AIR QUALITY MANAGEMENT PLAN

CORAKI QUARRY

Date of Issue:

16 November 2017

1.0 Purpose

The air quality management plan is required to comply with Condition 15 of the Development Consent Schedule 3. The purpose of the air quality management plan is to ensure that air pollutant emissions from the activity are minimised and do not result in nuisance at a sensitive place through the implementation of best practice dust management measures in accordance with the conditions of the development consent and environment protection licence for the Coraki Quarry.

2.0 Performance Targets

The relevant air quality Performance Targets are specified in Table 5 (Condition 12) of the Development Consent Schedule 3, as follows:

Air Quality Impact Assessment Criteria

12. The Applicant must ensure that all reasonable and feasible avoidance and mitigation measures are employed so that particulate matter emissions generated by the development do not cause exceedances of the criteria in Table 5 at any residence on privately-owned land.

Table 5: Air quality criteria

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

Notes tor Table 5:

a. *Cumulative impact (ie increase in concentrations due to the development plus background concentrations due to all other sources).*
b. *Incremental impact (ie incremental increase in concentrations due to the development with zero allowable exceedances of the criteria over the life of the development).*
c. *Deposited dust is to be assessed as insoluble solids as defined by Standards Australia, AS/NZS 3580.10.1:2003: Methods for Sampling and Analysis of Ambient Air - Determination of Particulate Matter - Deposited Matter - Gravimetric Method.*
d. *Excludes extraordinary events such as bushfires, prescribed burning, dust storms, sea fog, fire incidents, or any other activity agreed to by the Secretary.*
e. *"Reasonable and feasible avoidance and mitigation measures" includes, but is not limited to, the operational requirements in conditions 14 and 15 to develop and implement an air quality management system that ensures operational responses to the risks of exceedance of the criteria.*

3.0 Relevant Conditions

The air quality management plan is provided to comply with Condition 15 of the Development Consent Schedule 3. The Development Consent Schedule 3 Conditions 12 to 17 are relevant to the air quality management plan. Condition 13 requires that a tenant of any occupied residence on quarry-owned land be notified of any health risks associated with an exceedance of the performance targets specified in Condition 12. It should be noted that there is currently no residence on the quarry-owned land. If a residence is established notification will be made at that time.

Condition O3.1 of the Environment Protection Licence requires the activity to be carried out in a manner that minimises dust emissions, as follows:

O3 Dust

O3.1 Activities occurring in or on the premises must be carried out in a manner that will minimise the generation, or emission from the premises, of wind-blown or traffic generated dust.

4.0 Site-Specific Physical Dust Control Measures

- Provide sprinkler system or equivalent to effectively dampen crushed material stockpiles.
- If deemed a more effective solution given water availability at the site, provide a chemical suppressant delivery system for sprinkling of crushed material stockpiles.
- Provide enclosures and/or effective water misting sprays to the processing plant including tip head, screens and conveyor transfer/drop points in addition to load-out points from elevated storage bins if utilised.
- Provide a water truck capable of applying water to unsealed roads within the site at a rate of more than 2 litres per square metre per hour.
- Maintain an emergency backup water truck at the site or ensure that a suitable replacement truck is available within 24 hours in the event of breakdown.
- Prior to utilising Seelems Road - Seal (e.g. asphalt) part of the access road off Seelems Road for a minimum length of 200 metres west from the Seelems Road entry point.
- Rock drill to have an appropriate dust extraction system with collector fitted to rig and/or wet drilling via water sprays.
- Provide adequate water supply on-site for dust suppression purposes.

