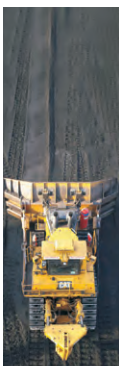
STRATFORDCOAL
Part of the Yancoal Australia Group

Stratford Extension Project
Environmental Impact Statement





APPENDIX C

NOISE AND BLASTING ASSESSMENT

Stratford Extension Project

Noise and Blasting Assessment

Report Number 610.09020-R1

25 October 2012

Stratford Coal Pty Ltd
PO Box 168
GLOUCESTER NSW 2422

Version: Revision 1

Stratford Extension Project

Noise and Blasting Assessment

PREPARED BY:

SLR Consulting Australia Pty Ltd
ABN 29 001 584 612
2 Lincoln Street Lane Cove NSW 2066 Australia

(PO Box 176 Lane Cove NSW 1595 Australia)
T: 61 2 9428 8100 F: 61 2 9427 8200
E: sydney@slrconsulting.com www.slrconsulting.com

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610.09020-R1	Revision 1	25 October 2012	Glenn Thomas	Yang Liu	Richard Heggie
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1 INTRODUCTION

1.1 Background

Stratford Coal Pty Ltd (SCPL), a wholly owned subsidiary of Yancoal Australia Limited (Yancoal), owns and operates the Stratford Coal Mine (SCM) and the Bowens Road North Open Cut (BRNOC) (collectively known as the Stratford Mining Complex).

In 1994, SCPL was granted approval to develop the SCM, with production involving conventional open cut operations commencing in 1995. In 2001 SCPL was granted approval to develop the BRNOC, with production commencing in 2003. The Stratford Mining Complex is located approximately 100 kilometres (km) north of Newcastle, New South Wales (NSW) in the Gloucester Basin. Product coal from the Stratford Mining Complex is transported by rail to Newcastle.

The nearby Duralie Coal Mine (DCM) is also owned by Yancoal and is located approximately 20 km south of the Stratford Mining Complex. Sized run-of-mine (ROM) coal from the DCM is transported on the North Coast Railway to the Stratford Mining Complex for processing.

SCPL seeks approval to extend the Stratford Mining Complex operations into additional open pit working areas with associated increased production of ROM coal up to approximately 2.6 million tonnes per annum (Mtpa), herein referred to as the Stratford Extension Project (the Project). The Project would include completion of the BRNOC, extension of the existing Roseville West Pit (Roseville West Pit Extension) as well as the development of the new Avon North and Stratford East Open Cuts. The existing Stratford Main Pit would be utilised for the storage of waste rock, water and rejects from the coal handling and preparation plant (CHPP). The BRNOC is scheduled for closure in Year 1 of the Project.

SLR Consulting Australia Pty Ltd (SLR Consulting) has been engaged by SCPL to evaluate and assess the potential noise and blasting impacts associated with the Project.

1.2 Assessment Requirements

This assessment of noise and blasting impacts has been guided by the NSW Department of Planning and Infrastructure (DP&I) Director-General's Requirements (DGRs) for the Project, dated 14 December 2011, as presented in **Table 1**.

Table 1 NSW Department of Planning and Infrastructure Director-Generals Requirements

DGR	Section Reference
Noise, Vibration and Blasting Impacts - including a quantitative assessment of potential:	
Construction, operational and off-site transport noise impacts;	**Section 7**, **Section 8**, **Section 9**, **Section 10**
Blasting impacts on people, livestock and property;	**Section 11**
Reasonable and feasible mitigation measures (including assessment of restricted night-time operations) including evidence that there are no such measures available other than those proposed; and	**Section 6**
Monitoring and management measures, in particular real-time, attended noise monitoring and predictive meteorological forecasting.	**Section 7.8**
The assessment shall be prepared to take into account the *Interim Construction Noise Guideline* (ICNG) (DECC, 2009), NSW *Industrial Noise Policy* (INP) (EPA, 2000), NSW *Environmental Criteria for Road Traffic Noise* (EPA, 1999) and *Assessing Vibration: a Technical Guideline* (DEC, 2006).	**Table 2**

Note 1: The Environment Protection Authority (EPA) existed as a legal entity operated within the NSW Office of Environment and Heritage (OEH) which came into existence in 2011. The EPBA became a separate statutory authority on 29 February 2012. The OEH was previously part of the NSW Department of Environment, Climate Change and Water (DECCW). The DECCW was also recently known as the NSW Department of Environment and Climate Change (DECC), and prior to that the NSW Department of Environment and Conservation (DEC).

The OEH (now EPA) provided agency comments on the draft DGRs for the Project. Comments relating to noise and blasting have been considered in this assessment. In accordance with the DGRs and OEH's comments, predicted Project noise and blast emissions have been comprehensively evaluated and assessed in accordance with the assessment methodology and procedure guidelines presented in **Table 2**.

Table 2 Relevant OEH Letter Content

OEH Letter Content	Section References
1. In relation to noise, the following matters should be addressed (where relevant) as part of the Environmental Impact Statement (EIS).	
General 2. Construction noise associated with the proposed development should be assessed using the *Interim Construction Noise Guideline* (DECC, 2009). http://www.environment.nsw.gov.au/noise/construction.htm	**Section 5.1 and Section 7.1**
3. Vibration from all activities (including construction and operation) to be undertaken on the premises should be assessed using the guidelines contained in the *Assessing Vibration: a technical guideline* (DEC, 2006). http://www.environment.nsw.gov.au/noise/vibrationguide.htm	**N/A**
4. If blasting is required for any reasons during the construction or operational stage of the proposed development, blast impacts should be demonstrated to be capable of complying with the guidelines contained in *Australian and New Zealand Environment Council - Technical basis for guidelines to minimise annoyance due to blasting overpressure and ground vibration* (ANZEC[1], 1990). http://www.environment.nsw.gov.au/noise/blasting.htm	**Section 11**
Industry 5. Operational noise from all industrial activities (including private haul roads and private railway lines) to be undertaken on the premises should be assessed using the guidelines contained in the *NSW Industrial Noise Policy* (EPA, 2000) and *Industrial Noise Policy Application Notes*. http://www.environment.nsw.gov./noise/industrial.htm	**Section 7 and Section 8**
Road 6. Noise on public roads from increased road traffic generated by land use developments should be assessed using the guidelines contained in the *Environmental Criteria for Road Traffic Noise* (EPA, 1999). http:/www.environment.nsw.gov.au/noise/traffic.htm	**Section 10**
7. Noise from new or upgraded public roads should be assessed using the *Environmental Criteria for Road Traffic Noise* (EPA, 1999). http://www.environment.nsw.gov.au/noise/traffic.htm	**N/A**
Railway 8. Noise from new or upgraded railways (other than railways on private premises) should be assessed using the *Interim Guideline for the Assessment of Noise from Rail Infrastructure Projects*[2] (DECC, 2007). http:/www/environment.nsw.gov.au/noise/railinfranoise.htm	**N/A**
9. Noise from increased rail traffic on the NSW Rail Network resulting from rail traffic generating development (e.g. an extractive industry) should be assessed using the environmental assessment requirements for rail traffic-generating developments available at http://www.environment.nsw.gov.au/noise/railnoise.htm	**Section 9**

Note 1: ANZEC = Australian and New Zealand Environment Council.

Note 2: *Interim Guideline for the Assessment of Noise from Rail Infrastructure Projects* = IGANRIP.

In addition to the above, TransGrid raised the potential effect of blast vibration on the 132 kilovolt (kV) power line in its agency comments. This issue is specifically addressed in **Section 11.1.7**.

1.3 Other Relevant Approved or Proposed Projects

Other relevant approved or proposed projects in the Gloucester Valley are summarised in **Table 3**.

Table 3 Other Relevant Approved or Proposed Projects in the Gloucester Valley

Proponent	Project	Status
AGL Gloucester LE Pty Ltd (AGL)	AGL Gloucester Gas Project	Project Approval dated 22 February 2011
Gloucester Resources Ltd (GRL)	Rocky Hill Coal Project	Application for DGRs and Supporting Documentation lodged with the DP&I February 2012
Duralie Coal Pty Ltd	Duralie Extension Project	Project Approval dated 26 November 2010 (and subsequently re-approved by the NSW Land and Environment Court on 10 November 2011)

The above projects are considered cumulatively for operational noise in this assessment (refer to **Section 8**). In addition, the rail noise assessment (refer to **Section 9**) includes potential Rocky Hill Coal Project product coal trains, whilst the road traffic noise assessment includes potential traffic associated with both the AGL Gloucester Gas Project and the Rocky Hill Coal Project.

2 EXISTING STRATFORD MINING COMPLEX

2.1 Overview

Mining of ROM coal at the Stratford Mining Complex involves conventional drill and blast, truck and shovel open cut extractive methods with on-site coal handling, washing and stockpiling. Mining operations are supported by existing on-site facilities including a CHPP, main infrastructure area, water management storages and rail loading and unloading infrastructure.

Currently, the Roseville West Pit and BRNOC are consented to operate during the hours (hrs) 0700 to 2200 and 0700 to 1900, respectively. Previous mining of the Stratford Main Pit occurred 24 hours a day.

ROM coal is delivered to the ROM pad via haul trucks and is then transferred into a loading hopper and conveyed to the CHPP for processing. In addition, sized ROM coal from the DCM is transported on the North Coast Railway to the Stratford Mining Complex for processing.

Coal products from the CHPP and bypass coal are conveyed to the product coal stockpiles and subsequent reclaim, and loaded onto trains for transport to domestic and export markets.

2.2 Existing Approvals

With respect to noise and blasting emissions, SCPL has consent to operate in accordance with the following approval requirements and licence conditions:

- SCM Development Consent (DA 23-98/99) dated 5 February 1999 (relevant sections attached as **Appendix A1**).
- BRNOC Development Consent (DA 39-02-01) dated 25 July 2001 (relevant sections attached as **Appendix A2**).

- Stratford Mining Complex Environmental Protection Licences (EPLs) 5161 and 11745.

In addition, NSW Work Cover Dangerous Goods Licences and/or Occupational Health and Safety legislation describe noise specifications for individual equipment, for health and safety purposes.

Whilst they are approved under separate Development Consents, mining activities at the SCM and BRNOC are effectively integrated. Consequently, mine operating noise, rail transportation noise and blast emissions from the simultaneous operation of the existing SCM and BRNOC (ie the Stratford Mining Complex) are assessed collectively.

The following properties have (unexercised) acquisition upon request rights in the existing SCM Development Consent DA 23-98/99 are as follows: 29 Ward; 31(1) Isaac; 40 Leslie Allenby Blanch; and the vacant land 32 Mcintosh & McIntosh and Cr 1 Wood.

2.3 Noise and Blasting Management

A Noise Management Plan for the Stratford Mine operations was prepared in September 1996 and an additional Noise Management Plan was prepared for the BRNOC Project in 2002. A Noise Consent and Management Plan (VIPAC, 2006) subsequently replaced these documents and was updated to include quarterly noise monitoring to conform to the NSW INP.

A new Noise Management Plan for the Stratford Mining Complex was prepared by SCPL and submitted to the Director-General of the DP&I in May 2011 for approval. This document was subsequently revised in March 2012 and describes the current monitoring regime for the SMC, which consists of eight quarterly attended monitoring sites and one real-time monitoring site (**Appendix B1**).

A Blast and Vibration Management Plan (*Bowens Road North Project Blasting Vibration Management Plan* [SCPL], 2002) was prepared for the BRNOC and addressed the management of blasts for the SCM and BRNOC. A revised Blasting/Vibration Management Plan for the Stratford Mining Complex was prepared by SCPL and submitted to the Director-General of the DP&I in May 2011 for approval.

Blasting is currently undertaken within the BRNOC and Roseville West Pits. The existing blast monitoring regime currently consists of five vibration and airblast monitoring locations (**Appendix B1**).

2.4 Noise and Blasting Compliance Monitoring Results

Based on the *Independent Environmental Audit Stratford Mine Complex* (Applied Environmental Management Consultants [AEMC], 2011) the following information is provided in relation to recent noise and blasting monitoring, management and compliance.

Quarterly noise monitoring surveys have been conducted in March, June, September, and December each year to assess compliance of the mine operations with approved noise limits. Attended monitoring (a component of the quarterly surveys) has been conducted at sites NM1 to NM8 (**Appendix B1**) during the period 2008 to 2011.

A review of 2008 to 2011 quarterly noise surveys indicated that the results were consistent with the July 2010 Development Consent Modification (DA 23-98/99) predictions and were compliant with the relevant noise limits with the exception of a single exceedance at site NM1 for the evening component of the March 2011 survey (AEMC, 2011). Enhanced noise levels attributable to the mine operations were reported during September 2010, January and June 2011 surveys, and were not deemed to exceed the relevant noise limits on the basis of the presence of temperature inversions and/or winds >3 metres per second (m/s) (AEMC, 2011).

The noise survey reports generally demonstrate compliance with the relevant noise limits. The noise complaints received between 2007 and 2011 have been generally from residents located close to the mine operations and related mainly to CHPP stockpile and dozer noise, and general mine noise. No request for property acquisition has been received from the complainants (AEMC, 2011).

Airblast (or blast overpressure) and ground vibration are monitored at five locations (**Appendix B1**) for each blast event at the Stratford Mining Complex.

No airblast results exceeding 120 linear decibels (dB(L)) were recorded at any privately owned properties during the period 2008 to 2011. One blast exceeded 115 dB(L) at the 31(1) Isaac residence on 23 March 2010 (119.6 dB(L)), and two blasts resulted in an air blast reading in excess of 115 dB(L) at the 13 (1) AGL (formerly Atkins) residence, equivalent to 4.7 percent (%) (2 of 43 blasts) of blasts exceeding 115 dB(L) for the period 2010 to 2011. All vibration results were less than 5 millimetres per second (mm/s) (with no blast vibration in excess of 10 mm/s), therefore conforming to limits specified in the relevant approvals (Condition Schedule 3 condition 9 of DA 23-98/99 and EPL 5161 condition L3.1 and L3.2).

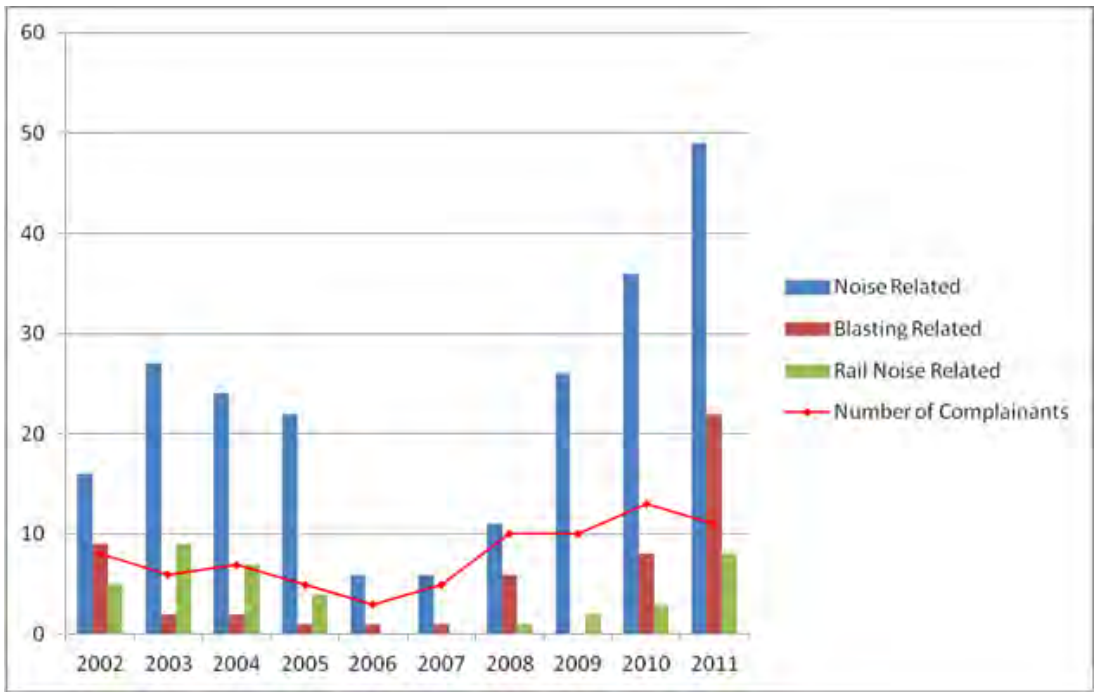
Accordingly, airblast and ground vibration monitoring has demonstrated that the Stratford Mining Complex blasting and vibration management is compliant with the regulatory criteria at the monitored sites (AMEC, 2011).

2.5 Noise and Blasting Complaints Summary

The numbers of complaints received relating to on-site operational noise, off-site rail noise and blasting are shown on **Figure 1**, along with the corresponding numbers of complainants. As shown in **Figure 1**, whilst the overall number of noise and blasting complaints has fluctuated during this period, ranging from approximately seven per year up to 79 per year, the overall number of complainants in any one year has remained relatively low, ranging from 3 to 13.

It is relevant to note that the property of a local resident responsible for approximately one third of all noise and blasting complaints lodged during the period 2002 to 2011 has recently been purchased by SCPL. This receiver is located off The Bucketts Way (**Appendix B1**).

Figure 1 Relevant Noise, Blasting and Rail Complaints 2002 to 2011



3 PROJECT

3.1 Approved and Proposed Hours of Operation

The operating hours for the approved Stratford Mining Complex and the proposed Project are summarised in **Table 4**.

Table 4 Approved Stratford Mining Complex and Project Hours of Operation

Phase	Approved Stratford Mining Complex		Proposed Project
	SCM	BRNOC	
Construction	Nominally 0700 hrs to 1800 hrs Monday to Friday 0800 hrs to 1300 hrs Saturday	Not applicable	0700 hrs to 1800 hrs Monday to Friday 0800 hrs to 1300 hrs Saturday
Mine Operation	24 hrs[1] 7 days per week	0700 hrs to 1900 hrs 7 days per week	Refer **Section 3.2**
Coal handling, processing and stockpiling	24 hrs 7 Days per week	N/A	As per SCM
On-site train loading	24 hrs 7 days per week	N/A	As per SCM
Off-site rail transportation	24 hrs 7 days per week	24 hrs 7 days per week	As per SCM
Blasting	0900 hrs to 1700 hrs Monday to Saturday	0900 hrs to 1700 hrs Monday to Saturday	As per SCM

Note 1: Roseville West Pit hours of operation 0700 hrs to 2200 hrs 7 days per week.

SCPL is currently seeking separate approval to extend the Duralie Shuttle Train paths to 0100 hrs (ie 0600 hrs to 0100 hrs). Accordingly, this report assesses unloading of coal from Duralie Shuttle Trains during day, evening and night-time periods.

In summary, Project mining operations would be conducted during the periods specified below:

- **BRNOC** - mining operations would only occur between 0700 hrs to 1900 hrs, seven days per week.
- **Roseville West Pit Extension** - mining operations would only occur between 0700 hrs to 1800 hrs, seven days per week.
- **Stratford East Open Cut (Years 1 to 5)** - mining operations would be conducted 24 hours per day, seven days per week, subject to compliance with noise limits. Fleet associated with the removal of overburden would generally only operate between the hours of 0700 hrs to 1800 hrs, seven days per week.
- **Stratford East Open Cut (Years 6 to 11)** - mining operations would be conducted 24 hours per day, seven days per week.
- **Avon North Open Cut** - mining operations would be conducted 24 hours per day, seven days per week.

Recovery of CHPP rejects by excavation from the western co-disposal area for re-processing would occur between 0700 hrs to 1800 hrs, seven days per week.

3.2 General Description

The general arrangement of the Project would utilise the existing infrastructure and service facilities at the Stratford Mining Complex. The main activities associated with the development of the Project would include:

- ROM coal production up to 2.6 Mtpa for an additional 11 years (commencing 1 July 2013 or upon grant of all required approvals), including mining operations associated with:
  - completion of the BRNOC;
  - extension of the existing Roseville West Pit; and
  - development of the new Avon North and Stratford East Open Cuts.
- Exploration activities.
- Progressive backfilling of mine voids with waste rock behind the advancing open cut mining operations.
- Continued and expanded placement of mine waste rock in the Stratford Waste Emplacement and Northern Waste Emplacement.
- Progressive development of new haul roads and internal road.
- Coal processing at the existing CHPP including Project ROM coal, sized ROM coal received and unloaded from the DCM and material recovered periodically from the western co-disposal area.
- Stockpiling and loading of product coal to trains for transport on the North Coast Railway to Newcastle.
- Disposal of CHPP rejects via pipeline to the existing co-disposal area in the Stratford Main Pit and, later in the Project life, the Avon North Open Cut void.
- Realignments of Wheatleys Lane, Bowens Road, and Wenham Cox/Bowens Road.
- Realignment of a 132 kV power line for the Stratford East Open Cut.
- Continued use of existing contained water storages/dams and progressive development of additional sediment dams, pumps, pipelines, irrigation infrastructure and other water management equipment and structures.
- Development of soil stockpiles, laydown areas and gravel/borrow areas, including minor modification and alterations to existing infrastructure as required.
- Monitoring and rehabilitation.
- All activities approved under DA 23-98/99 and DA 39-02-01.
- Other associated minor infrastructure, plant, equipment and activities, including minor modification and alterations to existing infrastructure as required.

Project general arrangements for end of Year 2, Year 7 and Year 10 are attached as **Appendices C1 to C3**, respectively. These general arrangements are based on planned maximum production and mine progression. The mining layout and sequence may vary to take account of localised geological features, coal market volume and quality requirements, mining economics and detailed Project engineering design.

In order to illustrate the temporal relationship between the Stratford Mining Complex and the Project, the approved Stratford Mining Complex and proposed Project provisional development schedule is presented in **Table 5**.

Table 5 Approved Stratford Mining Complex and Project Provisional Development Schedule

Year End	SCM[3]				BRNOC[3]	Coal Processing/Handling
	Main Pit	RWP[1]	ANOC[1]	SEOC[1]		
June 2001	7	-	-	-	0	SCM coal
June 2002	8	-	-	-	1	SCM and BRNOC coal
June 2003	9	-	-	-	2	SCM, BRNOC and DCM coal
June 2004	Closed	-	-	-	3	
June 2005	-	-	-	-	4	
June 2006	-	-	-	-	5	
June 2007	-	0	-	-	6	
June 2008	-	1	-	-	7	
June 2009	-	2	-	-	8	
June 2010	-	3	-	-	9	
June 2011	10[2]	4	-	-	10	
June 2012	11[2]	5	-	-	11	
June 2013	12[2]	6	0	0	12	
June 2014	13[2]	7	1	1	13	Project and DCM coal
June 2015	14[2]	8	2	2	-	
June 2016	15[2]	9	3	3	-	
June 2017	16[2]	10	4	4	-	
June 2018	17[2]	11	5	5	-	
June 2019	18[2]	12	Closed	6	-	Project only
June 2020	19[2]	13	-	7	-	
June 2021	20[2]	14	-	8	13[2]	
June 2022	21[2]	15	-	9	14[2]	
June 2023	22[2]	16	-	10	15[2]	
June 2024	Closed	Closed	-	Closed	Closed	

Note 1: RWP - Roseville West Pit, ANOC - Avon North Open Cut, SEOC - Stratford East Open Cut.
Note 2: Backfill of waste rock only ie no mining operations in these years.
Note 3: Column integers refer to the relevant year of development.

3.3 Construction/Development

Construction/development works are generally limited, but would include the following:

- Public road realignments of sections of Wheatleys Lane, Bowens Road, and Wenham Cox/Bowens Road (**Appendix B2**).
- On-site relocation of a 132 kV power line (**Appendix B2**).
- On-site installation of a new rotary breaker in the CHPP (**Appendix C4**).
- On-site noise management infrastructure upgrades and haul road bunding.
- Realignment of a NSW Rural Fire Service fire trail.
- Relocation of a Telstra phone line.

On-site construction-related activities would generally be restricted to daylight hours (ie 0700 hrs to 1800 hrs) up to seven days a week.

The public road realignments include the construction of:

- A 400 metre (m) sealed two-lane road realignment of Wheatleys Lane and Bowens Road around the western extent of the proposed Roseville West Pit Extension and upslope diversion.
- A 1.7 km sealed two-lane road realignment of Wenham Cox/Bowens Road around the north-eastern extent of the proposed Northern Waste Emplacement Extension and Avon North Open Cut.

The public road realignments would be discrete, short-term activities located beyond the open-cut perimeters. The work would be undertaken by a construction contractor and in consultation with Gloucester Shire Council. It would involve a relatively modest bulk earthworks fleet and is anticipated to take up to approximately 12 weeks.

