

HAERSES ROAD QUARRY

AIR QUALITY MANAGEMENT PLAN

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Version V3

Client: Dixon Sand (No. 1) Pty Ltd

Prepared by: Project Environmental Services Pty Ltd

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Document Control

Revision No.	Reviewer		Approved for Issue		Comments
	Name	Date	Name	Date	
Umwelt V1 to V3					AQMP versions V1 (Jun 2018) to V3 (Apr 2020) previously composed in Umwelt Pty Ltd document template.
PES V1	Hunny Churcher	25/11/2021	Mark Dixon	26/11/2021	The contents of AQMP V3 (Apr 2020) were transferred to PES document template. The AQMP was reviewed and revised to address the requirements of DA Modifications 3 and 4 consent conditions.
PES V2	Hunny Churcher	16/11/2022	Mark Dixon	16/11/2022	Update to address the requirements of DA Modification 5.
PES V2.1	Hunny Churcher	20/01/2023	Mark Dixon	20/01/2023	Addressed DPE's RFI (dated 22/12/2022)
PES V3	Hunny Churcher	12/01/2024	David Dixon	12/01/2024	Update to address the requirements of DA Modification 6.

Table of Contents

1.0	Introduction.....	1
1.1	Background.....	1
1.2	Purpose and Scope.....	1
1.3	Development Consent Conditions.....	4
1.3.1	EIS Environmental Management Commitments	6
2.0	Regulatory Requirements.....	8
2.1	Environmental Protection Licence.....	8
2.2	Stakeholder Consultation	11
2.3	Guidelines, Policies and Standards.....	11
2.4	Further Studies.....	11
2.5	Hold Points.....	11
3.0	Existing Air Quality Environment	13
3.1	Sensitive Receivers.....	13
3.2	Ambient Air Quality Levels	13
3.3	Climatic Data.....	13
3.4	Proposed Operation Emission Sources.....	13
4.0	Air Quality Assessment Criteria	15
4.1	Pollutant Criteria and Trigger Values.....	16
5.0	Air Quality and Greenhouse Gas Management Measures	18
5.1	Environmental Inspections	18
5.1.1	Training and Awareness	20
5.2	Reactive Management Measures.....	20
6.0	Air Quality Monitoring	23
6.1	Dust Deposition and PM ₁₀ Monitoring Locations.....	23
6.2	Total Suspended Particles (TSP) Monitoring	24
6.3	Meteorological Monitoring	24
6.4	Monitoring Standards	24
6.5	Monitoring Records.....	25
7.0	Reporting.....	28
7.1	External Reporting.....	28
7.2	Air Quality Criteria Exceedance Reporting.....	28
7.3	Adaptive Management	28
7.4	Community Complaints	29
7.5	Independent Review.....	29
8.0	Review and Improvement.....	30
9.0	Responsibilities.....	31
10.0	Definitions.....	32
11.0	References	33

Figures

Figure 1.1 Locality Plan	2
Figure 1.2 Haerses Road Quarry	3
Figure 6.1 Quality Monitoring Locations	27

Tables

Table 1.1: Development Consent Conditions	4
Table 1.2: Relevant EIS, EA and MR Air Quality Management Commitments.....	6
Table 2.1: Relevant Environment Protection Licence Conditions.....	8
Table 4.1: Air Quality Criteria.....	15
Table 6.1: Dust Deposition and PM ₁₀ Monitoring Locations.....	23
Table 6.2: Meteorological Monitoring Parameters and Methods.....	24
Table 6.3: Location of EPA Identified Monitoring Points (as per condition P1.1 of the EPL) and their Position on Site at Haerses Road Quarry.....	25
Table 9.1: Roles and Responsibilities.....	31
Table 10.1: Definitions.....	32

Appendices

Appendix 1	Plan Preparation Checklist and Certification
Appendix 2	Stakeholder Consultation

1.0 Introduction

1.1 Background

Dixon Sand (No. 1) Pty Limited (Dixon Sand) operates the Haerses Road Quarry (the Quarry) located on Haerses Road at Maroota, New South Wales (NSW) (refer to **Figure 1.1**), a sand extraction and processing operation. The Quarry has been in operation since 2006. The site is approximately 71 hectares (ha) and includes 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 (refer to **Figure 1.2**). The Quarry is located in the small rural community of Maroota which supports a number of other sand extraction operations, including the Old Northern Road Quarry which is also operated by Dixon Sand. The Quarry supplies concrete sand and specialty sands to the Sydney metropolitan market.

The Quarry operates in accordance with Development Consent (DA 165-7-2005) by the Minister for Planning on 14 February 2006. The following Modifications to the Development Consent have been approved:

- Modification 1 under Section 75W of the *Environmental Planning and Assessment Act 1979* (EP&A Act) on 22 January 2018,
- Modification 2 under Section 4.55(A) of the EP&A Act on 29 January 2019,
- Modification 4 under Sections 4.15(1) and 4.55(1A) of the EP&A Act on 29 June 2021,
- Modification 3 under Section 4.55 of the EP&A Act on 23 July 2021,
- Modification 5 under Section 4.55(1A) of the EP&A Act on 29 June 2022, and
- Modification 6 under Section 4.55(1A) of the EP&A Act on 9 September 2023.

The Development Consent permits the extraction and processing of 495,000 tonnes per annum (tpa). Transport of up to 190,000 tpa of quarry product to the Old Northern Road Quarry for processing, located approximately 2 kilometres (km) to the north, is permitted. A total of 250,000 tonnes of Virgin Excavated Natural Material and/or Excavated Natural Material (VENM / ENM) may be imported into the Quarry for rehabilitation and/or processing in each calendar year. A total of 180 daily truck movements (either arrival or dispatch, and includes transfers between Haerses Road and Old Northern Road quarries) is permitted. Of the total daily truck movement limit, 20 truck movements (arrival or dispatch) is permitted between 6:00 and 7:00 am.

The Development Consent permits quarrying operations to be carried out on site until 14 February 2046.

1.2 Purpose and Scope

The purpose of this Air Quality Management Plan (AQMP) is to describe the air quality management strategies, procedures, controls and monitoring programs to be implemented for the management of potential air quality impacts arising from the operation of the Quarry.

This AQMP applies to 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 as shown on **Figure 1.2**.

This AQMP addresses the relevant requirements of the Development Consent and Environment Protection Licence (EPL) 12513. The Development Consent conditions and related Environmental Impact Statement (EIS) (ERM, 2005), Environmental Assessment (EA) (Umwelt, 2016), Modification Report (MR) Mod 3 (Umwelt, 2019), MR Mod 4 (Umwelt, 2020), MR Mod 5 (Umwelt, 2022) and MR Mod 6 (Umwelt, 2023) management commitments relevant to this plan are provided in **Section 2.1**. EPL conditions relevant to this plan are provided in **Section 2.2**.

This plan also outlines the control and contingency measures to be implemented as part of the continued operations at the Quarry to minimise the potential impacts on local air quality. This AQMP has been developed in accordance with the requirements of the Department of Planning and Environment's (DPE) *Environment Management Plan Guidelines: Draft* (the guidelines). A checklist of where each condition has been addressed within this document is shown in **Appendix 1**.

Figure 1.1 Locality Plan

Figure 1.2 Haerses Road Quarry – update this figure

1.3 Development Consent Conditions

Table 1.1 identifies the air quality related Development Consent conditions and where they have been addressed within this AQMP.