5.0 Site-Specific Air Quality Management Measures

- Operate a sprinkler system or equivalent to the crushed material stockpiles at times when dust emissions are visible (e.g. during high wind speed conditions, when loading fine product stockpiles).
- Operate a water truck on all on-site haul roads and access/stockpile roads applying approximately 2 litres/m^2/hour at times when dust emissions are visible from vehicle movements.
- Wind conditions are to be subjectively assessed and the current on-site weather station wind speeds and directions are to be reviewed by the Quarry Manager or delegate prior to issuing approval to blast. A blast shall not be initiated whilst wind speed exceed 20km/h and wind directions are WNW, West or WSW (i.e. between 247.5 degrees and 292.5 degrees) as these conditions are likely to result in direct transport of the blast plume towards nearby residences on Spring Hill Road
- Quarry Manager to consider prevailing and forecast weather conditions when scheduling activities with the potential to generate significant dust emissions (e.g. overburden clearing) and relocate, modify (e.g. apply water) and/or stop operations as necessary to minimise risk of exceeding the Performance Targets.
- In the event of air quality monitoring identifying non-compliance or a trend towards non-compliance with the Performance Targets appropriate corrective action is to be undertaken which may include modification of operations, implementation of additional mitigation measures and/or amendment of the Air Quality Management Plan.
- Implement reasonable and feasible measures to minimise the release of greenhouse gas emissions from the development such as the selection of low emission machinery, appropriate maintenance of machinery and application of fuel and energy efficient operational practices.

6.0 General Air Quality Management Strategies

Strategies/mitigation measures for the management of air emissions from the site will be implemented in accordance with the relevant conditions of development. Relevant management strategies for quarrying activities include the following:

Disturbed Areas

- Dampen down cleared areas, extraction working areas, stockpiles and other hardstand areas by water spraying and/or chemical suppressants.
- Limit clearing, topsoil and overburden removal at any one time to that necessary whilst providing for effective production of the resource.
- Monitor meteorological conditions (refer **Attachment 1**) to schedule clearing, topsoil and overburden removal activities in favourable weather conditions.
- Restrict vehicle and mobile machinery movements to designated routes and standing areas to the extent practicable.
- Maintain buffers between operational areas and the site boundaries where possible, and between operational areas and Indigenous Heritage Non-Disturbance Zone and Protected Macadamia Trees.

Processing Plant

- Dampen down work areas.
- Dampen materials prior to transport.
- Use water sprays at the processing plant.
- Use shielding and/or windbreaks where possible.
- Maintain vehicles and equipment in accordance with the original equipment manufacturers' specifications.

Stockpiles

- Use water sprays or chemical dust suppressant products as required during high wind conditions likely to generate dust releases.
- Stabilise and revegetate topsoil and overburden stockpiles where possible.
- Use dust suppressants and shielding where possible.
- Limit the height and slope of stockpiles.

Trafficable Areas

- Water haul and access roads at a rate of approximately 2 litres/m^2/hr at times when dust emissions are visible from vehicle movements.
- Enforce a maximum speed of 40 km/hr on unsealed haul and internal roads.
- Keep trafficable areas as clean as possible.
- Maintain road surfaces in good condition.

Material Transport and Transport Vehicles

- Ensure signage is installed to advise drivers to contain and cover all loads of material prior to leaving the site.
- Securely fix tailgates of all material transport vehicles and ensure loads are appropriately contained and covered prior to leaving the site.
- Dampen down the load prior to transport where necessary and practicable.
- Clear spillages from side rails, tailgates and draw bars of trucks (following loading and tipping).
- Level loads prior to truck exit from the site where possible.

Screening Equipment

- Install windshields, enclosures and/or barriers where possible.
- Maintain material in moistened state.

Rehabilitation

- Progressively rehabilitate the site as areas become available in accordance with the Coraki Quarry Environmental Management Strategy and Section 2.2 of the Coraki Quarry Biodiversity and Rehabilitation Management Plan which states that the overall rehabilitation objectives for the site are to:
    1. *Achieve a safe, stable and non-polluting, final landform that is integrated with surrounding natural landforms as far as is reasonable and feasible, and designed to minimise the visual impacts of the development when viewed from surrounding land.*
    2. *Decommission and remove all surface infrastructure, unless required for the ongoing operation of Petersons Quarry (or as agreed with the Secretary).*
    3. *Revegetate the quarry benches and pit floor within Lot 401 on DP633427 using a combination of pasture species and native vegetation corridors, which link other remnant vegetation on site.*
- Minimise windblown dust during any rehabilitation activities.
- Ensure vehicles use established roads and tracks where possible and limit access to any rehabilitated areas.

Other

- The rock drill is to have an appropriate dust extraction system with collector fitted to the rig and/or wet drilling system via water sprays.
- Blasting should be limited to periods of favourable weather conditions where possible.
- Employees and contractors are to be made aware of dust management practices.
- Ensure sufficient on site water supply is available for dust suppression.
- Apply good housekeeping practices.

