

Air Quality Management Plan

Bass Point Quarry Expansion

November 2021

Revision 7.2



Document Control

Status	Date	Description	Reviewer(s)	Date lodged to DPIE	Date and DPIE response
Revision 7.2	30.11.2021	Revised Figure 2 as per DPIE request.	Chelsea Flood Belinda Pignone	30.11.2021	10.12.2021 Approved
Revision 7.1	15.10.2021	Addressed DPIE comments on Revision 7. Restructured document control table. Added Appendix A.	Chelsea Flood Belinda Pignone	09.11.2021	29.11.2021 Request for additional information
Revision 7	15.07.2021	Revision for administrative updates and amendment of PM10-2 location.	Damon Roddis (Zephyr) Chelsea Flood Belinda Pignone	21.07.2021	05.10.2021 Revision required
Revision 6	30.07.2019	Revision due to MOD 2 approval and relocation of DDG-2 (EPL 2193).	Danroy D'Souza (SLR) Jason Shepherd (SLR) Kirsten Lawrence (SLR)	09.08.2019	-
Revision 5	14.12.2017	Revision to incorporate comments from DPE.	Kirsten Lawrence (SLR) Fardaus Rahaman (SLR)	-	04.12.2017 Approved
Revision 4	06.11.2017	Revision to incorporate comments from DPE.	Kirsten Lawrence (SLR) Graeme Starke (SLR)	-	04.12.2017 Approved pending final revision
Revision 3	26.06.2017	Revision to incorporate comments from NSW EPA.	Kirsten Lawrence (SLR) Michael Brecko (SLR)	-	04.09.2017 Revision required
Revision 2	07.10.2016	-	Alison Radford (SLR) Kirsten Lawrence (SLR)	-	-
Revision 1	16.09.2016	-	Alison Radford (SLR) Kirsten Lawrence (SLR)	-	-
Revision 0	27.05.2021	New document	Tanya Henley (SLR) Martin Doyle (SLR)	30.05.2014	

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1. Introduction

This Air Quality Management Plan (the Plan) has been prepared by Hanson Construction Materials (Hanson) and Zephyr Environmental Pty Ltd (Zephyr) for the Bass Point Quarry (the Quarry). The Minister for Planning and Infrastructure conditionally approved the continued operation of Bass Point Quarry, NSW, until 31 January 2044 (Project Application MP 08_0143).

The following Plan contains the assessment criteria, the monitoring locations and procedures, and the compliance checking procedures for subsequent reporting in accordance with the Department of Planning, Industry and Environment (DPIE) (previously the Department of Planning and Environment (DPE)) and the NSW Environment Protection Authority (EPA) requirements.

1.1. Project Overview

The Quarry is situated between the coastal towns of Shellharbour and Kiama, approximately 20 kilometres (km) south of the central business district of Wollongong on the NSW south coast. The Quarry is an active hard rock quarrying operation, located on the Bass Point Headland and bordered by a state park, a reserve park, an aquatic reserve and a growing residential land release.

The site layout is shown in . There are two points of access to the site; at the eastern boundary via a right of carriageway, and at the northern boundary via Bass Point Tourist Drive. Truck access is prohibited along Bass Point Tourist Drive.

Operations at the Quarry with the potential to generate dust, odour and fumes are as follows:

- Open pit operations, including drilling and blasting, front-end loader and haul truck movements;
- Western boundary amenity bund construction, including use of dozer, excavator and haul trucks;
- Processing plant operations, including stockpiling of materials, truck loading and distribution;
- Wind-generated erosion emissions from stockpiles and exposed surfaces;
- Ship loading operations; and
- Concrete plant operations.

This Plan details the measures that will be implemented to ensure adverse air quality impacts do not occur at off-site sensitive receptor locations. Refer to **Table 8** for a summary of the measures that will be implemented to comply with the relevant air quality criteria.

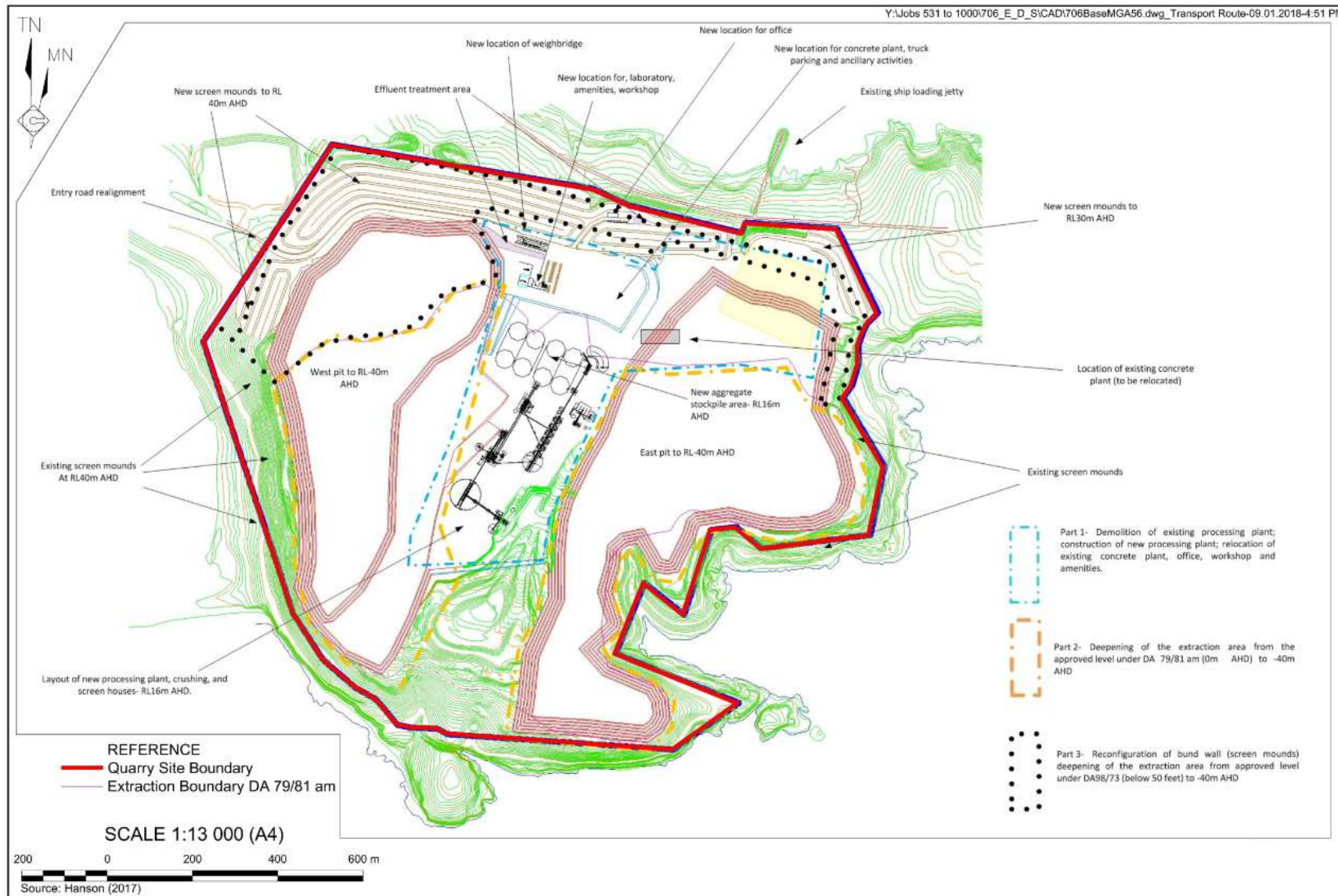


Figure 1: Site Layout

2. Statutory Requirements

2.1. Approval Requirements

Table 1 provides a summary of the specific conditions required to be adhered to by the conditions of Project Approval together with the relevant section(s) of this Plan indicating where the requirements have been addressed.

Table 1: Requirements of Conditions of Approval

Required Element (Approval MP 08_0173)	Relevant Section
Schedule 3, Condition 14 – Air Quality Criteria	
The Proponent must ensure that all reasonable and feasible avoidance and mitigation measures are employed so that particulate matter emissions generated by the project do not exceed the criteria [as specified] at any residence on privately-owned land.	Section 4, Section 9, Section 10
Schedule 3, Condition 15 – Operating Conditions	
The Proponent must:	
(a) implement best management practices to minimise the dust and fume emissions of the project;	Section 9
(b) regularly assess meteorological and air quality monitoring data and relocate, modify and/or stop operations on site as may be required to ensure compliance with the relevant conditions of this approval;	Section 7, Section 8, Section 9
(c) minimise the air quality impacts of the project during adverse meteorological conditions and extraordinary events;	Section 7, Section 8, Section 9, Section 10
(d) minimise any visible off-site air pollution; and	Section 8, Section 9
(e) minimise surface disturbance of the site, other than as permitted under this approval, to the satisfaction of the Secretary.	Section 9
Schedule 3, Condition 16 – Air Quality Management Plan	
The Proponent must prepare and implement an Air Quality Management Plan for the project to the satisfaction of the Secretary. This plan must:	
(a) be prepared in consultation with the EPA, and submitted to the Secretary for approval by 31 May 2014;	Section 2.3
(b) describe the measures that would be implemented to ensure: <ul style="list-style-type: none"> ▪ best management practice is employed; ▪ the air quality impacts of the project are minimised during adverse meteorological conditions and extraordinary events; and, ▪ compliance with the relevant conditions of this approval; 	Whole of document
(c) describe the proposed air quality management system based on the preparation of a site-specific best management practice determination and reactive dust management strategy; and.	Section 7, Section 8, Section 9, Section 10
(d) include an air quality monitoring program that: <ul style="list-style-type: none"> ▪ is capable of evaluating the performance of the project; ▪ includes a protocol for determining any exceedances of the relevant conditions of approval; ▪ adequately supports the air quality management system; and ▪ evaluates and reports on the adequacy of the air quality management system. 	Section 7, Section 13

Required Element (Approval MP 08_0173)

Relevant Section

Schedule 3, Condition 17 – Meteorological Monitoring

For the life of the project, the Proponent must ensure that there is a suitable meteorological station operating in the vicinity of the site that:

(a) complies with the requirements in the <i>Approved Methods for Sampling of Air Pollutants in New South Wales</i> guideline; and	Section 7.6
(b) is capable of continuous real-time measurement of temperature lapse rate, in accordance with the <i>NSW Industrial Noise Policy</i> , or as otherwise approved by the EPA.	Section 8.6

Schedule 5, Condition 3 – Management Plan Requirements

The Proponent must ensure that the Management Plans required under this approval are prepared in accordance with any relevant guidelines, and include:

(a) detailed baseline data;	Section 6
(b) a description of: <ul style="list-style-type: none"> ▪ the relevant statutory requirements (including any relevant approval, licence or lease conditions); ▪ any relevant limits or performance measures/criteria; and ▪ the specific performance indicators that are proposed to be used to judge the performance of, or guide the implementation of, the project or any management measures; 	Section 2, Section 4, Section 15
(c) a description of the measures that would be implemented to comply with the relevant statutory requirements, limits, or performance measures/criteria;	Section 9
(d) a program to monitor and report on the: <ul style="list-style-type: none"> ▪ impacts and environmental performance of the project; ▪ effectiveness of any management measures in (c) above; 	Section 8, Section 13
(e) a contingency plan to manage any unpredicted impacts and their consequences;	Section 10
(f) a program to investigate and implement ways to improve the environmental performance of the project over time;	Section 15, Section 16
(g) a protocol for managing and reporting any: <ul style="list-style-type: none"> ▪ incidents; ▪ complaints; ▪ non-compliances with statutory requirements; and ▪ exceedances of the impact assessment criteria and/or performance criteria; and 	Section 13
(h) a protocol for periodic review of the plan.	Section 13.4

Schedule 5, Condition 11 – Access to Information

By 31 May 2014, the Proponent must:

(a) make the following information publicly available on its website: <ul style="list-style-type: none"> ▪ the EA; ▪ all current statutory approvals for the project; ▪ all approved strategies, plans or programs; ▪ a summary of the monitoring results of the project, which have been reported in accordance with the various plans and programs approved under the conditions of this approval; ▪ a complaints register, updated on a quarterly basis; ▪ minutes of all CCC meetings; ▪ copies of any annual reviews, or similar (for the last 5 years); 	Section 11, Section 13, Section 14
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Required Element (Approval MP 08_0173)	Relevant Section
<ul style="list-style-type: none"> ▪ any independent environmental audit, and the Proponent's response to the recommendations in any audit; and ▪ any other matter required by the Secretary; 	
(b) keep this information up-to-date, to the satisfaction of the Secretary	Section 13

Schedule 3, Condition 13 of the Approval also requires that a Blast Management Plan is implemented including “a specific blast fume management protocol to demonstrate how emissions will be minimised, including risk management strategies if blast fumes are generated”. *Section 9* provides details of mitigation measures implemented to minimise blast fume.

2.2. Environment Protection Licence Requirements

The EPA regulates the operations conducted at the Quarry through an Environment Protection Licence (EPL 2193) issued under the *Protection of the Environment Operations Act 1997* (POEO Act). EPL conditions relevant to the Plan are outlined in **Table 2** below together with the relevant section(s) of the Plan indicating where the requirements have been addressed.

Table 2: EPL Requirements

Required Element (EPL 3751)	Relevant Section
Section 2, P1 Location of monitoring/discharge points and areas P1.1 Compliance dust monitoring undertaken at two locations identified as Point 4 and 5, located at the north-western side of the quarry and labelled "DDG 1" and "DDG 2".	Section 8.2
Section 3, L3 Blasting L3.5 Blasting operations at the premises may only take place between the hours of 8:00am to 5:00pm, Monday to Friday (excluding Public Holidays).	Section 9
Section 4, O2 Maintenance of plant and equipment O2.1 All plant and equipment installed at the premises or used in connection with the licensed activity: a) must be maintained in a proper and efficient conditions; and b) must be operated in a proper and efficient manner.	Section 9
Section 4, O3 Dust O3.1 The premises must be maintained in a condition which minimises or prevents the emission of dust from the premises.	Section 9
Section 5, M1 Requirement to monitor concentration of pollutants discharged M1.3 The following records must be kept in respect of any samples required to be collected for the purposes of this licence: a) the date(s) on which the sample was taken; b) the time(s) at which the sample was collected; c) the point at which the sample was taken; and d) the name of the person who collected the sample.	Section 8.2, Section 13.1
G2 Other General Conditions G2.1 Completed Programs <ul style="list-style-type: none"> ▪ PRP1 – Dust Suppression Trial: Dust Suppression Trial. Install and operate a non-aqueous dust suppression system to the crushing and screening plant. (*); ▪ PRP2 – Dust Control Equipment Installation: Installation of Dust Extraction and Suppression Equipment. Reduce dust emissions during extreme weather conditions (*) 	
	PRP1: Completed 31 July 2006 PRP2: Completed 30 June 2011

2.3. Consultation

Hanson undertakes ongoing consultation with DPIE and EPA regarding monitoring requirements at the site as detailed in **Table 3**.

Table 3: Consultation Summary

Date	Company/Agency	Items Discussed
Mid – Late 2015	EPA Other parties	It is understood by Hanson that the other parties were contacted mid-late 2015 regarding the EPA's proposal to establish an air quality monitoring network
December 2015	EPA Hanson	EPA consulted with Hanson via a letter in respect to the Quarry N&BMP and AQMP
19/04/2016	EPA: William Dove/Matt Fuller Hanson Boral Cleary Bros Holcim	Development of an ambient monitoring program for the four Illawarra hard rock quarries.
24/05/2016	Cement Concrete Aggregates Association (CCAA) working group met	Discussed the EPA's desire for an air quality monitoring network.
15/06/2016	CCAA phone conversation with EPA	Discussed the appointment of the CCAA as the representative industry body for the four quarries and requested a meeting once William Dove (EPA officer) returned from leave.
02/09/2016	CCAA EPA	Discussed the EPA's desire to establish DustTrak (real time) monitoring, a TARP, and data availability amongst other topics.
22/05/2017	EPA	In response to the 2016 Annual Review report submitted to EPA for the Quarry operations, EPA requested that the AQMP be updated to include on-site monitoring to demonstrate compliance with the PM ₁₀ and TSP impact assessment criteria specified in Condition 14 of Schedule 3 of the approval. The AQMP was revised on 26 June 2017 in response to this requirement (see Section 8).
04/09/2017	DPIE, EPA	Further comments were received from DPIE regarding the proposed PM ₁₀ monitoring program on 4 September 2017. Following additional consultation with EPA, Section 8 of the AQMP was revised on 6 November 2017 to address the comments received.
14/12/2017	DPIE	Final comments were received from DPIE on 4 December 2017 proposing that the revised AQMP be accepted, subject to a provision being included for the implementation of High Volume Air Samplers (HVAS) at sensitive locations, should the real-time monitoring indicate the possibility of exceedance of the air quality criteria at sensitive receivers. Sections 8 and Section 10 were revised on 14 December 2017 to address this requirement.
05/10/2021	DPIE	Revision 7 was mistakenly provided to DPIE prior to completion of the necessary consultation. DPIE requested that the section references in Table 1 be updated, consultation be undertaken (and the plan be updated accordingly), and justification provided for the AQMP update. The AQMP was revised on 15 October 2021 (7.1) to update Table 1 and Table 3.
25/10/2021	EPA	The EPA advised that they had reviewed the AQMP (7.1) and had no comments.
29.11.2021	DPIE	DPIE queried Figure 2 (sensitive receptors) because it was different to Appendix 2 of the Project Approval. The AQMP was revised on 30 November 2021 (7.2) to update Figure 2 and Table 4 so that they were consistent with the Project Approval and most recent Air Quality Impact Assessment (2011).

3. Sensitive Receptor Locations

A number of sensitive receptors are situated in the area surrounding the Quarry. **Table 4** presents the location of the closest adjoining residences. Locations are illustrated in **Figure 2**. Furthermore, it is noted that the surrounding suburb of Shell Cove is undergoing significant residential development, with vacant lots approved for dwelling construction. The Quarry is situated in a coastal setting and as a result, the topographical features surrounding the site are quite varied. Beyond the Quarry boundary, the terrain undulates gradually, increasing to the west from the Killalea Lagoon. The majority of sensitive receptor locations (see **Table 4**), are located at an elevation at or below that of the Quarry perimeter terrain.

Table 4: Closest Receptor Locations

Receptor ID	Location	Geo. Coordinates (m, MGA56)		Distance (km) / Direction from Site Boundary	Elevation (m AHD)
		Easting	Northing		
R1	Boollwarroo Parade	304,815	6,170,987	1.0 / NNW	6
R2	Mary Street	304,480	6,171,080	1.2 / NNW	6
R3	Sophia Street Park	304,195	6,171,070	1.3 / NNW	6
R4	Sloop Avenue	303,815	6170715	1.3 / NW	17
R5	Apollo Drive	303,915	6,170,400	1.1 / NW	14
R6	Makaha Way	304,200	6,170,110	0.7 / WNW	21
R7	Mystics Drive	304,185	6,169,960	0.7 / WNW	27
R8	Hinchinbrook Drive	303,790	6,169,810	0.9 / WNW	32
R9	Magnetic Ridge	303,735	6,169,620	0.9 / W	46
R10	Shell Cove Primary School	303,410	6,169,700	1.3 / W	37
R11	Norman Close ¹	303,680	6,169,460	1.0 / W	51
R12	Davis Parkway ¹	303,650	6,169,265	1.1 / WSW	55
R13	Killalea State Park Picnic Area	304,015	6,168,955	0.8 / SW	52
R14	Proposed Playing Fields, Shell Cove	304,850	6,169,855	0.2 / N	19
R15	The Shallows Coastal Reserve Carpark	305,335	6,170,090	0.05 / NW	6

