15 NOISE

15.1 INTRODUCTION

The development of the open cut coal mine and associated mine infrastructure including the gas supply pipeline will introduce new noise sources into the existing rural environment. A noise assessment has been carried out as part of environmental impact assessment to assess the potential noise impacts of the Wandoan Coal Project (the Project) on the surrounding environment.

This chapter provides a brief description of the noise assessment study and existing environmental values, describes existing noise levels at 'sensitive receptors', examines the sources of noise from the Project, and assesses potential impacts. Mitigation and management measures are recommended to minimise potential impacts.

A detailed noise technical report is presented in TR 15-1-V1.4 Noise Impact Assessment. Note that figures/documents with numbering ending in V1.4 refer to figures/documents contained in Volume 1, Book 4 of the EIS.

An assessment of noise from blasting activities has been undertaken separately in Chapter 16 Vibration. The potential impact of noise on terrestrial and aquatic animals is covered in Chapter 17 Ecology.

15.2 METHODOLOGY OF ASSESSMENT

15.2.1 LEGISLATION AND GUIDELINES

This assessment was undertaken in accordance with the provisions of the Queensland Environmental Protection (Noise) Policy 1997 (EPP(Noise)) and Ecoaccess Guideline – Planning for Noise Control.

Environmental Protection (Noise) Policy

The EPP (Noise) provides guidance in achieving the object of the *Environmental Protection Act 1994* (EP Act) by identifying (section 10) the environmental values to be enhanced or protected as follows:

a) The wellbeing of the community or a part of the community, including its social and economic amenity.

b) The wellbeing of an individual, including the individual's opportunity to have sleep, relaxation and conversation without unreasonable interference from intrusive noise.

Section 319 of the EP Act places a general environmental duty on the WJV to ensure that it does not carry out any activity that causes, or is likely to cause, environmental harm unless the WJV takes all reasonable and practical measures to prevent or minimise the harm.

Section 11 of the policy also provides a numerical value to determine an acoustic quality objective as follows:

1. The 'acoustic quality objective' is the objective of achieving an ambient level of L_{Aeq} 55 dBA or less for most of Queensland's population living in residential areas.
2. It is intended that the acoustic quality objective be achieved as part of progressively achieving the object of this policy over the long term.
3. It is not intended that, in achieving the acoustic quality objective, any part of the existing acoustic environment be allowed to significantly deteriorate.

For subsection (1), the ambient level in a residential area is measured over 24 hours as the long-term L_{Aeq} outside a dwelling in the area.

There are no specific limits or guidelines specified in the EPP (Noise) which relate to noise generated from construction activities. It is expected that construction works will meet the general environmental duty as outlined in section 319 of the EP Act and the provisions of the EPA Regulation.

To ensure best practice, management processes will be implemented throughout the construction phase to help ensure that the EPP (Noise) acoustic objective of $L_{Aeq,\ 24hr}$ 55 dBA is satisfied.

Ecoaccess Guideline – Planning for noise control

The recommended noise levels emitted from industrial sources such as the Project are outlined in the Ecoaccess Guideline – Planning for noise control 2004 (Ecoaccess Guideline).

Two noise criteria need to be satisfied for noise emissions from the Project, namely the specific noise level, and, the planning noise level.

Specific noise level

Under the Ecoaccess Guideline the specific noise level is based on the existing background noise and is summarised by the following equation:

$$L_{Aeq,\ 1\ hour} \leq minL_{A90,\ 1\ hour} + 3\ dB$$

Note: $minL_{A90,\ 1\ hour}$ is the adjusted Rating Background Level (RBL). RBL is defined as the median value of the measured Assessment Background Levels (ABL) for each period (day/evening/night). ABL is the tenth percentile measured background noise level ($L_{A90,T}$) during each measurement period (day/evening/night) for each 24 hours.

A threshold background noise level of 25 dBA is to be used if the measured rating background level (RBL) is below this value as it is not possible to maintain background levels below 25 dBA as development occurs. Outdoor background noise levels are shown in Table 15-1, as recommended in the Ecoaccess Guideline.

Table 15-1: Recommended outdoor background noise level

Receptor land use	Receptor area dominant land use (description of neighbourhood)	Background noise level, min$L_{A90,\ 1\ hour}$ (dBA)		
		Time period		
		Day	Evening	Night
Purely Residential	Very rural	35	30	25
	Rural Residential, church, hospital	40	35	30
	Shop or commercial office	45	40	35
	Light industry	50	45	40

The measured RBL is further adjusted based on a comparison with the values shown in Table 15-1, which determines the min$L_{A90,\ 1hour}$.

Planning noise level

Under the Ecoaccess Guideline the planning noise level (PNL) is based on the measured ambient noise level ($L_{Aeq,\ 1\ hour}$) of the receptor. Maximum noise levels from industrial noise sources for the type of noise receptor area are shown in Table 15-2.

Table 15-2: Estimated maximum values of planning noise levels

Noise area category	Description of neighbourhood	Maximum hourly sound pressure level, $L_{Aeq,\ 1\ hour}$ (dBA)		
		Monday to Saturday Sunday / public holidays		
		Day	Evening	Night
Z1	Very rural, purely residential. Less than 40 vehicles an hour	40	35	30
Z2	Negligible transportation. Less than 80 vehicles an hour	50	45	40
Z3	Low density transportation. Less than 200 vehicles an hour	55	50	45

The planning noise levels (PNL) shown in Table 15-2 is adjusted based on the measured ambient noise level from which the maximum PNL is determined by a set of conditions outlined in the guideline.

Once the specific noise level and the planning noise level have been established, the design criterion for the Project is taken to be the lower of the specific level and maximum planning noise level for each time period.

$$Design\ Criterion = L_{Aeq,\ 1\ hour} - K_1 - K_2$$

Note: K_1 – tonal adjustment, K_2 – impulse adjustment,

Times of day for Tables 15-1 and 15-2 are defined as:

- day – 7:00 am to 6:00 pm
- evening – 6:00 pm to 10:00 pm
- night – 10:00 pm to 7:00 am
- on Sundays and public holidays: Day – 9:00 am to 6:00 pm.

The Ecoaccess Guideline also requires inclusion of the effects of temperature inversions (if they occur) for at least 30 percent of the total night time period during the winter period (June, July and August).

Ecoaccess Guideline: Noise – Assessment of low frequency noise (draft)

The Queensland EPA has unpublished guidelines in draft format for the assessment of low frequency noise (Ecoaccess Guideline: Noise – Assessment of Low Frequency Noise (DRAFT)). This guideline outlines initial screening criteria as follows:

> *'Where a noise emission occurs exhibiting an unbalanced frequency spectra, the overall sound pressure level inside residences should not exceed 50 dB (linear) to avoid complaints of low frequency annoyance. If the dB (linear) measurement exceeds the dBA measurement by more than 15 dBA, a one-third octave band measurement in the frequency range 10 to 200 Hz should be carried out.'*

enHealth Council 2004 report

The enHealth Council 2004 report on the health effects of environmental noise sets out various criteria for adverse health effects due to environmental noise based on a number of worldwide studies. The criteria for any of the health effects identified was significantly higher than the predicted noise levels at the sensitive receptors, therefore it can be concluded that no adverse health effects due to noise exposure from the operation of the mine should be experienced by any of the sensitive receptors.

15.2.2 ASSESSMENT CRITERIA

Construction noise

There are no specific limits or guidelines specified in the EPP (Noise) which relate to noise and vibration generated from construction activities. The Environmental Protection Regulation 1998 (EPA Regulation) provides that it is an offence to carry out building works on a building site in a way that makes or causes audible noise from the building work on a Sunday or a public holiday at any time, or on a Saturday or business day before 6.30 am or after 6.30 pm. It is therefore expected that these activities meet the general environmental duty as outlined in section 319 of the *EP Act*. Given that the majority of the construction activities will be undertaken at large distances from sensitive receptors, best practice and management processes will be adopted to sufficiently control any potential impacts on the sensitive receptors.

It is assumed that 'construction activities' include building activities associated with construction of machinery and infrastructure on site which includes building of the dragline, the coal preparation and handling plant, the optional power station, conveyors,

stockpile areas, gas pipeline and water treatment upgrades, construction of buildings, haulage road construction and rail spur construction.

Removal of overburden is considered to be part of the mining activity and is assessed against the operational noise criteria (outlined in Section 15.3.1).

Operations noise

Assessment noise criteria are based on results of the noise survey carried out in the vicinity of the proposed Project area, as described in Section 15.2.3 and 15.3.1. The noise levels measured from the background noise monitoring sites can be applied for the assessment of neighbouring properties which are expected to contain similar background noise.