Table 1.1: Development Consent Conditions

Condition	Description	Section/s Addressed															
Schedule 3 – Specific Environmental Conditions																	
Air Quality Impact Assessment Criteria																	
9	<p>The Applicant must ensure that particulate matter emissions generated by the development do not cause exceedances of the criteria in Table 3 at any residence on privately-owned land.</p> <p><i>Table 3: Air quality criteria</i></p> <table border="1"> <thead> <tr> <th>Pollutant</th> <th>Averaging Period</th> <th>Criterion</th> </tr> </thead> <tbody> <tr> <td>Particulate matter < 10 µm (PM₁₀)</td> <td>Annual</td> <td>a,d 30 µg/m³</td> </tr> <tr> <td>Particulate matter < 10 µm (PM₁₀)</td> <td>24 hour</td> <td>b 50 µg/m³</td> </tr> <tr> <td>Total suspended particulates (TSP)</td> <td>Annual</td> <td>a,d 90 µg/m³</td> </tr> <tr> <td>^c Deposited dust</td> <td>Annual</td> <td>b 2 g/m²/month a,d 4 g/m²/month</td> </tr> </tbody> </table> <p>Notes to Table 3:</p> <p><i>a Cumulative impact (ie increase in concentrations due to the development plus background concentrations due to all other sources).</i></p> <p><i>b Incremental impact (ie increase in concentrations due to the development alone, with zero allowable exceedances of the criteria over the life of the development.</i></p> <p><i>c Deposited dust is to be assessed as insoluble solids as defined by Standards Australia, AS/NZS 3580.10.1:2003: Methods for Sampling and Analysis of Ambient Air - Determination of Particulate Matter - Deposited Matter - Gravimetric Method.</i></p> <p><i>d Excludes extraordinary events such as bushfires, prescribed burning, dust storms, sea fog, fire incidents or any other activity agreed by the Secretary.</i></p>	Pollutant	Averaging Period	Criterion	Particulate matter < 10 µm (PM ₁₀)	Annual	a,d 30 µg/m ³	Particulate matter < 10 µm (PM ₁₀)	24 hour	b 50 µg/m ³	Total suspended particulates (TSP)	Annual	a,d 90 µg/m ³	^c Deposited dust	Annual	b 2 g/m ² /month a,d 4 g/m ² /month	Section 4.0
Pollutant	Averaging Period	Criterion															
Particulate matter < 10 µm (PM ₁₀)	Annual	a,d 30 µg/m ³															
Particulate matter < 10 µm (PM ₁₀)	24 hour	b 50 µg/m ³															
Total suspended particulates (TSP)	Annual	a,d 90 µg/m ³															
^c Deposited dust	Annual	b 2 g/m ² /month a,d 4 g/m ² /month															
Operating Conditions																	
10	<p>The Applicant must:</p> <p>(a) implement best practice management to minimise the dust emissions of the development;</p> <p>(b) operate a continuous monitoring system to minimise air quality impacts at sensitive sites such as the Maroota Public School, including:</p> <ul style="list-style-type: none"> • a monitoring device that is connected to an alarm system at the site; • trigger level(s) as agreed with the EPA; and • procedures to cease or modify operations in the event that the trigger level(s) are reached, to ensure compliance with the criteria in condition 9 above, to the satisfaction of the EPA; 	Whole Document															

Condition	Description	Section/s Addressed
	(c) regularly assess meteorological and air quality monitoring data on an ongoing basis and relocate, modify and/or stop operations on site to ensure compliance with the air quality criteria in this consent; (d) minimise the air quality impacts of the development during adverse meteorological conditions and extraordinary events (see note d under Table 3); (e) monitor and report on compliance with the relevant air quality conditions in this consent; and (f) minimise the area of surface disturbance and undertake progressive rehabilitation of the site, to the satisfaction of the Secretary.	
Air Quality Management Plan (AQMP)		
11	The Applicant must prepare an AQMP for the development to the satisfaction of the Secretary. This plan must: <ul style="list-style-type: none"> (a) be prepared in consultation with the EPA; (b) be submitted to the Secretary for approval within 6 months of the determination of Modification 1, unless otherwise agreed by the Secretary; (c) describe the measures to be implemented to ensure: <ul style="list-style-type: none"> • compliance with the air quality criteria and operating conditions of this consent; • best practice management is being employed; and • the air quality impacts of the development are minimised during adverse meteorological conditions and extraordinary events; (d) describe the proposed air quality management system; and (e) include an air quality monitoring program that: <ul style="list-style-type: none"> • is capable of evaluating the performance of the development and informing day to day operational decisions; • includes a protocol for determining any exceedances of the relevant conditions of this consent; and • effectively supports the air quality management system; (f) include a program to implement the air quality emissions controls detailed in MR (Mod 3), including sealing the Quarry Access Road between Wisemans Ferry Road and the processing plant. Relevant controls must be implemented before: <ul style="list-style-type: none"> • any increase in extractive operations above 250,000 tonnes of product per year; and • the commencement of quarrying operations in Stages 4 or 5. (g) describe the mitigation measures that will be implemented in the sandstone cutting shed during the processing of extracted sandstone and detail how these measures will achieve compliance with the air quality criteria in this consent at all times; and 	Whole Document

Condition	Description	Section/s Addressed
	(h) describe the mitigation measures that will be implemented in the operation of plant and equipment to minimise dust emissions from sandstone cutting to ensure compliance with the air quality criteria in this consent at all times. The Applicant must implement the AQMP as approved by the Secretary.	
Meteorological Monitoring		
12	For the life of the development, the Applicant must ensure that there is a suitable meteorological station operating in the vicinity of Maroota Public School that: (a) complies with the requirements in the <i>Approved Methods for Sampling and Analysis of Air Pollutants in New South Wales</i> (DEC, 2007); and ... unless a suitable alternative is approved by the Planning Secretary following consultation with the EPA.	Section 6.0
Greenhouse Gas Emissions		
13	The Applicant must implement all reasonable and feasible measures to minimise the release of greenhouse gas emissions from the site.	Section 5.0

1.3.1 EIS Environmental Management Commitments

Condition 2 Schedule 2 of the Development Consent stipulates that the Quarry must be developed and operated generally in accordance with the EIS (ERM, 2005), EA Mod 1 (Umwelt, 2016), EA Mod 2 (Umwelt, 2018), MR Mod 3 (Umwelt, 2019), MR Mod 5 (Umwelt, 2022) and MR Mod 6 (Umwelt, 2023) prepared for the development.

Table 1.2 summarises the management commitments relating to air quality and greenhouse gas management that have been identified in the EIS (ERM, 2005), EA Mod 1 (Umwelt, 2016), EA Mod 2 (Umwelt, 2018), MR Mod 3 (Umwelt, 2019) and MR Mod 5 (Umwelt, 2022).

Table 1.2: Relevant EIS, EA and MR Air Quality Management Commitments

Source	Description	Section/s Addressed
EIS Section 6.7.4 (ERM, 2005)	The maximum area exposed on any one day is anticipated to be three strips (with a total area of 12 ha) in each of two stages (Stage 1 and one of Stage 2, 3, 4 or 5). The maximum area exposed at any one time is therefore estimated to be 24 ha.	Section 5.0
	Raw material will be stockpiled on the quarry floor, with the stockpile having an approximate diameter of 40 metres (m) and height of 10 m. This stockpile will be the equivalent of 2 to 3 days' worth of material.	Section 5.0
	Haul roads will be watered.	Section 5.0
	Haerses Road is to be used as an internal haulage road for the proposed development and will consist of 300 m of sealed road and approximately 900 m of unsealed road. The two stages modelled (Stage 1 and Stage 5) will be	Section 5.0

Source	Description	Section/s Addressed
	<p>accessed by the paved section and approximately 350 m of the unpaved length of Haerses Road.</p> <p>Note this commitment has been superseded by Modification 5</p>	
<p>EIS Section 7.2.2 (ERM, 2005)</p>	<p>Air Quality</p> <p>Air quality mitigation measures include:</p> <ul style="list-style-type: none"> • minimising exposed areas and disturbance as much as practicable; • progressive rehabilitation of extracted areas; • regular emissions monitoring to provide relevant data and alert operators to faulty or poorly functioning equipment; • dust mitigation measures including: <ul style="list-style-type: none"> - watercart (3 to 4 trips in dry weather, up to 6 to 8 in dry/windy weather); - seeding of any stockpiles present for more than four months; and - progressive rehabilitation to agricultural use. • limiting traffic disturbances of exposed surfaces ie traffic constrained to designated roads; • the use of chemical stabilisation on roads if further control is required; and • the regular tuning and maintenance of equipment will be carried out to reduce greenhouse gas emissions. 	<p>Section 5.0</p>
<p>EA Section 6.6.1 (Umwelt, 2016)</p>	<p>Dixon Sand measures particulate matter at Maroota Public School approximately 2 km north of the Haerses Road Quarry, and dust deposition on site at the Quarry. There are also several other dust deposition monitoring locations in the local area associated with other quarries.</p>	<p>Section 6.0</p>
<p>EA Section 6.6.5 (Umwelt, 2016)</p>	<p>The following air quality management measures will continue to be implemented at the site as part of the Modification:</p> <ol style="list-style-type: none"> a) use of a water cart to control emissions from haul roads (unsealed) b) enforcement of speed limits onsite c) progressive rehabilitation of exposed areas d) minimising drop height of material during truck loading and unloading where possible e) management of dust generating activities during unfavourable meteorological conditions. 	<p>Section 5.0</p>
<p>EA Section 6.13.6 (Umwelt, 2016)</p>	<p>Dixon Sand will review opportunities for diesel use efficiency when purchasing or replacing equipment at the Quarry and will appropriately maintain all equipment to provide for efficient operations.</p>	<p>Section 5.0</p>
<p>MR Mod 3 Section 8.0 (Umwelt, 2019)</p>	<p>Air Quality</p> <ul style="list-style-type: none"> • Continue to implement the <i>Air Quality Management Plan (2019)</i> • Use of a water cart to control emissions from haul roads (unsealed) • Enforcement of speed limits onsite • Progressive rehabilitation of exposed areas 	<p>Section 5.0</p>

Source	Description	Section/s Addressed
	<ul style="list-style-type: none"> Minimising drop height of material during truck loading and unloading where possible Management of dust-generating activities during unfavourable meteorological conditions. 	
MR Mod 5 Table B1, Appendix B (Umwelt, 2022)	Air Quality <ul style="list-style-type: none"> Continue to implement the latest <i>Air Quality Management Plan</i> approved by the Secretary Use of a water cart to control emissions from haul roads (unsealed) Enforcement of speed limits onsite Progressive rehabilitation of exposed areas Minimising drop height of material during truck loading and unloading where possible Management of dust-generating activities during unfavourable meteorological conditions. 	Section 5.0

2.0 Regulatory Requirements

2.1 Environmental Protection Licence

Air quality monitoring will be undertaken in accordance with the conditions of EPL 12513. The EPL was issued by the Environment Protection Authority (EPA) under the *Protection of the Environment Operations Act 1997* (POEO Act) for sand extraction operations at Haerses Road and intersection of Wisemans Ferry Road, Maroota NSW 2756.

