HANCOCK PROSPECTING PTY LTD

Alpha Coal Project Supplementary Environmental Impact Statement

R | Coal Mine – Noise and Vibration

Report

Noise and Vibration Impact Assessment
Alpha Coal Mine SEIS

18 MARCH 2011

Prepared for

Hancock Prospecting Pty Ltd

Hancock House
355 Queen Street, Brisbane, QLD 4000

42626680

URS

Project Manager:

Robert Storrs
Senior Associate
Environmental Scientist

URS Australia Pty Ltd

Level 16, 240 Queen Street
Brisbane, QLD 4000
GPO Box 302, QLD 4001
Australia
T: 61 7 3243 2111
F: 61 7 3243 2199

Principal-In-Charge:

Chris Pigott
Senior Principal
Environmental Scientist

Author:

Sean Flaherty
Senior Acoustics Engineer

Reviewer:

Arnold Cho
Senior Associate Acoustics
Engineer

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Abbreviations

Abbreviation	Description
BMP	Blasting Management Plan
CHPP	Coal Handling Preparation Plant
CoP	Code of Practice
dB(A)	Unit used to measure 'A-weighted' sound pressure levels
DTMR	Department of Transport and Roads
EA	Environmental Authority
EIS	Environmental Impact Statements
EM Plan	Environmental Management Plan
EP Act	*Environmental Protection Act 1994* (Queensland)
EPA	Environmental Protection Agency
EPP (Noise)	Environmental Protection (Noise) Policy 2008
HPPL	Hancock Prospecting Pty Ltd
Hz	Hertz
IPCC	In Pit Crusher Conveyor
kg	Kilogram
kHz	Kilohertz
km	Kilometre(s)
km^2	Square kilometre(s)
L_{A90} (Time)	The A-weighted sound pressure level that is exceeded for 90 per cent of the time over which a given sound is measured. This is considered to represent the background noise, e.g. L_{A90} (15 min).
L_{Aeq} (1 hr)	The L_{Aeq} noise level for a one-hour period. It represents the highest tenth percentile hourly A-weighted L_{eq} during the period 7 am to 10 pm, or 10 pm to 7 am, (whichever is relevant).
LIA	Light Industrial Area
L_{LF}	Low frequency noise level in the frequency range 20 Hz to 200 Hz.
m	Metre(s)
MIA	Mine Infrastructure Area
MIC	maximum instantaneous charge
ML	Mining Lease
MLA	Mining Lease Application
mm/s	Millimetre(s) per second
OLC	Overland Conveyor
PFS	Pre Feasibility Study
PPV	Peak Particle Velocity
QR	Queensland Rail
RMS	Root Mean Square
ROM	Run of Mine
RT	Rubber tyred
SEIS	Supplementary Environmental Impact Statement
SPL	Sound Pressure Level
STP	Sewage Treatment Plant
SWL	Sound level
T	Tonnes
TLO	Train Load Out
TOR	Terms of Reference

Abbreviation	Description
URS	URS Australia Pty Ltd
WHO	World Health Organisation

Executive Summary

URS Australia Pty Ltd (URS) prepared and issued a Noise and Vibration Impact Assessment, dated 20 September 2010 as part of the Environmental Impact Statement (EIS) application process on behalf of Hancock Prospecting Pty Ltd (HPPL) for the proposed Alpha Coal Project (Mine) (the Project). The assessment was prepared in accordance with the *Terms of Reference* (TOR) dated June 2009, the *Environmental Protection Act 1994* (EP Act) and the *Environmental Protection (Noise) Policy* (Queensland Government, 2008).

Noise and vibration impacts associated with the site's proposed construction and operation were assessed in accordance with the relevant draft Environmental Protection Agency (EPA) Ecoaccess guidelines (*EPA Ecoaccess Guideline Planning for Noise Control* [EPA, 2004]*, EPA Ecoaccess Guideline Noise and Vibration from Blasting* [EPA, 2006] and *EPA Ecoaccess Guideline Assessment of Low Frequency Noise* [EPA, 2004). Off-site road traffic noise was assessed against the Department of Transport and Main Roads (DTMR) *Road Traffic Noise Management Code of Practice* (DTMR, 2007) criteria. Rail noise associated with the Project was assessed in accordance with the Queensland Rail (QR) *Code of Practice for Railway Noise Management* (QR, 2007) criteria.

The EIS was issued for public display between 5 November 2010 and 20 December 2010. Since these dates there have been a number of revisions to the Project Description and project site layout.

This report provides a supplementary assessment to the original EIS noise and vibration study. It addresses the relevant Project Description revisions in terms of their influence on noise and vibration emissions from the site. Additionally it provides verification on the findings of the noise and vibration assessment prepared as part of the EIS application process.

The Project Description revisions that would materially influence the exiting noise and vibration predictions provided in the EIS are identified and their effects quantified with respect to the established criteria. Additionally a benefits vs. consequences analysis is provided with respect to the relevant Project Description changes in terms of noise and vibration effects.

The key findings of this assessment are as follows:

- HPPL has advised that the two most affected dwellings reported in the EIS assessment (Wendouree and Hobartville Homesteads) will not be habitable during the Project and should not therefore be considered as sensitive receptors for purposes of establishing mitigation plans and commitments in the Supplementary EIS (SEIS), the Environmental Management Plan (EM Plan) and draft Environmental Authority (EA) conditions. These receptors have been disregarded for the purposes of this assessment.
- Due to the adoption of in-pit crusher conveyor (IPCC) mining methods and resulting reduction in mobile plant, particularly dump and haul trucks, predicted operational noise levels are marginally to significantly reduced at all identified sensitive receptor locations.
- Noise generated during the construction phase is not expected to substantially change from the levels reported in the EIS. No exceedance of the nominated construction noise limits is predicted.
- An updated blasting schedule has been provided, which indicates that for the blasting of weathered and Permian >30 m, occasional increased capacity maximum instantaneous charge (MIC) blasts (up to 1,800 kg) may be detonated. Whilst there is potential for marginally higher levels of ground vibration and overpressure levels above those reported in the EIS, it is anticipated that ground vibration and overpressure levels would be generally lower than previously expected and full compliance with the assessment criteria will be maintained at all sensitive receptor locations. Blasting will be effectively managed with suitable blasting control measures that will be incorporated into a Blasting Management Plan (BMP).

- Mine Site access will now be through Degulla Road instead of Hobartville Road. This will result in higher traffic volumes along Clermont-Alpha Road in the section between Degulla Road and Hobartville Road. Off-site traffic noise levels will be relatively higher than previously predicted at receptor locations along this section of road; however, full compliance with the relevant road traffic noise criteria would be maintained during all construction and operational stages.

