp Wallaby.

The Dural Land Snail *Pommerhelix duralensis* was successfully located during the 2024 flora survey period in the HRBOA. A search for the species under leaf litter, particularly around rocks and crevices, located the empty shell of the species. This provides a good indication that a population of the species is still inhabiting the immediate area.

A survey for microchiropteran bat species using an AnaBat Express sound recorder was undertaken during February 2024. The Eastern Coastal Free-tailed Bat *Mormopterus norfolkensis* (listed as vulnerable under the *BC Act*) was identified two out of twenty two recording nights while the Large-eared Pied bat *Chalinolobus dwyeri* (listed as vulnerable under the *EPBC Act* and *BC Act*) was identified on five out of twenty two recording nights via the sound recordings by Dr Anna McConville. In addition to this the Eastern Falsistrelle *Falsistrellus tasmaniensis*, Greater Broad-nosed Bat *Scoteanax rueppellii*, Little Bent-winged Bat *Miniopterus australis*, Large Bent-winged Bat *Miniopterus orianae*

*oceanensis*, Eastern Cave Bat *Vespadelus troughtoni*, Yellow-bellied Sheath-tailed Bat *Saccolaimus flaviventris* and Southern Myotis *Myotis Macropus* (all listed as vulnerable under the *BC Act*) potentially occurred within the site however the recorded calls could not be confidently identified. IN total seven bat species were confidently identified via 45% of the calls recorded. The remaining 55% of the calls recorded were potentially from fifteen bat species of which seven are listed as threatened species. This is a fantastic result which suggests that quarry activities in the nearby area does not appear to impact upon the local distribution of bats.

The fauna survey results can be seen in Appendix D and E.



**Figure 43.** Bandicoot digs at ONR



**Figure 44.** Dural Land Snail shell found in the leaf litter within HRBOA Quadrat 3

### 3.5 EXOTIC SPECIES

Exotic flora species were identified within the NVC and 250m buffer area at the Old Northern Road site. Six species considered as High Threat Weeds (HTW) under the *Biosecurity Act 2015* occur on the property, Crofton Weed *Ageratina adenophora*, Whiskey Grass *Andropogon virginicus*, Cobblers Pegs *Bidens pilosa*, Paspalum Grass *Paspalum dilatatum*, Fireweed *Senecio madagascariensis* and the most widespread on the property Lantana *Lantana camara*. Two of those weed species, Fireweed and Lantana, are also listed as Weeds of National Significance (WoNS) as determined by the Commonwealth Government. A weed management program is currently in place and will continue throughout the life of the rehabilitation plan. There was one HTW identified within the HRBOA, Whiskey Grass *Andropogon virginicus*, which occurs in the rehabilitation area located in the south east area of the site. It is likely seed has been spread to the walking trails of the site via the clothing and shoes of the bush regenerators undertaking weed management in the rehabilitation area. Annual sweeps of the property are recommended to ensure any outbreaks are managed and controlled before species become established.

A weed distribution map has been developed which will be updated yearly to allow for annual comparison. The weed management contractor should aim to reduce the size of these areas on an annual basis with the ultimate goal of eradication, particularly of WoNS and HTW. The weed

distribution map has not changed from the previous reporting period. This is due to the wet conditions making it difficult for the weed management contractor to gain access to the site and the wet conditions providing ideal growing conditions for weed species.

Exotic fauna species were identified within the NVC at the Old Northern Road site. Infra-red cameras were left in place for 30 survey nights although no images of pest fauna were recorded within the survey period this year. Fauna prints were recorded at several locations where sand and mud were present within the site. Foxes, dog, macropods and bandicoot were confidently recorded with various bird prints also identified.

European Rabbit scats were observed in several locations within the NVC in low density. It could then be assumed that carnivore scats also observed onsite were most likely from the European Red Fox. As no Rabbits were observed feeding during the day, scats were not in high density and large warrens were not observed the population can be considered to be low and likely to be kept under control by biological means such as predation from foxes, dogs, cats and birds of prey such as the Wedge-tailed Eagle observed flying nearby. Should the number of rabbits become problematic then it may be necessary to engage in a control program to reduce or eliminate the population.

The Noisy Minor, *Manorina melanocephala*, was also observed within the NVC and 250m buffer area at the Old Northern Road Site. Although this bird is a native species to eastern Australia it is worth mentioning here as the species is considered a pest in high density and a Key Threatening Process to many threatened species of small bird including the Brown Treecreeper, which was identified at HRBOA. The population of Noisy Minor appeared to be small and a variety of small birds were observed on site during the survey period. The population should be monitored over time to ensure the species does not become dominant and eliminate other bird species from the vegetation.



Figure 45. Sand plot monitoring results showing Wallaby prints and European Fox prints

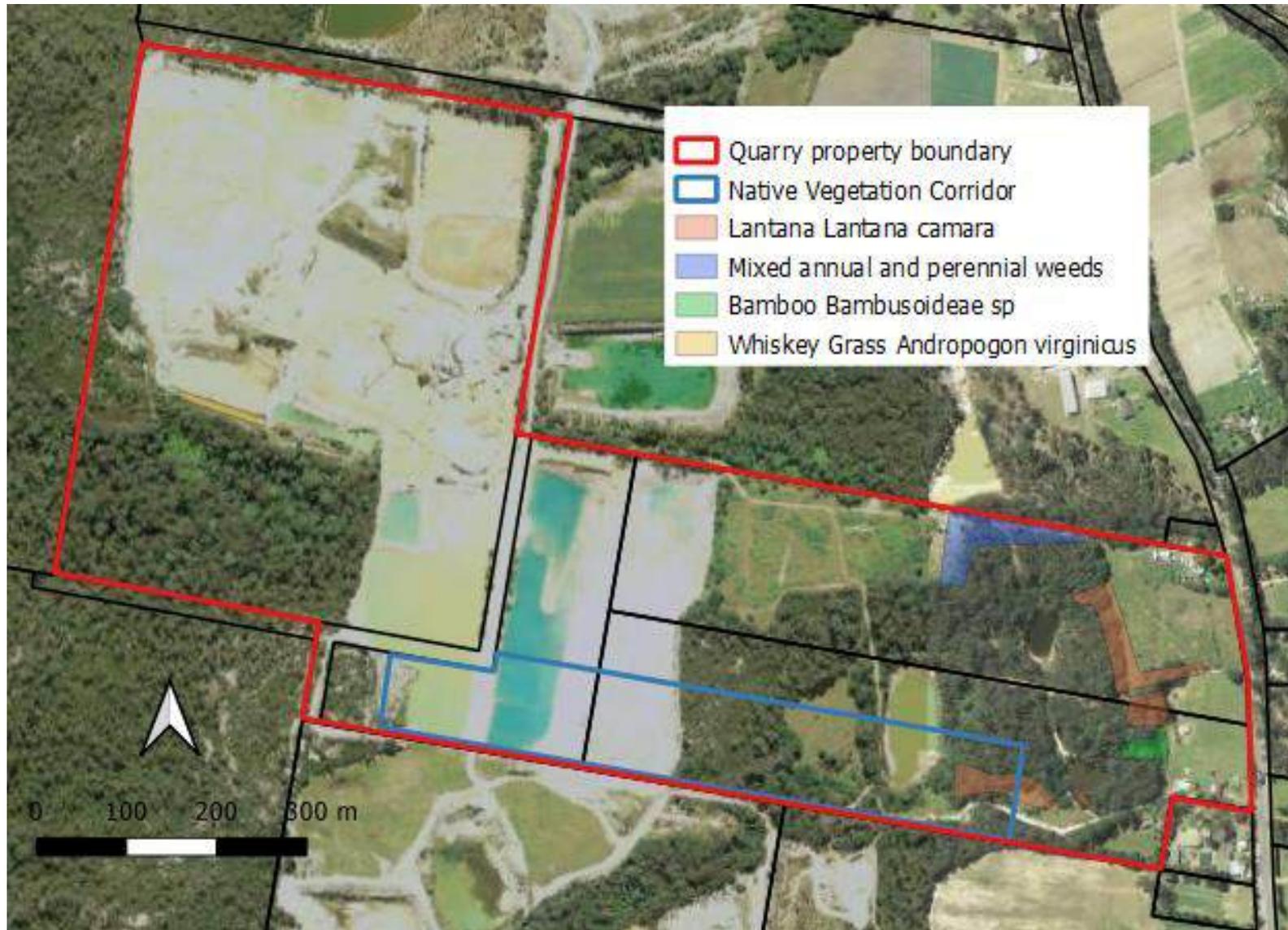


Figure 46. Annual weed distribution map ONR 2024

### 3.6 ASSESSMENT AGAINST CRITERIA

The results of the field survey were assessed against the criteria for successful rehabilitation (Table 12).

**Table 11.** Assessment against criteria to monitor success of rehabilitation

Category	Performance Criteria	Target Achieved	Comments
<b>Native Vegetation</b>	More than 75% of trees are healthy and growing as indicated by long term monitoring	YES	More than 75% of the native vegetation within the active rehabilitation area is healthy and is growing as expected for long term survival. All shrub and ground cover species have reached maturity with flowering and seed production observed. Some species have begun self-propagation within rehabilitation sites. <i>Eucalyptus</i> , <i>Angophora</i> and <i>Corymbia</i> species have not yet reached maturity.
	More than 50% of translocated or propagated threatened flora species survive as indicated by long term monitoring	YES	More than 50% of translocated and planted propagated threatened flora species has survived despite the extreme weather conditions of the past reporting periods. To date at least 45 propagated <i>Darwinia fascicularis subsp. Oligantha</i> and 52 propagated <i>Melaleuca deanei</i> have survived transplanting in the rehabilitation area. A complete count of translocated <i>Darwinia fascicularis subsp. Oligantha</i> was not undertaken at the time of relocation however it appears that any losses that may have occurred were minimal and new recruits are now visible throughout much of the area.
<b>Vegetation Structure</b>	Revegetation areas contain flora species assemblages characteristic of the desired native vegetation communities	N/A	At this stage it is too early in the rehabilitation process to determine if the desired vegetation community is being established. Species planted have been specifically chosen to recreate a Banksia Heath community.
<b>Ecosystem Function</b>	Second generation tree seedlings are present or likely to be, based on monitoring comparable older rehabilitation sites (evidence of fruiting of native species observed)	N/A	It is too early in the rehabilitation process for second generation tree seedlings. Fruiting of tree species is has only just commenced therefore this KPI is likely to be achieved within the next 2-3 years.
	Habitat values retained or beginning to develop and improve over time (leaf litter, fallen timber etc)	YES	Habitat values have been added to the rehabilitation site in the form of logs and vegetation debris. The site is not yet at the age where it will begin to form its own habitat value. This is expected

			to begin between 5-10 years following the original planting. That being said, leaf litter is beginning to form.
<b>Weeds and Pests</b>	Regular inspections indicate a decline weed diversity, density and abundance and a decline in signs of feral animal activity	YES	There were very few weed species identified within the rehabilitation area. There are no signs of feral animal activity.
	There is no significant weed infestation such that weeds do not comprise a significant proportion of the species in the stratum	YES	There is no significant weed infestation within the rehabilitation area. Significant weed infestations are located within the NVC outside of the rehabilitation area. These areas are being actively addressed by weed management contractors.
	There is no evidence of significant damage resulting from feral animal activity	YES	There is no evidence of significant damage caused from feral animal activity within the rehabilitation area.

## 4 DISCUSSION AND RECOMMENDATIONS

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This is the seventh Annual Biodiversity and Rehabilitation Management Report produced for Dixon Sand Modification 5. Rehabilitation work is in the mid to early stages and will increase with both intensity and measurable criteria in the years that follow.

This report provides information which will allow for measurable and quantifiable data to be compared over time as the rehabilitation and monitoring continues.

The average rainfall over this reporting period has provided ideal growing conditions for the rehabilitation areas of the NVC. Flora within all strata have increased in size, maturity and density during the past twelve month period. New juvenile recruits are evident from shrub and ground cover species while an increase in species diversity was also recorded. Canopy species are growing well and have reached reproductive maturity during this reporting period.

The remaining vegetation areas within the ONR site have recovered well from the drought conditions of 2017-2019 and wet conditions of 2020-2022. The average rainfall over the past 12 month period has provided ideal growing conditions for ground cover species, particularly forbs, grasses and ferns. The native vegetation areas with no weedy growth have demonstrated their resilience with no new weed growth or establishment evident following the return to regular and average rainfall events.

Vegetation within the HRBOA has once again had very little vegetation changes observed throughout the site demonstrating the hardiness of native vegetation stands with minimal historic disturbances. Shrub and forb species density and diversity has recovered from the slight decrease noted in 2023 likely due to average weather conditions returning following an over abundance of rainfall during the past three reporting periods.

Threatened species located within the NVC have persisted despite the drought conditions of 2017-2019. The *Kunzea rupestris* was adversely impacted by the drought, particularly from radiant heat reflection from the surrounding sandstone. Although the species is well suited to enduring dry seasons and limited water resources some losses did occur to individuals within the population. New juvenile recruitment is evident thanks to the continuation of regular rainfall. All other threatened species previously recorded onsite were located and appear healthy.

Weed species, particularly *Lantana camara*, within the NVC and 250m school buffer area of the Old Northern Road site should remain a priority management species for removal and control over the next twelve month period. Management of the species has commenced by the bush regeneration contractors however the average rainfall has provided the species with ideal growing conditions. Without management this species is likely to spread over a larger area, in turn supporting habitat for exotic fauna species such as the European Rabbit and the European Red Fox. Suitable techniques for removal have been provided in appendix F.