¹ Proposed Residential Location

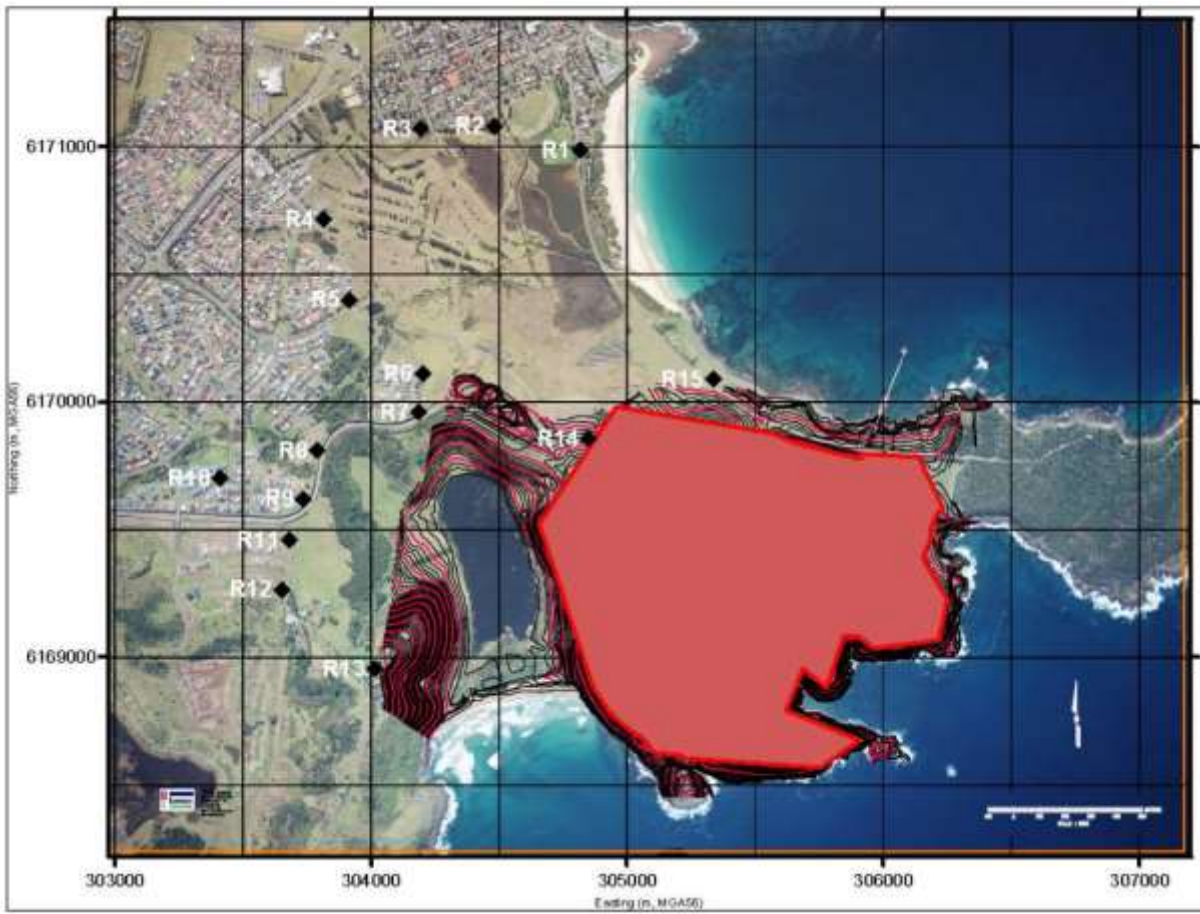


Figure 2: Closest Receptors to the Quarry

4. Air Quality Criteria

Air quality impact assessment criteria relevant to the Quarry operations are provided in *Schedule 3, Condition 14* and Tables 4, 5 and 6 of *Approval 08_0143* and have been reproduced below. These criteria are prescribed by the NSW EPA in their document, *Approved Methods for the Modelling and Assessment of Air Pollutants in New South Wales* (2016).

These criteria apply at any residence on privately-owned land. In accordance with the Approval, the operations at the Quarry and any associated operations must not cause any exceedances of the air quality impact assessment criteria outlined below.

Table 5: Criteria for Particular Matter

Pollutant	Averaging Period	Criterion	Source
Total suspended particulate (TSP)	Annual	90 µg/m ³ (a)	Approval 08_0143
Particulate matter < 10 µm (PM ₁₀)	Annual	30 µg/m ³ (a)	Approval 08_0143
	24 hours	50 µg/m ³ (a)	Approval 08_0143
Deposited dust (c)	Annual	Maximum Increase in Deposited Dust Level	Approval 08_0143
		2 g/m ² /month (b)	
		Maximum Total Deposited Dust Level	
		4 g/m ² /month (a)	

Notes:

- (a) Total cumulative concentrations and deposition rates due to the project plus background levels due to all other sources.
- (b) Incremental increase in deposition rate due to the project on its own.
- (c) Deposited dust is to be assessed as insoluble solids as defined by Standards Australia, *AS/NZS 3580.10.1:2003 Methods for Sampling and Analysis of Ambient Air – Determination of Particulate Matter - Deposited Matter - Gravimetric Method*.

5. Dispersion Modelling Results

The SLR report “Bass Point Quarry Expansion – Air Quality Impact Assessment” (2010) [hereafter BPQ AQIA (2010)] provides the results of an air quality dispersion modelling assessment undertaken for the Project. It contains detailed baseline monitoring data and an analysis of the local meteorology and topography for the local area.

The findings of the modelling exercise indicated that operations at the Quarry would generally comply with the relevant criteria and that the likelihood of adverse cumulative impact is low.

In summary:

- Dust deposition rates were predicted to be below the air quality criterion at all surrounding sensitive receptor locations assessed for all modelled scenarios, with the exception of the closest modelled receptor (R9; the proposed playing fields) during Scenario 1a (i.e. current site configuration at production rate of 1.5 Mtpa plus construction of western boundary amenity bund)¹.
- Cumulative annual average PM₁₀ concentrations were predicted to satisfy the air quality criterion at all surrounding sensitive receptor locations for all modelled scenarios.
- Cumulative annual average TSP concentrations were predicted to satisfy the air quality criterion at all surrounding sensitive receptor locations for all modelled scenarios.
- A small number of exceedances of the impact assessment criterion for 24-hour average PM₁₀ concentrations were predicted when cumulative impacts were addressed. However, review of the likely frequency of exceedances occurring through comparison of the likely concurrence of elevated ambient PM₁₀ concentrations and incremental increase attributable to the quarry were very low. Additionally, exceedances were experienced only at near field, non-residential sensitive receptor locations. Consequently, the potential for adverse impact associated with 24-hour average PM₁₀ was considered very low.
- Reference should be made to the BPQ AQIA (2010) for further details.

¹ Note: Previously modelled receptors differ to those identified in Section 3 due to subsequent residential development

6. Baseline Air Quality

6.1. Baseline Dust Deposition Rates

Dust deposition monitoring is being conducted at two locations along the north-western side of the quarry boundary, as required by the EPL conditions. However, all data recorded by these gauges includes the impacts of activities occurring at the Quarry, which has been operating since the 1880s. There is therefore no baseline data available for the site and surrounds.

6.2. Baseline PM₁₀ Concentrations

Baseline PM₁₀ data is not available for the Quarry. Regional PM₁₀ real-time data is available from the DPIE Albion Park South Air Quality Monitoring Station (AQMS). This air quality monitoring site is located in Terry Reserve on Hughes Drive, Albion Park, approximately 8.5 km west-northwest of the Quarry.

The results of monitoring undertaken at the Albion Park South monitoring site during the year 2008 are summarised in **Figure 3**. During this year, a maximum 24-hour average PM₁₀ concentration of 96.1 µg/m³ was recorded on 1 July 2008, which is above the EPA 24-hour criterion of 50 µg/m³. The second highest concentration measured during 2008 was 45.1 µg/m³ on 2 October 2008. The annual average PM₁₀ concentration recorded during 2008 was 14.8 µg/m³, which is below the EPA annual average criterion of 25 µg/m³.

More recent PM₁₀ monitoring data from the year 2018 (see **Figure 4**) has also been analysed for comparison to the 2008 baseline data. The highest 24-hour average PM₁₀ concentration measured at the Albion Park South monitoring site in 2018 was 94.4 µg/m³ on 2 December 2018, which is above the EPA 24-hour criterion of 50 µg/m³. The average PM₁₀ concentration recorded during 2016 was 17.8 µg/m³.

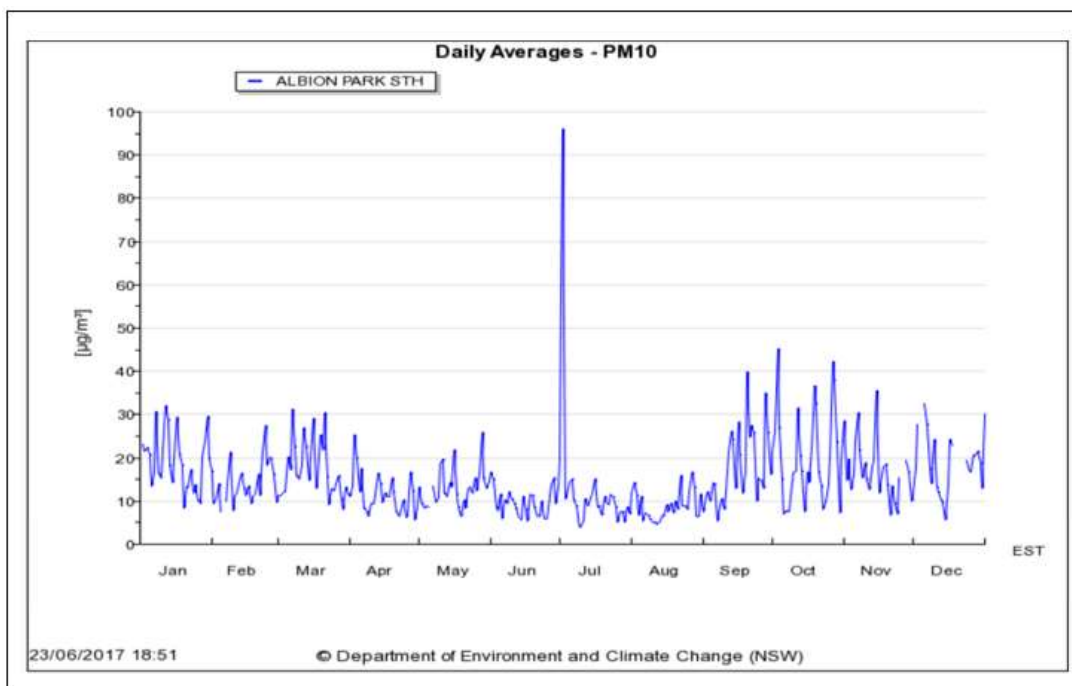


Figure 3: PM₁₀ (24-Hour Average) Monitoring Results for Albion Park South, 2008

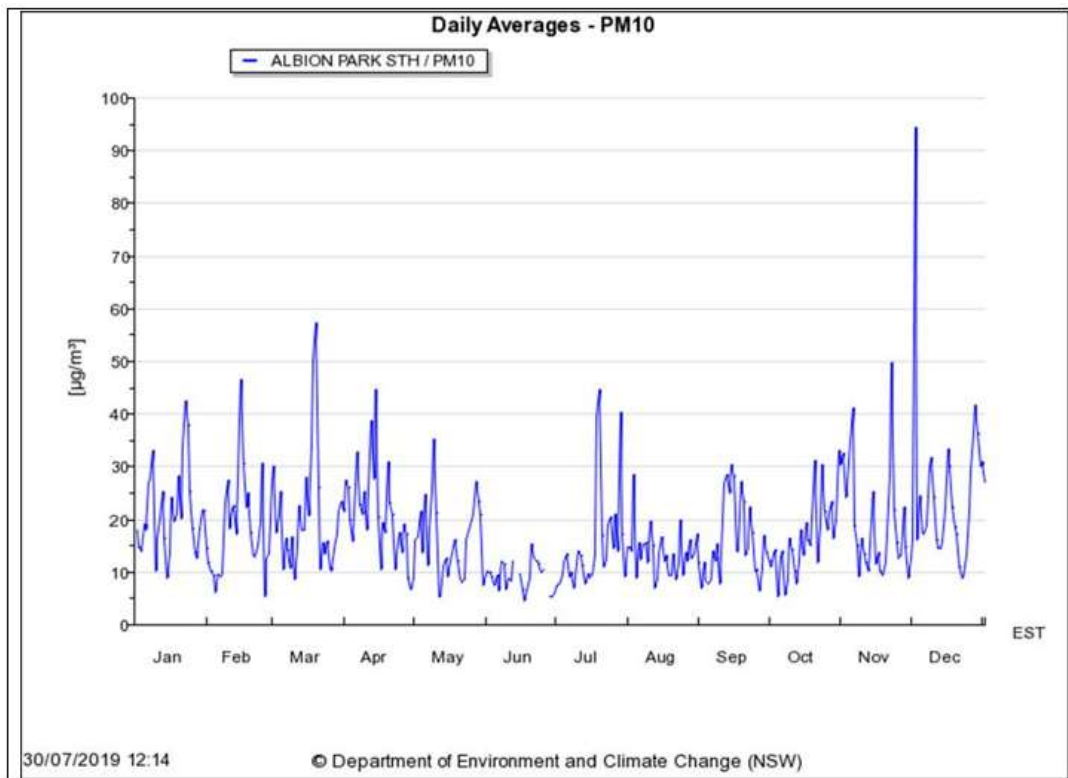


Figure 4: PM₁₀ (24-Hour Average) Monitoring Results for Albion Park South, 2018

The above analysis indicates that background PM₁₀ concentrations have not materially changed over the 10-year period 2008-2018.