This supplementary assessment indicated that cumulative noise impacts from construction activities and operation of the proposed mine are not expected to be any greater than previously reported by the EIS noise and vibration assessment. The Project would therefore not significantly degrade the existing acoustic environment nor be expected to create undue annoyance to the identified noise sensitive receptors. No further mitigation measures or commitments beyond those identified in the EIS are considered necessary. The existing EM Plan has, however, been updated to reflect the Project Description revisions discussed herein (refer to Volume 2, Appendix V).

This assessment indicated that the proposed Project Description revisions would, on balance, benefit the Project in terms of its emissions of noise and vibration.

1

Introduction

1.1 Summary of EIS Noise and Vibration Assessment

URS Australia Pty Ltd (URS) prepared and issued a Noise and Vibration Impact Assessment, dated 20 September 2010 as part of the Environmental Impact Statement (EIS) application process on behalf of Hancock Prospecting Pty Ltd (HPPL) for the proposed Alpha Coal Project (the Project). The assessment was prepared in accordance with the *Terms of Reference* (TOR) dated June 2009, the *Environmental Protection Act 1994* (EP Act) and the *Environmental Protection (Noise) Policy* (Queensland Government, 2008).

Noise and vibration impacts associated with the site's proposed construction and operation were assessed in accordance with the relevant draft Environmental Protection Agency (EPA) Ecoaccess guidelines (*EPA Ecoaccess Guideline Planning for Noise Control* [EPA, 2004]*, EPA Ecoaccess Guideline Noise and Vibration from Blasting* [EPA, 2006] and *EPA Ecoaccess Guideline Assessment of Low Frequency Noise* [EPA, 2004]). Off-site road traffic noise was assessed against the Department of Transport and Main Roads (DTMR) *Road Traffic Noise Management Code of Practice* (DMR, 2007) criteria. Rail noise associated with the Project was assessed in accordance with the *Code of Practice for Railway Noise Management* (Queensland Rail, 2007) criteria.

Additionally, the following guidelines and standards were considered:

- Australian Standards AS1055.1 and AS1055.2 (1997) *Description and Measurement of Environment Noise;*
- *Interest in Planning Schemes No. 3* (Queensland Transport, 2007);
- Australian Standard AS 2187.2 (2006) *Explosives, Storage and Use, part 2, Use of Explosives;*
- British Standard BS7385 Part 2 (1993) *Evaluation and Measurement for Vibration in Buildings, Guide to Damage Levels from Ground-borne Vibration;*
- British Standard *BS6472* (1992) *Evaluation of Human Exposure to Vibration in Buildings (1 Hz to 80 Hz)*;
- *The Health Effects of Environmental Noise – other than hearing loss* (enHealth Council, 2004);
- Australian/New Zealand Standard AS/NZS 2107 (2000) *Acoustics – Recommended Design Sound Levels and Reverberation Times for Building Interiors*; and
- *World Health Organisation Guidelines for Community Noise* (WHO, 1999).

The EIS was issued for public display between 5 November 2010 and 20 December 2010. Since these dates there have been a number of revisions to the Project Description and project site layout.

This report provides a supplementary assessment to the original EIS noise and vibration study, dated 20 September 2010. It addresses the relevant Project Description revisions and their potential impacts of noise and vibration emissions from the site on the nearest noise sensitive receptors considered in the original assessment. Additionally it provides verification on the findings of the noise and vibration assessment prepared as part of the EIS application process and updated predictions.

The original assessment was included in Volume 5, Appendix P of the EIS and summarised in Volume 2, Section 15.

1.2 Scope of Supplementary Assessment

The supplementary assessment provides:

1 Introduction

- A summary of the Project Description changes that may materially influence the existing noise and vibration predictions provided in the EIS;
- Verification of the existing predictions of potential noise, overpressure and ground vibration impacts with reference to the established criteria;
- A benefits and consequences analysis with respect to the relevant Project Description changes in terms of noise and vibration effects; and
- Discussion of required updates to the Project Environmental Management Plan (EM Plan) and commitments required of HPPL with respect to the control of noise and vibration.

2

Project and Site Description

2.1 Key Changes to Project Description

The key Project Description revisions set out in Volume 1, Section 2 of the Supplementary EIS (SEIS) pertain to the proposed mining methods, mine design and layout, on-site support infrastructure and workforce. Additionally, the locations of noise sensitive receptors considered by the EIS assessment have changed.

The following sections provide a summary of the Project Description revisions that may materially influence the findings of the EIS noise and vibration assessment prepared as part of the EIS application process.

2.1.1 Noise Sensitive Receptors

Table 2-1 of Volume 5, Appendix I of the EIS sets out the nearest potentially affected noise sensitive receptor locations identified by the Proponent at the time of the assessment and their respective distances from the closest points on the mining lease boundary and pit area boundary. A site location plan indicating the identified receptor locations is shown in Figure 2-1 of the EIS Appendix report (Volume 5, Appendix I).

Two of the identified existing dwellings, Wendouree Station and Hobartville Homestead, are located within the mining lease boundary (Mining Lease Application [MLA] 70426). Since finalising the EIS, HPPL has advised that these dwellings will not be habitable during the Project and should not therefore be considered for the purpose of establishing mitigation plans and commitments in the SEIS, the EM Plan or draft Environmental Authority (EA) conditions. These receptors have therefore been disregarded for the purposes of this assessment.

Additionally, the on-site accommodation village that was proposed to be located off Hobartville Road to the south-eastern section of MLA 70426 will now be relocated approximately 20 km to the north, off Degulla Road within the north-eastern section of MLA 70426. In its new location, the accommodation village would be set back by approximately 8 km from the Alpha Coal Project pits.

Furthermore, an additional accommodation village is proposed as part of the proposed Kevin's Corner Coal Mine Project. This project is currently in the process of application preparation. The Kevin's Corner project site abuts the Alpha Coal project to the north, with its proposed accommodation village to be located close to the common boundary and set back by approximately 8 km from the Alpha Coal Project pits.

2.1.2 Summary of Key Project Description Revisions

Table 2-1 summarises the principal Project Description revisions and potential benefits or consequences with respect to noise and vibration emissions from the Project.