Rehabilitation efforts have continued in earnest with native plant relocation, propagation and planting taking place throughout the reporting period. Continued supplementary planting within the rehabilitation area and locations within the NVC and 250m school buffer where *Lantana* is removed will continue over the next reporting period.

A silt pond is currently being rested immediately to the east of the rehabilitation area within the NVC. This silt pond was expected to be ready for rehabilitation during this reporting period however continued rainfall has resulted in the pond not drying to a suitable standard. It is expected

commencement of rehabilitation of the NVC in the location of the silt pond will occur during the next twelve month period. During the next twelve months native rehabilitation work will continue along the western embankment at the front entrance to the quarry site and weed treatment and control will continue throughout the site.

## 5 LIMITATIONS AND ASSUMPTIONS

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This study was limited by the timing and frequency of the survey. There may be flora and/or fauna species present at the site that were not recorded due to their seasonal, territorial or cryptic nature.

It can never be proven that threatened species have not, do not or will not use the site as habitat. The conclusions drawn in this report are a result of testing, observation and experience.

This report describes the habitat and vegetation of the site at the time of the field survey. Vegetation and habitat will change over time and therefore the findings of this report are only relevant for the current proposal and for the duration of the application.

## 6 QUALIFICATIONS AND EXPERIENCE OF THE AUTHOR AND FIELD ECOLOGIST

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The Author and Field Ecologist, Melissa Mass, has formal qualifications including a Bachelor of Applied Science (B. App. Sc.), majoring in Ecology, and a Certificate 3 in Horticulture. Her current Scientific Licence number issued from the NSW OEH is SL101441 with expiry date 31st Oct 2024. Furthermore an Animal Research Authority issued by the NSW Animal Care and Ethics Committee is current to undertake general survey work in THSC local government area with expiry 23rd Mar 2025. Melissa is an accredited Biodiversity Assessor conforming to the requirements as imposed by OEH with Accreditation number being BAAS18053.

Melissa has been working as an Ecologist for 15 years. Her work has included targeted threatened species assessment and management, reviews of environmental factors, bush regeneration, environmental impact assessments, and environmental survey and monitoring.

Melissa has a strong focus on threatened species ecology and has actively contributed to the Long-nosed Potoroo National Recovery Plan.

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## 8 APPENDIX

### APPENDIX A – FLORA SPECIES IDENTIFIED WITHIN THE ONR STUDY AREA

Status	Botanical Name	Common Name	Plot 1	Plot 2	Plot 4 - NVC
	<i>Acacia linifolia</i>	White Wattle		3	1
	<i>Acacia myrtifolia</i>	Red-stemmed Wattle			1
	<i>Acacia parramattensis</i>	Parramatta Wattle	1		1
	<i>Acacia suaveolens</i>	Sweet Wattle	1	1	1
	<i>Acacia ulicifolia</i>	Prickly Moses	1	1	
	<i>Actinotus minor</i>	Lesser Flannel Flower	1	1	
	<i>Allocasuarina littoralis</i>	Black She-oak	3	1	1
	<i>Allocasuarina torulosa</i>	Forest She-oak	1		
<b>HTW</b>	<i>Andropogon virginicus</i>	Whiskey Grass		1	
	<i>Angophora costata</i>	Smooth Barked Apple	1	1	
	<i>Austrostipa pubescens</i>	Spear Grass	1	1	2
	<i>Banksia serrata</i>	Old Man Banksia		1	
	<i>Banksia spinulosa</i>	Hairpin Banksia	1	2	1
	<i>Billardiera scandens</i>	Hairy Apple Berry	1	1	1
	<i>Boronia ledifolia</i>	Sydney Boronia		1	1
	<i>Bossiaea heterophylla</i>	Variable Bossiaea	1		1
	<i>Bossiaea obcordata</i>	Spiny Bossiaea		2	2
	<i>Bursaria spinosa</i>	Sweet Bursaria		1	1
	<i>Cassytha glabella</i>	Slender Devils Twine	1		1
	<i>Ceratopetalum gummiferum</i>	NSW Christmas Bush	2	1	
	<i>Cheilanthes sieberi</i>	Mulga Fern	1		
	<i>Corymbia eximia</i>	Yellow Bloodwood		1	1
	<i>Corymbia gummifera</i>	Red Bloodwood		2	1
	<i>Cyathochaeta diandra</i>	Sheath Rush	1		1
	<i>Desmodium varians</i>	Slender Tock-trefoil		1	
	<i>Dianella caerulea</i>	Blue Flax Lily	1	1	1
	<i>Dianella prunina</i>	Native Flax Lily		1	
	<i>Dillwynia retorta</i>	Heathy Parrot Pea	1	1	1
	<i>Drosera peltata</i>	Sundew		1	
	<i>Entolasia marginata</i>	Bordered Panic	2		
	<i>Entolasia stricta</i>	Wiry Panic	1	2	3
	<i>Epacris pulchella</i>	Wallum Heath	1		
	<i>Eragrostis brownii</i>	Brown's Lovegrass	1	1	2
	<i>Eucalyptus haemastoma</i>	Scribbly Gum			1
	<i>Eucalyptus pilularis</i>	Blackbutt		1	
	<i>Eucalyptus piperita</i>	Sydney Peppermint	3	1	
	<i>Eucalyptus punctata</i>	Grey Gum	1		1
	<i>Exocarpos cupressiformis</i>	Cherry Ballart		1	1
	<i>Gompholobium grandiflorum</i>	Large Wedge Pea	1	1	1
	<i>Gonocarpus teucrioides</i>	Raspwort	1		1

	<i>Goodenia bellidifolia</i>	Daisy-leaved Goodenia	1		
	<i>Grevillea buxifolia</i>	Grey Spider Flower			2
	<i>Hakea sericea</i>	Needlebush	1	2	2
	<i>Hardenbergia violacea</i>	False Sarsaparilla		1	
	<i>Hovea linearis</i>	Common Hovea			
	<i>Isopogon anemonifolius</i>	Broad-leaved Drumsticks	1	1	
	<i>Jacksonia scoparia</i>	Dogwood			1
	<i>Kunzea ambigua</i>	Tickbush	3		
	<i>Lambertia formosa</i>	Mountain Devil		1	1
<b>WoNS HTW</b>	<i>Lantana camara</i>	Lantana			
	<i>Leptospermum polygalifolium</i>	Tantoon	1		
	<i>Leucopogon parviflorus</i>	Coastal Beard-heath		1	2
	<i>Lindsaea microphylla</i>	Lacy Wedge Fern		1	
	<i>Lomandra brevis</i>	Tufted Mat-rush			
	<i>Lomandra filiformis</i>	Wattle Mat-rush	1	1	
	<i>Lomandra gracilis</i>	Lomandra gracilis		1	
	<i>Lomandra longifolia</i>	Spiny-headed Mat-rush	1	1	1
	<i>Lomandra multiflora</i>	Many Flowered Mat-rush	1	1	1
	<i>Lomandra obliqua</i>	Fish Bones	1	1	2
	<i>Lomatia silaifolia</i>	Crinkle Bush		1	
	<i>Microlaena stipoides</i>	Weeping Grass			1
	<i>Ozothamnus diosmifolius</i>	Rice Flower	1	1	1
<b>W</b>	<i>Paspalum</i>	Paspalum			
	<i>Persoonia levis</i>	Broad Leaved Geebung		1	1
	<i>Persoonia linearis</i>	Narrow Leaved Geebung		1	2
	<i>Persoonia pinifolia</i>	Pine-leaved Geebung		1	1
	<i>Petrophile pulchella</i>	Conesticks		1	1
	<i>Phyllanthus hirtellus</i>	Thyme Spurge	1	1	1
<b>W</b>	<i>Phytolacca octandra</i>	Inkweed			
<b>V</b>	<i>Pimelea curviflora</i> var. <i>Curviflora</i>	Pimelea curviflora var. curviflora			1
	<i>Pimelea linifolia</i>	Slender Rice Flower		1	1
<b>W</b>	<i>Plantago lanceolata</i>	Plantain			
	<i>Platysace linearifolia</i>	Carrot Tops	1	1	
	<i>Pratia purpurascens</i>	Whiteroot			1
	<i>Pteridium esculentum</i>	Bracken Fern	1	1	1
	<i>Rytidosperma racemosum</i>	Wallaby Grass			1
	<i>Scaevola ramosissima</i>	Purple Fan-flower		1	1
	<i>Smilax glycyphylla</i>	Sweet Sarsaparilla	1	1	
	<i>Stylidium lineare</i>	Slender Trigger Grass			
<b>V</b>	<i>Tetratheca glandulosa</i>	Glandular Pink Bells			1
	<i>Tetratheca thymifolia</i>	Black-eyed Susan		1	
	<i>Themeda australis</i>	Kangaroo Grass	2	2	2

	<i>Trema tomentosa</i> var. <i>aspera</i>	Native Peach		1	
	<i>Xanthorrhoea resinosa</i>	Grass Tree		1	1
	<i>Xanthosia pilosa</i>	Woolly Xanthosia	2	1	1
	<i>Xanthosia tridentata</i>	Rock Xanthosia	2		
	<i>Xylomelum pyriforme</i>	Woody Pear		1	

**V** – Vulnerable Species , **W** – Weed , **WoNS** – Weed of National Significance , **HTW** – High Threat Weed

**Key**

Braun-Blanquet scale.

- 1 <5% cover & 3 or less individuals
- 2 <5% cover & more than 3 individuals sparsely scattered
- 3 <5% cover common and consistent
- 4a <5% cover & very abundant many individuals
- 4b 5 – 25% cover
- 5 25 – 50% cover
- 6 50 – 75% cover
- 7 75% - 100% cover

**APPENDIX B – FLORA SPECIES IDENTIFIED WITHIN ONR REHABILITATION AREA**

Status	Botanical Name	Common Name	Rehab 1	Translocate	Soil seedbank
	<i>Acacia linifolia</i>	White Wattle	Seed bank	*	*
	<i>Acacia myrtifolia</i>	Red-stemmed Wattle	Seed bank	*	
	<i>Acacia parramattensis</i>	Parramatta Wattle	Seed bank	*	*
	<i>Acacia suaveolens</i>	Sweet Wattle	Planted	*	*
	<i>Acacia ulicifolia</i>	Prickly Moses	Planted	*	*
	<i>Actinotus minor</i>	Lesser Flannel Flower	Seed bank	*	*
	<i>Allocasuarina littoralis</i>	Black She-oak	Planted	*	*
<b>HTW</b>	<i>Andropogon virginicus</i>	Whiskey Grass	Seed bank	*	*
	<i>Angophora bakeri</i>	Narrow-leaf Apple	Seed bank	*	
	<i>Angophora costata</i>	Smooth Barked Apple	Planted		
	<i>Angophora hispida</i>	Dwarf Apple	Planted	*	*
	<i>Anisopogon avenaceus</i>	Oat Spear Grass	Seed bank	*	*
	<i>Aristida vagans</i>	Threeawn Speargrass	Planted	*	*
	<i>Aristida warburgii</i>	Fine-leaved Wire Grass	Seed bank	*	*
	<i>Asplenium trichomanes</i>	Common Spleenwort	Seed bank	*	*
	<i>Austrostipa pubescens</i>	Spear Grass	Seed bank	*	*
	<i>Banksia ericifolia</i>	Heath-leaved Banksia	Planted	*	*
	<i>Banksia serrata</i>	Old Man Banksia	Planted	*	*
	<i>Banksia spinulosa</i>	Hairpin Banksia	Planted	*	
	<i>Billardiera scandens</i>	Hairy Apple Berry	Seed bank	*	*
	<i>Boronia floribunda</i>	Pale Pink Boronia	Seed bank	*	*
	<i>Boronia ledifolia</i>	Sydney Boronia	Seed bank	*	*
	<i>Bossiaea heterophylla</i>	Variable Bossiaea	Seed bank	*	*
	<i>Bossiaea lenticularis</i>	Bossiaea	Seed bank	*	
	<i>Bossiaea obcordata</i>	Spiny Bossiaea	Planted	*	
	<i>Calytrix tetragona</i>	Common Fringe Myrtle	Planted	*	*
	<i>Cassytha glabella</i>	Slender Devils Twine	Seed bank	*	*
	<i>Caustis pentandra</i>	Curly Wig	Seed bank	*	
	<i>Cheilanthes seiberi</i>	Mulga Fern	Seed bank	*	
	<i>Corymbia eximia</i>	Yellow Bloodwood	Planted		
	<i>Corymbia gummifera</i>	Red Bloodwood		*	
	<i>Cyanthochaeta diandra</i>	Sheath Rush	Seed bank	*	*
<b>EnP</b>	<i>Darwinia fascicularis</i> <i>subsp. oligantha</i>		Planted	Planted	Planted
	<i>Desmodium varians</i>	Slender Tock-trefoil	Seed bank	*	
	<i>Dianella caerulea</i>	Blue-flax Lily	Seed bank	*	
	<i>Dianella prunina</i>	Native Flax Lily	Planted	*	
	<i>Dichelachne</i> <i>inaequiglumis</i>	Short-hair Plume Grass		*	
	<i>Dillwynia floribunda</i>	Showy Parrot Pea	Seed bank	*	
	<i>Dillwynia retorta</i>	Parrot Pea	Seed bank	*	
	<i>Drosera pelata</i>	Sundew	Seed bank	*	
	<i>Echinopogon caespitosus</i>	Bushy Hedgehog Grass	Planted	*	
	<i>Entolasia marginata</i>	Bordered Panic	Planted		
	<i>Entolasia stricta</i>	Wiry Panic	Seed bank	*	*
	<i>Epacris microphylla</i>	Coral Heath		*	*
	<i>Epacris pulchella</i>	Wallum Heath	Seed bank	*	*

