

Dendrobium Mine

# Environmental Management System Management Plan



## Noise

## Review History

Revision	Description of Changes	Date	Approved
0	Draft submitted	Nov 04	Bryan Quinn
1.0	Incorporating comments on draft	Feb 05	David Oliver
2.0	Update following Department of Planning Compliance Audit	Oct 06	David Oliver
3.0	Three yearly review as required by Development Consent	Mar 08	David Oliver
4.0	Review as required by the revised Development Consent (issued 8 December 2008)	April 09	Wayne Price

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# 1 INTRODUCTION

## 1.1 Background

Dendrobium Mine is an underground mine which commenced construction in January 2002 following approval from the Minister of the then Department of Urban Affairs and Planning on 20 November 2001. Longwall mining commenced at Dendrobium in April 2005. The mine is owned and operated by Dendrobium Coal Pty Ltd, a wholly owned subsidiary of BHP Billiton and is operated on a continuous basis, 24 hours a day and 7 days a week.

The Mining operations are located immediately adjacent to Mt Kembla, approximately 8km west of Wollongong, NSW, on the Illawarra escarpment. Mt Kembla village, located within 500m of the Pit Top site, has close historical links with coal mining.

The Pit Top facilities have been developed on the site previously known as Nebo Colliery, which was combined with Wongawilli Colliery in 1993 to form Elouera Colliery. The Nebo Portal site was relinquished from the ownership and responsibility of Elouera Colliery in December 2001 to enable Dendrobium Mine to acquire formal responsibility, ownership and identity of the site.

Dendrobium Mine accesses coal from the No. 3 Seam (Wongawilli Seam) of the Illawarra Coal Fields. Three mining areas make up the approved mine plan for Dendrobium and are named Areas 1, 2, and 3 respectively.

Dendrobium produces coking coal and is approved to produce up to 5.2 million tonnes per annum with an expected life of mine in excess of 20 years. The Bluescope Port Kembla Steel Works and Whyalla Steel Works are the major customers. In addition to these Australian based customers, coal may be exported via the Port Kembla Coal Terminal to international customers.

This Noise Management Plan (NMP) addresses the management of noise associated with operation of the mine and associated infrastructure in accordance with the Dendrobium Development Consent and Environmental Protection Licence 3241. These activities include longwall mining, coal clearance and rail haulage activities.

This document is a module of the Environmental Management System (EMS) document. This document contains an introduction to the EMS as well as the common aspects across the Environmental Management Plans.

## 1.2 Scope

The scope of this document includes the following Dendrobium sites and facilities:

**Dendrobium Pit Top** - consists of administration building, workshop, machinery and equipment storage areas, people and materials access to the underground workings via the Dendrobium Tunnel, a sedimentation pond and grey water treatment and Oil Water Separation facility.

**Kemira Valley Coal Loading Facility** – the KVCLF receives coal from underground via the Kemira Valley Tunnel. Coal is transported from underground to KVCLF via the coal clearance system which is comprised of an extensive conveyor network. The coal is then fed into a rill tower and deposited onto a 150,000 tonne stockpile from which it is loaded into trains via an enclosed rail-loading chute.

**Kemira Valley Rail Line** - used to transport the coal from KVCLF to the Dendrobium Coal Preparation Plant.

**Ventilation Shaft Number 1** - The No.1 ventilation shaft, located within the Metropolitan Special Area administered by Sydney Catchment Authority (SCA), operates as a downcast shaft (i.e. drawing fresh air into the underground workings). The No. 1 vent shaft is on land owned by Illawarra Coal.

**Ventilation Shafts Number 2 and 3** – Also located within the Metropolitan Special Area and within Mining Lease ML1566. Construction of the No.2 and 3 ventilation shafts was completed during 2008. The No.2 shaft operates as an additional downcast shaft whilst the No.3 shaft operates as an upcast shaft.

## 2 OBJECTIVES

The objectives of the NMP are to:

- Comply with all regulatory requirements set out in the Dendrobium Development Consent, Environment Protection Licence 3241 and other legislation with regards to noise;
- Ensure BHP Billiton environmental and other relevant Strategies and Policies are met and upheld;
- Ensure that operational noise impact is reduced to the lowest level which is feasible and reasonable to minimise the impact on the local community, thereby reducing the number of complaints received;
- Create an environment where site personnel and contractors are involved in addressing and encouraged to identify and comply with correct noise management practices through education and other programs; and
- Create a monitoring, auditing and reporting system to measure performance against the noise management objectives.

### 3 RESPONSIBILITIES

It is the responsibility of all employees and contractors to undertake practices to manage and minimise noise according to this Management Plan.

The Environment and Community Manager is responsible for coordinating the implementation of this management plan and for the periodic review of the Plan. The Environment and Community Manager will also be responsible for ensuring the commitments contained within this management plan are met. This will include:

- i. Overseeing the operation of the noise monitoring program and collection of monitoring data;
- ii. Reviewing data to ensure its integrity;
- iii. Analysis and interpretation of data; and
- iv. Production and dissemination of reports and appropriate summaries of information in reports.

The Environment and Community Manager, along with the Safety and Training Manager, is also responsible for coordinating the training of employees and contractors with regards to the management of noise.

Issues associated with the loading of coal at Kemira Valley and the train line are managed by the Logistics Group of Illawarra Coal, with some aspects, such as the EPA licence requirements, managed in conjunction with Dendrobium's Environment and Community Manager.

## 4 LEGISLATIVE AND OTHER REQUIREMENTS

### 4.1 Legislative Requirements

Legislation relating to the management of noise includes:

- *Protection of the Environment Operations Act 1997 (POEO Act);*
- *Protection of the Environment Operations (General) Regulation 1998; and*
- *Protection of the Environment Operations (Noise Control) Regulation 2000.*

### 4.2 Environment Protection Licence Requirements

Licence 3241 applies to the Dendrobium Mine premises and associated activities, and contains conditions pertaining to noise. A copy of the licence can be accessed at the DECC website. [http://www.environment.nsw.gov.au/poeo/details.asp?licence\\_no=3241](http://www.environment.nsw.gov.au/poeo/details.asp?licence_no=3241)

### 4.3 Development Consent Conditions

Schedule 4 of the Development Consent details the specific environmental conditions (surface facilities) with which Dendrobium must comply. The following conditions apply to this NMP:

#### **Schedule 4**

#### **Noise –Noise Impact Assessment Criteria**

1. The Applicant shall ensure that the noise generated at the surface facilities does not exceed the noise impact assessment criteria in Table 1 at any residence on privately-owned land, or on more than 25% of any privately-owned land. The applicable criteria for any residence not listed in Table 1 shall be the criteria applying to the nearest residence.

*Table 1: Noise impact assessment criteria dB(A)*

<b>Day</b> <i>LAeq (15min)</i>	<b>Evening</b> <i>LAeq(15min)</i>	<b>Night</b>		<b>Residence</b>
		<i>LAeq(15min)</i>	<i>LA1(1min)</i>	
42	42	38	48	R2
41	41	40	50	R22
40	40	39	49	R1
				R9
				R15a
40	40	37	47	R3a
				R5a
				R6a&b
37	35	35	45	R39a

#### **Noise – Land Acquisition Criteria**

2. If the noise generated at the surface facilities exceeds the relevant criteria in Table 2 at any residence on privately-owned land or on more than 25% of any privately-owned land, the Applicant shall, upon receiving a written request for acquisition from the landowner, acquire the land in accordance with the procedures in conditions 8 - 10 of schedule 4. The applicable criteria for any residence not listed in Table 2 shall be the criteria applying to the nearest residence

Table 2: Noise acquisition criteria dB(A)

Day LAeq(15min)	Evening LAeq(15min)	Night LAeq(15min)	Residence
47	47	43	R2
46	46	45	R22
45	45	44	R1
			R9
			R15a
45	45	42	R3a
			R5a
			R6a&b
42	40	40	R39a

#### **Noise: Rail Haulage Impact Assessment Criteria**

3. The Applicant shall ensure that noise generated by locomotives using the Kemira Valley rail line does not exceed the rail noise impact assessment criteria in Table 3.