2 Project and Site Description

Table 2-1 Summary of key revisions influencing predicted Noise and Vibration levels

Noise Source	Project Description Revisions	Benefit or Consequence in Terms of Operational Noise and/or Vibration
Run of Mine (ROM) Dump Stations (ROM North and ROM South)	• ROM Dump Station North is proposed to be relocated approximately 4 km south of original location. • ROM Dump Station South's location will remain unchanged.	• Marginally reduced noise contribution to Surbiton South Homestead. • No material influence to predicted noise levels at other sensitive receptors.
Haul Roads	• Minor realignment of haul roads is proposed. • Key notable differences are the increased setback distances from the northern and southern MLA 70426 boundaries. • Setback distances increase by approximately 3 km from the northern boundary and by approximately 2.5 km from the southern boundary.	• Marginal reduction in mobile plant noise levels received at all receptors to the south, principally Kia Ora and Monklands Homesteads.
Rail Loop and Train Load Out Facilities (TLO)	• Minor modifications to the rail loop alignment and minor relocation of the TLO. • Configuration changes are not significant.	• No material influence to predicted noise levels at receptors.
Overland Conveyors (OLC North and OLC South)	• OLCs follow the same route as before. • OLC North is now about 4 km shorter, thereby increasing relative setback from northern MLA 70426 boundary.	• Marginally reduced noise contribution, principally to Surbiton South Homestead.
Coal Handling and Preparation Plant (CHPP)	• CHPP relocated 750 m to the south. • Configuration of feeder bins, conveyors, plant, stockpiles and train load-out facilities remain unchanged, but relocated 500-750 m to the south.	• No material influence to predicted noise levels at receptors.
Mine Infrastructure Area (MIA)	• MIA relocated approximately 500 m to the west, thereby increasing relative setback from eastern MLA 70426 boundary.	• No material influence to predicted noise levels at receptors.
Dragline Area / Mine Layout	• Previously, four pits (A-D) were envisaged. Six open-cut pits (1-6) are now proposed. • The footprint of the open-cut pits has changed substantially, as has the system of ramps and bridges crossing the open-cut pits. • The number of ramps crossing the pits has reduced from 11 to 6 and proposed permanent land bridges have increased from 1 to 5. • The total area of the revised footprint is substantially the same. The key notable differences are the inclusion of an area of approximately 7.5 km^2 to the south-west and the exclusion of a similar area to the north-west.	• No material influence to predicted noise levels at receptors apart from Kia Ora Homestead and to a lesser extent Monklands Homestead where the noise contribution from the dragline area may be marginally increased.

2 Project and Site Description

Noise Source	Project Description Revisions	Benefit or Consequence in Terms of Operational Noise and/or Vibration
In Pit Crusher Conveyor (IPCC)	• The revised Project Description includes the addition of two IPCC systems.	• The IPPC systems would generate significant noise. However, with consideration to the reduction in the number of haul trucks as a result of the adoption of IPCC mining methods, overall operational noise levels are predicted to reduce.
Major Mobile Equipment	• Draglines numbers reduced from nine to six • Dump truck numbers reduced by 42% • Rope shovel numbers reduced by 66% • Excavator numbers reduced by 33% • 220 t dump truck types have been replaced by 120 t dump trucks	• Reductions in the number of major mobile equipment units will substantially reduce operational noise contributions. • However, these reductions will be significantly offset with the introduction of the proposed IPCC systems.
Light Industrial Area (LIA)	• Inclusion of a Light Industrial Area (LIA)	• No material influence to predicted noise levels at receptors.
Water Treatment Plant (WTP) / Sewage Treatment Plant (STP)	• Water treatment and sewage plant relocated	• No material influence to predicted noise levels at receptors.
Site Access	• Mine site access will now be from Degulla Road instead of Hobartville Road	• This will result in more traffic along Clermont-Alpha Road in the section between Degulla Road and Hobartville Road. • Off-site traffic noise levels would be relatively higher for Tressillian, Burtle and Surbiton South Homesteads but would remain within the road traffic noise criteria.
Roadworks	• Degulla Road will be upgraded to sealed standard; additionally, water supply pipeline and power link services will be installed along Degulla Road.	• Construction works along Degulla Road have potential to generate temporarily increased noise at Surbiton South and Burtle Homesteads.
Construction Workforce	• A marginal increase in personnel numbers from 1,358 to 1,535 are anticipated during the construction stages of the Project.	• This may possibly marginally increase off-site traffic, though it is unlikely to influence predicted off-site traffic noise levels.
Operational Workforce	• A decrease in personnel numbers is anticipated during the operational stages of the Project, with peak personnel numbers of 770 on-site at any time.	• This would result in marginally decreased off-site traffic, and result in marginally less off-site traffic noise.

Noise Source	Project Description Revisions	Benefit or Consequence in Terms of Operational Noise and/or Vibration
Blasting	• The proposed maximum instantaneous charge (MIC) capacities for blasting considered in the EIS assessment were 350 – 1,300 kg. • An updated blasting schedule has since been provided by HPPL mining consultant, MineOp Consulting. They note that for blasting of weathered and Permian > 30 m, dragline blast bench height MICs of between 780 -1,800 kg may potentially be used. • The dragline blast bench height would range between 40 and 55 m and the MIC will vary accordingly. • MineOp has indicated that blasting of weathered and Permian > 30 m would occur on average at a frequency of once or twice per week. • MineOp has confirmed that during peak production, typically only one blast per day would occur, generally using lower capacity MICs than considered in the EIS.	• Based on the updated proposed blasting schedule and discussions with MineOp Consulting, ground vibration and overpressure levels at the identified sensitive receptor locations are not expected to be any higher than previously reported and the criteria would be met at all sensitive receptor locations. • In the case of 1,800 kg MIC detonations, ground vibration and overpressure levels would marginally increase; however, full compliance with the assessment criteria would be maintained. • The Kia Ora Homestead location may experience the greatest relative increase in overpressure with consideration to blasting in Pit 1. At this location noise levels of up to 113 dB(Z) are predicted. • Blasting control measures are discussed in **Section 2.2.6** of this report.
Alpha Coal Project Accommodation Village	• Relocation of the Alpha Coal Project Accommodation Village, approximately 20 km to the north.	• The accommodation village would be exposed to similar levels of noise overpressure and vibration from the Alpha Coal Project as it would in its previous location. • It is noted, however, that the new location would be more exposed to cumulative noise increases with respect to the proposed Kevin's Corner Project to the north. Consequently, increased acoustic design requirements for the accommodation village buildings may be required to ensure satisfactory internal noise levels are achieved should the Kevin's Corner Project go ahead.

2.2 Verification of Existing Predictions

2.2.1 Calculation Method

For the purposes of the EIS Noise and Vibration Impact Assessment (Volume 5, Appendix I of the EIS), noise levels due to the proposed construction and the operation of the site at the identified noise

sensitive receptor locations were predicted using an acoustics computer model created in SoundPLAN Version 7.0. This program is used internationally and recognised by regulators and authorities throughout Australia.