As the guidelines do not provide explicit noise criteria for cemeteries, the set criterion of $L_{Aeq,1hr}$ 40 dBA has been adopted and is based on the day time recommended outdoor background noise level for a church in a residential area.

15.2.3 BACKGROUND NOISE MONITORING

In order to establish the existing environmental noise values, background noise monitoring has been conducted at three locations in the vicinity of the Project area since the 8 March 2008. The three locations are considered representative of the three different types of noise environments in the area and are outlined below with their positions displayed in Figure 15-1-V1.3.

- N1 Nathan Road – Open rural with slight traffic noise contribution, 200 m north of Nathan Road, 1 km east of Leichhardt Highway
- N2 Wodonga – Open rural with no traffic noise contribution, 4 km west of Leichhardt Highway
- N3 Town – Wandoan town noise, east of Leichhardt Highway.

15.2.4 NOISE MODELLING METHODOLOGY

The noise impact assessment was conducted using the following information:

- inputs from the environmental noise survey carried out on site, along with the design details established by the design team
- site layout details which included information as to how the natural topography would be altered by pit and infrastructure locations
- meteorological conditions, determined as part of the air quality assessment for the Project, which identified the extent and frequency of conditions that are favourable for noise propagation
- proposed schedule of the operating equipment along with operating scenarios throughout the anticipated life of the mine
- noise emission data for the mining equipment and associated infrastructure provided by the respective manufacturers, or measured at other coal mining operations similar to this Project

- rail spur noise emission data provided by the Surat Basin Rail Project Proponent, with relevant data incorporated in this assessment
- an on-site assessment of all occupied sensitive receptor locations within a few kilometres from the MLA boundaries.

This information was used in SoundPLAN noise modelling software to create a virtual model of the development during each operating scenario. ISO 9613 was used as the noise dispersion model to predict the noise emissions from the site. The predicted noise level at each sensitive receptor was then assessed against the applicable criteria to confirm compliance. Noise attenuation and management measures have been identified where required.

Due to the nature of the inputs and the physical environment, there are inherent limitations to the noise assessment which result in a conservative prediction of noise levels. This is partly based on the constantly changing weather conditions in the form of fluctuating wind speeds, wind direction and the degree of atmospheric stability, all of which can significantly affect the noise level at an individual sensitive receptor.

Conservativeness is also built into the noise model through assumptions of full power operation throughout the mining process and omnidirectional noise emissions. There are also inherent limitations in the propagation algorithms used to develop the model such as the assumption of constant worst case meteorological conditions throughout the one hour assessment period.

The equipment schedules and snapshots for the scenarios assessed do not reflect the equipment designation throughout that whole year, rather during the specific time in that operational year that has been modelled. Due to the mobile nature of the mining equipment, the area of operation for each piece of mining equipment will vary in between the Scenario years modelled in accordance with mining schedule for every year of operation.

Overall therefore, the noise impact assessment provides a conservative analysis of the potential noise impacts of the Project based on a worst case scenario of adverse weather conditions and maximum noise generation.

Mining equipment

The implementation of noise sources from mining equipment in SoundPLAN was carried out as follows:

- all mining equipment was modelled as point sources
- mobile equipment (dump trucks, water trucks and graders) were distributed along haulage routes with periods of increased duration for dump trucks at loading and dump locations
- D11 dozer noise was assumed to be 50% pushing 50% reversing. The logarithmic average was calculated to determine average noise level
- dragline bucket noise was modelled to emit intermittently for 10% of the operating time and includes a 5 dB penalty for its impulsive noise source characteristics.

Coal handing and preparation plant

Noise modelling was conducted based on the most significant noise emitting items of equipment in the coal handling and preparation plant (CHPP), which are the coal wash plant, conveyor, reclaimer and train load out. These noise sources have been included as part of the operational noise model.

Rail spur

For consistency, noise associated with rail movements were modelled and provided by the Surat Basin Rail Project Proponent. The results provided have been incorporated into the overall operational noise model results.

Power supply

Modelling of the noise impact assessment for the gas fired power station option has only been conducted for the worst case (80 MW) power station option from a noise perspective. These noise sources have been included as part of the operational noise model.

Wastewater treatment plant

Noise emission modelling from the wastewater treatment plant has not been undertaken due to minimal new major noise sources associated with the upgrade, due to the remote location of this plant in respect to sensitive receptors.

Potable water treatment plant

New noise sources associated with the upgrade of the potable water treatment plant have been assessed independently from the operation of the mine due to their limited localised effect.

Airstrip

As discussed in Chapter 6 Project Operations, the location of the airstrip has not been finalised. A separate noise study will be carried out for this operation once the location is decided. This study will require details of aircraft models to utilise the airstrip, predicted aircraft takeoff and landing frequency, flight path predictions and runway specification. This operation will be modelled using the Integrated Noise Model (INM) software (or similar) to determine applicable aircraft noise contour charts. Based on these contours, noise impacts on sensitive receptors will be assessed.

15.3 EXISTING ENVIRONMENT

15.3.1 BACKGROUND DATA

Background noise levels

Due to the rural environment and minimal level of development in the area, sensitive noise receptors currently experience minimal background noise levels, especially during the night time period, given minimal level of development that exists in the area.

Noise logging data collected from 8 March to 3 April 2008 was analysed to determine applicable noise criteria which is an allowable $L_{Aeq,1hr}$ noise level to be emitted from the Project. Subsequent logging data (to August 2008) has been analysed and determined that noise criteria set out below remain unchanged. The collected data was filtered to exclude measurement periods when rainfall occurred or when wind speed was in excess of 5 m/s

(as per *AS 1055.1*: "Acoustics – Description and measurement of environmental noise Part 1: General Procedures", 1997). The results of the noise logging are shown in Table Table 15-3. Attachment B of TR 15-V1.4 Noise Impact Assessment shows the collected raw data before analysis.

Table 15-3: Summary of noise logging results

Time	N1 Nathan Road		N2 Wodonga		N3 Town	
	Average L_{eq} (dBA)	RBL* (dBA)	Average L_{eq} (dBA)	RBL* (dBA)	Average L_{eq} (dBA)	RBL* (dBA)
Day	48	26	45	25	39	26
Evening	49	30	47	35	36	27
Night	38	18	38	19	32	24

* RBL = rating background level

Existing noise sources in the area consist predominately of traffic noise along the Leichhardt Highway. Evening and night time noise is likely to be dominated by insects which can be observed by heightened noise levels at the N1 Nathan Road and N2 Wodonga measurement locations when compared to levels at N3 Wandoan Township. Other noise sources in the town area consist of a timber mill, cattle trucking station and a grain silo facility.

Existing meteorological conditions

General details of the climatic conditions were provided in Chapter 7 Climate. Additional meteorological information specifically required for the noise impact assessment is provided in TR 15-V1.4 Noise Impact Assessment.

Background data specific assessment criteria

Assessment noise criteria for operational noise from the Project are based on results of the background noise monitoring carried out in the vicinity of the proposed Project area. Table 15-4 shows the calculated noise criteria applicable to various types of receptors in each area. Attachment C of TR 15-V1.4 Noise Impact Assessment provides the results for each assessment criteria.

Table 15-4: Operations assessment noise criteria

Location	Receptor type	Time of day	Assessment criteria $L_{Aeq,1hr}$ (dBA)
N1 Nathan Road	Very Rural Residential	Day	34
		Evening	28
		Night	28
N2 Wodonga	Very Rural Residential	Day	33
		Evening	28
		Night	28
N3 Wandoan Town	Very Rural Residential	Day	34

Location	Receptor type	Time of day	Assessment criteria $L_{Aeq,1hr}$ (dBA)
		Evening	30
		Night	28
	Rural Residential, Church, Hospital	Day	34
		Evening	35
		Night	31
	Shop or Commercial Office	Day	34
		Evening	35
		Night	32
	Light Industry	Day	50
		Evening	45
		Night	40

The criteria from the three background noise monitoring sites can be applied for the assessment of neighbouring properties which are expected to contain similar background noise, as outlined in Table 15-4 As the guidelines do not provide explicit noise criteria for cemeteries, the set criterion of $L_{Aeq,1hr}$ 40 dBA has been adopted and is based on the day time recommended outdoor background noise level for a church in a residential area.

15.3.2 SENSITIVE RECEPTORS

The term *'sensitive receptors'* is used to describe places surrounding the MLAs at which acceptable noise levels from the Project must be met and can include residential dwellings, commercial properties, industrial developments as well as community buildings and facilities.