Table 3: Rail noise impact assessment criteria

Operating Conditions	Measurement Conditions	Criteria LA1(1min)
Locomotive at idle, with compressor radiator fans and air conditioning operating at maximum load	Stationary 15 metre contour	70 dB(A)
All other throttle settings under self-load, with compressor radiator fans and air conditioning operating at maximum load	Stationary 15 metre contour	87 dB(A) 95 dB(Lin)
All service conditions	Up to 50 km/hr, 15 metres from the centerline of rail track	87 dB(A) 95 dB(Lin) Must be non-tonal, Linear noise must not exceed A-weighted noise levels by more than 15dB

#### **Continuous Improvement**

4. The applicant shall:

- a. Continue to investigate ways to reduce the noise generated by the development (including off-site road noise, noise and vibration impacts from the operation of the Kemira Valley rail line and maximum noise levels which may result in sleep disturbance);
  - b. Continue to implement all reasonable and feasible best practice noise mitigation measures; and
  - c. Report on these investigations and the implementation and effectiveness of these measures in the AEMR.
- to the satisfaction of the Director-General.

5. The Applicant shall use its best endeavours to minimise wheel squeal, brake squeal and locomotive wheel slippage arising from rail haulage on the Kemira Valley rail line.

**Noise – Additional Noise Mitigation Measures**

6. Upon receiving a written request from the owner of any residence where subsequent noise monitoring shows the noise generated by the development is 3dB(A) greater than the noise impact assessment criteria in Table 1 (except where a negotiated noise agreement is in place) the Applicant shall implement reasonable and feasible noise mitigation measures (such as double glazing, insulation and/or air conditioning) at any residence on the land in consultation with the landowner.

**Noise – Monitoring**

7. The Applicant shall prepare and implement a Noise Monitoring Program for the development to the satisfaction of the Director-General. This program must:
- a. be submitted to the Director-General for approval by 30 April 2009;
  - b. be prepared in consultation with DECC;
  - c. provide for quarterly attended noise monitoring and real-time noise monitoring (where appropriate) to monitor the performance of the development, especially in residential areas close to the surface facilities; and
  - d. include a noise monitoring protocol for evaluating compliance with the noise impact and land acquisition criteria in this consent.

**Transport – Rail Transport of Coal**

23. The Applicant shall ensure that trains do not travel on the Kemira Valley rail line:
- a. between 12 midnight and 6am, until 29 April 2010; and
  - b. between 11pm and 6am, from 30 April 2010
- unless written approval is obtained from DECC for emergency use of the rail line.

Schedule 7 of the Development Consent details additional procedures for air quality and noise management. The following conditions apply to this NMP.

**Schedule 7**

**Notification of Landowners**

1. If the results of the monitoring required in Schedule 4 identify that the impacts generated by the development are greater than the relevant impact assessment criteria in Schedule 4, except where

this is predicted in the documents listed in Condition 2 of Schedule 2 or where negotiated agreement has been entered into in relation to that impact, then the Applicant shall notify the Director-General and the affected landowners and/or existing or future tenants (including tenants of mine-owned properties) accordingly, and provide quarterly monitoring results to each of these parties until the results show that the development is complying with the criteria in Schedule 4

***Independent Review***

2. If a landowner considers the development to be exceeding the impact assessment criteria in Schedule 4, except where this is predicted in the EA, then he/she may ask the Director-General in writing for an independent review of the impacts of the development on his/her land.

If the Director-General is satisfied that an independent review is warranted, the Applicant shall within 2 months of the Director-General's decision:

- a. consult with the landowner to determine his/her concerns;
- b. commission a suitably qualified, experienced and independent person, whose appointment has been approved by the Director-General, to conduct monitoring on the land, to:
  - determine whether the development is complying with the relevant impact assessment criteria in Schedule 4; and
  - identify the source(s) and scale of any impact on the land, and the development's contribution to this impact; and
- c. give the Director-General and landowner a copy of the independent review.

3. If the independent review determines that the development is complying with the relevant impact assessment criteria in Schedule 4, then the Applicant may discontinue the independent review with the approval of the Director-General. If the landowner disputes the results of the independent review then either the Applicant or the landowner may refer the matter to the Director-General for resolution.

Where matters referred to the Director-General under this condition cannot be resolved by the Director-General within 28 days, the Director-General shall refer the matter to an Independent Dispute Resolution Process.

4. If the independent review determines that the development is not complying with the relevant impact assessment criteria in Schedule 4, and that the development is primarily responsible for this non-compliance, then the Applicant shall:

- a. take all reasonable and feasible measures, in consultation with the landowner, to ensure that the development complies with the relevant criteria and conduct further monitoring to determine whether these measures ensure compliance; or
- b. secure a written agreement with the landowner to allow exceedances of the relevant criteria; or
- c. offer to acquire all or part of the landowner's land in accordance with the procedures in Conditions 6-8 below.

to the satisfaction of the Director-General.

5. If further monitoring under Condition 4(a) determines that the development is complying with the relevant impact assessment criteria, then the Applicant may discontinue the independent review with the approval of the Director-General.

If further monitoring under Condition 4(a) determines that measures implemented under that condition have not achieved compliance with the impact assessment criteria in Schedule 4, and the Applicant cannot secure a written agreement with the landowner under Condition 4(b) to allow these exceedances, then the Applicant shall, upon receiving a written request from the landowner, acquire all or part of the landowner's land in accordance with the procedures in Conditions 6-7 below.

#### **Land Acquisition**

6. Within 3 months of receiving a written request from a landowner with acquisition rights, the Applicant shall make a binding written offer to the landowner based on:

- a. the current market value of the landowner's interest in the property at the date of this written request, as if the property was unaffected by the development the subject of the development application, having regard to the:
  - existing and permissible use of the land, in accordance with the applicable planning instruments at the date of the written request; and
  - presence of improvements on the property and/or any approved building or structure which has been physically commenced at the date of the landowner's written request, and is due to be completed subsequent to that date, but excluding any improvements that have resulted from the implementation of the 'additional noise mitigation measures' on Condition 6 of Schedule 4;
- b. the reasonable costs associated with:
  - relocating within the local government areas of the affected Councils, or to any other local government area determined by the Director-General;
  - obtaining legal advice and expert advice for determining the acquisition price of the land, and the terms upon which it is required; and
- c. reasonable compensation for any disturbance caused by the land acquisition process.

If, within 28 days of the Applicant making this offer, the Applicant and landowner cannot agree on the acquisition price of the land and/or terms upon which the land is to be acquired, then either party may refer the matter to the Director-General for resolution.

Upon receiving such a referral, the Director-General shall request the President of the NSW Division of the Australian Property Institute (the API) to appoint a qualified independent valuer to:

- consider submissions from both parties;
- establish a fair market valuation for the land and determine reasonable costs and compensation for the acquisition, in accordance with paragraphs (a)-(c) above and any guidance or guidelines that the Director-General may prepare relating to this condition; and
- propose any appropriate fair and reasonable terms of acquisition.

The appointed valuer is to provide a full report and explanation of their valuation, determinations and proposed terms of acquisition to the Director-General, the Applicant and the landowner. The Director-General shall consider the report and decide whether the valuation, determinations and any proposed terms of acquisition are fair and reasonable and advise the parties accordingly.