Based largely on the Project's Pre-Feasibility Study (PFS) and design details provided by HPPL, the noise model was constructed to allow the prediction of cumulative noise levels from the site including the contribution of each noise source. The noise model took into account:

- Sound power levels of each identified source;
- Receptor locations;
- Screening effects due to topography;
- Meteorological effects and attenuation due to distance; and
- Ground and atmospheric absorption.

The noise calculations were carried out using the L_{Aeq} descriptor to assess the operational and construction noise impacts.

Additionally, potential increases in noise levels due to meteorological conditions have been considered in the noise modelling. Adverse meteorological conditions have the potential to increase noise levels at a receptor. Such phenomena generally occur during temperature inversions or where there is a wind gradient with wind direction from the source to the receptor. Potential noise impacts were predicted separately for neutral and adverse meteorological conditions. Since the most sensitive period is the night time, the noise modelling results for neutral and adverse conditions were mostly compared with the night-time criteria, with source-to-receptor wind.

2.2.2 Operational Noise

The EIS noise modelling for the proposed operational phase of the project was undertaken based on likely maximum operating conditions for installed and mobile equipment. In setting up the noise model, all sources were positioned according to the proposed site layout for the respective stages, with eight operational scenarios modelled to quantify operational noise emissions from the site over the proposed life of the mine for years 2013-2042.

Table 5-4 from Volume 5, Appendix I of the EIS identifies the noise modelling scenarios, indicating the numbers of major and minor operational equipment units applied in the noise modelling. Appendix C of the EIS Appendix report (Volume 5, Appendix I) provides a full detailed schedule of equipment applied in the noise modelling for each operational stage.

For the purpose of the noise assessment, it was assumed that the noise-generating activities for each stage would occur simultaneously, and all equipment identified for each scenario would operate continuously.

A summary of the noise modelling results for each operational stage is presented in Table 5-5 of Volume 5, Appendix I of the EIS. The noise levels predicted for each operational stage were within the established noise criteria at all the receptors located outside of the mining lease boundary, under all meteorological conditions. Operational noise levels at these receptor locations were predicted to steadily increase from the commencement of operations, typically by 1-2 dB(A) each year from 2013 until full capacity production is reached, by 2017.

The operational noise modelling Scenario 8 (representative of years 2033-2043) under adverse meteorological conditions provided the highest predicted noise levels. During this period the mine

would be in full production, with all fixed plant operating and the maximum number of major and minor operational units in use.

For the purpose of this SEIS assessment, noise modelling Scenario 8 has been adapted to reflect the revised operational equipment schedule proposed as set out in Table 2-2.

With reference to Table 2-2, it is noted that the unit numbers applied in the EIS noise assessment were based on those provided in Appendix 6A of the Project's PFS. After the completion of the EIS noise and vibration assessment, MineOp Consulting provided a further refined schedule of operational equipment, which was presented in the EIS Project Description. As a result, there is some disparity between the equipment numbers presented in the EIS and those applied in the EIS noise assessment, although the noise assessment represented a precautionary approach. The variations identified would not have materially influenced the findings of the EIS noise assessment. Table 2-3 provides the revised operational noise predictions based on the identified Project Description revisions and a comparison of results.

Table 2-2 Revised operational equipment schedule – EIS Scenario 8 (2033–2043)

Operational Equipment	Unit Type	Proposed in EIS*	Applied in EIS Noise Assessment*	Applied in SEIS Noise Assessment
Drills (overburden and coal mining)	Drills	17	13	6
Draglines	Marion 8750 Dragline	9	8	6
Rope Shovel	PH4100 XPB Shovel	9	9	3
Excavators (overburden, coal mining)	Liebherr R9800 and R9350BH Excavator	18	14	13
Rear Dump Trucks (Overburden, Reject haulage)	Cat 797 785 793RDT Haul Truck	130	116	70
IPCC System (Dump and mobile conveyors, in-pit crushers)	Unspecified **	0	0	2
Front End Loaders (overburden, coal mining)	Cat 994D	3	2	0
Bottom Dump Trucks (coal haulage)	Kress 200-II Coal Haulers	42	44	31
Bulldozers (major ancillaries)	Cat D10 D11	46	39	44
Dozer Rubber Tyred (RT)	Cat 854K RT Dozer	14	13	6
Graders	Cat 24M Grader	11	10	15
Water Trucks	Cat 789C Water Truck	8	9	8
Total Units		**307**	**277**	**204**

Notes: * The unit numbers applied in the EIS noise assessment were based on those provided in Appendix 6A of the Project's Pre-Feasibility Study (PFS). After the completion of the EIS noise and vibration assessment, MineOp Consulting provided a further refined schedule of operational equipment, which was presented in the EIS Project Description. As a result, there is some disparity between the equipment numbers presented in the EIS and those applied in the EIS noise assessment, although the noise assessment represented a precautionary approach.

** Unit type of the IPCC system is unknown, crusher component assumed as 310 kW/90 t semi-mobile crusher (hard rock quarry activities) identified in BS5228. Conveyor layouts are based on the IPCC Functional Description Report (Ref. No.: HC-SKM-RPT-5000) in Volume 2, Appendix of this SEIS and sound power levels are based on the EIS for Ensham Central Project Environmental Noise Assessment (Bassett Acoustics, 2006).

Table 2-3 Revised operational noise predictions – Scenario 8 (2033–2043), adverse meteorology

Receptor	EIS Predicted Worst Case Noise Level (L_{Aeq}, dBA)	SEIS Predicted Worst Case Noise Level (L_{Aeq}, dBA)	Noise Level Reduction (L_{Aeq}, dBA)	Notes
A Forrester	22	19	3	Noise levels controlled by excavators and haul trucks outside the open-cut mine. Noise reduction of 3 dB is expected due to reduced length of overland conveyor north and haul roads.
B Eulimbie	12	3	9	Noise levels are expected to be reduced substantially due to relocation of ROM pad north and shortening of overland conveyor north.
C Surbiton South	26	25	1	Dominant noise source is the OLC North. Marginal noise reduction is expected by the shortening of the conveyor and reduction in the number of haul trucks.
D Burtle	25	24	1	Dominant noise source is the OLC South. Marginal noise reduction is expected by reduction in the number of haul trucks.
E Tresillian	19	18	1	Dominant noise sources are haul trucks and OLC South. Marginal noise reduction is expected by reduction in the number of haul trucks.
F Mentmore	14	10	4	Noise levels controlled by haul trucks outside the open-cut mine. Significant noise reduction is expected due to reduction in number of haul trucks.
G Monklands	25	23	2	Noise levels controlled by haul trucks outside the open-cut mine. Noise reduction is expected due to reduction in number of haul trucks.
H Kia Ora	26	24	2	Noise levels controlled by haul trucks outside the open-cut mine. Noise reduction is expected due to reduction in number of haul trucks.
K Alpha Coal Project Accommodation Village	34	33	1	Noise controlled by ROM OLCs, TLO and CHPP.

