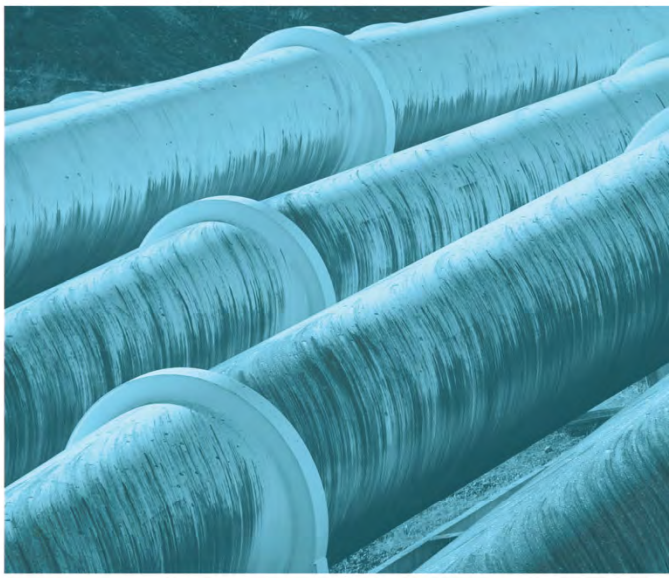



Luddenham Quarry

Air quality management plan

Prepared for Luddenham Operations Pty Ltd
June 2024

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Luddenham Quarry

Air quality management plan

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Luddenham Quarry

Air quality management plan

Report Number

E231131 (formerly J190749) RP47

Client

Luddenham Operations Pty Ltd

Date

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Version

v2 Final

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Cale Kennedy
Senior Environmental Consultant
5 June 2024

Approved by

Scott Fishwick
Air Quality National Technical Leader
5 June 2024

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1 Introduction

Luddenham Quarry is located at 275 Adams Road, Luddenham NSW (Lot 3 in DP 623799, 'the site') within the Liverpool City Council municipality (refer Figure 1.1). The existing shale/clay quarry is approved by state significant development (SSD) consent DA 315-7-2003, issued by the NSW Minister for Planning under the NSW *Environmental Planning and Assessment Act 1979* (EP&A Act). The site is owned by CFT No 13 Pty Ltd, a member of the Coombes Property Group (CPG).

Luddenham Operations Pty Ltd will reactivate and operate the quarry in accordance with Modification 5 (MOD 5) of DA 315-7-2003 which was granted on 24 May 2021.

Condition 4 (Schedule 4) of the development consent (as modified) requires the preparation of Air quality management plan (AQMP) in accordance with the requirements summarised in Table 1.1.

Table 1.1 Condition 4 (Schedule 4) Air Quality Management Plan Requirements

Requirements	Relevant section of this AQMP
Prior to recommencing quarrying operations under Modification 5, the Applicant must prepare an Air Quality Management Plan for the development to the satisfaction of the Planning Secretary. This plan must:	
(a) be prepared by a suitably qualified and experienced person/s;	Refer Section 1.3
(b) be prepared in consultation with the EPA;	Refer Section 1.4
(c) describe the measures to be implemented to ensure:	
compliance with the air quality criteria and operating conditions in this consent	Refer Section 4 and Section 5
best practice management is being employed	Refer Section 4
air quality impacts of the development are minimised during adverse meteorological conditions and extraordinary events	Refer Section 4.2
(d) describe the air quality management system	Refer Section 4
(e) include an air quality monitoring program, prepared in accordance with the Approved Methods for Sampling and Analysis of Air Pollutants in New South Wales (DEC, 2007), that	Refer Section 5 and Section 9
is capable of evaluating the performance of the development against the air quality criteria	
adequately supports the air quality management system	
includes a protocol for identifying any air quality-related exceedance, incident or non-compliance and for notifying the [Department of Climate Change, Energy, the Environment and Water (DCCEEW)] Department and relevant stakeholders of these events	

1.1 Objectives and targets

This AQMP is prepared to satisfy the AQMP requirements outlined in Table 1.1 and to describe how air quality impacts will be managed in accordance with statutory requirements and other conditions of consent relevant to air quality (refer Section 2). This AQMP replaces and updates the existing *Air Quality Monitoring Programme,* developed in 2009 (Golder 2009).

The AQMP forms part of the Environmental Management Strategy (EMS) (EMM 2021), the overarching document guiding environmental management and performance at Luddenham Quarry. The EMS provides a strategic framework for environmental management at Luddenham Quarry commits the site to implement all Environmental Management Strategies, Plans, Programs and Protocols required.

1.2 Approved operations

Extractive operations are limited to 300,000 tonnes per annum (tpa), at a maximum depth of 30 m, approved to 31 December 2024. The quarry will provide clay and shale for the production of approximately 80 million standard bricks per year. The approved site layout is provided in Figure 1.2.

Note: The quarry operations consist majorly of care and maintenance activities with only two to three months of extraction operations (as campaign mining) planned to occur within a calendar year. Campaign mining onsite is irregular and is dependent on climatic conditions and commercial demand.

1.2.1 Extraction methodology, processing, and haulage

The approved quarrying method involves extraction, crushing and stockpiling using a bulldozer, excavators, dump trucks and loading materials onto road trucks with a front-end loader.

The quarry is approved to generate approximately 80 daily truck movements. These trucks will be accessing and exiting the site via the northern section of Adams Road between the site access road and Elizabeth Drive.

1.2.2 Hours of operation and workforce numbers

The approved hours of operation for the site are as follows:

- 7:00 am–6:00 pm Monday to Friday (no haulage vehicles will enter or leave the site between 6 pm and 7 am Monday to Friday and on public holidays)
- 7:00 am–1:00 pm on Saturdays for maintenance activities only (no other work is to be undertaken on Saturday, Sunday and public holidays).

The quarry site will support around 12 employees during normal operating conditions, with a maximum of 15 employees during peak operating times.