Figure 15-2-V1.3 shows the general locations of sensitive receptors located around the MLA and gas pipeline areas with Figure 15-3-V1.3 displaying the sensitive receptors within Wandoan township that represent the most exposed locations. Satisfying noise criteria at these locations will ensure that the remaining receptors in the town will also comply with the assessment criteria. Table 15-5 shows the corresponding receptor labels and their Lot numbers. Dwellings that have been purchased by WJV have not been treated as sensitive receptors and are not shown in the figures below. Similarly, the accommodation facility has not been treated as a sensitive receptor as it is part of the mine development.

Table 15-5: Sensitive receptors and their Lot location

Receptor	Lot	Plan	Relevant noise survey location	Receptor type
Cemetery	—	—	—	Rural Residential, Church, Hospital
MLA-378	1	RP144130	N1 Nathan Road	Very Rural Residential

Receptor	Lot	Plan	Relevant noise survey location	Receptor type
MLA-601	22	FT746	N1 Nathan Road	Very Rural Residential
MLA-520	36	FT981	N1 Nathan Road	Very Rural Residential
MLA-706	47	CP868426	N3 Town	Rural Residential, Church, Hospital
MLA-616	—	—	N3 Town	Rural Residential, Church, Hospital
MLA-718	162	FT999	N3 Town	Rural Residential, Church, Hospital
Town Centre	—	—	N3 Town	Rural Residential, Church, Hospital
MLA-240	—	—	N3 Town	Shop or Commercial office
MLA-478	1	RP170166	N3 Town	Rural Residential, Church, Hospital
MLA-434 Timber Mill	2	RP147174	—	Light Industry
MLA-640	2	SP106043	N1 Nathan Road	Very Rural Residential
MLA-579	29	FT130	N1 Nathan Road	Very Rural Residential
MLA-557	3	FT695	N1 Nathan Road	Very Rural Residential
MLA-591	59	FT105	N2 Wodonga	Very Rural Residential
MLA-484	1	RP110817	N2 Wodonga	Very Rural Residential
MLA-679	24	FT41	N2 Wodonga	Very Rural Residential
MLA-659	2	RP123884	N2 Wodonga	Very Rural Residential
MLA-505	6	FT788	N2 Wodonga	Very Rural Residential
MLA-552	16	FT1012	N2 Wodonga	Very Rural Residential
MLA-300	15	FT161	N2 Wodonga	Very Rural Residential
MLA-453	30	FT468	N2 Wodonga	Very Rural Residential
MLA-305	29	FT467	N2 Wodonga	Very Rural Residential
MLA-459	28	FT467	N2 Wodonga	Very Rural Residential
MLA-404	15	SP180948	N2 Wodonga	Very Rural Residential
MLA-49	14	FT165	N2 Wodonga	Very Rural Residential
MLA-50	1	SP210618	N2 Wodonga	Very Rural Residential
MLA-595	38	AB188	N2 Wodonga	Very Rural Residential
MLA-728	131	SP121742	N2 Wodonga	Very Rural Residential
MLA-720	72	FT590	N2 Wodonga	Very Rural Residential
MLA-692	70	FT590	N2 Wodonga	Very Rural Residential
MLA-712	39	FT503	N2 Wodonga	Very Rural Residential
MLA-697	40	FT503	N2 Wodonga	Very Rural Residential
MLA-693	41	CP857459	N2 Wodonga	Very Rural Residential
MLA-175	42	FT505	N2 Wodonga	Very Rural Residential
MLA-199	43	FT506	N2 Wodonga	Very Rural Residential
MLA-244	45	FT507	N2 Wodonga	Very Rural Residential

Receptor	Lot	Plan	Relevant noise survey location	Receptor type
MLA-277	50	FT508	N2 Wodonga	Very Rural Residential
MLA-740, MLA-741 and MLA708 Abattoir	156 and 53	FT931	N1 Nathan Road	Light Industry

15.4 DESCRIPTION OF PROPOSED DEVELOPMENT

The Project is proposed to be producing 30 million tonnes per annum (Mtpa) of ROM coal by year three of the operation. Approximately fifteen distinct mining pits will be developed across the MLAs with some pits being adjacent to the MLA boundaries and potentially generating noise impacts to nearby sensitive receptors. The mine's operation will include Frank Creek Pit which is in close proximity to the Wandoan township, being approximately 500 m from the Leichhardt Highway at its closest location.

15.4.1 MINING EQUIPMENT

Mining equipment includes all mobile machinery that is utilised during the mining process such as dump trucks, dozers, excavators, and draglines. Table 15-6 outlines the indicative equipment models to be used on site.

Table 15-6: Expected mining equipment to be used on site

Equipment	Model
Dragline	Bucyrus 8750
Dozer	CAT D11R
Dump Truck	CAT 793D Mining Truck
Excavator (Medium)	O&K RH340
Excavator (Small)	O&K RH200
Front End Loader	CAT 994F Wheel Loader
Grader	CAT 16M, CAT 24M
Overburden Drill	Tamrock D55SP, Reedrill DR0770
Water Truck	CAT 785C Mining Truck

Unattenuated noise levels

Table 15-7 shows the sound power data of the scheduled equipment. This sound power used is the worst case noise emitted (i.e. during full power) for the respective equipment in standard configuration.

Table 15-7: Mining equipment noise levels

Element name	Sound power level (dB) in octave bands (Hz)								Total	
	63	125	250	500	1k	2k	4k	8k	dB	dBA
Bucyrus 8750 – body[1]	121	119	113	118	116	116	106	95	126	121
Bucyrus 8750 – bucket[1]	126	128	127	133	124	123	113	104	136	132
O&K RH340 Excavator[2]	110	115	119	116	114	109	103	92	123	118
CAT D11R – Pushing[3]	119	110	110	107	103	101	96	87	120	109
CAT D11R – 2nd gear reverse[3]	122	112	114	122	115	116	106	94	126	122
Tamrock D55SP Drill DR0732[3]	115	116	113	113	111	110	104	99	121	116
Reedrill DR0770[3]	111	127	116	114	111	110	103	101	127	117
CAT 24M Grader[4]	129	128	119	112	109	107	98	89	132	117
CAT 16M Grader[4]	125	124	116	108	106	102	99	88	128	114
CAT 994F Wheel Loader[4]	108	116	114	116	112	111	106	97	122	118
CAT 793D Mining Truck[4]	114	120	115	116	114	113	109	97	124	119
CAT 785C Mining Truck[4] (water truck)	125	122	118	121	116	115	109	100	129	122

Note 1 – Noise data for Medium and Small excavators considered to be the same as advised by the manufacturer which has been modeled as O&K RH340

Noise data sources: [1] Bucyrus Australia [2] Terex Mining [3] Xstrata Hunter Valley [4] Caterpillar Inc (USA)

Attenuated noise levels

The emitted sound power of the equipment listed above is reduced by implementation of standard equipment modification or installation of lower noise emitting components on mining equipment, as shown in Table 15-26. These noise reducing measures were implemented to the mining equipment used at Bengalla mine, near Muswellbrook in the Hunter Valley, New South Wales are outlined by Mills P et al 2000. Table 15-8 outlines these potential noise attenuation measures and their corresponding noise reduction outcomes. The reduced sound power levels for the respective attenuated equipment have been used for the modelling of the "noise attenuated" version for each scenario.

Table 15-8: Mining equipment noise reducing treatment methods and resultant sound powers

Equipment	Attenuation measures	Noise reduction	Reduced sound power
Dragline – Body	Acoustic treatment to fans Improved engine room treatment	14 dB	107 dBA
Dragline – Bucket	Resilient pads on rim of bucket and on sides near lifting points (prevent direct metal contact with chains) Resilient coating on spreader bar and lift chains Use of archless bucket	16 dB	116 dBA
Excavator	Radiator louvers Plenum chambers Improved engine enclosure Treated air inlet Exhaust system improvements Hydraulically cooled braking system (trucks only)	7 dB	111 dBA
Wheel Loader		7 dB	111 dBA
Wheel Dozer		5 dB	111 dBA
Grader		7 dB	< 110 dBA
Drills		5 dB	< 112 dBA
Mining Truck		10 dB	110 dBA
Water Truck		10 dB	112 dBA
Dozer – Engine		4 dB	112 dBA
Dozer – Tracks	Removal of 3rd reverse gear Installation of resilient pads imbedded in track plates	5 dB	114 dBA

15.4.2 COAL HANDLING AND PREPARATION PLANT

The most significant noise emitting items of equipment in the CHPP are the coal wash plant, conveyor, reclaimer and train load out. Noise emitted levels from the CHPP are outlined in Table 15-9.