Notes:
1. Due to its proposed relocation, the predicted noise levels presented for the Alpha Coal Project Accommodation Village relate to different locations.
2. Rail noise contribution not considered

The noise modelling results indicate that the Project Description revisions would result in marginally lower operational noise emissions from the Project site. The reductions are generally due to the reduced number of mobile equipment units as a result of adopting IPCC mining methods.

Further noise modelling indicates that positioning of the two proposed IPCC systems at various locations within their proposed operational areas within Pits 2, 3 and 4, would have little influence on the cumulative noise levels from the site at the identified sensitive receptor locations, with a variability of <1 dB(A) predicted.

Rail noise and vibration, off-site road traffic noise and vibration, and overpressure from blasting are considered independently in the sections below.

The general operational noise from the site considered is expected to be barely audible or inaudible at all receptor locations outside the mining lease boundary during the day-time period. In low background noise conditions, occurring during the night-time period, the site operation may be audible externally at receptors locations A, C, D, E, G and H. (Forrester Homestead, Surbiton South Homestead, Burtle Station, Tresillian Homestead, Monklands Homestead, and Kia Ora Homestead). However, as previously identified, the predicted noise levels would not exceed the operational noise criteria set out in the EIS. Considering the attenuation afforded through the dwellings' external façades, operational noise from the mine is not expected to be audible inside any of the identified dwellings located outside the mining lease boundary.

Specific noise mitigation measures to control general on-site operational noise, with respect to these receptors, are not considered necessary, beyond normal good practice.

The highest operational noise levels are predicted at the on-site HPPL Accommodation Village. As previously noted in the EIS, the key amenity issue for the accommodation village is sleep protection, as limited external activity is expected, and its primary function is to provide sleeping facilities for mine workers between shifts. On this basis, only the internal noise criteria set out in the EIS are considered appropriate for the assessment of the accommodation village. External noise levels of up to 33 dB(A) L_{Aeq} are predicted at this location under adverse meteorological conditions and as such it is expected that the internal noise criteria would be met with windows open. However, the accommodation would be air conditioned and provided with mechanical ventilation, allowing windows to be kept closed.

2.2.3 Construction Noise

The EIS noise modelling for the proposed construction phase of the project was undertaken based on nominated construction equipment schedules for the different stages of the mine construction works proposed between 2012 and 2016 as set out in Tables 5-6 and 5-7 of the EIS Appendix report (Volume 5, Appendix I).

For the purpose of the noise assessment, it was assumed that the noise-generating activities for each construction stage would occur simultaneously, and all equipment identified for each stage would operate continuously.

The Project Description revisions do not indicate any substantial modifications of the assumed construction equipment schedules set out in the original assessment. On this basis, the construction noise levels predicted in the EIS are not expected to change significantly.

No exceedances of the established construction noise limits were predicted at any of the identified sensitive receptor locations for the construction of the mine infrastructure during the day or night time periods.

Specific physical construction noise mitigation measures are not considered necessary. However, as identified in the EIS, the adoption of noise management strategies implementing good industry practice is recommended to minimise noise emissions from the proposed construction works.

2.2.4 Sleep Disturbance

As identified in the EIS, the predicted night-time period levels are significantly below 50 dB(A) L_{Amax} at receptor locations A-H. Therefore, the Project is not predicted to give rise to sleep disturbance at these locations.

The sleep protection criterion is expected to be readily achieved within the HPPL Accommodation Village, which would be provided with mechanical ventilation and air-conditioning, allowing windows to be kept closed.

2.2.5 Low Frequency Noise

As identified in the EIS, low frequency noise would not be at a level to cause annoyance to the identified residential receptors and compliance with the low frequency noise criterion inside these dwellings is predicted.

2.2.6 Blasting Noise and Vibration

The proposed maximum instantaneous charge (MIC) capacities for blasting considered in the EIS assessment were 350-1,300 kg.

An updated blasting schedule has since been provided by HPPL mining consultant, MineOp Consulting. They note that for blasting of weathered and Permian >30 m, dragline blast bench height MICs of 780-1,800 kg may potentially be used. The dragline blast bench height will range between 40 and 55 m and the MIC will vary accordingly.

MineOp indicated that blasting of weathered and Permian >30 m would occur on average at a frequency of once or twice per week. Additionally, they have confirmed that during peak production, typically only one blast per day would occur, generally using lower capacity MICs than considered in the EIS.

Based on the updated proposed blasting schedule and discussions with MineOp Consulting, ground vibration and overpressure levels at the identified sensitive receptor locations are not expected to be any higher than previously reported and the criteria would generally be met at all sensitive receptor locations.

Overpressure

Due to the proposed increase in upper range MICs and the additional proposed mining area to the south-west (Pit 1), overpressure levels may marginally increase above the levels reported in the EIS. Full compliance with the criteria is, however, predicted to be maintained at all the identified sensitive receptor locations. In the case of 1,800 kg MIC detonations occurring within the southernmost part of Pit 1, the Kia Ora location would likely be the most affected, experiencing predicted overpressure

levels of up to 113 dB(Z). Overpressure effects will be effectively managed with suitable blasting control measures that will be incorporated into a Blasting Management Plan (BMP).

It must be noted that the predictions detailed in the EIS are based on site constants that are generally regarded as providing conservative results and hence the predicted levels should only be used as a guide. It is recommended that predictions are refined on the availability of site-specific constants and once the exact locations for blasting are known. Blast monitoring should be undertaken to assess compliance, determine the site constants and confirm the predictions.

Blasting carried out within the recommended hours (0900-1700) is not expected to ordinarily be affected by the presence of temperature inversions as these generally occur during the night-time and early morning period. Source-to-receptor wind direction may be expected to give rise to increased noise levels at the receptors, however, and should be considered when planning blasting.

As identified in the EIS, provided blasting is properly managed, the proposed blasting program can be carried out to meet the overpressure criteria at all identified sensitive receptor locations. Reducing the MIC capacity and increasing distance is the most effective way of reducing blasting impacts. Recommendations on the management of overpressure from blasting are provided in Section 6.2 of the EIS Appendix report (Volume 5, Appendix I). It is expected that these recommendations would be provided to the blasting contractor for consideration and would be incorporated into a BMP.