7.0 Monitoring

Air quality monitoring is to be undertaken in accordance with the Air Quality Monitoring Plan in **Attachment 1**. Air quality monitoring beyond the scope of the Air Quality Monitoring Plan shall be undertaken at the request of the administering authority. If requested, monitoring shall be carried out at a place(s) relevant to the potentially affected sensitive place to assist in the investigation of the complaint and to determine whether the operations are compliant and must include:

- For a complaint alleging dust nuisance, dust deposition monitoring in accordance with *AS/NZS 3580.10.1:2003: Methods for Sampling and Analysis of Ambient Air - Determination of Particulate Matter - Deposited Matter - Gravimetric Method*.
- For a complaint alleging adverse health effects caused by dust, the concentration per cubic metre of particulate matter with an aerodynamic diameter of less than 10 micrometre (µm) (PM_{10}) suspended in the atmosphere over a 24hr averaging time. If required, PM_{10} monitoring shall be undertaken in accordance with the *Approved Methods for Sampling of Air Pollutants in New South Wales* (NSW EPA, January 2007) and may utilise mobile high volume dust samplers.

8.0 Complaint Response Procedure

Complaints in relation to air quality shall be managed in accordance with the Community Engagement, Complaints and Incidents Procedure contained within the Coraki Quarry Environmental Management Strategy.

9.0 Corrective Action and Contingency Plan

The Quarry Manager shall take appropriate action to rectify unpredicted impacts or any identified management or equipment deficiencies in accordance with Community Engagement, Complaints and Incidents Procedure contained within the Coraki Quarry Environmental Management Strategy. The Quarry Manager may request the services of a specialist consultant to investigate and to give advice to assist in resolving the unpredicted impacts.

10.0 Auditing and Review

The Quarry Manager shall review this management plan and its management measures to confirm their effectiveness and investigate ways to improve environmental performance. The management plan shall be reviewed at least once every year at the time of completing the Annual Review and as required in accordance with Schedule 5, Condition 3 and 4 of the Development Consent.

ATTACHMENT 1

Air Quality Monitoring Plan

1.0 Purpose

Air quality monitoring is required to comply with Condition 15 of the Development Consent Schedule 3. The purpose of the air quality monitoring program is to ensure that the operation of the quarry does not cause dust nuisance at sensitive receptors.

2.0 Meteorological Monitoring

2.1 Requirement

Meteorological monitoring is required to comply with Development Consent Schedule 3 Condition 16. The meteorological monitoring data will allow for:

- Consideration of prevailing wind conditions when planning activities at the quarry
- Accurate assessment of meteorological conditions for compliance noise monitoring
- Consideration of prevailing conditions when investigating dust monitoring results, complaints and/or incidents

2.2 Location

The location of the weather station is shown on **Figure 1 – Environmental Monitoring Locations** contained in the Coraki Quarry Environmental Management Strategy and is attached to this document for ease of reference.

The weather station shall be appropriately sited for the purposes of assessing prevailing local meteorological conditions, in particular wind speeds and directions. The monitoring location is to comply with the *Approved Methods for Sampling of Air Pollutants in New South Wales* (NSW EPA, January 2007) and *AS3580.14-2011 Methods for sampling and analysis of ambient air - Meteorological monitoring for ambient air quality monitoring applications* to the extent practicable within the site constraints. Ideally, the wind monitoring location should be at a height of 10 metres in a relative open area free of obstructions where the anemometer is distant from any obstruction by at least 10 times the height of the obstruction. The following diagram from AS3580.14-2011 summarises the wind monitoring siting guidance.

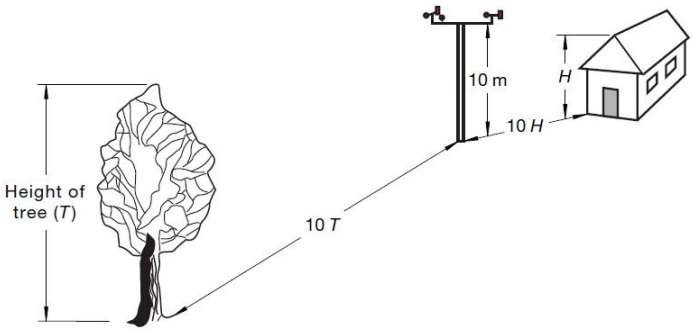


FIGURE 1 EXAMPLE OF SITING WIND INSTRUMENTS

Where siting in accordance with the AS3580.14-2011 guidance is not feasible within the site constraints then the non-compliance should be minimised and the site shall achieve the overall objective of being representative of assessing prevailing local meteorological conditions.