1.3 Report preparation

The AQMP was prepared by Ronan Kellaghan (Associate – Air Quality). Ronan has over 15 years' experience in air quality management, with expertise in dispersion modelling, emission estimation, odour assessment, monitoring, management and greenhouse gas assessment. Ronan has been previously approved by the DCCEEW as an independent expert, auditor and reviewer for air quality and odour issues.

Note: this revision of the AQMP has been completed by Cale Kennedy with 6+ years of experience in environmental compliance and subsequently approved by Scott Fishwick, with 18 years of experience in air quality impact assessment, ambient air quality and meteorological monitoring.

1.4 Consultation

The draft AQMP was sent to the NSW Environmental Protection Authority (EPA) for review and comment. The EPA responded that the EPA's role is to set environmental objectives for environmental management and not to be directly involved in the development of strategies to achieve those objectives and accordingly noted that they would not be providing comments on the draft AQMP. This correspondence is contained in Appendix B.

KEY

- Study area
- Cadastral boundary

Assessment location

- Active recreation
- Commercial
- Noise assessment locations
- Noise monitoring locations

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Source: EMM (2023); DFSI (2017); GA (2011); Nearmap (2020)

0 100 200 m

GDA 1994 MGA Zone 56

N

Noise Compliance Report
- April 2024

CPG Luddenham Quarry
Noise Compliance Report - April 2024
Figure 1.1

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KEY

- Study area
- Cadastral boundary

Proposed site modifications

- Approved extraction footprint
- Existing noise bunds
- Existing stockpiling area
- Extended stockpiling area
- Internal road
- Site entry infrastructure (incl. offices, amenities, weighbridge)
- Equipment laydown area

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Source: EMM (2021); DFSI (2017); GA (2011); Nearmap (2020)

0 50 100 m

GDA 1994 MGA Zone 56

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Approved site layout

Luddenham Quarry
Air Quality Management Plan
Figure 1.2

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2 Statutory requirements and conditions of consent

2.1 Air quality criteria

Condition 1 of Schedule 4 lists the relevant air quality criteria for the development (replicated below in Table 2.1, Table 2.2 and Table 2.3).

The long-term criteria in Table 2.1 are assessed against the total cumulative impact (the development contribution plus all other sources), whereas the short-term criteria in Table 2.2 apply to the incremental impact (development contribution alone). Criteria for dust deposition in Table 2.3 are given for both the incremental impact and total cumulative impact.

Table 2.1 Long-term air quality criteria for particulate matter

Pollutant	Averaging period	Criterion	Basis
Total suspended particulate matter (TSP)	Annual	90 µg/m^3	Total impact (incremental increase from development plus all other sources) but excluding extraordinary events such as bushfires, prescribed burning, dust storms.
Particulate matter <10 µm (PM_{10})	Annual	25 µg/m^3	
Particulate matter <2.5 µm ($PM_{2.5}$)	Annual	8 µg/m^3	

Table 2.2 Short-term air quality criteria for particulate matter

Pollutant	Averaging period	Criterion	Basis
Particulate matter <10 µm (PM_{10})	24 hour	50 µg/m^3	Incremental impact (increase in concentrations from the development alone)
Particulate matter <2.5 µm ($PM_{2.5}$)	24 hour	25 µg/m^3	

Table 2.3 Long-term air quality criteria for deposited dust

Pollutant	Averaging period	Maximum increase	Maximum total
Deposited dust	Annual	2 g/m^2/month	4 g/m^2/month

The performance of the development is evaluated against the air quality criteria through the air quality monitoring program described in Section 5. Luddenham Operations will take all reasonable and feasible measures, as outlined in Section 4, to ensure that the air quality criteria are not exceeded due to the operation of the quarry.

As outlined in condition 3 of Schedule 4, the criteria in Table 2.1, Table 2.2 and Table 2.3 do not apply if the Applicant has an agreement with the landowner of any privately-owned land that would allow an exceedance of the air quality criteria (provided the Applicant has advised the Department in writing of the terms of this agreement).

It is noted that there are currently no agreements in place with any privately-owned land in the vicinity of the quarry.

2.2 Air quality operating conditions

Table 2.4 summarises the Air Quality Operating Conditions outlined in Condition 3 (Schedule 4) and how they are addressed in the AQMP.

Table 2.4 Condition 3 (Schedule 4) Air Quality Operating Conditions

Requirements		Relevant section of this AQMP
The Applicant must:		
(a) take all reasonable steps to:		
(i)	*minimise odour, fume and particulate matter (including PM_{10} and $PM_{2.5}$) emissions of the development, paying particular attention to minimising wheel-generated haul road emissions*	Section 4 Note, there are no sources of odour identified for the operation of the quarry (see Section 3.3)
(ii)	*improve energy efficiency and reduce greenhouse gas emissions of the development*	Section 6
(iii)	*minimise any visible off-site air pollution generated by the development; and*	Section 5.1
(iv)	*minimise the extent of potential dust generating surfaces exposed on the site at any given point in time*	Section 4
(b) ensure that all 'non-road' mobile diesel equipment used in undertaking the development includes reasonable and feasible diesel emissions reduction technology		Section 4
(c) operate an air quality management system to guide the day to day planning of quarrying operations		Section 4
(d) minimise the air quality impacts of the development during adverse meteorological conditions and extraordinary events		Section 4.2
(e) carry out regular air quality monitoring to determine whether the development is complying with the relevant conditions in this consent		Section 5
(f) regularly assess meteorological and air quality monitoring data and relocate, modify or stop operations on the site to ensure compliance with the relevant conditions of this consent.		Section 5

2.3 Meteorological monitoring

Table 2.5 summarises the meteorological monitoring requirements outlined in Condition 20 (Schedule 4) and how where they are addressed in the AQMP.