	<i>Eragrostis brownii</i>	Brown's Lovegrass	Seed bank	*	*
	<i>Eucalyptus haemastoma</i>	Scribbly Gum	Planted	*	*
	<i>Eucalyptus punctata</i>	Grey Gum	Seed bank		
	<i>Eucalyptus tereticornis</i>	Forest Redgum	Planted		
	<i>Exocarpos cupressiformis</i>	Cherry Ballart		*	
	<i>Gahnia sieberiana</i>	Red-fruit Saw-sedge		*	*
	<i>Gompholobium grandiflorum</i>	Large Wedge Pea	Seed bank	*	*
	<i>Gonocarpus teucrioides</i>	Raspwort	Planted	*	*
	<i>Goodenia bellidifolia</i>	Daisy-leaved Goodenia		*	
	<i>Goodenia hederacea</i>	Forest Goodenia	Planted	*	
	<i>Goodenia rotundifolia</i>	Star Goodenia	Seed bank		
	<i>Grevillea buxifolia</i>	Grey Spider Flower	Planted	*	*
	<i>Grevillea mucronulata</i>	Green Spider Flower	Planted		*
	<i>Grevillea sericea</i>	Pink Spider Flower	Planted		
	<i>Grevillea speciosa</i>	Red Spider Flower	Planted	*	*
	<i>Hakea dactyloides</i>	Broad-leaved Hakea	Seed bank	*	
	<i>Hakea sericea</i>	Needlebrush	Planted	*	*
	<i>Hardenbergia violacea</i>	False Sarsparilla	Seed bank	*	
	<i>Hibbertia aspera</i>	Rough Guinea Flower	Planted	*	
	<i>Hibbertia diffusa</i>	Wedge Guinea Flower	Planted	*	*
	<i>Hovea linearis</i>	Common Hovea	Seed bank	*	
	<i>Imperata cylindrica</i>	Blady Grass	Seed bank	*	*
	<i>Isopogon anemonifolius</i>	Broad-leaved Drumsticks	Planted	*	*
	<i>Jacksonia scoparia</i>	Dogwood		*	
	<i>Juncus usitatus</i>	Common Rush	Seed bank	*	
	<i>Kunzea ambigua</i>	Tick Bush	Seed bank	*	*
	<i>Kunzea capitata</i>	Pink Kunzea	Planted		
	<i>Lambertia Formosa</i>	Mountain Devil		*	*
	<i>Laxmannia gracilis</i>	Slender Wire Lily	Seed bank	*	*
	<i>Lepidosperma neesii</i>	Stiff Rapier-sedge	Seed bank	*	
	<i>Leptospermum polygalifolium</i>	Tantoon		*	*
	<i>Leptospermum trinervium</i>	Flaky-barked Tea-tree	Planted	*	*
	<i>Leucopogon juniperinus</i>	Prickly-beard Heath	Planted	*	
	<i>Leucopogon microphyllus</i>	Small-leaved White Beard	Seed bank	*	*
	<i>Lindsaea microphylla</i>	Lacy Wedge Fern	Seed bank	*	
	<i>Lomandra brevis</i>	Tufted Mat-rush	Seed bank		
	<i>Lomandra glauca</i>	Pale Mat-rush	Seed bank	*	*
	<i>Lomandra longifolia</i>	Spiny-headed Mat-rush	Planted	*	*
	<i>Lomandra multiflora</i>	Many Flowered Mat-rush	Seed bank	*	*
	<i>Lomandra obliqua</i>	Fishbones	Seed bank	*	*
	<i>Lomatia silaifolia</i>	Crinkle Bush	Seed bank	*	*
<b>V</b>	<i>Melaleuca deanei</i>	Deane's Paperbark	Planted	Planted	Planted
	<i>Microlaena stipoides</i>	Weeping Grass	Seed bank	*	*
	<i>Micromyrtus ciliata</i>	Fringed Heath Myrtle		*	*
	<i>Mirbelia rubiifolia</i>	Heath Mirbelia	Seed bank	*	*
	<i>Mirbelia speciosa</i>	Mirbelia	Seed bank	*	

	<i>Ozothamenus diosmidifolius</i>	Rice Flower	Seed bank	*	*
	<i>Patersonia sericea</i>	Purple Flag Flower	Seed bank	*	
	<i>Persoonia lanceolata</i>	Lance-leaved Geebung	Seed bank	*	*
	<i>Persoonia levis</i>	Broad-leaved Geebung	Seed bank	*	
	<i>Persoonia pinifolia</i>	Pine-leaved Geebung	Seed bank	*	*
	<i>Petrophile pulchella</i>	Conesticks		*	*
	<i>Petrophile sessilis</i>	Prickly Conesticks	Planted		
	<i>Phyllanthus hirtellus</i>	Thyme Spurge	Planted	*	*
	<i>Phyllota phyllicoides</i>	Heath Phyllota		*	*
<b>V</b>	<i>Pimelea curviflora</i> var. <i>curviflora</i>			*	
	<i>Pimelea linifolia</i>	Slender Rice Flower	Seed bank	*	
	<i>Platysace linearifolia</i>	Carrot Tops	Seed bank	*	*
	<i>Pomax umbellate</i>	Pomax	Seed bank	*	
	<i>Poranthera microphylla</i>	Small Poranthera	Seed bank	*	
	<i>Pratia purpurascens</i>	White Root	Seed bank	*	*
	<i>Pteridium esculentum</i>	Bracken Fern		*	
	<i>Pultenaea flexilis</i>	Graceful Bush Pea		*	
	<i>Rytidosperma racemosum</i>	Wallaby Grass	Seed bank	*	
	<i>Scaevola ramosissima</i>	Purple Fan Flower	Seed bank	*	
	<i>Schoenus ericetorum</i>	Heath Bog Rush	Seed bank	*	*
	<i>Stylidium graminifolium</i>	Grass Trigger Plant		*	
<b>V</b>	<i>Tetratheca glandulosa</i>	Glandular Pink Bells	Seedbank	Translocated	
	<i>Themeda australis</i>	Kangaroo Grass	Seedbank	*	*
	<i>Trema tomentose</i>	Native Peach	Seed bank	*	*
	<i>Xanthosia pilosa</i>	Woolly Xanthosia	Seed bank	*	

**EnP** – Endangered Population

**V** – Vulnerable species

**HTW** – High Threat Weed

**APPENDIX C – FLORA SPECIES IDENTIFIED AT HRBOA**

Status	Botanical Name	Common Name	Plot 1	Plot 2	Plot 3	Plot 4	Plot 5
	<i>Acacia hispidula</i>	Little Harsh Acacia	1		1		1
	<i>Acacia linearifolia</i>	Narrow-leaved Wattle				1	
	<i>Acacia linifolia</i>	White Wattle	1		1	1	1
	<i>Acacia suaveolens</i>	Sweet Wattle		1	1		1
	<i>Acacia ulicifolia</i>	Prickly Moses	2				1
	<i>Actinotus helianthi</i>	Flannel Flower					2
	<i>Actinotus minor</i>	Lesser Flannel Flower	1	2		1	2
	<i>Allocasuarina distyla</i>	Scrub She-oak		1			1
	<i>Allocasuarina littoralis</i>	Black She-oak	2			1	1
	<i>Angophora costata</i>	Smooth Barked Apple	2			1	
	<i>Angophora hispida</i>	Dwarf Apple	1	2			1
	<i>Aristida vagans</i>	Threeawn Speargrass	1	1			
	<i>Aristida warburgii</i>	Fine-leaved Wire Grass	1	1	1	1	
	<i>Asplenium trichomanes</i>	Common Spleenwort				1	
	<i>Austrostipa pubescens</i>	Spear Grass	1	2	1	1	1
	<i>Banksia ericifolia</i>	Heath-leaved Banksia		2	1	1	1
	<i>Banksia oblongifolia</i>	Fern-leaved Banksia		1			1
	<i>Banksia serrata</i>	Old Man Banksia	2	1	1	1	2
	<i>Banksia spinulosa</i>	Hairpin Banksia	1	1		2	
	<i>Billardiera scandens</i>	Hairy Apple Berry	1		1	1	1
	<i>Boronia floribunda</i>	Pale Pink Boronia	2	1			1
	<i>Boronia ledifolia</i>	Sydney Boronia	1		1	1	2
	<i>Bossiaea hetrophylla</i>	Variable Bossiaea	1	1			2
	<i>Bossiaea lenticularis</i>	Bossiaea				2	
	<i>Bossiaea obcordata</i>	Spiny Bossiaea			1	2	
	<i>Bossiaea scolopendra</i>	Sword Bossiaea	1	1			1
	<i>Callicoma serratifolia</i>	Black Wattle				3	
	<i>Calochlaena dubia</i>	Soft Braken Fern			1		
	<i>Calytrix tetragona</i>	Common Fringe Myrtle		3			
	<i>Cassytha glabella</i>	Slender Devils Twine		2	1	1	1
	<i>Caustis flexuosa</i>	Curly Wig	2		2	1	1
	<i>Caustis pentandra</i>	Thick Twist Rush		1			
	<i>Ceratopetalum gummiferum</i>	NSW Christmas Bush	1		2	1	
	<i>Cheilanthes seiberi</i>	Mulga Fern		2		1	1
	<i>Corymbia eximia</i>	Yellow Bloodwood			1		1
	<i>Corymbia gummifera</i>	Red Bloodwood	1		2	2	1
	<i>Cyathochaeta diandra</i>	Sheath Rush	1	1	1	1	1
	<i>Cymbidium sp</i>	Orchid				1	
<b>V</b>	<i>Darwinia biflora</i>			1			
	<i>Dianella caerulea var. producta</i>	Blue Flax Lily			1	1	1
	<i>Dianella prunina</i>	Native Flax Lily		1		1	1
	<i>Dillwynia floribunda</i>	Showy Parrot Pea		2			1
	<i>Dillwynia retorta</i>	Parrot Pea	1	1			1
	<i>Dodonaea viscosa</i>	Sticky Hop Bush			1		
	<i>Dracophyllum secundum</i>	Dracophyllum			1	1	
	<i>Drosera auriculata</i>	Sundew		1	1	1	1

<i>Elaeocarpus reticulatus</i>	Blueberry Ash			1	1		
<i>Entolasia stricta</i>	Wiry Panic	2	3	2	1	1	
<i>Epacris pulchella</i>	Wallum Heath	1	2	1	1	1	
<i>Eragrostis brownii</i>	Brown's Lovegrass				1	1	
<i>Eucalyptus haemastoma</i>	Scribbly Gum		1				1
<i>Eucalyptus pilularis</i>	Blackbutt	1		1			
<i>Eucalyptus piperita</i>	Sydney Peppermint			1			
<i>Eucalyptus punctata</i>	Grey Gum			1			1
<i>Eucalyptus resinifera</i>	Red Mahogany					1	
<i>Gahnia sieberiana</i>	Red-fruit Saw-sedge					2	
<i>Glochidion ferdinandi</i>	Cheese Tree					1	
<i>Gompholobium glabratum</i>	Dainty Wedge Pea		1	1			1
<i>Gonocarpus teucrioides</i>	Raspwort						1
<i>Grevillea buxifolia</i>	Grey Spider Flower	1	1	1			1
<i>Grevillea mucronulata</i>	Green Spider Flower			1			
<i>Grevillea speciosa</i>	Red Spider-flower	2	1	1			
<i>Hakea dactyloides</i>	Broad-leaved Hakea	1	1				1
<i>Hakea propinqua</i>	Large Fruit Hakea		1				
<i>Hakea sericea</i>	Needlebush	1	1	1	1		
<i>Hibbertia aspera</i>	Rough Guinea Flower			1			
<i>Hibbertia diffusa</i>	Wedge Guinea Flower						1
<i>Hovea linearis</i>	Common Hovea		1	1			1
<i>Imperata cylindrica</i>	Blady Grass						1
<i>Isopogon anemonifolius</i>	Broad-leaved Drumsticks	1	1				1
<i>Lambertia formosa</i>	Mountain Devil	2	1	1	1	1	2
<i>Lepidosperma laterale</i>	Variable Swordsedge		2			1	1
<i>Leptospermum polygalifolium</i>	Tantoon		1	1	1		
<i>Leptospermum trinervium</i>	Flaky-barked Tea-tree	3	3	2	2		1
<i>Leucopogon juniperinus</i>	Prickly-beard Heath						1
<i>Leucopogon microphyllus</i>	Small Leaved White Beard		1				1
<i>Leucopogon parviflorus</i>	Coastal Beard-heath	1		1	1		
<i>Lindsaea microphylla</i>	Lacy Wedge Fern		1	1	1		1
<i>Lomandra brevis</i>	Tufted Mat-rush	1					1
<i>Lomandra filiformis</i>	Wattle Mat-rush			1	1		
<i>Lomandra glauca</i>	Pale Mat-rush	1		1	1		1
<i>Lomandra longifolia</i>	Spiny-headed Mat-rush					1	
<i>Lomandra multiflora</i>	Many Flowered Mat-rush		2			2	1
<i>Lomandra obliqua</i>	Fish Bones	1	1	1	1		1
<i>Lomatia silaifolia</i>	Crinkle Bush	1		1	1		1
<i>Micrantheum ericoides</i>			2				
<i>Micromyrtus ciliata</i>	Fringed Heath-myrtle		2				1
<i>Mirbelia rubiifolia</i>	Heath Mirbelia	1	2				1
<i>Patersonia sericea</i>	Purple Flag Flower						
<i>Persoonia lanceolata</i>	Lance Leaf Geebung		1				1