Within 14 days of receiving the Director-General's decision that the independent valuer's report is fair and reasonable, the Applicant shall make a written offer to purchase the land at a price and according to terms not less than set out in the independent valuer's report.

If the Director-General is of the opinion that the valuation and/or determination is not fair and/or reasonable, they shall give notice to the parties that a further independent valuation and determination will be undertaken in accordance with this condition and duly request a further appointment by the API.

If the landowner refuses to accept with 6 months a written offer duly made by the Applicant under this condition, then the Applicant's obligations to acquire the land shall cease, unless otherwise agreed by the Director-General.

7. The Applicant shall bear the full costs of any independent valuer's valuation, determination and report.

8. If the Applicant and landowner agree that only part of the land shall be acquired, then the Applicant shall pay reasonable costs associated with obtaining council approval for the plan of subdivision (where permissible), and registration of the plan at the Office of the Registrar-General.

#### 4.4 BHP Billiton and Other Policies and Strategies

BHP Billiton operates in accordance with the Health, Safety, Environment and Community (HSEC) Management Standard (STA.009) which covers all operational aspects and activities of its business and the Environment Standard (STA.020) which prescribes the mandatory environmental performance requirements that support the aspiration of zero harm across BHP Billiton.

The HSEC Management System framework is consistent with internationally recognised standards. It aims to set benchmarks for the Company's diverse range of businesses to develop and implement their own HSEC Management Systems, to provide auditable criteria for these systems and to provide a basis from which to drive continuous improvement.

The Noise Management Plan has been developed consistent with the principles of the HSEC Management Standard and Environment Standard.

Dendrobium Mine maintains an environmental management system which is certified to ISO14001 standard.

## 5 MANAGEMENT STRATEGIES

### 5.1 Operational Activities and Potential Noise Issues

This section describes the activities undertaken at the Dendrobium Mine and highlights those components with the potential to create noise issues.

#### 5.1.1 Underground Mining Activity

Mining at Dendrobium is by the longwall method. Development mining involves driving tunnels and roadways to access longwall mining areas. Equipment involved in mining activities include:

- Continuous miners which are used in development mining;
- Shuttle cars to collect and transport coal from the continuous miners to the underground conveyor network;
- A longwall shearer and associated roof supports;
- Personnel transport vehicles to transport mine workers to and from the underground workings; and
- Rubber tyred vehicles (loaders) which are used to support the operations for materials transport.

All mining production activities occur beneath the surface and are not expected to present any direct noise issues to residential premises located adjacent to the mine.

#### 5.1.2 Dendrobium Surface Activities

Activities on the Dendrobium Pit Top with the potential to create noise impacts include:

- Handling of materials utilising forklifts and ballast/underground road base materials delivery and transport;
- Vehicles moving around the surface;
- Vehicles accessing the site;
- The periodic construction or upgrading of facilities; and
- Maintenance and cleaning equipment.

The Dendrobium Mine is accessed via a drift from the Dendrobium Tunnel, driven directly into the No. 3 Seam outcrop. Rubber-tyred vehicles transport people and materials into the Mine via this drift. Noise from this activity has been minimised through modification of underground machinery (rubber tyred vehicles) and the introduction of a self-imposed night time curfew from 10pm to 5am. During the curfew, surface vehicle movements are minimised where possible except where required for safety, emergency reasons or change of shifts. Low

frequency reversing alarms have been fitted to all mine vehicles to reduce intrusive noise levels.

Low noise emission mine site equipment has and will continue to be sourced and/or designed, where practicable, to assist in meeting site noise limits, or as a noise mitigation measure.

Vehicle access to the Mine is via the main entry from Cordeaux Road and is controlled through the Drivers' Code of Conduct (refer to the Traffic Management Plan), a document in which employees, contractors and other users of the site are trained to abide to Dendrobium's Consent Conditions. The Drivers' Code of Conduct, which is initially communicated to all employees and contractors during the site induction and regularly reinforced through Environment and Community Awareness Training, is supplied to all transport companies accessing the Dendrobium site. Breaches of the Code, including unnecessarily 'noisy' driving, may result in disciplinary action.

### 5.1.3 Kemira Valley Coal Loading Facility

The KVCLF is located in a valley, generally set apart from residential areas. However, there are several isolated residences potentially affected by its operation. The nearest non-mining residence is located approximately 600 metres to the south and is separated from the KVCLF by a ridge which is approximately 50 metres high.

Coal is brought from the mine to the surface via a coal clearance system consisting of an extensive conveyor network. Once on the surface, the coal travels a further 540 metres via a surface conveyor, via a coal sizer, to the 150,000 tonne capacity stockpile. The surface conveyor from the portal to the KVCLF has been designed to address noise impacts. This includes the following aspects:

- It is partially enclosed.
- The conveyor profile design eliminates the need for any surface transfer points. The system consists of one continuous conveyor with the drive intentionally located underground to reduce noise.
- Where the conveyor crosses open ground, landscape planting has been introduced to assist with visual, acoustic (line of sight) and dust screening.
- Steel rollers on the KVCLF conveyor were replaced with polyurethane coated rollers.

Coal is transferred from the conveyor onto the 150,000 tonne capacity stockpile via the use of a rill tower. This method of transfer is considered to have a lower noise emission than trip conveyors or other systems. Extensive modifications have been made to the rill tower to modify the impact plates on the coal delivery chute and the exit doors. Polyurethane was

placed on the chute work to lower noise levels. Rubber or rubber backed steel doors are being progressively installed to minimise 'ringing' that can occur when ROM coal strikes bare steel rill tower doors.

Empty trains arrive at the loader and pass through the tunnel beneath the stockpile. During the loading operation, locomotives are transferred to the opposite end of the wagons ready to pull the loaded wagons back to Port Kembla. Train loading occurs under gravity via a vibratory feeder from the base of the stockpile into trains as they are shunted through a tunnel beneath the stockpile.

A bulldozer and excavator operates on the stockpile to clear blockages and to push coal from those parts of the stockpile from which coal cannot self-load under gravity. Earth moving equipment noise levels have been monitored from a series of locations to identify noise received at residential locations, due to concern over community impacts and to identify potential improvements.

The stockpile tunnel is ventilated by a fan directing air to the centre of the tunnel. That air is drawn from the northern end of the tunnel, released in the middle and flows to either end, removing any diesel fumes.

#### 5.1.4 Ventilation

Mine ventilation is provided through a series of inlet and outlet shafts and openings in combination with fans that remove stale air and draw fresh air into the Mine. The fans, located on the surface, have the potential to cause noise impact however due to their remote locations (in SCA land) they are unlikely to impact on any residences.

The No. 2 Ventilation Shaft is currently operating as an upcast shaft whilst the No.1 and No.3 shafts are currently operating as downcast shafts.

Ventilation fans are required to operate continuously 24 hours a day, 7 days a week. The design of all ventilation fans is carried out to ensure compliance with Dendrobium's Conditions of Consent and EPA Licence requirements.

#### 5.1.5 Rail Transport of Coal

All coal is transported from the Dendrobium Mine via rail along the existing rail line from Kemira Valley to the Port Kembla Steelworks.

Rail movements associated with Dendrobium are controlled by a travel curfew. Currently this restricts train movements to the hours between 6.00am and midnight, however, unless

otherwise amended, is to be further restricted between the hours of 6.00am and 11.00pm from 30 April 2010.

Up to 10 trains per day (i.e. 20 movements) transport coal from the KVCLF to the Dendrobium Coal Preparation Plant at Port Kembla.