Table 2.5 Condition 20 (Schedule 4) Meteorological monitoring requirements

Requirements	Relevant section of this AQMP
Prior to recommencing quarrying operations under Modification 5, the Applicant must ensure that there is a suitable meteorological station operating in close proximity to the site that:	Section 5.2
(a) complies with the requirements in the Approved Methods for Sampling and Analysis of Air Pollutants in New South Wales (DEC 2007); and	
(b) is capable of measuring meteorological conditions in accordance with the NPfI;	
unless a suitable alternative is approved by the Planning Secretary following consultation with the EPA.	

2.4 Schedule 5 Condition 2

Schedule 5 Condition 2 of the development consent outlines that prior to entering into any tenancy agreement for any land owned by the Applicant that is predicted to experience exceedances of the recommended air quality criteria, Luddenham Operations must advise the prospective tenants of the potential health and amenity impacts associated with living on the land, and give them a copy of the fact sheet entitled "Mine Dust and You" (NSW Health 2017) and advise the prospective tenants of the rights they would have under this consent, to the satisfaction of the Planning Secretary. This condition is not applicable to the development. While there is a dwelling on the subject property, inhabited by the caretaker for the subject property, the caretaker has resided on the property since prior to the establishment of the quarry.

3 Sources of emissions

3.1 Fugitive dust

Dust generating activities at the site were identified in the air quality impact assessment for the reactivation of the Luddenham Quarry (EMM 2020), as follows:

- extraction of material within the pit using excavator or scraper
- dozer pushing material in the pit
- handling of material (loading to trucks and unloading to stockpiles)
- crushing/screening of material within the approved quarry footprint
- movement of vehicles across paved and unpaved roads and surfaces within the site
- rehandle of material to product stockpiles
- loading of product to truck for dispatch
- diesel fuel combustion by on-site plant and equipment[1]
- wind erosion associated with material stockpiles and exposed ground.

3.2 Diesel emissions

The combustion of diesel in quarrying equipment results in the emission of PM mostly in the $PM_{2.5}$ fraction, as well as gases including oxides of nitrogen (NO_x), sulphur dioxide (SO_2), carbon monoxide (CO), carbon dioxide (CO_2) and volatile organic compounds (VOCs). Gaseous air emissions generated by diesel combustion do not generally result in significant off-site concentrations.

Notwithstanding, Luddenham Operations will operate equipment that has, as a minimum, emissions performance equivalent to US EPA Tier 3 certification, consistent with best practice.

3.3 Odour

There are no sources of odour identified with the operation of the quarry. The quarried material is inert and does not emit odour. All waste generated during operations will be managed appropriately and removed for off-site disposal.

If an unforeseen source of odour is identified during operation of the quarry, work will cease to identify the cause of the odour and appropriate odour management measures will be implemented to eliminate or manage the odour.

[1] Emissions of other pollutants (including oxides of nitrogen, carbon monoxide and sulphur dioxide) associated with diesel fuel combustion are likely to be minor relative to particulate matter emissions and were not included in this assessment.

3.4 Significant of emission sources

The relative significance of key source types by particle size is illustrated in Figure 3.1. The most significant source of emissions is associated with the haulage of extracted material and product (includes grading of haulage routes). Material handling and wind erosion are next biggest contributors for the coarser particle fraction (TSP and PM_{10}) while the significance of diesel combustion emissions increases with decreasing particle size (diesel combustion is the next largest source of $PM_{2.5}$ after haulage).

Proactive dust management for the site will, therefore, focus on the most significant sources/activities, including haulage, wind erosion, material handling and diesel emissions.