<i>Persoonia levis</i>	Broad Leaved Geebung	1		2	1	1
<i>Persoonia pinifolia</i>	Pine-leaved Geebung	2	2	3	1	2
<i>Petrophile pulchella</i>	Conesticks		2			2
<i>Phyllanthus hirtellus</i>	Thyme Spurge	1	2	1	1	1
<i>Phyllota phyllicoides</i>	Heath Phyllota		1			
<i>Pimelea linifolia</i>	Slender Rice Flower			1	1	
<i>Platysace linearifolia</i>	Carrot Tops	2		1	1	2
<i>Pomax umbellata</i>	Pomax					
<i>Pratia purpurascens</i>	Whiteroot					
<i>Pteridium esculentum</i>	Bracken Fern	2		1	2	
<i>Rytidosperma racemosum</i>	Wallaby Grass					1
<i>Scaevola ramosissima</i>	Purple Fan-flower	1		1		
<i>Schoenus melanostachys</i>	Black Bog Rush	1				1
<i>Smilax glycyphylla</i>	Sweet Sarsaparilla	1		1	1	1
<i>Stylidium graminifolium</i>	Grass Trigger Plant	1		1	2	
<i>Telopea speciosissima</i>	NSW Waratah				2	
<i>Tetratheca thymifolia</i>	Black Eyed Susan				1	
<i>Themeda australis</i>	Kangaroo Grass			1		1
<i>Woollsia pungens</i>	Snow Heath		1			3
<i>Xanthorrhoea resinosa</i>	Grass Tree	1	1	1	1	1
<i>Xanthosia pilosa</i>	Woolly Xanthosia		1		1	1
<i>Xanthosia tridentata</i>	Rock Xanthosia	1	2	1	1	1
<i>Xylomelum pyriforme</i>	Woody Pear				1	

**V – Vulnerable species****Key****Braun-Blanquet scale.**

- 1 <5% cover & 3 or less individuals
- 2 <5% cover & more than 3 individuals sparsely scattered
- 3 <5% cover common and consistent
- 4a <5% cover & very abundant many individuals
- 4b 5 – 25% cover
- 5 25 – 50% cover
- 6 50 – 75% cover
- 7 75% - 100% cover

**APPENDIX D – FAUNA SPECIES IDENTIFIED WITHIN ONR SURVEY AREA**

	Scientific Name	Common name	Method of observation
<b>BIRDS</b>			
	<i>Acanthorhynchus tenuirostis</i>	Eastern Spinebill	On site observation
	<i>Anthochaera chrysoptera</i>	Little Wattlebird	On site observation
	<i>Aquila audax</i>	Wedge-tailed Eagle	Flying above
<b>V</b>	<i>Calyptorhynchus lathamii</i>	Glossy Black Cockatoo	On site observation
	<i>Chenonetta jubata</i>	Australian Wood Duck	On site observation
	<i>Colluricincla harmonica</i>	Grey Shrike-thrush	On site observation
	<i>Cracticus tibicen</i>	Australian Magpie	On site observation
	<i>Cracticus torquatus</i>	Grey Butcherbird	On site observation
	<i>Dacelo novaeguineae</i>	Laughing Kookaburra	On site observation
	<i>Eopsaltria australis</i>	Eastern Yellow Robin	On site observation
	<i>Falco cenchroides</i>	Nankeen Kestrel	Flying above
	<i>Haliaeetus leucogaster</i>	White-breasted Sea Eagle	Flying above
	<i>Hirundo neoxena</i>	Welcome Swallow	On site observation
	<i>Lichenostomus leucotis</i>	White-eared Honeyeater	On site observation
	<i>Malurus cyaneus</i>	Superb Fairy Wren	On site observation
	<i>Manorina melanocephala</i>	Noisy Minor	On site observation
	<i>Meliphaga lewinii</i>	Lewin's Honeyeater	On site observation
	<i>Neochmia temporalis</i>	Red-browed Finch	On site observation
	<i>Ocyphaps lophotes</i>	Crested Pigeon	On site observation
	<i>Phylidonyris novaehollandiae</i>	New Holland Honeyeater	On Site observation
	<i>Platycercus elegans</i>	Crimson Rosella	On site observation
	<i>Rhipidura albiscapa</i>	Grey Fantail	On site observation
	<i>Rhipidura leucophrys</i>	Willie Wagtail	On site observation
	<i>Sericornis frontalis</i>	White-browed Scrubwren	On site observation
	<i>Strepera graculina</i>	Pied Currawong	On site observation
	<i>Trichoglossus moluccanus</i>	Rainbow Lorikeet	On site observation
<b>MAMMALS</b>			
<b>P</b>	<i>Canis lupus familiaris</i>	Dog	Scat and prints
<b>P</b>	<i>Felis catus</i>	Cat	Prints
	<i>Perameles nasuta</i>	Long-nosed Bandicoot	Digs
<b>P</b>	<i>Oryctolagus cuniculus</i>	European Rabbit	Scat/digs
	<i>Trichosurus vulpecula</i>	Brush-tailed Possum	Scat
<b>P</b>	<i>Vulpes vulpes</i>	European Red Fox	Scat and prints
	<i>Wallabia bicolor</i>	Swamp Wallaby	On site observation/scat/ Sand pad
<b>AMPHIBIANS</b>			
	<i>Crinia signifera</i>	Common Eastern Froglet	Heard at farm dam
	<i>Litoria peronei</i>	Peron's Tree Frog	Heard in distance
<b>REPTILES</b>			
	<i>Lampropholis guichenoti</i>	Common Garden Skink	On site observation
	<i>Pseudechis porphyriacus</i>	Red-bellied Black Snake	On site observation
	<i>Varanus varius</i>	Lace Monitor	On site observation

**V** – Vulnerable species  
**P** – Pest species

**APPENDIX E – FAUNA SPECIES IDENTIFIED WITHIN HRBOA SURVEY AREA**

	<b>Scientific Name</b>	<b>Common name</b>	<b>Method of observation</b>
<b>BIRDS</b>			
	<i>Acanthorhynchus tenuirostris</i>	Eastern Spinebill	On site observation
	<i>Alisterus scapularis</i>	King Parrot	On site observation
	<i>Anthochaera chrysoptera</i>	Little Wattlebird	On site observation
<b>V</b>	<i>Calyptorhynchus lathami</i>	Glossy Black Cockatoo	On site observation
<b>V</b>	<i>Climacteris picumnus</i>	Brown Treecreeper	On site observation
	<i>Colluricincla harmonica</i>	Grey Shrike-thrush	On site observation
	<i>Cracticus tibicen</i>	Australian Magpie	On site observation
	<i>Cracticus torquatus</i>	Grey Butcherbird	On site observation
	<i>Dacelo novaeguineae</i>	Laughing Kookaburra	On site observation
	<i>Eopsaltria australis</i>	Eastern Yellow Robin	On site observation
	<i>Falco cenchroides</i>	Nankeen Kestrel	On site observation
	<i>Lichenostomus chrysops</i>	Yellow-faced Honeyeater	On site observation
	<i>Lichenostomus leucotis</i>	White-eared Honeyeater	On site observation
	<i>Leucosarcia melanoleuca</i>	Wonga Pigeon	On site observation
	<i>Macropygia Phasianella</i>	Brown Cuckoo-Dove	On site observation
	<i>Malurus cyaneus</i>	Superb Fairy Wren	On site observation
	<i>Meliphaga lewinii</i>	Lewin's Honeyeater	On site observation
	<i>Neochmia temporalis</i>	Red-browed Finch	On site observation
	<i>Pardalotus punctatus</i>	Spotted Pardalote	On site observation
	<i>Phylidonyris novaehollandiae</i>	New Holland Honeyeater	On site observation
	<i>Platycercus elegans</i>	Crimson Rosella	On site observation
	<i>Platycercus eximius</i>	Eastern Rosella	On site observation
	<i>Ptilonorhynchus violaceus</i>	Satin Bowerbird	On site observation
	<i>Rhipidura albiscapa</i>	Grey Fantail	On site observation
	<i>Rhipidura leucophrys</i>	Willie Wagtail	On site observation
	<i>Rhipidura rufifrons</i>	Rufus Fantail	On site observation
	<i>Sericornis frontalis</i>	White-browed Scrubwren	On site observation
	<i>Strepera graculina</i>	Pied Currawong	On site observation
<b>MAMMALS</b>			
	<i>Austronomus australis</i>	White-striped Free-tailed Bat	AnaBat Express
<b>P</b>	<i>Canis lupus familiaris</i>	Dog	Print
<b>V</b>	<i>Chalinolobus dwyeri</i>	Large-eared Pied Bat	AnaBat Express
	<i>Chalinolobus gouldii</i>	Gould's Wattled Bat	AnaBat Express
	<i>Chalinolobus morio</i>	Chocolate Wattled Bat	AnaBat Express
<b>V</b>	<i>Micronomus norfolkensis</i>	Eastern Coastal Free-tailed Bat	AnaBat Express
	<i>Ozimops ridei</i>	Ride's Free-tailed Bat	AnaBat Express
	<i>Perameles nasuta</i>	Long-nosed Bandicoot	Digs/scats
	<i>Rhinolophus megaphyllus</i>	Eastern Horseshoe Bat	AnaBat Express
	<i>Trichosurus vulpecula</i>	Brush-tailed Possum	Scat
<b>P</b>	<i>Vulpes vulpes</i>	European Red Fox	Scat

	<i>Wallabia bicolor</i>	Swamp Wallaby	Scat/prints/Infrared camera
<b>AMPHIBIANS</b>			
	<i>Crinia signifera</i>	Common Eastern Froglet	Heard in distance
	<i>Litoria peronei</i>	Peron’s Tree Frog	Heard in distance
<b>REPTILES</b>			
	<i>Morelia spilota</i>	Diamond Python	On site observation
	<i>Lampropholis guichenoti</i>	Common Garden Skink	On site observation
	<i>Pseudechis porphyriacus</i>	Red-bellied Black Snake	On site observation
<b>INVERTEBRATES</b>			
<b>En</b>	<i>Pommerhelix duralensis</i>	Dural Land Snail	On site observation

**V** – Vulnerable species

**P** – Pest species

**En** – Endangered species

**APPENDIX F – MELALUECA DEANEI IN REHABILITATION AREA**

<b>ID number</b>	<b>Easting</b>	<b>Northing</b>	<b>Condition</b>	<b>Height</b>	<b>Width</b>
<b>Planted Rehabilitation</b>					
<b>1</b>	312588	6296396	Healthy	1.3m	0.8m
<b>2</b>	312592	6296403	Healthy	1.3m	0.7m
<b>3</b>	312589	6296408	Healthy	0.85m	0.3m
<b>4</b>	312580	6296412	Healthy	1.1m	0.4m
<b>5</b>	312563	6296403	Healthy	1.05m	0.4m
<b>6</b>	312560	6296413	Healthy	1.2m	0.5m
<b>7</b>	312556	6296404	Healthy	0.95m	0.3m
<b>8</b>	312584	6296410	Healthy	1.05m	0.5m
<b>9</b>	312558	6296418	Healthy	1.55m	0.7m
<b>10</b>	312502	6296414	Healthy	1m	0.4m
<b>11</b>	312556	6296422	Healthy	1.25m	0.5m
<b>12</b>	312567	6296416	Healthy	1.35m	0.4m
<b>13</b>	312574	6296396	Healthy	1.45m	0.5m
<b>14</b>	312221	6296241	Healthy	1.15m	0.3m
<b>Translocated Rehabilitation</b>					
<b>1b</b>	312539	6296391	Planted 2017 Healthy	1.35m	0.4m
<b>2b</b>	312587	6296378	Planted May 2021	50cm	20cm
<b>3b</b>	312582	6296376	Planted May 2021	40cm	20cm
<b>4b</b>	312581	6296382	Planted May 2021	40cm	20cm
<b>5b</b>	312576	6296379	Planted May 2021	35cm	20cm
<b>6b</b>	312575	6296376	Planted May 2021	40cm	20cm
<b>7b</b>	312573	6296377	Planted May 2021	50cm	20cm
<b>8b</b>	312571	6296385	Planted May 2021	40cm	20cm
<b>9b</b>	312564	6296387	Planted May 2021	40cm	20cm
<b>10b</b>	312564	6296385	Planted 2017 Healthy	1.4m	0.5m
<b>11b</b>	312562	6296380	Planted May 2021	50cm	20cm
<b>12b</b>	312565	6296378	Planted May 2021	40cm	20cm
<b>13b</b>	312561	6296383	Planted May 2021	40cm	20cm
<b>14b</b>	312549	6296390	Planted May 2021	40cm	20cm
<b>15b</b>	312555	6296381	Planted May 2021	35cm	20cm
<b>16b</b>	312549	6296385	Planted May 2021	450cm	20cm

<b>17b</b>	312545	6296379	Planted May 2021	40cm	20cm
<b>18b</b>	312535	6296387	Planted May 2021	35cm	20cm
<b>19b</b>	312541	6296392	Planted May 2021	40cm	20cm
<b>20b</b>	312547	6296393	Planted May 2021	45cm	20cm
<b>21b</b>	312525	6296400	Planted May 2021	40cm	20cm
<b>22b</b>	312531	6296408	Planted May 2021	40cm	20cm
<b>23b</b>	312537	6296405	Planted May 2021	40cm	20cm
<b>24b</b>	312540	6296406	Planted May 2021	45cm	20cm
<b>25b</b>	312543	6296406	Planted May 2021	40cm	20cm
<b>26b</b>	312586	6296367	Planted Oct 2021	35cm	20cm
<b>27b</b>	312580	6296386	Planted Oct 2021	40cm	20cm
<b>28b</b>	312527	6296405	Planted Oct 2021	50cm	20cm
<b>29b</b>	312529	6296414	Planted Oct 2021	40cm	20cm
<b>30b</b>	312536	6296422	Planted Oct 2021	40cm	20cm
<b>31b</b>	312553	6296421	Planted Oct 2021	50cm	20cm
<b>32b</b>	312562	6296418	Planted Oct 2021	40cm	20cm
<b>33b</b>	312574	6296415	Planted Oct 2021	40cm	20cm
<b>34b</b>	312574	6296438	Planted Oct 2021	45cm	20cm
<b>35b</b>	312567	6296406	Planted Oct 2021	40cm	20cm
<b>36</b>			Grown from parent plant	5cm	3cm
<b>37</b>			Grown from parent plant	5cm	3cm
<b>Seedbank Rehabilitation</b>					
<b>17</b>	312510	6296389	Healthy	2m	0.9m
<b>Front Gate Rehabilitation</b>					
<b>1</b>	312751	6297182	Planted July 2023	<30cm	<20cm
<b>Lot 196 Rehabilitation</b>					
<b>6</b>	312505	6296873	Planted July 2023	<30cm	<20cm

<b>7</b>	312481	6296885	Planted July 2023	<30cm	<20cm
<b>8</b>	312470	6296892	Planted July 2023	<30cm	<20cm
<b>11</b>	312415	6296903	Planted July 2023	<30cm	<20cm

**APPENDIX G – LANTANA CAMARA MANAGEMENT GUIDE**

# How to control lantana

Quick reference guide

Lantana - Lantana camara

**Minimise spread and future impacts**

Although lantana is widespread on the east coast of Australia, it is still absent from parts of its potential range. These areas should be protected by:

- preventing the importation of further varieties and species of lantana
- stopping more planting of lantana in gardens
- strategically controlling infestations which threaten uninfested areas.