The initial bulk earthworks phase would involve typical construction mobile equipment with topsoil removal with a D6 or similar dozer, removal of unsuitable material, placement of subgrade and final grade with a 30 tonne (t) excavator, two to three articulated trucks and a grader. Water carts and compactors would be used throughout construction. Subsequent to the bulk earthworks phase, bitumen seals would be formed by specialised contract equipment (ie bitumen truck and road base truck).

3.4 On-site Blasting

The method of material fragmentation at the Stratford Mining Complex is by drill and blasting techniques as well as dozer ripping. Waste rock would typically be drilled in a 6 m by 6 m pattern in 20 m benches. A mixture of ammonium nitrate and fuel oil (ANFO) (dry holes) and emulsion blends (wet holes) would be used at an average powder factor of approximately 0.8 kilograms per bank cubic metre (bcm). Blast sizes would generally remain unchanged by the Project and typically range from 50,000 bcm up to 250,000 bcm.

Blasting would occur between 0900 hrs and 1700 hrs, six days per week (excluding public holidays or Sundays). While only one blast per day would continue to occur on the site (unless an additional blast is required following a misfire), the Project would require up to five blasts per week on average over any 12 month period (ie two additional blasts per week).

3.5 Off-site Rail Transport

Up to approximately 3.3 Mtpa of coal products (including saleable thermal and coking coal) are currently approved for the Stratford Mining Complex. The existing capacity of the product coal stockpiles is approximately 400,000 t. Product coal is reclaimed to the existing rail loading conveyor and bin adjacent to the rail loop. Product coal is transported to domestic and export markets via the North Coast Railway to Newcastle. The Project maximum product coal production rate is 3.5 Mtpa.

An average of two and half product coal train movements per day (with a peak of five movements per day) is currently approved at the Stratford Mining Complex. The proposed Project would not alter the average of two and half coal train movements per day however the number of peak movements would increase from five to six per day.

Sized ROM coal from the DCM is transported on the Duralie Shuttle Train along the North Coast Railway to the Stratford Mining Complex. ROM coal is unloaded from trains at the rail unloading bin and conveyed to the ROM stacker for subsequent reclaim from the ROM pad to the CHPP. Rail loading and transport services are provided by a rail contractor who operates the shuttle and co-ordinates all loading, unloading and shuttle train movements. All train movements on the North Coast Railway are co-ordinated with the Australian Rail Track Corporation (ARTC).

3.6 Off-site Road Transport

The existing mine access road off The Bucketts Way would remain as the primary site access. The Stratford Mining Complex has an existing operational workforce of approximately 125 employees, including SCPL staff and contractors. At full development, the Project operational workforce increases to approximately 250 on-site personnel.

The Project shift arrangements at the Stratford Mining Complex are presented in **Table 6** which would be augmented to allow 24 hour mining of Avon North Open Cut and Stratford East Open Cut. During the life of the Project, alternative shift configurations may be required to meet operational requirements.

Table 6 Project Provisional Shift Schedule

Phase	Daytime	Night-time
Construction	0700 hrs to 1800 hrs	-
Mining Operations	0630 hrs to 1730 hrs	1830 hrs to 0400 hrs
CHPP	0700 hrs to 1900 hrs	1900 hrs to 0700 hrs
Administration	0700 hrs to 1630 hrs	-

Source: *Stratford Extension Project Road Transport Assessment* (Halcrow, 2012).

The additional personnel would result in additional light vehicle movements on the local road network. In addition, the Project would include an increase in the number of deliveries of materials and consumables associated with the increased level of activity at the Stratford Mining Complex during the life of the Project (Halcrow, 2012).

3.7 Project Site and Land Ownership

The Land Ownership Plans (**Appendix B1**) identify the nearest receivers. The Project Site General Arrangement Plan (**Appendix B2**), project interactions figure (**Appendix B3**), and *Gloucester Local Environment Plan 2010* (Gloucester LEP) (**Appendix B4**) are attached. The Project General Arrangement Plan (**Appendix B2**) shows the location of the key features of the Project. The project interactions figure (**Appendix B3**) shows the locations of the AGL Gloucester Gas Project and proposed Rocky Hill Coal Project, whilst the Gloucester LEP (**Appendix B4**) shows the land use zones in the vicinity of the Project. **Appendix B5** presents a list of property identification numbers, landowners and dwelling co-ordinates.

4 EXISTING METEOROLOGICAL AND NOISE ENVIRONMENT

4.1 Meteorological Environment

Section 5.3 of the INP (EPA, 2000) provides the following regarding wind effects:

> *Wind effects need to be assessed where wind is a feature of the area. Wind is considered to be a feature where source to receiver wind speeds (at 10 m height) of 3 m/s or below occur for 30 percent of the time or more in any assessment period in any season.*

An assessment of prevailing wind conditions was derived from the meteorological data recorded by SCM Automatic Weather Station (AWS). The seasonal wind speeds and directions over the 12 month period (to the end of October 2011) were analysed in accordance with a methodology consistent with the requirements of the INP.

Based on this analysis, the prevailing winds less than (or equal to) 3 m/s with a frequency of occurrence greater than (or equal to) 30% and considered to be relevant to the Stratford Mining Complex in accordance with the INP, are presented in **Table 7**.

Table 7 Prevailing Wind Conditions in Accordance with the INP

Season	Winds ±45 degrees 3 m/s with Frequency of Occurrence 30%		
	Daytime	**Evening**	**Night-Time**
Annual	Nil	Nil	N (40%), NNE (36%), NNW (33%)
Summer	Nil	NNE (30%)	N (40%), NNE (36%), NNW (34%)
Autumn	Nil	SSW (32%)	N (40%), NNE (38%), NNW (33%)
Winter	Nil	Nil	N (30%)
Spring	Nil	N (37%), NNE (35%), NNW (30%)	N (50%), NNE (46%), NE (32%), NNW (42%)

Section 5.2 of the INP (EPA, 2000) provides the following regarding temperature inversions:

> *Where inversion conditions are predicted for at least 30% (or approximately two nights per week) of total night-time in winter, then inversion effects are considered to be significant and should be taken into account in the noise assessment.*

An assessment of atmospheric stability conditions has also been prepared from the meteorological data recorded by the SCM AWS. The frequency of occurrence of atmospheric stability classes are presented in **Table 8**, together with estimated Environmental Lapse Rates (ELR).

Table 8 Atmospheric Stability Frequency of Occurrence - Winter Evening and Night-Time

Stability Class	Frequency of Occurrence					Estimated ELR ^{o}C/100 m	Qualitative Description
	Annual	**Summer**	**Autumn**	**Winter**	**Spring**		
A	0	0	0	0	0	<-1.9	Lapse
B	0	0	0	0	0	-1.9 to -1.7	Lapse
C	0	0	0	0	0	-1.7 to -1.5	Lapse
D	46%	49%	37%	54%	44%	-1.5 to -0.5	Neutral
E	14%	15%	16%	11%	16%	-0.5 to 1.5	Weak inversion
F	30%	27%	32%	29%	31%	1.5 to 4	Moderate inversion
G	10%	10%	15%	6%	9%	>4.0	Strong inversion

^{O}C = degrees Celsius.

In accordance with the INP, the frequency of occurrence of moderate to strong (ie 1.5 to >4.0^{o}C/100 m inclusive) temperature inversions is greater than 30% during winter in the combined evening and night-time period, and therefore is included for assessment. Consequently, consistent with the INP, temperature inversions are assessable during night-time operations (refer to INP extract below [EPA, 2000]):

> *Assessment of impacts is confined to the night noise assessment period (10 pm to 7 am), as this is the time likely to have the greatest impact—that is, when temperature inversions usually occur and disturbance to sleep is possible.*

The noise modelling meteorological parameters presented in **Table 9** are based on analysis of the available SCM meteorological data set. In this case, the observed meteorological conditions at the Project site are generally consistent with the default parameters presented in the Section 5 of the INP.

Table 9 Calm (Neutral) and Noise Enhancing Meteorological Modelling Parameters

Period	Meteorological Parameter	Air Temperature	Relative Humidity	Wind Velocity	Temperature Gradient
Daytime	Calm	18°C	60%	0 m/s	0°C/100 m
Evening	Calm	14°C	70%	0 m/s	0°C/100 m
	Wind only	14°C	70%	NNW 3m/s, N 3m/s, NNE 3 m/s, SSW 3m/s,	0°C/100 m
Night-time	Calm	10°C	90%	0 m/s	0°C/100 m
	Wind only	10°C	90%	NNW 3 m/s , N 3 m/s, NNE 3 m/s, NE 3 m/s,	0°C/100 m
	Temperature Inversion only	10°C	90%	0 m/s	3°C/100 m
	Inversion plus Drainage flow	10°C	90%	NNW 2 m/s, N 2 m/s, NNE 2 m/s, NE 2 m/s,	3°C/100 m

The prevailing evening weather conditions are characterised by north-northeast and south-southeast cross flow wind patterns. At night-time temperature inversions are a feature of the area, coinciding with north-northwest to northeast drainage flow.

4.2 Noise Environment

Given the existing Stratford Mining Complex operations, it is appropriate to review the pre-mining background noise data (from the SCM in 1994 and the BRNOC in 2000) to determine the relevant Rating Background Levels (RBLs) and noise amenity levels ($L_{Aeq(period)}$) in accordance with the INP procedures. In addition, supplementary ambient noise monitoring was conducted in November 2007 coinciding with SCM operations. Targeted noise measurements of existing rail and road traffic were also conducted in May 2011.

Stratford Coal Mine June 1994

Ambient noise surveys to characterise and quantify the existing acoustical environment in the area surrounding the existing SCM were conducted in June and July 1994. The four unattended noise loggers were positioned at the 13 (1) AGL (formerly Atkins), 19 (7) SCPL (formerly Van Der Drift), 31 (1) Isaac and 42 D Blanch properties (**Appendix B1**) commencing Friday 24 June 1994 for a period of up to 11 days.

The measurement methodology and analysis procedures are described in Richard Heggie Associates Pty Ltd Report 4734-R1 "*Stratford Coal Project - Noise and Blast Impact Assessment*" dated 22 July 1994. The unattended ambient noise logger data from each monitoring location together with the on-site weather conditions are presented graphically on a daily basis in Attachments I, J, K and L of the *Bowens Road North Project Operating and Transportation Noise and Blasting Impact Assessment* (Richard Heggie Associates Pty Ltd, 2001). The ambient noise data have been subsequently processed in accordance with the requirements of the INP to determine the background noise levels as shown in **Table 10**.

Table 10 Background Noise Environment June 1994 (dBA re 20 µPa)

ID	Landholder	RBL			LAeq(period) All Noise Sources			LAeq(period) Industrial Noise Only		
		Daytime	Evening	Night	Daytime	Evening	Night	Daytime	Evening	Night
13(1)	AGL (formerly Atkins)	31	31	30	53	43	39	<44	<39	<34
19(7)	SCPL (formerly Van Der Drift)	31	31	31	45	45	40	<44	<39	<34
31(1)	Isaac	33	31	30	53	53	50	<44	<39	<34
42	Blanch	31	30	30	51	47	45	<44	<39	<34

Source: Richard Heggie Associates Pty Ltd (1994).
Note 1: Daytime 0700 hrs to 1900 hrs, Evening 1900 hrs to 2200 hrs and Night-time 2200 hrs to 0700 hrs.
Note 2: dBA = A-weighted decibels.
Note 3: µPa = micro Pascals.

Bowens Road North Open Cut November 2000

Ambient noise surveys to characterise and quantify the existing acoustical environment in the area surrounding the SCM were conducted in November 2000 for the proposed BRNOC operations (Richard Heggie Associates Pty Ltd, 2001). Three unattended noise loggers were positioned at the 9 (2) Williams, 19 (33) SCPL (formerly Ellis) and 7 Burrell (formerly Morgan) properties (**Appendix B1**) for periods of up to 14 days.

The measurement methodology and analysis procedures are described in Attachment E of the BRNOC Noise and Blast Impact Assessment. The unattended ambient noise logger data from each monitoring location, together with the on-site weather conditions are presented graphically on a daily basis in Attachments F, G and H of the BRNOC Noise and Blast Impact Assessment. The ambient noise data have been subsequently processed in accordance with the requirements of the INP to determine the ambient noise levels as shown in **Table 11**.

Table 11 Ambient Noise Environment November 2000 (dBA re 20 µPa)

ID	Landholder	RBL[1]			LAeq(period) All Noise Sources[2]			LAeq(period) Industrial Noise Only[2]		
		Daytime	Evening	Night	Daytime	Evening	Night	Daytime	Evening	Night
9(2)	Williams	30	38	33	45	57	50	<44	<39	<34
19(33)	SCPL (formerly Ellis)	29	39	32	56	52	44	<44	<39	<34
7	Burrell (formerly Morgan)	29	42	35	49	57	55	<44	<39	<34

Source: Richard Heggie Associates Pty Ltd (2001).
Note 1: In accordance with the NSW INP (EPA, 2000), if the RBL is below 30 dBA, then 30 dBA shall be the assumed RBL.
Note 2: Daytime 0700 hrs to 1900 hrs, Evening 1900 hrs to 2200 hrs and Night-time 2200 hrs to 0700 hrs.

The measured evening RBLs included the seasonal effects of insect noise (Richard Heggie Associates Pty Ltd, 2001). Whilst the existing SCM was occasionally audible at some properties located north of the BRNOC (under particular weather conditions), the $L_{Aeq(period)}$ amenity contribution remained low during the daytime, evening and night-time periods.

Project Ambient Noise November 2007

Supplementary noise surveys to quantify ambient noise levels (ie all noise sources) and to estimate industrial noise only (ie in the absence of transport, natural and domestic noise) were conducted in November 2007. Three unattended noise loggers were positioned at 19(1) SCPL, 53 Barnes and 68 Lyford properties (**Appendix B1**) for periods of up to 14 days.

In order to supplement the unattended logger and to assist in identifying the character and duration of the noise sources, operator-attended daytime, evening, and night-time measurements were also conducted in the vicinity of the logging locations. The measurement methodology and analysis procedures are described in **Appendix D**. The operator-attended measurement results are summarised in **Table 12**.

Table 12 Operator-Attended Noise Survey Results 2007 (dBA re 20 µPa)

ID	Landholder	Measured $L_{A90(15minute)}$ All Noise Sources			Estimated $L_{Aeq(15minute)}$ Industrial Noise Only		
		Day	Evening	Night	Day	Evening	Night
19(1)	SCPL	35	39	39	<44	35	<34
53	Barnes	36	31	51	<44	<39	<34
68	Lyford	33	43	35	<44	<39	<34

Note 1: Daytime 0700 hrs to 1800 hrs, Evening 1800 hrs to 2200 hrs and Night-time 2200 hrs to 0700 hrs.

The unattended ambient noise logger data from each monitoring location and the on-site weather conditions were analysed on a daily basis and presented graphically as statistical 24 hour ambient noise profiles in **Appendices E1 to E3**. The ambient noise data were then processed in accordance with the requirements of the INP to derive the ambient noise levels presented in **Table 13**.

Table 13 Unattended Noise Monitoring Results 2007 (dBA re 20 µPa)

ID	Landholder	Measured RBL All Noise Sources			Measured $L_{Aeq(period)}$[1] All Noise Sources			Estimated $L_{Aeq(period)}$[1] Industrial Noise Only		
		Day	Evening	Night	Day	Evening	Night	Day	Evening	Night
19(1)	SCPL	33	35	34	53	52	50	<44	<39	<34
53	Barnes	33	36	35	46	50	46	<44	<39	<34
68	Lyford	34	37	36	48	52	50	<44	<39	<34

Note 1: Daytime 0700 hrs to 1800 hrs, Evening 1800 hrs to 2200 hrs and Night-time 2200 hrs to 0700 hrs.

During the monitoring period, existing SCM noise was measurable and/or audible at some locations; however the INP data analysis procedure tends to minimise the potential for low level intrusive mine noise to influence resultant RBLs. Moreover, insect noise was common and likely to be a regular seasonal feature of the noise environment, particularly in the warmer months. As demonstrated by the June 1994 dataset (ie in the absence of the SCM), cooler season background noise levels with minimal influence from fauna noise are approximately 33 dBA to 30 dBA. These cooler season noise levels were used for establishing RBLs.

Background Noise and Amenity Levels for Project Assessment Purposes

For the purposes of assessing the potential noise impacts from the proposed Project, the ambient noise level data have been previously distilled into two general localities namely:

- Stratford/Craven - including all privately owned residential dwellings within Stratford and Craven as shown the Land Ownership Plan attached as **Appendix B1**.
- Other Rural - including all privately owned residential dwellings beyond the Stratford and Craven (as defined above).

On the basis of the two localities and the measured noise levels presented in **Table 10** and **Table 11**, the representative background noise levels are presented in **Table 14**.

Table 14 Background Noise Environment for Assessment Purposes (dBA re 20 µPa)

Locality	RBL			$L_{Aeq(period)}$ All Noise Sources			$L_{Aeq(period)}$ Industrial Noise Only		
	Daytime	Evening	Night	Daytime	Evening	Night	Daytime	Evening	Night
Stratford/Craven Residential[1]	32	31	30	50	48	45	<44	<39	<34
Other Rural[2]	30	30	30	49	48	44	<44	<39	<34

Note 1: Derived from noise measurements at 19(1) SCPL, 31(1) Isaac and 42 Blanch.
Note 2: Derived from noise measurements at 13(1) AGL, 9(2) Williams, 19(1) SCPL and 7 Burrell adjusted for the seasonal effects from insect noise.

The background noise levels adopted for assessment purposes are generally representative of the pre-mine noise environment, with RBLs ranging from 32 dBA to 30 dBA during the daytime, evening and night-time with negligible industrial noise contributions. These RBLs are consistent with those established in the BRNOC EIS (Richard Heggie Associates Pty Ltd, 2001).

The established background noise levels presented in **Table 14** are consistent with the two localities of Stratford/Craven and Other Rural as presented in both the SCM and BRNOC Development Consent Conditions. In particular, the consented noise acquisition criteria (ie SCM Condition 3 refer **Appendix A1**, and BRNOC Condition 6.4B refer **Appendix A2**) are based on the two localities and the established RBLs presented in **Table 14**. In addition, noise limits in the existing Stratford Mining Complex EPLs (Numbers 5161 and 11745) are generally consistent with these RBLs.

4.3 Rail Traffic Noise

Duralie Extension Project 2007

A rail traffic noise survey was conducted in November 2007 for the Duralie Extension Project. One unattended noise logger was positioned adjacent to the North Coast Railway to quantify the near-field rail traffic noise for a period of up to 8 days. The measurement methodology and analysis procedures are described in Attachment D of the *Duralie Extension Project Noise and Blast Impact Assessment* (Heggies Pty Ltd, 2010). The unattended noise logger data and the on-site weather conditions were analysed on a period basis and are presented graphically as statistical 24 hour ambient noise profiles in Attachment E5 of Heggies Pty Ltd (2010).

The rail traffic noise data were then analysed to derive the daytime/evening $L_{Aeq(15hour)}$, night-time $L_{Aeq(9hour)}$ and maximum pass-by noise levels as presented in **Table 15**.

Table 15 Unattended Rail Traffic Noise Monitoring Results - November 2007 (dBA re 20 µPa)

Free Field Offset[1]	Train Type	Pass-by Intrusive $L_{Aeq(15minute)}$	Pass-by Average Maximum	Pass-by 5% Exceedance Maximum	Daytime/ evening $L_{Aeq(15hour)}$	Night-time $L_{Aeq(9hour)}$	24 Hour $L_{Aeq(24hour)}$
14 m	Passenger	65	90	96	64 dBA (123 pass-bys over approx. 8 periods; or mean 15 pass-bys per period)	57 dBA (31 pass-bys over approx. 8 periods; or mean 4 pass-bys per period)	63 dBA (154 pass-bys over approx. 8 days; or mean 19 pass-bys per day)
14 m	Freight	68	92	97			
14 m	DCM[2]	69	95	101			
14 m	SCM[3]	67	92	96			

Note 1: 14 m off-set from rail centre or approximately 12 m off-set from near side of train as per Heggies Pty Ltd (2010).
Note 2: DCM trains including locomotive type QR National 423 Class (1,120 kilowatt [kW], built 1967/69).
Note 3: SCM trains including locomotive type Pacific National 82 Class (2,260 kW, built 1994/95).

The intrusive and maximum (ie average and 5% exceedance) pass-by noise measurement results indicated a moderate range from the four train types, which is well within the expected variation for railway traffic. It was noted that the DCM shuttle coal train had higher intrusive and maximum noise levels by comparison with other trains on the North Coast railway between the DCM and the SCM at that time.

Stratford Extension Project 2011

A rail traffic noise survey was conducted in May 2011 to quantify the near-field rail traffic noise at Craven Station adjacent to the North Coast Railway. The measurement methodology and analysis procedures are described in **Appendix D**. The unattended noise logger data and the on-site weather conditions were analysed on a daily basis and are presented graphically as statistical 24 hour ambient noise profiles in **Appendices E4**. The rail traffic noise data were then analysed to derive the daytime/evening $L_{Aeq(15hour)}$, night-time $L_{Aeq(9hour)}$ and maximum pass-by noise levels as presented in **Table 16**.

Table 16 Unattended Rail Traffic Noise Monitoring Results - May 2011 (dBA re 20 µPa)

Free Field Offset	Train Type	Pass-by Intrusive $L_{Aeq(15minute)}$	Pass-by Average Maximum	Pass-by 5% Exceedance Maximum	Daytime/ evening $L_{Aeq(15hour)}$	Night-time $L_{Aeq(9hour)}$	24 Hour $L_{Aeq(24hour)}$
45 m	Passenger	56	76	77	56 dBA (16 pass-bys over approx. 1 period)	49 dBA (3 pass-bys over approx. 1 period)	55 dBA (19 pass-bys over approx. 1 day)
45 m	Freight	61	79	83			
45 m	DCM[1]	58	77	80			
45 m	SCM[2]	58	73	74			

Note 1: DCM trains including locomotive type QR National 423 Class (1,120 kW, built 1967/69).

Note 2: SCM trains including locomotive type Pacific National 82 Class (2,260 kW, built 1994/95).

Duralie Modification 2012

A further rail traffic noise survey was conducted in March 2012. The rail traffic noise data were subsequently analysed to derive the $L_{Aeq(15minute)}$ and maximum pass-by noise levels as presented in **Table 17**.

Table 17 Unattended Rail Traffic Noise Monitoring Results - March 2012 (dBA re 20 µPa)

Free Field Offset	Train Type	Pass-by Intrusive $L_{Aeq(15minute)}$	Pass-by Average Maximum	Pass-by 5% Exceedance Maximum	Daytime/ evening $L_{Aeq(15hour)}$	Night-time $L_{Aeq(9hour)}$	24 Hour $L_{Aeq(24hour)}$
15 m	Passenger	62	84	86	61 dBA (59 pass-bys over approx. 3 periods; or mean 18 pass-bys per period)	55 dBA (10 pass-bys over approx. 3 periods; or mean 3 pass-bys per period)	59 dBA (69 pass-bys over approx. 3 periods; or mean 21 pass-bys per period)
15 m	Freight	67	90	96			
15 m	DCM[1]	67	89	92			
15 m	SCM[2]	68	90	96			

Note 1: DCM trains including locomotive type GL Class (2,380 kW, built 2003/04) (or equivalent).

Note 2: SCM trains including locomotive type Pacific National 82 Class (2,260 kW, built 1994/95).

The rail traffic noise survey conducted in November 2007 recorded the former Duralie shuttle train pass-by intrusive ($L_{Aeq(15minute)}$) level of 69 dBA and maximum (5% exceedance) level of 101 dBA (at a distance of 14 m). Following the introduction of GL Class (2,380 kW, built 2003/04) locomotives (or equivalent) and associated Bradken wagons, the rail traffic noise survey conducted in March 2012 recorded the Duralie shuttle train pass-by intrusive ($L_{Aeq(15minute)}$) level of 67 dBA and maximum (5% exceedance) level of 92 dBA (at a distance of 15 m).

As anticipated in Heggies Pty Ltd (2010), it is apparent that the new Duralie shuttle train is approximately 2 dBA quieter by comparison with the former shuttle train with maximum noise level reductions of up to 9 dBA being subject to local track and train operating conditions in the vicinity of the receiver.

Further discussion on rail noise is provided in **Section 9**.