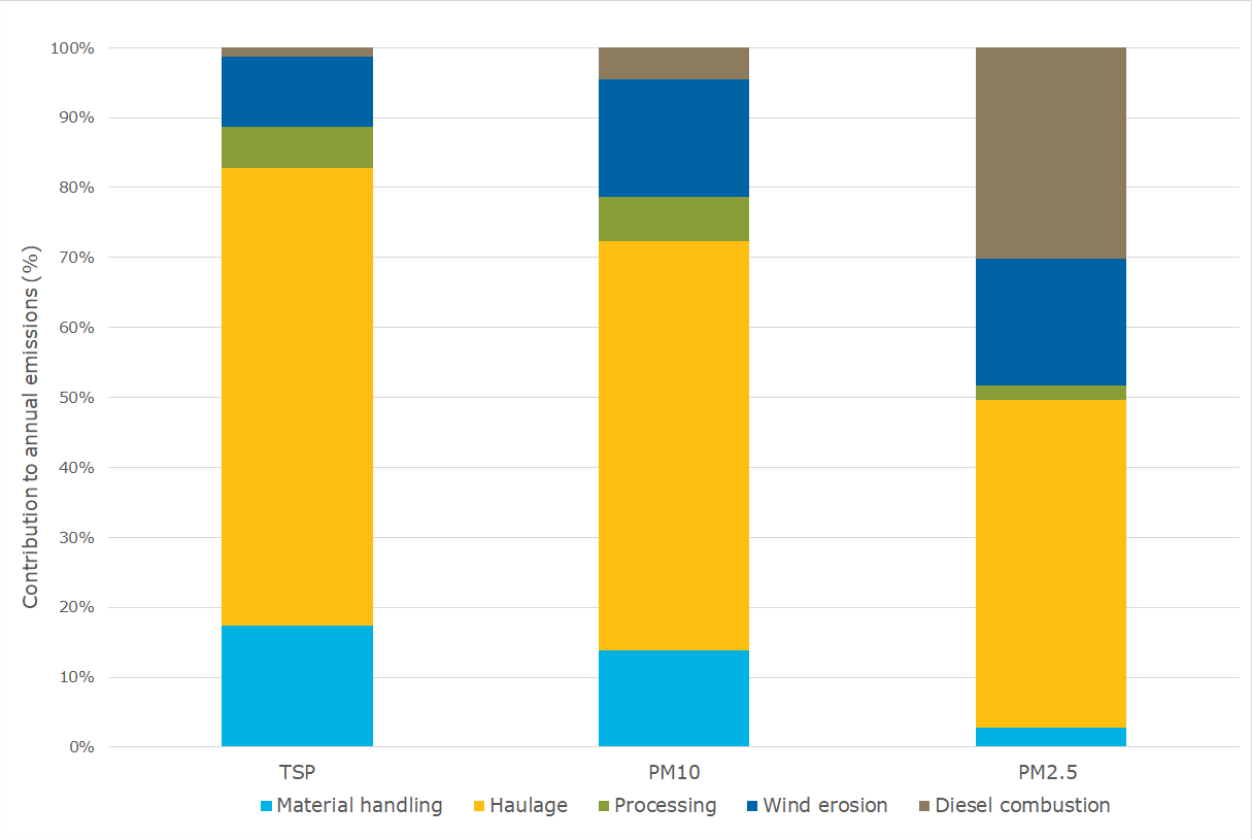

Figure 3.1 Relative contribution of emission sources to total annual emissions

4 Air quality management

4.1 Proactive dust management measures

Proactive dust management measures for the site are outlined in Table 4.1. Each control measure is assigned a target or key performance indicator (KPI) and monitoring requirement. In accordance with Condition 4 (c) (ii), the measures outlined in Table 4.1 are consistent with best management practice (BMP) for extractive industry as outlined in (Katestone, 2011).

Table 4.1 Proactive management measures and key performance indicators

Source / activity	Management measures	KPI / target	Monitoring
Wheel generated dust from trucks entering/exiting on sealed access road	Wheel wash and shaker grid installed to remove excess dirt from wheels prior to exiting site.	No visible track out onto Adams Road. No community complaints. No ambient air quality exceedances	Daily visual checks by site supervisor. Complaints register. Ambient monitoring
	Enforce vehicle speed limit.	Speed limit signs clearly visible and communicated.	Daily visual checks by site supervisor.
Wheel generated dust from vehicle movements on unsealed internal roads	Operation of a water cart to dampen all unsealed vehicle routes onsite including grader routes.	No visible wheel dust generated. No ambient air quality exceedances	Daily visual checks by site supervisor. Ambient monitoring
	Enforce vehicle speed limit.	Speed limit signs clearly visible and communicated.	Site supervisor to ensure this is communicated and is being adhered to.
Unloading / loading material to / from trucks and to processing circuit	Minimise material drop heights.	No visible dust at source. No ambient air quality exceedances	Daily visual checks by site supervisor. Ambient monitoring
	Double handling of material will be avoided where possible.	No specific KPI.	Site supervisor to ensure this is communicated and is being adhered to.
Crushing and screening	Water sprays on the material feed to crusher and screen to maintain high moisture content.	No visible dust at source. No ambient air quality exceedances	Daily visual checks by site supervisor Ambient monitoring
Diesel emissions	Regular maintenance of plant and equipment.	No visible smoky exhaust or idling on site.	Regular checks of plant and equipment by site supervisor
	Operate quarrying plant and equipment that has, as a minimum, emissions performance equivalent to US EPA Tier 3 certification, consistent with best practice	All quarrying plant and equipment to comply with US EPA Tier 3 certification.	Maintain records of equipment specification and certification.
	Avoidance of unnecessary idling.	No specific KPI.	Site supervisor to ensure this is communicated and is being adhered to.

Table 4.1 Proactive management measures and key performance indicators

Source / activity	Management measures	KPI / target	Monitoring
Wind erosion	Limit working faces on stockpiles to avoid disturbance.	No visible dust leaving the site and no community complaints No ambient air quality exceedances	Visual monitoring Complaints register Ambient monitoring
	Disturbance of stabilised ground cover will be avoided where possible.	Stabilised areas not disturbed and no visual dust seen in these areas.	Site supervisor to ensure this is communicated and is being adhered to.
	Areas of disturbance that are inactive long-term will be stabilised with ground cover.	Progressive rehabilitation targets achieved	Rehabilitation plan

4.2 Reactive dust management and planning for adverse weather and extraordinary events

Luddenham Operations will regularly assess meteorological conditions and air quality monitoring data and modify onsite activities as required to ensure compliance with the development consent.

Proactive air quality management to account for potentially adverse meteorological conditions will include:

- daily review of three-day meteorological forecasts by the environmental site representative or site supervisor to predict when the risk of dust emissions will be high (due to adverse wind conditions) allowing preparatory measures to be implemented. Adverse weather in terms of dust impacts relates to hot, dry and gusty / windy conditions and are defined for this site as:
  - little or no rainfall forecast and little or no rainfall in past 48 hours
  - wind speeds in excess of 5.4 m/s blowing towards the closest receptors
- discussion of weather conditions and dust considerations at daily toolbox talks
- modifying or suspending the planned activities, as appropriate, to minimise dust impacts (i.e. relocating crusher to within the quarry pit, ceasing crushing and/or extraction operations)
- watering surfaces so they are moist prior to hot and windy conditions
- planning additional water spraying/water cart on unsealed internal roads during the day
- reschedule of product despatch.

Additional reactive measures will be implemented to minimise environmental impact in the event of an incident occurring by instigating an appropriate operational response. Reactive measures are instigated in response to a visual inspection or triggered by community complaint or ambient air quality exceedance.

A summary of the reactive dust management and preparator measures are summarised in Table 4.2.

Table 4.2 Triggers for reactive management and preparatory measures

Trigger	Reactive / preparatory measure
Visible dust from haulage. Community complaint.	Relocate water cart to control dust or increase watering intensity rate
	Deploy a street sweeper when high silt loading is observed or track out on Adams Road is visible
	Reschedule product dispatch where possible until road surface is cleaned.
Excessive dust generation from stockpiles or exposed areas. Community complaint.	Use water truck / water sprays to dampen surface or increase frequency of application.
Meteorological forecasts indicate that the risk of dust emissions is high (due to adverse wind conditions)	Watering surfaces so they are moist prior to hot and windy conditions Planning additional water spraying during the day Ceasing some activities or reducing activity levels Re-scheduling product dispatch.