6.3. Baseline TSP Concentrations

TSP is not currently monitored in the vicinity of the Quarry. The DPIE have historically conducted concurrent TSP and PM₁₀ sampling in the Illawarra region through a network of High Volume Air Sampler (HVAS) units. HVAS sampling data for TSP and PM₁₀ concentrations in the Illawarra region, conducted on a one-in-six day cycle between 1996 and 2004, was obtained from the DPIE (then Office of Environment and Heritage) for the purposes of the BPQ AQIA (2010) report.

To derive a suitable background TSP concentration from the PM₁₀ data recorded by the DPIE at Albion Park (see preceding section), the ratio of PM₁₀ to TSP from the historical HVAS sampling data in the Illawarra region was analysed. The average PM₁₀ to TSP ratio of all monitoring data between 1996 and 2004 was calculated to be 36% and this was used as an indicative relationship between the two parameters in the Illawarra Region.

When applied against the annual average PM₁₀ concentration recorded at the Albion Park South monitoring station in 2008 and 2018 (i.e. 14.8 µg/m³ and 17.8 µg/m³ respectively), a background annual average TSP concentration of 45 µg/m³ can be derived. This represents fifty percent of the EPA annual TSP criterion of 90 µg/m³.

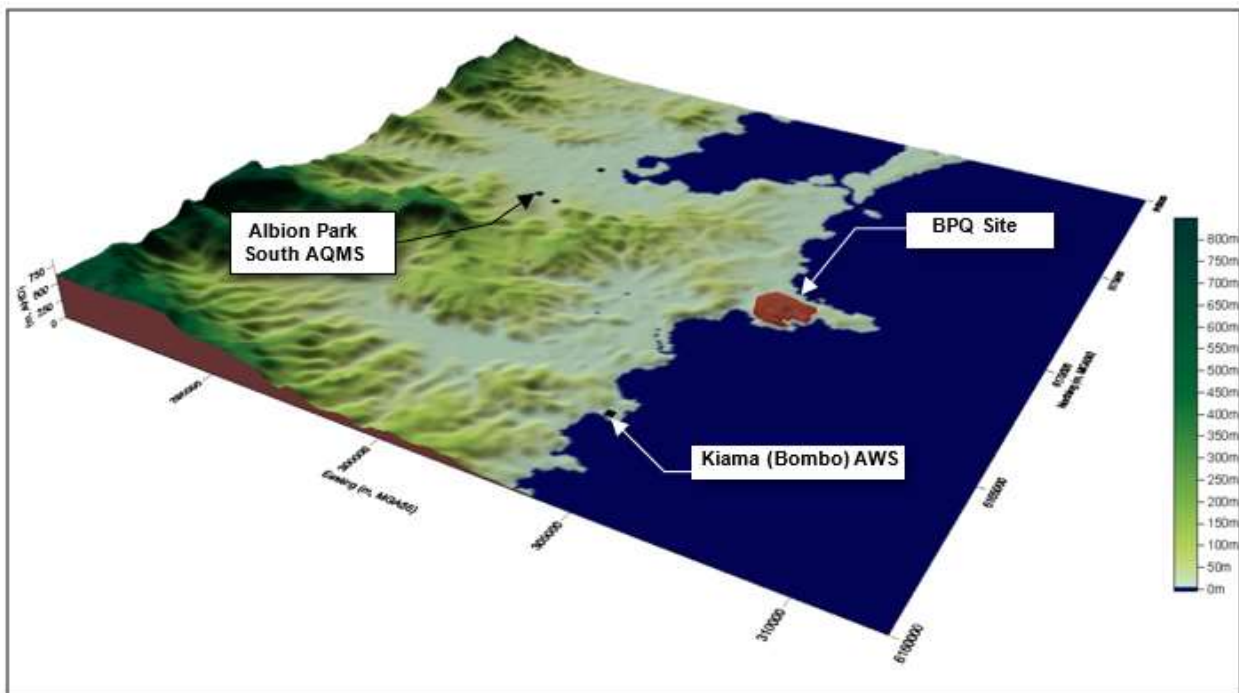
7. Meteorological Conditions

To adequately characterise the meteorology of the Quarry area, monitoring data from the Bureau of Meteorology’s (BoM) Kiama (Bombo Headland) Automatic Weather Station (AWS) was sourced. The location details of this monitoring station are provided in **Table 6**. Due to a similar coastal siting (see **Figure 5**), the Kiama (Bombo) AWS is considered representative of weather conditions likely to be experienced at the site.

The proximity of the Kiama AWS to the Project Site and the topographical features between the two locations is presented in **Figure 5**. The Albion Park South AQMS discussed in **Section 6.2** is also shown.

Table 6: Meteorological Monitoring Station Details

Station Name	Station ID	Location (m, MGA56)		Distance (km) / Direction from Project Site	Base Elevation (m, AHD)
		Easting	Northing		
Kiama (Bombo)	068242	303,966	6,163,336	5.5 / SSW	15.5 m



Source: BPQ AQIA (2010)

Figure 5: Location of Regional Meteorological and Air Quality Monitoring Stations

Annual and seasonal wind roses (i.e. plots of wind speed and direction) have been generated for the years, 2011 to 2013, and are presented in **Figure 6**. The plots show that winds from the north, north-northeast, south and south-southwest, and west quadrants are prevalent in the local area, with winds from the west also experienced at the Quarry. The frequency of calm wind conditions (i.e. wind speeds of less than 0.5 m/s) for the 3 year period was 2.2%. East and southeasterly winds, which have the potential to transport airborne pollutants in the direction of sensitive receptors to the west of the Quarry, are experienced infrequently throughout the year (less than 4% of the time) in the local area.

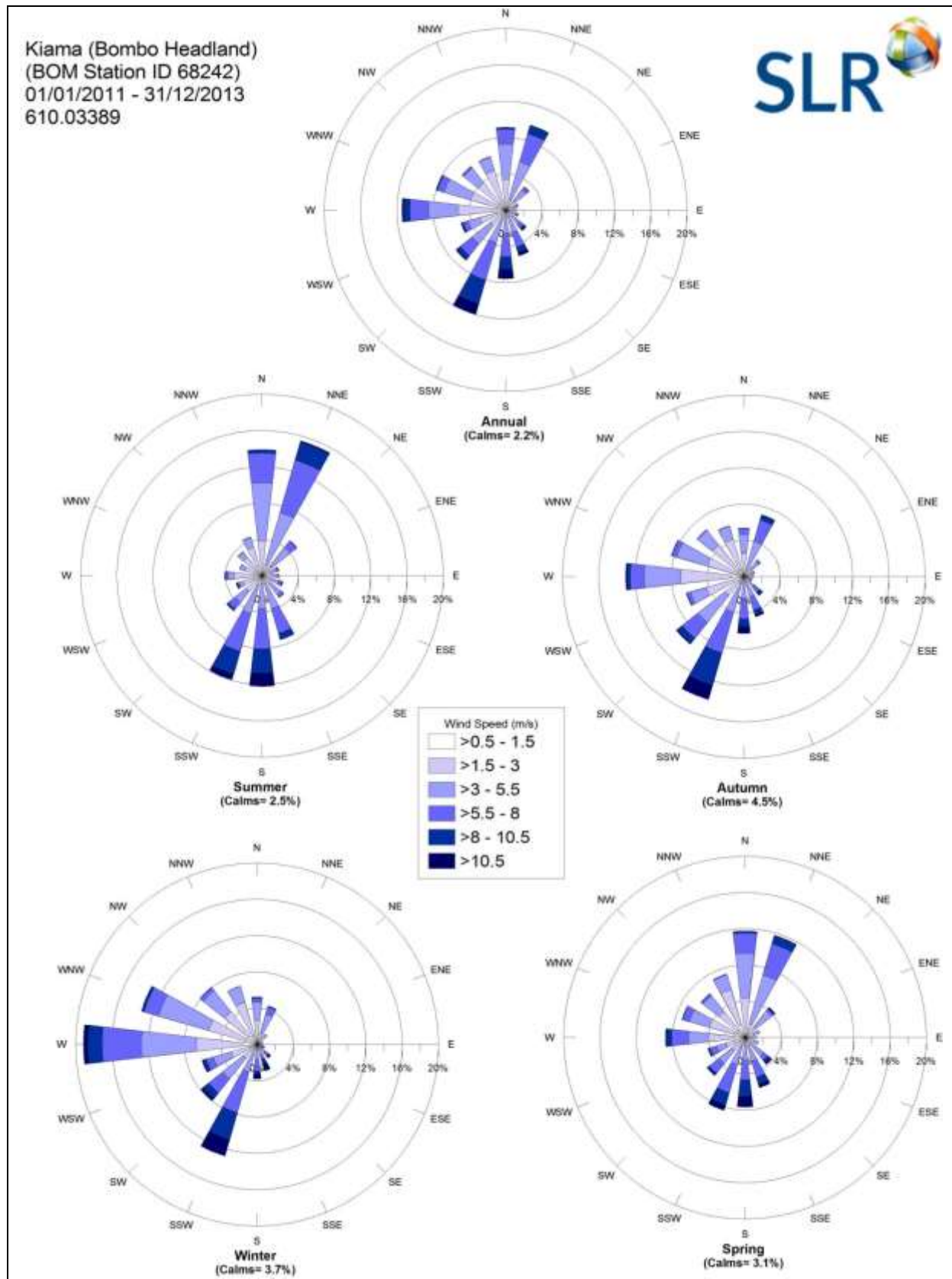


Figure 6: Annual and Seasonal Wind Roses, 2011 - 2013, Kiama AWS

8. Air Quality Monitoring Program

The Air Quality Monitoring Program has been developed in consultation with the EPA and DPIE. The monitoring program is designed to ensure that air quality is measured at representative locations in the vicinity of the Quarry. Data from the monitoring program will be used to determine the impact of the Quarry's operations on the surrounding air environment and private properties in the vicinity of the Quarry, and the compliance status of the quarrying operations in relation to Approval conditions.

8.1. General Requirements of the Air Quality Monitoring Program

The Air Quality Monitoring Program includes:

- dust deposition monitoring at two on-site monitoring locations;
- real-time PM₁₀ monitoring as part of a proactive dust management system;
- sampling of PM₁₀ concentrations using a low volume sampler on a 1 day in 6 regime; and
- meteorological conditions recorded at the nearby BoM Kiama (Bombo Headland) AWS

Data from this monitoring program will help determine the compliance status of the Project.