A list of the EPL conditions relating to air quality monitoring and an indication of where they are addressed within this document are included in **Table 2.1**.

Table 2.1: Relevant Environment Protection Licence Conditions

Condition	Description	Section/s Addressed
O3.1	All operations and activities occurring at the premises must be carried out in a manner that will minimise the emission of dust from the premises.	Section 5.0
O3.2	Trucks entering and leaving the premises that are carrying loads must be covered at all times, except during loading and unloading.	Section 5.0
O3.3	The licensee must maintain and operate a continuous dust monitoring device at Point 1 identified in condition P1.1 of this licence. The device must be fitted with an automatic alarm system alerting quarry managers once the trigger value for PM ₁₀ (42 µg/m ³) is reached.	Sections 2.6, 5.0 and 6.0
O3.4	Dust deposition gauges installed at the site must be operated and maintained in accordance with the current Australian Standard: <i>Ambient Air – Particulate</i>	Section 6.0

Condition	Description	Section/s Addressed																				
	<i>matter Determination of deposited matter expressed as insoluble solids, ash, combustible matter, soluble solids and total solids for deposition gauges.</i>																					
O3.5	The licensee must maintain and operate a continuous automatic meteorological station at monitoring Point 2 of the licence according to the requirements of the current Australian Standard: Ambient air – <i>Guide for measurement of horizontal wind for air quality applications</i> . Wind monitoring components of the meteorological station must be interfaced with the continuous dust monitoring device identified in condition P1.1.	Sections 2.6, 5.0 and 6.0																				
O3.6	The licensee must ensure that the dust generated by the development does not cause any additional exceedances of the air quality impact assessment criteria listed in the table below at any residence on privately owned land, listed in condition L3.1. Note: Deposited dust is assessed as insoluble solids as defined by Standards Australia AS 3580.10.1, Methods for Sampling and Analysis of Ambient Air – Determination of Particulates – Deposition Matter – Gravimetric Methods.	Sections 4.0 and 5.0																				
	<table border="1"> <thead> <tr> <th>Pollutant</th> <th>Averaging period</th> <th>Reference Condition</th> <th>Criterion</th> </tr> </thead> <tbody> <tr> <td>Total suspended particulate (TSP)</td> <td>Annual</td> <td>Long term</td> <td>90 ug/m3</td> </tr> <tr> <td>Particulate matter <10 um (PM10)</td> <td>Annual</td> <td>Long term</td> <td>30 ug/m3</td> </tr> <tr> <td>Particulate matter <10 um (PM10)</td> <td>24 hour</td> <td>Short term</td> <td>50 ug/m3</td> </tr> <tr> <td>Deposited dust</td> <td>Annual</td> <td>Long term</td> <td>4g/m2/month (max total) 2g/m2/month (max increase)</td> </tr> </tbody> </table>	Pollutant	Averaging period	Reference Condition	Criterion	Total suspended particulate (TSP)	Annual	Long term	90 ug/m3	Particulate matter <10 um (PM10)	Annual	Long term	30 ug/m3	Particulate matter <10 um (PM10)	24 hour	Short term	50 ug/m3	Deposited dust	Annual	Long term	4g/m2/month (max total) 2g/m2/month (max increase)	
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Deposited dust	Annual	Long term	4g/m2/month (max total) 2g/m2/month (max increase)																			
M1.4	The licensee must keep in an electronic format the following records for monitoring Point 1 identified in licence condition P1.1: (a) each 15 minute PM ₁₀ result; (b) each rolling 24-hour average PM ₁₀ results (15 minutes); (c) each daily 24-hour average PM ₁₀ result (midnight to midnight); and (d) the rolling annual average PM ₁₀ result (each day, midnight to midnight, and over the total number of days of monitoring since monitoring began for first year of monitoring only).	Section 6.5																				
M1.5	The licensee must keep in an electronic format the following records for Point 2 identified in licence condition P1.2: each 15 minute, 1 hour and 24 hour result as indicated in the table at condition M4.1.	Section 6.5																				
M2.1 and M2.2	For each monitoring/discharge point or utilisation area specified below (by a point number), the licensee must monitor (by sampling and obtaining results by analysis) the concentration of each pollutant specified in Column 1. The licensee must use the sampling method, units of measure, and sample at the frequency, specified in the other columns: Air Monitoring Requirements POINT 1 <table border="1"> <thead> <tr> <th>Pollutant</th> <th>Units of measure</th> <th>Frequency</th> <th>Sampling Method</th> </tr> </thead> <tbody> <tr> <td>PM10</td> <td>micrograms per cubic metre</td> <td>Continuous</td> <td>Australian Standard 3580.9.8 - 2001</td> </tr> </tbody> </table>	Pollutant	Units of measure	Frequency	Sampling Method	PM10	micrograms per cubic metre	Continuous	Australian Standard 3580.9.8 - 2001	Section 6.0												
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PM10	micrograms per cubic metre	Continuous	Australian Standard 3580.9.8 - 2001																			

Condition	Description	Section/s Addressed																														
M2.3	<p>If any rolling 24-hour average PM₁₀ result measured at Point 1 in licence condition M2.2 is found to be greater than 42 µg/m³ and the prevailing wind at the site is between 180 and 240 degrees as measured at Point 2:</p> <ul style="list-style-type: none"> i) the licensee must take immediate action to reduce its PM₁₀ emissions; ii) the licensee must immediately notify the EPA Manager Sydney Industry; iii) if the dust level does not return to below 42 µg/m³ within 1 hour then all dust generating activity on site must stop; and, iv) dust generating activity may only recommence when the rolling 24-hour average PM₁₀ result measured at Point 1 is less than 42 µg/m³ for four consecutive 15-minute periods. 	Sections 5.0 and 7.0																														
M2.4	A comprehensive written action plan must be developed and implemented to ensure compliance with condition M2.3.	Whole Document																														
M3.1	<p>Note: The <i>Protection of the Environment Operations (Clean Air) Regulation 2021</i> requires testing for certain purposes to be conducted in accordance with test methods contained in the publication "Approved Methods for the Sampling and Analysis of Air Pollutants in NSW".</p> <p>Monitoring for the concentration of a pollutant emitted to the air required to be conducted by this licence must be done in accordance with:</p> <ul style="list-style-type: none"> a) any methodology which is required by or under the Act to be used for the testing of the concentration of the pollutant; or b) if no such requirement is imposed by or under the Act, any methodology which a condition of this licence requires to be used for that testing; or c) if no such requirement is imposed by or under the Act or by a condition of this licence, any methodology approved in writing by the EPA for the purposes of that testing prior to the testing taking place. 	Section 6.0																														
M4.1	<p>At the point(s) identified below, the licensee must monitor (by sampling and obtaining results by analysis) the parameters specified in Column 1 of the table below, using the corresponding sampling method, units of measure, averaging period and sampling frequency, specified opposite in the Columns 2, 3, 4 and 5 respectively.</p> <p>Weather monitoring</p> <p>POINT 2</p> <table border="1" data-bbox="475 1505 1264 1720"> <thead> <tr> <th>Parameter</th> <th>Sampling method</th> <th>Units of measure</th> <th>Averaging period</th> <th>Frequency</th> </tr> </thead> <tbody> <tr> <td>Temperature at 10 metres</td> <td>AM-4</td> <td>degrees Celsius</td> <td>1 hour</td> <td>Continuous</td> </tr> <tr> <td>Wind Direction at 10 metres</td> <td>AM-2 & AM-4</td> <td>-</td> <td>15 minutes</td> <td>Continuous</td> </tr> <tr> <td>Wind Speed at 10 metres</td> <td>AM-2 & AM-4</td> <td>metres per second</td> <td>15 minutes</td> <td>Continuous</td> </tr> <tr> <td>Sigma Theta</td> <td>AM-2 & AM-4</td> <td>-</td> <td>15 minutes</td> <td>Continuous</td> </tr> <tr> <td>Rainfall</td> <td>AM-4</td> <td>millimetres</td> <td>24 hours</td> <td>Continuous</td> </tr> </tbody> </table>	Parameter	Sampling method	Units of measure	Averaging period	Frequency	Temperature at 10 metres	AM-4	degrees Celsius	1 hour	Continuous	Wind Direction at 10 metres	AM-2 & AM-4	-	15 minutes	Continuous	Wind Speed at 10 metres	AM-2 & AM-4	metres per second	15 minutes	Continuous	Sigma Theta	AM-2 & AM-4	-	15 minutes	Continuous	Rainfall	AM-4	millimetres	24 hours	Continuous	Section 6.0
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Temperature at 10 metres	AM-4	degrees Celsius	1 hour	Continuous																												
Wind Direction at 10 metres	AM-2 & AM-4	-	15 minutes	Continuous																												
Wind Speed at 10 metres	AM-2 & AM-4	metres per second	15 minutes	Continuous																												
Sigma Theta	AM-2 & AM-4	-	15 minutes	Continuous																												
Rainfall	AM-4	millimetres	24 hours	Continuous																												

2.2 Stakeholder Consultation

In accordance with Condition 11 Schedule 3 of the Development Consent, this AQMP has been prepared in consultation with the EPA. A copy of correspondence provided by the EPA and a summary of how these issues have been addressed is provided in **Appendix 2**.