Table 15-9: CHPP noise levels

Element name	Sound power level (dB) in octave bands (Hz)								Total	
	63	125	250	500	1k	2k	4k	8k	dB	dBA
Coal Wash Plant[1]	115	110	110	109	109	106	101	94	119	113
Conveyor (dB/m)[2]	75	69	71	73	70	67	60	60	79	75
Reclaimer[1]	135	121	115	111	105	104	102	99	135	115
Train Load Out[1]	129	122	114	113	112	111	109	104	130	118

Noise data sources: [1] Clermont Coal Mine Project EIS [2] Carborough Downs Mine EIS

15.4.3 RAIL SPUR

For consistency, noise associated with rail movements has been modelled and provided by the Surat Basin Rail Project Proponent. The results provided have been used in the overall noise model of the noise emissions from the mine sources. The worst case noise levels from the operation of the rail at each receptor are shown in Table 15-10.

Table 15-10: Rail spur noise contribution at each receptor

Receptor	Worst Case Rail Spur Noise $L_{eq, 1\ hour}$ (dBA)
Cemetery	39
MLA-378	23
MLA-601	14
MLA-520	13
MLA-706	9
MLA-616	9
MLA-718	9
Town Centre	8
MLA-240	8
MLA-478	7
MLA-434	5
MLA-277	9

Note: Remaining receptors do not experience noise from the Rail Spur

15.4.4 POWER SUPPLY

The four power supply options under consideration for the Project are:

- Option 1: total supply via a new 132 kV or 275 kV electricity transmission line, from a new substation adjacent to the 275 kV Callide to Tarong line, near Auburn River, east of Wandoan, to a substation at or adjacent to the MLAs
- Option 2: total supply via a new 132 kV electricity transmission line from the Columboola Switchyard east of Miles, which is currently under construction, to a substation at or adjacent to the MLAs
- Option 3: an on-site 80 MW gas fired power station likely to be located on MLA 50231 comprising of twelve gas dual fuel engines, each with 8 MW of electrical output. Ten units will operate at a time and two will be on standby
- Option 4: partial supply from a new 132 kV electricity transmission line, and balance of supply from on-site 30 MW on-site gas fired power station likely to be located on MLA 50231. The power station will comprise of six dual fuel gas engines, each with 8 MW of electrical output. Four units are expected to operate at a time with two units on standby mode.

Option 3 is considered the worst case from a noise emission level perspective. Compliance with Option 3 would ensure compliance with Option 4, therefore only Option 3 has been considered in the noise assessment.

Options 1 and 2 would not be a source of noise generation on site (other than during construction) and has not been considered further in this operational noise assessment.

Noise levels from the power station are outlined in Table 15-11 below.

Table 15-11: Power Station noise levels

Element name	Sound power level (dB) in octave bands (Hz)								Total	
	63	125	250	500	1k	2k	4k	8k	dB	dBA
Engine Hall	123	119	119	113	112	107	104	102	126	117
Radiators	104	102	98	97	94	91	83	74	107	99
Stack Mouth	129	114	108	105	105	106	112	111	129	116
Stack Body	91	89	83	81	80	81	87	86	95	91

Note – Noise source data based on manufacturer specification of 65 dBA at boundary fence which will be at least 20 m from the radiators when utilising a 35 dBA silencer, and 85 dBA at one metre outside the engine hall

15.4.5 WASTE WATER TREATMENT PLANT

As discussed in Chapter 6 Operations, it is proposed to upgrade this plant to manage sewage generation from the Project. Increased noise emissions will be associated with new sludge drying beds and floating aerators which can increase water flow noise. No specific information on the additional noise levels is available. Remaining equipment does not contain any new major noise sources.

15.4.6 POTABLE WATER TREATMENT PLANT

As discussed in Chapter 6 Operations, it is proposed to upgrade this plant to supply potable water to the Project. The main noise source would be from the proposed additional water cooling tower and associated pumps with sound power level shown in Table 15-12. No specific noise levels for coagulation and chlorine pumps have been provided however they generally emit low noise levels (i.e. approximately 50 dBA at 1 m). The upgraded submersible pump for the borehole would be within an existing enclosure minimising the contribution to noise levels.

Table 15-12: Potable Water Treatment Plant noise level

Element name	Sound pressure level (dB) at 1 m in octave bands (Hz)								Total	
	63	125	250	500	1k	2k	4k	8k	dB	dBA
Cooling Tower	85	76	78	77	75	72	69	66	87	80

15.4.7 GAS SUPPLY PIPELINE

Details of the gas supply pipeline are provided in Chapter 6 Operations. The pipeline will be located underground, and it is assumed that the existing compressor station would not be changed.

15.4.8 AIRSTRIP

An airstrip may be located on or adjacent to the MLA areas. The location is yet to be determined and will be assessed during the detailed design phase. The airstrip has not been included in any noise modeling and is therefore not considered further in this chapter.

15.4.9 MINE OPERATIONS

In order to assess the potential noise impacts of the Project over the life of the mine, the noise impact assessment examines five distinct scenarios taking into account various years of operation. Scenario 3 is broken down into four subsets to take into consideration different mining techniques for Frank Creek Pit. Each scenario takes into account a "snap shot" which shows the number, type and disposition of all operating mining equipment based on the mining schedule during this time. All stationary infrastructure such as the CHPP, rail spur and power generation as discussed above on site are included in the noise emissions during every scenario. Table 15-13 provides a summary of each operating scenario, as were defined in Chapter 6 Project Operations.

Table 15-13: Operational scenarios

Operational scenario	Description
1	This "Do Nothing" Scenario assumes that the coal mine is not constructed the for first year (Year 1) of coal mining, assuming this year to be 2012
2	Assumes construction and operation of the coal mine, examining the first year (Year 1) of coal mining, assuming this year to be 2012
3	Assumes construction and operation of the coal mine, examining Year 5 of coal mining, assuming this year to be 2016 For Frank Creek Pit: a. This scenario took into account the operation of the Dragline in the southern end of the Frank Creek pit. This scenario has not been further considered in this chapter, on the basis of the findings of the Air Quality study (Chapter 13) which indicated that air quality goals may be exceeded at sensitive receptors from the operation of draglines in the southern end of the in the Frank Creek pit. b. This scenario took into account the operation of the dragline in the middle of the Frank Creek pit. This scenario has not been further considered in the chapter, on the basis of the findings of the Air Quality study (Chapter 13) which indicated that air quality goals may limit the operation of draglines in the Frank Creek pit. c. Operations are examined using blasting of partial bench height of approximately 10 m and trucks and excavators to remove overburden, operating 24 hours a day, seven days a week d. Operations are examined using blasting of partial bench height of approximately 10 m and trucks and excavators to remove overburden, operating 12 hours a day (daylight hours), seven days a week
4	Assumes construction and operation of the coal mine, examining Year 10 of coal mining, assuming this year to be 2021

Operational scenario	Description
5	Assumes construction and operation of the coal mine, examining Year 20 of coal mining, assuming this year to be 2031
6	Assumes construction and operation of the coal mine, examining the final year (assumed Year 30) of coal mining, assuming this year to be 2041

It is important to highlight that each scenario does not reflect the equipment designation throughout that whole year, rather during the specific time in that operational year that has been modelled. Due to the mobile nature of the mining equipment, the area of operation for each piece of mining equipment will vary in between the scenario years modelled in accordance with the mining schedule for every year of operation.

All scenarios utilise worst case meteorological conditions as defined in previous sections.

It should also be noted that Scenarios 3c and 3d shown in Table 15-4 from a noise modelling perspective, are exactly the same. The assessment period of noise emissions is of worst case conditions during a one hour interval. These are assumed to be the same regardless whether mining activities would occur over a 24 hour or are limited to 12 hours a day, hence limiting operating times does not affect the noise results during a one hour period. The rate of extraction of coal is also assumed not to affect the maximum noise level emitted during a one hour a period as the difference in simultaneously operating equipment will be very small (if any), therefore the worst case scenario has been determined.

Scenario 1

The 'Do Nothing' scenario does not introduce any new noise sources into the rural area, therefore the existing noise environment will remain unaffected if the Project does not proceed.

Scenario 2 – Year 1

The output during the first year of operation will be approximately 10 Mt of ROM coal due to the ongoing establishment of equipment and processes on site. Mining activities will be carried out in the Austinvale North Pit with the utilisation of only one dragline and three excavators. Table 15-14 shows the proposed schedule of operating equipment for this scenario.