During extraordinary events such as bushfires, prescribed burning, fire incidents or dust storms, altering the operation of the site is not expected to have any noticeable effect on local air quality, as the ambient concentrations would be dominated by the contribution from the extraordinary event. Therefore, the site will continue to operate if it is safe to do so, from an operational and employee health and safety point of view.

5 Air quality monitoring

5.1 Visual monitoring

Visual monitoring under this plan will be undertaken by the site supervisor during extractive and haulage operations. Daily inspections of activities onsite will focus on the following key issues:

- inspect the sealed access road for high silt loading and clean surface using sweeper and water cart, if required
- inspect and report on excessive dust being generated at source (wheel generated dust, excavators, FEL, wind erosion)
- inspect and report on water cart activity and effectiveness
- inspect and report on dust leaving the site.

A Dust Inspection Checklist will be used daily during operations to maintain a record of compliance and effectiveness of controls. Items that require action will also be documented during environmental inspection.

Excessive dust at source or dust leaving the site would trigger the reactive controls outlined in Table 4.2.

5.2 Air quality monitoring program

The requirements for ambient air quality monitoring are outlined in Condition 3 (Schedule 4) as follows:

> *carry out regular air quality monitoring to determine whether the development is complying with the relevant conditions in this consent.*

The specific AQMP requirements outlined in Condition 4 (Schedule 4) requires a monitoring program that:

> *(i) is capable of evaluating the performance of the development against the air quality criteria;*
>
> *(ii) adequately supports the air quality management system; and*
>
> *(iii) includes a protocol for identifying any air quality-related exceedance, incident or non-compliance and for notifying the Department and relevant stakeholders of these events*.

5.2.1 Dust deposition

Dust deposition gauge (DDG) monitoring will be carried out at three locations as follows:

- DDG1 – southwest corner of the site, along the site boundary
- DDG2 – northeast of the quarry pit, beyond the haulage route on the site boundary
- DDG3 – on the site boundary along the site access road near the site infrastructure.

The indicative locations are shown on Figure 5.1.

Dust deposition monitoring will be conducted in accordance with AS/NZS 3580.10.1:2016: *Methods for sampling and analysis of ambient air - Method 10.1: Determination of particulate matter - Deposited matter - Gravimetric method*. As far as practicable and taking site constraints into consideration, the siting of dust deposition gauges will be conducted in accordance with AS/NZS 3580.1.1:2016: *Methods for sampling and analysis of ambient air - Part 1.1: Guide to siting air monitoring equipment*.

Dust deposition monitoring will be conducted during periods of active operations. Monitoring will occur for a minimum one (1) month per annum in accordance with AS 3580.10.1: 2016 during active operations. The sample(s) will be collected and sent to a laboratory for analysis. Monitoring will not occur during periods when the site is inactive, unless otherwise considered necessary by CPG.

Where consecutive (two or more) air quality related complaints or exceedances of air quality criteria are recorded (Section 2.1) during active operational dust deposition monitoring periods, the dust deposition monitoring program will be reinstated for a minimum period of one month or until dust deposition levels have returned to levels which meet the air quality criteria in Section 2.1.

Note: the reduction in the sampling frequency has been justified on the basis of historical dust deposition levels recorded at the site, which have consistently been below the applicable impact assessment criterion. DCCEEW have been directly engaged prior to the revision of this management plan and have provided general acceptance of CPG revised monitoring methodology. The reinstatement of the air quality monitoring program in relation to air quality complaints or exceedances has been updated following feedback from DPHI on the AQMP Rev 1.

5.2.2 Continuous PM monitoring

To evaluate compliance with the air quality criteria for TSP, PM_{10} and $PM_{2.5}$ (Table 2.1 and Table 2.2), two continuous PM monitoring instructions will be deployed on a campaign basis[2].

The instruments will be solar powered and relocatable and will be positioned upwind and downwind of the main dust generation activities occurring during the monitoring campaign. The upwind and downwind monitoring will enable compliance assessment against the short-term air quality criteria, which are evaluated against the increment increase from the development alone, as follows:

- PM contribution from quarry = downwind concentration minus upwind concentration.

Seasonal wind roses for Badgerys Creek are presented in Figure A.1 which can be used to determine which locations are upwind and downwind locations for each monitoring campaign. Compliance assessment will use the meteorological monitoring data collected for the period of each monitoring campaign to determine upwind and downwind conditions on a daily basis.

The continuous monitoring campaign will occur for a 14-day period, once per year during extractive/ haulage operations.

A compliance assessment against the long-term air quality criteria will be based on monitoring data collected at both locations across the monitoring campaign. The fortnightly average concentrations will be used as a proxy for compliance assessment against the annual average concentrations. Any identified extraordinary events during each monitoring campaign will be excluded from the calculation of the fortnightly average.

5.2.3 Meteorological monitoring

There are two existing automatic weather station (AWS) in close proximity to the site, both of which can be used to characterise and describe the prevailing meteorology of the local area, as follows:

- Bureau of Meteorology (BoM) AWS at Badgerys Creek is located approximately 2.4 km south of the site
- DCCEEW Air Quality Monitoring Station (AQMS) at Bringelly is located approximately 6 km south-east of the site.

[2] If all three size fractions cannot be measured simultaneously by the selected instrument, preference will be given to PM_{10} and $PM_{2.5}$ and TSP will be inferred from PM_{10} concentrations based on the assumption that PM_{10} is 40% of TSP.

In accordance with Condition 20 (Schedule 4), both sites comply with the requirements in the Approved Methods for Sampling and Analysis of Air Pollutants in New South Wales (DEC 2007) and provide measurements of meteorological conditions in accordance with the NSW Noise Policy for Industry (NPfI)[3].