Ground Vibration

It is considered that with respect to ground vibration, the proposed blasting schedule may be undertaken in full compliance with the established criteria, without risk of damage to the receptor properties or undue community annoyance.

Due to the setback distance afforded to the HPPL Accommodation Village, for maximum capacity blasts peak particle velocity (PPV) is predicted to not exceed 1 millimetre per second (mm/s), whilst at the closest sensitive receptor locations beyond the mining lease boundary PPV is predicted to not exceed magnitudes in the order of 0.2 mm/s.

Vibration Effects on Underground Pipelines

German Standard DIN 4150.3 (1999) recommends offset distances for buried pipelines constructed from various materials for the prevention of damage from vibration effects. Masonry or plastic pipes are most susceptible; for these pipeline types an offset distance of 510 m is recommended. There are no known buried pipelines within 510 m of the proposed blasting areas and therefore no adverse effects on pipelines due to blasting are expected.

Vibration Effects on Underground Communications Cabling

Optic fibre cables would supply communications to the site, and would likely enter the mine site along the Powerlink powerlines. It is understood that the cable network would not be sited within 500 m of the proposed blasting areas and therefore no adverse effects on communications networks due to blasting are expected.

2.2.7 Off-Site Traffic Noise

The potential off-site traffic noise impact associated with the proposed operation and construction of the Project was assessed in the EIS based on traffic volume predictions undertaken for the

development. The increases in traffic volumes for each road section were estimated for trips to and from the site. The following route sections were identified:

- A: Alpha to Alpha Coal Mine site, via Clermont-Alpha Road;
- B: Clermont to Alpha Coal Mine site, via Clermont-Alpha Road;
- C: East of Alpha to Alpha, via Capricorn Highway; and
- D: West of Alpha to Alpha, via Capricorn Highway.

The Project site access will now be from Degulla Road instead of Hobartville Road. This would result in more traffic along Clermont-Alpha Road in the section between Degulla Road and Hobartville Road.

The predicted $L_{A10(18hour)}$ road traffic noise levels at the affected sensitive receptor locations estimated in the EIS are compared in Table 2-4 with those re-estimated with consideration to the relocated mine site access route. The relative increases in noise levels indicated.

Table 2-4 Predicted road traffic noise results

Sensitive Receptor	Setback (from Clermont-Alpha Rd)	Existing Traffic Noise $L_{A10(18hours)}$ yr 2009	Predicted Road Noise dB(A)		Relative Increase in Noise Level (dB)	
			Construction yr 2013 EIS / SEIS	Operation yr 2041 EIS / SEIS	Construction yr 2013 EIS / SEIS	Operation yr 2041 EIS / SEIS
Mentmore Homestead	500 m	23	31 / 35	33 / 37	8 / 12	10 / 14
Tressillian Homestead	600 m	23	27 / 32	30 / 33	4 / 9	7 / 10
Burtle South	200 m	27	31 / 38	34 / 40	4 / 11	7 / 13

The predicted traffic volumes generated by the Project and with regard to the reassigned site access route represent a significant increase when compared with the existing level of traffic. Whilst full compliance with the 68 dB(A) $L_{A10(18hour)}$ Code of Practice (CoP) criterion is expected to be readily achieved without the requirement for any specific mitigation, a perceived increase in road traffic noise experienced by the identified receptors is considered likely.

The Mentmore Homestead (Location E) is predicted to be the most affected of the identified receptors, with a relative increase in $L_{A10(18hour)}$ noise levels by approximately 12 dB (an additional 4 dB increment over the level predicted in the EIS) during peak mine construction and by approximately 14 dB (an additional 4 dB increment) during peak mine operation.

The predicted increases of this order in off-site road traffic noise levels represent an effective perceived doubling (or more) in subjective loudness. Noise management strategies to minimise the noise from the off-site road traffic associated with the proposed mine construction and operation have been provided in Section 6.1 of Volume 5, Appendix I of the EIS.

2.2.8 Rail Noise and Vibration

The Project Description revisions do not indicate any substantial modifications of the proposed rail operations, with only minor realignments to the track and TLO proposed. On this basis, the rail noise and vibration levels predicted in the EIS are not expected to change significantly.

No exceedances of the established rail noise limits have been predicted.

2.2.9 Impacts on Fauna

No further impacts on terrestrial fauna, beyond those addressed in the EIS are expected due to the proposed Project Description revisions.

3

Noise Mitigation Measures

3.1 Construction and Operational Noise

Specific physical construction and operational noise mitigation measures were not considered necessary following the EIS assessment. This supplementary assessment has not identified any further requirement for any such measures. Notwithstanding this, adoption of the noise management strategies set out in Section 6 of Volume 5, Appendix I of the EIS are recommended to further reduce the potential for noise issues during the proposed construction and operation periods of the Project.

3.2 Blasting

The EIS assessment recommended that a BMP be prepared, which should include a monitoring program and be made available to the relevant authority as required. Retaining this measure is recommended.

3.3 Off-Site Road Traffic

The EIS assessment found that specific noise mitigation measures to control off-site road traffic noise are unnecessary. Traffic noise management strategies were identified in Section 6.1 of Volume 5, Appendix I of the EIS, which when applied, however, would further reduce the potential for noise issues during the proposed construction and operation periods of the Project. Application of these strategies is further recommended.

4

Conclusions

URS prepared and issued a Noise and Vibration Impact Assessment, dated 20 September 2010, as part of the EIS application process on behalf of HPPL for the proposed Alpha Coal Project (Mine) (the Project). The assessment was prepared in accordance with the *Terms of Reference* (TOR) dated June 2009 (Queensland Government, 2009), the *Environmental Protection Act 1994* and the *Environmental Protection (Noise) Policy* (Queensland Government, 2008). It was included in Volume 5 (Appendix I) of the EIS and summarised in Volume 2 (Section 15) of the EIS.

Noise and vibration impacts detailed in the EIS associated with the site's proposed construction and operation were assessed in accordance with the relevant draft EPA Ecoaccess guidelines (*EPA Ecoaccess Guideline Planning for Noise Control* [EPA, 2004], *EPA Ecoaccess Guideline Noise and Vibration from Blasting* [EPA, 2006], and *EPA Ecoaccess Guideline Assessment of Low Frequency Noise*) [EPA, 2004]). Off-site road traffic noise was assessed against the DMR's *Road Traffic Noise Management Code of Practice* (DMR, 2007) criteria. Rail noise associated with the Project was assessed in accordance with QR's *Code of Practice for Railway Noise Management* (Queensland Transport, 2007), criteria.