4.4 Road Traffic Noise

A road traffic noise survey was conducted in May 2011 to quantify the near-field road traffic noise adjacent to The Bucketts Way. The measurement methodology and analysis procedures are described in **Appendix D**. The unattended noise logger data and the on-site weather conditions were analysed on a daily basis and are presented in **Table 18** and graphically as statistical 24 hour ambient noise profiles in **Appendices E5 to E6**.

Table 18 Unattended Road Traffic Noise Monitoring Results - May 2011 (dBA re 20 µPa)

Location	Position[1]	Leq(15hour)	Leq(9hour)
North of Mine Access Road	21 m from centre of The Bucketts Way	61	55
South of Mine Access Road	10 m from centre of The Bucketts Way	63	57

Note 1: Free field offset distance.

Further discussion of existing traffic noise measurements is provided in **Section 10.2**.

5 NOISE ASSESSMENT CRITERIA

5.1 Project Construction Assessment Criteria

As discussed in **Section 3.3**, the construction of public road realignments (Wheatleys Lane and Bowens Road and Wenham Cox/Bowens Roads) would involve bulk earthworks and the EPA's ICNG has been used for this assessment. The use of the ICNG is considered appropriate as the public road realignments are a discrete, short-term activity located beyond the open-cut perimeters. The work would be undertaken by a construction contractor and in consultation with Gloucester Shire Council. It would involve a relatively modest bulk earthworks fleet and is anticipated to take up to approximately 12 weeks).

The ICNG recommends a construction noise management level (CNML) equivalent to the daytime RBL plus 10 dBA within standard hours (ie daytime) and RBL plus 5 dBA outside standard hours (ie evening and night-time). The ICNG also contains "highly noise affected" daytime CNMLs which are set at 75 dBA $L_{Aeq(15minute)}$. As the road realignment works would be limited to daytime only, the ICNG construction noise management levels are as presented in **Table 19**.

Table 19 Intrusive $L_{Aeq(15minute)}$ Construction Noise Management Levels (dBA re 20 µPa)

Locality	Daytime CNML (noise affected) RBL plus 10 dBA	Daytime CNML (highly noise affected)
Stratford/Craven	42	75
Other Rural	40	75

Note 1: Daytime 0700 hrs to 1800 hrs, Evening 1800 hrs to 2200 hrs and Night-time 2200 hrs to 0700 hrs.
Note 2: Refer to **Table 14**.

5.2 Project Operating Assessment Criteria

The EPA has regulatory responsibility for the control of noise from "scheduled premises" under the *Protection of the Environment Operations Act, 1997*. In implementing the INP, the EPA has two broad objectives:

- Controlling intrusive noise levels in the short-term; and
- Maintaining noise amenity levels for particular land uses over the medium to long-term.

The INP prescribes detailed calculation routines for establishing Project-specific Noise Levels (PSNLs) (ie $L_{Aeq(15minute)}$ intrusive criteria and $L_{Aeq(period)}$ amenity criteria) at potentially affected receivers for an industrial development. Ideally, the intrusive noise level should not exceed the background level by more than 5 dBA. Similarly, the noise amenity level should not exceed the specified INP "acceptable" or "maximum" noise level appropriate for the particular land use. The applicable acceptable and maximum noise amenity levels for receivers in the vicinity of the Project site are shown in **Table 20**.

Table 20 INP Acceptable and Maximum Noise Amenity Levels (dBA re 20 µPa)

Locality	Gloucester LEP Zone	INP Noise Amenity Zone	Amenity $L_{Aeq(period)}$[1] Acceptable			Amenity $L_{Aeq(period)}$[1] Maximum		
			Day	Evening	Night	Day	Evening	Night
Stratford	Village	Rural Residential	50	45	40	55	50	45
Craven	Primary Production							
Other Rural	Primary Production	Rural Residential	50	45	40	55	50	45
Parkers Road	Heavy Industry	Industrial	70	70	70	75	75	75
Any	-	School[2]	External 45 when in use			External 50 when in use		
Any	Special Activities (Cemetery)	Church[2], Cemetery[2]	External 50 when in use			External 55 when in use		
Any	Public Recreation	Active Recreation	External 55 when in use			External 60 when in use		

Note 1: Daytime 0700 hrs to 1800 hrs, Evening 1800 hrs to 2200 hrs, Night-time 2200 hrs to 0700 hrs.

Note 2: External criteria equivalent to internal criteria plus 10 dBA.

In accordance with the INP's Chapter 2 Industrial Noise Criteria and associated Application Notes (9 June 2011), the PSNLs for the residential, industrial and other localities in the vicinity of the Project are presented in **Table 21** for both intrusive noise and amenity. These criteria are nominated for the purposes of assessing potential noise impacts from the Project.

Appendix B4 shows the Gloucester LEP land use zones in the vicinity of the Project. As shown on **Appendix B4**, land use is dominated by the General Rural zone. In addition, Stratford is zoned village, and there are areas of Public Recreation (parkland and sporting facilities) and Special Activities (Stratford cemetery) to the south of Stratford. Further south, there is a Heavy Industrial area off Parkers Road, and an Environmental Management zone on the fringe of the Heavy Industrial area.

In order to facilitate assessment of these zones, the Public Recreation area is assessed under the INP active recreation criteria, the Special Activities area is assessed under the INP place of worship criteria, and the Heavy Industrial area is assessed under the INP industrial criteria. The Environmental Management zone is not specifically assessed as there is no evidence of passive recreational use of this area (e.g. it is adjacent to The Bucketts Way and the North Coast Railway).

Table 21 Project-specific Noise Levels and Assessment Criteria (dBA re 20 µPa)

Locality	Land Use	Intrusive $L_{Aeq(15minute)}$[1]			Amenity $L_{Aeq(period)}$[1]		
		Day	Evening	Night	Day	Evening	Night
Stratford/Craven	Village Residential[2]	37	36	35	50	45	40
	Village Vacant Land[3]						
Other Rural	Rural Residential[2]	35	35	35	50	45	40
	Rural Vacant Land[3]						
Parkers Road	Industrial	Intrusive noise criteria not applicable			70	70	70
Any	School[4]	Intrusive noise criteria not applicable			External 45 when in use		
Any	Church[4], Cemetery[4]	Intrusive noise criteria not applicable			External 50 when in use		
Any	Active Recreation	Intrusive noise criteria not applicable			External 55 when in use		

Note 1: Daytime 0700 hrs to 1800 hrs, Evening 1800 hrs to 2200 hrs, Night-time 2200 hrs to 0700 hrs.
Note 2: At the most-affected point within 30 m of the residential area.
Note 3: Where exceedances are predicted over 25% of the vacant land area.
Note 4: External criteria equivalent to internal criteria plus 10 dBA.

The village and rural amenity criteria nominated in **Table 21** are reflective of the general rural area following review of the Gloucester LEP (refer **Appendix B4**). The intrusiveness criterion is met if the $L_{Aeq(15minute)}$ is less than or equal to the RBL plus 5 dBA, where the RBL is determined from monitoring data following the INP procedures discussed in **Section 4.2**. Thus, the most stringent PSNLs for the Project at residential receivers would be the $L_{Aeq(15minute)}$ intrusiveness criterion.

The INP states that the PSNLs are based on preserving the amenity of at least 90% of the population living in the vicinity of industrial noise sources from the adverse effects of noise for at least 90% of the time. Provided the PSNLs are achieved, then most people would consider the resultant noise levels acceptable. In those cases where the PSNLs are not achieved, it does not automatically follow that all people exposed to the noise would find the noise unacceptable. In subjective terms, exceedances of the PSNLs can be described as follows:

- Negligible noise level increase <1 dBA - not noticeable by all people.
- Marginal noise level increase 1 dBA to 2 dBA - not noticeable by most people.
- Moderate noise level increase 3 dBA to 5 dBA - not noticeable by some people but may be noticeable by others.
- Appreciable noise level increase >5 dBA - noticeable by most people.

5.3 Project Sleep Disturbance Assessment Criteria

The EPA's INP Application Notes dated 9 June 2011 (refer **Appendix F**) recognise that the current $L_{A1(1minute)}$ sleep disturbance criterion of 15 dBA above the prevailing $L_{A90(15minute)}$ level is not ideal. The assessment of potential sleep disturbance is complex and not fully understood; however the EPA believes that there is insufficient information to determine a suitable alternative criterion.

The *Environmental Criteria for Road Traffic Noise* (EPA, 1999) (Appendix B Technical Background to Road Traffic Noise Criteria) contains a comprehensive review of research into to sleep disturbance and traffic noise. The review has been more recently updated in The NSW Road Noise Policy (OEH, 2011) (**Section 5.3** Sleep Disturbance) however the EPA's conclusion remains unchanged as follows:

(i) maximum *internal* noise levels below 50 to 55 dBA are unlikely to cause awakening reactions; and

(ii) one or two noise events per night, with maximum *internal* noise level of 65 to 70 dBA, are not likely to affect health and wellbeing significantly.

It is noteworthy that conditions of approval generally include external noise limits. The internal noise levels (presented above) can be conservatively transposed to an external noise level by adding 10 dBA (or 12.5 dBA when measured 1 m from the dwelling facade). It follows, that an external $L_{A1(1minute)}$ noise criteria of 60 dBA would appear to be consistent with the current research in relation to this matter.

The EPA continues to review research on sleep disturbance as it becomes available and in the interim, the EPA suggests that the $L_{A1(1minute)}$ level of 15 dBA above the RBL is a suitable screening criterion for sleep disturbance for the night-time period. This approach is generally consistent with the existing Stratford Development Consent (DA 23-98/99) (**Appendix A1**). The Project night-time $L_{A1(1minute)}$ Sleep Disturbance Noise Levels (SDNLs) are presented in **Table 22** together with the comparable SCM consented $L_{A1(1minute)}$ noise limit.

Table 22 Night-time $L_{A1(1minute)}$ Sleep Disturbance Criteria (dBA re 20 µPa)

Locality	Approved $L_{A1(1minute)}$ SCM Night-time[1] Limit	Project $L_{A1(1minute)}$ Night-time[1] Criteria
Stratford/Craven	45	45
Other Rural	45	45

Note 1: Monday to Saturday 2200 hrs to 0700 hrs; Sundays and Public Holidays 2200 hrs to 0800 hrs.

The proposed night-time operation of the Project is anticipated to involve a larger proportion of the mobile equipment being operated in repeatable routines and a relatively smaller proportion of continuous fixed plant. Noise emissions from the mobile equipment are typically variable, whereas fixed plant noise emissions are relatively continuous (or steady) levels. When mobile equipment and fixed plant operate simultaneously, some noise sources (including the operation of trains on the rail loop) have the potential to emerge audibly above the overall mine noise.

Night-time noise monitoring data have been examined to determine the extent of difference between 15 minute average and maximum noise levels. The results of night-time noise monitoring in May 2011 are summarised in **Table 23** including the mine-contributed intrusive $L_{Aeq(15minute)}$ and maximum (L_{Amax}) measured noise levels.

Table 23 Measured Intrusive $L_{Aeq(15minute)}$ and Maximum Noise Levels (dBA re 20 µPa)[1]

Residential Receiver	Measured intrusive $L_{Aeq(15minute)}$ Level	Measured Maximum Level[2]	Measured Difference
19 (7) SCPL (Stratford)	29 dBA	33 dBA	4 dBA
19 (42) SCPL (Craven)	37 dBA	48 dBA	11 dBA

Note 1: Monday to Saturday 2200 hrs to 0700 hrs and Sundays and Public Holidays 2200 hrs to 0800 hrs.

Note 2: In accordance with the INP Application Notes, for the purposes of this assessment, LA1(1minute) and maximum (LAmax) noise levels are considered to be equivalent.

The measurement results at 19 (7) SCPL (Stratford Village) and 19 (42) SCPL (Craven Village) show a difference of up to 11 dBA between the mine-contributed intrusive and maximum noise levels and are therefore consistent with similar mining operations where the difference is typically 10 dBA. Hence, if the intrusive PSNLs (refer **Section 5.2** ie RBL plus 5 dBA) are achieved, then the SDNLs (ie RBL plus 15 dBA) would also be met. This relationship enables the noise assessment process to focus on the setting and assessment of INP-based intrusive noise and amenity levels which aim to minimise annoyance at noise sensitive receiver locations. Notwithstanding the foregoing, given the re-introduction of mobile plant at night-time as part of the Project, the predicted $L_{A1(1minute)}$ night-time noise levels are presented in **Section 7.4** together with an assessment of potential sleep disturbance impacts from the Project.

5.4 Project and Cumulative Mine Noise Impact Assessment Methodology

In view of the foregoing, **Table 24** presents the methodology for assessing the Project operating noise levels against the intrusive and amenity PSNLs (**Table 21**) and the $L_{A1(1minute)}$ SDNLs (**Table 22**) together with cumulative amenity noise levels (**Table 20**) for assessing operating noise levels from existing, approved and proposed mining developments in the vicinity of the Project.

Table 24 Project & Cumulative Mine Noise Impact Assessment Methodology (dBA re 20 µPa)

Assessment Source	Assessment Parameter	Assessment Criteria	Noise Management Zone[1]		Noise Affectation Zone
			Marginal	Moderate	
Project	PSNL Intrusive	RBL plus 5 dBA	1 to 2 dBA above assessment criteria	3 to 5 dBA above assessment criteria	> 5 dBA above assessment criteria[2]
	PSNL Amenity	INP acceptable			
	SDNL $L_{A1(1minute)}$	RBL plus 15 dBA			
Mine Developments	Cumulative Amenity	INP acceptable	1 to 2 dBA above assessment criteria	3 dBA above assessment criteria	> 3 dBA above assessment criteria[3]

Note 1: Depending on the degree of predicted exceedance of the relevant assessment parameter potential noise impacts in the noise management zone could range from marginal to moderate (in terms of the perceived noise increase).

Note 2: Exposure to Project noise levels greater than 5 dBA above the relevant PSNL and or SDNL may be considered unacceptable by some landowners.

Note 3: Exposure to cumulative mine noise levels greater than 3 dBA above the relevant INP acceptable noise level may be considered unacceptable by some landowners.

For the purposes of assessing any potential Project noise impacts, the noise management and affectation zones are further defined as follows.

Project Noise Management Zone

Depending on the degree of predicted exceedance of the PSNL and or SDNL (1 to 5 dBA), potential noise impacts in the noise management zone could range from marginal to moderate (in terms of the perceived noise increase). In addition to the noise mitigation measures included in the predictive modelling (**Section 6**), noise management procedures would include:

- Noise monitoring on-site and within the community.
- Prompt response to any community issues of concern.
- Refinement of on-site noise mitigation measures and operating procedures where practicable.
- Implementation of reasonable and feasible acoustical mitigation at receivers (which may include measures such as enhanced glazing, insulation and/or air-conditioning) at receivers where noise monitoring shows mine noise levels are 3 to 5 dBA above the relevant criteria.

Project Noise Affectation Zone

Exposure to Project noise levels greater than 5 dBA above the relevant PSNL and or SDNL may be considered unacceptable by some landowners. Management procedures for the Noise Affectation Zone would include:

- Discussions with relevant land owners to assess concerns and define responses.
- Implementation of reasonable and feasible acoustical mitigation at receivers (which may include measures such as enhanced glazing, insulation and/or air-conditioning) at receivers where noise monitoring shows mine noise levels are >5 dBA above the relevant criteria.
- Negotiated agreements with land owners where required.

6 NOISE MITIGATION MEASURES AND MODELLING METHODOLOGY

6.1 Existing/Approved SCM Noise Mitigation Measures

6.1.1 SCM Coal Handling Modification 2008

An appreciable level of effort has been applied by SCPL to identify and implement reasonable and feasible on-site noise controls since the commencement of mining, particularly to minimise the impact of night-time noise emissions from the SCM. The noise mitigation measures identified as reasonable and feasible in the *Coal Handling Modification Noise Assessment* (Heggies Pty Ltd, 2008) are summarised in **Table 25** together with their implementation status.

Table 25 SCM Coal Handling Modification Noise Mitigation and Implementation Status

Component	Noise Control and Management Measures	Implementation Status (refer to SCM 75W Modification 2010)
Coal Handling Facility	Install ROM front-end loader (FEL) CAT 988 (or equivalent) with an operating Leq SWL of 110 dBA.	Completed and in accordance with SCM 75W Modification FEL CAT 988 replaced by FEL CAT 992 (or equivalent). Refer to **Table 27** for replacement FEL CAT 992 (or equivalent) with an operating Leq SWL of 112 dBA.
	Install 5 m high ROM hopper barrier. ROM coal stockpiles to be maintained at 5 m height whenever possible and FEL to be operated generally within the ROM coal stockpile area.	Completed.
	Install secondary crusher SWL 106 dBA.	Ongoing - SWL reduced to 110 dBA; crusher replacement fourth quarter of 2012.
	Install visual/noise bund wall adjacent to the CHPP with increased height by approximately 3 m to RL 140 m.	Completed.
	Install new coal stockpile facility and retain a minimum RL 137 (even when empty) so that the effective height of the barrier (provided by previous bunding) not compromised.	Completed.
	Install new coal stockpile CAT D10XQ Dozer (or equivalent) with an operating Leq SWL of 110 dBA.	Completed. Refer to **Table 27** for replacement coal stockpile CAT D11XQ Dozer (or equivalent) with an operating Leq SWL of 112 dBA.
	Install new conveyors and drives (new product stockpile and ROM conveyor/stacker) to be consistent with current low noise conveyor system technology in accordance with an acoustical design specification.	Completed. Refer to **Table 27** for additional fixed plant noise controls.

Source: *SCPL (2012).*
Note 1: SWL = sound power level.
Note 2: RL = relative level.

6.1.2 SCM Mining Operations Modification 2010

The noise mitigation measures identified as reasonable and feasible in the *2010 Modification Mining Operations and Rail Transport Noise Impact Assessment* (Heggies Pty Ltd, 2010) are summarised in **Table 26** together with their implementation status.

Table 26 SCM Operating Modification Noise Mitigation and Implementation Status

Component	Noise Control and Management Measures	Implementation Status
CHPP	Partial enclosure of the ground and first floor levels of the CHPP and acoustic lining of 50% of the interior in accordance with an acoustic design specification.	The design phase is complete, with implementation scheduled for the fourth quarter of 2012.
Rail Loop	Install two adjacent acoustic barriers approximately 60 m in length, with an elevation of 5 m above rail level and an offset distance no greater than 3 m from the nearest outer rail. The barriers to be located adjacent to the "at rest location" of idling locomotives on the southern (ie inbound) side of the rail loop.	SCPL has designed and constructed earthen bunds of equivalent acoustic performance, with acoustic testwork to demonstrate equivalent noise reduction performance due for completion in 2012.
Coal Unloading Conveyors	Install low noise idlers on conveyors CV18 and CV17 consistent with current low noise conveyor system technology in accordance with an acoustic design specification.	Installation completed and acoustic performance verified.
Coal Loading and Unloading Stations	Partial enclosure of the eastern and western wings of the coal loader comprising 0.47 millimetres Colorbond Profile Steel Iron Cladding (or equivalent) extending from ground level up to a minimum height of 10 m. Similarly, enclosure of the coal unloader comprising iron cladding extending from rail down to ground level.	Implementation and acoustic testwork to demonstrate performance due for completion June 2013.
Noise Management Plan	Preparation of a Noise Management Plan in accordance Project Approval Schedule 3 Condition 8 and associated noise monitoring and management requirements.	Submitted to the DP&I in May 2011 and updated in March 2012 following comments in the Independent Environmental Audit (AEMC, 2011).

Source: SCPL (2012).

6.2 Proposed Project Noise Mitigation Measures

6.2.1 Investigation of Reasonable and Feasible Noise Mitigation

SCPL is obligated under the DGRs, current Development Consent conditions (e.g. Condition 7, Schedule 3 of DA 23-98/99) and the INP to implement all reasonable and feasible noise mitigation measures for the approved Project. In addition, further investigation of reasonable and feasible noise mitigation measures for the proposed Project was conducted in consultation with SCPL particularly in relation to evening and night-time operations. A number of iterative steps were undertaken to develop noise mitigation measures for the Project, including:

- Extensive preliminary noise modelling scenarios representative of the predicted maximum Project noise emissions to identify any potential noise exceedances.
- Ranking the highest noise contributors and progressively introducing noise mitigation measures to appreciably reduce noise associated with the Project.
- Revision of detailed mine planning to reschedule intrusive activities to less sensitive times of the day where possible and to optimise acoustic benefit of mine landforms (eg shielding of noise sources by out-of-pit waste rock emplacements). This was an ongoing, iterative process requiring both acoustic (SLR Consulting) and mining engineering input (SCPL/Minarco-MineConsult).
- Evaluating various combinations of noise control and management measures to assess their relative effectiveness.
- Agreement by SCPL to adopt a range of noise control and management measures (including low noise equipment and operational controls) to appreciably reduce noise emissions associated with the proposed Project as presented in **Table 27**.

The measures presented in **Table 27** have had the effect of appreciably reducing noise levels at nearby receivers. In particular, noise reduction at receivers to levels at or below the PSNLs in Stratford has been targeted through the implementation of the above measures. This has been achieved in particular by:

- Implementation of "XQ" mobile fleet and quieter conveyor drives and idlers (on conveyors CV01, CV04/05, CV22 and CV23) as described in **Table 27**.
- Implementation of extensive acoustic bunds around the site, targeting haul roads and rail operations.
- Operation of the Roseville West Pit Extension daytime only.
- Emplacement of Avon North Open Cut waste rock in the Stratford Main Pit during evening and night-time operations rather than use of the adjacent Northern Waste Emplacement Extension, which is relatively more exposed.
- Maximising in-pit waste rock emplacement activities associated with the Stratford East Open Cut
- Bunding of waste rock emplacement activities associated with the Stratford East Open Cut during evening and night-time operations when out-of-pit (ie in-pit dumping opportunities are not available).

Given the optimised mine plan for the Project and other operational restrictions, it is considered that the measures in **Table 27** are reasonable and feasible.

Table 27 Proposed Project Noise Mitigation Measures

Mitigation	Roseville West Pit Extension	Avon North Open Cut	Stratford East Open Cut	CHPP and Infrastructure (including Rail Operations)
Noise Source Control - use of noise attenuated mobile fleet and fixed plant	4 x CAT 740 ADT Haul Trucks (ie uses smaller articulated dump trucks)	3 x CAT 785XQ Haul Trucks 5 x CAT 789XQ Haul Trucks	8 x CAT 785XQ Haul Trucks 8 x CAT 789XQ Haul Trucks	Install low noise conveyors (idlers) and drives for rotary breaker circuit Reduce existing conveyor drives (CV01, CV04/05, CV22 and CV23) to SWL 95 dBA (or equivalent control) 1 x ROM FEL CAT 992 (or equivalent) with operating Leq SWL of 112 dBA
	2 x CAT D10XQ Dozer (limit to 3rd gear operation in-pit) 2 x CAT D11XQ Dozer (limit to 3rd gear operation in-pit) 2 x CAT D10XQ Dozer (limit to 2nd gear operation on waste rock emplacement)	1 x CAT D10XQ Dozer (limit to 3rd gear operation in-pit) 1 x CAT D10XQ Dozer (limit to 2nd gear operation on waste rock emplacement)	1 x CAT D10XQ Dozer (limit to 3rd gear operation in-pit) 1 x CAT D10XQ Dozer (limit to 1st gear operation in Year 7 and limit to 2nd gear operation in Year 2 and Year 10 when operating on Stratford Waste Emplacement)	1 x CAT D11XQ Dozer (limited to 1st gear operation with SWL of 112 dBA)
	Installation of broadband noise emission "quacker" style reversing alarms on mobile equipment.			
Noise Propagation Path – installation of acoustic bunds	Approximately 2.6 kms of 6 m high noise bund walls as shown on **Appendices C1 to C3**.	Approximately 2.9 kms of 6 m high noise bund walls as shown on **Appendices C1 to C3**.	Approximately 2.1 kms of 6 metre high noise bund walls and 2.2 kms of 10 m high noise bund walls on top of the Stratford Waste Emplacement (whilst in-use) as shown on **Appendices C1 to C3**.	Approximately 3.8 kms of 6 m high noise bund walls enclosing the rail loop as shown in **Appendices C1 to C3**.