## 5.2 Noise Management and Mitigation

Operational noise management for the Dendrobium Mine and associated facilities in the Mount Kembla area is achieved in a number of ways including:

- i. Ensuring all equipment is procured, where practicable, to a noise specification which assists with meeting site noise limits. Plant equipment can also be strategically placed to minimise noise escaping from site and contained within suitably designed noise mitigation structures. Procurement controls are supplemented by operational management controls which include procedures to minimise noise emission.
- ii. Focus on the management of night time noise emissions. Controlled management can be applied to times of operation (including a night time curfew, as currently occurs), operator training and use of new technology. This is especially the case with rail noise emissions control.
- iii. Subsequent noise monitoring then assesses sound levels from the Mine and associated activities received in residential receiver locations. If monitored sound levels are in compliance with Development Consent conditions, it will indicate that noise management measures are effective in meeting the conditions of consent and EPA licence requirements.
- iv. Modelling of noise source contributions at residential receiver locations can assist this process, especially where ambient sound levels are higher than contribution sound level conditions for the Mine and associated sources.
- v. Should community advice indicate specific sources or operations are of concern; investigations will be implemented to assess the contribution of the specific sources or activities at residential receivers. These investigations will include monitoring and modelling of the noise, where relevant. Reports of special investigations will refer to results, comparison with conditions and options for reduction of noise, if required.

Items specific to the operation of the rail line to minimise noise have, and will continue to include the following:

- vi. Use of driver training to minimise noise emissions during braking and general operations;
- vii. Maintenance of wheels, brakes and rail lines to minimise potential for squealing noise. This includes the operation of grease/lubrication points on the line; and

- viii. Continued review of rail operations to minimise noise through procedures, training, and technology.

Methods to demonstrate the Mine is achieving best practice in minimising low frequency noise will be based on utilising materials and machinery with specifications for low-frequency noise, as well as maintenance, operation and monitoring of this equipment.

The works and activities shown in the table below have been implemented since 2006, or are currently in progress to address noise emissions from the Dendrobium operations, are provided in the table below.

Noise Source and / or Control Option	Status	Comments	Estimated Completion
Mine Vehicle Reversing Alarms	Installed	A reduction in noise level emission noted in attended surveys.	Complete
Rill Tower Doors	Several trial doors fitted Noise assessment to be completed	Monitoring to continue to determine success in reducing sleep disturbance related noise emissions	Ongoing
Conveyor Roller Replacement on KV conveyor	Completed installation of polyurethane rollers	All rollers replaced, monitoring confirmed 10 dB(A) noise reduction	Complete
Rill Tower Bash Plate	Noise assessment completed and design provided	Modifications completed in March 2007	Complete
Coal Sizer Design	Noise assessment completed and design provided	Construction and installation completed in April 2007	Complete
Noise Control Kits on mine vehicles	Baseline measurements undertaken and preliminary design advice provided	Preliminary design being reviewed by vehicle manufacturers. Substantial safety issues need to be overcome.	Ongoing
Rail noise	Recommendations made in the Marich Report. Proposal to monitor levels whilst trialling modifications	Major rail track improvement works undertaken in 2007. Monitoring to assess noise reduction.	Ongoing

### 5.3 Management Strategy Effectiveness

The operational noise management and mitigation actions described in Section 5 and the detailed noise monitoring program described in Section 6 have been developed by Dendrobium Mine in consultation with expert noise consultants, government regulators, the community, equipment manufacturers and using the operational experience of other mine operators.

An example of this approach is the development and implementation of low frequency reversing alarms that have been fitted to all underground vehicles at Dendrobium Mine. This project involved the development of an intrinsically safe low frequency alarm that satisfied both noise and underground safety requirements. This was an Australian first and has led the way in establishing a new benchmark in mining related noise management for underground coal mines.

Dendrobium Mine will continue to research and where its is relevant to do so, develop and implement, noise monitoring, management and mitigation measures to ensure that noise emissions are maintained at community acceptable levels.

## 6 MONITORING

The objective of the monitoring program is to provide monitoring information and advice to ensure that noise emissions from the site are appropriately managed and that low frequency noise is minimised. Ongoing refinement of the monitoring programs, including monitoring locations, may be necessary as a result of monitoring result analysis or the review of operational activities.

### 6.1 Existing Noise Monitoring Program - Receiver Noise

Quarterly attended noise monitoring occurs at appropriate locations at specific receivers nominated in this NMP, and as required based on community complaints, additional investigations/studies and unplanned events.

The monitoring program consists of a combination of attended and real time unattended monitoring and is carried out in accordance with “AS1055-1997: Acoustics – Measurement and Description of Environmental Noise” and the NSW Department of Environment and Climate Change (DECC) “Industrial Noise Policy” (2000).

#### 6.1.1 Attended Monitoring

**Frequency:** Monitoring shall occur within each seasonal period on a quarterly basis. This frequency of monitoring shall be reviewed on a regular basis (a minimum of every three years);

**Interval:** The monitoring interval shall be several 15-minute periods at each representative receiver location during a mix of day, evening and night periods, with a focus on the more sensitive night-time period.

**Parameters:** Parameters to be recorded include the following:

$L_{Aeq-15min}$  The equivalent continuous A-weighted sound level over the measurement interval of 15-minutes;

$L_{A90-15min}$  The A-weighted sound level exceeded for 90% of the time in the measurement interval of 15 minutes;

$L_{Amax}$  The range of maximum A-weighted sound level in the measurement interval and identification of likely source where obvious;

Weather Wind speed range and direction at the monitoring location shall be measured and noted. Kemira Valley and Pit Top

Weather station data, including wind speed, wind direction and rainfall, will also be included in the quarterly noise reports. During adverse weather conditions (e.g., rain, wind > 3 m/s) valid noise monitoring data cannot be collected.

**Sources** Sound levels, which can be associated with specific sources at the operations, shall be captured and recorded via attended monitoring. This is to identify sources contributing to the overall noise environment in the monitoring area and to calculate the  $L_{Aeq,15min}$  contribution and  $L_{Amax}$  from Dendrobium operations.

**Instruments:** Instruments used for attended monitoring shall be of Type 1 – Precision grade, in accordance with the requirements of *AS1055:1997* and *ASIEC61672: 2004 Electroacoustics - Sound level meters* and within the calibration requirements of both standards. A calibration check shall be performed regularly using a calibrated field sound level source.

**Locations:** For the Mount Kembla area, specific locations to be used for each monitoring activity are shown in Figure 1, with the addresses described in the table below.

**Priority Level:** Low Priority locations require a minimum of two 15 minute measurements whilst High Priority locations require a minimum of two 15 minutes measurements performed on consecutive days (i.e. a total of 4 measurements).

Location	GPS Coordinates		Address	Owned By	Description	Priority Level
	Easting	Northing				
R1	298990	6188274	17 High Street	Dendrobium	South-western corner of driveway, next to parking shed	High
R5a	299437	6187910	8 Benjamin Road	Private Residence	40m from the corner of Cordeaux Rd, at the front yard of No. 8	Low
R6a	298965	6187725	374 Cordeaux Road	Private Residence	Next to dust monitor at the boundary of No. 374	High
R15a	298588	6187903	View Street	Dendrobium	South of Bowling Club, next to street sign	Low
R39a	300793	6188421	Figtree Farm	Private Residence	On the western end of the house with direct line of site to the KVCLF site	High

Additional locations may be used, as identified from previous monitoring, community advice or other noise management investigations.

The specific locations used shall be reviewed every three years. Alternatives to regular locations may be used where regular monitoring locations cannot be accessed.

**Reporting:** For each site, the following shall be reported:

- Location, date and time, and attendant;
- Type of Instrument used and calibration status;
- Parameters measured and their results;
- Weather conditions; and
- Sound levels from specific identifiable sources.

If Dendrobium receives notification from a landowner who considers the operations to be exceeding the noise criteria detailed in Schedule 4 of the Development Consent, the applicable conditions outlined in Schedule 7 of the Consent will be followed.