**A control program for dense infestations in pastures**

The Queensland Department of Natural Resources and Mines has produced a pest series fact sheet on lantana (PP#34). They advise that herbicides are too expensive to treat large lantana infestations.

A combination of fire and mechanical control makes spot treatment of small patches with herbicides more cost-effective. The following suggested control program for dense infestations in pastures is based on the fact sheet:

1. Exclude stock to allow a fuel load to build up.
2. Bulldoze, stickrake or plough the infestation to add to the fuel load.
3. Burn the infestation after obtaining a permit. Summer burns are more effective than winter burns.
4. Sow an improved pasture. Seek advice of local council or state/territory government agencies for selection of non-weedy pasture species.
5. Continue stock exclusion until pasture has established and set seed.
6. Burn the infestation again after obtaining a permit.

7. Spot spray or grub out any regrowth or seedlings. Spraying is most effective between summer and autumn.
8. Follow-up burning, spraying and/or grubbing will be required for several years.



Lantana can escape from garden plantings into surrounding bushland.  
Photo: Tim Schultz

**Control options**

Type of infestation	Physical	Mechanical	Chemical	Fire	Biological
Small (few plants, small area)	Hand grubbing only suitable for seedlings.	Not suitable.	Spot spray plants less than 2 m in height between summer and autumn with a registered herbicide.	Not suitable.	There are four useful biological control agents. They are already distributed throughout their potential range.
Medium (medium density, medium total area)	Wear gloves for protection from thorns.	Bulldoze, plough, stickrake or slash infestations. Soil disturbance will lead to mass seed germination, so follow up with further controls. Do not use mechanical control in areas susceptible to erosion. A permit may be required.	Spraying is uneconomical for medium or large infestations. Helicopter spraying is used when there is no access for mechanical control, eg very steep slopes.	Under permit, burn in summer with good fuel load of grass and/or mechanically cleared lantana. Also use as follow-up. Do not burn in rainforests.	
Large (many plants, many ha)					

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End  
Of  
Report

## **Appendix I – S94 Contribution**



## SECTION 94 CONTRIBUTION

### SAND & SANDSTONE SALES MAY 2024

1	801.26
2	1,047.24
3	703.82
4	41.86
6	449.98
7	328.68
8	205.22
9	555.88
10	199.24
13	695.86
14	762.92
15	688.34
16	741.60
17	601.46
18	133.92
20	662.85
21	561.44
22	708.92
23	682.54
24	644.25
25	289.12
27	1,486.36
28	584.02
29	714.94
30	635.70
31	672.92

15,600.34

Tonnes @ \$1.11  
\$17,316.38

## **Appendix J – Community Engagement and CCC Meeting Minutes**



**DIXON SAND**

**MINUTES OF THE BI-ANNUAL  
COMMUNITY CONSULTATIVE COMMITTEE  
WEDNESDAY 8 NOVEMBER 2023  
GLENORIE RSL CLUB**

	<b>NAME</b>	<b>ORGANISATION</b>
<b>PRESENT</b>	Lisa Andrews (LA)	Independent Chairperson
	Hunny Churcher (HC)	Environmental Officer, Dixon Sand
	Mark Dixon (MD)	Dixon Sand
	Melissa Mass (MM)	Dixon Sand - Ecologist
	Pat Schwartz (PS)	Community Representative
	Kristine McKenzie (KM)	The Hills Shire Council Representative
	Timothy Baker (TB)	Bush Regeneration Contractor (Bush-It)
<b>APOLOGIES</b>	Jemma Roberts (JR)	Community Representative (alternate)
	Farley Roberts (FR)	Community Representative
	Lisa Aylward (LAy)	Maroota Public School Representative
	David Dixon (DD)	General Manager, Dixon Sand

<b>WELCOME &amp; INTRODUCTION</b>	LA opened the meeting at 12.54pm following a light luncheon. All members were welcomed.	
<b>APOLOGIES</b>	As listed above.	
<b>DECLARATIONS OF INTEREST</b>	LA declared that she is approved by the Department of Planning and Environment to chair the meeting and engaged by Dixon Sand.	<b>No changes to previous declarations.</b>
<b>BUSINESS ARISING FROM PREVIOUS MEETING (3/5/23)</b>	Nil.	
<b>CORRESPONDENCE (as emailed with Meeting Notice on 10/10/23 with 1 additional item)</b>	<ul style="list-style-type: none"> <li>10/5/23- Draft minutes sent to members for review</li> <li>19/5/23 – Email to members with the finalised minutes</li> <li>3/10/23 – Email from HC with advice that DPE regarding Modification 6 for DA 165-7-2005 for Haerses Road Quarry has been approved and submission of the 2022-2023 Annual Review.</li> <li>10/10/23 – Email to members with meeting notice &amp; agenda for 8/11/23.</li> <li>6/11/23 – <a href="#">Email to members with the reminder for this meeting.</a></li> </ul>	
<b>PROJECT REPORT, INCLUDING PRODUCTION/SALES</b>	HC (on behalf of DD). There have been a few changes at ONR. The quarry is producing speciality sand for all the NSW Racecourses. The Australian Turf Club tested 14 different sands from different suppliers and Dixon Sand’s product was the best performing and most suited to the requirements of racetracks.	<b>Questions asked and answered throughout the presentation.</b>

	<p>Dixon Sand continue to provide sand for Golf Courses, the SCG, Brookvale Oval, etc.</p> <p>Extraction on Lots 1 &amp; 2. There has been minimal extraction from Cons Hill. The silt ponds are being capped and will bake over summer in preparation for rehabilitation. Hopefully weather conditions will be stable for this purpose.</p> <p>Stockpiled materials containing seeds of native flora is going to be transferred on to the silt pond area to continue the Native Vegetation Corridor.</p> <p>KM sought clarification on the aerial map regarding water storage. It was confirmed as contained run-off from the floods 2 years ago. MD advised that because it is deep and cold, that it doesn't evaporate very quickly. However, this is likely to occur this summer.</p> <p>HC stated that the sediment pond on Lots 1 &amp; 2 will progress towards the school. Construction of the 250m noise bund to the school has commenced and will continue.</p> <p>HC stated that extraction at ONR is restricted to the same areas and increasing in depth. Extraction at Haerses Road currently occur in Stages 1 and 2 (Tertiary sand, original DA) and Cells 1A, 1B, 2B, 3B and parts of 1A (Friable sandstone, Mod 1 extraction area) Dixon Sand has purchased enough biodiversity credits for the whole project.</p>	
<p><b>Haerses Rd Quarry – Proposed Mod 6.</b></p>	<p>MOD 6 was approved by DPE on 7 September 2023. This involves the relocation of the sand stone cutting shed and the maintenance shed – 90m to the north. The Construction Certificate for both sheds has been issued. Pre-commencement conditions have been completed. Construction will commence in 2 weeks.</p>	<p><b>Slides: 8</b></p>
<p><b>ONR – Proposed DA Mod 6 - Extraction within existing cells to maximise resource</b></p>	<ul style="list-style-type: none"> <li>• Increase the depth of extraction within Lot 196 DP752025 to within 2m of the highest recorded regional wet weather groundwater level;</li> <li>• Import up to 250,000 tonnes per annum of virgin excavated natural material (VENM) and excavated natural material (ENM) within existing incoming trucks; and</li> <li>• Extend the quarry life by 11 years until 2053.</li> </ul> <p><b>Extraction within existing cells to maximise resource</b></p> <ul style="list-style-type: none"> <li>○ 17 January 2023 - Scoping letter lodged with DPE</li> <li>○ 21 March 2023 - DPE confirms pathway of modifying consent under section 4.56 of the EP&amp;A Act.</li> </ul>	<p><b>Sides: 9 &amp; 10</b></p>

	<p>DPE requests in addition to the matters identified in the scoping letter for the Modification Report to include:</p> <ul style="list-style-type: none"> <li>○ A traffic assessment that considers the growth in background traffic over the period of the proposed extension; and</li> <li>○ An updated rehabilitation and final landform assessment that takes into account the proposed increase in extraction depth.</li> <li>○ September 2023 – Consultation with Agencies</li> <li>○ Current Status – Finalisation of Modification Report and 'soft' lodgement of the Modification Report to the DPE</li> </ul> <p>MD advised that half the staff have moved over to this site with the main production being white sand and brickies sand.</p> <p>Sales and demand for Sandstone blocks are doing very well. Larger blocks are being sold for commercial sites (such as the development site in Camden) and small blocks for the residential market.</p> <p>Production overall is down 25%, due to the down turn in the market from interest rate rises which are affecting the building of homes.</p>	
<b>BIODIVERSITY OFF SET CREDITS</b>	Discussions on biodiversity off set credits. MD advised that Dixon Sand has purchased enough biodiversity credits to cover the whole project.	
<b>ENVIRONMENTAL MONITORING RESULTS</b>	<p>HC commenced by explaining the locations of all the monitoring points and the schedule for conducting the monitoring.</p> <p>HC advised that DPI Water has requested that an additional bore be installed to replace bores that were decommissioned. The new bore is located in the south west corner of cell 1A.</p>	<b>Slides: 12-16</b>
<b>TEOM DATA</b>	<p>HC explained the TEOM data and measurement criteria.</p> <ul style="list-style-type: none"> <li>○ TEOM and Meteorological station records PM10 levels and weather data such as rain, temperature, wind etc.</li> <li>○ Monitoring Criteria – <ul style="list-style-type: none"> <li>● Long term: Annual PM10 average (light blue line) should not exceed the annual average criteria (pink line – 30µg/m3) –</li> <li>● Short term: 24hr PM10 average (blue bars) should not exceed the 24hr PM10 NEPM Criteria (yellow line – 50µg/m3) –</li> <li>● Short term: If the 24hr PM10 EPL Criteria Level (green line</li> </ul> </li> </ul>	<b>Slides: 17-18</b>

	<p>– 42µg/m3) is exceeded by the 24hr PM10 average (blue bars), and the prevailing wind is from the specific quadrant Dixon Sand is required to:</p> <ul style="list-style-type: none"> <li>• Notify EPA</li> <li>• Take immediate action to reduce PM10 levels</li> <li>• Stop works if levels do not fall below 42µg/m3 within 1 hour</li> </ul> <p>o TEOM station represent the EPL Points 1 &amp; 3</p>													
<b>DEPOSITIONAL DUST DATA</b>	<p>Dust data for this monitoring period: Dec 2022 – Oct 2023</p> <table border="1"> <thead> <tr> <th>Location</th> <th>Dust Gauge</th> </tr> </thead> <tbody> <tr> <td rowspan="4">Old Northern Road</td> <td>D1A Access road</td> </tr> <tr> <td>D4 Rehab area</td> </tr> <tr> <td>D5 Bundwall</td> </tr> <tr> <td>D7 Mullock Heap</td> </tr> <tr> <td rowspan="4">Haerses Road</td> <td>D8 Olive Grove</td> </tr> <tr> <td>D10 Haerses Road (EPL Point 3)</td> </tr> <tr> <td>D11 Receiver R6</td> </tr> <tr> <td>D12 Receiver R8</td> </tr> </tbody> </table>	Location	Dust Gauge	Old Northern Road	D1A Access road	D4 Rehab area	D5 Bundwall	D7 Mullock Heap	Haerses Road	D8 Olive Grove	D10 Haerses Road (EPL Point 3)	D11 Receiver R6	D12 Receiver R8	<p><b>See graphs for results. Slides: 19-28 (maps)</b></p>
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<b>NOISE MONITORING</b>	<p>ONR &amp; Haerses Rd:</p> <p>Tables of noise monitoring locations indicating: Receivers, property addresses, descriptions and extrapolated monitoring results.</p>	<p><b>See Slides 29-33 For location of monitoring sites and summary of data.</b></p>												
<b>GROUND WATER MONITORING</b>	<p><b>GW Monitoring wells</b></p> <ul style="list-style-type: none"> <li>• ONR 11 x BH</li> <li>• HR 19 x BH</li> </ul> <p><b>GW levels:</b></p> <ul style="list-style-type: none"> <li>• Monthly + continuous data loggers</li> </ul> <p><b>GW quality sampling &amp; lab analysis:</b></p> <ul style="list-style-type: none"> <li>• 6 monthly sampling and testing.</li> </ul>	<p><b>Graphs explained - See Slides 34-48 (maps)</b></p>												
<b>SURFACE WATER MONITORING</b>	<p><b>ONR</b></p> <ul style="list-style-type: none"> <li>• SW19 = Surface water monitoring at creek on Lot 196</li> <li>• LDP1 = EPL 3916 Licenced Discharge Point at Weir of Main Water Channel</li> </ul> <p><b>HR</b></p> <ul style="list-style-type: none"> <li>• SW1 = Surface water monitoring at creek east of extraction Stage 2 East (inside the Biodiversity Offset Area)</li> <li>• SW2 = Surface water monitoring at creek west of extraction Cell 1A (Mod 1)</li> <li>• Basin 1.</li> </ul> <p>No discharges have been carried out. All within criteria.</p>	<p><b>Graphs/Tables explained - See Slides 49-52</b></p>												