2.3 Equipment

The meteorological monitoring station shall be compliant with the requirements of the *Approved Methods for Sampling of Air Pollutants in New South Wales* (NSW EPA, January 2007) and *AS3580.14-2011 Methods for sampling and analysis of ambient air - Meteorological monitoring for ambient air quality monitoring applications* unless otherwise approved by the NSW EPA.

The weather station should measure wind speed at a height of 10 metres above ground level (± 0.5m).

The meteorological monitoring station must be capable of measuring and recording the following, as a minimum:

- Wind Speed
- Wind Direction
- Temperature
- Relative Humidity
- Atmospheric Pressure
- Rainfall
- Sigma Theta[1]

The weather station shall incorporate remote data access that is available to the Quarry Manager with provision for notifications/alerts in the event of equipment malfunction.

The weather station shall be capable of processing data for averaging periods of, as a minimum, 5 minutes, 15 minutes and 1 hour.

Equipment is to be installed in accordance with the manufacturer's guidance to the extent practicable.

2.4 Calibration and Maintenance

Equipment is to be maintained and calibrated in accordance with manufacturer's guidance to minimise the potential for equipment failure.

The Quarry Manager or Delegate is to visually inspect the equipment on a minimum Monthly basis and in the event of an automated notifications/alert being received suggesting equipment malfunction.

2.5 Timing and Frequency

- To be operational prior to commencement of use.
- To operate continuously.
- Equipment failure to be rectified as soon as practicable.

[1] NSW EPA has previously accepted analysis of sigma theta by post-processing calculation

3.0 Dust Deposition Monitoring

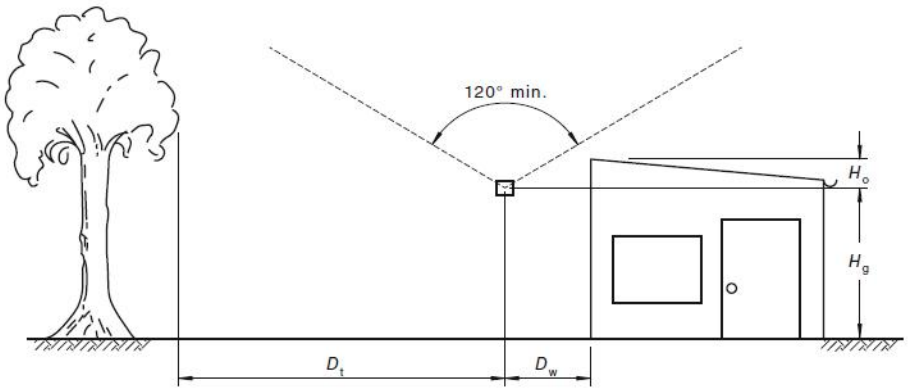
3.1 Requirement

Development Consent Schedule 3 Condition 15 requires an air quality monitoring program. The dust deposition monitoring data will allow for compliance assessment against the 'deposited dust' criterion specified in Table 5 of the Development Consent Schedule 3. Monthly review of dust deposition monitoring data is to occur to identify any potential trend towards non-compliance with the "annual average" Performance Target.

3.2 Locations

The dust deposition monitoring locations are shown on **Figure 1 – Environmental Monitoring Locations** contained in the Coraki Quarry Environmental Management Strategy and is attached to this document for ease of reference. To the extent practicable, dust deposition monitoring locations should be representative of the nearest nuisance sensitive places and should not be unreasonably affected by near-field dust emission sources. Equipment is to be installed in accordance with *AS/NZS 3580.10.1:2003: Methods for Sampling and Analysis of Ambient Air - Determination of Particulate Matter - Deposited Matter - Gravimetric Method* extent practicable within the site constraints. It will be necessary to determine specific siting constraints based upon on-site assessment. The following diagram from AS3580.1.1:2016 summarises the siting guidelines. Specific siting considerations should give regard to guidance provided in AS3580.1.1:2016 *Methods for sampling and analysis of ambient air - Guide to siting air monitoring equipment*. Relevant siting requirements include:

- Sampling height of 1.8 to 2.2 metres above ground
- Clear sky angle 120°
- Unrestricted airflow for 360°
- 10 metres from drip-line of trees
- No extraneous sources nearby



LEGEND:
H_g = Height of sampling inlet above ground—2 to 5 m for ground based sampling sites and up to 15 m for roof top sampling sites.
H_o = Height of nearby obstacle above sampling inlet—$2H_o \leq D_w$
D_t = Distance to nearby tree—≥10 m
D_w = Distance to wall (supporting structure)—minimum 1 m
120° = Minimum clear sky angle above sampling inlet

FIGURE 1 GENERALIZED GROUND LEVEL SAMPLING SITE

3.3 Equipment

Dust deposition monitoring equipment shall be in accordance with the specifications of *AS/NZS 3580.10.1:2003: Methods for Sampling and Analysis of Ambient Air - Determination of Particulate Matter - Deposited Matter - Gravimetric Method*. Spare funnels, stoppers and bottles shall be retained at the site for use in the event of equipment loss, damage or tampering.

3.4 Analysis and Reporting

Sample analysis shall be undertaken by a NATA accredited laboratory in accordance with *AS/NZS 3580.10.1:2003*.

The Quarry Manager or Delegate shall maintain records of the monitoring results to identify trends that are likely to result in non-compliance with the Performance Targets. Dust deposition monitoring results shall be reviewed monthly and if the annual 4g/m^2/month Performance Target is exceeded at monitoring location for more than two consecutive months then appropriate corrective actions shall be taken.

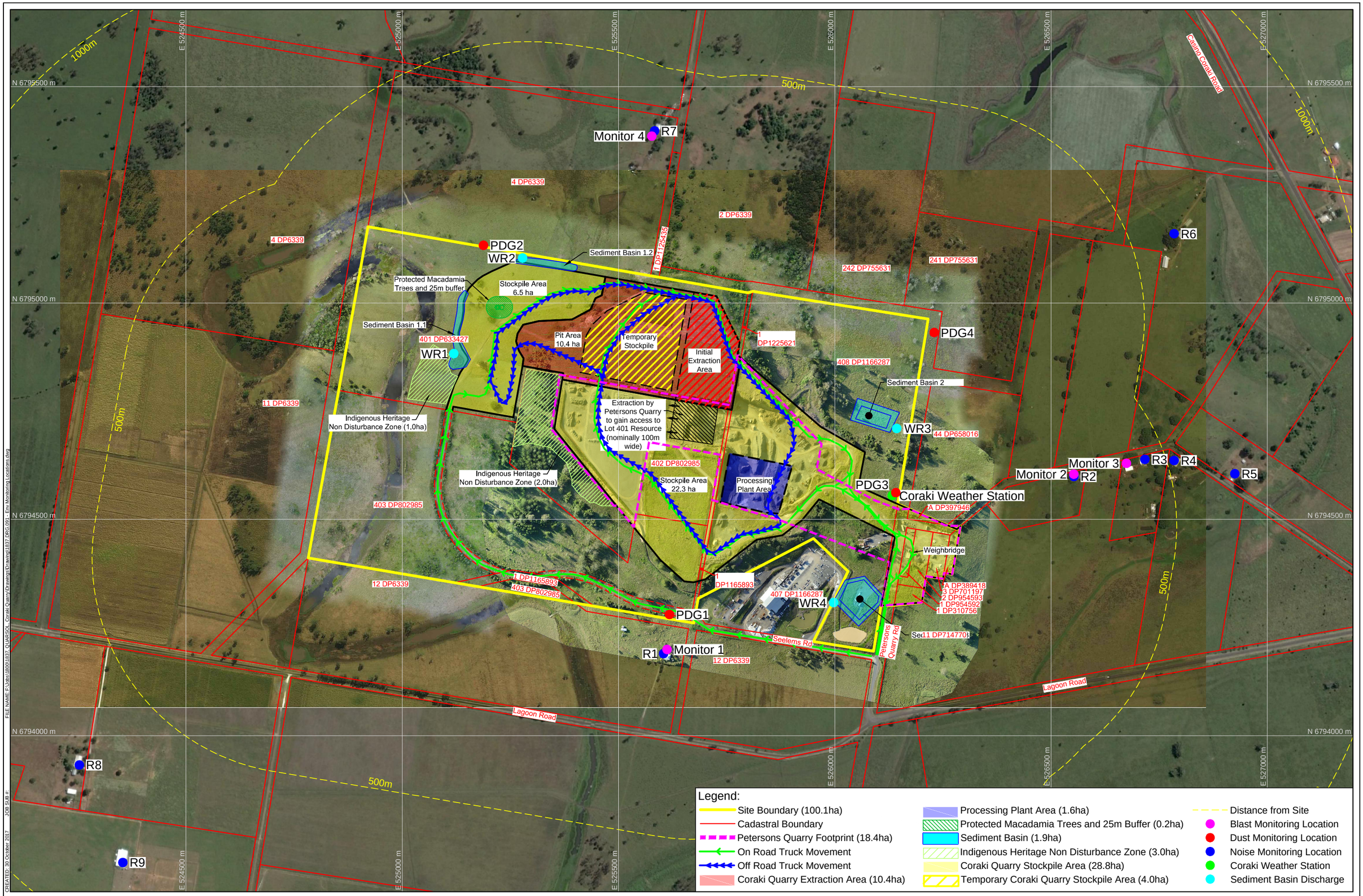
Dust deposition monitoring data shall be summarised in a report to be submitted to the NSW EPA with the Environment Protection Licence annual return. If non-compliance with the Performance Targets is identified then the annual report shall document appropriate corrective actions and a timeframe for implementation.