Mitigation	Roseville West Pit Extension	Avon North Open Cut	Stratford East Open Cut	CHPP and Infrastructure (including Rail Operations)
Operational Controls - rescheduling of intrusive activities to less sensitive times of the day	Restricted to daytime operation only.	Waste fleet dumping to Northern Waste Emplacement Extension during the daytime only. Dumping to Stratford Main Pit area during evening/night.	Years 1-5: Mining operations would be conducted 24 hours per day, seven days per week, subject to compliance with noise limits (refer to **Section 6.3**). Years 6-7: Waste fleet dumping to Stratford Main Pit area during daytime only. Dumping to Stratford Waste Emplacement area (behind the 10 m high noise bund walls) during the evening/night. Years 8-11: Waste fleet dumping inpit to Stratford East Open Cut during day, evening and night.	N/A
Noise and Weather Monitoring	Implementation of realtime noise monitoring in Stratford and Craven. Implementation of continuous weather monitoring in the vicinity of the Project site.			

Note 1: Extra quiet - XQ.

Whilst other, more extensive noise mitigation measures may be technically possible, they are not considered by SCPL to be feasible and reasonable. For example, some elevated night-time noise levels at some locations could be avoided by restriction of mining at Avon North Open Cut and Stratford East Open Cut (in Years 6 to 11) to daytime only. However, these measures are not considered to be economically feasible by SCPL. Further discussion of these alternatives is provided in Section 6 in the Main Report of the EIS.

6.2.2 Mobile Equipment and Fixed Plant Sound Power Levels

The potential for machinery to emit noise is quantified as the SWL expressed in dBA re 1 picowatt. At the receiver, the received noise is quantified as the sound pressure level (SPL) expressed in dBA re 20 µPa. The INP's energy equivalent (L_{eq}) assessment parameter has introduced greater mathematical rigour to the prediction of received noise levels as it enables the use of L_{eq} SWL as noise model inputs. In general terms, any variation in mine site L_{eq} SWL would produce a similar variation in the $L_{eq(15minute)}$ SPL at the receiver.

Equipment SWLs at the Stratford Mining Complex have been the subject of ongoing measurements in accordance with the noise management plan (refer **Section 2.3**) and SCPL have refined the SWLs for individual fleet items. Comparative equipment fleets are presented in **Table 28** together with the overall mine site L_{eq} SWLs from *RHA report 8140-R1 Stratford Coal Mine Train Unloading Operations Preliminary Noise Impact Assessment* (Richard Heggie Associates Pty Ltd, 1998), the *Stratford Coal Modification July 2010 Environmental Assessment* (SCPL, 2010) and the proposed Project.

Table 28 Approved SCM and Proposed Project Plant and Equipment SWLs (dBA re 1ρW)[1]

Equipment Description[2]	SCM (1999 Consent)		SCM and BRNOC (2010 Approval)		Proposed Project Plant and Equipment					
					Year 2		Year 7		Year 10	
	No Items	SWL	No Items	SWL	No Items	SWL	No Items	SWL	No Items	SWL
Drills	1	116	1	119	4	122	3	121	3	121
Excavators	4	121	6	118	11	125	11	125	11	125
789 Haul Trucks	6	132			9	127	8	126	8	126
785 Haul Trucks	6	131			9	125	8	124	8	124
775 Haul Trucks	-	-	11	130	12	132	12	132	10	131
A40D Haul Trucks	-	-	4	118	4	119	4	119	4	119
Dozers	2	120	6	128	10	130	9	130	9	130
Water Cart	1	120	2	121	3	123	3	123	3	123
Loaders (ROM)	1	117	1	110	1	112	1	112	1	112
Graders	1	115	2	115	3	117	3	117	3	117
Mobile Fleet	**22**	**135**	**33**	**133**	**66**	**136**	**62**	**136**	**60**	**136**
Primary Crusher		107		107		108		108		108
Rotary Breaker		-		-		112		112		112
Secondary Crusher		113		106		109		109		109
CHPP		122		122		116		116		116
Stockpile Dozer	1	120	1	112	1	112	1	112	1	112
Coal Stockyard		109		111		115		115		115
Trains/Rail Loadout		114		113		115		115		115
Rail Loading		112		118		109		109		109
Coal Handling[3]		**125**		**124**		**122**		**122**		**122**
Overall Total		**136**		**134**		**136**		**136**		**136**

Note 1: pW = picowatt.

Note 2: Exclusive of construction mobile equipment associated with public road realignments.

Note 3: Coal Handling Infrastructure includes relevant conveyor SWLs.

As shown above, the overall site L_{eq} SWL from the proposed Project (136 dBA) is marginally (2 dBA) greater than the current SCM and BRNOC Operating Modification 2010 (134 dBA) and essentially the same as the original SCM as approved in 1999 (DA 23-98/99) (136 dBA) (which included 24 hour coal mining operations).

6.3 Project Noise Modelling Procedure and Justification

The Project noise model was prepared using RTA Software's Environmental Noise Model (ENM for Windows, Version 3.06), a commercial software system developed in conjunction with the NSW EPA. The acoustical algorithms utilised by this software have been endorsed by the ANZEC and all State Environmental Authorities throughout Australia as representing one of the most appropriate predictive methodologies currently available.

ENM has been used for all major noise assessments at the Stratford Mining Complex (ie Richard Heggie Associates Pty Ltd [1994], Richard Heggie Associates Pty Ltd [2001], *Stratford Coal Mine Operating Noise Impact Assessment* [Heggies Pty Ltd, 2005], *Stratford Coal Mine Roseville West Pit Modification Operating Noise Impact Assessment* [Heggies Pty Ltd, 2006], *Stratford Coal Mine Coal Handling Modification Noise Impact Assessment* [Heggies Pty Ltd, 2008] and *Stratford Coal Mine Section 75W Modification Mine Operating and Rail Transport Noise Impact Assessment* [Heggies Pty Ltd, 2010]).

The existing ENM for the Stratford Mining Complex has been significantly updated with current digital terrain and extended receiver area coverage as well as incorporating the proposed Project mine plans and significant mobile equipment and fixed plant. On-site noise measurements to determine mobile equipment and fixed plant SWLs were conducted in May 2011 together with off-site noise monitoring at Stratford and Craven villages for the purposes of noise model validation. A preliminary prediction of the observed night-time operation was performed to compare off-site noise measurement results with the initial predictions. In particular, elevated mine noise levels due to mine operations and or during adverse meteorological conditions were considered most useful for the purposes of validation. The preliminary predictions were moderately greater than the observed night-time operation and the noise model was subsequently adjusted for consistency with the off-site noise measurement results. The noise model validation outcomes were consistent with field measurement and modelling results from similar large scale resource developments.

The Project description was reviewed to determine representative scenarios to assess potential Project noise impacts. For the purposes of assessing noise impacts in accordance with INP requirements, the following scenarios were considered:

Year 2 Operations (refer to Indicative General Arrangement Plan Year 2015 Appendix C1):

Representative of approximately 1.7 Mtpa ROM coal production rate arising from the first full year of the Roseville West Pit Extension operation (daytime only), the initial Avon North Open Cut operation (24 hours) and Stratford East Open Cut (waste operations daytime only and coal 24 hours). This scenario also coincides with placement of waste on the elevated portions of the Northern Waste Emplacement Extension.

In Year 2, whilst the fleet associated with the removal of waste rock at the Stratford East Open Cut would generally be operated daytime only, some operations would be conducted outside of these hours subject to compliance with noise limits. The following additional modelling has been conducted for the Year 2 scenario (as representative of Years 1 to 5) to assess the noise levels associated with these type of operations:

- Evening and night time operation of fleet associated with the removal of waste rock at the Stratford East Open Cut under calm conditions.
- Evening and night time operation of limited fleet associated with the removal of waste rock (two CAT 789XQ trucks, four CAT 785XQ trucks and one D10XQ operating in first gear on the Stratford East waste rock emplacement) at the Stratford East Open Cut under adverse weather conditions coupled with unloading of coal from Duralie shuttle trains (ie no product coal loading).

The additional Year 2 modelling results are presented in **Appendix J1** and **Appendix J2** and are similar to those predicted for the representative Year 2 Operations presented in **Section 7**. The additional Year 2 modelling results do not introduce any intrusive noise exceedances in addition to those predicted throughout the life of the Project (ie Year 2, Year 7 and Year 10) as presented in **Section 7**. Hence, there are no additional noise impacts and the additional Year 2 modelling results are not further discussed in this report.

Year 7 Operations (refer to Indicative General Arrangement Plan Year 2020 Appendix C2):

Representative of approximately 2.1 Mtpa ROM coal production rate arising from the continuation of the Roseville West Pit Extension operation (daytime only), and the full operation of the Stratford East Open Cut 24 hours a day.

Year 10 Operations (refer to Indicative General Arrangement Year 2023 Appendix C3):

Representative of approximately 2.6 Mtpa ROM coal production rate arising from the continuation of the Roseville West Pit Extension operation (daytime only), the cessation of operations in the Avon North Open Cut and including operation of the southern extent of Stratford East Open Cut (operating 24 hours a day when at the maximum waste and coal production rate).

The three operational noise modelling scenarios include all existing and proposed plant items operating concurrently to simulate the overall maximum energy equivalent (ie $L_{Aeq(15minute)}$) intrusive noise level. A large proportion of the mobile equipment is operated in repeatable routines and a relatively smaller proportion of the emissions emanate from continuous fixed plant items.

The L_{Aeq} SWLs given for each item of mobile equipment do not include noise emissions which emanate from alarms or communication 'horns'. In the event that alarm noise is considered to be a source of disturbance, the alarm noise level should be checked against the appropriate Australian Standard (AS) and/or other workplace safety requirements and the necessary mitigating action taken to achieve an acceptable noise reduction without compromising safety standards. It is noted that SCPL have installed broad-band "quacker" reversing alarms on the majority of the existing Stratford Mining Complex mobile equipment, which have lower impacts than traditional tonal "Beeping" alarms. This practice would continue for new mobile plant items for the Project.

At the Stratford Mining Complex rail loop, both loading and unloading of coal occurs. The loading and unloading scenarios were modelled separately in Heggies Pty Ltd (2010). From a review of Heggies Pty Ltd (2010), noise associated with the loading scenario was worst-case at the majority of receivers during evening and night-time operations; often 5 dBA to 6 dBA greater than the unloading scenario. Unloading operations were marginally (less than 2 dBA) greater than loading operations at a limited number of receivers under some weather conditions (notably in the Craven area). The most exposed of these receivers has since been purchased by SCPL (receiver 19[2]). Further, it is relevant to note that the unloading scenario is only relevant for the first six years of the Project (ie delivery of DCM ROM coal would cease after Project Year 6).

This is further emphasised by the additional Year 2 modelling scenarios described above, which show that mobile equipment associated with Stratford East Open Cut waste rock removal can be conducted in the evening and night-time in conjunction with the unloading of coal from the Duralie shuttle train which results in noise level predictions equivalent or lower than general Year 2 operations presented in **Section 7**, which include loading of coal.

As discussed in **Section 5.2**, the Project would involve a larger proportion of the mobile equipment and a relatively small addition of continuous fixed plant. In view of the above, it is not considered necessary to model both loading and unloading operations for the Project. Therefore, loading operations have been modelled for all Project scenarios in this report.

Opportunistic recovery of CHPP rejects from the western co-disposal area would continue to occur as part of the Project. This activity would be conducted on a campaign basis using Roseville West Pit Extension fleet, during daytime hours only. Given that the scenarios described above utilise the same equipment in locations generally closer to Stratford receivers, no quantitative modelling of recovery of CHPP rejects from the western co-disposal area has been undertaken (ie it is considered that noise levels from general Roseville West Pit Extension operations would be worst-case from an acoustic perspective).

In addition, construction of the visual/acoustic bunding around the site may have the potential for short-term elevation in noise levels. In particular, the perimeter visual/acoustic bund to be progressively constructed on the western side of the Roseville West Pit Extension would be located approximately 1 km from the easternmost receivers in Stratford.

This perimeter visual/acoustic bund would be constructed during daytime only, using waste rock from the adjacent Roseville West Pit Extension, with bulldozers periodically used to assist with formation of the bund over campaigns of 1 to 2 months duration. Once constructed, the bunds themselves would provide some visual and acoustic attenuation for receivers to the west.

Given that no additional mobile equipment would be used for this construction activity and the activity would be short-term and daytime only, it is considered that the Roseville West Pit Extension operational scenarios as modelled are likely to be acoustically similar to the bund construction scenario, therefore no additional modelling has been undertaken for bund construction.

Similarly, extensive bunding is proposed to be constructed along haul roads and around the rail loop (**Section 6.2.1**). These bunds would be constructed in a similar fashion to the bunds described above and would provide acoustic attenuation once constructed, No additional modelling has been undertaken for construction of these bunds.

The relocation of the 132 kV powerline and installation of a new rotary breaker at the CHPP are both also on-site construction activities proposed as part of the Project. As these construction activities would be undertaken during daytime hours only, are short-term, and would involve a relatively modest fleet, quantification of the potential noise levels is not required.

One resource company-owned receiver ([19(42)] SCPL) is anticipated to be in relatively close proximity to some powerline relocation works (ie this receiver is located approximately 250 m from the existing powerline). Given the proximity of receiver 19(42) SCPL to the powerline relocation, SCPL (or the relevant power authority) would keep any tenant informed of the timing and progress of the relocation of the 132 kV powerline.

7 CONSTRUCTION AND OPERATING NOISE IMPACT ASSESSMENT

7.1 Daytime Construction - Intrusive Noise Levels

Consistent with the discussion provided in **Section 5.1**, construction associated with the realignment of Bowens Road and Wheatleys Lane and Wenham Cox/Bowens Road are assessable under the ICNG.

The predicted daytime construction $L_{Aeq(15minute)}$ intrusive noise levels associated with the realignment of Bowens Road and Wheatleys Lane and Wenham Cox/Bowens Road are presented in **Table 29** at the nearest receivers.

Table 29 Daytime Intrusive $L_{Aeq(15minute)}$ Construction Noise Levels (dBA re 20 µPa)

ID No and Landholder	Wheatleys Lane/Bowens Road Calm	Wenham Cox Road/Bowens Road Calm
1 Fraser	19	19
5(1) Bignell	21	20
5(2) Bignell	19	22
7 Burrell	19	23
9(1) Williams	25	21
9(2) Williams	25	21
10 Whatmore & Whatmore	29	18
11 Walker, Walker, Walker & Walker	27	18
16 Pickett	31	16
17 Fisher & Smith	32	16
23 Bagnall	20	36
24 Harris	8	7
25 Thompson	29	14
26 Lowrey & Lowrey	30	14
27 Gloucester Shire Council	33	16
34 Hall & Hall	21	11
36 Wallace & Wallace	19	12
36a(1) Berecry	8	18
36a(2) Berecry	7	18
38 Johnson & Johnson	27	14
39 Standen	21	14
43 Moseley	26	13

ID No and Landholder	Wheatleys Lane/Bowens Road Calm	Wenham Cox Road/Bowens Road Calm
44 Cross & Jane	18	13
47 Digges, Digges, Hart & Hart	3	2
48 Rounsley	2	3
50 Porter	1	0
53 Barnes & Barnes	3	3
54 Hughes & Carrysong Pty Ltd	2	1
55 Hancock & Hancock	3	2
56 McCalden & McCalden	2	0
58(1) Blanch & Blanch	9	7
58(2) Blanch & Blanch	9	6
59 Cassar & Cassar	9	6
60 Healy & Greenwood	10	1
65 Weismantle	9	6
69 Hooper & Bartholmew	11	7
70 Knight	12	6
71 Burnet & Burnet	11	8
202 Wenham	31	17
265 Stenstrom & Stenstrom	15	12
274 Wilson & Wilson	18	15
275 Pace Farm Pty Ltd	19	16
276 Luscombe & Luscombe	15	13
279 Cullum & Cullum	21	18
281 Lewis & Lewis	33	15
282 Ross	22	11
283 Nolan	26	13
284 Perrin & Perrin	20	12
285 Carter & Carter	22	11
287 Sinderberry & Rinkin	19	11
288 Perrin	20	11
289 Mcintosh	24	13
290 Ryan & Tordoff	16	9
291 Crawley & Crawley	20	12
292(1) Fisher & Fisher	14	8
293 Braunton	15	8
294 Morcom & Morcom	15	9
295 Bush & Bush	15	8
296 Watson & Watson	17	11
303 JSTC Newcastle Pty Ltd	12	8
304 Abeysekera & Abeysekera	12	9
307 Wolfenden & Wolfenden	10	6
316 Country Rail Infrastructure Authority	8	16
Craven		
Cr.7 Pryce-Jones	18	14
Stratford		
S1 Rees	33	17
S3 Yeatman	35	16
S4 Grady & Grady	32	17
S5 Britnell	33	16
S6 Threadgate & Threadgate	33	16

ID No and Landholder	Wheatleys Lane/Bowens Road Calm	Wenham Cox Road/Bowens Road Calm
S8 Forbes	33	16
S9 Greenham & Greenham	33	16
S10 Germon	33	16
S11 Glew	34	16
S12 Mitchell & Mitchell	34	16
S13 Wells & Wells	35	16
S14 Bignell	32	16
S15 Minister for Education	33	16
S18 Whittall & Whittall	36	16
S19 Carroll	37	16
S20 McGrath	33	16
S21 Adams	33	16
S23 Bartlett	34	16
S24 Mavay	34	16
S26 Young	34	16
S27 Brown & Brown	35	16
S28 Morris & Morris	35	16
S29 Bagnall & Bagnall	35	16
S30 Baker	35	16
S31 Richards	36	16
S33 Langtry, Gilbert & Gilbert	36	16
S34 Ashby	36	16
S35 Rodgers & Bekker	36	16
S36 Platt & Platt	37	16
S37 Pryor & Pryor	37	16
S38 Kirkman	37	16
S39(1) Nicholls & Husband	37	16
S39(2) Nicholls & Husband	37	16
S40 Curtis	33	16
S41 Mcclure & Aplin	34	15
S43 Squire	34	16
S47 Potts	35	16
S48 Farley & Farley	36	16
S49 Blanch	36	16
S50 Vanderdrift & Blanch	36	16
S51 Trenholme	36	16
S52 Farley & Barry	36	16
S53 Arthur	37	16
S54 Adams	37	16
S56 Collins & Collins	33	15
S57 Gam	34	15
S58 Harrigan	34	15
S59 Grady & Grady	34	15
Receivers subject to Landholder Agreement		
14 Wenham & Wenham	32	19
15(1) Falla Superannuation	32	20
15(2) Falla Superannuation	32	21
15(3) Falla Superannuation	35	21
29 Ward	37	16

ID No and Landholder	Wheatleys Lane/Bowens Road Calm	Wenham Cox Road/Bowens Road Calm
31(1) Isaac	32	16
31(2) Isaac	32	15
37 Worth	20	14
40 Leslie Allenby Blanch	22	14
42 Blanch	20	14
297 Bosma	17	12
298 Yates	18	12
Cr.2 Boorer	20	12
Resource company-owned Receivers		
6 AGL	27	29
13(1) AGL	29	26
13(2) AGL	24	15
4(1) GRL	18	20
4(2) GRL	15	21
4(4) GRL	15	19
4 (5) GRL	16	17
4(6) GRL	18	18
4(7) GRL	17	18
4(8) GRL	18	20
4(9) GRL	16	17
4(12) GRL	20	17
4(15) GRL	25	19
4(16) GRL	24	20
4(18) GRL	18	21
19(1) SCPL	20	14
19(2) SCPL	25	15
19(4) SCPL	35	16
19(5) SCPL	36	16
19(6) SCPL	21	13
19(7) SCPL	21	16
19(8) SCPL	37	12
19(9) SCPL	20	12
19(10) SCPL	20	12
19(11) SCPL	10	7
19(12) SCPL	21	15
19(13) SCPL	21	15
19(14) SCPL	21	14
19(15) SCPL	20	15
19(16) SCPL	19	15
19(17) SCPL	19	15
19(18) SCPL	19	14
19(19) SCPL	19	14
19(20) SCPL	20	15
19(21) SCPL	18	12
19(22) SCPL	16	11
19(23) SCPL	19	12

ID No and Landholder	Wheatleys Lane/Bowens Road Calm	Wenham Cox Road/Bowens Road Calm
19(25) SCPL	16	12
19(26) SCPL	14	6
19(27) SCPL	12	2
19(28) SCPL	19	12
19(29) SCPL	29	29
19(30) SCPL	28	35
19(31) SCPL	7	3
19(32) SCPL	6	3
19(33) SCPL	24	43
19(34) SCPL	15	19
19(35) SCPL	8	5
19(36) SCPL	8	5
19(37) SCPL	8	5
19(38) SCPL	19	21
19(39) SCPL	20	12
19(40) SCPL	25	44
19(41) SCPL	28	15
19(42) SCPL	21	14
19(43) SCPL	18	11
19(45) SCPL	20	12
19(46) SCPL	20	12
19(47) SCPL	25	35

Note 1: All predicted noise levels from the worst case meteorological conditions in **Table 9** for each receiver.
Note 2: Predicted $L_{Aeq(15minute)}$ noise level complies with the intrusive CNML.
Note 3: Predicted marginal noise exceedance 1 to 2 dBA above intrusive CNML.
Note 4: Predicted moderate noise exceedance 3 to 5 dBA above intrusive CNML.
Note 5: Predicted appreciable noise exceedance > 5 dBA above intrusive CNML.

As presented in **Table 29**, predicted intrusive $L_{Aeq(15minute)}$ construction noise levels are below the respective daytime CNMLs of 42 dBA at all Stratford/Craven dwellings and 40 dBA at all Other Rural dwellings. Construction noise impacts are therefore considered acceptable, except at 19 (33) SCPL and 19(40) SCPL. At 19 (33) SCPL and 19(40) SCPL, construction noise levels are predicted to be 43 dBA and 44 dBA respectively and therefore moderately (3 dBA to 4 dBA) above the CNML of 40 dBA.

Following review of **Table 29**, the following conclusion can be made:

- Construction noise levels are below the maximum CNML (**Section 5.1**) at all locations.
- Construction noise levels are similarly below the daytime CNML (**Section 5.1**) at all privately-owned receivers.

7.2 Daytime Operating - Intrusive Noise Levels

The predicted daytime operating $L_{Aeq(15minute)}$ intrusive levels associated with the Year 2, Year 7 and Year 10 scenarios are presented in **Table 30**.