	<p><b>ONR – Licensed Discharge Point on the EPL 3916 (Main Water Channel)</b></p> <table border="1"> <thead> <tr> <th colspan="2">EPL 3916 water quality criteria</th> </tr> <tr> <th>pH</th> <th>TSS (mg/L)</th> </tr> </thead> <tbody> <tr> <td>4.5 – 6.5</td> <td>50</td> </tr> </tbody> </table> <p>No planned discharge of water during period: May 2023 – November 2023.</p>	EPL 3916 water quality criteria		pH	TSS (mg/L)	4.5 – 6.5	50	
EPL 3916 water quality criteria								
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<p><b>BUSH REGENERATION WORKS</b></p>	<p>Presented by TB</p> <p><b><u>Old Northern Rd Works Areas: Rehabilitation of Lot 196</u></b></p> <p><b>Challenges:</b></p> <ul style="list-style-type: none"> <li>• Machinery-compacted soils on North-facing aspect</li> <li>• Missing all native vegetation strata and microbial activity.</li> </ul> <p><b>Achievements:</b></p> <ul style="list-style-type: none"> <li>• Recent Melaleuca deanei plantings have struggled in hot/dry conditions experience in September in particular.</li> <li>• Direct seeded enrichment nodes where slashing is no longer being undertaken where there are natives shrubs recruiting ie mostly Kunzea ambigua.</li> </ul> <p><b>Future Works:</b></p> <ul style="list-style-type: none"> <li>• Continued revegetation with locally endemic trees, shrubs and grasses (creating dense enrichment nodes) in April-May 2023.</li> <li>• Seed collection currently being undertaken.</li> </ul> <p><b><u>Assisted Regeneration - Native Vegetation Corridor (NVC)</u></b></p> <p><b>Challenges</b></p> <ul style="list-style-type: none"> <li>• Minimal microbial and mycorrhizal fungi</li> <li>• Very minor Infestation of exotic grasses</li> </ul> <p><b>Achievements</b></p> <ul style="list-style-type: none"> <li>• Treatment of exotic grass has prevented seed-set and spread, in particular Pampas Grass.</li> <li>• Re-growth of mother Melaleuca deanei.</li> </ul> <p><b>Future Work</b></p> <ul style="list-style-type: none"> <li>• Continue to cull assertive shrub species to promote diversity</li> <li>• Monitor the impact of dry conditions.</li> </ul> <p><b><u>Assisted Regeneration - Native Vegetation Corridor</u></b></p> <p>The 6 months to November has seen:</p> <ul style="list-style-type: none"> <li>• Unprecedented hot and drier conditions.</li> </ul>	<p><b>See photographs in Slides 53-61</b></p> <p><b>TB spoke further about the Melaleuca deanei plantings. 11 of the 32 remain. Consideration of interfering vs not interfering.</b></p> <p><b>Discussions about climate proofing some species, ie bringing them from northern NSW as they are accustomed to the heat.</b></p>						

	<p><b>Rehabilitation of Lot 2</b></p> <p><b>Challenges</b></p> <ul style="list-style-type: none"> <li>• Excessive surface water flows and waterlogged soils are drying out.</li> <li>• Extensive infestation of woody weeds.</li> </ul> <p><b>Achievements</b></p> <ul style="list-style-type: none"> <li>• Treatment of Lantana to evict Bell Miners and promote tree health.</li> <li>• Recovery of native species by in-situ resilience only at this stage.</li> </ul> <p><b>Future Work</b></p> <ul style="list-style-type: none"> <li>• Continued revegetation of disturbed grassy areas with canopy species.</li> <li>• Follow-up work on Lantana needed to finish off.</li> </ul> <p><b>Haerses Rd – New Work Areas</b> (discussions on what to name this new area, Barry’s Bush?)</p> <p><b>Challenges</b></p> <ul style="list-style-type: none"> <li>• Dense Lantana thicket</li> <li>• Runoff from surrounding fields</li> </ul> <p><b>Achievements</b></p> <ul style="list-style-type: none"> <li>• Treatment of Lantana over the last few months</li> </ul> <p><b>Future Work</b></p> <ul style="list-style-type: none"> <li>• Follow-up work on Lantana needed.</li> </ul> <p><b>Assisted Regeneration - Haerses Road Biodiversity Offset</b></p> <p><b>Challenges</b></p> <ul style="list-style-type: none"> <li>• Encroachment of invasive species along an extended edge and along drainage lines</li> </ul> <p><b>Achievements</b></p> <ul style="list-style-type: none"> <li>• Treatment of Crofton Weed to prevent seed-set and spread.</li> <li>• Manual treatment and minimal herbicide use has resulted in a dense buffer of native shrubs and canopy species.</li> </ul> <p><b>Future Work</b></p> <ul style="list-style-type: none"> <li>• Continued monitoring for incursions along the leading edge</li> </ul> <p><b>Haerses Rd - Translocation</b></p> <p><b>Challenges</b></p> <ul style="list-style-type: none"> <li>• Dominance of assertive native canopy species – Kunzea, Melaleuca and Acacia spp.</li> <li>• Infestation by invasive exotic grasses (Common Couch in particular).</li> </ul> <p><b>Achievements</b></p> <ul style="list-style-type: none"> <li>• Treatment of exotic grass to prevent seed-set and spread.</li> </ul>	
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	<ul style="list-style-type: none"> <li>Select thinning of assertive native canopy species has promoted understorey natives.</li> </ul> <p><b>Future Work</b></p> <ul style="list-style-type: none"> <li>Continued treatment of grasses</li> <li>Thinning of assertive native canopy.</li> </ul> <p><b>Haerses Rd – Visual buffer along Wisemans Ferry Road</b></p> <p><b>Challenges</b></p> <ul style="list-style-type: none"> <li>Exposed to surrounding impacts and fairly degraded soil</li> <li>Weed density relatively low now.</li> </ul> <p><b>Achievements</b></p> <ul style="list-style-type: none"> <li>Treatment of Pellaea vridis and Asparagus Fern mostly.</li> <li>Control of Common Couch on sandstone capped area.</li> <li>Plantings mostly successful.</li> </ul> <p><b>Future Work</b></p> <ul style="list-style-type: none"> <li>Continued monitoring and maintenance weed control works.</li> <li>Supplementary planting required in April-May 2024.</li> </ul>	
<p><b>BIODIVERSITY AND REHABILITATION (Threatened Species Update)</b></p>	<p>MM provided the following presentation:</p> <p><b>Biodiversity and Rehabilitation Annual Report 2023</b></p> <ul style="list-style-type: none"> <li>The Biodiversity and Rehabilitation Annual Report identifies native flora and fauna within the Native Vegetation Corridor and the Haerses Road Biodiversity Offset Area, it monitors the success of the rehabilitation area within the NVC and describes the current condition of threatened flora and fauna and their habitats within the Old Northern Road site and the HRBOA.</li> <li>The 2023 Biodiversity and Rehabilitation Annual Report was completed in September and submitted with the Annual Review on the 30th of September.</li> <li>The results found the rehabilitation areas are thriving and increasing in diversity and density. Ideal growing conditions with favourable temperatures and regular rainfall over the past 3 years has improved the overall biodiversity of all rehabilitation and monitoring sites.</li> <li>Survey work for the preparation of the 2024 report will begin in January 2024.</li> </ul> <p><b>Rehabilitation process</b></p> <ul style="list-style-type: none"> <li>Three stage process:</li> <li>Extraction operations completed and silt ponds created</li> <li>Silt ponds filled, dried and capped</li> <li>Rehabilitation of biodiversity begins.</li> </ul>	<p><b>See Slides 62 – 75 (see photographs)</b></p>

	<p><b>BCT Reporting</b></p> <ul style="list-style-type: none"> <li>• The Annual Management Report for year 4 was completed in March - Passive Management at Haerses Road and Porters Road sites was completed in March 2023. Passive management continues at both locations.</li> <li>• PS enquired that when a site is cleared, do you have to comply with certain requirements. MM responded yes, a pre-clearing survey has to be undertaken, threatened species are mapped out, habitat (hollow) trees are marked and felling of potential habitat trees are undertaken in multi-stages to ensure maximum chance of fauna relocation.</li> <li>• PS asked if sound records were used as she has had great success. MM advised that she has been recording bat species. Commenting that a lot of fauna have moved away from the quarry.</li> </ul>	
<b>GENERAL BUSINESS</b>	<ul style="list-style-type: none"> <li>○ TB asked MD if Dixon Sand have excess bio diversity credits. MD responded yes and explained passive vs active management options. Stating that he is currently going through the government buy back system.</li> <li>○ TB commented that the native garden at Dixon Sand is looking great.</li> <li>○ MM advised that a few weeks ago, there were some comments made on a local Maroota Face Book page, following an enquiry about the impact of quarry activities on dust, noise, water quality, etc in the area. The original query came from someone looking at moving to the area. There were some negative responses/comments made. MM provided a positive response to the page, but suggested that CCC community members could make themselves available to the broader community to bring any issues to the CCC. PS commented that the Progress Association often receives questions as well.</li> </ul>	
<b>REVISED CCC GUIDELINES</b>	<p>LA confirmed that DPE have released its revised CCC Guidelines released in June 2023 (which are now available on the Department’s website) and referred to the Briefing Sheet provided to members with the meeting notice. LA provided an overview of the key changes, including the requirements for a specific Terms of Reference for the CCC. LA discussed potential recruitment, raising that there is availability on the committee for additional members.</p> <p>LA noted a new CCC member recruitment method means that it is now acceptable to refer potential new members via word of mouth. LA asked if the CCC knew of anyone that would like to join this forum to</p>	<b>Printed CCC guideline handed to PS.</b>

	<p>please provide them with LA's contact details and vice versa.</p> <p>LA stated that she would send out the draft Terms of Reference for members' review, as well as the new Code of Conduct and Pecuniary/Interest Forms for completion and return. Advising that these documents would be reviewed on an annual basis.</p>	
<b>MEETING SCHEDULE FOR 2024</b>	<p>It was agreed to continue with the bi-annual meetings, May &amp; November 2024. Accordingly:</p> <ul style="list-style-type: none"> <li>• Wednesday 1 May 2024 at 12.30pm (on site at quarry, Maroota – details to be confirmed).</li> <li>• Wednesday 6 November 2024.</li> </ul>	<b>Agreed.</b>

***The meeting was closed at 3:08pm with the chair thanking all members for their attendance.***

**ACTION ITEM:**

<b>NO.</b>	<b>ITEM</b>	<b>RESPONSIBILITY</b>
1	Send out draft Terms of Reference for comment and governance forms for members' completion and return.	LA



**MINUTES OF THE BI-ANNUAL  
COMMUNITY CONSULTATIVE COMMITTEE  
TUESDAY 28 MAY 2024  
HAERSES ROAD QUARRY, ADMINISTRATION BUILDING**

	<b>NAME</b>	<b>ORGANISATION</b>
<b>PRESENT</b>	Lisa Andrews (LA)	Independent Chairperson
	Hunny Churcher (HC)	Environmental Officer, Dixon Sand
	David Dixon (DD)	Dixon Sand
	Melissa Mass (MM)	Dixon Sand - Ecologist
	Farley Roberts (FR)	Community Representative
	Lisa Aylward (LAy)	Maroota Public School Representative
	Kristine McKenzie (KM)	The Hills Shire Council Representative
	Zoe Ridgeway (ZR)	Bush-It (alternate)
	Jamie Baker (JB)	Dixon Sand – Business Development Manager
<b>APOLOGIES</b>	Jemma Roberts (JR)	Community Representative (alternate)
	Timothy Baker (TB)	Bush Regeneration Contractor (Bush-It)
	Pat Schwartz (PS)	Community Representative

*HC provided a 'housekeeping' induction to members as it was a new venue.*

<b>WELCOME &amp; INTRODUCTION</b>	LA opened the meeting at 1.25pm following a light luncheon. All members were welcomed.		
<b>APOLOGIES</b>	As listed above.		
<b>DECLARATIONS OF INTEREST</b>	LA declared that she is approved by the Department of Planning and Environment to chair the meeting and engaged by Dixon Sand.		<b>FR &amp; JR to complete their governance forms and submit to LA.</b>
<b>BUSINESS ARISING FROM PREVIOUS MEETING (9/11/23)</b>	<b>NO.</b>	<b>ITEM</b>	<b>RESPONSIBILITY</b>
	1	Send out draft Terms of Reference for comment and governance forms for members' completion and return. <b>Complete - Sent 24/11/23</b>	LA
			<b>LA noted that she had replaced Mark Dixon with Jamie Baker in the ToR &amp; asked if members were happy to ratify. Agreed.</b>