#### 6.1.2 Real Time Monitoring – Low Frequency Noise

Noise from Dendrobium at surrounding receivers is dependent on activities occurring on site at the time, and also the prevailing weather conditions (wind and temperature inversions). The deployment of a directional real time noise monitoring system to supplement attended data can assist in the identification of activities or equipment that contribute to offsite noise impacts. Once the diagnostic phase of the directional real time noise monitoring program is undertaken, improvement opportunities can be implemented to reduce the noise signature from mine site equipment or activities that may impact on nearby residents.

The steep and heavily vegetated topography around the mine can make the deployment of sophisticated unattended noise monitoring systems difficult. In addition, the amount and volume of non-mining related low frequency noise in the local areas is substantial, therefore making discrimination of noise sources more challenging compared to relatively sparsely populated areas adjacent to open cut or more remote mines.

Recent noise mitigation works undertaken by Dendrobium have been successful in terms of achieving compliance against the noise limits prescribed by the Development Consent and Environment Protection Licence. A significant reduction in the number of noise complaints made by the community supports the success of these works.

Given that the noise emissions from the mine are generally in compliance with regulatory limits and do not attract a high number of community complaints, real time directional noise monitoring will only be deployed on an as needs basis in response to an demonstrable

increase in complaints alleging noise impacts from the mine, a significant change in the operation or activity at the mine that may cause an increase or change in noise emissions from the mine, or for the purpose of complementing attended noise monitoring to demonstrate that Dendrobium Mine is achieving best practice in minimising low frequency noise.

A real time directional noise monitor (for example a BarnOwl version 4) would be deployed at 374 Cordeaux Road (location 6a) or Figtree Farm (location 39a) (see Figure 1) Error! Reference source not found. to determine the noise emissions from the Pit Top or Kemira Valley respectively. The deployment would be for a period of two weeks. To aid in the diagnostic process, an electronic audio recorder would be integrated into the BarnOwl real time directional noise monitor to provide continuous audio recordings.

In addition to determining where noise is coming from, BarnOwl has the ability to filter out extraneous mid to high frequency insect noise, thus improving the capabilities of the system to detect lower frequency mine operations such as diesel engines. A low pass filter (LPF) with a cut-off frequency of 1kHz selectively filters out the influence of extraneous noise.

Directional data can be graphed where the  $L_{Aeq}$  levels in the direction of the mine are above the “specific noise criterion for each period of day” then audio recordings are used to determine the likely source of the noise in those periods. Cumulative radar plots over 5 minute periods can be used to assist in establishing the “specific” area within the Pit Top where the highest noise events occur.

Real time directional noise monitoring was undertaken to assess Pit Top noise emissions during May 2007. Examples of the directional graphed data (and radar plots for the Dendrobium Mine Pit Top are provided in Section 10, Appendix A.

## 6.2 Existing Noise Monitoring Program - Rail Noise

Monitoring of rail noise will predominantly cover operational noise from the locomotives used on the Kemira Valley Rail Line (KVRL). The conditions for rail noise emissions are specified in both the Dendrobium Development Consent conditions and EPA Licence 3241.

Monitoring will include a combination of attended monitoring of locomotives and unattended monitoring at specific locations dependent on train performance, operational characteristics and community concern in relation to wheel squeal.

### 6.2.1 Locomotive Noise Monitoring

In conjunction with the noise expert on the Dendrobium Independent Expert Review Panel, a review of the previous rationale behind the rail noise monitoring was conducted. Although the monitoring attempted to measure rail noise at the point of potential affectation at nearby residences, it did not follow the requirements of the Conditions of Consent. The Conditions of

Consent contain specific requirements for measuring the locomotives at a distance of 15 metres under specific operating conditions (i.e. idle, stationary and passby).

The table below presents a summary of rail haulage noise criteria. Noise levels from locomotives used on the KVRL are governed by these specified noise limits.

Operating Condition	Speed & Location of Measurement	Noise Limits
		L <sub>Amax</sub>
Idle with compressor radiator fans and air conditioning operating at maximum load occurring at idle	Stationary 15m contour	70dBA
All other throttle settings under self load with compressor radiator fans and air conditioning operating	Stationary 15m contour	87dBA 95dBLin
All service conditions	0 to 50 km/h, 15m from centreline of track	87dBA 95dBLin

In addition to these noise level limit requirements, there are conditions relating to potential tonal / low frequency noise from locomotives. All locomotives used on the KVRL for the Dendrobium Coal operation must comply with the tonality emission requirements specified below:

- All measured noise levels must be assessed for tonality unless otherwise specified;
- Assessment of tonality is to be based on one-third octave analysis. To comply with the requirements of non-tonality the sound pressure level in each one-third octave band must not exceed the level of the adjacent bands on both sides by:
  - o 5dB if the centre frequency of the band containing the tone is above 400Hz;
  - o 8dB if the centre frequency of the band containing the tone is between 160 and 400Hz, inclusively; and
- 15dB if the centre frequency of the band containing the tone is below 160Hz; and
- In addition, the overall linear noise level must not exceed the overall A-weighted noise level by more than 15dB. (This relates to low frequency noise).

The noise limits specified above must be assessed at 15 metres from the centreline of the track with a sound level meter operated with a fast time weighting. The assessment of tonality for this condition (part b) and the comparison between linear and A-weighted levels in this condition (part c) are to be conducted using all one-third octave bands between 10 Hz and 20 kHz.

**Frequency:** Monitoring shall occur on a six monthly basis with half the locomotives tested each time to minimise disruption to rail haulage;

**Instruments:** Instruments used for attended monitoring shall be of Type 1 – Precision grade, in accordance with the requirements of *AS1055:1997* and *ASIEC61672: 2004 Electroacoustics - Sound level meters* and within the calibration requirements of both standards. A calibration check shall be performed before and after the measurements at each site using a calibrated field sound level source;

**Reporting:** For each site, the following shall be reported:

- Location, date and time, and attendant;
- Type of Instrument used and the calibration status;
- Parameters measured and their results; and
- Weather conditions.

A typical reporting format is shown in the table below.

**Table 1: Summary of Results for Locomotive Class 8142 at 15m**

Locomotive Class: 8142													
Speed & Location of Measurements	Operating Conditions	Octave Band (Hz)										Measured $L_{Amax}$	
		31.5	63	125	250	500	1K	2K	4K	8K	16K	dBA	dBLin
Stationary 15m Contour	Idle	82	74	74	69	67	64	57	50	43	32	69	84
Stationary 15m Contour	Self Load	89	90	90	83	81	81	77	75	70	69	85	95
25km/hr 15m from centreline of track	Passby	81	90	89	83	84	81	79	73	66	71	86	94
Meet Criteria (Yes/No) & Comments for													
Idle	dBA	Yes, overall A-weighted noise level complies with the criterion of 70dBA.											
	Tonality	Yes, complies with tonality requirements.											
	Low frequency	Yes, overall linear noise level is within 15dB of the overall A-weighted noise level.											
Self Load	dBA	Yes, overall A-weighted noise level complies with the criterion of 87dBA.											
	dBLin	Yes, overall linear noise level complies with the criterion of 95dBLin.											
	Tonality	Yes, complies with tonality requirements.											
Passby	Low frequency	Yes, overall linear noise level is within 15dB of the overall A-weighted noise level.											
	dBA	Yes, overall A-weighted noise level complies with the criterion of 87dBA.											
	dBLin	Yes, overall linear noise level complies with the criterion of 95dBLin.											
	Tonality	Yes, complies with tonality requirements.											
	Low frequency	Yes, overall linear noise level is within 15dB of the overall A-weighted noise level.											