Table 30 Daytime Year 2, Year 7 and Year 10 Intrusive $L_{Aeq(15minute)}$ Noise (dBA re 20 µPa)

ID No and Landholder	Project Year 2 Calm	Project Year 7 Calm	Project Year 10 Calm
Stratford/Craven Rural Receivers			
1 Fraser	28	23	23
5(1) Bignell	29	25	25
5(2) Bignell	28	24	24
7 Burrell	27	24	23
9(1) Williams	32	28	28
9(2) Williams	32	28	29
10 Whatmore & Whatmore	32	28	28
11 Walker, Walker, Walker & Walker	32	29	29
16 Pickett	32	30	30
17 Fisher & Smith	32	31	30
23 Bagnall	33	27	24
24 Harris	17	17	17
25 Thompson	32	29	29
26 Lowrey & Lowrey	31	29	29
27 Gloucester Shire Council	33	32	31
34 Hall & Hall	27	26	26
36 Wallace & Wallace	29	29	28
36a(1) Berecry	10	9	9
36a(2) Berecry	13	11	11
38 Johnson & Johnson	31	28	28
39 Standen	33	32	32
43 Moseley	30	27	27
44 Cross & Jane	29	28	27
47 Digges, Digges, Hart & Hart	14	15	18
48 Rounsley	14	15	16
50 Porter	11	12	13
53 Barnes & Barnes	13	15	19
54 Hughes & Carrysong Pty Ltd	13	14	17
55 Hancock & Hancock	12	13	15
56 McCalden & McCalden	11	11	13
58(1) Blanch & Blanch	17	18	19
58(2) Blanch & Blanch	16	17	19
59 Cassar & Cassar	17	20	22
60 Healy & Greenwood	17	17	23
65 Weismantle	16	16	16
69 Hooper & Bartholmew	18	19	18
70 Knight	17	17	20
71 Burnet & Burnet	19	19	18
202 Wenham	32	31	30
265 Stenstrom & Stenstrom	20	18	18
274 Wilson & Wilson	23	21	21
275 Pace Farm Pty Ltd	24	23	22
276 Luscombe & Luscombe	21	19	19
279 Cullum & Cullum	26	24	24
281 Lewis & Lewis	33	32	31
282 Ross	27	24	24
283 Nolan	30	26	26
284 Perrin & Perrin	28	28	27
285 Carter & Carter	26	24	24

ID No and Landholder	Project Year 2 Calm	Project Year 7 Calm	Project Year 10 Calm
287 Sinderberry & Rinkin	24	24	23
288 Perrin	25	24	23
289 Mcintosh	29	29	28
290 Ryan & Tordoff	25	24	23
291 Crawley & Crawley	27	26	25
292(1) Fisher & Fisher	20	20	20
293 Braunton	23	22	22
294 Morcom & Morcom	24	23	22
295 Bush & Bush	24	23	22
296 Watson & Watson	27	26	25
303 JSTC Newcastle Pty Ltd	21	21	20
304 Abeysekera & Abeysekera	19	19	18
307 Wolfenden & Wolfenden	18	18	17
316 Country Rail Infrastructure Authority	32	31	31
Craven			
Cr.7 Pryce-Jones	30	31	29
Stratford			
S1 Rees	33	32	31
S3 Yeatman	34	33	32
S4 Grady & Grady	32	31	30
S5 Britnell	32	32	31
S6 Threadgate & Threadgate	32	31	31
S8 Forbes	33	32	32
S9 Greenham & Greenham	33	32	31
S10 Germon	33	32	32
S11 Glew	33	32	31
S12 Mitchell & Mitchell	33	32	31
S13 Wells & Wells	34	32	32
S14 Bignell	33	31	31
S15 Minister for Education	34	32	32
S18 Whittall & Whittall	35	33	33
S19 Carroll	35	33	33
S20 McGrath	33	32	31
S21 Adams	33	32	31
S23 Bartlett	33	32	32
S24 Mavay	33	32	32
S26 Young	33	32	32
S27 Brown & Brown	34	32	32
S28 Morris & Morris	34	32	32
S29 Bagnall & Bagnall	34	32	32
S30 Baker	34	33	32
S31 Richards	34	33	32
S33 Langtry, Gilbert & Gilbert	34	33	33
S34 Ashby	34	33	33
S35 Rodgers & Bekker	34	33	33
S36 Platt & Platt	34	33	33
S37 Pryor & Pryor	35	33	33
S38 Kirkman	35	33	33
S39(1) Nicholls & Husband	35	34	33
S39(2) Nicholls & Husband	35	34	33
S40 Curtis	33	32	32

ID No and Landholder	Project Year 2 Calm	Project Year 7 Calm	Project Year 10 Calm
S41 Mcclure & Aplin	33	32	32
S43 Squire	33	32	32
S47 Potts	34	33	33
S48 Farley & Farley	34	33	33
S49 Blanch	34	33	33
S50 Vanderdrift & Blanch	34	33	33
S51 Trenholme	34	33	33
S52 Farley & Barry	34	33	33
S53 Arthur	34	33	33
S54 Adams	34	33	33
S56 Collins & Collins	33	32	32
S57 Gam	33	32	32
S58 Harrigan	33	32	32
S59 Grady & Grady	33	32	32
Receivers subject to Landholder Agreement			
14 Wenham & Wenham	34	32	32
15(1) Falla Superannuation	34	32	32
15(2) Falla Superannuation	36	34	34
15(3) Falla Superannuation	39	37	36
29 Ward	35	34	35
31(1) Isaac	35	34	34
31(2) Isaac	34	33	33
37 Worth	29	28	27
40 Leslie Allenby Blanch	34	34	33
42 Blanch	32	32	32
297 Bosma	27	26	26
298 Yates	26	26	25
Cr.2 Boorer	33	33	32
Resource company-owned Receivers			
6 AGL	35	31	31
13(1) AGL	38	33	34
13(2) AGL	38	38	38
4(1) GRL	25	22	22
4(2) GRL	25	20	20
4(4) GRL	23	20	18
4 (5) GRL	24	21	19
4(6) GRL	25	22	20
4(7) GRL	24	22	21
4(8) GRL	24	21	20
4(9) GRL	25	21	21
4(12) GRL	25	21	21
4(15) GRL	24	21	21
4(16) GRL	26	22	22
4(18) GRL	27	23	23
19(1) SCPL	31	30	30
19(2) SCPL	35	35	35
19(4) SCPL	34	33	32
19(5) SCPL	34	33	33
19(6) SCPL	33	32	31
19(7) SCPL	34	33	33
19(8) SCPL	32	32	32

ID No and Landholder	Project Year 2 Calm	Project Year 7 Calm	Project Year 10 Calm
19(9) SCPL	33	32	32
19(10) SCPL	33	33	32
19(11) SCPL	18	19	18
19(12) SCPL	33	33	32
19(13) SCPL	33	33	32
19(14) SCPL	32	32	32
19(15) SCPL	31	32	30
19(16) SCPL	30	32	30
19(17) SCPL	30	31	30
19(18) SCPL	30	32	30
19(19) SCPL	31	32	30
19(20) SCPL	31	32	31
19(21) SCPL	30	31	29
19(22) SCPL	24	25	25
19(23) SCPL	30	33	31
19(25) SCPL	25	28	30
19(26) SCPL	21	22	23
19(27) SCPL	18	19	20
19(28) SCPL	28	30	41
19(29) SCPL	40	33	34
19(30) SCPL	46	33	32
19(31) SCPL	16	18	25
19(32) SCPL	14	15	20
19(33) SCPL	39	27	26
19(34) SCPL	24	20	19
19(35) SCPL	15	15	15
19(36) SCPL	15	16	15
19(37) SCPL	15	15	15
19(38) SCPL	28	23	22
19(39) SCPL	33	33	32
19(40) SCPL	41	32	28
19(41) SCPL	32	32	32
19(42) SCPL	32	33	32
19(43) SCPL	27	29	40
19(45) SCPL	33	33	32
19(46) SCPL	33	33	32
19(47) SCPL	40	34	30

Note 1: All predicted noise levels from the worst case meteorological conditions in **Table 9** for each receiver.
Note 2: Predicted $L_{Aeq(15minute)}$ noise level complies with the intrusive PSNL.
Note 3: Predicted marginal noise exceedance 1 to 2 dBA above intrusive PSNL.
Note 4: Predicted moderate noise exceedance 3 to 5 dBA above intrusive PSNL.
Note 5: Predicted appreciable noise exceedance > 5 dBA above intrusive PSNL.
Note 6: Resource company-owned receivers are those receivers owned by SCPL, AGL or GRL.

Sections 7.5 and **7.7** present a summary of potential impacts on private receivers and resource company-owned receivers, respectively.

7.3 Evening Operating - Intrusive Noise Levels

The predicted evening operating Year 2, Year 7 and Year 10 intrusive $L_{Aeq(15minute)}$ noise levels at the nearest receivers are presented in **Table 31**.

Table 31 Evening Year 2, Year 7 and Year 10 Intrusive $L_{Aeq(15minute)}$ Noise (dBA re 20 µPa)

ID No and Landowner	Project Year 2		Project Year 7		Project Year 10	
	Calm	Wind	Calm	Wind	Calm	Wind
Stratford/Craven Rural Receivers						
1 Fraser	15	25	14	25	14	24
5(1) Bignell	17	27	16	26	15	26
5(2) Bignell	15	26	14	26	13	26
7 Burrell	16	27	16	25	14	26
9(1) Williams	19	29	18	29	17	29
9(2) Williams	20	29	19	29	18	29
10 Whatmore & Whatmore	21	28	20	29	19	29
11 Walker, Walker, Walker & Walker	21	30	20	30	19	30
16 Pickett	23	31	23	32	22	31
17 Fisher & Smith	23	31	23	32	22	30
23 Bagnall	24	34	18	32	16	29
24 Harris	13	24	16	25	15	25
25 Thompson	26	31	26	31	26	31
26 Lowrey & Lowrey	25	31	25	31	25	30
27 Gloucester Shire Council	24	33	24	34	23	33
34 Hall & Hall	24	31	25	31	24	30
36 Wallace & Wallace	28	35	29	36	28	35
36a(1) Berecry	3	19	0	19	4	17
36a(2) Berecry	5	25	1	23	4	19
38 Johnson & Johnson	24	28	24	29	24	29
39 Standen	31	39	32	40	32	39
43 Moseley	24	27	24	28	23	27
44 Cross & Jane	27	37	28	37	27	37
47 Digges, Digges, Hart & Hart	9	28	14	28	18	28
48 Rounsley	10	16	14	18	28	18
50 Porter	7	25	11	17	13	17
53 Barnes & Barnes	9	29	15	29	19	29
54 Hughes & Carrysong Pty Ltd	8	27	13	28	16	27
55 Hancock & Hancock	8	23	12	17	14	18
56 McCalden & McCalden	6	26	10	23	12	23
58(1) Blanch & Blanch	12	28	18	30	19	29
58(2) Blanch & Blanch	12	30	16	31	18	30
59 Cassar & Cassar	14	25	19	28	22	28
60 Healy & Greenwood	15	28	16	35	23	37
65 Weismantle	11	24	16	27	16	27
69 Hooper & Bartholmew	15	26	19	29	18	28
70 Knight	15	26	16	31	20	34
71 Burnet & Burnet	14	26	18	28	17	27
202 Wenham	22	31	22	32	21	31
265 Stenstrom & Stenstrom	10	16	11	16	9	15
274 Wilson & Wilson	14	21	13	21	13	21
275 Pace Farm Pty Ltd	15	22	14	22	13	20
276 Luscombe & Luscombe	11	17	11	18	10	17
279 Cullum & Cullum	16	24	15	24	15	24
281 Lewis & Lewis	26	34	27	34	26	33
282 Ross	21	23	21	22	21	21
283 Nolan	22	24	22	25	22	24

ID No and Landowner	Project Year 2		Project Year 7		Project Year 10	
	Calm	Wind	Calm	Wind	Calm	Wind
284 Perrin & Perrin	24	24	25	25	24	24
285 Carter & Carter	21	26	22	25	21	24
287 Sinderberry & Rinkin	21	25	22	26	21	25
288 Perrin	21	27	22	26	21	26
289 Mcintosh	27	28	27	29	26	28
290 Ryan & Tordoff	22	30	23	31	22	30
291 Crawley & Crawley	24	30	24	30	24	30
292(1) Fisher & Fisher	17	24	18	25	17	24
293 Braunton	20	29	21	30	20	29
294 Morcom & Morcom	21	29	22	29	21	28
295 Bush & Bush	21	29	22	30	21	29
296 Watson & Watson	25	34	25	35	25	34
303 JSTC Newcastle Pty Ltd	17	27	20	30	18	28
304 Abeysekera & Abeysekera	15	26	19	30	18	29
307 Wolfenden & Wolfenden	14	24	17	29	16	28
316 Country Rail Infrastructure Authority	25	33	25	34	25	33
Craven						
Cr.7 Pryce-Jones	28	39	30	41	29	39
Stratford						
S1 Rees	23	31	23	31	22	31
S3 Yeatman	24	34	24	34	23	33
S4 Grady & Grady	22	29	22	29	21	29
S5 Britnell	24	30	24	30	23	30
S6 Threadgate & Threadgate	24	29	24	30	23	29
S8 Forbes	24	30	24	31	23	30
S9 Greenham & Greenham	24	31	24	32	23	31
S10 Germon	24	30	24	30	23	30
S11 Glew	24	33	24	34	23	33
S12 Mitchell & Mitchell	24	33	24	34	23	33
S13 Wells & Wells	25	34	25	34	25	34
S14 Bignell	24	30	24	30	23	30
S15 Minister for Education	26	34	26	35	25	34
S18 Whittall & Whittall	26	35	26	35	26	35
S19 Carroll	26	35	26	36	25	35
S20 McGrath	26	33	26	34	26	33
S21 Adams	26	34	26	34	26	33
S23 Bartlett	26	33	26	34	26	33
S24 Mavay	26	33	26	34	25	33
S26 Young	26	34	26	34	26	34
S27 Brown & Brown	26	34	26	34	25	34
S28 Morris & Morris	26	34	26	34	26	34
S29 Bagnall & Bagnall	26	34	26	35	26	34
S30 Baker	26	34	26	35	26	34
S31 Richards	26	34	26	35	26	34
S33 Langtry, Gilbert & Gilbert	26	35	26	35	26	34
S34 Ashby	27	35	27	36	26	35
S35 Rodgers & Bekker	27	35	27	36	26	35
S36 Platt & Platt	26	35	26	36	26	35
S37 Pryor & Pryor	27	35	26	36	26	35

ID No and Landowner	Project Year 2		Project Year 7		Project Year 10	
	Calm	Wind	Calm	Wind	Calm	Wind
S38 Kirkman	27	35	26	36	26	35
S39(1) Nicholls & Husband	26	35	26	36	26	35
S39(2) Nicholls & Husband	26	36	26	36	26	35
S40 Curtis	27	34	27	34	26	34
S41 Mcclure & Aplin	27	34	27	35	26	34
S43 Squire	26	34	26	35	26	34
S47 Potts	27	35	27	35	26	34
S48 Farley & Farley	27	35	27	35	26	35
S49 Blanch	27	35	27	35	26	35
S50 Vanderdrift & Blanch	27	35	27	36	26	35
S51 Trenholme	27	35	27	36	26	35
S52 Farley & Barry	27	35	27	36	26	35
S53 Arthur	27	35	27	36	26	35
S54 Adams	27	36	27	36	26	35
S56 Collins & Collins	27	34	27	35	27	34
S57 Gam	28	35	28	35	27	35
S58 Harrigan	28	35	28	35	27	35
S59 Grady & Grady	28	35	28	35	28	35
Receivers subject to Landholder Agreement						
14 Wenham & Wenham	22	32	22	33	21	32
15(1) Falla Superannuation	22	31	21	32	20	32
15(2) Falla Superannuation	22	31	21	32	20	31
15(3) Falla Superannuation	24	35	23	35	22	34
29 Ward	29	38	29	38	30	38
31(1) Isaac	33	38	33	38	32	38
31(2) Isaac	30	36	30	37	30	36
37 Worth	26	36	27	35	26	36
40 Leslie Allenby Blanch	33	41	34	42	33	41
42 Blanch	31	40	32	41	31	40
297 Bosma	25	34	26	35	25	34
298 Yates	24	34	25	35	24	34
Cr.2 Boorer	32	39	32	40	32	39
Resource company-owned Receivers						
6 AGL	20	31	19	30	18	30
13(1) AGL	22	33	21	32	20	31
13(2) AGL	38	43	38	43	38	43
4(1) GRL	13	22	13	21	12	21
4(2) GRL	13	21	12	21	10	21
4(4) GRL	13	25	12	23	10	23
4 (5) GRL	13	26	13	23	11	23
4(6) GRL	15	24	14	23	12	22
4(7) GRL	14	26	13	24	11	22
4(8) GRL	16	24	14	22	12	21
4(9) GRL	14	26	14	24	13	23
4(12) GRL	12	24	12	23	12	23
4(15) GRL	12	27	12	24	12	25
4(16) GRL	13	26	13	24	13	25
4(18) GRL	14	28	14	25	13	25
19(1) SCPL	29	38	30	38	29	38
19(2) SCPL	34	42	34	42	34	42

ID No and Landowner	Project Year 2		Project Year 7		Project Year 10	
	Calm	Wind	Calm	Wind	Calm	Wind
19(4) SCPL	26	34	26	35	26	34
19(5) SCPL	26	35	26	35	26	34
19(6) SCPL	31	39	32	40	31	39
19(7) SCPL	27	36	27	36	26	36
19(8) SCPL	31	39	32	40	32	39
19(9) SCPL	32	39	32	40	32	39
19(10) SCPL	32	39	33	40	32	39
19(11) SCPL	13	24	18	28	18	28
19(12) SCPL	32	40	33	41	32	40
19(13) SCPL	32	40	32	41	32	40
19(14) SCPL	31	39	32	40	32	39
19(15) SCPL	29	39	31	41	30	40
19(16) SCPL	29	39	31	41	30	40
19(17) SCPL	28	38	31	41	29	40
19(18) SCPL	28	38	31	41	30	40
19(19) SCPL	29	38	31	41	30	40
19(20) SCPL	29	39	32	41	30	40
19(21) SCPL	27	38	30	41	29	40
19(22) SCPL	21	33	24	35	25	35
19(23) SCPL	27	38	31	42	30	41
19(25) SCPL	23	32	28	39	30	40
19(26) SCPL	17	26	21	30	22	33
19(27) SCPL	15	24	18	29	19	31
19(28) SCPL	26	34	31	41	41	48
19(29) SCPL	22	33	21	33	20	32
19(30) SCPL	22	30	19	29	19	29
19(31) SCPL	12	30	17	33	25	34
19(32) SCPL	11	28	14	33	20	32
19(33) SCPL	22	33	17	30	15	29
19(34) SCPL	13	26	12	23	11	23
19(35) SCPL	10	22	15	27	14	28
19(36) SCPL	11	21	15	26	14	26
19(37) SCPL	10	22	15	27	14	27
19(38) SCPL	16	27	15	25	13	24
19(39) SCPL	32	39	33	40	32	39
19(40) SCPL	36	41	24	34	19	31
19(41) SCPL	30	32	31	32	30	32
19(42) SCPL	31	40	33	42	31	40
19(43) SCPL	25	34	30	40	40	48
19(45) SCPL	32	39	32	40	32	39
19(46) SCPL	32	39	32	40	32	39
19(47) SCPL	35	39	26	36	23	30

Note 1: All predicted noise levels from the relevant noise enhancing meteorological conditions (e.g. winds) in **Table 9** for each receiver.
Note 2: Predicted $L_{Aeq(15minute)}$ noise level complies with the intrusive PSNL.
Note 3: Predicted marginal noise exceedance 1 to 2 dBA above intrusive PSNL.
Note 4: Predicted moderate noise exceedance 3 to 5 dBA above intrusive PSNL.
Note 5: Predicted appreciable noise exceedance > 5 dBA above intrusive PSNL.

Sections 7.5 and **7.7** present a summary of potential impacts on private receivers and resource company-owned receivers, respectively.

7.4 Night-time Operating Intrusive and Sleep Disturbance Noise

The predicted night-time Year 2, Year 7 and Year 10 operating intrusive $L_{Aeq(15minute)}$ noise levels at the nearest receivers are presented in **Table 32** together with the sleep disturbance $L_{A1(1minute)}$ noise levels.

Table 32 Night-time Year 2, Year 7 and Year 10 Intrusive $L_{Aeq(15minute)}$ Noise (dBA re 20 µPa)

ID No and Landowner	Project Year 2			Project Year 7			Project Year 10		
	Calm	Inversion plus Drainage	LA1 (1min)	Calm	Inversion plus Drainage	LA1 (1min)	Calm	Inversion plus Drainage	LA1 (1min)
Stratford/Craven Rural Receivers									
1 Fraser	15	23	29	15	23	29	14	23	30
5(1) Bignell	17	25	31	17	25	31	16	24	31
5(2) Bignell	15	24	29	15	24	30	14	23	30
7 Burrell	17	24	30	16	23	28	15	24	30
9(1) Williams	20	27	32	19	26	33	18	25	32
9(2) Williams	21	27	33	20	27	33	19	26	33
10 Whatmore & Whatmore	21	27	34	21	27	34	20	26	34
11 Walker, Walker, Walker & Walker	21	28	34	21	28	35	20	27	34
16 Pickett	24	31	37	24	31	38	23	30	37
17 Fisher & Smith	23	30	37	23	31	37	22	29	36
23 Bagnall	24	37	43	18	29	35	16	25	32
24 Harris	13	26	33	16	27	34	16	26	34
25 Thompson	27	34	41	27	33	40	26	32	39
26 Lowrey & Lowrey	26	33	40	26	32	39	25	31	39
27 Gloucester Shire Council	25	32	39	25	32	39	24	31	39
34 Hall & Hall	25	35	43	25	35	44	24	35	43
36 Wallace & Wallace	29	38	46	29	39	47	29	38	47
36a(1) Berecry	4	8	16	0	7	15	4	7	14
36a(2) Berecry	5	20	27	2	22	28	5	17	24
38 Johnson & Johnson	25	33	40	25	32	39	25	31	39
39 Standen	32	40	48	33	41	49	32	40	48
43 Moseley	24	33	40	24	32	39	24	31	38
44 Cross & Jane	27	38	46	28	39	47	27	39	47
47 Digges, Digges, Hart & Hart	10	29	37	15	30	36	19	30	37
48 Rounsley	10	18	24	15	19	25	16	20	26
50 Porter	8	27	34	11	20	28	13	21	28
53 Barnes & Barnes	9	30	37	15	31	38	20	30	37
54 Hughes & Carrysong Pty Ltd	8	28	35	13	29	36	17	29	36
55 Hancock & Hancock	9	26	32	13	19	26	15	20	26
56 McCalden & McCalden	7	28	35	11	25	33	12	25	33
58(1) Blanch & Blanch	13	29	36	19	31	38	19	31	38
58(2) Blanch & Blanch	13	31	38	16	32	39	18	32	39
59 Cassar & Cassar	14	28	35	20	30	37	22	30	38
60 Healy & Greenwood	15	30	37	17	37	42	23	39	43
65 Weismantle	12	26	32	17	29	35	16	29	37
69 Hooper & Bartholmew	15	28	35	19	30	37	18	29	37
70 Knight	16	28	35	17	33	38	20	35	41

ID No and Landowner	Project Year 2			Project Year 7			Project Year 10		
	Calm	Inversion plus Drainage	LA1 (1min)	Calm	Inversion plus Drainage	LA1 (1min)	Calm	Inversion plus Drainage	LA1 (1min)
71 Burnet & Burnet	15	27	34	19	30	36	17	30	39
202 Wenham	23	30	37	22	30	37	22	29	36
265 Stenstrom & Stenstrom	11	16	23	11	16	24	10	16	23
274 Wilson & Wilson	14	21	26	14	21	27	13	21	29
275 Pace Farm Pty Ltd	15	22	27	15	22	28	14	19	27
276 Luscombe & Luscombe	12	17	25	12	18	26	10	17	24
279 Cullum & Cullum	16	24	30	16	24	30	15	23	31
281 Lewis & Lewis	27	33	41	27	33	41	27	33	40
282 Ross	22	31	39	22	31	38	21	30	38
283 Nolan	23	30	37	23	29	36	22	28	36
284 Perrin & Perrin	25	29	37	25	30	38	24	29	37
285 Carter & Carter	22	31	39	22	31	39	21	30	38
287 Sinderberry & Rinkin	22	30	38	23	30	38	21	29	38
288 Perrin	22	34	41	22	34	41	22	33	41
289 Mcintosh	27	33	41	27	33	41	27	33	41
290 Ryan & Tordoff	23	34	42	24	34	42	23	34	42
291 Crawley & Crawley	24	35	43	25	35	44	24	35	43
292(1) Fisher & Fisher	18	27	35	19	28	36	18	27	35
293 Braunton	20	32	40	21	33	40	20	32	41
294 Morcom & Morcom	21	32	40	22	32	40	21	32	40
295 Bush & Bush	21	32	40	22	33	40	21	32	40
296 Watson & Watson	25	36	44	26	37	45	25	37	45
303 JSTC Newcastle Pty Ltd	17	28	35	20	32	37	19	30	39
304 Abeysekera & Abeysekera	16	27	34	19	32	38	18	31	39
307 Wolfenden & Wolfenden	14	25	32	18	30	36	17	30	39
316 Country Rail Infrastructure Authority	26	33	40	26	33	40	26	33	40
Craven									
Cr.7 Pryce-Jones	28	40	48	31	43	49	29	41	48
Stratford									
S1 Rees	24	29	36	24	29	36	23	28	35
S3 Yeatman	25	32	39	25	33	40	24	32	39
S4 Grady & Grady	22	28	34	22	28	35	21	27	34
S5 Britnell	24	29	36	24	29	36	24	28	35
S6 Threadgate & Threadgate	24	29	36	24	29	36	24	28	35
S8 Forbes	25	30	36	25	30	37	24	29	36
S9 Greenham & Greenham	24	30	36	24	31	37	24	29	36
S10 Germon	25	29	36	25	29	37	24	29	36
S11 Glew	25	32	39	25	33	40	24	31	39
S12 Mitchell & Mitchell	25	32	39	25	33	40	24	31	39
S13 Wells & Wells	26	33	40	26	33	40	25	32	40
S14 Bignell	25	29	36	25	29	37	24	29	36
S15 Minister for Education	27	33	40	26	33	40	26	32	40
S18 Whittall & Whittall	27	34	41	27	34	41	26	33	41
S19 Carroll	26	34	41	26	34	41	26	33	41