Table 15-14: Schedule of operating equipment for Scenario 2

Equipment designation	Mining pit	Haulage road
	Austinvale	
Dragline	1	—
Dozer	5	1
Dump Truck	6	7
Excavator (Medium)	2	—
Excavator (Small)	1	—

Equipment designation	Mining pit	Haulage road
	Austinvale	
Front End Loader	1	—
Grader	—	1
Overburden Drill	3	—
Water Truck	—	1

Scenario 3c/d – Year 5 Truck and excavator mining of Frank Creek Pit

This scenario provides an alternative method for mining of the Frank Creek Pit through the use of a truck and excavator arrangement, instead of a dragline to remove overburden. Table 15-15 outlines the applicable equipment schedule that will in operation during year 5.

Table 15-15: Schedule of operating equipment for Scenario 3c/d Operations with truck and excavator in Frank Creek Pit

Equipment designation	Mining pit			Haulage roads
	Frank Creek	Woleebee	Austinvale	
Dragline	—	1	1	—
Dozer	3	5	5	1
Dump Truck	4	3	3	10
Excavator (Medium)	2	—	1	—
Excavator (Small)	—	1	1	—
Front End Loader	1	1	—	—
Grader	1	—	—	2
Overburden Drill	—	2	1	—
Water Truck	—	—	—	3

Scenario 4 – Year 10

Scenario 4 consists of equipment spread out across all MLA areas, reaching the western boundary of the development with the operation of the initial mining strips at the Turkey Hill Pit. Table 15-16 shows the proposed schedule of operating equipment for year 10.

Table 15-16: Schedule of operating equipment for Scenario 4

Equipment designation	Mining pit					Haulage roads
	Turkey Hill	Summer Hill	Mud Creek	Woleebee	Austinvale	
Dragline	1	1	—	1	—	—
Dozer	5	5	—	5	1	2
Dump Truck	6	2	—	4	1	14
Excavator (Medium)	1	1	—	—	—	—
Excavator (Small)	—	1	—	1	—	—
Front End Loader	1	—	—	1	—	—
Grader	—	1	—	—	—	2
Overburden Drill	2	1	1	1	—	—
Water Truck	—	—	—	—	—	3

Scenario 5 – Year 20

Scenario 5 will see the mine operate the scheduled equipment across seven mining pits, including five draglines. The equipment will be spread quite evenly across the MLA areas. Table 15-17 shows the proposed schedule of operating equipment that will operated for this scenario.

Table 15-17: Schedule of operating equipment for Scenario 5

Equipment designation	Mining pit							Haulage roads
	Turkey Hill	Summer Hill	Mud Creek	Woleebee North	Woleebee Creek	Austinvale	Leichhardt	
Dragline	1	1	—	2	-	-	1	—
Dozer	4	3	2	5	3	1	3	3
Dump Truck	3	3	3	2	—	1	1	14
Excavator (Medium)	—	—	1	—	—	—	1	—
Excavator (Small)	—	1	—	—	1	—	—	—
Front End Loader	1	—	—	1	—	—	—	—
Grader	—	—	1	—	—	—	—	2
Overburden Drill	1	1	1	2	1	—	1	—
Water Truck	—	—	—	—	—	—	—	3

Scenario 6 – Year 30

Scenario 6 will see the mine operate predominantly in the Woleebee Pits as well as completing mining in pits located at the western end of MLA 50229. Table 15-18 shows the proposed schedule of equipment that will be operating for this scenario.

Table 15-18: Schedule of operating equipment for Scenario 6

Equipment designation	Mining pit						Haulage roads
	Summer Hill North	Mud Creek	Woleebee North	Woleebee Creek	Woleebee South	Austinvale	
Dragline	1	1	1	1	1	—	—
Dozer	3	3	3	5	4	1	3
Dump Truck	1	4	1	3	1	1	16
Excavator (Medium)	—	1	—	1	—	—	—
Excavator (Small)	1	—	—	1	—	—	—
Front End Loader	1	—	1	—	1	—	—
Grader	—	1	—	—	—	—	2
Overburden Drill	1	1	1	2	2	—	—
Water Truck	1	—	—	—	—	—	2

15.5 POTENTIAL IMPACTS

15.5.1 EARLY WORKS

Upgrade of the WWTP and water treatment plant may commence during early works. Based on the existing environment, the distance of sensitive receptors and the nature of the works, construction associated with the WWTP and potable water treatment plant are expected to have minimal noise impacts on the sensitive receptors.

15.5.2 CONSTRUCTION

Mining infrastructure within MLA areas

Construction activities will generally be centralised within the MLA areas at the specific sites of the respective infrastructure being built. The position of the MIA, CHPP and Power station is quite isolated from the most exposed sensitive receptors which are at least 5 km away (Receptors MLA-601 and MLA-277). This separation distance will minimise any significant noise transfer from the construction minimising potential impacts at the receptors.

The route of the rail spur is within 2 km of Receptors MLA-601, which is likely to make the construction activities audible at this receptor however the expected impact is minimal.

Gas supply pipeline

The selected pipeline route could potentially impact 11 properties due to construction activities. Figure 15-2-V1.3 shows the locations of nearby sensitive receptors.

The potential impacts on environmental values are expected to be minor and will generally be limited to a short construction period for any location along the alignment.

15.5.3 MINE OPERATION

The following assessment of noise impacts is based on the combined noise impact of the CHPP, rail spur, power supply as well as mining equipment.

Scenario 1

The 'Do Nothing' scenario does not introduce any new noise sources into the rural area, therefore the existing noise environment will remain unaffected.

Scenario 2 – Year 1

Modelling, using unattenuated equipment, predicted only night time exceedances at Receptor ML-378 (refer Figure 15-4-V1.3) under worst case meteorology with the dominant noise source being the dragline bucket noise, bucket stacker reclaimers, as well as the train noise from the rail spur.

Installing mitigation measures to the dragline bucket will reduce the overall noise experienced at Receptor MLA-378 as shown in Table 15-19 and Figure 15-4-V1.3 but the resulting noise level will not meet the criteria for the Project. The use of attenuated mining equipment would not lower the level sufficiently due to the noise contribution from the stationary infrastructure such as the rail spur, CHPP and reclaimers.

Table 15-19: Predicted Noise Levels for Scenario 2

Receptor	Predicted noise $L_{eq\ (1\ hour)}$ (dBA)	Criteria $L_{eq\ (1\ hour)}$ (dBA)	
	Attenuated dragline bucket	Day	Night
Cemetery	40	40	—
MLA-378	30*	34	28
MLA-601	23	34	28
MLA-520	25	34	28
MLA-706	25	34	31
MLA-616	24	34	31
MLA-718	26	34	31
Town Centre	23	34	31
MLA-240	23	34	32
MLA-478	21	34	31
MLA-434	20	50	40
MLA-640	< 15	34	28
MLA-579	< 15	34	28
MLA-557	< 15	34	28

Receptor	Predicted noise $L_{eq\ (1\ hour)}$ (dBA)	Criteria $L_{eq\ (1\ hour)}$ (dBA)	
	Attenuated dragline bucket	Day	Night
MLA-591	< 15	33	28
MLA-484	< 15	33	28
MLA-679	< 15	33	28
MLA-659	< 15	33	28
MLA-505	<15	33	28
MLA-552	21	33	28
MLA-300	16	33	28
MLA-453	< 15	33	28
MLA-305	< 15	33	28
MLA-459	< 15	33	28
MLA-404	< 15	33	28
MLA-49	< 15	33	28
MLA-50	< 15	33	28
MLA-595	< 15	33	28
MLA-728	< 15	33	28
MLA-720	< 15	33	28
MLA-692	< 15	33	28
MLA-712	< 15	33	28
MLA-697	< 15	33	28
MLA-693	< 15	33	28
MLA-175	< 15	33	28
MLA-199	< 15	33	28
MLA-244	23	33	28
MLA-277	27	33	28

Note: * – exceedance of night criteria

Scenario 3c/d – Year 5 Truck and excavator mining of Frank Creek Pit

The overall noise levels using standard (ie unattenuated) equipment will exceed day and night criteria at Receptors ML-378, MLA-520, MLA-706, MLA-616, MLA-718, MLA-240 and MLA-478. Installation of noise reduction measures (i.e. meeting noise levels outlined in Table 15-8) for all equipment operating in Frank Creek Pit will reduce the emitted noise levels so that mining of the of the eastern end of Frank Creek Pit can occur under any meteorological conditions for day time operations only. The resulting noise contours are shown in Figure 15-5-V1.3 with the highest predicted noise levels and night time exceedances shown in Table 15-20.