2.3 Guidelines, Policies and Standards

Dixon Sand will manage air quality from operations and undertake environmental monitoring in accordance with the following guidelines, policies and standards applicable to air quality management at the Quarry:

- *Approved methods for the sampling and analysis of air pollutants in NSW (State of NSW and NSW EPA, 2022)*
- *Protection of the Environment Operations (Clean Air) Regulation 2022*
- AS/NZS 3580.14:2014: Methods for Sampling and Analysis of Ambient Air – Meteorological Monitoring for Ambient Air Quality Monitoring Applications.
- AS/NZS 3580.10.1:2016: Methods for Sampling and Analysis of Ambient Air - Determination of Particulate Matter - Deposited Matter - Gravimetric Method.

2.4 Further Studies

There are no requirements under the Development Consent to undertake any further studies relevant to this AQMP.

2.5 Hold Points

There are three hold points within the Development Consent and EPL with respect to air quality monitoring and management.

Hold Point 1 - completed

Condition O3.3 of the EPL requires Dixon Sand to maintain and operate a continuous dust monitoring device at Point 1 identified in condition P1.1 of the EPL. The continuous dust monitoring device must be fitted with an automatic alarm system alerting the Quarry staff once the trigger value for PM₁₀ (42 µg/m³) is reached. Condition 10(b) Schedule 3 of the Development Consent also requires Dixon Sand to operate a monitoring device that is connected to an alarm system at the site.

Hold Point 2 - completed

Condition 12 Schedule 3 of the Development Consent and Condition O3.5 of the EPL specify that Dixon Sand must maintain and operate a continuous automatic meteorological station in the vicinity of Maroota Public School (monitoring Point 2, identified in condition P1.2 of the EPL).

Both of these hold points are complete. A weather station and Tapered Element Oscillating Microbalance (TEOM) monitoring station were installed in 2004, and these continue to operate near Maroota Public School (refer to **Figure 6.1** and **Table 6.3**).

Hold Point 3 - completed

Condition 11 Schedule 3 of the Development Consent specify that the Quarry Access Road between Wisemans Ferry Road and the processing plant be sealed before:

- Any increase in extractive operations above 250,000 tonnes of product per year; and
- The commencement of quarrying operations in Stages 4 or 5.

3.0 Existing Air Quality Environment

The Quarry is located in an area that is primarily rural, although significant sand extraction activity is also taking place in the area both by Dixon Sand and other companies (MR Mod 3, 2019).

3.1 Sensitive Receivers

The closest sensitive receptor locations are presented in **Figure 6.1**. These residential receivers (some of which are owned by Dixon Sand) represent assessment locations in close proximity to the Quarry (MR Mod 3, 2019)

3.2 Ambient Air Quality Levels

Background air quality levels surrounding the Quarry were established as part of the Air Quality Assessment completed for the EA (Pacific Environment Limited, 2016), in general accordance with the Approved Methods of Modelling and Assessment of Air Pollutants in NSW.

For the purpose of assessing potential air quality impacts, the following existing air quality levels were assumed (MR Mod 3, 2019):

- annual average PM₁₀ concentration of 13.8 µg/m³
- annual average TSP concentration of 34.5 µg/m³
- annual average PM_{2.5} concentration of 5.7 µg/m³
- annual average dust deposition of 1.5 g/m²/month

3.3 Climatic Data

Wind speed and direction data collected locally at the Maroota Public School in 2017 show predominant winds are from the north, east and south-west quadrants and are generally light with an average wind speed of 1.2 m/s. There is also a relatively high percentage of calms (wind speeds below 0.5 m/s) at 17.3% (MR Mod 3, 2019).

3.4 Proposed Operation Emission Sources

Proposed operation emission sources include (Pacific Environment 2016 and Umwelt 2022):

- dozer/excavator/loader clearing vegetation/topsoil;
- dozer ripping sandstone;
- excavator cutting sandstone
- sandstone cutting operation in the designated sandstone cutting shed
- dozer/loader for overburden shaping;

- excavator/loader for excavation of raw material;
- front end loader stockpiling raw material;
- front end loader loading road trucks in extraction cells;
- hauling on unsealed roads from extraction cells to sealed road;
- hauling product on sealed access road to processing plant and/or to market;
- dry processing (crushing/screening);
- wind erosion from active extraction cells, areas yet to be rehabilitated and active stockpiles; and
- rehabilitation and placement of VENM/ENM in the disturbed areas.

4.0 Air Quality Assessment Criteria

Air quality criteria for the Quarry are established by Condition 9 Schedule 3 of the Development Consent and condition O3.6 of the EPL. The criteria are consistent between the Development Consent and EPL and are provided in **Table 4.1**.

Table 4.1: Air Quality Criteria

Pollutant	Averaging Period	Criterion
Particulate matter < 10 µm (PM ₁₀)	Annual	^{a,d} 30 µg/m ³
Particulate matter < 10 µm (PM ₁₀)	24 hour	^b 50 µg/m ³
Total suspended particulate (TSP) matter	Annual	^{a,d} 90 µg/m ³
^c Deposited dust	Annual	^b 2 g/m ² /month ^{a,d} 4 g/m ² /month

Notes to Table 4.1:

^a Cumulative impact (ie increase in concentrations due to the development plus background concentrations due to all other sources).

^b Incremental impact (ie increase in concentrations due to the development alone, with zero allowable exceedances of the criteria over the life of the development).

^c Deposited dust is to be assessed as insoluble solids as defined by Standards Australia, AS/NZS 3580.10.1:2003: Methods for Sampling and Analysis of Ambient Air - Determination of Particulate Matter - Deposited Matter - Gravimetric Method. (Note that this standard has been superseded by AS/NZS 3580.10.1:2016)

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

In accordance with condition O3.6 of the EPL, Dixon Sand must ensure that the dust generated by the development does not cause any additional exceedances of the air quality impact assessment criteria (listed above in **Table 4.1**) at any residence on any privately owned land listed in condition L3.1 (refer to **Table 4.2** below).

Table 4.2: Location of Residences on Privately Owned Land as per MR Mod 3 (Umwelt, 2019).

Receiver	Location
R1	1710 Wisemans Ferry Road
R2	1700 Wisemans Ferry Road
R3	1643 Wisemans Ferry Road
R4	1617 Wisemans Ferry Road

R5	1579 Wisemans Ferry Road
R6	1543 Wisemans Ferry Road
R7	1539 Wisemans Ferry Road
R8	1521 Wisemans Ferry Road
R9	1517 Wisemans Ferry Road
R10	1499 Wisemans Ferry Road
R11	1487 Wisemans Ferry Road
R12	1725 Wisemans Ferry Road
R13	1728 Wisemans Ferry Road
R14	1638 Wisemans Ferry Road
R15	1630 Wisemans Ferry Road
R16	1602 Wisemans Ferry Road
R21	1559 Wisemans Ferry Road

4.1 Pollutant Criteria and Trigger Values

Table 4.3 below outlines the relevant pollutant criteria and trigger values as required by the Development Consent and EPL.

The EPA requires the automatic alarm system of the continuous dust monitoring device to be set at a PM₁₀ trigger value which triggers specific dust mitigation measures. For Haerses Road, the agreed trigger value is 42 µg/m³.

TSP and deposited dust levels are criteria values which once exceeded require immediate action in accordance with actions outlined in **Table 5.2** of **Section 5**.