ID No and Landowner	Project Year 2			Project Year 7			Project Year 10		
	Calm	Inversion plus Drainage	LA1 (1min)	Calm	Inversion plus Drainage	LA1 (1min)	Calm	Inversion plus Drainage	LA1 (1min)
S20 McGrath	27	33	40	27	33	40	26	32	40
S21 Adams	27	33	40	27	33	41	27	32	40
S23 Bartlett	27	33	40	27	33	40	26	32	40
S24 Mavay	27	33	40	26	33	40	26	32	40
S26 Young	27	33	40	27	33	41	26	32	40
S27 Brown & Brown	27	33	40	27	33	40	26	32	40
S28 Morris & Morris	27	33	40	27	33	40	26	32	40
S29 Bagnall & Bagnall	27	33	40	27	33	41	26	32	40
S30 Baker	27	34	41	27	34	41	27	33	41
S31 Richards	27	34	41	27	34	41	27	33	40
S33 Langtry, Gilbert & Gilbert	27	34	41	27	34	41	26	33	41
S34 Ashby	27	34	41	27	34	42	27	33	41
S35 Rodgers & Bekker	27	34	41	27	34	42	27	33	41
S36 Platt & Platt	27	34	41	27	34	42	27	33	41
S37 Pryor & Pryor	27	34	41	27	34	42	27	33	41
S38 Kirkman	27	34	42	27	34	42	27	33	41
S39(1) Nicholls & Husband	27	34	41	27	34	42	26	33	41
S39(2) Nicholls & Husband	27	34	42	27	34	42	27	34	41
S40 Curtis	27	33	41	27	34	41	27	33	41
S41 Mcclure & Aplin	27	33	41	27	34	41	27	33	41
S43 Squire	27	33	41	27	33	41	27	33	40
S47 Potts	27	34	41	27	34	41	27	33	41
S48 Farley & Farley	27	34	41	27	34	41	27	33	41
S49 Blanch	27	34	41	27	34	42	27	33	41
S50 Vanderdrift & Blanch	28	34	42	28	34	42	27	33	41
S51 Trenholme	27	34	41	27	34	42	27	33	41
S52 Farley & Barry	27	34	41	27	34	42	27	33	41
S53 Arthur	27	34	42	27	34	42	27	33	41
S54 Adams	27	34	42	27	35	42	27	34	42
S56 Collins & Collins	28	34	41	28	34	42	27	33	41
S57 Gam	28	34	42	28	34	42	28	34	42
S58 Harrigan	28	34	42	28	34	42	28	34	42
S59 Grady & Grady	29	34	42	29	35	42	28	34	42
Receivers subject to Landholder Agreement									
14 Wenham & Wenham	23	30	37	22	30	37	22	29	36
15(1) Falla Superannuation	23	29	36	22	30	36	21	29	35
15(2) Falla Superannuation	23	29	35	21	29	36	20	28	35
15(3) Falla Superannuation	25	31	37	23	31	38	23	30	37
29 Ward	29	37	45	30	37	45	30	37	45
31(1) Isaac	33	39	47	33	40	48	33	39	47
31(2) Isaac	31	37	45	31	37	45	31	36	45
37 Worth	27	37	46	28	38	46	27	37	46
40 Leslie Allenby Blanch	34	42	50	34	43	50	34	42	50
42 Blanch	31	41	49	33	42	50	32	41	49
297 Bosma	25	36	45	26	37	45	26	37	44

ID No and Landowner	Project Year 2			Project Year 7			Project Year 10		
	Calm	Inversion plus Drainage	LA1 (1min)	Calm	Inversion plus Drainage	LA1 (1min)	Calm	Inversion plus Drainage	LA1 (1min)
298 Yates	25	35	44	26	36	45	25	35	44
Cr.2 Boorer	32	40	48	33	41	49	33	40	48
Resource company-owned Receivers									
6 AGL	20	27	34	19	27	33	18	27	34
13(1) AGL	22	30	35	21	29	35	20	28	35
13(2) AGL	38	45	53	38	46	54	38	45	53
4(1) GRL	14	21	27	13	21	27	13	20	28
4(2) GRL	13	19	26	13	17	24	11	17	24
4(4) GRL	13	19	26	13	20	26	11	19	24
4 (5) GRL	14	22	29	13	21	27	12	19	25
4(6) GRL	15	21	27	14	20	27	12	19	26
4(7) GRL	14	22	29	13	21	28	12	19	25
4(8) GRL	16	21	29	14	20	28	12	19	26
4(9) GRL	14	23	31	14	22	28	13	20	27
4(12) GRL	13	22	28	13	22	27	12	21	28
4(15) GRL	13	21	25	13	23	27	12	23	29
4(16) GRL	14	21	26	14	22	27	14	23	29
4(18) GRL	15	22	27	15	23	28	14	23	30
19(1) SCPL	30	39	47	31	40	48	30	39	48
19(2) SCPL	35	46	54	35	46	54	35	45	54
19(4) SCPL	27	33	40	27	33	41	26	32	40
19(5) SCPL	27	33	41	27	34	41	26	33	41
19(6) SCPL	32	40	48	32	41	48	32	40	48
19(7) SCPL	27	35	42	27	35	42	27	34	42
19(8) SCPL	32	40	48	33	41	49	32	40	48
19(9) SCPL	32	40	48	33	42	49	33	41	48
19(10) SCPL	33	40	48	33	42	49	33	41	48
19(11) SCPL	14	26	33	19	29	36	18	30	38
19(12) SCPL	33	41	48	33	42	49	33	41	49
19(13) SCPL	32	41	48	33	42	49	33	41	48
19(14) SCPL	32	40	48	33	42	49	32	41	48
19(15) SCPL	29	40	48	32	43	49	30	42	50
19(16) SCPL	29	40	48	31	43	49	30	42	50
19(17) SCPL	29	40	47	31	43	49	30	41	50
19(18) SCPL	29	39	47	31	43	49	30	41	50
19(19) SCPL	29	40	47	32	43	49	30	41	50
19(20) SCPL	30	40	47	32	43	49	31	42	50
19(21) SCPL	28	39	47	31	43	49	29	41	50
19(22) SCPL	21	34	42	25	37	44	25	37	45
19(23) SCPL	28	39	46	32	44	49	31	43	51
19(25) SCPL	24	34	41	28	40	46	31	42	50
19(26) SCPL	18	27	34	21	32	38	23	34	41
19(27) SCPL	15	26	33	19	30	36	20	32	38
19(28) SCPL	26	36	43	31	42	47	42	49	54
19(29) SCPL	22	29	36	21	29	35	20	28	35

ID No and Landowner	Project Year 2			Project Year 7			Project Year 10		
	Calm	Inversion plus Drainage	LA1 (1min)	Calm	Inversion plus Drainage	LA1 (1min)	Calm	Inversion plus Drainage	LA1 (1min)
19(30) SCPL	23	27	35	20	25	33	19	25	33
19(31) SCPL	12	32	38	17	34	41	25	35	41
19(32) SCPL	12	30	37	15	35	41	21	34	39
19(33) SCPL	22	28	35	17	25	32	16	24	31
19(34) SCPL	14	21	28	13	20	26	11	18	25
19(35) SCPL	11	23	30	15	29	34	14	29	37
19(36) SCPL	11	23	30	15	27	33	14	27	34
19(37) SCPL	11	23	30	15	29	34	14	28	35
19(38) SCPL	16	24	31	16	22	29	14	21	28
19(39) SCPL	33	41	48	33	42	49	33	41	49
19(40) SCPL	36	43	48	25	32	38	19	29	36
19(41) SCPL	31	40	48	31	40	48	31	40	48
19(42) SCPL	31	41	49	33	44	50	32	41	49
19(43) SCPL	25	35	43	30	42	47	41	49	53
19(45) SCPL	32	40	48	33	41	49	32	41	48
19(46) SCPL	32	40	48	33	42	49	33	41	49
19(47) SCPL	36	41	47	25	32	39	23	30	37

Note 1: Presents the outer envelope (ie worst case) of the relevant noise enhancing meteorological conditions (e.g. winds and inversion conditions) in **Table 9** for each receiver.
Note 2: Predicted $L_{Aeq(15minute)}$ noise level complies with the intrusive PSNL.
Note 3: Predicted marginal noise exceedance 1 to 2 dBA above intrusive PSNL.
Note 4: Predicted moderate noise exceedance 3 to 5 dBA above intrusive PSNL.
Note 5: Predicted appreciable noise exceedance > 5 dBA above intrusive PSNL.

The outer envelope night-time intrusive $L_{Aeq(15minute)}$ intrusive noise contours for Year 2, Year 7 and Year 10 are presented in **Appendices G1**, **G2** and **G3**, respectively. The calculation of the noise contours involves numerical interpolation of a noise level array with a graphical accuracy of up to approximately ±2 dBA. This means that in some cases the contour locations presented in **Appendices G1** to **G3** will differ slightly from the values in **Table 32**.

7.5 Privately Owned Receivers - Impact Assessment Summary

In summary, the predicted noise levels show that:

- Compliance is generally determined by night-time noise levels, due to the noise enhancing meteorological conditions experienced at night-time.
- A total of 18 privately owned receivers exceed the PSNLs, including 13 receivers within the Noise Management Zone, and 5 receivers in the Noise Affectation Zone.
- During the daytime, up to 2 privately owned receivers are within the Noise Management Zone and no receiver is in the Noise Affectation Zone.
- During the evening, up to 10 privately owned receivers are within the Noise Management Zone and 2 receivers are in the Noise Affectation Zone.
- During the night-time, up to 11 privately owned receivers are within the Noise Management Zone and 5 receivers are in the Noise Affectation Zone.

Table 33 and **Table 34** present the privately owned receivers with predicted intrusive $L_{Aeq(15minute)}$ noise level exceedances of the PSNLs and predicted $L_{A1(1minute)}$ exceedances of the SDNLs.

Table 33 Privately Owned Receivers[1] with Intrusive PSNL Exceedances

Period	Noise Management Zone		Noise Affection Zone
	1 dBA to 2 dBA above PSNL	**3 dBA to 5 dBA above PSNL**	**> 5 dBA above PSNL**
Daytime	15(2)[3]	15(3)[3]	-
Evening	31(2)[3], 36, 37[3], 44, 60	29[2,3], 39, Cr.2[3], Cr.7, 31(1)[2,3]	42[3], 40[2,3]
Night-time	23, 29[2,3], 31(2)[3], 296, 297[3], 298[3]	36, 37[3], 44, 60, 31(1)[2,3]	39, 42[3], Cr.2[3], Cr.7, 40[2,3]

Note 1: Refer to **Appendix B1** for land ownership details.
Note 2: Receivers identified in the existing SCM Project Approval (DA 23-98/99) as being in the Noise Affectation Zone.
Note 3: Receivers subject to an existing Landholder Agreement.

Table 34 Privately Owned Receivers[1] with Night-time $L_{A1(1minute)}$ Criteria Exceedances

Period	Noise Management Zone		Noise Affection Zone
	1 dBA to 2 dBA above $L_{A1(1min)}$ 45 dBA	**3 dBA to 5 dBA above $L_{A1(1min)}$ 45 dBA**	**> 5 dBA above $L_{A1(1min)}$ 45 dBA**
Night-time	36, 37[3], 44	39, 42[3], Cr.2[3], Cr.7, 31(1)[2,3], 40[2,3]	-

Note 1: Refer to **Appendix B1** for land ownership details.
Note 2: Receivers identified in the existing SCM Project Approval (DA 23-98/99) as being in the Noise Affectation Zone.
Note 3: Receivers subject to an existing Landholder Agreement.

As described in **Section 5.3**, the sleep disturbance criteria are not considered by the EPA to be ideal, because the research into disturbance of sleep remains inconclusive and therefore it is not possible to develop noise level criteria for sleep disturbance that would have the equivalent level of confidence as those criteria used for annoyance reactions. For example, the highest predicted night-time $L_{A1(1minute)}$ a receiver 40 Leslie Allenby Blanch is 50 dBA and according to current research (refer **Section 5.3**) is perhaps unlikely to cause awakening reactions.

The highest noise levels presented in **Table 32** include night-time rail movements. An average of one movement and a maximum of up to three movements would occur at night, Therefore, these worst-case noise levels, which are perhaps unlikely to cause awakening reactions, would occur once a night period on average.

It is relevant to note that all of the receivers with predicted Night-time $L_{A1(1minute)}$ Criteria Exceedances would fall within the noise affectation zone for intrusive noise impacts, with the exception of receivers 31(1), 36, 37 and 44. Of these, 31(1) and 37 are subject to an existing Landholder Agreement, whilst receivers 36 and 44 are in the marginal (1 to 2 dBA exceedance) management zone.

Therefore, consistent with the discussion in **Section 5.4**, all of these receivers would be offered either:

- Reasonable and feasible acoustical mitigation at the receivers; or
- Negotiated agreements.

7.6 Privately Owned Vacant Land - Impact Assessment

The DP&I have previously advised that the noise impacts on vacant land are assessed on a “case by case” basis. **Table 35** identifies those properties for all scenarios where exceedances of the intrusive $L_{Aeq(15\ minute)}$ noise level is predicted for more than 25% of a vacant (potentially residential) property.

Table 35 Privately Owned Vacant Land[1] with Intrusive $L_{Aeq(15minute)}$ PSNL Exceedances

Period	Noise Management Zone	Noise Affectation Zone
	1 dBA to 5 dBA above PSNL	**> 5 dBA above PSNL**
Daytime	-	-
Evening	35[3]	32[2,3], Cr.1[2,3], 51
Night-time	-	32[2,3], 35[3], Cr.1[2,3], 51

Note 1: Refer to **Appendix B1** for land ownership details.
Note 2: Receivers identified in the existing SCM Project Approval (DA 23-98/99) as being in the Noise Affectation Zone.
Note 3: Receivers subject to an existing Landholder Agreement.

7.7 Resource Company-owned Receivers - Impact Assessment Summary

The existing and historic property acquisition strategy has resulted in a 'buffer' of SCPL-owned lands surrounding parts of the Stratford Mining Complex. Consequently, predicted noise levels are elevated at some resource company-owned properties.

In addition, a number of properties in the vicinity of the Project are owned by GRL and AGL.

In summary, the predicted operating intrusive $L_{Aeq(15minute)}$ noise levels at resource company-owned receivers show that:

- Compliance is generally determined by night-time noise levels, due to the noise enhancing meteorological conditions experienced at night-time.
- A total of 34 resource company-owned receivers exceed the PSNLs, including 7 receivers within the Noise Management Zone, and 27 receivers in the Noise Affectation Zone.
- During the daytime, up to 6 resource company-owned receivers are within the Noise Management Zone and 3 receivers are in the Noise Affectation Zone.
- During the evening, up to 12 resource company-owned receivers are within the Noise Management Zone and 16 receivers are in the Noise Affectation Zone.
- During the night-time, up to 3 resource company-owned receivers are within the Noise Management Zone and 26 receivers are in the Noise Affectation Zone.

Table 36 and **Table 37** present the resource company-owned receivers with predicted intrusive $L_{Aeq(15minute)}$ noise level exceedances of the PSNLs and predicted $L_{A1(1minute)}$ exceedances of the SDNLs.

Table 36 Resource Company-owned Receivers[1] with Intrusive PSNL Exceedances

Period	Noise Management Zone		Noise Affection Zone
	1 dBA to 2 dBA above PSNL	**3 dBA to 5 dBA above PSNL**	**> 5 dBA above PSNL**
Daytime	-	13(1), 13(2), 19(29), 19(33), 19(43), 19(47)	19(28), 19(30), 19(40)
Evening	19(7)	19(1), 19(6), 19(8), 19(9), 19(10), 19(14), 19(25), 19(39), 19(45), 19(46), 19(47),	13(2), 19(2), 19(12), 19(13), 19(15), 19(16), 19(17), 19(18), 19(19), 19(20), 19(21), 19(23), 19(28), 19(40), 19(42), 19(43),
Night-time	19(22)	19(1), 19(41)	13(2), 19(2), 19(6), 19(8), 19(9), 19(10), 19(12), 19(13), 19(14), 19(15), 19(16), 19(17), 19(18), 19(19), 19(20), 19(21), 19(23), 19(25), 19(28), 19(39), 19(40), 19(42), 19(43), 19(45), 19(46), 19(47)

Note 1: Refer to **Appendix B1** for land ownership details.

Table 37 Resource Company-owned Receivers[1] Night-time $L_{A1(1minute)}$ Criteria Exceedances

Period	Noise Management Zone		Noise Affection Zone
	1 dBA to 2 dBA above SDNL	**3 dBA to 5 dBA above SDNL**	**> 5 dBA above SDNL**
Night-time	19(47)	19(1), 19(6), 19(8), 19(9), 19(10), 19(12), 19(13), 19(14), 19(15), 19(16), 19(17), 19(18), 19(19), 19(20), 19(21), 19(25), 19(39), 19(40), 19(41), 19(42), 19(45), 19(46)	13(2), 19(2), 19(23), 19(28), 19(43)

Note 1: Refer to **Appendix B1** for land ownership details.

7.8 Review of Existing Stratford Mining Complex Noise Management Plan

It is recommended that the existing Stratford Mining Complex Noise Management Plan (**Section 2.3**) be reviewed and revised for the Project to include:

- The noise mitigation and management measures included in the Project noise model.
- Revised locations for operator attended compliance monitoring.
- A new real time noise monitoring site located in Stratford to assist with operational management of noise in accordance with the NMP.

In addition, the NMP would be updated to include a meteorological forecasting system. This system would predict meteorological conditions for the coming day to determine, one day in advance, where the risk of noise-enhancing weather conditions may occur (e.g. based on wind speed, direction and atmospheric stability). The predictive meteorological forecasting system would be used as part of a proactive management system and would work in conjunction with the real-time noise monitoring system, providing an alert for the appropriate personnel to review the real-time data and manage the intensity of activities for that day as may be required.

8 PROJECT AND CUMULATIVE NOISE AMENITY IMPACT ASSESSMENT

8.1 $L_{Aeq(Period)}$ Noise Amenity Criteria

The INP provides non-mandatory cumulative noise assessment guidelines that address existing and successive industrial development by setting acceptable (and maximum) cumulative $L_{Aeq(period)}$ noise amenity levels for all industrial noise sources only (ie non-transport related) for a particular land use. It is noted that the INP does not set acceptable cumulative $L_{Aeq(15minute)}$ intrusive criteria for all industrial noise sources, but rather seeks to control cumulative noise via the $L_{Aeq(period)}$ noise amenity criterion (refer **Section 5.2**).

8.2 Project Operating Noise Amenity Levels

The predicted mine operating Year 2, Year 7 and Year 10 $L_{Aeq(period)}$ noise amenity levels at the nearest receivers are presented in **Table 38**.

Table 38 Year 2, Year 7 and Year 10 $L_{Aeq(period)}$ Noise Amenity (dBA re 20 µPa)

ID No and Landowner	Project Year 2			Project Year 7			Project Year 10		
	Day	Evening	Night	Day	Evening	Night	Day	Evening	Night
Stratford/Craven Rural Receivers									
1 Fraser	22	19	18	17	18	17	17	18	17
5(1) Bignell	23	20	20	19	20	19	19	20	18
5(2) Bignell	22	20	18	18	19	18	17	19	17
7 Burrell	21	21	19	19	19	18	16	20	18
9(1) Williams	26	23	22	22	23	21	22	23	20
9(2) Williams	27	23	23	23	23	22	23	23	20
10 Whatmore & Whatmore	27	23	24	23	23	23	23	23	22
11 Walker, Walker, Walker & Walker	27	24	24	23	24	23	23	24	22
16 Pickett	27	26	27	25	26	26	24	25	25
17 Fisher & Smith	27	25	26	26	26	26	25	25	24
23 Bagnall	29	30	33	21	26	24	18	23	21
24 Harris	15	22	24	14	22	25	14	22	24
25 Thompson	28	26	30	26	26	30	26	26	29
26 Lowrey & Lowrey	27	26	30	25	26	29	25	25	28
27 Gloucester Shire Council	28	27	28	26	28	28	26	27	27
34 Hall & Hall	23	26	32	23	27	32	22	26	31
36 Wallace & Wallace	26	32	35	26	32	36	25	32	35
36a(1) Berecry	5	12	4	3	13	2	4	11	4
36a(2) Berecry	6	18	13	4	16	14	4	12	11
38 Johnson & Johnson	27	24	29	24	25	29	24	24	28
39 Standen	31	37	39	30	37	39	29	36	39
43 Moseley	26	24	29	23	24	29	23	23	28
44 Cross & Jane	26	33	36	25	34	37	24	33	36
47 Digges, Digges, Hart & Hart	11	25	27	12	25	27	15	25	27
48 Rounsley	11	13	15	13	16	17	14	17	18
50 Porter	7	21	23	8	13	16	10	15	17
53 Barnes & Barnes	10	26	27	12	25	27	16	26	27
54 Hughes & Carrysong Pty Ltd	10	23	25	10	24	26	14	24	26
55 Hancock & Hancock	8	19	21	10	14	16	13	16	17
56 McCalden & McCalden	7	22	24	6	17	20	8	17	20
58(1) Blanch & Blanch	15	25	28	16	27	29	17	27	29
58(2) Blanch & Blanch	14	27	29	14	28	30	16	28	30

ID No and Landowner	Project Year 2			Project Year 7			Project Year 10		
	Day	Evening	Night	Day	Evening	Night	Day	Evening	Night
59 Cassar & Cassar	15	23	25	17	25	28	20	26	28
60 Healy & Greenwood	14	26	28	14	32	34	20	34	36
65 Weismantle	14	22	24	14	25	27	14	24	27
69 Hooper & Bartholmew	16	24	26	17	26	29	16	25	28
70 Knight	15	24	26	14	27	31	18	31	33
71 Burnet & Burnet	17	23	25	16	25	28	15	24	27
202 Wenham	27	25	26	25	26	26	25	25	24
265 Stenstrom & Stenstrom	16	11	13	14	11	14	14	10	13
274 Wilson & Wilson	18	15	18	16	15	17	16	15	17
275 Pace Farm Pty Ltd	20	16	18	18	17	17	18	14	16
276 Luscombe & Luscombe	17	12	14	15	13	15	15	12	14
279 Cullum & Cullum	22	18	20	18	18	19	18	18	19
281 Lewis & Lewis	28	28	30	27	28	30	27	28	29
282 Ross	23	21	28	22	21	27	21	20	26
283 Nolan	27	21	27	23	22	26	23	21	25
284 Perrin & Perrin	26	23	27	26	24	28	25	23	27
285 Carter & Carter	23	22	28	21	21	28	20	21	27
287 Sinderberry & Rinkin	21	22	27	21	22	27	20	21	26
288 Perrin	21	23	30	20	22	30	19	22	29
289 Mcintosh	27	26	30	26	26	31	26	26	30
290 Ryan & Tordoff	22	26	31	20	27	31	20	26	31
291 Crawley & Crawley	23	26	31	22	26	32	22	26	31
292(1) Fisher & Fisher	17	20	25	17	21	26	17	20	25
293 Braunton	20	25	29	18	25	30	18	24	29
294 Morcom & Morcom	21	25	29	19	25	30	19	24	29
295 Bush & Bush	21	25	30	19	26	30	19	25	29
296 Watson & Watson	24	30	34	23	31	35	22	30	34
303 JSTC Newcastle Pty Ltd	19	24	26	18	27	30	17	25	28
304 Abeysekera & Abeysekera	17	23	26	17	27	30	16	26	29
307 Wolfenden & Wolfenden	16	22	24	15	26	29	14	25	28
316 Country Rail Infrastructure Authority	27	27	29	26	28	29	26	27	29
Craven									
Cr.7 Pryce-Jones	28	36	38	28	38	41	27	37	39
Stratford									
S1 Rees	28	25	26	27	25	25	26	25	24
S3 Yeatman	29	28	28	27	28	28	26	27	27
S4 Grady & Grady	27	23	24	26	23	24	25	23	23
S5 Britnell	28	25	26	27	25	26	27	24	25
S6 Threadgate & Threadgate	28	24	26	27	24	25	27	24	25
S8 Forbes	29	25	26	27	26	27	27	25	25
S9 Greenham & Greenham	28	26	26	27	26	27	26	25	25
S10 Germon	29	25	26	27	25	26	27	24	25
S11 Glew	28	27	28	26	28	28	26	27	27
S12 Mitchell & Mitchell	28	27	28	27	28	28	26	27	27
S13 Wells & Wells	29	28	29	27	28	29	27	28	28
S14 Bignell	29	25	26	27	25	26	27	24	25
S15 Minister for Education	29	28	30	27	29	29	27	28	28
S18 Whittall & Whittall	30	29	30	28	29	29	28	29	29
S19 Carroll	29	29	29	28	29	29	28	29	29