The predicted noise levels under neutral weather conditions using noise attenuated equipment are displayed in Table 15-21. The results indicate that no exceedances will occur for night time mining provided that these meteorological conditions prevail. Neutral

weather conditions are assumed to be no downwind propagation and no occurrence of a temperature inversion during the assessment period of one hour.

Table 15-20: Predicted noise levels for Scenario 3c/d

Receptor	Predicted noise $L_{eq\ (1\ hour)}$ (dBA)	Criteria $L_{eq\ (1\ hour)}$ (dBA)	
	Attenuated equipment	Day	Night
Cemetery	40	40	—
MLA-378	30*	34	28
MLA-601	24	34	28
MLA-520	33*	34	28
MLA-706	34*	34	31
MLA-616	33*	34	31
MLA-718	34*	34	31
Town Centre	28	34	31
MLA-240	32	34	32
MLA-478	29	34	31
MLA-434	27	50	40
MLA-640	20	34	28
MLA-579	16	34	28
MLA-557	15	34	28
MLA-591	15	33	28
MLA-484	20	33	28
MLA-679	15	33	28
MLA-659	< 15	33	28
MLA-505	25	33	28
MLA-552	24	33	28
MLA-300	19	33	28
MLA-453	< 15	33	28
MLA-305	< 15	33	28
MLA-459	< 15	33	28
MLA-404	< 15	33	28
MLA-49	< 15	33	28
MLA-50	< 15	33	28
MLA-595	< 15	33	28
MLA-728	< 15	33	28
MLA-720	< 15	33	28
MLA-692	< 15	33	28
MLA-712	< 15	33	28
MLA-697	< 15	33	28

Receptor	Predicted noise $L_{eq\ (1\ hour)}$ (dBA)	Criteria $L_{eq\ (1\ hour)}$ (dBA)	
	Attenuated equipment	Day	Night
MLA-693	< 15	33	28
MLA-175	< 15	33	28
MLA-199	< 15	33	28
MLA-244	23	33	28
MLA-277	27	33	28

Note: * – exceedance of night criteria

Table 15-21: Predicted noise levels for Scenario 3c/d under neutral weather conditions

Receptor	Predicted noise $L_{eq\ (1\ hour)}$ (dBA)	Criteria $L_{eq\ (1\ hour)}$ (dBA)	
	Attenuated equipment	Day	Night
MLA-378	27	34	28
MLA-601	20	34	28
MLA-520	28	34	28
MLA-706	29	34	31
MLA-616	28	34	31
MLA-718	29	34	31
Town Centre	23	34	31
MLA-240	27	34	32
MLA-478	24	34	31

Scenario 4 – Year 10

Using standard specification, unattenuated equipment, exceedances will occur at Receptor MLA-595 because of its close location to the edge of the Turkey Hill Pit (less than 1 km). As well, minor exceedances will occur at other westerly receptors (MLA-728 and MLA-720) due to the position of the haulage route which bring the equipment within 2 km from these receptors and Receptor MLA-505 due to Woleebee Pit activities. Installation of attenuation measures (as outlined in Table 15-7) to excavators, tracked dozers, mining trucks and water trucks will reduce noise levels to within acceptable limits for both day and night time operations under worst case meteorological conditions with the exception of Receptor MLA 595 as shown in Figure 15-6-V1.3 and Table 15-22.

Table 15-22: Predicted noise levels for Scenario 4

Receptor	Predicted noise $L_{eq\ (1\ hour)}$ (dBA)	Criteria $L_{eq\ (1\ hour)}$ (dBA)	
	Attenuated equipment	Day	Night
Cemetery	40	40	—
MLA-378	28	34	28
MLA-601	22	34	28
MLA-520	23	34	28
MLA-706	22	34	31
MLA-616	22	34	31
MLA-718	22	34	31
Town Centre	21	34	31
MLA-240	22	34	32
MLA-478	19	34	31
MLA-434	18	50	40
MLA-640	< 15	34	28
MLA-579	< 15	34	28
MLA-557	< 15	34	28
MLA-591	< 15	33	28
MLA-484	16	33	28
MLA-679	< 15	33	28
MLA-659	< 15	33	28
MLA-505	24	33	28
MLA-552	22	33	28
MLA-300	18	33	28
MLA-453	15	33	28
MLA-305	18	33	28
MLA-459	20	33	28
MLA-404	20	33	28
MLA-49	19	33	28
MLA-50	23	33	28
MLA-595	35+	33	28
MLA-728	27	33	28
MLA-720	28	33	28
MLA-692	21	33	28
MLA-712	21	33	28
MLA-697	20	33	28
MLA-693	20	33	28
MLA-175	17	33	28

Receptor	Predicted noise $L_{eq\ (1\ hour)}$ (dBA)	Criteria $L_{eq\ (1\ hour)}$ (dBA)	
	Attenuated equipment	Day	Night
MLA-199	< 15	33	28
MLA-244	22	33	28
MLA-277	26	33	28

Note: $^{+}$ – exceedance of day and night criteria

Scenario 5 – Year 20

Without noise attenuating measures, the modelling predicts that night exceedances will occur at receptors MLA-305, MLA-459 and MLA-50 which are closest to the southern end of the Summer Hill Pit. Exceedances will also be experienced at the Cemetery, Receptors MLA-378 and MLA-520 due to the operation of the Leichhardt Pit.

Noise attenuated mining equipment (meeting noise levels outlined in Table 15-7) will be implemented (based on noise monitoring results) in the Summer Hill and Leichhardt Pits with the resulting noise levels shown in Figure 15-6-V1.3. However, even with the implementation of the above noise attenuation measures, it is predicted that under calm or neutral atmospheric conditions the noise level generated at Receptor MLA-378 will still exceed noise criteria during night time operations as shown in Table 15-23. Noise levels at all other sensitive receptors are within the criteria.

Table 15-23: Predicted noise levels for Scenario 5

Receptor	Predicted noise $L_{eq\ (1\ hour)}$ (dBA)	Criteria $L_{eq\ (1\ hour)}$ (dBA)	
	Attenuated equipment	Day	Night
Cemetery	40	40	—
MLA-378	30*	34	28
MLA-601	23	34	28
MLA-520	28	34	28
MLA-706	26	34	31
MLA-616	25	34	31
MLA-718	25	34	31
Town Centre	24	34	31
MLA-240	24	34	32
MLA-478	22	34	31
MLA-434	21	50	40
MLA-640	< 15	34	28
MLA-579	< 15	34	28
MLA-557	< 15	34	28
MLA-591	< 15	33	28
MLA-484	< 15	33	28

Receptor	Predicted noise $L_{eq\ (1\ hour)}$ (dBA)	Criteria $L_{eq\ (1\ hour)}$ (dBA)	
	Attenuated equipment	Day	Night
MLA-679	< 15	33	28
MLA-659	< 15	33	28
MLA-505	16	33	28
MLA-552	22	33	28
MLA-300	19	33	28
MLA-453	20	33	28
MLA-305	22	33	28
MLA-459	24	33	28
MLA-404	21	33	28
MLA-49	19	33	28
MLA-50	24	33	28
MLA-595	22	33	28
MLA-728	< 15	33	28
MLA-720	22	33	28
MLA-692	21	33	28
MLA-712	20	33	28
MLA-697	18	33	28
MLA-693	19	33	28
MLA-175	17	33	28
MLA-199	17	33	28
MLA-244	23	33	28
MLA-277	27	33	28

Note: * – exceedance of night criteria

Scenario 6 – Year 30

There will be an exceedance using standard unattenuated equipment at Receptor MLA-505 due to its close location to the edge of the Woleebee South Pit (less than 1 km) as well as a significant exceedance at Receptor MLA-552 due to the high numbers of equipment in operation, especially at surface level at the southern end of Woleebee Creek Pit. Exceedances during the night time period will also occur at receptors MLA-692, MLA-712, MLA-697, MLA-693 located near Summer Hill North.

Through the use of attenuated equipment (excavators, tracked dozers, mining trucks and water trucks) at the Summer Hill North Pit, noise levels can be controlled to within allowable limits in this area.

Utilising attenuated equipment (i.e. meeting noise levels outlined in Table 15-7) in Woleebee Creek pit will lower the noise level to satisfy the night time criteria except for Receptor MLA-552 and receptor MLA 505 as seen in Figure 15-7-V1.3 and Table 15-24.