The EIS was issued for public display between 5 November 2010 and 20 December 2010. Since these dates there have been a number of revisions to the Project Description and project site layout. A supplementary assessment has therefore been carried out to verify and update the finding of the original assessment. The key findings of this supplementary assessment are as follows:

- HPPL has advised that the two most affected dwellings reported in the EIS assessment (Wendouree and Hobartville Homesteads) will not be habitable during the Project and should not therefore be considered for purposes of establishing mitigation plans and commitments in the SEIS, the EM Plan and draft EA conditions.
- Due to the adoption of IPCC mining methods and resulting reduction in mobile plant, particularly dump and haul trucks, the predicted operational noise levels are marginally to significantly reduced at all identified sensitive receptor locations. Full compliance with the established operational noise limits is predicted to be maintained.
- Noise generated during the construction phase is not expected to substantially change from the levels reported in the EIS. Full compliance with the established construction noise limits is predicted to be maintained.
- An updated blasting schedule has been provided, which indicates that for the blasting of weathered and Permian >30 m, occasional increased capacity MIC blasts (up to 1,800 kg) may be detonated. Whilst there is potential for marginally higher levels of ground vibration and overpressure levels above those reported in the EIS, it is anticipated that ground vibration and overpressure levels would be generally lower than previously expected and full compliance with the assessment criteria will be maintained at all sensitive receptor locations. Blasting will be effectively managed with suitable blasting control measures that will be incorporated into a BMP.
- The Project's site access will now be through Degulla Road instead of Hobartville Road. This will result in higher traffic volumes along Clermont-Alpha Road in the section between Degulla Road and Hobartville Road. Off-site traffic noise levels will be relatively higher at receptor locations along this section of road; however, full compliance with the relevant road traffic noise criteria is predicted during all construction and operational stages.

On the basis of this assessment, it is concluded that cumulative operational noise impacts and cumulative construction noise impacts are not expected to be any greater than previously reported by the EIS noise and vibration assessment. The Project would therefore not significantly degrade the

4 Conclusions

existing acoustic environment nor be expected to create undue annoyance to the identified noise sensitive receptors. No further mitigation measures or commitments beyond those identified in the EIS are considered necessary. The existing EM Plan has, however, been updated to reflect the Project Description revisions discussed herein.

This assessment indicated that the proposed Project Description revisions would, on balance, benefit the Project in terms of its emissions of noise and vibration.

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Limitations

URS Australia Pty Ltd (URS) has prepared this report in accordance with the usual care and thoroughness of the consulting profession for the use of Hancock Prospecting Pty Ltd (HPPL) and only those third parties who have been authorised in writing by URS to rely on the report. It is based on generally accepted practices and standards at the time it was prepared. No other warranty, expressed or implied, is made as to the professional advice included in this report. It is prepared in accordance with the scope of work and for the purpose outlined in the Proposal dated 11 November 2010.

The methodology adopted and sources of information used by URS are outlined in this report. URS has made no independent verification of this information beyond the agreed scope of work and URS assumes no responsibility for any inaccuracies or omissions. No indications were found during our investigations that information contained in this report as provided to URS was false.

This report was prepared during February and March 2011 and is based on the information reviewed at the time of preparation. URS disclaims responsibility for any changes that may have occurred after this time.

This report should be read in full. No responsibility is accepted for use of any part of this report in any other context or for any other purpose or by third parties. This report does not purport to give legal advice. Legal advice can only be given by qualified legal practitioners.

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A

Appendix A Glossary of Acoustical Terminology

A wide range of acoustic parameters and technical terms are used in this report. To assist in understanding the technical contents, a brief description of the acoustic terms is provided in this section.

Typical Noise Levels: Compared to the static air pressure (10^5 Pa), the audible sound pressure variations are very small ranging from about 20 µPa ($20x10^{-6}$ Pa), which is called *threshold of hearing,* to 100 Pa. A sound pressure of approximately 100 Pa is so loud that it causes pain and is therefore called *threshold of pain*.

dB (Decibel): A unit of sound level measurement. The human ear responds to sound logarithmically rather than linearly, so it is convenient to deal in logarithmic units in expressing sound levels. To avoid a scale that is too compressed, a factor of 10 is introduced, giving rise to the decibel. It is equivalent to 10 times the logarithm (to base 10) of the ratio of a given sound pressure to a reference pressure.

Perception of Sound: The number of sound pressure variations per second is called the frequency of sound, and is measured in Hertz (Hz). The normal hearing for a healthy young person ranges from approximately 20 Hz to 20 kHz. In terms of sound pressure levels, audible sound ranges from the threshold of hearing at 0 dB to the threshold of pain at 130 dB and over. A change of 1 dB or 2 dB in the level of a sound is difficult for most people to detect, whilst a 3 dB to 5 dB change corresponds to a small but noticeable change in loudness. An increase of about 8-10 dB is required before the sound subjectively appears to be significantly louder.

Sound Pressure (SPL): Sound pressure is the measure of the level or loudness of sound. Like sound power level, it is measured in logarithmic units. The symbol used for sound pressure level is SPL, and it is generally specified in dB. 0 dB is taken as the threshold of human hearing. Sound pressure levels of some common sources are listed in Table A-1.

Appendix A

Table A-1 Sound pressure levels of some common sources

Sound Pressure Level (dB)	Sound Source	Typical Subjective Description
140	Propeller aircraft; artillery fire, gunner's position	Intolerable
120	Riveter; rock concert, close to speakers; ship's engine room	
110	Grinding; sawing	
100	Punch press and wood planers, at operator's position; pneumatic hammer or drilling (at 2 m)	Very noisy
80	Kerbside of busy highway; shouting; Loud radio or TV	Noisy
70	Kerbside of busy traffic	
60	Department store, restaurant, conversational speech	
50	General office	Moderate
40	Private office; quiet residential area	Quiet
30	Unoccupied theatre; quiet bedroom at night	
20	Unoccupied recording studio; leaves rustling	Very quiet
10	Hearing threshold, good ears at frequency of maximum sensitivity	
0	Hearing threshold, excellent ears at frequency maximum response	

Sound Power (SWL): Sound power is the energy radiated from a sound source. This power is essentially independent of the surroundings, while the sound pressure depends on the surroundings (e.g. reflecting surfaces) and distance to the receptor. If the sound power is known, the sound pressure at a point can be calculated. Sound power is also measured in logarithmic units, 0 dB sound power level corresponding to 1 pW (10^{-12} W). The symbol used for sound power level is SWL or Lw, and it is specified in dB.