### 6.2.2 Unattended Rail Monitoring

Additional rail noise monitoring will be undertaken on an as needed basis including when modifications are carried out to the rail line and associated infrastructure. A recent report

prepared by Marich Consulting Services Pty Ltd, Kemira Valley Line Rail/Wheel Squeal Noise Investigation – Study conducted on behalf of Fluor Global Services Australia and Pacific National, April 2006 (the “Marich Report”) identified works required on the Kemira Valley rail line designed to address current noise and other operational issues. The works recommended in the Marich report were progressively implemented during 2006-2007. The modifications and works identified in the report are monitored regularly to determine their effectiveness. Regular unattended rail noise monitoring is undertaken on the KVRL to monitor rail noise impact. Noise consultants analyse the data to determine noise impacts and identify any particularly noisy rolling stock.

The following specification has been derived for monitoring the works to be implemented by the Marich report:

**Frequency:** Monitoring will occur on an as needed basis in relation to each proposed modification.

**Interval:** A minimum of 40 train movements are required before and after each proposed modification.

**Location:** Preliminary monitoring is proposed to occur at the one curve before the Bushells Hill tunnel. The rail corridor is sufficiently wide at this point to also obtain a successful measurement at the 15m distance required in the consent conditions for the locomotives.

**Parameters:** Parameters to be recorded include the following:

- $L_{Amax}$  per pass-by;
- $L_{Amax}$  wheel squeal only per pass-by;
- $L_{Amax}$  flanging only per pass-by;
- SEL (dBA) per pass-by;
- SEL wheel squeal only per pass-by
- SEL flanging only per pass-by

**Weather:** Record rainfall for potential correlation with sound levels;

**Rail times:** Record times of rail departures from Kemira Valley Coal Loading Facility. Data is to be recorded during the period of the monitoring survey, to enable correlation of the sound levels recorded with the times of train movements.

**Instruments:** Instruments for unattended monitoring shall be of Type 2 General grade, in accordance with the requirements of *AS1055-1997* and *ASIEC61672*:

*2004 Electroacoustics - Sound level meters.* They shall be capable of recording the required parameters at 15-minute intervals continuously for periods of up to five days without the need for battery recharge or data download. They shall also be capable of storing mp3 format data which is capable of download direct to a personal computer for subsequent aural or automatic analysis. A calibration check shall be performed before and after each measurement period.

**Reporting:**

For each site, the following shall be reported:

- Location, dates and times of measurement period;
- Instrument, calibration status and calibration level before and after measurements;
- Weather: periods of rainfall over the monitoring period; and
- Noise levels.

Unattended noise monitoring reports will be reviewed by the Environment and Community personnel at Dendrobium Mine and Logistics. These reports will be assessed to determine the effectiveness of modifications to the rail line or its associated infrastructure. Where improvement opportunities are identified, these will be assessed and where it is appropriate to do so, a Performance Improvement Plan prepared to implement the improvement opportunity.

If Dendrobium receives notification from a landowner who considers the operations to be exceeding the noise criteria detailed in Schedule 4 of the Development Consent, the applicable conditions outlined in Schedule 7 of the Consent will be followed.

### 6.3 Noise Monitoring Program Review

The NMP will be reviewed on a triennial basis or when required.

A review of the noise data and associated community complaints was undertaken in 2009. This review, which was conducted in January 2009, consisted of an internal and external review of compliance levels achieved at each of the noise receiver locations, for the period from 2006 to 2008. The review recommended the removal of a number of the receiver location sites. The sites that have been removed from the program are outlined in the table below.

Location	GPS Coordinates		Address	Date of removal from NMP	Reason
	Easting	Northing			
R2	300062	6188449	20 Stones Road	February 2009	Refer to WM Report: dated 23/01/2009
R3	299545	6188132	30 Avon Parade	February 2009	Refer to WM Report: dated 23/01/2009
R6b	299099	6187622	1 Araluen Avenue	February 2009	Refer to WM Report dated 23/01/2009
R9	308477	6187948	View Street	2005/06	Refer to WM Report dated 23/01/2009
R22	298797	6188120	Central Avenue	February 2009	Refer to WM Report dated 23/01/2009
R40	298720	6189798	No.1 Ventilation Shaft	February 2009	Refer to WM Report dated 23/01/2009

## 7 REPORTING

### 7.1 Monitoring Data and Non-Conformances

All non-conformances to this NMP and community complaints are recorded in First Priority, a computer based incident recording and reporting system. This system keeps track of non-compliances, corrective actions, responsibilities, planned and actual completion dates and details of reporting to Regulatory Agencies and the community where appropriate.

Reporting of noise monitoring results and non-compliances occurs in a range of formats including:

- Internal Reporting (e.g. Monthly and Annual reports);
- Reports to Regulatory Agencies (e.g. Licence Annual Returns, annual Environmental Management Report); and
- Community Reports (e.g. BHP Billiton/Illawarra Coal annual Sustainability Reports and presentations to the Dendrobium Community Consultative Committee (DCCC)).

The Environmental Management Strategy contains further details of these reporting systems.

### 7.2 Notification of Potential Significant Noise Events

Where a planned operational activity has the potential to create significant noise in the local community, the following notification procedure will apply prior to the event occurring:

- Notification of the planned activity to potentially affected residences via a letter box drop,
- Notification of the planned activity to the community representatives on the Community Consultative Committee either at the meeting prior to the event, or, in the case that a meeting is not scheduled close to the event, an email will be sent to the community representatives, and,
- Notification of the planned activity to relevant government authorities such as DoP, DECC and Wollongong City Council.

Notification will include the scheduled date, time and length of the planned operational activity, a description of the activity to be undertaken and the associated noise character and company contact details for further information.

### 7.3 Auditing

A system of HSEC auditing is undertaken on the Dendrobium Mine sites and includes the use of trained internal and external auditors. In addition auditing is undertaken to ensure compliance with the ISO14001 standard.

Dendrobium Mine has an independently certified Environmental Management System (EMS). The Illawarra Coal EMS Team meets on a regular basis to develop, implement and improve the EMS. An ongoing audit program is implemented in accordance with the following schedule:

Audit Type	Frequency
Internal – from other IC site	Every 6 months
External - independent	Every 12 months
ISO14001 Certification - independent	Every 3 years

All internal auditors are trained and certified as competent auditors by an independent and external provider.

The results of monitoring and auditing are regularly reported through the senior management team to ensure that action items are addressed.

Noise monitoring results are reported to relevant government agencies in accordance with the requirements of the Development Consent and Environment Protection Licence.

## 8 COMPLAINTS RECORDING AND REPORTING

Dendrobium has a 24 hour, 7 day free call community hotline number (1800 000 510), advertised to the public via the DCCC and public notices such as Dendrobium News, which provides a mechanism by which complaints and general enquiries regarding environmental or community issues associated with operational activities can be directed. All complaints and enquiries (whether received via the hotline or directly to Dendrobium personnel) are documented and entered into First Priority (a data and document management program). After hours community complaints are immediately forwarded to the relevant Environment and Community representative for investigation and action.

Complaints will be handled via the procedures required by Section M4 of the EPL and explained in the Environmental Management Strategy. These involve the keeping of a legible record of all complaints showing:

- i. The date and time of the complaint
- ii. The method by which the complaint was received
- iii. The personal detail of the complainant which were provided by the complainant and if no details were provided a note to that effect
- iv. The nature of the complaint
- v. The action taken including any follow up contact
- vi. If no action is taken the reason why no action was taken.

The number and category (noise, traffic, dust, etc) of complaints are reported monthly to senior Mine Management and also during DCCC meetings on a bi-monthly basis. A summary of complaints for the year is reported in the annual Environmental Management Report.

All aspects of the operation will be reviewed if noise standards/goals are exceeded to identify further improvements that can practically be implemented, with the goal being to achieve zero noise related complaints received as a result of operational activities.