Table 4.3: PM10 Criteria and Trigger Values

Source	Condition	Pollutant	Development Consent / EPL Criteria	Trigger Value	Comments and Actions
Development Consent/EPL	Condition 10 Schedule 3/ M2.3	PM ₁₀	30 µg/m ³	42 µg/m ³ with prevailing wind at the site between 180° and 240°	Trigger level which when reached prompts the following actions: <ul style="list-style-type: none"> • reduce dust emissions immediately and cease operations (Section 5.0) • immediately notify the EPA (Table 5.2)

Development Consent/EPL	Condition 9 Schedule 3/ O3.6	PM ₁₀	30 µg/m ³	-	Annual average criteria level which, if exceeded, triggers air quality exceedance action outlined in Table 5.2
Development Consent/EPL	Condition 9 Schedule 3/ O3.6	PM ₁₀	50 µg/m ³	-	24 hour average criteria level which, if exceeded, triggers air quality exceedance action outlined in Table 5.2
EPL	O3.3	PM ₁₀	-	42 µg/m ³	Trigger value for PM ₁₀ automatic alarm and management plan strategies (refer to Table 5.2)
Development Consent/EPL	Condition 9 Schedule 3/ O3.6	TSP	90 µg/m ³	-	Annual average criteria level which, if exceeded, triggers air quality exceedance action outlined in Table 5.2
Development Consent/EPL	Condition 9 Schedule 3/ O3.6	Deposited dust	2 g/m ² /month	-	Criteria value for maximum increase in deposited dust level. Exceedance of this triggers air quality exceedance action outlined in Table 5.2
			4 g/m ² /month	-	Criteria value for maximum total deposited dust level. Exceedance of this triggers air quality exceedance action outlined in Table 5.2

5.0 Air Quality and Greenhouse Gas Management Measures

5.1 Environmental Inspections

Dixon Sand is committed to implementing all reasonable and feasible measures to minimise the potential air quality impacts of the operation on nearby sensitive receivers. A range of air quality management and mitigation measures are utilised at the quarry to limit the generation of dust and greenhouse gas emissions. A summary of these measures is provided in **Table 5.1**.

Table 5.1: Air Quality Management and Mitigation Measures

Management or Mitigation Measure	Timing	Responsibility	Performance Indicator
Maintain and operate a continuous automatic meteorological station in the vicinity of Maroota Public School (refer to Figure 6.1)	Continuous	Quarry Manager/ Environmental Officer	Air quality and meteorological monitoring data
Maintain and operate the TEOM monitoring station fitted with an automated alarm system set at a PM ₁₀ trigger value of 42mg/m ³ (refer to Figure 6.1)	Continuous	Quarry Manager/ Environmental Officer	TEOM Alarm Register
Ensure reviews of meteorological forecasts are undertaken on a daily basis prior to the commencement of operations	Ongoing	Quarry Manager	Site Condition Checklist Pre-start/Tool-box talks
Minimise the active extraction areas within the quarry project area through progressive clearing and rehabilitation in the strips before and after the active extraction area to reduce the potential for dust generation. Progressive rehabilitation to occur as per the Biodiversity and Rehabilitation Management Plan	Ongoing	Quarry Manager/ Environmental Officer	Site Condition Checklist
Limit the maximum area exposed at any one time to 24 ha	Ongoing	Quarry Manager	Site Condition Checklist
Raw material to be stockpiled on the quarry floor, with the stockpile having an approximate diameter of 40 m and height of 10 m (the equivalent of 2 - 3 days worth of material)	Ongoing	Quarry Manager	Site Condition Checklist
Minimise drop height of material during truck loading and unloading	Ongoing	Quarry Manager	Site Condition Checklist
Make operators of mobile plant aware of measures to minimise dust impacts on	Prior to works and ongoing	Quarry Manager/ Environmental Officer	Site Condition Checklist records

Management or Mitigation Measure	Timing	Responsibility	Performance Indicator
sensitive receivers, and provide adequate training so that operating procedures can be implemented, where feasible and reasonable			Training records
During operating hours, water cart to be used to suppress dust on unsealed roads, truck loading areas and stockpiles where required	Ongoing	Quarry Manager	Site Condition Checklist
Use of chemical stabilisation on roads if further control is required in addition to water spraying	Ongoing	Quarry Manager	Site Condition Checklist
Seed any topsoil stockpiles present for more than 4 months	As required for stockpiles present for more than 4 months	Quarry Manager	Site Condition Checklist
Undertake air quality monitoring in accordance with the air quality monitoring program (Section 6.0)	Ongoing	Environmental Officer	Monitoring reports
Cease or restrict, as necessary, dust generating activities during periods of high winds	As required during unfavourable weather conditions	Quarry Manager/ Environmental Officer	Site Condition Checklist
Maintain sprinklers on the stockpile conveyors	Ongoing	Quarry Manager/ Environmental Officer	Site Condition Checklist
Surface initial 300m* of Haerses Road in selected hard, non-friable material	Ongoing	Quarry Manager/ Environmental Officer	Site Condition Checklist
Limit vehicle speed to 20 km/hr on internal unsealed access tracks	Ongoing	Quarry Manager/ Environmental Officer	Site Condition Checklist
Ensure that trucks carrying loads are covered at all times when entering and leaving the premises, except during loading and unloading	Ongoing	Quarry Manager	Visual inspection
Regularly tune and maintain mobile and fixed equipment to minimise exhaust and greenhouse gas emissions	Ongoing	Quarry Manager	Maintenance records
Review opportunities for improvement in diesel use and energy efficiency when purchasing or replacing equipment at the quarry to reduce greenhouse gas emissions.	Ongoing	Quarry Manager/ Environmental Officer	Procurement records Maintenance records

Management or Mitigation Measure	Timing	Responsibility	Performance Indicator
Seal the Quarry Access Road between Wisemans Ferry Road and the processing plant	Prior to 1) any increase in extractive operations above 250,000 tonnes of product per year, and 2) the commencement of quarrying operations in Stages 4 or 5.	Quarry Manager/ Environmental Officer	Site Condition
No concurrent operations of sandstone extraction are to occur in the Sandstone extraction Areas A and B and the: <ul style="list-style-type: none"> Excavator loading of the extracted sandstone for transfer to the processing area, and Operations of haulage trucks on unsealed roads between the extraction area and the processing plant 	Ongoing	Quarry Manager	Site Condition Checklist
Utilise 'wet' sandstone cutting technique in the sandstone cutting shed to minimise dust generation and ensure air quality compliance	Ongoing	Quarry Manager	Site Condition Checklist

5.1.1 Training and Awareness

All personnel and contractors working at the Quarry will undergo an induction. This induction includes information on the management of dust while working on site. After completing the induction, workers will sign a statement of attendance and records of this are kept in the administration office.

Tool-box meetings are held to discuss whole-of-site production, management, safety and environmental issues. Matters relating to air quality and potential adverse meteorological conditions are raised during these meetings, when necessary.

5.2 Reactive Management Measures

In addition to the operational controls outlined in Section 5.1, specific reactive management measures will be implemented in response to identified triggers. Air quality triggers and responses are outlined in **Table 5.2** below.

Table 5.2: Air Quality Triggers and Responses

Trigger	Response/Corrective Action
Rolling 24-hour average PM ₁₀ result measured at the TEOM monitoring station exceeds 42 µg/m ³ and the prevailing wind at the site is between 180° and 240°	<p>If any rolling 24-hour average PM₁₀ result measured at the TEOM monitoring station (refer to Figure 6.1) is found to be greater than 42 µg/m³ and the prevailing wind at the site is between 180° and 240° as measured at the weather station:</p> <ul style="list-style-type: none"> • the Environmental Officer in consultation with the Quarry Manager will take immediate action to reduce the Quarry's PM₁₀ emissions; • the Quarry Manager (or delegated representative) will immediately notify the EPA Manager Sydney Industry; • if the dust level does not return to below 42 µg/m³ within 1 hour then the Quarry Manager will cease all dust generating activities on site; <p>dust generating activities will only recommence once the rolling 24-hour average PM₁₀ result measured at the TEOM monitoring station is less than 42 µg/m³ for 4 consecutive 15 minute period.</p>
Air quality criteria exceedance	<p>If air quality monitoring indicates that the air quality criteria has been exceeded, the following responses and action plan will be implemented:</p> <ul style="list-style-type: none"> • After identifying an exceedance, the Environmental Officer (or delegated representative) will review meteorological conditions at the time of the exceedance to assess whether these represent conditions for which the air quality criteria do not apply. • The Environmental Officer, in consultation with the Quarry Manager, will immediately investigate the source of the emission, review the performance of equipment and if necessary make arrangements to alter the configuration of equipment, or stand down specific equipment, so that dust levels are reduced to achieve compliance with the air quality criteria. • The Quarry Manager (or delegated representative) will immediately notify DPE and EPA Manager Sydney Industry, and any other relevant agencies of the exceedance. • Within 7 days of the date of the exceedance occurring, the Quarry Manager will provide DPE and any other relevant agencies with a detailed report of the exceedance, and such further reports as may be requested. • As soon as practicable, and no longer than 7 days, after obtaining monitoring result showing an exceedance of air quality criteria, the Quarry Manager will notify the affected landowners in writing of the exceedance, and provide regular monitoring results, at least every 3 months, to each affected land owner until the development is again complying with the relevant criteria. • Any exceedance of the air quality criteria will be reported in the Annual Review. • In the event of ongoing or regular exceedances of the air quality criteria, the Environmental Officer, in consultation with the Quarry Manager will investigate the feasibility of any reasonable additional controls or treatments on individual sources within the quarry, or other long term means of reducing air quality levels to comply with the air quality criteria. <p>Where reasonable additional controls or treatment are unfeasible or unable to reduce air quality levels to comply with the criteria, the Quarry Manager will, in consultation with the affected sensitive receiver, investigate options for receiver based air quality controls or treatments, and/or acceptable compensation for the air quality impacts experienced.</p>