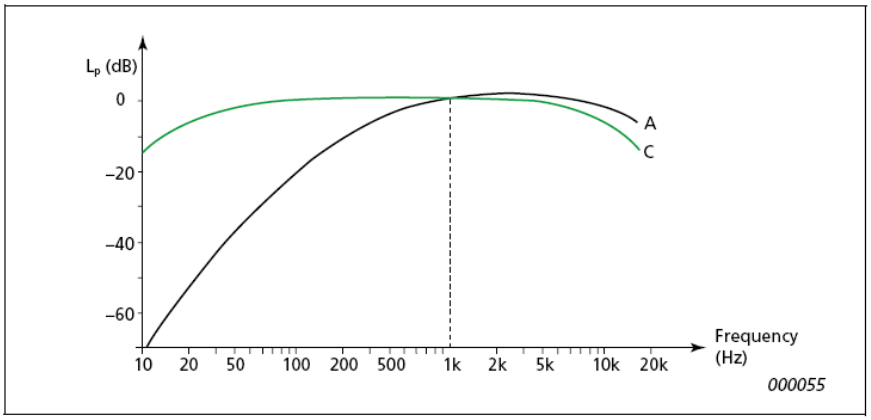
Frequency: Frequency is synonymous to pitch and is measured in units of Hz.

Frequency Spectrum: In environmental noise investigations, it is often found that the single-number indices, such as L_{Aeq}, do not fully represent the characteristics of the noise. If the source generates noise with distinct frequency components, then it is useful to measure the frequency content in octave or one-third octave frequency bands. For calculating noise levels, octave spectra are often used to account for the frequency characteristics of propagation.

***A* Frequency Weighting:** The method of frequency weighting the electrical signal with a noise measuring instrument to simulate the way the human ear responds to a range of acoustic frequencies. It is based on the 40 dB equal loudness contour. The symbols for the noise parameters often include the letter *A* (e.g. L_{Aeq}) to indicate that frequency weighting has been included in the measurement. See the graph below.

***C* Frequency Weighting:** The response of the human ear varies with the sound level. At higher levels, 100 dB and above, the ear's response is flatter, as shown in the C-Weighted Response below.

Although the A-Weighted response is used for most applications, C-Weighting is also available on many sound level meters. C-Weighting is usually used for peak measurements and also in some industrial and entertainment noise measurement, where the transmission of low frequency noise can be a problem. C-weighted measurements are expressed as dBC or dB(C).



***Z* Frequency Weighting:** Z or Zero frequency-weighting was introduced in 2003 with the intent of replacing the "Flat" or "Linear" frequency weighting, in order to standardise previously arbitrary low and high frequency filter characteristics (roll-offs) in measuring instruments. The Z weighting is preferred when peak sound levels are measured and the C-frequency-weighting, (with –3dB points at 31.5Hz and 8 kHz) does not provide a sufficient bandpass to allow the accurate measurement of true peak noise (Lpk).

Adverse Weather: Weather effects (wind and temperature inversions) that enhance noise. The prescribed conditions are for wind occurring more than 30% of the time in any assessment period in any season and/or for temperature inversions occurring more than 30% of the nights in winter.

Assessment Period: The period in a day over which assessments are made: day (7:00 am – 6:00 pm, Monday to Saturday; or 8:00 am – 6:00 pm on Sundays and public holidays), evening (6:00 pm – 10:00 pm, all days) or night (10:00 pm – 7:00 am, Monday to Saturday; or 10:00 pm – 8:00 am on Sundays and public holidays).

Ambient Noise: The all-encompassing sound at a site comprising all sources such as industry, traffic, domestic, and natural noises. This is represented as the L_{Aeq} noise level in environmental noise assessment. (See also L_{Aeq})

Background Noise: Background noise is the term used to describe the underlying level of noise present in the ambient noise, measured in the absence of the noise under investigation, when extraneous noise is removed. It is measured statistically as the A-weighted noise level exceeded for 90 percent of a sample period. This is represented as the L_{A90} noise level (See also L_{A90}).

Free Field: An environment in which a sound wave may propagate in all directions without obstructions or reflections. Free field noise measurements are carried out outdoors at least 3.5 m from any acoustic reflecting structures other than the ground.

Extraneous Noise: Noise resulting from activities that are not typical of the area. Untypical activities may include construction, traffic generated by holiday periods, and by special events such as concerts or sporting events. Normal daily traffic is not considered to be extraneous.

Appendix A

Impulsive Noise: Noise having a high peak of short duration or a sequence of such peaks. Noise from impacts or explosions, e.g., from a pile driver, punch press or gunshot, is called impulsive noise. It is brief and abrupt, and its startling effect causes greater annoyance than would be expected from a simple measurement of the sound pressure level.

Intermittent Noise: Noise with a level that abruptly drops to the level of or below the background noise several times during the period of observation. The time during which the level remains at a constant value different from that of the ambient level being of the order of 1 second or more.

Meteorological Conditions/Effects: Wind and temperature inversion conditions.

Noise Barrier: Solid walls or partitions, solid fences, earth mounds, earth berms, buildings, etc. used to reduce noise without eliminating it.

Temperature Inversion: An atmospheric condition in which temperature increases with height above the ground.

Tonality: Noise containing a prominent frequency and characterised by a definite pitch.

L_{Aeq}: A-weighted equivalent continuous noise level. This parameter is widely used and is the constant level of noise that would have the same energy content as the varying noise signal being measured. The letter *A* denotes that the A-weighting has been included and *eq* indicates that an equivalent level has been calculated. This is referred to as the ambient noise level. (See Ambient Noise)

L_{A90}: The A-weighted sound pressure level that is exceeded for 90% of the measurement period. It is determined by calculating the 90^{th} percentile (lowest 10%) noise level of the period. This is referred to as the background noise level. (See Background Noise)

L_{A10}: The A-weighted sound pressure level that is exceeded for 10% of the measurement period.

L_{A1}: The A-weighted sound pressure level that is exceeded for 1% of the measurement period.

L_{Amax}: The A-weighted maximum Root Mean Square (RMS) sound pressure level measured during the sample period.

L_{LF}: Low frequency noise level in the frequency range 20 Hz to 200 Hz.

URS Australia Pty Ltd
Level 16, 240 Queen Street
Brisbane, QLD 4000
GPO Box 302, QLD 4001
Australia
T: 61 7 3243 2111
F: 61 7 3243 2199

www.ap.urscorp.com