Table 15-24: Predicted noise levels for Scenario 6

Receptor	Predicted noise $L_{eq\ (1\ hour)}$ (dBA)	Criteria $L_{eq\ (1\ hour)}$ (dBA)	
	Attenuated equipment	Day	Night
Cemetery	40	40	—
MLA-378	28	34	28
MLA-601	22	34	28
MLA-520	23	34	28
MLA-706	22	34	31
MLA-616	22	34	31
MLA-718	22	34	31
Town Centre	22	34	31
MLA-240	22	34	32
MLA-478	19	34	31
MLA-434	18	50	40
MLA-640	< 15	34	28
MLA-579	< 15	34	28
MLA-557	< 15	34	28
MLA-591	< 15	33	28
MLA-484	19	33	28
MLA-679	19	33	28
MLA-659	19	33	28
MLA-505	32*	33	28
MLA-552	29*	33	28
MLA-300	23	33	28
MLA-453	25	33	28
MLA-305	22	33	28
MLA-459	19	33	28
MLA-404	18	33	28
MLA-49	< 15	33	28
MLA-50	17	33	28
MLA-595	23	33	28
MLA-728	< 15	33	28
MLA-720	20	33	28
MLA-692	23	33	28
MLA-712	26	33	28
MLA-697	25	33	28
MLA-693	26	33	28
MLA-175	22	33	28
MLA-199	19	33	28

Receptor	Predicted noise $L_{eq\ (1\ hour)}$ (dBA)	Criteria $L_{eq\ (1\ hour)}$ (dBA)	
	Attenuated equipment	Day	Night
MLA-244	23	33	28
MLA-277	26	33	28

Note: * – exceedance of night criteria

15.5.4 WASTEWATER TREATMENT PLANT

Given the remote location of the WWTP (closest sensitive receptor is located approximately 1,000 m away), noise issues are not expected to arise from installation of the new equipment.

15.5.5 POTABLE WATER TREATMENT PLANT

Additional noise impacts will occur only from the cooling tower which will be limited to 40 dBA at the nearest sensitive receptors which are commercial buildings with the closest being located approximately 40 m away.

The receptors in the vicinity of the treatment plant consist of commercial properties, with the closest being located approximately 40 m south east from the site. The cooling tower which is the prominent noise source will be elevated at a level of approximately 4.5 m off the ground on top of the flocculation tanks.

15.5.6 GAS SUPPLY PIPELINE

The closest sensitive receptor in the vicinity of the pipeline is located 600 m from the route as shown Figure 15-2-V1.3.

No major noise sources have been identified as occurring during the operation of the pipeline.

15.5.7 ROAD TRAFFIC NOISE

Traffic volumes along the existing road infrastructure (especially along Leichhardt Highway) have the potential to increase both during the construction and operational phases of the Project leading to additional noise exposure for sensitive receptors located in the vicinity of the highway.

Chapter 12 Transportation outlines the expected increases in traffic volumes as a result of the Project. Based on the findings of this assessment, the increase in traffic volumes along the Leichhardt Highway in the vicinity of Wandoan during the construction and operational phases of the Project is expected to be negligible. The expected increase in traffic volumes for both phases of the Project is generally less than 5% (except for shift change days during the construction phase only), which will lead to an insignificant increase in traffic noise. For comparison, a doubling of the traffic volume (i.e. 100% growth) would result in

a 3 dBA increase of noise levels, so the predicted increase will result in a negligible contribution to overall noise levels.

15.5.8 LOW FREQUENCY NOISE

All noise sources' noise emissions (with the exception of the bucket stacker reclaimers) satisfy the criteria of (Total (dB) – Total (dBA) ≤ 15 dB). Receptor MLA-378 is the most exposed sensitive receptor to the noise emitted from bucket stacker reclaimers (the only source with significant low frequency noise). The worst case noise level at Receptor MLA-378 (after implementation of scenario specific attenuation measures) will occur during Scenario 2 with an incident level of 30 dBA (Table 15-1918) or 51 dB (linear). The existing dwelling façade will provide sufficient attenuation to drop this overall level below the 50 dB (linear) criteria outlined above. Remaining sensitive receivers will be exposed to lower levels of low frequency noise that will satisfy the screening criteria thus eliminating any further assessment. Accordingly, all impacts will meet the guideline regarding low frequency noise emissions.

15.6 MITIGATION MEASURES

15.6.1 CONSTRUCTION

As no specific construction noise and vibration criteria are specified by the EPA guidance, best practice processes and methods will be implemented to manage the construction noise to minimise disturbance to sensitive receptors. The EPA Regulation provides that it is an offence to carry out building works on a building site in a way that makes or causes audible noise from the building work on a Sunday or a public holiday at any time, or on a Saturday or business day before 6.30 am or after 6.30 pm.

The following actions will be implemented and included in the Construction Management Plan to minimise disturbance to sensitive receptors:

- automated noise monitoring at relevant sensitive receptor locations will be undertaken during all construction activities
- permission will be sought from the administering authority to conduct construction activities during all hours. However if noise monitoring indicates that Project construction activities will or are likely to cause audible noise at a sensitive receptor, relevant Project construction activities will not be undertaken during the following hours (as per Section 6W of Environmental Protection Regulation 1998):
  - on a Sunday or Public holiday at any time
  - on a Saturday or business day before 6:30 am or after 6.30 pm.
- recommendations given in AS 2438 'Guide to noise control on construction, maintenance and demolition sites', 1981, will be implemented where appropriate in the Construction Management Plan
- stationary equipment such as air compressors and generators will be placed as far as practicable from noise sensitive locations
- the ongoing community consultation program will include forward notice to the community regarding the construction program

- a Noise Management Plan will be prepared prior to the respective phases of the Project and will include the routine monitoring of noise levels during construction as well as the logging and assessment of any complaints.

15.6.2 OPERATIONS

The most effective strategy of mitigating noise impacts to sensitive receptors is to implement a combination of management activities that include noise monitoring as well as the use of lower noise and noise attenuated machinery in specific mining pits during respective operational scenarios as outlined in this section.

Triggers for management actions

The allowable noise criteria (as shown in Table 15-4) are established according to the EPA procedure as outlined in the Ecoaccess Guideline. However, at some locations, natural background noise level may mask the noise emitted from the mining operation making it inaudible to residents even if these criteria are exceeded.

Management actions will be triggered when a complaint is raised and the noise from the mining operations is above allowable noise criteria. Noise measurements will be carried out to identify the noise level emitted from the mine operation that is experienced by the sensitive receptor in question. If the noise level emitted from the mine is identified to exceed the operational criteria by more than 5 dBA at a sensitive receptor, further measures (which may include offers of compensation) will be considered by the Proponent.

Equipment specification

Mining equipment

Noise specifications will be provided in tender documentation as outlined in Table 15-25 and Table 15-26 (or equivalent). These values have been used as the basis for noise emission modelling undertaken for this noise assessment. Noise measurements of equipment will also be undertaken to ensure suppliers meet their noise guarantee commitments. Measurements will be undertaken by a suitably qualified acoustic engineer.

Table 15-25: Unattenuated mining equipment sound power limits

Mining equipment	Sound power limit
Dragline	
body	121 dBA
bucket	132 dBA
Dozer	
pushing	109 dBA
reversing	122 dBA
Dump truck	119 dBA
Excavator (medium and small)	118 dBA
Front end loader	118 dBA
Grader	117 dBA
Overburden drill	116 dBA
Water truck	122 dBa

Table 15-26: Required mining equipment sound power limits following attenuation

Mining equipment	Sound power limit
Dragline body bucket	 107 dBA 116 dBA
Dozer	114 dBA
Dump truck	110 dBA
Excavator (medium and small)	111 dBA
Front end loader	111 dBA
Grader	110 dBA
Overburden drill	112 dBA
Water truck	112 dBA

Power station

To minimise noise impacts associated with the operation of the power station the following measures will be implemented:

- exhaust silencers will be installed on each engine providing a minimum insertion loss of 20 dB across the whole spectrum
- the engine hall will satisfy 85 dBA at 1 m as per manufacturer specification
- the overall complex will satisfy a noise level as per the manufacturer specification of 65 dBA at the boundary fence which will be a minimum 20 m from the radiator cooling towers.

Noise monitoring

Based on the noise impact assessment, the following monitoring program will be undertaken, subject to refined noise monitoring requirements from future noise impact assessments throughout the life of the project:

- measurements will be carried out by a suitably qualified acoustic engineer
- following the commissioning of infrastructure and equipment on site, a noise survey will be conducted at suitable locations specific to each operating scenario with the plant operating as close as possible to its design capacity
- noise monitoring will be undertaken as detailed in Table 15-27. The monitoring will be conducted as continuous monitoring (i.e. noise levels being constantly monitored with statistical data being recorded at 15 minute intervals). However, where a location ceases to be a sensitive receptor, an appropriate alternative will be considered
- spot measurements will be taken as required using hand held to validate noise logger results and to provide additional monitoring data from around the site.
- required monitoring parameters will include: L_{Amax}, L_{A1}, L_{A10}, L_{Aeq}, and L_{A90} at 15 minute intervals

- measured noise levels will be verified against predicted noise levels and assessed against noise emission criteria.