A summary of the parameters measured and reported at the sites is provided in Table 5.1.

Table 5.1 Meteorological parameters measured in the vicinity of the development

Parameter	Measured or reported at
Wind speed and direction	BoM Badgerys Creek and DCCEEW Bringelly
Sigma theta (standard deviation of wind direction)	BoM Badgerys Creek and DCCEEW Bringelly
Air temperature (2m)	BoM Badgerys Creek and DCCEEW Bringelly
Relative humidity	BoM Badgerys Creek and DCCEEW Bringelly
Atmospheric pressure	BoM Badgerys Creek
Solar radiation	DCCEEW Bringelly

Data from both sites will be collected to facilitate compliance assessment for the ambient air quality monitoring program.

Weather forecasts will be regularly checked by site supervision and appropriate mitigation measures implemented in advance of adverse weather. The local weather stations stated within Table 5.1 will be checked daily during extractive/haulage operations to identify adverse weather conditions for site management purposes.

[3] Estimates of noise enhancing conditions (stability class or significance of temperature inversions) can be made using existing data for the area, based on measurements of sigma theta and solar radiation.

KEY

- Study area
- Cadastral boundary
- Indicative air quality monitoring location
- Air quality assessment location

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Source: EMM (2021); DFSI (2017); GA (2011); Nearmap (2020)

0 100 200 m

GDA 1994 MGA Zone 56

N

Indicative air quality monitoring locations

Luddenham Quarry
Dust Deposition Monitoring
Figure 1.1

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6 Summary of air quality management system

As required in Condition 3 (c) a summary of the air quality management system used to guide the day-to-day planning of quarrying operations is as follows:

1. During normal operations, the proactive air quality management measures outlined in Table 4.1 are implemented as standard practice.

2. Employees are reminded of their responsibilities for the implementation of proactive air quality management measures during toolbox talks and site meetings.

3. The site manager completes daily inspections of activities onsite to review effectiveness of the proactive air quality management measures and implement reactive measures as required. For example, if excessive dust is being generated at source or dust is seen leaving the site, the site manager will:

    a) relocate water cart to problem area or increase watering intensity rate

    b) use water truck / water sprays to dampen surface or material being handled

    c) deploy a street sweeper or water truck to clean paved surfaces

    d) ceasing some activities or reduce activity levels, or

    e) re-schedule product dispatch.

4. Three-day weather forecasts are reviewed daily to identify the potential for upcoming adverse weather and prepare for measures to be implemented if required. The onsite weather station will be used to review real-time weather conditions and, in combination with visual monitoring, determine if reactive measures are required during adverse weather conditions, for example:

    a) relocate water cart to problem area or increase watering intensity rate

    b) use water truck / water sprays to dampen surface or material being handled

    c) deploy a street sweeper or water truck to clean paved surfaces

    d) ceasing some activities or reduce activity levels, or

    a) re-schedule product dispatch.

5. Conditions during extraordinary events such as bushfires, prescribed burning, fire incidents or dust storms will be continuously reviewed to determine if the site can continue to operate safely.

6. The site manager will ensure that the ongoing air quality monitoring described in Section 5 continues for the duration and frequency required by this plan.

7. Complaints, incidents, and non-compliance will be recorded, investigated, and reported (refer Section 9.2).

7 Greenhouse gas management

Greenhouse gas (GHG) emissions from the project are principally associated with on-site energy consumption, as follows:

- diesel combustion from quarrying plant and equipment
- consumption of purchased electricity in site entry infrastructure (offices, amenities, weighbridge).

Measures and practices designed to minimise fuel consumption and improve energy efficiency will assist with the management of project GHG emissions. Other sources of GHG emissions include employee generated waste and employee travel; however, given the small workforce (peak operational staff of 15), these GHG emission sources are considered relatively minor.

The following GHG management measures will be implemented:

- regular maintenance of plant and equipment to optimise fuel consumption
- efficient scheduling and planning (e.g. minimising rehandling and haulage of materials) to minimise fuel consumption
- consideration of fuel efficiency in the plant equipment selection phase
- all staff will be trained to reduce idling and turn off equipment when not in use
- selection of energy efficient equipment for site office
- education and signage to encourage energy efficiency.

8 Roles and responsibilities

The site manager will be responsible for the day-to-day operation of the site, including dust management. All site personnel will undergo appropriate induction training and individual responsibilities for ensuring that procedures are adhered to will be clearly identified. Daily visual checks would be made by site manager or delegated personnel and any non-conformance would be reported immediately to the site manager.

General roles and responsibilities of this AQMP are provided in Table 8.1.

Table 8.1 Roles and responsibilities of site staff

Role	Responsibility
Site manager	• implement this AQMP • provide required resources and support to implement this AQMP • undertake or provide training to staff in relevant management plans and procedures as required • coordinate investigation of dust complaints • document the results of the investigation and actions taken • maintain the records of the dust complaints • liaise with any complainants regarding the steps to be taken to minimise further air pollution emissions where appropriate • complete regular visual monitoring of the dust levels at the site • manage vehicle speed movements • restrict operations during periods of strong wind • arrange for watering of the site access road to reduce dust when appropriate.
All staff	• adhere to the requirements of this AQMP • report any air quality incidents immediately to the site environmental representative, or site supervisor.

9 Complaints handling and incidents

9.1 Complaints handling

A complaints register will be maintained, and the following information will be recorded:

- name and address of complainant
- date and time of complaint
- nature of the complaint (i.e. fugitive dust, track out, smoky vehicle)
- details of the investigation into the complaint
- actions taken to address complaint and results of action taken
- any follow up contact with complainant or further action undertaken.

The details of any complaint will be logged in the complaints register, with investigation findings and actions noted. The record of a complaint will be kept for at least four years after the complaint was made. The record will be produced to any authorised officer of the EPA who asks to see them.

The complaints register will be available on the project website and will be updated monthly.