3.5 Calibration and Maintenance

The Quarry Manager or Delegate is to visually inspect the equipment on a minimum Weekly basis and implement any necessary repairs.

3.6 Timing and Frequency

- To be operational prior to commencement of use.
- To operate continuously with a routine sample period of 30 days ± 2 days
- Equipment failure to be rectified as soon as practicable.



Legend:

- Site Boundary (100.1ha)
- Cadastral Boundary
- Petersons Quarry Footprint (18.4ha)
- On Road Truck Movement
- Off Road Truck Movement
- Coraki Quarry Extraction Area (10.4ha)
- Processing Plant Area (1.6ha)
- Protected Macadamia Trees and 25m Buffer (0.2ha)
- Sediment Basin (1.9ha)
- Indigenous Heritage Non Disturbance Zone (3.0ha)
- Coraki Quarry Stockpile Area (28.8ha)
- Temporary Coraki Quarry Stockpile Area (4.0ha)
- Distance from Site
- Blast Monitoring Location
- Dust Monitoring Location
- Noise Monitoring Location
- Coraki Weather Station
- Sediment Basin Discharge

REV	DESCRIPTION	DATE	BY
3	Updated topographic data and aerial survey	31/10/16	LT
4	Extraction Area Amended	10/03/17	JS
5	Extraction Area & Stockpile Area Amended	11/05/17	JS

Data Sources:
Photography: UAV Survey 2016-05-05; Google. Image date: 2014-12-18
Topography: UAV Survey 2016-05-05
Cadastre:
Ecosystem:
Other:

Area of New Disturbance Associated with Coraki Quarry:

Coraki Quarry Extraction Area (Including Temporary Coraki Quarry Stockpile Area) (9.9ha)
Coraki Quarry Stockpile Area Outside of the Petersons Quarry Footprint (7.7ha + 6.5ha on Lot 401 = 14.2ha)
Sediment Basin (1.9ha)

PROJECT: Coraki Quarry

CLIENT: Quarry Solutions Pty Ltd

TITLE: Figure 1 - Environmental Monitoring Locations

GROUNDWORK plus
PH: +61 7 3871 0411
WWW.GROUNDWORK.COM.AU

SCALE: 1:8,000 When Printed On A3 (0 – 160)
DRAWING NUMBER: 1837.DRG.091A
REVISION:
DATE: 30 October 2017
DRAWN: JS
PRINTED: 30 October 2017
CHECKED: JL
DATUM: HORIZONTAL / VERTICAL / ZONE: MGA / AHD / 56

FILE NAME: P:\Jobs\1800s\1837_QUARSOL - Coraki Quarry\Drawings\Drawings\1837.DRG.091 - Env Monitoring Locations.dwg
JOB SUB #:
CREATED: 30 October 2017