8.2. Dust Deposition Monitoring

Dust Deposition Gauges (DDGs) record dust fallout and are a useful measure of longer-term changes in air quality.

Two (2) EPL DDGs are installed to the west and northwest of the quarry and are referred to as "DDG-1" and "DDG-2". Monitoring locations are presented in Figure 7. The monitoring locations conform to the requirements of AS 3580.1.1:2007 *Methods for sampling and analysis of ambient air – Guide to siting air monitoring equipment*, subject to local site constraints with any deviations from the standard noted in the siting documentation.

DDGs are exposed for 30 days (± 2 days) and analysed for Total Insoluble Solids and Ash Residue. Equipment and monitoring methods complies with *Approved Methods for the Sampling and Analysis of Air Pollutants in New South Wales (2005)* and Australian Standard, *AS/NZS 3580.10.1:2016 Determination of particulate matter – Deposited matter – Gravimetric method*. Monitoring is conducted by suitably trained personnel.

Where rain events occur, dust deposition flasks are changed over to prevent over-filling and therefore loss of sample, with the results of the analyses summed to provide a total dust deposition rate for the monitoring period.

All air quality monitoring samples are analysed at a NATA accredited laboratory and results interpreted and reported by a suitably qualified personnel.

Where dust deposition rates of greater than 4 g/m²/month are measured at the EPL monitoring points, these results are recorded within the site's EPL Annual Return.

In accordance with Condition M1 of EPL 2193, the following records of monitoring are kept:

- a. the date(s) on which the sample was taken;

- b. the time(s) at which the sample was collected;
- c. the point at which the sample was taken; and
- d. the name of the person who collected the sample.

Monitoring records must also be maintained and kept for a period of at least four years.

8.3. Suspended Particulate - Continuous PM₁₀ Monitor

A continuous PM₁₀ monitor is installed on the northern site boundary as shown in Figure 7 (monitoring site PM10-1). The monitor is fitted with a wind sensor to record wind speed and wind direction in the vicinity of the sample inlet.

The PM₁₀ monitor is a beta-attenuation monitor, which continuously records ambient concentrations of PM₁₀. The instrument operates in compliance with *AS/NZS 3580.9.11:2016 Methods for sampling and analysis of ambient air Determination of suspended particulate matter - PM₁₀ beta attenuation monitors* and operated in accordance with manufacturer's specifications, including all calibration and maintenance requirements as set out in the operating manual. The monitoring location conforms with the requirements of *AS 3580.1.1:2016 Methods for sampling and analysis of ambient air – Guide to siting air monitoring equipment*, subject to local site constraints with any deviations from the standard noted in the siting documentation.

The air quality impact assessment criteria for PM₁₀ set out in *Section 4* apply at any residence on privately-owned land. As the PM10-1 monitoring site is located on-site and is significantly closer to the quarrying activities than the nearest sensitive receptors, an exceedance of the criterion recorded at this location does not represent non-compliance with the criteria presented in *Section 4*.

Rather, the main objective of the continuous PM₁₀ monitoring is to provide real-time information to the Quarry on the current PM concentrations being experienced on site. Real-time data allows for proactive dust management in the event that short-term concentrations of PM exceed specified trigger levels.

This is achieved through the Trigger Action Response Plan (TARP) detailed in *Section 9.3*.

Where the continuous PM₁₀ monitor data indicates that there is a possibility of exceedance of air quality criteria at sensitive receptors, and investigations using the Low Volume PM₁₀ Sampler confirm this (see *Section 8.4*), then a High Volume Air Sampler will be installed and operated at the sensitive receptor location (subject to landowner approval) to assess compliance at this location.

A summary of the continuous PM₁₀ monitoring data will be included in the site's Annual Review. This will include a comparison of the on-site PM₁₀ data and data recorded over the same period by the Albion South AQMS, to provide an assessment of on-site PM₁₀ concentrations compared to regional background levels. Any 24-hour or annual average PM₁₀ concentrations recorded above the PM₁₀ criteria presented in *Section 4* will be identified, and assessment of whether they relate to on-site operations or regional background levels will be provided.

Consistent with air quality monitoring undertaken for the purposes of the EPL (Condition M1 of the EPL 2193), the following records of monitoring will be kept in relation to the PM₁₀ monitoring:

- a. A date/time stamped electronic data file of the raw PM₁₀ concentration data, wind speed and wind direction data recorded by the monitor;
- b. A date/time stamped electronic data file of verified and quality assured PM₁₀ concentration data and wind speed and wind direction data with records of the reasons for any invalidated data removed from the dataset;
- c. Written records of investigations and remedial actions taken (where applicable) for each event when exceedances of the trigger levels outlined in *Section 9.3* have been recorded; and
- d. Records of all maintenance and calibration activities performed on the monitor.

The above records must also be maintained and kept for a period of at least 4 years.

8.4. Suspended Particulate - Low Volume PM₁₀ Sampler

A low volume air sampler (LVAS) fitted with a PM₁₀ sampling head has historically been installed on site at the northwestern side of the quarry (now superceded; referred to as PM10-2_SS in Figure 7).

It has been identified that there is potentially to confound the LVAS monitoring results due to ongoing earthworks at the adjacent marina site, north-east of the Quarry.

As a result, PM10-2 LVAS monitoring location has been relocated approximately 250 m from the northwestern boundary of the site (referred to as PM10-2_NEW in Figure 7). The location is not within Hanson owned land however an agreement to site the LVAS instrument at this location has been reached with the land owners/managers.

The LVAS is operated on a 1-day-in-6 regime. The PM₁₀ LVAS is operated in accordance with *AS/NZS 3580.9.9:2017 Methods for sampling and analysis of ambient air Determination of suspended particulate matter - PM₁₀ low volume sampler – Gravimetric method* and the manufacturer's specifications, including all calibration and maintenance requirements as set out in the operating manual. The new monitoring location conforms with the requirements of *AS 3580.1.1:2016 Methods for sampling and analysis of ambient air – Guide to siting air monitoring equipment*, subject to local site constraints with any deviations from the standard noted in the siting documentation. For this location, this principally comprises of a siting with a minimum clear-sky angle of 120 degrees above the sample inlet, as well as ensuring that it is located as far as practicable from buildings / other objects or tree drip-lines. The filter papers are weighed before and after sampling by a laboratory accredited by the National Association of Testing Authorities (NATA) for gravimetric analysis of particulate matter.

The PM₁₀ LVAS is a highly portable instrument that operates on a battery and can be easily relocated if required. These advantages are a function of the relatively low air volume that is drawn through the LVAS filter, as the name suggests. This means that for a 24-hour sample period, insufficient PM may be collected to enable low PM concentrations to be expressed with precision. Hence, lower 24-hour average concentrations are typically recorded as "<25 µg/m³" as this reflects the detection limit of the method.

As the PM10-2 monitoring site is located between the Quarry boundary and the nearest residences, an exceedance of the 24-hour or annual average criteria does not necessarily mean that an exceedance of the assessment criteria for PM₁₀ set out in *Section 4* (which apply at any residence on privately-owned land).

However, if a non-compliance is experienced at the PM₁₀-2 sampling site, or a particulate matter complaint is received from a nearby residence, the PM₁₀ LVAS may be relocated to the nearest/relevant residence (with owner approval) to enable a detailed investigation of PM₁₀ concentrations to be performed. During such investigations, more frequent sampling (e.g. every second day) may be used to enable data to be collected at a higher temporal resolution than the standard 1-day-in-6 regime.

Based on the findings of such investigations, a High Volume Sampler (HVAS) may be installed and operated at the sensitive receptor location (subject to landowner approval) to measure ambient PM₁₀ concentrations in accordance with the NSW EPA *Approved Methods for the Sampling and Analysis of Air Pollutants in New South Wales* (2005). This is discussed further in *Section 8.5*.

A summary of the PM₁₀ LVAS monitoring data will be included in the site's Annual Review. The measured 24-hour average PM₁₀ concentrations will be compared to data recorded over the same period by the Albion South AQMS to provide an assessment of on-site PM₁₀ concentrations compared to regional background levels. Any 24-hour or annual average PM₁₀ concentrations recorded above the PM₁₀ criteria presented in *Section 4* will be identified, and an assessment of whether they relate to on-site operations or regional background levels will be provided.

Consistent with the requirements for other air quality monitoring completed under the EPL (Condition M1 of the EPL 2193), the following records must be kept for each sampling event using the PM₁₀ LVAS:

- a. Sampling location;
- b. The name of the person who collected the sample
- c. Start and end date and time of the sampling period;
- d. Pre- and post-sampling filter paper weights;
- e. Sampling air flowrate;
- f. Total volume of air sampled;
- g. Calculated PM₁₀ concentration;
- h. Wind speed and wind direction data recorded by the sensor attached to the LVAS;
- i. Written records of investigations and remedial actions taken (where applicable) for each event when exceedances of the PM₁₀ criteria presented in *Section 4* have been recorded; and
- j. Records of all maintenance and calibration activities performed on the monitor.

The above records must also be maintained and kept for a period of at least 4 years.

8.5. Suspended Particulate - High Volume Air Sampler (Compliance Monitoring)

The NSW *Approved Methods for the Sampling and Analysis of Air Pollutants in New South Wales* (2005) lists two methods for the measurement of ambient PM₁₀ concentrations:

- AS 3580.9.6-2015 *Particulate matter – PM₁₀ – high volume sampler with size-selective inlet*
- AS 3580.9.8-2016 *Particulate matter – PM₁₀ – TEOM.*

As noted above, the continuous PM₁₀ monitor is used for operational dust management purposes and the LVAS is used as an indicator of off-site compliance.

These methods are considered fit-for-purpose and have been selected for use in this Plan due to their reduced siting requirements, portability and lower capital / operational costs compared to the sampling methods detailed within the EPA's Approved Methods.

As noted in *Section 8.4*, if elevated PM concentrations are recorded by the PM₁₀ LVAS at the PM10-2 sampling site, or an air quality complaint is received from a nearby residence, the PM₁₀ LVAS may be relocated to the nearest/relevant residence (with owner approval) to enable a detailed investigation of dust levels to be performed.

Should the investigations using the PM₁₀ LVAS non-compliance with air quality criteria at a sensitive receptor location, then a High Volume Air Sampler (HVAS) will be installed and operated at the sensitive receptor location to provide monitoring data compliant with the NSW EPA *Approved Methods for the Sampling and Analysis of Air Pollutants in New South Wales* (2005). Installation and operation of the HVAS at the sensitive receptor will be subject to gaining landowner approval to access a suitable monitoring location where a mains power supply can be provided.

The results of any PM₁₀ HVAS monitoring will be included in the site's Annual Review. The measured 24-hour average PM₁₀ concentrations will be compared to data recorded over the same period by the Albion South AQMS to provide an assessment of on-site PM₁₀ concentrations compared to regional background concentrations. Any 24-hour or annual average PM₁₀ concentrations recorded above the PM₁₀ criteria presented in *Section 4* will be identified, and an assessment of whether they relate to on-site operations or regional background levels will be provided.