Table 15-27: Monitoring requirements for mining operations

Location	Monitor type	Monitoring duration
Receptor MLA-378 (existing monitoring point N1 Nathan Road) N3 Town Noise	Fixed automated monitoring (existing, continuous monitoring)	During the whole operation of the Project. Reviewed on a regular basis
Receptor MLA-520 Receptor MLA-706	Mobile or fixed automated continuous monitoring using an unattended noise logger for a defined (minimum seven day) period	One month before the commencement of mining at Frank Creek Pit and at monthly intervals during the operation of Frank Creek Pit
Receptor MLA-720 Receptor MLA-728	Mobile or fixed automated continuous monitoring using an unattended noise logger for a defined (minimum seven day) period	Monthly during the operation of Turkey Hill Pit
Receptor MLA-459	Mobile or fixed automated continuous monitoring using an unattended noise logger for a defined (minimum seven day) period	Monthly once mining of the northern 50% of Summer Hill Pit is completed
Receptor MLA-712	Mobile or fixed automated continuous monitoring using an unattended noise logger for a defined (minimum seven day) period	Monthly during operation of Summer Hill North Pit.
Receptor MLA-552	Mobile or fixed automated continuous monitoring using an unattended noise logger for a defined (minimum seven day) period	Monthly during operation of Woleebee Creek pit

Mining operations

The following measures will be undertaken during mining operations to assist in managing noise impacts based on the noise monitoring program outlined above and subject to refined noise management requirements from future noise impact assessments throughout the life of the project:

- if certain stages of operation exceed the criteria, activities will be limited to specified times of day governed by the modelling results
- a meteorological forecasting system will be implemented to allow site management to allow night time mining of Frank Creek Pit during optimal weather periods (i.e. calm or non source to receptor wind conditions and no occurrence of atmospheric stability). The system would be based on on-site weather station measurements

- restricting dragline operations in the Frank Creek Pit unless monitoring of weather conditions and noise levels indicate that objectives and performance measures at the environmental authority will be achieved
- consult with the landowner of the abattoir (MLA-740 and MLA-741) prior to the commencement of mining in Frank Creek Pit with a view to reaching agreement on appropriate mitigation arrangements
- based on monitoring data if night time levels exceed criteria, operations in Frank Creek Pit will be limited to day time only in the area towards the eastern edge of pit coming closer to the Wandoan township
- consult with landowner of receptor MLA-595 prior to commencement of mining in Turkey Hill Pit with a view to reaching agreement on appropriate mitigation arrangements
- consult with landowner of receptor MLA-505 prior to commencement of mining in Woleebee South Pit with a view to reaching agreement on appropriate mitigation arrangements.

The following attenuation measures will be implemented:

- broadband reversing sirens will be installed on all vehicles
- noise attenuated excavators, tracked dozers, mining trucks and water trucks will be used in the Frank Creek Pit to satisfy the overall noise levels outlined for truck and excavator operations.

The installation of the remaining attenuation measures to the mobile mining equipment will be considered based on the results of noise monitoring as highlighted in Table 15-27.

The following measures have been recommended based on the predicted noise level during worst case meteorological conditions to satisfy noise criteria during all times of day:

- installation of resilient pads and coatings on draglines during their operation in every pit (or equivalent)
- noise attenuated excavators, tracked dozers, mining trucks and water trucks will be used in Turkey Hill Pit, to obtain compliance with acceptance criteria
- noise attenuated excavators, tracked dozers, mining trucks and water trucks will be used for operations in Leichhardt and Summer Hill Pits
- acoustic treatment outlined in Table 15-25 will be applied to the dragline operating in Leichhardt Pit
- noise attenuated overburden drills, excavators, tracked dozers, mining trucks and water trucks will be used for operations in Woleebee Creek Pit to meet acceptance criteria
- noise attenuated excavators, tracked dozers, mining trucks and water trucks will be used, so to satisfy overall noise levels outlined for operations in Summer Hill North Creek Pit
- acoustic treatment will be applied to Draglines operating in Woleebee Creek Pit due to their proximity to sensitive receptors.

Proactive / predictive noise management

The following management measures will also be undertaken to further minimise noise impact:

- all plant machines and equipment will be maintained regularly to minimise noise generation
- ongoing validation testing and inspection of significant plant during procurement will be performed. Visual checks should also be performed to ensure that equipment is fitted with appropriate noise suppression devices as specified in the design documentation
- regular noise monitoring will be conducted at both on site and at potential noise-affected receptor areas, in accordance with this management plan and relevant regulations or Australian Standards
- maintenance procedures for all equipment will be prepared to ensure that equipment is operating in proper condition
- noise control treatments (including silencers, acoustic lining, and vibration mountings) will be maintained and inspected regularly to make sure they continue to be effective
- an equipment noise register that details all significant environmental noise contributors will be prepared and maintained to compare noise levels emitted from equipment against the nominated specification.

Potable water treatment plant

To minimise noise impacts associated with the operation of the potable water treatment plant, a noise barrier will be installed approximately one metre from the southern and eastern sides of the cooling tower equal to the height of the cooling tower which is approximately 3.6 m from the top of the flocculation tanks.

Complaints management

To manage any complaints, a community hot line will be established for residents who wish to report noise related incidents associated with the operation of the Project. In addition the following commitments are made:

- all noise complaints will be investigated
- strategies and targets based on the annual review of noise monitoring results and review of noise complaints will be undertaken as part of the sites Environmental Management System requirements.

Noise management plan

Construction and operations Noise Management Plans will be prepared for construction and operation phases of the Project. The Plan will detail performance objectives, actions and procedures and be prepared prior to the respective phases of the Project and incorporate the above measures. The plan will incorporate the actions listed in Section 15.6.2. The plan will be reviewed on a regular basis.

15.7 RESIDUAL IMPACTS

Provided potential noise impacts on sensitive receptors MLA-740, MLA-741, MLA-505 and MLA-595 are addressed, small residual impacts have been predicted during each of the modelled operational scenarios even with the implementation of noise attenuation measures applied to the operating equipment as discussed in Section 15.5.3. Most of the exceedances are sufficiently small that they can be mitigated through the implementation of the noise management plan.

15.8 REFERENCES

AS 1055.1 "Acoustics – Description and measurement of environmental noise Part 1: General Procedures", 1997.

AS 2438 "Guide to noise control on construction, maintenance and demolition sites", 1981.

Carborough Downs Joint Venture, *Carborough Downs Mine Expansion Draft Environmental Impact Statement Appendix I,* 1 February 2007.

Ecoaccess Guideline: Noise – Assessment of Low Frequency Noise (DRAFT), EPA (QLD), unpublished.

Ecoaccess Guideline: Noise – Planning for Noise Control, EPA (QLD), 20 July 2004 (A copy is available from <http://www.epa.qld.gov.au/publications?id=1369>, (8 September 2008).

enHealth Council, *The health effects of environmental noise – other than hearing loss,* Department of Health and Ageing, Commonwealth of Australia, May 2004.

Environmental Protection Act 1994, Queensland Parliamentary Counsel Government.

Environmental Protection (Noise) Policy 1997, Queensland Parliamentary Counsel Government.

Environmental Protection Regulation 1998, Queensland Parliamentary Counsel Government.

ISO 9613-1 "Acoustics – Attenuation of sound during propagation outdoors – Part 1: Calculation of the absorption of sound by the atmosphere", 1 June 1993.

ISO 9613-2 "Acoustics – Attenuation of sound during propagation outdoors – Part 2: General method of calculation", 15 December 1996.

Mills, P, Bridges, M and Juillerat, E, *Noise Reduction in New Open-Cut Coal Mines, Coal Handling and Preparation Plants* pp. 31-44. This article was first presented at the 8th Australian Coal Preparation Society Conference at Port Stephens, November 12-16, 2000.

New South Wales Government Department of Environment and Climate Change (DECC), Construction Noise, http://www.environment.nsw.gov.au/noise/constructnoise.htm, accessed 24 September 2008.

Pasquill, F, *The estimation of dispersion of windborne material,* Meteorological Magazine 1961, vol 90(1063), pp 33-49.

Queensland Government Environmental Protection Agency, *Guideline Preparing environmental management plans,* 28 March 2003.

Rio Tinto Coal Australia, Clermont, *Clermont Coal Mine Project – Environmental Impact Statement Volume 1,* August 2004.