<p><b>CORRESPONDENCE</b> <b>(as emailed with Meeting Notice on 3/5/24 with 1 additional item)</b></p>	<ul style="list-style-type: none"> <li>• 16/11/23- Draft minutes and draft Terms of Reference sent to members for review</li> <li>• 24/11/23 – Email to members with the finalised minutes and governance forms for completion and return.</li> <li>• 28/11/23 – Email from KM with completed declaration form.</li> <li>• 29/11/23 – Email from HC with completed governance forms and new logo for future documentation.</li> <li>• 23/1/24 – Email from HC advising of the updated EMS and Management Plans Distribution.</li> <li>• 5/2/24 – Email to members with reminder for governance forms to be completed and returned.</li> <li>• 23/2/24 – Email to members with the change in date from 1/5/24 to 28/5/24.</li> <li>• 18/3/24 – Email from LAy with completed governance forms. Acknowledged.</li> <li>• 26/3/24 – Email from HC with details of the DA250-09-01 Old Northern Road Quarry - Revision of Environmental Management strategy</li> <li>• 22/4/24 – Email from HC with completed governance forms from DD &amp; JB.</li> <li>• 3/5/24 – Email to members with meeting notice &amp; agenda for 28/5/24.</li> <li>• 21/5/24 – Email from KM requesting November CCC proceed as scheduled. Acknowledged.</li> <li>• 27/5/24 – Email to members with the reminder for this meeting.</li> </ul>	<p><b>LA to finalise.</b></p> <p><b>LA spoke to this item &amp; moved to “Next Meeting” Agenda item for discussion.</b></p>
<p><b>PROJECT REPORT, INCLUDING PRODUCTION/SALES</b></p>	<p>DD advised that there has not been many changes at Old Northern Road operations. Progressing with the new silt ponds. Sandstone and sand extraction continues.</p> <p>Haerses Rd produces brick laying operations and sandstone cutting operations.</p> <p>MOD 5 (sandstone cutting operations) has been approved by DPHI. Two sheds (maintenance and processing) to be erected. Proposed works have been taking some time due to an industry lull.</p> <p>Currently providing product to Kembla Grange Racecourse as well as continuing to supply golf &amp; sporting fields.</p> <p>The Quarry is reviewing a number of internal systems including OH&amp;S to address the change and growth of quarry operations.</p>	<p><b>Questions asked and answered throughout the presentation.</b></p>
<p><b>ONR – Proposed DA Mod 6 - Extraction within existing cells to maximise resource</b></p>	<ul style="list-style-type: none"> <li>• Increase the depth of extraction within Lot 196 DP752025 to within 2m of the highest recorded regional wet weather groundwater level;</li> <li>• Import up to 250,000 tonnes per annum of virgin excavated natural material (VENM) and excavated natural material (ENM) within existing incoming trucks; and</li> <li>• Extend the quarry life by 11 years until 2053.</li> </ul>	<p><b>Sides: 9 &amp; 10</b></p>

	<p><b>Timeline</b></p> <table border="1"> <thead> <tr> <th>Date</th> <th>Milestone</th> </tr> </thead> <tbody> <tr> <td>January 2023</td> <td>Scoping Letter lodge with DPE (now DPHI)</td> </tr> <tr> <td>March 2023</td> <td>DPE confirmed pathway and requests additional traffic assessment and rehabilitation and final landform assessment to be updated</td> </tr> <tr> <td>September 2023</td> <td>Consultation with Agencies</td> </tr> <tr> <td>November 2023</td> <td>Modification Report submitted to DPE</td> </tr> <tr> <td>November 2023 – April 2024</td> <td>Public Exhibition, received submissions from the community and agencies, submissions report submitted to DPE</td> </tr> <tr> <td>May 2024</td> <td>Received further comments from DCCEEW-Water. Submission report being prepared.</td> </tr> </tbody> </table>	Date	Milestone	January 2023	Scoping Letter lodge with DPE (now DPHI)	March 2023	DPE confirmed pathway and requests additional traffic assessment and rehabilitation and final landform assessment to be updated	September 2023	Consultation with Agencies	November 2023	Modification Report submitted to DPE	November 2023 – April 2024	Public Exhibition, received submissions from the community and agencies, submissions report submitted to DPE	May 2024	Received further comments from DCCEEW-Water. Submission report being prepared.	
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May 2024	Received further comments from DCCEEW-Water. Submission report being prepared.															
<p><b>ENVIRONMENTAL MONITORING RESULTS</b></p>	<p>HC commenced by explaining the locations of all the monitoring points and the schedule for conducting the monitoring.</p>	<p><b>Slides: 10-15 for results</b></p>														
<p><b>TEOM DATA</b></p>	<p>HC explained the TEOM data and measurement criteria.</p> <ul style="list-style-type: none"> <li>○ TEOM and Meteorological station records PM10 levels and weather data such as rain, temperature, wind etc.</li> <li>○ Monitoring Criteria – <ul style="list-style-type: none"> <li>● Long term: Annual PM10 average (light blue line) should not exceed the annual average criteria (pink line – 30µg/m3) –</li> <li>● Short term: 24hr PM10 average (blue bars) should not exceed the 24hr PM10 NEPM Criteria (yellow line – 50µg/m3) –</li> <li>● Short term: If the 24hr PM10 EPL Criteria Level (green line – 42µg/m3) is exceeded by the 24hr PM10 average (blue bars), and the prevailing wind is from the specific quadrant Dixon Sand is required to: <ul style="list-style-type: none"> <li>● Notify EPA</li> <li>● Take immediate action to reduce PM10 levels</li> <li>● Stop works if levels do not fall below 42µg/m3 within 1 hour</li> </ul> </li> </ul> </li> <li>○ TEOM station represent the EPL Points 1 &amp; 3</li> </ul> <p>Lay asked why there weren't more TEMO monitors on site. DD explained it was due to costs (\$100k each) and confirmed that dust monitoring requirements are met in accordance with the projects' conditions of consent.</p>	<p><b>Slides: 16-17 for results</b></p>														

<p><b>DEPOSITIONAL DUST DATA</b></p>	<p>Dust data for this monitoring period: June 2023 –May 2024:</p> <table border="1"> <thead> <tr> <th>Date</th> <th>Milestone</th> </tr> </thead> <tbody> <tr> <td rowspan="5">Old Northern Road</td> <td>D1A Access road</td> </tr> <tr> <td>D4 Rehab area</td> </tr> <tr> <td>D5 Bundwall</td> </tr> <tr> <td>D6 School</td> </tr> <tr> <td>D7 Mullock Heap</td> </tr> <tr> <td rowspan="4">Haerses Road</td> <td>D8 Olive Grove</td> </tr> <tr> <td>D10 Haerses Road (EPL Point 3)</td> </tr> <tr> <td>D11 Receiver R6</td> </tr> <tr> <td>D12 Receiver R8</td> </tr> </tbody> </table> <p>Dust exceedances due to bundwall work, paddock maintenance and neighbouring farming activities at some of the dust gauges, trying to get these dust gauges removed/moved as they aren't indicative of quarry operations.</p> <p>A few elevated results, due to a fire at the school (burning off tree pruning, etc) and slashing works on the neighbouring property.</p> <p>FR advised that roadworks are also generating dust.</p> <p>DD advised that they continue to provide occupational dust monitoring for staff and equipment for inhalable and respirable dust and quartz, in addition to environmental monitoring requirements. One elevated dust result was attributed insufficient seal on the door of a crusher was rectified, retested and retested which returned results well before the exposure standard.</p> <p>Annual testing of employees including CT scans of lungs every year. Clean bill of health.</p>	Date	Milestone	Old Northern Road	D1A Access road	D4 Rehab area	D5 Bundwall	D6 School	D7 Mullock Heap	Haerses Road	D8 Olive Grove	D10 Haerses Road (EPL Point 3)	D11 Receiver R6	D12 Receiver R8	<p><b>See graphs for results. Slides: 18-27 (maps)</b></p>
Date	Milestone														
Old Northern Road	D1A Access road														
	D4 Rehab area														
	D5 Bundwall														
	D6 School														
	D7 Mullock Heap														
Haerses Road	D8 Olive Grove														
	D10 Haerses Road (EPL Point 3)														
	D11 Receiver R6														
	D12 Receiver R8														
<p><b>NOISE MONITORING</b></p>	<p><b>ONR &amp; Haerses Rd:</b></p> <p>Tables of noise monitoring locations indicating: Receivers, property addresses, descriptions and extrapolated monitoring results.</p>	<p><b>See Slides 28-35 For location of monitoring sites and summary of data.</b></p>													
<p><b>GROUND WATER MONITORING</b></p>	<p><b>GW Monitoring wells</b></p> <ul style="list-style-type: none"> <li>• ONR 11 x BH</li> <li>• HR 22 x BH</li> </ul> <p><b>GW levels:</b></p> <ul style="list-style-type: none"> <li>• Monthly + continuous data loggers</li> </ul> <p><b>GW quality sampling &amp; lab analysis:</b></p>	<p><b>Graphs explained - See Slides 36-49 (maps)</b></p>													

	<ul style="list-style-type: none"> <li>• 6 monthly sampling and testing.</li> </ul> <p>HC handed around a data logger that has been taken out of service, to show the equipment to members.</p>	
<p><b>BUSH REGENERATION WORKS</b></p>	<p>Summary of Assisted Bush Regeneration Work - November 2023 to May 2024 - presented by ZR.</p> <p><b><u>Old Northern Rd Works Areas: Rehabilitation of Lot 196</u></b></p> <p><b>Challenges:</b></p> <ul style="list-style-type: none"> <li>• In the commander area, ongoing challenge of heavily compacted soils and absence of all native vegetation strata.</li> <li>• The majority of Melaleuca deanei plantings in this area did not survive, most likely due to September 2023 dry conditions, 4/11 remain (one at ONR entrance and estimated three at commander).</li> <li>• Repressing the established stand of Andropogon virginicus in such a heavily degraded area.</li> </ul> <p><b>Achievements:</b></p> <ul style="list-style-type: none"> <li>• Short term successful maintenance in repressing Andropogon virginicus. Mixed treatments of brush-cutting areas with 100% weed cover and hand removing amongst the direct seeded enrichment nodes consisting of juvenile Kunzea ambigua. € Planted 40 Acacia longifolias and 10 Imperata cylindricas to create more dense enrichment nodes in this heavily degraded edge of the site.</li> </ul> <p><b>Future Works:</b></p> <ul style="list-style-type: none"> <li>• Continued regular yet minimal maintenance of Andropogon virginicus, so as not to drain hours and results from more resilient areas.</li> <li>• Continue seed collection and revegetation, planting endemic canopy and shrub species that are more resistant to harsh conditions and soil compaction, as per most recent planting strategy.</li> </ul> <p><b><u>Assisted Regeneration - Native Vegetation Corridor (NVC)</u></b></p> <p><b>Challenges</b></p> <ul style="list-style-type: none"> <li>• Minor infestations of exotic grasses, namely Andropogon virginicus and Cynodon dactylon var. dactylon</li> <li>• Shrub density of Banksia ericifolia and Grevillea buxifolia threatens the biodiversity of the translocation due to changes in light levels.</li> <li>• Regrowth of mother Melaleuca deanei has come to a standstill but will continue to observe.</li> </ul>	<p><b>See photographs in Slides 50-65</b></p>