Consistent with the air quality monitoring completed for the purposes of the EPL (Condition M1 of the EPL 2193), the following records must be kept for any sampling using a PM₁₀ HVAS:

- a. Sampling location;
- b. The name of the person who collected the sample
- c. Start and end date and time of the sampling period;
- d. Pre- and post-sampling filter paper weights;
- e. Sampling air flowrate;
- f. Total volume of air sampled;
- g. Calculated PM₁₀ concentration;
- h. Written records of investigations and remedial actions taken (where applicable) for each event when exceedances of the PM₁₀ criteria presented in *Section 4* have been recorded; and
- i. Records of all maintenance and calibration activities performed on the monitor.

The above records must also be maintained and kept for a period of at least 4 years.

8.6. Meteorological Monitoring

As outlined in *Section 7*, the continuous PM₁₀ monitor and Low Volume Air Sampler will be fitted with wind sensors to record concurrent wind speed and wind direction data at the sampling heads. These data will be used to analyse the measured PM₁₀ data to determine (if relevant/possible) the potential sources of any elevated dust levels recorded. The wind data may also be used to assess whether (for example) there is a wind speed threshold that results in a significant increase in dust levels that may be used as a management tool to trigger the need for additional dust control.

The nearby and representative BOM weather station at Kiama (Bombo Headland) is referred to for all meteorological monitoring. This AWS provides representative real-time weather data including wind speed and direction, rainfall, temperature (including sigma theta), temperature lapse rate and humidity, and complies with the requirement in the EPA's *Approved Methods for the Sampling and Analysis of Air Pollutants in New South Wales* (2005).

Real-time data from the station is made available to environmental personnel and the Quarry Manager to assist in operational monitoring and real-time response.

To illustrate the suitability of the Kiama AWS dataset, the BPQ AQIA (2010) compared hourly wind speed and direction observations concurrent with the observations recorded at the Quarry weather station between 2008 and 2009. It was shown that a very similar wind direction pattern is experienced at both stations, although wind speed is typically stronger at the Kiama AWS than the Quarry weather station, which is most likely due to the more exposed setting of the Kiama AWS site.

8.7. Summary of Air Quality Monitoring Program

The Air Quality Monitoring Program consists of the following:

- Two (2) dust deposition gauges;
- One on-site continuous PM₁₀ monitor;
- One low volume PM₁₀ sampler (which can be located to residential locations for investigations of impacts at sensitive receptor locations); and
- One (1) representative AWS in the vicinity of the Project Site.

All monitoring locations conform to the requirements of *AS 3580.1.1:2016*, subject to local site constraints. Air quality monitoring locations are illustrated in **Table 7**.

Table 7: The Quarry Air Quality Monitoring Network

Site No.	Location	Parameter	Instrument	Frequency
DDG-1 (EPL Pt 4)	Western Boundary	Dust Deposition	DDG	30 days (± 2 days)
DDG-2 (EPL Pt 5)	Northwest Boundary	Dust Deposition	DDG	30 days (± 2 days)
PM ₁₀ -1	Northern Boundary	PM ₁₀	BAM	Continuous
PM ₁₀ -2	Northwest Boundary	PM ₁₀	LVAS	1 day in 6
Automatic Weather Station	Kiama (Bombo Headland)	Meteorological Parameters	AWS	Continuous

Should the monitoring program outlined above indicate that there is a possibility of exceedance of air quality criteria at a sensitive receptor location due to emissions from the

Quarry, then a HVAS will be installed and operated at the sensitive receptor location, subject to landowner approval, to provide monitoring data compliant with the *NSW Approved Methods for the Sampling and Analysis of Air Pollutants in New South Wales (2005)*.



Figure 7: Dust Deposition and PM₁₀ Monitoring Locations

9. Mitigation Measures

9.1. Best Practice Measures

The potential for atmospheric emissions during quarry operations can be largely controlled through the implementation of a range of best practice mitigation measures, including good site management, good housekeeping measures, vehicle and equipment maintenance, and spills and leaks management procedures. Best practice mitigation measures will vary by application and location. As such, site-specific mitigation measures, which reflect the concept of best practice, are provided in the following section.

9.2. Site Specific Mitigation Measures

The site-specific air emissions mitigation measures implemented at the Quarry are listed in **Table 8**.

Table 8: Site Specific Mitigation Measures

Mitigation/Control Measure	Implementation Timing	Responsibility
Engineering Controls		
Enclosure of crushing plant and raw materials unloading point.	Incorporated into the design of the new processing plant and/or operational machinery	Project Manager to ensure plant is built to specifications.
Partial/complete enclosure of all conveyors at site, including transfer to ship load out.		
Truck spray bar prior to weigh station at exit.		Site Manager to ensure that the plant is operating correctly
Tunnels used to reclaim materials from stockpiles.		
Enclosure of crushers.		
Dust extraction system fitted on the new crushing plant.		
Fitting of scrapers to clean conveyor belts.		
Dust suppression sprays on the primary crusher.		
Fitting drills with either water sprays and/or dry dust collection devices.		
Location of new plant/crusher in the pit.		
Operational Controls		
Routine water spraying of haul routes and unsealed surfaces.	Ongoing	Site Manager to direct. Operator to implement.
Water spraying of stockpiles and stockpile transfer points.	Ongoing	Site Manager to direct. Operator to implement.
Routine (minimum once weekly) cleaning (street sweeper) of selected sealed interna haul roads, and the approved transport route along Bass Point Quarry Road, up to and including the roundabout	Ongoing	Site Manager to direct. Contractor to implement.
Maintaining control over the state of trucks leaving the Quarry, minimising truck-out of materials which may lead to enhanced paved road silt loading. Maintenance and application of existing spray bar will assist in this matter.	Ongoing	Site Manager Truck driver

Mitigation/Control Measure	Implementation Timing	Responsibility
Ensuring the regular maintenance of Quarry haul routes, both unsealed and sealed, is continued.	Ongoing	Site Manager or delegate to continuously review.
Dust suppression is in place at key points to minimise the dust using either water or an environmentally friendly chemical dust suppressants.	Ongoing	Site Manager to regularly review.
All hazardous liquid materials are stored in mobile bunds. Bunds are inspected regularly and are cleared after any major rain event so as to maintain efficient capture levels. Safety measures are in place to minimise spill occurrences including emergency shut off procedures and spill kit and mobile bunding procedures (refer to the Bass Point Site Emergency Plan). Hydraulic lines are routinely inspected, and hoses are replaced prior to failure due to wear.	Ongoing	Site Manager to ensure compliance.
Haul roads and processing areas to be compacted and suitably constructed.	As required.	Site Manager to direct operators.
Implementation of requirements of this Plan.	Throughout operations	Site Manager/supervisor or their delegate
Completion of ongoing monitoring and reporting as described in this Plan.	Throughout operations	Site Manager/supervisor or their delegate
Reviewing meteorological conditions as they relate to dust generation.	Daily	Site Manager/supervisor or their delegate
Daily overburden haulage and placement will be guided by ambient weather conditions.	Daily	Site Manager/supervisor or their delegate
Reviewing of meteorological conditions prior to blasting and amendment of blast plans if excessive dust generation is anticipated, and/or winds are blowing towards sensitive receptor locations.	Prior blasting	Site Manager/supervisor or their delegate
Topsoil stripping when moist either naturally or through application of water.	Overburden stripping	Site Manager/supervisor or their delegate
Traffic confined to pre-determined haul routes and laydown areas where feasible.	Throughout operations	Site Manager/supervisor or their delegate
Progressive rehabilitation of the bund and wherever practical after operations.	Throughout operations	Site Manager/supervisor or their delegate
Watering of haul roads.	As required	Site Manager/supervisor or their delegate
Use of dust suppressants on haul roads or unsealed areas where watering or rehabilitation is not effective or possible.	As required	Site Manager/supervisor or their delegate
Restrictions on speed of vehicles on site.	Ongoing	Site Manager/supervisor or their delegate
Cleaning up of areas which could become sources of wind blown dust due to build-up of settled fine material.	As required	Site Manager/supervisor or their delegate
Routine inspection of pollution control equipment.	As required	Site Manager/supervisor or their delegate

Mitigation/Control Measure	Implementation Timing	Responsibility
Minimising the area of exposed surfaces and stockpiles in the more exposed areas of the Quarry site. Revegetation of the amenity bunds to minimise wind erosion from these areas.	As required	Site Manager/supervisor or their delegate
Ensuring the regular maintenance of Quarry haul routes, both unsealed and sealed, is continued.	Ongoing	Site Manager/supervisor or their delegate
Planning Controls		
Minimising the area of exposed surfaces and stockpiles in the more exposed areas of the Quarry.	Campaign based	Site Manager to co-ordinate with horticulturalist/suitably qualified person.
The quarry has been designed with the plant in the pit to reduce off site dust impacts at nearby sensitive receptors.	Incorporated into the design of the new processing plant.	Project Manager to ensure plant is built to specifications.
Education of staff, including orientations/inductions.	As required	Site Manager/supervisor or their delegate

9.3. Trigger Action Response Plan

A Reactive Dust Management Strategy, based on the following Trigger Action Response Plan (TARP), is to be implemented at the Quarry as part of this Plan.

A 1-hour average time period has been selected as a practical time-step for identifying sustained elevated dust concentrations that could potentially result in an exceedance of the NSW EPA 24-hour average PM₁₀ criterion, while providing sufficient time for additional mitigation measures to be implemented at the Quarry to reduce dust emissions before such an exceedance occurs.

The short-term (1-hour average) trigger levels for the TARP have been set based on experience at mine and quarry sites throughout Australia and are also based on the results of a number of fugitive dust dispersion modelling studies that have examined the ratio between the peak 1-hour average predictions and 24-hour average predictions. These trigger levels are consistent with levels used at a number of major construction sites, mines and quarries in NSW to successfully manage dust impacts in a proactive manner. The 1-hour average trigger levels and responses are shown in **Table 9**.

Table 9: TARP PM₁₀ Trigger Levels and Responses

Alert	$\geq 100 \mu\text{g}/\text{m}^3$ but $\leq 125 \mu\text{g}/\text{m}^3$	<ul style="list-style-type: none"> Review operations via a visual inspection of dust emissions from current activities to ensure all standard dust mitigation measures are being appropriately implemented. Determine if background concentrations may be the key contributor to high concentrations being recorded (e.g., based on wind direction, information on regional events such as bush fires or dust storms, etc). Continue to closely monitor PM₁₀ concentrations being recorded.
Action I	$\geq 125 \mu\text{g}/\text{m}^3$ but $\leq 150 \mu\text{g}/\text{m}^3$	<ul style="list-style-type: none"> Increase watering rates on haul roads where appropriate. Reduce speed of equipment / vehicles.