If the complaint is relevant to any of the conditions of the Approval, it will be handled as per the Approval conditions relevant to that environmental aspect.

9.2 Incident and non-compliance identification and notification protocols

9.2.1 Incident and non-compliance identification

For the purpose of this AQMP, a complaint that is deemed to be the direct result of operational emissions from the site will be classified as an air quality incident. A review of the air quality monitoring will be undertaken during the incident investigation and the requirement to reinstate or continue air quality monitoring in accordance with Section 5.2 will also be undertaken.

Non-compliances (if they occur) will be identified through a review of monitoring results and through daily dust inspection checklists and other visual observations (i.e. observing a haulage vehicle leave the site uncovered or without using the wheel wash or a haulage vehicle driving faster than the internal road speed limits). Non-compliances (if they occur) will also be identified through internal audits (refer Chapter 7 of the EMS).

9.2.2 Incident notification

On becoming aware of an air quality incident, the Applicant will notify DCCEEW in writing to compliance@planning.nsw.gov.au or via the major projects website, immediately after the Applicant becomes aware of an incident. Within seven days of the incident, Luddenham Operations will submit a written incident notification via the major projects website. Further details regarding notification requirements are outlined in Section 4.3 of the EMS.

Within 24 hours of an air quality incident, an initial letter report outlining basic details of the incident will be sent to the EPA's Regional Manager Planning Section. Within 14 days of an incident, a detailed report will be prepared and submitted to the EPA's Regional Manager Planning Section documenting incident investigation findings, causes of the incident and additional mitigation measures that will be implemented to prevent a reoccurrence.

Incidents will also be recorded in the Environmental Incident and Action Register and reported in the Annual Review and those related to the EPL will be reported in the Annual Return.

9.2.3 Non-compliance notification

Within seven days of becoming aware of a non-compliance, the Luddenham Operations will notify DCCEEW in writing to compliance@planning.nsw.gov.au or via the major projects website. The notification will identify the non-compliance, the reasons for non-compliance and what actions have and will be undertaken to address the non-compliance.

As soon as practicable and no longer than 7 days after obtaining monitoring results showing an exceedance of the air quality criterion in Section 2.1, details of the exceedance will be provided to any affected landowners and/or tenants.

10 Reporting and review

Luddenham operations reporting requirements are provided in Table 10.1. In accordance with DA 315-7-2003, Section 66(6) of the POEO Act, requirements issued by the EPA, and approved Management plans, regular reporting of environmental performance of the quarry site will be made publicly available on the Luddenham operations website and kept up to date to the satisfaction of the Planning Secretary.

Table 10.1 Luddenham Quarry Reporting Requirements

Report Name	Due Date	Due To	Submission Method	Responsibility
Annual Review	End of September annually	DCCEEW Council Any other relevant government agencies Any other interested person upon request	In writing via the Major Projects Website	Operations Manager
Annual Return	Annually	EPA	EPA website	Operations Manager
Environmental incident	Upon becoming aware of the incident	DCCEEW Any other relevant government agencies	In writing via the Major Projects Website	Operations Manager
Environmental Incident Report	Within 7 days following a reportable incident	DCCEEW EPA Any other relevant government agencies	In writing via the Major Projects Website	Operations Manager
Environmental non-compliance	Within 7 days of becoming aware of the non-compliance	DCCEEW Any other relevant government agencies	In writing via the Major Projects Website	Operations Manager

10.1 Annual review

Luddenham Quarry prepares an annual review (previously named an annual environmental management report) that reviews the performance of operations, provides an overview of environmental management actions taken and summarises the monitoring results over the 12-month reporting period.

10.2 Auditing

In accordance with DA 315-7-2003, Schedule 6, Condition 7 and 8 an Independent Environmental Audit (IEA) of the development will be conducted every 3 years by a suitably qualified, experienced, and independent team of experts whose appointment has been endorsed by the Secretary. The audit team will include experts in rehabilitation and any other field specified by the Planning Secretary. The IEA will be conducted in consultation with relevant government agencies in order to:

- assess the environmental performance of the development, and whether it is complying with the relevant requirements in this consent and any relevant EPL (including any assessment, plan or program required under these approvals)
- review the adequacy of any approved strategy, plan or program required under these approvals
- recommend measures or actions to improve the environmental performance of the development, and/or any assessment, plan or program required under these approvals.

In accordance with Schedule 6, Condition 8, within six weeks of the completion of the audit, or as otherwise agreed by the Planning Secretary, Luddenham Operations will submit a copy of the audit report to the Planning Secretary, together with its response to any recommendations contained in the audit report.

10.3 Review and improvement

Continuous improvement will be achieved by the ongoing evaluation of dust management performance and effectiveness of this AQMP against objectives and targets.

The AQMP will be reviewed annually and updated as required, for example, due to a process improvement, operational change or as a result of corrective and preventative action taken to address non-conformances.

Other circumstances under which the AQMP will be reviewed and revised are following:

- the submission of an incident report
- the submission of an Independent Environmental Audit
- the approval of any modification of the conditions of consent, or
- the issue of a direction of the Planning Secretary which requires a review.

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

References

DCCEEW 2019, *Air quality monitoring data from Bringelly air quality monitoring station,* prepared by Department of Planning, Industry and Environment.

EMM 2020, *Air Quality Impact Assessment Luddenham Quarry Modification 5,* prepared for Coombes Property Group and KLF Holdings by EMM Consulting Pty Limited.

Golder 2009, *Clay/shale quarry, Adams Road, Luddenham: air quality (dust) monitoring programme*, prepared by Golder Associates Pty Limited for Blue Sky Mining Pty Ltd, published March 2009.

Katestone 2011, *NSW Coal Mining Benchmarking Study: International Best Practice Measures to Prevent and/or Minimise Emissions of Particulate Matter from Coal Mining*.

NSW EPA 2005, *Approved Methods for the Sampling and Analysis of Air Pollutants in New South Wales*, published August 2005.