ID No and Landowner	Project Year 2			Project Year 7			Project Year 10		
	Day	Evening	Night	Day	Evening	Night	Day	Evening	Night
S20 McGrath	29	28	30	27	28	29	27	27	28
S21 Adams	29	28	30	27	28	29	27	28	29
S23 Bartlett	29	28	30	27	28	29	27	27	28
S24 Mavay	29	28	29	27	28	29	27	27	28
S26 Young	29	28	30	27	29	29	27	28	29
S27 Brown & Brown	29	28	30	27	28	29	27	28	28
S28 Morris & Morris	29	28	30	27	28	29	27	28	28
S29 Bagnall & Bagnall	29	28	30	27	29	29	27	28	28
S30 Baker	29	29	30	28	29	30	27	28	29
S31 Richards	30	29	30	28	29	29	27	28	29
S33 Langtry, Gilbert & Gilbert	30	29	30	28	29	29	27	28	29
S34 Ashby	29	29	30	28	29	30	28	29	29
S35 Rodgers & Bekker	30	29	30	28	29	30	28	29	29
S36 Platt & Platt	30	29	30	28	30	30	28	29	29
S37 Pryor & Pryor	30	29	30	28	30	30	28	29	29
S38 Kirkman	30	30	30	28	30	30	28	29	29
S39(1) Nicholls & Husband	30	29	30	28	30	30	28	29	29
S39(2) Nicholls & Husband	30	30	30	28	30	30	28	29	29
S40 Curtis	28	28	30	27	29	30	27	28	29
S41 Mcclure & Aplin	29	28	30	27	29	30	27	28	29
S43 Squire	29	28	30	27	29	30	27	28	29
S47 Potts	29	29	30	28	29	30	28	28	29
S48 Farley & Farley	29	29	30	28	29	30	28	29	29
S49 Blanch	29	29	30	28	29	30	28	29	29
S50 Vanderdrift & Blanch	29	29	31	28	29	30	28	29	29
S51 Trenholme	29	29	30	28	29	30	28	29	29
S52 Farley & Barry	29	29	30	28	29	30	28	29	29
S53 Arthur	30	29	30	28	30	30	28	29	29
S54 Adams	30	30	31	28	30	30	28	29	30
S56 Collins & Collins	28	29	30	27	29	31	27	28	30
S57 Gam	29	29	31	27	29	31	27	29	30
S58 Harrigan	29	29	31	27	29	31	27	29	30
S59 Grady & Grady	29	29	31	27	29	31	27	29	30
Receivers subject to Landholder Agreement									
14 Wenham & Wenham	28	26	25	26	26	25	26	25	24
15(1) Falla Superannuation	29	25	25	26	26	24	26	25	23
15(2) Falla Superannuation	31	25	24	28	26	24	28	25	22
15(3) Falla Superannuation	33	28	27	31	28	25	30	28	24
29 Ward	30	32	32	29	32	32	30	32	33
31(1) Isaac	31	33	36	30	33	36	30	33	36
31(2) Isaac	29	31	34	28	31	34	29	31	34
37 Worth	26	33	35	25	31	36	25	33	35
40 Leslie Allenby Blanch	32	39	41	32	39	41	31	38	41
42 Blanch	30	37	39	30	39	41	30	38	40
297 Bosma	24	30	34	23	31	35	23	31	34
298 Yates	24	31	33	23	31	34	23	31	33
Cr.2 Boorer	31	37	39	30	38	40	30	37	39
Stratford/Craven Non-Residential Receivers									
30 Stratford Cemetery	29	30	31	28	30	31	28	30	30

ID No and Landowner	Project Year 2			Project Year 7			Project Year 10		
	Day	Evening	Night	Day	Evening	Night	Day	Evening	Night
S15 Stratford Public School	28	27	29	26	28	28	26	27	28
S25 St John's Anglican Church	29	28	29	27	28	29	27	28	28
Resource company-owned Receivers									
6 AGL	29	25	22	24	24	21	25	23	21
13(1) AGL	32	26	24	27	26	23	28	25	22
13(2) AGL	35	40	43	35	40	43	35	40	43
4(1) GRL	19	16	16	16	16	16	16	15	15
4(2) GRL	20	16	14	16	15	13	14	15	12
4(4) GRL	18	18	15	14	17	15	12	16	13
4 (5) GRL	18	20	16	15	17	15	13	17	14
4(6) GRL	20	18	16	16	17	16	15	16	14
4(7) GRL	19	20	17	16	18	16	15	16	14
4(8) GRL	20	18	18	16	17	16	15	15	14
4(9) GRL	19	20	17	16	18	16	15	17	15
4(12) GRL	19	18	16	15	17	16	15	17	16
4(15) GRL	18	21	15	15	18	16	14	18	17
4(16) GRL	20	19	16	16	18	17	16	18	17
4(18) GRL	21	22	17	17	19	17	17	19	17
19(1) SCPL	29	34	37	28	35	38	27	34	37
19(2) SCPL	31	38	42	31	38	42	31	38	42
19(4) SCPL	29	28	30	28	29	29	27	28	28
19(5) SCPL	30	29	30	28	29	29	27	28	28
19(6) SCPL	30	36	39	30	37	39	29	36	38
19(7) SCPL	30	30	31	28	30	30	28	29	30
19(8) SCPL	31	36	38	30	37	40	30	37	39
19(9) SCPL	31	37	39	30	38	40	30	37	39
19(10) SCPL	31	37	39	30	38	40	30	37	39
19(11) SCPL	16	22	24	17	25	28	16	26	28
19(12) SCPL	31	37	39	31	38	40	30	37	39
19(13) SCPL	31	37	39	30	38	40	30	38	40
19(14) SCPL	30	37	39	30	38	40	30	37	39
19(15) SCPL	29	37	39	29	38	41	28	37	40
19(16) SCPL	28	37	39	29	38	41	28	37	40
19(17) SCPL	28	36	38	29	38	41	27	37	40
19(18) SCPL	28	36	38	29	38	41	27	37	40
19(19) SCPL	29	36	38	29	38	41	28	37	40
19(20) SCPL	29	36	38	30	38	41	28	37	40
19(21) SCPL	27	35	37	29	38	41	27	37	39
19(22) SCPL	22	30	32	23	33	35	23	32	35
19(23) SCPL	28	35	37	30	39	41	28	38	40
19(25) SCPL	23	30	32	26	36	39	28	37	40
19(26) SCPL	19	23	25	20	28	30	21	30	33
19(27) SCPL	16	22	24	17	27	29	18	28	30
19(28) SCPL	25	32	34	28	39	41	39	46	48
19(29) SCPL	34	27	24	27	26	23	28	26	23
19(30) SCPL	41	24	24	28	23	21	27	23	21
19(31) SCPL	13	27	29	15	30	31	21	30	32
19(32) SCPL	12	25	27	12	30	32	17	28	30
19(33) SCPL	33	26	23	21	24	19	20	22	18

ID No and Landowner	Project Year 2			Project Year 7			Project Year 10		
	Day	Evening	Night	Day	Evening	Night	Day	Evening	Night
19(34) SCPL	18	19	16	15	17	15	13	16	13
19(35) SCPL	13	20	22	13	25	27	13	25	27
19(36) SCPL	13	19	21	14	24	26	14	23	25
19(37) SCPL	13	20	22	13	25	27	13	24	27
19(38) SCPL	22	21	18	17	19	17	16	18	16
19(39) SCPL	31	37	39	31	38	40	30	37	39
19(40) SCPL	38	38	40	27	28	27	23	24	25
19(41) SCPL	29	30	37	29	30	37	29	30	36
19(42) SCPL	30	38	39	31	39	42	30	38	40
19(43) SCPL	25	32	33	27	38	40	38	46	47
19(45) SCPL	31	37	39	30	37	40	30	37	39
19(46) SCPL	31	37	39	31	38	40	30	37	39
19(47) SCPL	37	37	38	30	30	29	26	26	27

Note 1: All predicted noise levels from the worst case meteorological conditions in **Table 9** for each receiver.
Note 2: Predicted $L_{Aeq(period)}$ noise level complies with the amenity (INP acceptable) PSNL.
Note 3: Predicted marginal noise exceedance 1 to 2 dBA above amenity (INP acceptable) PSNL.
Note 4: Predicted moderate noise exceedance 3 to 5 dBA above amenity (INP acceptable) PSNL.
Note 5: Predicted appreciable noise exceedance > 5 dBA above amenity (INP acceptable) PSNL.

Sections 8.2.1 and **8.2.2** present a summary of potential impacts on private receivers and resource company-owned receivers, respectively.

8.2.1 Privately Owned Receivers - Impact Assessment

In summary, the predicted $L_{Aeq(period)}$ amenity noise levels show that:

- Compliance is generally determined by night-time noise levels, due to the noise enhancing meteorological conditions experienced at night-time.
- No receiver exceeds the INP recommended maximum amenity noise level.
- A total of 3 privately owned receivers exceed the PSNL, including 3 receivers within the Noise Management Zone and no receivers in the Noise Affectation Zone.
- During the daytime and evening, no privately owned receivers exceed the recommended acceptable amenity criteria.
- During the night-time, up to 3 privately owned receivers are within the Noise Management Zone and no receivers are in the Noise Affectation Zone.

Table 39 presents the privately owned receivers with predicted $L_{Aeq(period)}$ amenity noise level exceedance of the PSNLs.

Table 39 Privately Owned Receivers[1] with $L_{Aeq(period)}$ PSNL Exceedances

Period	Noise Management Zone		Noise Affection Zone
	1 dBA to 2 dBA above PSNL	3 dBA to 5 dBA above PSNL	> 5 dBA above PSNL
Daytime	-	-	-
Evening	-	-	-
Night-time	Cr.7, 40[2,3], 42[3]	-	-

Note 1: Refer to **Appendix B1** for land ownership details.
Note 2: Receivers identified in the existing SCM Project Approval (DA 23-98/99) as being in the Noise Affectation Zone.
Note 3: Receivers subject to an existing Landholder Agreement.

8.2.2 Resource Company-owned Receivers - Impact Assessment

In summary, the predicted $L_{Aeq(period)}$ amenity noise levels show that:

- Compliance is generally determined by night-time noise levels, due to the noise enhancing meteorological conditions experienced at night-time.
- A total of 13 resource company-owned receivers exceed the PSNLs, including 11 receivers within the Noise Management Zone, and 2 receiver in the Noise Affectation Zone.
- During the daytime, no resource company-owned receivers are within the Noise Management or the Noise Affectation Zone.
- During the evening, up to 2 resource company-owned receiver is within the Noise Management Zone and no receivers are in the Noise Affectation Zone.
- During the night-time, up to 11 resource company-owned receivers are within the Noise Management Zone and 2 receivers are in the Noise Affectation Zone.

Table 40 presents the resource company-owned receivers with predicted $L_{Aeq(period)}$ amenity noise level exceedance of the PSNLs.

Table 40 Resource Company-owned Receivers[1] with $L_{Aeq(period)}$ PSNL Exceedances

Period	Noise Management Zone		Noise Affection Zone
	1 dBA to 2 dBA above PSNL	**3 dBA to 5 dBA above PSNL**	**> 5 dBA above PSNL**
Daytime	-	-	-
Evening	19(28), 19(43)	-	-
Night-time	19(2), 19(15), 19(16), 19(17), 19(18), 19(19), 19(20), 19(21), 19(23), 19(42)	13(2)	19(28), 19(43)

Note 1: Refer to **Appendix B1** for land ownership details.

8.2.3 Consideration of other Land Uses

The Stratford cemetery, Stratford Public School and St John's Anglican Church (also in Stratford) were all modelled as amenity noise receivers (**Table 38**). The predicted noise levels at all three receivers are below the relevant INP amenity criteria (**Table 21**).

In addition, from review of the Gloucester LEP land use zoning (**Appendix B4**), it is noted that two other land use areas exist in the vicinity of the Project, *viz*. heavy industrial (Parkers Road) and public recreation (located south of Stratford).

From review of the noise levels in **Table 38** and the relevant criteria that apply to these zones (**Table 21**), it is considered that the Project amenity noise levels would comply with the relevant INP criteria. These zones are not considered further in this report.

8.3 Existing, Approved and Proposed Industrial Developments

A summary of the major existing, approved and proposed industrial developments in the vicinity of the Stratford Coal Extension Project is presented in **Table 41**. The locations of these projects are shown on the Project Interactions figure (**Appendix B3)**. In addition, predicted noise levels from the Duralie Extension Project were also conservatively considered. The estimated mine operating evening and night-time $L_{Aeq(period)}$ noise amenity levels from each these developments have been established by reviewing the environmental assessments (where available). These are then used for the purposes of the cumulative evening and night-time noise amenity assessment.

Table 41 Existing, Approved or Proposed Developments in the Vicinity of the Project

Development Site	Approval Date	Consent	Status	Source of Noise Data
SCM	26 Nov 2010	DA 23-98/99	Existing/ Approved[1]	SCM Mine Operating Modification Heggies Pty Ltd Report 10-3140R4 dated 9 June 2010
BRNOC	26 Nov 2010	DA 39-02-01		
AGL Gloucester Gas Project	22 Feb 2011	PA 08_0154	Approved	AGL Gloucester Gas Project (GGP) Environmental Assessment (EA) AECOM Volume 3 Appendix H dated October 2009
Duralie Extension Project	26 Nov 2010	PA 08_0203	Existing/ Approved	Duralie Extension Project Heggies Pty Ltd Report 10-6173R2R1 dated 18 January 2010
Stratford Extension Project	-	-	Proposed	As presented in this assessment report
Rocky Hill Coal Project	-	-	Proposed	Rocky Hill Coal Project Documentation Supporting an Application for Director-General's Requirements (GRL, 2012)[2] - conformance with PSNLs

Note 1: The existing SCM and BRNOC operations to be replaced by the proposed Project.

Note 2: Documentation Supporting an Application for Director-General's Requirements for the Rocky Hill Coal Project (GRL, 2012).

The various assumptions used for the evening and night-time cumulative assessment are presented in **Table 42**.

Table 42 Existing, Approved or Proposed Developments Noise Modelling Assumptions

Stratford Extension Project	Duralie Extension Project	AGL Project (Gas Field) as per GGP EA	AGL Project (Process Facility) as per GGP EA	Rocky Hill Coal Project
Outer envelope (ie worst case) of Year 2, Year 7 and Year 10	Neutral evening and night-time levels at location 100	200 m minimum distance between a well and a receiver	Determination of the SWL using predicted SPL at several receivers	Complies with intrusive criteria 35 dBA at any one receiver
Calculated evening period adjusted for intrusive to amenity (-4.7 dBA)	Adopted evening period adjusted for intrusive to amenity (-4.7 dBA)	Generator SWL 80 dBA, well SWL 70 dBA and SWL 27 dBA at 200 m	Assume constant noise and intrusive and amenity levels are equivalent	Calculated evening period adjusted for intrusive to amenity (-4.7 dBA)
Calculated night-time period adjustment for intrusive to amenity (-3.4 dBA)	Adopted night-time period adjustment for intrusive to amenity (-3.4 dBA)	4 wells per location and 2 locations impacting at any one receiver	Outer envelope from either Site1 and Site 7 (ie worst case)	Calculated night-time period adjustment for intrusive to amenity (-3.4 dBA)

Note 1: The above adjustments for converting intrusive noise levels to amenity noise levels adopted from the results of unattended noise monitoring conducted by SLR Consulting at the SCM.

In relation to the Rocky Hill Coal Project, noise levels have been assumed to be compliant with the INP intrusiveness criteria in accordance with the following statements in the Documentation Supporting an Application for Director-General's Requirements (GRL, 2012).

> *The Applicant would investigate and introduce further design and operational safeguards to ensure that the levels of noise experienced in the local community satisfy the relevant noise criteria.*
>
> *…*
>
> *The noise modelling and assessment will assist in the refinement, and establish the effectiveness, of the various design and operational safeguards to be adopted to attenuate the noise generated by the mobile and static earthmoving equipment so as to achieve compliance with the relevant criteria under both calm and adverse weather conditions.*
>
> *The noise assessment will also assess the noise generated by the Applicant's proposed mining operations together with the noise from other existing and proposed developments to ensure the combined or cumulative noise levels comply with the nominated criteria.*

Given predicted noise levels are required to be compliant at non project-related residences during adverse weather conditions and such conditions only occur periodically, operational noise levels at most other times would be lower and therefore acceptable throughout the community throughout the life of the proposed coal mine.

The assessment will also address both road traffic and rail noise impacts, identify the design and operational safeguards required to achieve compliance with the relevant criteria, and conclude with details of the proposed noise and vibration monitoring program.

In relation to the AGL Gloucester Gas Project, although the Project EIS generally considers only proposed gas wells and associated infrastructure located outside of existing mining tenements at the Stratford Mining Complex and Project Mining Lease Application Areas (MLAs), cumulative noise from the gas field has conservatively not restricted wells to outside of mining tenements and Project MLAs.

8.4 Cumulative Evening Noise Amenity Assessment

In accordance with the INP Chapter 2 Industrial Noise Criteria (Section 2.2.4), the evening cumulative sum of the existing, approved and proposed developments $L_{Aeq(4hour)}$ noise amenity levels have been determined as presented in **Table 43**. It should be noted that for each of the developments noted below, the likelihood of the existing, approved and proposed developments emitting simultaneous maximum noise emissions is remote, due to the range of development locations and directional and other differences in the noise enhancing weather effects. This cumulative assessment is therefore considered to be conservative.

Table 43 Cumulative Evening ($L_{Aeq(4hour)}$) Noise Amenity Levels (dBA re 20 µPa)

Property Number/Landowner	Stratford Extension Project[1]	Duralie Extension Project	AGL Project (Gas Field)	AGL Project (Process Facility)	Rocky Hill Coal Project	Cumulative Sum
Stratford/Craven Rural Receivers						
1 Fraser	19	11	30	29	30	35
5(1) Bignell	20	12	16	29	30	33
5(2) Bignell	20	12	30	33	30	36
7 Burrell	21	12	30	34	30	37
9(1) Williams	23	12	21	29	30	34
9(2) Williams	23	12	18	29	30	33
10 Whatmore & Whatmore	23	13	4	26	30	32
11 Walker, Walker, Walker & Walker	24	13	7	26	30	32
16 Pickett	26	13	17	25	30	33
17 Fisher & Smith	26	14	21	26	30	33
23 Bagnall	30	14	19	21	30	34
24 Harris	22	19	0	22	30	32
25 Thompson	26	14	14	27	30	33
26 Lowrey & Lowrey	26	14	14	27	30	33
27 Gloucester Shire Council	28	14	20	27	30	34
34 Hall & Hall	27	15	0	28	30	34
36 Wallace & Wallace	32	16	5	28	30	35
36a(1) Berecry	16	11	0	21	30	31
36a(2) Berecry	18	11	0	22	30	31
38 Johnson & Johnson	24	14	4	26	30	32
39 Standen	37	17	30	31	30	39
43 Moseley	24	14	0	26	30	32
44 Cross & Jane	33	17	17	28	30	36
47 Digges, Digges, Hart & Hart	25	17	0	21	30	32
48 Rounsley	17	17	0	21	30	31

Property Number/Landowner	Stratford Extension Project[1]	Duralie Extension Project	AGL Project (Gas Field)	AGL Project (Process Facility)	Rocky Hill Coal Project	Cumulative Sum
50 Porter	21	17	0	20	30	31
53 Barnes & Barnes	26	18	0	22	30	32
54 Hughes & Carrysong Pty Ltd	24	18	0	21	30	32
55 Hancock & Hancock	19	17	0	20	30	31
56 McCalden & McCalden	22	17	0	19	30	31
58(1) Blanch & Blanch	27	19	0	23	30	33
58(2) Blanch & Blanch	28	19	3	24	30	33
59 Cassar & Cassar	26	19	1	23	30	32
60 Healy & Greenwood	34	18	0	21	30	36
65 Weismantle	25	21	0	20	30	32
69 Hooper & Bartholmew	26	20	0	21	30	32
70 Knight	31	20	0	19	30	34
71 Burnet & Burnet	25	19	0	22	30	32
202 Wenham	26	13	21	25	30	33
265 Stenstrom & Stenstrom	17	11	0	20	30	31
274 Wilson & Wilson	16	11	0	22	30	31
275 Pace Farm Pty Ltd	21	12	0	24	30	32
276 Luscombe & Luscombe	19	12	0	21	30	31
279 Cullum & Cullum	20	12	0	24	30	32
281 Lewis & Lewis	29	14	21	28	30	34
282 Ross	22	14	0	24	30	32
283 Nolan	22	13	0	23	30	32
284 Perrin & Perrin	24	14	0	27	30	33
285 Carter & Carter	22	14	0	24	30	32
287 Sinderberry & Rinkin	23	15	0	25	30	32
288 Perrin	23	14	0	25	30	32
289 Mcintosh	26	15	9	31	30	34
290 Ryan & Tordoff	27	16	0	25	30	33
291 Crawley & Crawley	26	15	0	28	30	33
292(1) Fisher & Fisher	22	16	0	23	30	32
293 Braunton	25	16	0	23	30	32
294 Morcom & Morcom	25	16	0	23	30	32
295 Bush & Bush	26	16	0	24	30	32
296 Watson & Watson	30	16	0	27	30	34
303 JSTC Newcastle Pty Ltd	27	19	0	22	30	33
304 Abeysekera & Abeysekera	27	20	0	21	30	33
307 Wolfenden & Wolfenden	26	21	0	20	30	32
316 Country Rail Infrastructure Authority	28	14	22	28	30	34
Craven						
Cr.7 Pryce-Jones	37	17	30	29	30	39
Stratford						
S1 Rees	25	14	22	26	30	33
S3 Yeatman	28	14	26	26	30	34
S4 Grady & Grady	23	14	20	26	30	33
S5 Britnell	25	14	20	27	30	33
S6 Threadgate & Threadgate	24	14	20	27	30	33
S8 Forbes	26	14	21	27	30	33

Property Number/Landowner	Stratford Extension Project[1]	Duralie Extension Project	AGL Project (Gas Field)	AGL Project (Process Facility)	Rocky Hill Coal Project	Cumulative Sum
S9 Greenham & Greenham	26	14	22	26	30	33
S10 Germon	25	14	21	27	30	33
S11 Glew	28	14	22	27	30	34
S12 Mitchell & Mitchell	28	14	22	27	30	34
S13 Wells & Wells	28	14	23	27	30	34
S14 Bignell	25	14	19	27	30	33
S15 Minister for Education	28	14	22	27	30	34
S18 Whittall & Whittall	29	14	26	27	30	34
S19 Carroll	29	14	30	27	30	35
S20 McGrath	28	14	18	27	30	34
S21 Adams	28	14	18	27	30	34
S23 Bartlett	28	14	18	27	30	34
S24 Mavay	28	14	19	27	30	34
S26 Young	29	14	20	27	30	34
S27 Brown & Brown	28	14	21	27	30	34
S28 Morris & Morris	28	14	21	27	30	34
S29 Bagnall & Bagnall	29	14	22	27	30	34
S30 Baker	29	14	23	27	30	34
S31 Richards	29	14	23	27	30	34
S33 Langtry, Gilbert & Gilbert	29	14	24	27	30	34
S34 Ashby	30	14	24	28	30	35
S35 Rodgers & Bekker	29	14	25	28	30	34
S36 Platt & Platt	30	14	26	28	30	35
S37 Pryor & Pryor	30	14	26	28	30	35
S38 Kirkman	30	14	27	28	30	35
S39(1) Nicholls & Husband	30	14	30	28	30	36
S39(2) Nicholls & Husband	30	14	30	28	30	36
S40 Curtis	29	14	20	28	30	34
S41 Mcclure & Aplin	29	14	21	28	30	34
S43 Squire	29	14	21	28	30	34
S47 Potts	29	14	22	28	30	34
S48 Farley & Farley	29	14	23	28	30	34
S49 Blanch	29	14	23	28	30	34
S50 Vanderdrift & Blanch	30	14	24	28	30	35
S51 Trenholme	29	14	24	28	30	34
S52 Farley & Barry	30	14	25	28	30	35
S53 Arthur	30	14	25	28	30	35
S54 Adams	30	14	26	28	30	35
S56 Collins & Collins	29	14	25	28	30	35
S57 Gam	29	14	27	29	30	35
S58 Harrigan	29	14	30	29	30	36
S59 Grady & Grady	29	14	30	29	30	36
Receivers subject to Landholder Agreement						
14 Wenham & Wenham	26	13	21	26	30	33
15(1) Falla Superannuation	26	13	24	26	30	33
15(2) Falla Superannuation	25	13	30	27	30	35
15(3) Falla Superannuation	28	13	30	26	30	35
29 Ward	32	14	30	30	30	37