Action II	≥ 150 µg/m ³	<ul style="list-style-type: none"> ▪ Consider holding off on blasting (if appropriate). ▪ Note changed state and continue to closely monitor PM₁₀ concentrations being recorded.
		<ul style="list-style-type: none"> ▪ Review planned operations considering exposed areas ▪ Cease any dust-producing activities not critical to ongoing operation of quarry (e.g., construction works, grading, clearing etc) or relocate relevant activities where possible away from sensitive receptors, or to less exposed locations. ▪ Hold off on blasting ▪ Note changed state and monitor for further change

An alert level has been nominated at which point quarry management will review the wind directions and environmental conditions to determine if the dust is from the quarry or another local source or regional event. Further, confirm that all standard mitigation practices are being followed and remain alert as to any further increase in PM₁₀ concentrations that may require further action.

An exceedance of the interim trigger level (“Action I”) will alert quarry management to increasing short term PM₁₀ concentrations which will prompt a review of the need to increase/relocate watering where required based on visible dust etc. Even if the increased PM₁₀ concentrations are concluded to be due to elevated background concentrations rather than emissions from the Quarry, steps will be taken to minimise the additional incremental impacts from the Quarry where possible.

An exceedance of the Action II trigger level requires more direct action to reduce dust levels, e.g., assessing whether dust-generating activities (including processing, loading and unloading activities) need to be temporarily stopped or relocated until conditions improve.

The nominated 1-hour average trigger levels listed in **Table 8** are to be reviewed as monitoring data are collected at the site to ensure they are appropriate for the ongoing monitoring and management of dust emissions from the Quarry. Any amendments to the trigger levels will be undertaken in consultation with relevant stakeholders.

9.4. Quarry Pollution Reduction Programs

Bass Point Quarry has completed two Pollution Reduction Programs (PRPs), namely;

- **PRP 1 – Dust Suppression Trial:** Install and operate a non-aqueous dust suppression system to the crushing and screening plant.
- **PRP 2 – Dust Control Equipment Installation:** Installation of Dust Extraction and Suppression Equipment. Reduce dust emissions during extreme weather conditions.
- The EPA issued a completion date for these programs as 31 July 2006 and 30 June 2011 for PRP1 and PRP2 respectively. These were taken off the EPL (licence variation 1536758 on 18 July 2016).

9.5. Quarry Mitigation Measures Specific to Blasting Activities

Mitigation measures for fume, dust and odour control during blasting include:

- Fine material collected during drilling will not be used for blast stemming.

- All blast holes would be adequately stemmed with aggregate.
- Blasting to only occur between the hours 8.00 am and 5.00 pm, Monday to Friday (excluding Public Holidays), or as otherwise approved by the EPA and the Secretary of DPIE, as per EPL conditions.
- In excessive wind events (i.e. prolonged visual dust observed in a particular area), temporary halting of blasting activities and resumption when weather conditions have improved following appropriate assessment of weather conditions.
- Blasting should only occur following appropriate assessment of weather conditions by the Environment Coordinator (or equivalent role) and the professional and suitably qualified Drill and Blast Supervisor (or equivalent role) to ensure that wind speed and direction will not result in excess fume (or dust) emissions from the site in the direction of sensitive receptor locations.
- Additionally, the design for each blast will aim to maximise the blast efficiency and minimise the emission of fumes (as well as dust and odour) to ensure compliance with site specific blasting conditions. The blasting schedule will also be made available to the public via the Quarry website.

9.6. Quarry Mitigation Measures Specific to Combustion Emissions from Plant & Machinery

Relevant control measures implemented at the Quarry include:

- Vehicles and machinery are maintained in accordance with manufacturer's specifications.
- Truck queuing and unnecessary trips are minimised through logistical planning of materials delivery and work practices.
- Stationary trucks switch off engines if idling time on-site is likely to exceed 2 minutes and trucks avoid using the local road network during peak traffic periods, where possible.
- Fixed plant are located as far from local receptors as practicable. The new plant will be located in the pit which will aid in the reduction of air emissions from the fixed plant.

9.7. Quarry Mitigation Measures Specific to Fugitive VOC Emissions from Fuel Storage

The storage of fuels will be performed in accordance with the relevant Australian Standards, including:

- Australian Standard (AS) 1692 Tanks for flammable and combustible liquids.
- AS 1940 The storage and handling of flammable and combustible liquids.
- AS 4897 The design, installation and operation of underground petroleum storage tanks.
- AS 1657 Fixed platforms, walkways, stairways and ladders – design construction and installation.

Control measures implemented at the Quarry (as referenced from the above AS) include:

- Location of fuel storage and handling areas as far from local receptors as practicable.
- Storage areas for all liquids are appropriately bunded.
- Spill kits including absorbing materials are provided nearby handling and storage areas.
- Where possible, the delivery of liquid fuels utilises reciprocal feeds so that tank vapours are displaced into the delivery vehicle rather than being emitted to the atmosphere as a fugitive emission.

- Empty containers are managed and disposed of in appropriate manner.

9.8. Daily Site Inspections

Daily informal site inspections will be carried out during quarrying operations. Daily environmental inspections will include, but not be limited to:

- Visual inspection of airborne dust.
- Sniff tests for fumes / odour at the north-western site boundary (in the direction of sensitive receptors), particularly during blasting activities.
- Evaluate whether roads leaving the site are free of soil, and whether soil tracking onto the road network is being adequately prevented.
- Inspection of the erosion and sediment controls.
- Inspection of the waste storage areas.
- Inspection of any rehabilitated areas (where relevant).
- Determine whether all hazardous goods, including fuel and oil, are adequately stored or banded.
- Evaluate whether spill kits are appropriately located and stocked.
- Any environmental inspection reports should include the above observations, with remedial or corrective actions noted (as appropriate). Any remedial or corrective actions should be reported to the Quarry Manager as soon as is practicable.

9.9. Summary of Air Quality Management and Mitigation Measures

A summary of the Quarry’s proactive dust odour and fume mitigation measures, as captured in the previous sections, is presented in **Table 10**.

Table 10: Proactive Dust, Odour and Fume Mitigation Measures

Source	Control Measures
Wind-Blown Dust Sources	
Erosion and sedimentation controls	<ul style="list-style-type: none"> ▪ Erosion and sedimentation controls are regularly inspected to ensure that erosion and sedimentation controls do not become a potential source of dust emission.
Areas disturbed by quarrying operations	<ul style="list-style-type: none"> ▪ Only the minimum area necessary for quarrying is disturbed at any one time. ▪ Completed quarry land areas are rehabilitated as soon as practicable after the completion of quarrying using soil and overburden found on-site to reproduce the topography of the terrain. Tailing ponds are capped with layers of binding materials. ▪ Regular assessments of meteorological conditions are made to identify conditions which would be unfavourable in terms of dust levels from the north to west of the site. ▪ Areas susceptible to wind erosion are revegetated on a needs basis to avoid wind erosion of disturbed areas. ▪ The western bund works as a wind break to deflect wind from erodible areas. Further earth bunds/wind breaks will be installed where practical and as required. ▪ Dust suppression is in place at key points to minimise the dust using either water or an environmentally friendly chemical. ▪ Superfine dusts have been relocated to a more sheltered location within the quarry.

	<ul style="list-style-type: none"> Consider holding off on blasting (if appropriate). Note changed state and continue to closely monitor dust concentrations being recorded.
Stockpiles	<ul style="list-style-type: none"> Dust stockpiles are located in the eastern pit which is a sheltered location. Stockpiles wet down with the water cart as required. Manufactured sand is wet down during the production process.
Quarry-Generated Dust Sources	
Haul road dust	<ul style="list-style-type: none"> All haul roads and trafficked areas are watered using water cart to minimise the generation of dust. The Quarry clearly defines the edges of all haul roads with marker posts or equivalent to control their locations, especially crossing larger overburden emplacement areas. The Quarry enforce speed limits on all on-site vehicles to minimise wheel-generated dust. The Quarry employees and contractors are required to reduce speed on haul roads during high winds
Minor roads	<ul style="list-style-type: none"> Development of minor roads will be limited where possible and locations monitored. The Quarry will enforce speed limits on all on-site vehicles to minimise wheel-generated dust. Minor roads used regularly for access will be watered. The use of dust suppressant will be explored, where practical, for minor roads.
Topsoil stockpile	<ul style="list-style-type: none"> Soil stockpiles not required for more than three months would be revegetated.
Ship/truck loading	<ul style="list-style-type: none"> Material drop heights during loading and unloading are reduced as far as practical. Direct water spraying of trucks is also undertaken before leaving the site. Underground loading of conveyors from stockpiles
Blasting	<ul style="list-style-type: none"> Blasting is restricted to times of favourable weather conditions, and between 8:00am and 5:00pm, Monday to Friday, or as otherwise approved by the EPA and the Secretary of DPIE. Fine material collected during drilling is not used for blast stemming. All blast holes are adequately stemmed with aggregate. The design for each blast will aim to maximise blast efficiency and minimise the emission of fumes, dust and odour
Dust Handling Plant	
Dust handling plant	<ul style="list-style-type: none"> The Quarry will operate the dust suppression system when the crushing and screening plant is operated. All superfine dust must be stockpiled at a location within the lower quarry and that is capable of being kept damp by a water cart.
Other processing areas	<ul style="list-style-type: none"> Processing areas are enclosed including crushing and screening areas. Crushers and conveyors are enclosed or shielded on top and on a minimum of one side. Water sprays are operational at key transfer points. Automatic sprays will be fitted at transfer points. Water carts are used as required.
Plant and Equipment	
Plant and equipment	<ul style="list-style-type: none"> All plant and equipment installed at the quarry is maintained and operated in a proper and efficient condition.

- Truck queuing and unnecessary trips are minimised through logistical planning.
- Stationary trucks switch off engines (where possible) where idling time on-site is likely to exceed 2 minutes and trucks avoid using the local road network during peak traffic periods where possible.
- Fixed plant and fuel storage areas and handling areas are located as far as practicable away from sensitive receptor locations.
- Vehicle and equipment maintenance areas, and fuel/chemical storage areas are appropriately bunded and spill kits are strategically located to ensure timely clean-up should accidental spills/leaks occur.
- Where possible, the delivery of liquid fuels utilises reciprocal feeds so that tank vapours are displaced into the delivery vehicle rather than being emitted to the atmosphere as a fugitive emission.
- Empty containers are managed and disposed of in appropriate manner

Excessive Dust Events²

Exposed areas	<ul style="list-style-type: none"> ▪ Water carts employed for dust suppression as required, including on weekends and public holidays
Areas disturbed by quarrying operations and blasting	<ul style="list-style-type: none"> ▪ Where relocation is not possible, temporary halting of activities and resuming when weather conditions have improved (following assessment by the Environment Coordinator and Drill & Blast Supervisor).
Stockpile areas	<ul style="list-style-type: none"> ▪ Relocation or modification of exposed operations such as topsoil removal or overburden dumping.
Haul roads	<ul style="list-style-type: none"> ▪ Deployment of additional water cart movements to control haul road dust. ▪ Relocation of exposed haul truck routes.
Processing activities, loading and unloading activities	<ul style="list-style-type: none"> ▪ Temporary halting of activities and resuming when weather conditions have improved (following assessment by the Environment Coordinator).