## 9 REFERENCES

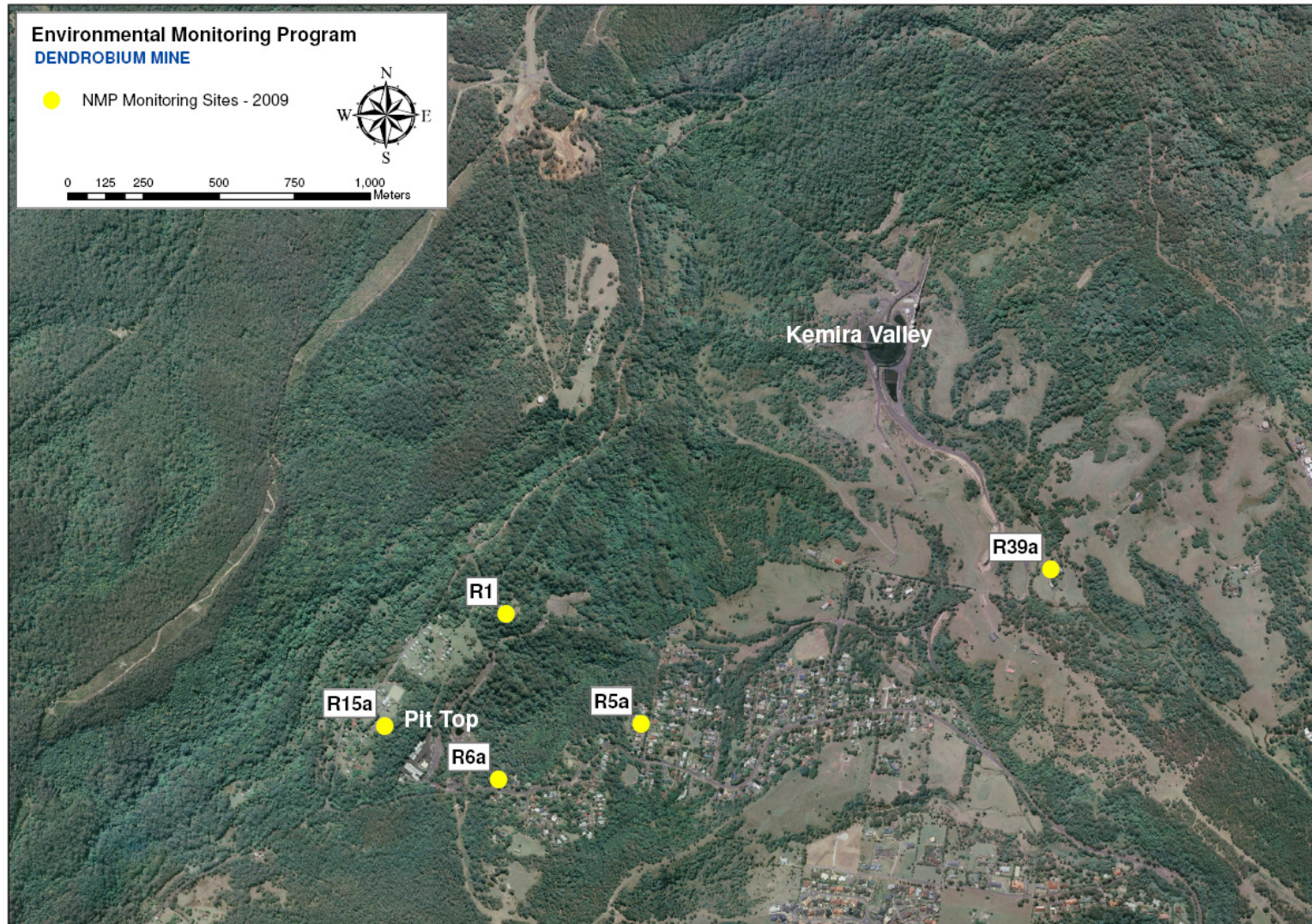
Department of Planning (2008) Notice of Modification – *Dendrobium Development Consent*

Department of Environment and Climate Change (2009) – *Environment Protection Licence 3241*

Marich Consulting Services Pty Ltd (2006) - *Kemira Valley Line Rail/Wheel Squeal Noise Investigation* – Study conducted on behalf of Fluor Global Services Australia and Pacific National, April 2006

Wilkinson Murray (2009), “*Quarterly Noise Monitoring Review – Summer 2006 to Spring 2008*”, prepared for BHP Billiton by Wilkinson Murray Pty Ltd, January 2009.

Figure 1: Noise Monitoring Program – Receiver Location



**10 APPENDIX A: REAL TIME MONITORING - LOW FREQUENCY RESULTS**

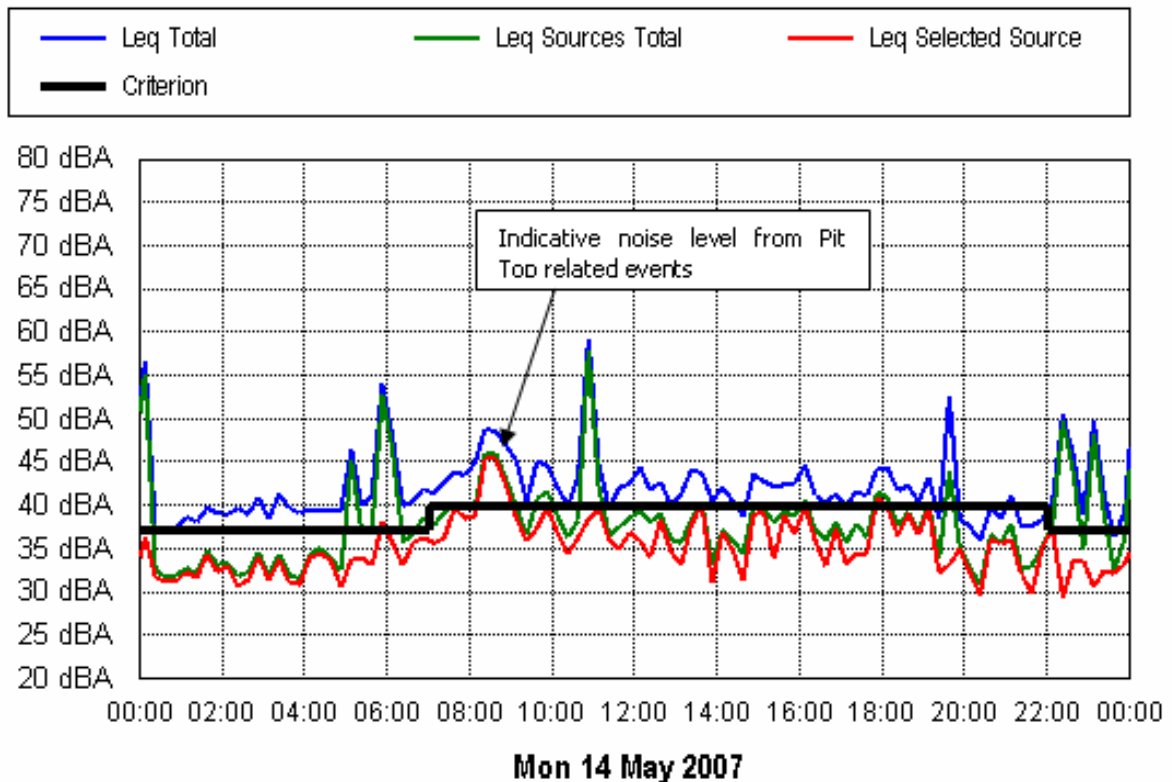
Real time directional noise monitoring was undertaken to assess Pit Top noise emissions during May 2007. Examples of the directional graphed data (and radar plots for the Dendrobium Mine Pit Top are shown below where the graphs typically presents four different colour coded lines to represent  $L_{eq}$  Total (Blue),  $L_{eq}$  Sources Total (Green),  $L_{eq}$  Selected Source (Red) and Site and Time Specific Noise Criterion (Black).