Trigger	Response/Corrective Action
Receipt of air quality complaint	<p>Following a complaint, appropriate action will be taken within two working days to determine the cause of the complaint and identify appropriate actions to remediate the complaint source. The following details will be recorded:</p> <ul style="list-style-type: none"> • The date and time of the complaint • Method by which the complaint was made • Personal details of the complainant • Nature of the complaint • Action taken in relation to the complaint, including follow up with the complainant; and • If no action taken, the reasons why no action was taken. <p>All complaints will be investigated and an appropriate response provided to the complainant. The investigation may include the following:</p> <ul style="list-style-type: none"> • A review of continuous monitoring data relevant to the time of the complaint • A review of the activities and/or equipment being carried out or operated at the time of the complaint • A review of whether activities outside the normal 'day-to-day' operations were being carried out on site at the time of the complaint • A review of whether any activities or extraordinary events/conditions in the locality may have contributed to the complaint • Recommendation of any actions that may be carried out to resolve the complaint and/or minimise the likelihood of further complaints.
Extraordinary Event or Adverse Meteorological Conditions	<p>The air quality criteria listed in Section 4.0 do not apply during extraordinary events. Extraordinary events are defined in Condition 9 Schedule 3 of the development Consent and include:</p> <ul style="list-style-type: none"> • bushfires; • prescribed burning; • dust storms; • sea fog; • fire incidents; or • any other activity agreed by the Secretary. <p>During these extraordinary events, the Quarry Manager will limit, modify or cease operations to ensure that air quality impacts are minimised. Measures to be implemented during extraordinary weather events are detailed below.</p> <p>When adverse weather conditions including excessive winds are observed, the Quarry Manager (or delegate) will ensure that operations are modified, or additional measures are implemented to minimise the air quality impacts of the Quarry. These measures include, but are not limited to:</p> <ul style="list-style-type: none"> • Scheduling of additional water carts • Scheduling revised working hours or working locations • Reviewing the elevation and wind exposure of Quarry activities and where possible relocating the activity to a sheltered area • Temporarily ceasing work when it is identified to be a likely contributor to elevated dust impacts, until more favourable conditions return.

6.0 Air Quality Monitoring

Air quality monitoring requirements for the Haerses Road Quarry operation are provided in Condition 10 Schedule 3 of the Development Consent and conditions O3 of the EPL. These conditions stipulate that Dixon Sand must maintain and operate a continuous dust monitoring device that is connected to an alarm system and a continuous automatic meteorological station.

6.1 Dust Deposition and PM₁₀ Monitoring Locations

In order to monitor air quality and assess compliance at the Quarry, monitoring will occur at the locations outlined in **Table 6.1** and shown on **Figure 6.1**.

Air quality monitoring at the Quarry consists of:

- 4 depositional dust gauges which are representative of the nearest residential receivers
- 1 TEOM unit located near Maroota Public School which continuously monitors PM₁₀. The TEOM is fitted with an automatic alarm system alerting Quarry staff once trigger value for PM₁₀ (42 µg/m³) is reached.

Table 6.1: Dust Deposition and PM₁₀ Monitoring Locations

Location	Parameters Monitored	Units of Measure	Averaging Period	Frequency	Sampling Method ¹
D8 - Hitchcock Road, Olive Grove	Deposited dust	g/m ² /month	Month, annual	Monthly	AM-19
D10 - Haerses Road (EPL Point 3)	Deposited dust	g/m ² /month	Month, annual	Monthly	AM-19
D11 – 1543 Wisemans Ferry Road	Deposited dust	g/m ² /month	Month, annual	Monthly	AM-19
D12 – 1521 Wisemans Ferry Road	Deposited dust	g/m ² /month	Month, annual	Monthly	AM-19
TEOM - Maroota Public School (EPL Point 1)	PM ₁₀	µg/m ³	24 hour, annual	Continuous	AM-22

NOTES: TEOM = Tapered Element Oscillating Microbalance

¹NSW EPA, 2007, *Approved Methods for the Sampling and Analysis of Air Pollutants in NSW*.

Monitoring commitments as part of Dixon Sand's EMP include:

- continuous PM₁₀ monitoring at TEOM air quality monitoring station
- wind speed, direction, temperature and rainfall to be measured daily by meteorological station
- air monitoring to be continued during rehabilitation works involving earthworks.

6.2 Total Suspended Particles (TSP) Monitoring

There are no measurements of TSP available for the Quarry. Estimates of annual average TSP concentrations can be made from the PM₁₀ measurements by assuming that 40% of the TSP is PM₁₀. This relationship was obtained from data collected by co-located TSP and PM₁₀ monitors operated for long periods of time in the Hunter Valley (NSW Minerals Council, 2000). Although this ratio is based on Hunter Valley data, in the absence of site specific data this provides an indicative estimate of the ambient TSP. Use of this relationship on the adopted PM₁₀ annual average of 13 µg/m³ gives an existing annual average TSP concentration of approximately 32.5 µg/m³ (Pacific Environment Limited, 2016). Estimated TSP emissions will be reported in the Annual Review.

6.3 Meteorological Monitoring

In accordance with Condition 12 Schedule 3 of the Development Consent, for the life of the development, Dixon Sand must ensure that there is a suitable meteorological station operating in the vicinity of Maroota Public School that complies with the requirements in the *Approved Methods for Sampling and Analysis of Air Pollutants in NSW* (DEC, 2007). Conditions O3.5 and P1.2 of the EPL also require Dixon Sand to maintain and operate a continuous automatic meteorological station near Maroota Public School.

As such, meteorological data is sourced from Dixon Sand's weather station as shown on **Figure 6.1**.

The weather station, in accordance with Condition M4.1 of the EPL, will monitor the parameters specified in **Table 6.2**, and will use the sampling method, units of measure, averaging period and sample at the frequency specified in the other columns of **Table 6.2**.

Table 6.2: Meteorological Monitoring Parameters and Methods

Parameter	Units of measure	Frequency	Averaging Period	Sampling Method
Air temperature	°C	Continuous	1 hour	AM-4
Wind direction	-	Continuous	15 minute	AM-2 & AM-4
Wind speed	m/s	Continuous	15 minute	AM-2 & AM-4
Sigma theta	-	Continuous	15 minute	AM-2 & AM-4
Rainfall	mm	Continuous	24 hour	AM-4

Note: Sampling methods are as per Approved Methods for Sampling and Analysis of Air Pollutants in NSW guideline (DEC, 2007)

6.4 Monitoring Standards

Air quality monitoring will be undertaken in accordance with the relevant Australian Standards, legislation and EPA approved methods for sampling, in particular:

- all sampling and analysis will be undertaken in accordance with the *Protection of the Environment Operations (Clean Air) Regulation 2022* and the guidelines specified in the EPA's publication *Approved methods for the sampling and analysis of air pollutants in NSW (EPA 2022)*.

All dust depositional gauges will be installed and maintained as per AS/NZS 3580.10.1:2016: Methods for Sampling and Analysis of Ambient Air - Determination of Particulate Matter - Deposited Matter - Gravimetric Method.

- Other monitoring standard applied to operations include: AS 3580.14:2014: Methods for Sampling and Analysis of Ambient Air – Meteorological Monitoring for Ambient Air Quality Monitoring Applications.

6.5 Monitoring Records

In accordance with conditions outlined in M1 of the EPL, the results of any monitoring required to be conducted must be recorded and retained.

All monitoring records will be:

- kept in a legible form, or in a form that can readily be reduced to a legible form;
- kept for at least 4 years after the monitoring or the event to which they relate took place; and
- produced in a legible form to any authorised officer of the EPA who asks to see them.

The following records will be kept in respect of air quality monitoring undertaken:

- the dates on which the monitoring was undertaken;
- the times at which the monitoring was undertaken;
- the point at which the monitoring was undertaken; and
- the name of the person who undertook the monitoring.

To comply with Condition M1.4 of the EPL, the following records for monitoring Point 1 identified in licence condition P1.1 (refer to **Table 6.3**), must be kept electronically:

- each 15 minute PM₁₀ result;
- each rolling 24-hour average PM₁₀ results (each 15 minutes);
- each daily 24-hour average PM₁₀ result (midnight to midnight); and
- the rolling annual average PM₁₀ result (each day, midnight to midnight, and over the total number of days of monitoring since monitoring began for first year of monitoring only).

Condition M1.5 requires that the following records for Point 2 identified in licence condition P1 (refer to **Table 6.3**), must be kept electronically:

- each 15 minute, 1 hour and 24 hour result as indicated in the table at condition M4.1.