NSW EPA 2017, *Approved Methods for the Modelling and Assessment of Air Pollutants in New South Wales,* minor revisions November 2016, published January 2017.

Department of the Environment 2016, *National Environment Protection (Ambient Air Quality) Measure*, amended February 2016.

Appendix A

Wind roses

A.1 Seasonal wind roses for Badgerys Creek

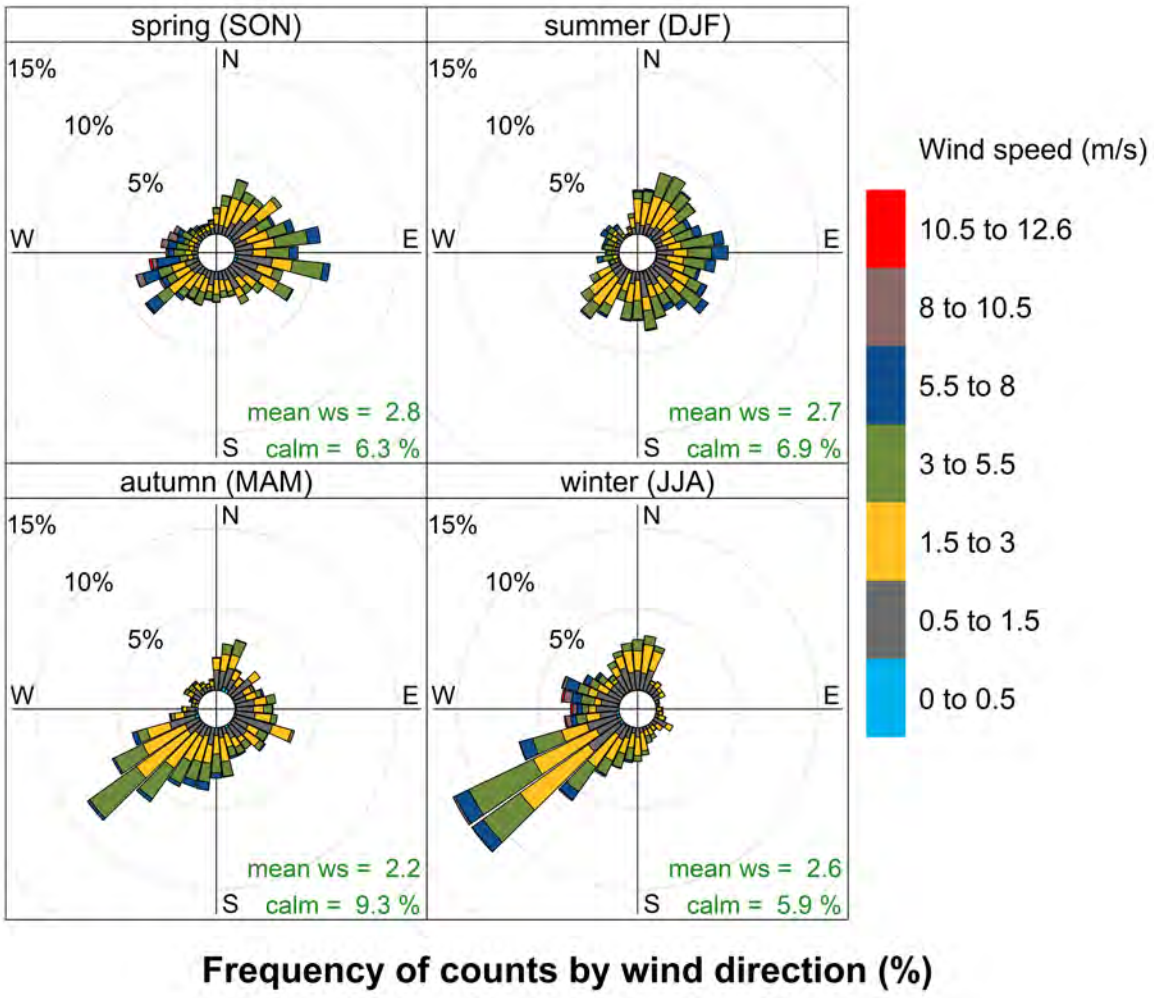

Figure A.1 Seasonal wind roses for Badgerys Creek

Appendix B

EPA consultation

Janet Krick

From: Kieran Henry <Kieran.Henry@epa.nsw.gov.au>
Sent: Wednesday, 28 July 2021 2:33 PM
To: Janet Krick
Cc: Phil Towler
Subject: RE: Luddenham Quarry - DA 315-7-2003 - Management Plans

Hi Janet,

The EPA's position on post approval management plans (including the NMP, AQMP and SWMP) is to encourage the development of such plans to ensure that proponents have determined how they will meet their statutory obligations and designated environmental objectives.

However, we do not approve or endorse these documents as our role is to set environmental objectives for environmental management and not to be directly involved in the development of strategies to achieve those objectives. Therefore we will not be providing comments on the NMP, AQMP and SWMP.

These documents are important for our decision making, such as with the licence application, and ensure compliance with s45 of the POEO Act and to support those decisions.

I expect to send a draft EPL to Luddenham Operations Pty Ltd by the end of the week.

Regards,

Kieran

From: Janet Krick <jkrick@emmconsulting.com.au>
Sent: Wednesday, 28 July 2021 7:58 AM
To: Kieran Henry <Kieran.Henry@epa.nsw.gov.au>
Cc: Phil Towler <ptowler@emmconsulting.com.au>
Subject: RE: Luddenham Quarry - DA 315-7-2003 - Management Plans

Good morning Kieran,

Following up on my email below – are you able to provide an update on when we may expect EPA's comments on the draft management plans and status of the EPL application?

Many thanks

Janet Krick
Associate Environmental Planner

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From: Janet Krick
Sent: Wednesday, 14 July 2021 2:39 PM
To: Kieran Henry <Kieran.Henry@epa.nsw.gov.au>