²Note 1: Refer to TARP outlined in Section 8

10. Contingency Plan

10.1. Proactive Response Procedure

The Compliance Officer (or equivalent role) will perform visual checks and review monitoring data and meteorological data on a regular basis (i.e. daily for meteorological conditions and on a monthly basis for review of dust monitoring results) to ensure that operations are relocated, modified and/or halted as required to ensure adverse air quality impacts are not realised at off-site sensitive receptor locations.

The TARP Trigger Levels should be updated under the following circumstances:

- Increase the TARP trigger levels if:
 - the trigger levels are reached frequently, but the 24-hour average PM₁₀ concentration remains less than 50% of the criterion.
- Decrease the TARP trigger levels if:
 - the trigger levels are reached infrequently, but the 24-hour average PM₁₀ concentration exceeds or regularly approaches the criterion.

10.2. Non-Compliance Response Procedure

In the event of a measured PM₁₀ concentration or dust deposition rate above the relevant air quality criterion being measured at the site boundary or a sensitive receptor location (considering relevant averaging periods for each criterion), or a complaint being received with regard to particulate matter concentrations, dust, fumes or odour, the following actions will be completed:

- The situation will be investigated to determine possible emission sources including investigation into the prevailing wind conditions experienced at the time of the complaint to identify the possible source;
- Where the source is identified at the Quarry, additional controls will be implemented, or operational activities altered until a favourable outcome can be achieved;
- The requirement for changes to the ambient air quality monitoring program will be reviewed and implemented as appropriate (e.g. relocation of the LVAS to the nearest downwind receptor if elevated concentrations have been measured, or installation of a HVAS at a sensitive receptor location if available information indicates there is a possibility that exceedances of the criterion are being experienced at this location);
- The Quarry Manager or appropriate delegate should be informed of any corrective action taken or complaint received;
- A full and complete record of the incident, actions and sign-off by an authorised person will be recorded;
- The Environmental Coordinator shall notify the Secretary and any other relevant agencies as soon as practicable, after becoming aware of the incident (considering relevant averaging periods for the relevant air quality criteria); and,
- Within seven days of the incident, Hanson will provide the Secretary and any relevant agencies with a detailed report of the incident.

Where a significant pollution incident occurs that may have an impact on air quality, reference will also be made to the “*Bass Point Pollution Incident Response Management Plan*” (PIRMP) for procedures relating to management of pollution incidents.

10.3. Continued Non-Compliance with Air Quality Criteria

Where particulate levels consistently exceed the relevant air quality criteria, air quality mitigation measures for excessive dust events should be implemented (as described in

Table 7) including:

- Deployment of additional water carts;
- Relocation of exposed haul truck routes;
- Relocation or halting of dust-generating sources, blasting and quarrying activities where possible;
- Relocation or modification of exposed operations such as topsoil removal or overburden dumping; and,
- Alteration or cessation of the use of equipment at the site and the loading and dumping of materials to minimise the generation of particulate matter.
- Amend the PM₁₀ TARP trigger levels downwards (as per *Section 10.1* to provide earlier warning of increasing dust levels.

In addition, further air quality control measures shall be investigated, and operations moderated until dust levels return to an acceptable level and/or the source of the exceedances can be determined and managed appropriately.

11. Complaints Handling Procedure

Hanson must operate a telephone complaints line during its operating hours and must notify the public of the complaints line telephone number. This number is 1800 882 478.

All complaints received regarding operational air quality will be responded to within 24 hours by the appropriate Quarry personnel, so far as is reasonably practical.

Hanson will keep a record of any complaint made to the Quarry or any employee or any agent of Hanson in relation to air quality from the Quarry. Records will include:

- Date and time of complaint.
- Method by which the complaint was made.
- Personal details of the complainant (if provided).
- Nature of the complaint.
- Action taken by Hanson and any follow up actions.
- If no action was taken, the reason why no action was taken.
- The complaints register must be made publicly available on the company website, updated on a quarterly basis, and records must be produced to any authorised officer of the EPA if requested.

12. Landowner Response Procedure

In accordance with *Schedule 4, Condition 1 and 2* of the Approval, if air monitoring results exceed the relevant assessment criteria specified within this Plan, Hanson will, as soon as practicable after obtaining monitoring results, notify the Secretary and the affected landowners. Hanson will then provide regular monitoring results to the landowners until results show compliance with the relevant criteria and send a copy of the NSW Health fact sheet entitled “Mine Dust and You” to the affected landowners and/or existing tenants of the land.

Schedule 4, Condition 2 of the Approval defines a procedure for an Independent Review in the case that owners of privately-owned land consider that the Project impacts are exceeding the relevant impact assessment criteria.

13. Reporting and Review

Air quality management reporting is designed to comply with Approval and EPL conditions and provide stakeholder access to relevant air quality information and data.

13.1. Monitoring Reports

Air quality monitoring results will be reviewed by the Compliance Officer on a monthly basis. Investigations into any exceedances of the relevant air quality criteria will be undertaken and include analysis of corresponding meteorological conditions and activities undertaken at the Quarry.

Monitoring results will be made available to the public on the Quarry website on a monthly basis.

Note: Exceedances of the continuous PM₁₀ trigger levels for periods less than one hour do not constitute an exceedance of the criteria.

13.2. Incident Report

Schedule 5, Condition 7 of the Approval requires that Hanson notify the Secretary and any other relevant agencies of any incident associated with the Project immediately after they become aware of an incident. A detailed incident report should be submitted to the Secretary and relevant agencies within seven working days of the incident.

13.3. Annual Review

By the end of March each year, Hanson shall submit to the Secretary a report reviewing the annual environmental performance of the project. The contents of the required report are detailed in *Condition 4 (a-f) Schedule 5* of the Approval.

Copies of Annual Reports will be made available to the public on the Quarry website.

13.4. Periodic Review

In line with *Schedule 5, Condition 9* of the Approval, by 30 June 2014, and every 3 years thereafter, an Independent Environmental Audit shall be carried out by a suitably qualified consultant.

Review of the management plan will also take place if monitoring records indicate that it is warranted or in the event of any significant change to air quality management procedures at the Project Site.

Any substantial modifications to the Quarry will be undertaken in consultation with the appropriate government agencies.

The Plan shall be reviewed, in accordance with *Schedule 5, Condition 5* of the Approval, within three (3) months of any of the following:

- The submission of an annual review;
- The submission of an incident report;
- The submission of an audit; and

- Any modification to the conditions of this Approval.

Review of the Plan will also take place if monitoring records indicate that it is warranted or in the event of any significant change to operations or air quality management procedures at the Project Site.

The DPIE must be notified in writing of any such review being undertaken. Where this review leads to revisions in any such document, then within six weeks of the review the revised document must be submitted for the approval of the Secretary. Any modifications to the Plan will be undertaken in consultation with the appropriate government agencies.

14. Community Consultation

Schedule 5, Condition 6 of the Approval states that Hanson shall establish a Community Consultative Committee (CCC) for the Project. The CCC must be operated in general accordance with the 'Guidelines for Establishing and Operating Community Consultative Committees for Mining Projects' (Department of Planning, 2007) or its latest version to the satisfaction of the Secretary.

The CCC currently meets on a quarterly basis and the minutes of all CCC meetings are to be made available to the public on the Quarry website.

15. Performance Monitoring

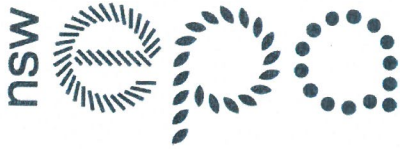
Compliance of this Plan with the Approval and EPL conditions and any other relevant agency requirements will be measured according to the following performance indicators:

- Compliance with relevant air quality criteria at monitoring locations;
- Compliance with relevant Australian Standards;
- The frequency and nature of complaints reported to the Quarry in relation to air quality;
- Contractor and employee awareness of the company's Environmental Policy and this Plan; and,
- Compliance with this Plan, as indicated by statutory reporting.

16. Continual Improvement

Through the effective application of best practice principles to Quarry operations including, where cost-effective and practicable, the adoption of best practice technologies and air quality control measures, Hanson will continue to improve on the Quarry's environmental performance with progress to be monitored against performance indicators noted in *Section 15*.

Appendix A – Agency Consultation



EPA Reference: DOC21/909610-2

Chelsea Flood
Compliance Officer
Hanson Construction Materials Pty Ltd
Boollwarroo Parade
SHELLHARBOUR NSW 2529
Via email: chelsea.flood@hanson.com.au

25 October 2021

Dear Ms Flood

**PAE-30115711 – Air Quality Management Plan Version 7.1
Hanson Bass Point Quarry (MP 08_0143)**

I am writing in reply to your invitation to the Environment Protection Authority (EPA) to provide comments on the Air Quality Management Plan (Version 7.1) for the Bass Point Quarry operated by Hanson Construction Materials Pty Ltd located at Boollwarroo Parade, Shellharbour. The EPA regulates Hanson Construction Materials Pty Ltd (Hanson) under Environment Protection Licence No. 2193 (Licence). The Plan is required to be prepared as per Schedule 3, Condition 16 of Project Approval MP 08_0143 (Consent).

The EPA emphasises that it does not review or endorse environmental management plans or similar. The EPA supports the development of Environmental Management Plans (EMPs) as part of good environmental management but does not generally approve specific EMPs for industry operations. I acknowledge however, that Schedule 3, Condition 16 of the Project Approval states that the Plan must be prepared "in consultation with" the EPA.

As such, the EPA has reviewed the Plan in accordance with Schedule 3, Condition 16 of the Consent and we have no comments on the Plan at this time.

If you have any questions about this matter, please contact James Crawford on

Yours sincerely

A handwritten signature in black ink, appearing to read 'Lara Barrington'.

LARA BARRINGTON
Unit Head - Regulatory Operations

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(from outside NSW)

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From: no-reply@majorprojects.planning.nsw.gov.au <no-reply@majorprojects.planning.nsw.gov.au>

Sent: Monday, 29 November 2021 1:24 PM

To: Pignone, Belinda (Parramatta) AUS

Cc: [REDACTED]

Subject: Bass Point Quarry - Air Quality Management Plan MP08_0143-PA-33 - Request for Additional Information

External Email - Please use proper judgment and caution when opening attachments, clicking links, or responding. Report suspicious emails with SPAM PHISH button.

Dear Belinda Pignone,

The Department is requesting that you provide additional information in relation to the Bass Point Quarry - Air Quality Management Plan .

Please access your profile for details of this request and to upload your response. You are requested to provide this response by 10/12/2021 .

If you have any enquiries, please contact Nagindar Singh on [REDACTED]

To sign in to your account click [here](#) or visit the [Major Projects Website](#).

Please do not reply to this email.

Kind regards

The Department of Planning, Industry and Environment



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Details of Request

Message

Please clarify:

- why the receptors (including receptor numbering) shown in Figure 2 of the AQMP is different to that in Appendix 2 of the consolidated consent
- which receptors were assessed in the latest Air Quality Assessment for the quarry
- whether the receptors are the same as those assessed for the noise impact assessment and are noted in consent condition 3 of Schedule 3 and Table 2.

Please amend Figure 2 in the AQMP and re-submit as relevant.

Please contact Nagindar Singh on [REDACTED] for an clarification.