Table 6.3: Location of EPA Identified Monitoring Points (as per condition P1.1 of the EPL) and their Position on Site at Haerses Road Quarry

EPA Identification No. (as per Condition P1.1 of the EPL)	Type of Monitoring Point	Description of Location on site at Haerses Road Quarry
Point 1	Ambient air monitoring	TEOM monitoring station located near the Maroota Public School as marked in Figure 6.1
Point 2	Meteorological station	Weather station located near the Maroota Public School as marked in Figure 6.1

Figure 6.1 Air Quality Monitoring Locations (to update)

7.0 Reporting

7.1 External Reporting

A summary of air quality monitoring results and statements of compliance with Development Consent and EPL conditions will be provided in the Quarry Annual Review and EPL Annual Return. The Annual Review will be prepared and submitted to the Secretary, in accordance with Condition 12 Schedule 5 of the Development Consent. The Annual Review will be made available to the public through the Community Consultative Committee (CCC) and the Dixon Sand web site (<http://www.dixonsand.com.au>).

In addition, in accordance with Condition 15 Schedule 5 of the Development Consent, Dixon Sand will publish air quality monitoring results on the Dixon Sand website.

A discussion of the effectiveness of the air quality management measures utilised at the Quarry will be reported to DPE in the Annual Review. The Annual Review will also identify whether any additional dust management controls are required to be implemented at the Quarry or whether there are any technological advancements in air quality control which are suitable for implementation at the Quarry.

Any investigations related to exceedances will be detailed in the Annual Review.

7.2 Air Quality Criteria Exceedance Reporting

In accordance with Condition 10 of Schedule 3, within 7 days of becoming aware of a non-compliance, Dixon Sand will notify the Department of the non-compliance. Notification will be in writing via the Major Projects Website and will identify the development (including the development application number and name), set out the condition of this consent that the development is non-compliant with, the way in which it does not comply and the reasons for the non-compliance (if known) and what actions have been, or will be, undertaken to address the non-compliance. In accordance with Condition 1 Schedule 4 of the Development Consent, as soon as practicable, and no longer than 7 days, after obtaining monitoring result showing an exceedance of air quality criteria (outlined in **Section 4.0**), Dixon Sand will notify the affected landowners in writing of the exceedance, and provide regular monitoring results, at least every 3 months, to each affected landowner until the development is again complying with the air quality criteria.

As soon as practicable, and no longer than 7 days after an exceedance, Dixon Sand will also send a copy of the NSW Health fact sheet entitled 'Mine Dust and You' to the affected landowners and current tenants of the land (including the tenants of the land which is not privately-owned).

7.3 Adaptive Management

In accordance with Condition 7 Schedule 5 of the Development Consent, the Quarry will assess and manage air quality related risks to ensure compliance with the criteria outlined in **Section 4.0**.

Where an exceedance of the air quality criteria in **Section 4.0** has occurred, Dixon Sand will, as soon as becoming aware of the exceedance and to the satisfaction of the Secretary:

- take all reasonable and feasible steps to ensure the exceedance ceases and does not reoccur;
- consider all reasonable and feasible options for remediation (where relevant) and submit a report to the Department describing those options and any preferred remediation measures or other course of action; and
- implement remediation measures as directed by the Planning Secretary.

7.4 Community Complaints

Complaints relating to air quality from the quarry are to be managed in accordance with the requirements of the Quarry EMS and the reactive management procedures outlined in **Section 5.2**. A register of complaints will be published on the Dixon Sand website and will be updated monthly. A summary of complaints will be provided in the Annual Review.

7.5 Independent Review

In the event a landowner considers the Quarry is exceeding air quality criteria at his or her property, the landowner may request an independent review of the dust impacts at the property. The independent review will be conducted in accordance with the procedure described in Condition 2 Schedule 4 of the Development Consent.

8.0 Review and Improvement

Ongoing monitoring and review of the performance and implementation of this AQMP will be undertaken in accordance with the Condition 5 Schedule 5 of the Development Consent, which states that review of the plan will occur within 3 months of the submission of an:

- incident report under Condition 10 Schedule 5;
- annual review under Condition 12 Schedule 5;
- independent Environmental Audit report under Condition 14 Schedule 5; and
- any modifications to this consent.

The Quarry will notify DPE in writing of any review of this AQMP. Should a review lead to any revisions to this AQMP, the revised document will be submitted to DPE within 6 weeks of the review.

Updated versions of this AQMP will be made publicly available on the Dixon Sand website in accordance with Condition 15 Schedule 5 of the Development Consent.

9.0 Responsibilities

Environmental management at Dixon Sand will be the responsibility of all employees and contractors, with the Quarry Manager having overall responsibility for environmental management of the operations. Environmental roles and responsibilities for the project personnel are outlined below. Environmental responsibilities are included in the position description of all employees.

General environmental responsibilities for key personnel at the Quarry are outlined in **Table 9.1**.

Table 9.1: Roles and Responsibilities

Role	Accountabilities for this document
Managing Director	<ul style="list-style-type: none"> • Ensure that sufficient resources are allocated for the implementation of this AQMP.
Haerses Road Quarry Manager	<ul style="list-style-type: none"> • Oversee the implementation of this AQMP • Have working knowledge of this AQMP • Ensure reviews of meteorological forecasts are undertaken on a daily basis prior to the commencement of operations • Coordinate the implementation of air quality management measures and strategies in accordance with this AQMP (refer to Section 5.0) • Be aware of the environmental legislative requirements associated with the Quarry and take measure to ensure compliance • Ensure employees are competent through training and awareness programs • Modify operation as required in response to an alarm, high winds or adverse meteorological conditions.
Environmental Officer	<ul style="list-style-type: none"> • Coordinate the review of this AQMP in accordance with the requirements of the Development Consent • Coordinate the air quality monitoring requirements of this AQMP • Evaluate and report monitoring results as required • Coordinate air quality related incident investigations and reporting as required by legislation and internal standards and guidelines • Provide primary contact for complaints and supply follow-up information to any complainant • Initiate investigations of complaints as received from the public or government agency • Inform the Quarry Manager of any identified causes resulting in elevated dust levels during operations • Undertake reviews of this AQMP in accordance with the requirements of the Development Consent.
All employees and contractors	<ul style="list-style-type: none"> • Comply with all requirements in this AQMP • Report all potential environmental incidents to the Quarry Manager immediately • Operate in a manner that minimises risks of incidents to themselves, fellow workers or the surrounding environment • Seek approval from the Quarry Manager prior to making changes to infrastructure/processes which may result in increased dust risks. • Follow any instructions provided by the Quarry Manager.

10.0 Definitions

The terminology utilised within this AQMP is defined in **Table 10.1** below.

Table 10.1: Definitions

Term	Definition
CCC	Community Consultative Committee
DA	Development Application
DEC	Department of Environment and Conservation
Development Consent	DA 165-7-2005 (Mod 6)
DPE	Department of Planning and Environment
Dust Deposition	Dust particles that settle out from the air - measured in grams per square metre per unit time (g/m ² /month)
EA	Environmental Assessment
EIS	Environmental Impact Statement
EMP	Environmental Monitoring Program
EMS	Environmental Management System
EPA	Environment Protection Authority
EPL	Environment Protection Licence
Exceedance	Occurs when environmental monitoring results do not comply with Development Consent criteria
Incident	An occurrence or set of circumstances that: <ul style="list-style-type: none"> causes, or threatens to cause material harm to the environment; and/or breaches or exceeds the limits or performance measures/criteria in the consent
MR	Modification Report
POEO	Protection of the Environment Operations
PM ₁₀	Particulate matter less than 10 micrometres (µm) in size
Secretary	The Secretary of the NSW Department of Planning and Environment, including any authorised delegate or nominee
TEOM	Tapered Element Oscillating Microbalance
TSP	Total Suspended Particulates. The nominal size of this fraction has particles with a diameter of up to 50 micrometres (µm).
µg/m ³	Micrograms per cubic metre