	<p><b>Achievements</b></p> <ul style="list-style-type: none"> <li>• Suppression of exotic grasses in translocation, mainly from hand removal of <i>Andropogon virginicus</i> and <i>Cortaderia selloana</i>. Sprayed <i>Cynodon dactylon</i> var. <i>dactylon</i> growing on adjacent sand mounds to prevent it spreading into NVG.</li> <li>• Thinned out dominating shrubs to promote biodiversity, using the excess material to brushmat exposed bare ground on site, aiming to create microclimates that promote further regeneration from the seed bank.</li> <li>• <i>Melaleuca deanei</i> plantings are continuing to go well in the area. Removed some guards and brush matted around the bases.</li> </ul> <p><b>Future Works</b></p> <ul style="list-style-type: none"> <li>• Continue to monitor and suppress exotic grasses</li> <li>• Monitor domineering shrubs and thin/brushmat when deemed necessary</li> </ul> <p><b><u>Rehabilitation of Lot 2</u></b></p> <p><b>Challenges</b></p> <ul style="list-style-type: none"> <li>• Past access to site, working around development of bund that coincided with previous planting window.</li> <li>• Minor regrowth of woody weed infestations.</li> <li>• Ongoing maintenance of exotic grasses and <i>Ageratina adenophora</i> in exposed and/or waterlogged areas</li> </ul> <p><b>Achievements</b></p> <ul style="list-style-type: none"> <li>• Collection of <i>Pultenaea flexilis</i> seed on site, processed at OZ Eco Flora for propagation.</li> <li>• Extended primary works and continued follow up treatment on <i>Lantana camara</i> (lantana) regrowth in order to evict Bell Minors from the area</li> <li>• Suppression of exotic grasses</li> <li>• Planted 200 specimens that included <i>Acacia longifolia</i>, <i>Acacia linifolia</i>, <i>Banksia serrata</i>, <i>Allocasuarina littoralis</i>, <i>Imperata cylindrica</i>, <i>Eucalyptus punctata</i> and <i>Pultenea flexilis</i> seeds that were harvested from Lot 2 and other sites across Dixon Sands.</li> </ul> <p><b>Future Work</b></p> <ul style="list-style-type: none"> <li>• Continued revegetation of exposed areas.</li> <li>• Continued suppression of lantana</li> </ul> <p><b><u>Rehabilitation of Haerses Rd – Old Dam Area</u></b></p> <p><b>Challenges</b></p> <ul style="list-style-type: none"> <li>• Dense lantana infestation</li> <li>• Runoff from surrounding fields</li> </ul> <p><b>Achievements</b></p> <ul style="list-style-type: none"> <li>• Successful reduction and consolidation of lantana infestation</li> </ul>	
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	<p><b>Future Work</b></p> <ul style="list-style-type: none"> <li>Continue to consolidate lantana, in the long term potential to follow up with planting native shrub species.</li> </ul> <p><b><u>Assisted Regeneration - Haerses Road Biodiversity Offset</u></b></p> <p><b>Challenges</b></p> <ul style="list-style-type: none"> <li>Encroachment of exotic grasses along disturbed edges of the site.</li> <li>Minor encroachments of <i>Ageratina adenophora</i> on edges and drainage lines on site</li> </ul> <p><b>Achievements</b></p> <ul style="list-style-type: none"> <li>Successful management of exotic grasses via non-chemical methods, brush-cutting and slashing. Dense native buffer remains in good condition.</li> <li>Continued suppression of <i>Ageratina adenophora</i>, minimal treatments have been required over this period.</li> </ul> <p><b>Future Work</b></p> <ul style="list-style-type: none"> <li>Continue maintenance of exotic grasses on disturbed edges</li> <li>Monitor for reshoots of <i>Ageratina adenophora</i>.</li> <li>Monitor for <i>Pallaea viridis</i> specimens and treat upon sighting.</li> </ul> <p><b><u>Haerses Rd - Translocation</u></b></p> <p><b>Challenges</b></p> <ul style="list-style-type: none"> <li>Infestations of invasive exotic grasses, namely <i>Cynodon dactylon</i> var. <i>Dactylon</i>, <i>Eragrostis curvula</i> and <i>Andropogon virginicus</i>.</li> <li><i>Pallaea viridis</i> specimen was found on site.</li> </ul> <p><b>Achievements</b></p> <ul style="list-style-type: none"> <li>Target-sprayed exotic grasses with 50:1 and 75:1 water:glyphosate for effective treatment.</li> <li>Successfully manual removal of known <i>Pallaea viridis</i> from site.</li> </ul> <p><b>Future Work</b></p> <ul style="list-style-type: none"> <li>Continued treatment of grasses</li> <li>Continue to monitor for <i>Pallaea viridis</i> specimens</li> </ul> <p><b><u>Haerses Rd – Visual buffer along Wisemans Ferry Road</u></b></p> <p><b>Challenges</b></p> <ul style="list-style-type: none"> <li>High proportion of resources required to maintain these areas. Sites on both sides of Hearses Road are highly exposed to invasive species such as <i>Rumex</i></li> </ul>	
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	<p>sagittarius, Cynodon dactylon var. Dactylon and Rubus fruticosus, as well as annuals.</p> <ul style="list-style-type: none"> <li>• Soil quality is degraded</li> </ul> <p><b>Achievements</b></p> <ul style="list-style-type: none"> <li>• Able spray and suppress aforementioned invasive species.</li> <li>• Continued control of Cynodon dactylon var. dactylon in the planting site via careful spray and manual removal. Slashed annuals in the area as well.</li> <li>• Planting continue to succeed and have started to remove guards on fast growing specimens ∅ Planted 50 specimens of Banksia serrata, Acacia longifolia and Imperata cylindrica into site.</li> </ul> <p><b>Future Work</b></p> <ul style="list-style-type: none"> <li>• Continued maintenance of aforementioned invasive species. Potential to supplement plantings again in the future Haerses Rd – Visual buffer along Wisemans Ferry Rd</li> </ul> <p><b>Porters Rd Offset Site</b></p> <ul style="list-style-type: none"> <li>• This site remains in excellent condition and is an ideal reference site for the area.</li> <li>• We successfully collected seed from native shrub and canopy species in the area, which were sent to Oz Eco Flora for propagation. Mainly Banksia, Acacia and Proteaceae species.</li> <li>• Will continue to conduct seed collection.</li> </ul>	
<p><b>BIODIVERSITY AND REHABILITATION (Threatened Species Update)</b></p>	<p>MM provided the following presentation:  <b>Biodiversity and Rehabilitation Annual Report 2024</b></p> <ul style="list-style-type: none"> <li>✚ The Biodiversity and Rehabilitation Annual Report identifies native flora and fauna within the Native Vegetation Corridor and the Haerses Road Biodiversity Offset Area, it monitors the success of the rehabilitation area within the NVC and describes the current condition of threatened flora and fauna and their habitats within the Old Northern Road site and the HRBOA.</li> <li>✚ The 2023 Biodiversity and Rehabilitation Annual Report was completed in September and submitted with the Annual Review on the 30th of September 2024.</li> <li>✚ The results found the rehabilitation areas are thriving and increasing in diversity and density. Ideal growing conditions with favourable temperatures and regular rainfall over the past 4 years has improved the overall biodiversity of all rehabilitation and monitoring sites.</li> <li>✚ Survey work has begun in preparation for the 2024-2025 report.</li> </ul>	<p><b>See Slides 66 – 77 (see photographs )</b></p>

	<p><b>Monitoring Fauna</b> Fauna monitoring is undertaken in the summer months when activity is at the highest and more likely to be observed</p> <ul style="list-style-type: none"> <li>○ Fauna monitoring includes: Recording bat calls via an Anabat sound recorder; The use of unbaited infra-red motion detection cameras on animal trails;</li> <li>○ Looking for scats, prints and other signs such as diggings, scratches, feed scars;</li> <li>○ Aural survey for birds; and</li> <li>○ Visual observation.</li> </ul> <p><b>Monitoring flora</b></p> <ul style="list-style-type: none"> <li>• Flora monitoring is undertaken in the winter months as many of the threatened species are flowering or budding up preparing for early spring flowering</li> <li>• Vegetation quadrats are repeated annually in monitoring locations. Quadrats are 20m x 50m, 20m x 20m and 1m x 1m which record the following information: <ul style="list-style-type: none"> <li>○ Species present and percentage of cover;</li> <li>○ Stem class including recruitments present or absent;</li> <li>○ Number of hollow bearing trees;</li> <li>○ Total length of coarse woody debris;</li> <li>○ Litter cover, rock surface area, bare ground</li> </ul> </li> </ul> <p><b>BCT Reporting</b></p> <p>Annual Management Report for year 5 was completed in March - Passive Management at Haerses Road and Porters Road continues</p>	
<b>GENERAL BUSINESS</b>	<ul style="list-style-type: none"> <li>○ HC showed drone footage of rehabilitation areas.</li> <li>○ LAy thanked Dixon Quarry for the donation to the School.</li> <li>○ FR stated that truck drivers seem to be responding to the signage regarding exhaust brakes. Commenting on a very loud truck at 1am, possibly associated with the roadworks.</li> <li>○ DD spoke about building waste dumped on the side of the road, just before the golf course on the right hand side.</li> </ul>	
<b>NEXT MEETING</b>	Next meeting will be held Wednesday 6 November 2024 as scheduled.	<b>Agreed.</b>

*The meeting was closed at 2:58pm with the chair thanking all members for their attendance.*

**ACTION ITEM:**

NO.	ITEM	RESPONSIBILITY
1	Send out finalised Terms of Reference for CCC to members	LA

## **Appendix K – Complaints Register**

**Dixon Sand Pty Ltd**  
**Old Northern Road Quarry**  
**Complaints Register - Summary**

<b>Period</b>	<b>Number of Complaints received</b>	<b>Complaint Register / Summary Published on Website</b>
July 2023	0	23 August 2023
August 2023	0	4 September 2023
September 2023	0	5 October 2023
October 2023	0	13 November 2023
November 2023	0	19 December 2023
December 2023	0	11 January 2024
January 2024	0	5 February 2024
February 2024	0	25 March 2024
March 2024	0	16 April 2024
April 2024	0	3 May 2024
May 2024	0	6 June 2024
June 2024	0	10 July 2024
<b>Total No. of Complaints</b>	<b>0</b>	

## Appendix L – Waste Register

## Old Northern Road Waste Tracking Register 2023-2024

Date	Waste Type	Amount	Measurement	Contractor	Disposal / Recycle	Receipt No
21/07/2023	Liquid Waste	1200	litres	ABC Waste Oil Collection	Treatment	1732
19/08/2023	Liquid Waste	3000	litres	ABC Waste Oil Collection	Treatment	1743
19/02/2024	Liquid Waste	1500	litres	ABC Waste Oil Collection	Treatment	1898
16/04/2024	Liquid Waste	3000	litres	ABC Waste Oil Collection	Treatment	1904
17/08/2023	Non-Putrescible skip	4	cubic metre	Asquith Mini Skips	Disposal	9676
26/07/2023	Non-Putrescible skip	4	cubic metre	Asquith Mini Skips	Disposal	9662
16/11/2023	Non-Putrescible skip	4	cubic metre	Asquith Mini Skips	Disposal	9710
26/09/2023	Non-Putrescible skip	4	cubic metre	Asquith Mini Skips	Disposal	9700
30/08/2023	Non-Putrescible skip	2	cubic metre	Asquith Mini Skips	Disposal	9684
8/01/2024	Non-Putrescible skip	4	cubic metre	Asquith Mini Skips	Disposal	9730
8/12/2023	Non-Putrescible skip	2	cubic metre	Asquith Mini Skips	Disposal	9722
16/02/2024	Non-Putrescible skip	4	cubic metre	Asquith Mini Skips	Disposal	9742
30/04/2024	Non-Putrescible skip	4	cubic metre	Asquith Mini Skips	Disposal	9785
8/03/2024	Non-Putrescible skip	2	cubic metre	Asquith Mini Skips	Disposal	9756
28/03/2024	Non-Putrescible skip	4	cubic metre	Asquith Mini Skips	Disposal	9772
3/06/2024	Non-Putrescible skip	6	cubic metre	Asquith Mini Skips	Disposal	9798
28/06/2024	Non-Putrescible skip	4	cubic metre	Asquith Mini Skips	Disposal	9814
01/07/23 - 30/06/24	General Solid Waste - recyclable	12.48	cubic metre	Council Waste Contractor	Recycle	Council Rate
01/07/23 - 30/06/24	Genral Solid Waste - putrescible	37.44	cubic metre	Council Waste Contractor	Disposal	Council Rate
5/07/2023	Hydrocarbon waste	300	litres	Greaseaters	Treatment	96205
31/07/2023	Hydrocarbon waste	300	litres	Greaseaters	Treatment	96508
28/08/2023	Hydrocarbon waste	300	litres	Greaseaters	Treatment	96746
26/09/2023	Hydrocarbon waste	300	litres	Greaseaters	Treatment	97047
23/10/2023	Hydrocarbon waste	300	litres	Greaseaters	Treatment	97344
20/11/2023	Hydrocarbon waste	300	litres	Greaseaters	Treatment	97595
18/12/2023	Hydrocarbon waste	300	litres	Greaseaters	Treatment	97888
15/01/2024	Hydrocarbon waste	300	litres	Greaseaters	Treatment	98196
12/02/2024	Hydrocarbon waste	300	litres	Greaseaters	Treatment	98444
13/03/2024	Hydrocarbon waste	300	litres	Greaseaters	Treatment	98758
11/04/2024	Hydrocarbon waste	300	litres	Greaseaters	Treatment	99079
7/05/2024	Hydrocarbon waste	300	litres	Greaseaters	Treatment	99369
5/06/2024	Hydrocarbon waste	300	litres	Greaseaters	Treatment	99629
01/07/23 - 30/06/24	Printer Ink Catridge	0.1	cubic metre	Post Office or Officeworks	Disposal	N/A
11/07/2023	Scrap Metal	8.6	tonne	Westland Metals	Recycle	N/A
6/10/2023	Scrap Metal	11.54	tonne	Westland Metals	Recycle	N/A
15/11/2023	Scrap Metal	6.64	tonne	Westland Metals	Recycle	N/A
28/11/2023	Scrap Metal	6.72	tonne	Westland Metals	Recycle	N/A
19/12/2023	Scrap Metal	12.1	tonne	Westland Metals	Recycle	N/A
12/02/2024	Scrap Metal	8.26	tonne	Westland Metals	Recycle	N/A
12/03/2024	Scrap Metal	9.1	tonne	Westland Metals	Recycle	N/A
15/05/2024	Scrap Metal	6.06	tonne	Westland Metals	Recycle	N/A
30/05/2024	Scrap Metal	6.82	tonne	Westland Metals	Recycle	N/A
12/06/2024	Scrap Metal	3.13	tonne	Westland Metals	Recycle	N/A
1/7/23 - 30/6/24	Sewage	As per manufacturer's specification		Onsite treatment	Treatment	N/A
01/07/23 - 30/06/24	Coffee Pods	<0.1	cubic metre	Return to manufacturer for recycling and composting	Recycle	N/A

Total	Scrap Metal	78.97	tonnes
	Non-Putrescible	48	m3
	Hydrocarbon waste	3900	litres
	Council Putrescible	37	m3
	Council Recycle	12	m3
	Printer Ink Catridge	0.1	m3
	Liquid Waste	8700	litres
	Coffee Pods	<0.1	m3
	Sewage	As per manufacturer's specification	

End of document