The blue line represents the total noise arriving at the BarnOwl unit. This is equivalent to the total  $L_{eq}$  level which would be measured by a standard unattended noise logger or measured with a sound level meter during attended measurements.

The green line represents the sum of all identified noise sources to which the system has been able to assign a direction.

The red line represents the sum of identified sources in the direction of interest, i.e. the Pit Top. This only includes levels from detected sources within a user specified range of angles.

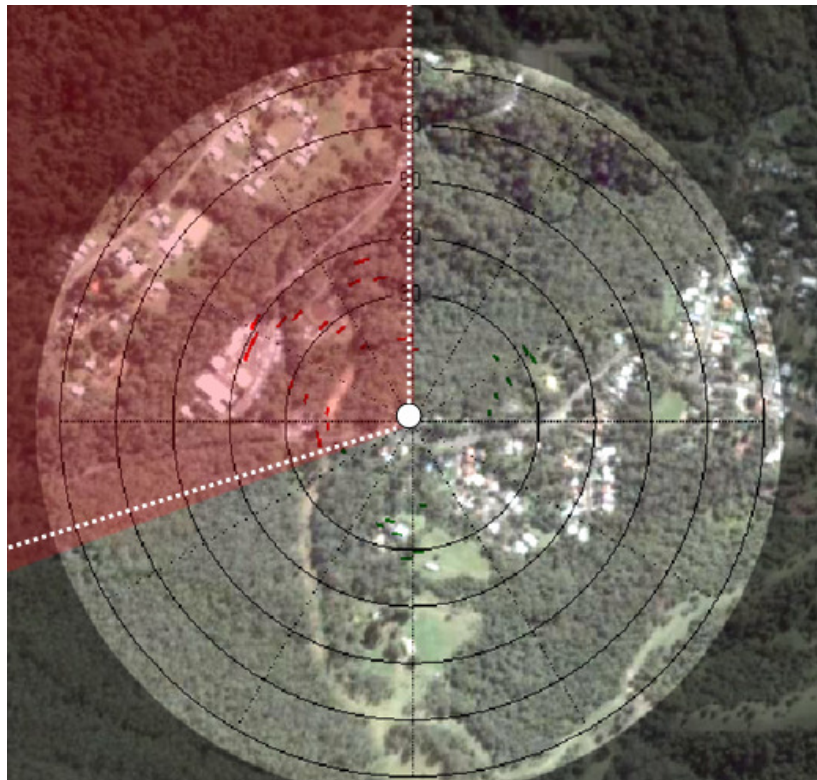
The black line presents the site and time specific criterion determined in accordance with the Consent Conditions.



**Figure 2: Graphed Noise Data – Real-time Directional Noise Monitoring**

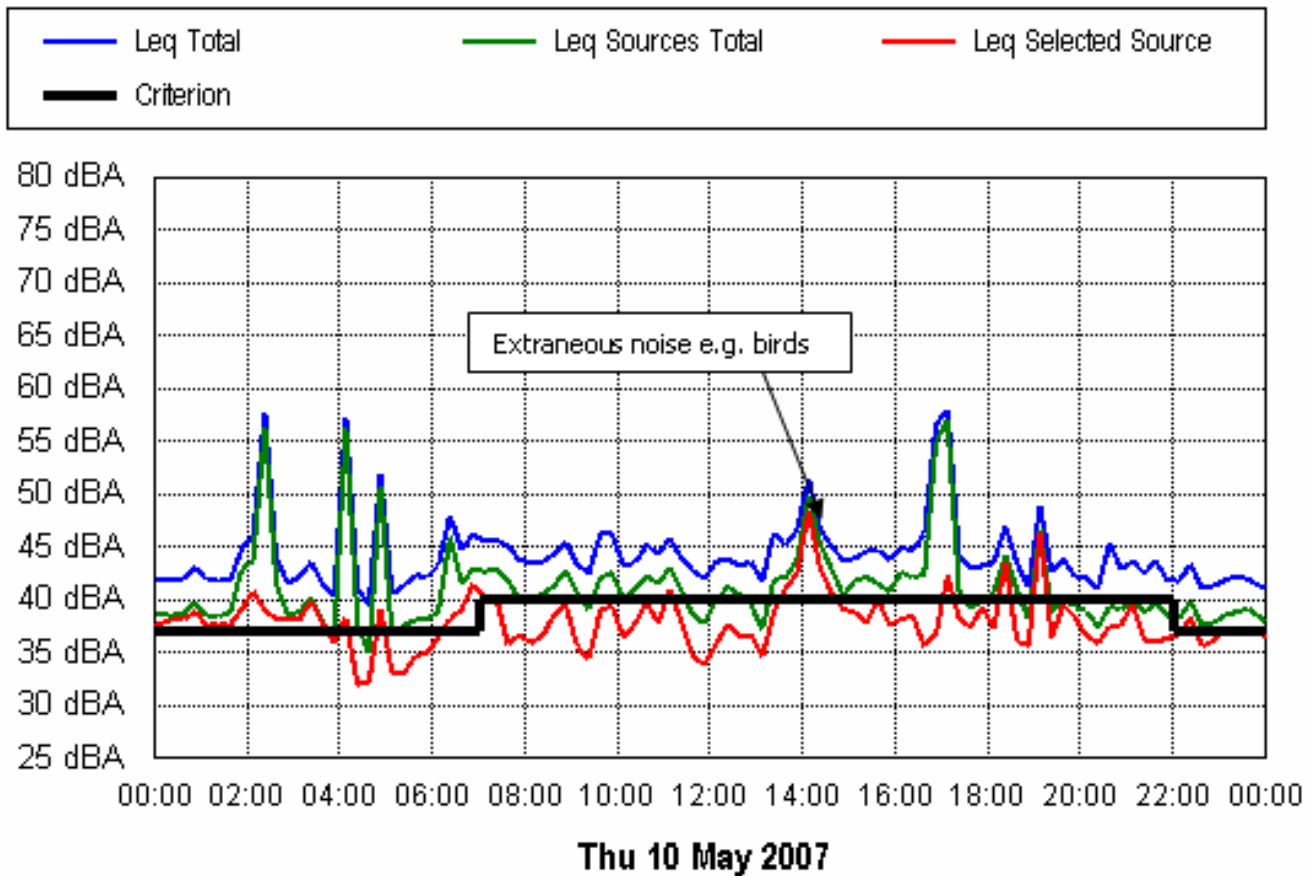
The graphed noise data is recorded with a low pass filter (LPF) implemented. This process eliminates the contribution from extraneous noise such as birds chirping (usually with mid to high frequencies characteristics) emanating from the direction of the Pit Top.

The radar plot shown in Figure 3 was used to determine the location and likely source of noise emissions. A review of the 5-minute period from 8.30-8.35am in more detail using the 5-minute cumulative radar plot associated with the graphed noise data shows the main direction where noise is generated. This confirms noise associated with vehicle movements was emanating along the haul road and Pit Top utility area. Movements are likely to be associated with vehicle movements associated with shift change activities. Shift changes are scheduled to coincide with periods of the day that are not likely to disturb nearby residents night time sleep.



**Figure 3: Radar Plot used to determine location and likely source of noise emissions**

The value of the LPF and electronic audio recording to selectively filter out the influence of extraneous noise is demonstrated in Figure 4.



**Figure 4: Graphed Noise Data showing influence from extraneous noise**

The apparent noise level exceedance at 2.00pm in the direction of the Pit Top is associated with birds chirping. This was confirmed with the audio recording during that time period which clearly includes chirping noise from birds.