11.0 References

- Australian Standard AS/NZS 3580.14:2014 Methods for Sampling and Analysis of Ambient Air – Meteorological Monitoring for Ambient Air Quality Monitoring Applications.
- Australian Standard AS/NZS 3580.10.1:2016 Methods for Sampling and Analysis of Ambient Air – Determination of Particulate Matter – Deposited Matter – Gravimetric Method.
- Department of Planning and Environment (DPE), 2017, *Environment Management Plan Guidelines: Draft*.
- Department of Planning and Environment (DPE), 2006, *Conditions of Consent DA 165-7-2005*.
- Department of Planning and Environment, 2006, *Conditions of Consent DA 165-7-2005 Modification 1*.
- Department of Planning and Environment, 2006, *Conditions of Consent DA 165-7-2005 Modification 2*.
- Department of Planning and Environment, 2006, *Conditions of Consent DA 165-7-2005 Modification 3*.
- Department of Planning and Environment, 2006, *Conditions of Consent DA 165-7-2005 Modification 4*.
- Department of Planning and Environment, 2006, *Conditions of Consent DA 165-7-2005 Modification 5*.
- Department of Planning and Environment, 2006, *Conditions of Consent DA 165-7-2005 Modification 6*.
- Dixon Sand (Penrith) Pty Ltd (Dixon Sand), 2017, Dixon Sand (Penrith) Pty Ltd - Old Northern Road and Haerses Road, Maroota Annual Review 2016 – 2017.
- Dixon Sand (Penrith) Pty Ltd (Dixon Sand), 2017, *Environmental Monitoring Program – Dixon Sand Haerses Road, Maroota*, Report prepared for DPE approval.
- Dixon Sand (Penrith) Pty Ltd (Dixon Sand), 2017, *Environmental Monitoring Strategy – Dixon Sand Haerses Road, Maroota*, Report prepared for DPE approval.
- Environmental Resources Management Australia Pty Ltd (ERM), 2005, *Proposed Sand Quarry at Haerses Road, Maroota, Environmental Impact Statement*, Report prepared for Dixon Sand (Penrith) Pty Ltd.
- NSW Environment Protection Authority, 3 June 2022, *Environmental Protection Licence 12513*.
- NSW Minerals Council (2000) Technical paper – Particulate Matter and Mining Interim Report.
- Pacific Environment Limited, 2016, *Dixon Sand Haerses Road Quarry Modification – Air Quality Assessment*, report prepared for Dixon Sand (Penrith) Pty Ltd.
- Protection of the Environment Operations (Clean Air) Regulation 2022*
- State of NSW and NSW EPA, 2022, *Approved methods for the sampling and analysis of air pollutants in NSW*.
- Umwelt (Australia) Pty Ltd, 2016, *Environmental Assessment Dixon Sand Haerses Road Quarry Extraction Area Modification*, Report prepared for Dixon Sand (Penrith) Pty Ltd.
- Umwelt (Australia) Pty Ltd, 2016, *Application to modify DA 165-7-2005 for Haerses Road Quarry under Section 4.55(1) of the Environmental Planning & Assessment Act 1979*.
- Umwelt (Australia) Pty Ltd 2019, *Haerses Road Quarry Modification 3 – Statement of Environmental Effects*.

Umwelt (Australia) Pty Ltd 2022, *Modification Report – Haerses Road Quarry Modification 5 (DA 165-7-2005 MOD 5) Relocation of Site Office, Workshop and Weighbridge*

Umwelt (Australia) Pty Ltd, 2023, *Haerses Road Quarry Modification 6 (DA 165-7-2005) – Relocation of Site Building Envelope and Site Office.*

Appendix 1

Plan Preparation Checklist and Certification

Appendix 1 - Plan Preparation Checklist & Certification

The Environmental Management Plan Requirements guidelines state that the following checklist must be completed and supplied to the Department with an Environmental Management Plan (EMP) and Sub-plans. *(Note: the items marked as NA are not required to be included in the Sub-plan).*

Requirement	Plan Reference	Yes/No/NA
Document preparation and endorsement		
Has the Plan been prepared in consultation with all relevant stakeholders? (Section 3.1)	Section 2.3 and Appendix 2	Yes
Have the views of the relevant stakeholders been taken into consideration, have appropriate amendments been made to the Plan and does the Plan clearly identify the location of any changes? (Section 3.1)	Section 2.3 and Appendix 2	Yes
Has the Plan been certified on behalf of the proponent? (Section 3.2)	Appendix 1	Yes
Version content		
Does the Plan include the required version control information? (Section 2.3)	Before Table of Contents	Yes
Does the Plan reference the project description as required in Section 2.4?	Section 1	Yes
Does the Plan identify the components of the project to which it applies (i.e. scope)? (Section 2.5).	Section 1.2	Yes
Does the Plan describe the proponent's Environmental Management System (EMS), and identify how the Plan relates to other documents required by the conditions of consent? (Section 2.6)	NA (Sub Plan)	NA (Sub Plan)
Does the Plan identify continuous improvements processes from the EMS that will be adopted? (Section 2.6)	NA (Sub Plan)	NA (Sub Plan)
Does the Plan include (unaltered) all the conditions of consent to the addressed by the Plan and identify where in the Plan each requirement has been addressed? (Section 2.7.1)	Section 2.1	Yes
Have all other additional approvals been identified? Has appropriate information been provided regarding how each additional approval is relevant? (Section 2.7.2)	Section 2.2	Yes
Have all relevant guidelines, policies and standards been identified, including details of how they are relevant? (Section 2.7.3)	Section 2.5	NA
Has the project's organisational structure been included? (Section 2.8)	NA (Sub Plan)	NA (Sub Plan)Yes
Are the roles and responsibilities of key positions or personnel (including any specialists required by the conditions of consent) outlined? (Section 2.8)	Section 4.0	Yes
Is the process that will be adopted to identify and analyse the environmental risks included? (Section 2.9)	NA (Sub Plan)	NA (Sub Plan)
Does the Sub-plan identify the relevant sections of the EIA documents that contain the assessment of the matter/s addressed by the Plan? (Section 2.10)	Section 2.1.1	Yes

Requirement	Plan Reference	Yes/No/NA
Have all further studies required to support mitigating measures been identified and included? (Section 2.11)	Section 2.5	Yes
Have project hold points been identified and included? (Sections 2.7.2 and 2.12)	Section 2.6	Yes
Have all mitigation measures from conditions of consent been included unaltered? (Section 2.13)	Section 2.1	Yes
Have any new mitigation measures been written in committed language and all relevant information included? (Section 2.13)	Section 5.0	Yes
Have the tools that will be used to communicate Plan requirements to project personnel been included? (Section 2.14)	NA (Sub Plan)	NA (Sub Plan)
Is an environmental inspection program described as required? (Section 2.15.1)	NA (Sub Plan)	NA (Sub Plan)
Are relevant details of environmental monitoring that will be carried out included? (Section 2.15.2)	Section 6.0	Yes
Is a compliance monitoring and reporting program (or similar) referenced? (Section 2.15.3)	NA (Sub Plan)	NA (Sub Plan)
Is an independent auditing program referenced? (Section 2.16)	NA (Sub Plan)	NA (Sub Plan)
Are project status notification protocols that comply with conditions included? (Section 2.17.1)	NA (Sub Plan)	NA (Sub Plan)
Does the Plan reference a Community and Stakeholder Engagement Plan (or similar) or include community and stakeholder engagement actions (if required)? (Section 2.17.2)	NA (Sub Plan)	NA (Sub Plan)
Does the document include the incident notification and reporting protocols that comply with the relevant conditions of consent? (Section 2.17.3)	Section 5.2	Yes
Does the document identify the project person or position that is responsible for deciding whether an occurrence is an incident? (Section 2.17.3)	Section 9.0	Yes
Does the document describe corrective and preventative action protocols that address the requirements? (Section 2.18)	NA (Sub Plan)	NA (Sub Plan)
Does the document identify training and awareness programs as required? (Section 2.19)	Section 5.1.1	Yes
Does the document include details of a document review and revision process that complies with the requirements? (Section 2.20)	Section 8.0	Yes
Does the document include details of public availability requirements? (Section 2.21)	Section 7.0	Yes

Document Certification Form

Project Name	Haerses Road Quarry
Project Application Number	DA 165-7-2005
Proponent	Dixon Sand (No.1) Pty Ltd
Document Title	Haerses Road Quarry Air Quality Management Plan
Document Version	V3
Date of Issue	12 January 2024

Haerses Road Quarry Air Quality Management Plan has been prepared by Project Environmental Services Pty Ltd in response to conditions of consent Schedule 5 Condition 1, DA 165-7-2005 for the Haerses Road Quarry. Subsequent reviews and changes to the Air Quality Management Plan have been made on behalf of Dixon Sand (No. 1) Pty Ltd.

I am authorised to and have reviewed the document on behalf of Dixon Sand (No. 1) Pty Ltd.

I certify that the Haerses Road Quarry Air Quality Management Plan:

- has been prepared in accordance with the relevant condition/s and the Department's Environmental Management Plan
- adequately identifies and addresses all relevant conditions of consent
- has been prepared in accordance with relevant requirements of the conditions of consent regarding stakeholder consultation.

Name of Certifier	Hunny Churcher
Position	Environment Officer
Company	Project Environmental Services
Date	12 January 2024

Appendix 2

Stakeholder Consultation

Issue	Response
EPA letter ref. DOC22/977622-1	
<p>We acknowledge that your planning consent (conditions 8a, 11a, 12, and 19b) states that environmental management plans must be prepared in consultation with the EPA. However, the EPA generally does not review management plans.</p>	Noted
<p>The role of the EPA is to regulate environmental protection licences (EPLs) and to set objectives for environmental protection and management, and not to be directly involved in the development of strategies to comply with such objectives.</p>	Noted
<p>It is the responsibility of the licensee to ensure that the monitoring program proposed is in line with conditions within EPL 12513 to ensure ongoing compliance with your licence and the <i>Protection of the Environment Operations Act 1997</i> (the Act).</p>	Noted
<p>The impact of pollutants to the environment must be managed to protect the amenity and wellbeing of the community. Potential impacts should be minimised through the implementation of all feasible and reasonable mitigation measures, relevant approved sampling methods, and guidance material. Please see epa.nsw.gov.au for further information and to guide your assessment of these matters.</p>	Noted

A copy of the Agency correspondence is also provided in **Appendix 2**.