Property Number/Landowner	Stratford Extension Project[1]	Duralie Extension Project	AGL Project (Gas Field)	AGL Project (Process Facility)	Rocky Hill Coal Project	Cumulative Sum
31(1) Isaac	33	15	30	26	30	37
31(2) Isaac	31	14	30	31	30	37
37 Worth	33	16	17	30	30	36
40 Leslie Allenby Blanch	39	16	30	35	30	41
42 Blanch	38	17	30	30	30	40
297 Bosma	31	17	2	27	30	35
298 Yates	31	17	11	28	30	35
Cr.2 Boorer	37	17	30	30	30	39
Stratford/Craven Non-Residential Receivers						
30 Stratford Cemetery	30	14	26	28	30	35
S15 Stratford Public School	28	14	18	27	30	34
S25 St John's Anglican Church	28	14	20	27	30	34
Resource company-owned Receivers						
6 AGL	25	12	30	26	30	35
13(1) AGL	26	13	30	45	30	46
13(2) AGL	40	16	30	43	30	45
4(1) GRL	16	11	15	26	30	32
4(2) GRL	16	12	30	32	30	36
4(4) GRL	18	11	30	28	30	35
4 (5) GRL	20	11	30	27	30	34
4(6) GRL	18	11	30	27	30	34
4(7) GRL	20	11	30	26	30	34
4(8) GRL	18	12	30	26	30	34
4(9) GRL	20	11	30	26	30	34
4(12) GRL	19	11	30	28	30	35
4(15) GRL	21	11	30	30	30	35
4(16) GRL	19	11	30	32	30	36
4(18) GRL	22	11	30	29	30	35
19(1) SCPL	35	17	22	30	30	37
19(2) SCPL	38	15	30	39	30	42
19(4) SCPL	29	14	23	27	30	34
19(5) SCPL	29	14	25	27	30	34
19(6) SCPL	37	17	30	31	30	39
19(7) SCPL	30	14	26	28	30	35
19(8) SCPL	37	17	30	30	30	39
19(9) SCPL	38	17	30	30	30	40
19(10) SCPL	38	17	30	30	30	40
19(11) SCPL	26	21	0	20	30	32
19(12) SCPL	38	17	30	30	30	40
19(13) SCPL	38	17	30	30	30	40
19(14) SCPL	38	17	30	29	30	40
19(15) SCPL	38	17	30	29	30	40
19(16) SCPL	38	17	30	29	30	40
19(17) SCPL	38	17	30	28	30	40
19(18) SCPL	38	17	30	28	30	40
19(19) SCPL	38	17	30	28	30	40
19(20) SCPL	38	17	30	28	30	40

Property Number/Landowner	Stratford Extension Project[1]	Duralie Extension Project	AGL Project (Gas Field)	AGL Project (Process Facility)	Rocky Hill Coal Project	Cumulative Sum
19(21) SCPL	38	17	30	28	30	40
19(22) SCPL	33	18	14	25	30	35
19(23) SCPL	39	17	30	27	30	40
19(25) SCPL	37	18	20	25	30	38
19(26) SCPL	30	20	0	20	30	34
19(27) SCPL	28	21	0	19	30	33
19(28) SCPL	46	18	18	24	30	46
19(29) SCPL	27	13	30	32	30	36
19(30) SCPL	24	13	30	29	30	35
19(31) SCPL	30	18	9	22	30	34
19(32) SCPL	30	18	0	21	30	34
19(33) SCPL	26	13	30	27	30	35
19(34) SCPL	19	11	30	27	30	35
19(35) SCPL	25	22	0	19	30	32
19(36) SCPL	24	23	0	18	30	32
19(37) SCPL	25	23	0	18	30	32
19(38) SCPL	21	12	30	28	30	35
19(39) SCPL	37	17	30	30	30	39
19(40) SCPL	38	14	30	23	30	39
19(41) SCPL	30	15	26	34	30	37
19(42) SCPL	39	17	30	30	30	40
19(43) SCPL	46	18	17	24	30	46
19(45) SCPL	37	17	30	30	30	39
19(46) SCPL	37	17	30	30	30	39
19(47) SCPL	37	14	21	22	30	38

Note 1: All predicted noise levels from the worst case meteorological conditions in **Table 9** for each receiver.
Note 2: Predicted cumulative $L_{Aeq(period)}$ amenity noise level complies with 45 dBA (Evening) amenity noise level.
Note 3: Predicted marginal noise exceedance 1 to 2 dBA above 45 dBA (Evening) amenity noise level.
Note 4: Predicted moderate noise exceedance 3 dBA above 45 dBA (Evening) amenity noise level.
Note 5: Predicted appreciable noise exceedance > 3 dBA above 45 dBA (Evening) amenity noise level.

Sections 8.5.1 and **8.5.2** present a summary of potential impacts on privately-owned receivers and resource company-owned receivers, respectively.

8.5 Cumulative Night-time Noise Amenity Assessment

The night-time cumulative sum of the existing, approved and proposed developments $L_{Aeq(9hour)}$ noise amenity levels have been determined as presented in **Table 44**. It should be noted that for each of the developments noted below, the likelihood of the existing, approved and proposed developments emitting simultaneous maximum noise emissions is remote due to the range of development locations and directional and other differences in the noise enhancing weather effects. This cumulative assessment is therefore considered to be conservative.

Table 44 Cumulative Night-time ($L_{Aeq(9hour)}$) Noise Amenity Levels (dBA re 20 µPa)

Property Number/Landowner	Stratford Extension Project[1]	Duralie Extension Project	AGL Project (Gas Field)	AGL Project (Process Facility)	Rocky Hill Coal Project	Cumulative Sum
Stratford/Craven Rural Receivers						
1 Fraser	18	14	30	29	32	35
5(1) Bignell	20	14	16	29	32	34
5(2) Bignell	18	14	30	33	32	36
7 Burrell	19	14	30	34	32	37
9(1) Williams	22	15	21	29	32	34
9(2) Williams	23	15	18	29	32	34
10 Whatmore & Whatmore	24	15	4	26	32	33
11 Walker, Walker, Walker & Walker	24	15	7	26	32	33
16 Pickett	27	16	17	25	32	34
17 Fisher & Smith	26	16	21	26	32	34
23 Bagnall	33	16	19	21	32	36
24 Harris	25	21	0	22	32	33
25 Thompson	30	16	14	27	32	35
26 Lowrey & Lowrey	30	16	14	27	32	35
27 Gloucester Shire Council	28	16	20	27	32	34
34 Hall & Hall	32	18	0	28	32	36
36 Wallace & Wallace	36	19	5	28	32	38
36a(1) Berecry	14	14	0	21	32	32
36a(2) Berecry	15	13	0	22	32	32
38 Johnson & Johnson	29	16	4	26	32	34
39 Standen	39	19	30	31	32	41
43 Moseley	29	16	0	26	32	34
44 Cross & Jane	37	19	17	28	32	39
47 Digges, Digges, Hart & Hart	27	20	0	21	32	33
48 Rounsley	18	19	0	21	32	32
50 Porter	23	19	0	20	32	33
53 Barnes & Barnes	27	20	0	22	32	33
54 Hughes & Carrysong Pty Ltd	26	20	0	21	32	33
55 Hancock & Hancock	21	19	0	20	32	32
56 McCalden & McCalden	24	19	0	19	32	33
58(1) Blanch & Blanch	29	21	0	23	32	34
58(2) Blanch & Blanch	30	21	3	24	32	34
59 Cassar & Cassar	28	21	1	23	32	34
60 Healy & Greenwood	36	21	0	21	32	38
65 Weismantle	27	23	0	20	32	34
69 Hooper & Bartholmew	28	22	0	21	32	34
70 Knight	33	22	0	19	32	36
71 Burnet & Burnet	28	22	0	22	32	34
202 Wenham	26	16	21	25	32	34
265 Stenstrom & Stenstrom	18	13	0	20	32	32
274 Wilson & Wilson	18	14	0	22	32	32
275 Pace Farm Pty Ltd	21	14	0	24	32	33
276 Luscombe & Luscombe	20	14	0	21	32	32
279 Cullum & Cullum	21	14	0	24	32	33
281 Lewis & Lewis	30	16	21	28	32	35
282 Ross	28	16	0	24	32	34

Property Number/Landowner	Stratford Extension Project[1]	Duralie Extension Project	AGL Project (Gas Field)	AGL Project (Process Facility)	Rocky Hill Coal Project	Cumulative Sum
283 Nolan	27	16	0	23	32	33
284 Perrin & Perrin	28	17	0	27	32	34
285 Carter & Carter	28	16	0	24	32	34
287 Sinderberry & Rinkin	28	17	0	25	32	34
288 Perrin	30	17	0	25	32	35
289 Mcintosh	31	17	9	31	32	36
290 Ryan & Tordoff	31	18	0	25	32	35
291 Crawley & Crawley	32	18	0	28	32	36
292(1) Fisher & Fisher	26	18	0	23	32	33
293 Braunton	30	18	0	23	32	34
294 Morcom & Morcom	29	18	0	23	32	34
295 Bush & Bush	30	18	0	24	32	34
296 Watson & Watson	34	19	0	27	32	37
303 JSTC Newcastle Pty Ltd	29	22	0	22	32	34
304 Abeysekera & Abeysekera	30	22	0	21	32	34
307 Wolfenden & Wolfenden	28	23	0	20	32	34
316 Country Rail Infrastructure Authority	29	16	22	28	32	35
Craven						
Cr.7 Pryce-Jones	40	19	30	29	32	41
Stratford						
S1 Rees	26	16	22	26	32	34
S3 Yeatman	28	16	26	26	32	35
S4 Grady & Grady	24	16	20	26	32	34
S5 Britnell	26	16	20	27	32	34
S6 Threadgate & Threadgate	26	16	20	27	32	34
S8 Forbes	26	16	21	27	32	34
S9 Greenham & Greenham	27	16	22	26	32	34
S10 Germon	26	16	21	27	32	34
S11 Glew	28	16	22	27	32	34
S12 Mitchell & Mitchell	28	16	22	27	32	34
S13 Wells & Wells	29	16	23	27	32	35
S14 Bignell	26	16	19	27	32	34
S15 Minister for Education	30	16	22	27	32	35
S18 Whittall & Whittall	30	16	26	27	32	35
S19 Carroll	29	16	30	27	32	36
S20 McGrath	30	16	18	27	32	35
S21 Adams	30	16	18	27	32	35
S23 Bartlett	30	16	18	27	32	35
S24 Mavay	29	16	19	27	32	35
S26 Young	30	16	20	27	32	35
S27 Brown & Brown	30	16	21	27	32	35
S28 Morris & Morris	30	16	21	27	32	35
S29 Bagnall & Bagnall	30	16	22	27	32	35
S30 Baker	30	16	23	27	32	35

Property Number/Landowner	Stratford Extension Project[1]	Duralie Extension Project	AGL Project (Gas Field)	AGL Project (Process Facility)	Rocky Hill Coal Project	Cumulative Sum
S31 Richards	30	16	23	27	32	35
S33 Langtry, Gilbert & Gilbert	30	16	24	27	32	35
S34 Ashby	30	16	24	28	32	35
S35 Rodgers & Bekker	30	16	25	28	32	35
S36 Platt & Platt	30	16	26	28	32	35
S37 Pryor & Pryor	30	16	26	28	32	35
S38 Kirkman	30	16	27	28	32	35
S39(1) Nicholls & Husband	30	16	30	28	32	36
S39(2) Nicholls & Husband	30	16	30	28	32	36
S40 Curtis	30	16	20	28	32	35
S41 Mcclure & Aplin	30	16	21	28	32	35
S43 Squire	30	16	21	28	32	35
S47 Potts	30	16	22	28	32	35
S48 Farley & Farley	30	16	23	28	32	35
S49 Blanch	30	16	23	28	32	35
S50 Vanderdrift & Blanch	31	16	24	28	32	36
S51 Trenholme	30	16	24	28	32	35
S52 Farley & Barry	30	16	25	28	32	35
S53 Arthur	30	16	25	28	32	35
S54 Adams	31	16	26	28	32	36
S56 Collins & Collins	31	16	25	28	32	36
S57 Gam	31	16	27	29	32	36
S58 Harrigan	31	16	30	29	32	37
S59 Grady & Grady	31	16	30	29	32	37
Receivers subject to Landholder Agreement						
14 Wenham & Wenham	25	15	21	26	32	34
15(1) Falla Superannuation	25	15	24	26	32	34
15(2) Falla Superannuation	24	15	30	27	32	35
15(3) Falla Superannuation	27	16	30	26	32	35
29 Ward	33	17	30	30	32	38
31(1) Isaac	36	17	30	26	32	38
31(2) Isaac	34	17	30	31	32	38
37 Worth	35	19	17	30	32	38
40 Leslie Allenby Blanch	41	19	30	35	32	43
42 Blanch	40	19	30	30	32	41
297 Bosma	35	19	2	27	32	37
298 Yates	34	19	11	28	32	37
Cr.2 Boorer	39	19	30	30	32	41
Stratford/Craven Non-Residential Receivers						
30 Stratford Cemetery	31	16	26	28	32	36
S15 Stratford Public School	29	16	18	27	32	35
S25 St John's Anglican Church	29	16	20	27	32	35

Property Number/Landowner	Stratford Extension Project[1]	Duralie Extension Project	AGL Project (Gas Field)	AGL Project (Process Facility)	Rocky Hill Coal Project	Cumulative Sum
Resource company-owned Receivers						
6 AGL	22	15	30	26	32	35
13(1) AGL	24	15	30	45	32	46
13(2) AGL	43	18	30	43	32	46
4(1) GRL	16	13	15	26	32	33
4(2) GRL	14	14	30	32	32	36
4(4) GRL	15	14	30	28	32	35
4 (5) GRL	16	14	30	27	32	35
4(6) GRL	16	14	30	27	32	35
4(7) GRL	17	14	30	26	32	35
4(8) GRL	18	14	30	26	32	35
4(9) GRL	17	14	30	26	32	35
4(12) GRL	19	13	30	28	32	35
4(15) GRL	17	13	30	30	32	36
4(16) GRL	17	14	30	32	32	36
4(18) GRL	17	14	30	29	32	35
19(1) SCPL	38	19	22	30	32	40
19(2) SCPL	42	18	30	39	32	44
19(4) SCPL	30	16	23	27	32	35
19(5) SCPL	30	16	25	27	32	35
19(6) SCPL	39	19	30	31	32	41
19(7) SCPL	31	16	26	28	32	36
19(8) SCPL	39	19	30	30	32	41
19(9) SCPL	40	19	30	30	32	41
19(10) SCPL	40	19	30	30	32	41
19(11) SCPL	28	23	0	20	32	34
19(12) SCPL	40	19	30	30	32	41
19(13) SCPL	40	19	30	30	32	41
19(14) SCPL	40	19	30	29	32	41
19(15) SCPL	41	19	30	29	32	42
19(16) SCPL	41	19	30	29	32	42
19(17) SCPL	41	19	30	28	32	42
19(18) SCPL	41	19	30	28	32	42
19(19) SCPL	41	19	30	28	32	42
19(20) SCPL	41	19	30	28	32	42
19(21) SCPL	41	19	30	28	32	42
19(22) SCPL	35	20	14	25	32	37
19(23) SCPL	41	19	30	27	32	42
19(25) SCPL	40	20	20	25	32	41
19(26) SCPL	33	22	0	20	32	36
19(27) SCPL	30	23	0	19	32	34

Property Number/Landowner	Stratford Extension Project[1]	Duralie Extension Project	AGL Project (Gas Field)	AGL Project (Process Facility)	Rocky Hill Coal Project	Cumulative Sum
19(28) SCPL	48	20	18	24	32	48
19(29) SCPL	24	15	30	32	32	36
19(30) SCPL	24	15	30	29	32	36
19(31) SCPL	32	20	9	22	32	35
19(32) SCPL	32	21	0	21	32	35
19(33) SCPL	23	15	30	27	32	35
19(34) SCPL	16	14	30	27	32	35
19(35) SCPL	27	25	0	19	32	34
19(36) SCPL	26	26	0	18	32	34
19(37) SCPL	27	25	0	18	32	34
19(38) SCPL	18	14	30	28	32	35
19(39) SCPL	40	19	30	30	32	41
19(40) SCPL	40	16	30	23	32	41
19(41) SCPL	37	17	26	34	32	40
19(42) SCPL	41	19	30	30	32	42
19(43) SCPL	47	20	17	24	32	47
19(45) SCPL	39	19	30	30	32	41
19(46) SCPL	40	19	30	30	32	41
19(47) SCPL	38	16	21	22	32	39

Note 1: All predicted noise levels from the worst case meteorological conditions in **Table 9** for each receiver.
Note 2: Predicted cumulative $L_{Aeq(period)}$ amenity noise level complies with 40 dBA (Night-time) amenity noise level.
Note 3: Predicted marginal noise exceedance 1 to 2 dBA above 40 dBA (Night-time) amenity noise level.
Note 4: Predicted moderate noise exceedance 3 dBA above 40 dBA (Night-time) amenity noise level.
Note 5: Predicted appreciable noise exceedance > 3 dBA above 40 dBA (Night-time) amenity noise level.

Sections 8.5.1 and **8.5.2** present a summary of potential impacts on privately-owned receivers and resource company-owned receivers, respectively.

8.5.1 Privately Owned Receivers - Cumulative Impact Assessment

In summary, the predicted cumulative $L_{Aeq(period)}$ noise amenity levels show that:

- Compliance is generally determined by night-time noise levels, due to the noise enhancing meteorological conditions experienced at night-time.
- No receiver exceeds the INP recommended maximum amenity noise level.
- A total of 5 privately owned receivers exceed the INP's acceptable amenity levels, including 5 receivers within the Noise Management Zone, and no receivers in the Noise Affectation Zone.
- During the evening, no privately owned receivers exceed the INP's acceptable amenity level.
- During the night-time, up to 5 privately owned receivers are within the Noise Management Zone and no receivers are in the Noise Affectation Zone.

Table 45 presents the privately owned receivers with predicted cumulative $L_{Aeq(period)}$ noise level exceedance of the INP's acceptable amenity levels.

Table 45 Privately Owned Receivers[1] with INP Acceptable Amenity Level Exceedances

Period	Noise Management Zone		Noise Affection Zone
	1 dBA to 2 dBA above INP Acceptable	**3 dBA above INP Acceptable**	**> 3 dBA above INP Acceptable**
Evening	-	-	-
Night-time	39, 42[3], Cr.2[3], Cr.7	40[2,3]	-

Note 1: Refer to **Appendix B1** for land ownership details.

Note 2: Receivers identified in the existing SCM Project Approval (DA 23-98/99) as being in the Noise Affectation Zone.

Note 3: Receivers subject to an existing Landholder Agreement.

Predicted cumulative noise exceedances are largely dominated by the Project. As shown in **Table 43** and **Table 44**, receivers where exceedances of the INP acceptable amenity noise levels are predicted are all receivers in the Project-only noise affectation zone (**Table 33**). Consequently, these receivers would be offered acoustic mitigation measures at the receiver and/or negotiated agreements as described in **Section 5.4**.

8.5.2 Resource Company-owned Receivers Impact Assessment

In summary, the predicted cumulative $L_{Aeq(period)}$ noise amenity levels show that:

- Compliance is generally determined by night-time noise levels, due to the noise enhancing meteorological conditions experienced at night-time.
- All but 5 receivers comply with the INP recommended maximum amenity noise levels.
- A total of 26 resource company-owned receivers exceed the INP's acceptable amenity levels, including 21 receivers within the Noise Management Zone and 5 receivers in the Noise Affectation Zone.
- During the evening, up to 3 resource company-owned receivers are within the Noise Management Zone and no receivers are in the Noise Affectation Zone.
- During the night-time, up to 21 resource company-owned receivers are within the Noise Management Zone and 5 receivers are in the Noise Affectation Zone.

Table 46 presents the resource company-owned receivers with predicted noise level exceedance of the INP's acceptable amenity levels.

Table 46 Resource Company-owned Receivers[1] with INP Acceptable Amenity Level Exceedances

Period	Noise Management Zone		Noise Affection Zone
	1 dBA to 2 dBA above PSNL	**3 dBA above PSNL**	**> 3 dBA above PSNL**
Evening	13(1), 19(28), 19(43)	-	-
Night-time	19(6), 19(8), 19(9), 19(10), 19(12), 19(13), 19(14), 19(15), 19(16), 19(17), 19(18), 19(19), 19(20), 19(21), 19(23), 19(25), 19(39), 19(40), 19(42), 19(45), 19(46)	-	13(1), 13(2), 19(2), 19(28), 19(43)

Note 1: Refer to **Appendix B1** for land ownership details.

Cumulative noise exceedances are largely dominated by the Project, with the exception of 13(1), 13(2), which are owned by AGL and are potentially subject to elevated noise levels from the AGL Gloucester Gas Project Central Processing facility.

9 RAIL TRANSPORT NOISE IMPACT ASSESSMENT

9.1 Rail Generating Developments Noise Criteria

The EPA's IGANRIP (DECC, 2007) addresses noise impacts from new rail infrastructure projects. Noise impacts from existing operations on the rail system or new rail traffic-generating developments are not covered by the IGANRIP. Rather, environment assessment requirements for rail traffic-generating developments are addressed in the EPA's rail noise guideline "*Environment Assessment Requirements for Rail Traffic - Generating Developments"* dated 26 February 2011 attached as **Appendix H1**. Rail noise assessment trigger levels are reproduced in **Table 47**.

Table 47 EPA Guideline Rail Noise Trigger Levels

Descriptor	Noise Assessment Trigger Level
LAeq(24hour)	60 dBA
Maximum Passby LAmax (95th percentile)	85 dBA
Project related rail noise increase	> 0.5 dBA

Note 1: 95th percentile equates to the 5% exceedance value.

The following assessment considers potential impacts on receivers along the North Coast Railway generally between the Stratford Mining Complex and the DCM, where trains travelling to and from the respective mines will pass nearby receivers including dwellings within Wards River (refer **Appendix I**).

9.2 Existing/Approved, Proposed and Potential Train Pass-bys

The existing/approved, proposed and potential daytime/evening, night-time and 24 hour rail traffic pass-bys are presented in **Table 48** together with the estimated train length while operating between the SCM and the DCM.

Table 48 Typical Daily Existing/Approved, Proposed and Potential Train Pass-bys[1]

Operating Status	Type	Daytime/Evening		Night-time		24 Hrs		Train Length
		Average	Peak	Average	Peak	Average	Peak	
Existing/Approved and Proposed	Passenger trains	5	5	1	1	6	6	205 m
	Freight trains	7	9	3	4	10	13	1500 m
	SCM (Product Coal)	3	6	2	4	5	10	Up to 1,300 m
	DCM Proposed Modification (ROM Coal)	6	10	2	3	8	10	600 m
Cumulative Base	Sum of the above	21	30	8	12	29	39	
Proposed Project	SCM (Product Coal)	3	8	2	6	5	12	1,300 m
Cumulative Project	Including the Proposed Project	21	32	8	14	29	41	
Potential Project	Rocky Hill (Product Coal)	1	1	1	1	2	2	1,300 m
Cumulative Potential	Including the Potential Project	22	33	9	15	31	43	

Note 1: Train movements and operating conditions estimated for the North Coast Railway in the vicinity of SCM to DCM.

Note 2: One movement = two pass-bys.

9.3 Rail Traffic Noise Prediction

In accordance with the EPA's rail noise guideline (refer **Appendix H1**), 24 hour equivalent continuous noise levels and the maximum pass-by levels have been modelled using a computer prediction model developed by SLR Consulting. This model has previously been accepted by the DP&I and the EPA and validated against the field rail noise measurements on the North Coast Railway as presented in the **Section 4.3** and together with more recent field measurements on the new Duralie Shuttle train.

The prediction model uses characteristic noise levels for the various sources (locomotive engine and exhaust noise as a function of throttle notch, wheel/rail noise as a function of train speed, and wagon type, etc.) at a fixed reference distance. The model then makes adjustments for the train length and distance from the track (assuming no barriers) and facade reflection (2.5 dBA). Parameters including the $L_{Aeq(24hour)}$, daytime $L_{Aeq(15hour)}$, night-time $L_{Aeq(9hour)}$ and maximum (5% exceedance) passby level can then be determined by summing the effects of the individual noise sources and by incorporating the number of train events. Note that as the model assumes no intervening barriers (ie existing topography, buildings, structures and the like) the predicted noise levels are indicative only and likely to be conservative at some receivers.

The $L_{Aeq(24hour)}$ and maximum (5% exceedance) noise levels for the existing/approved, proposed and potential rail traffic are presented in **Table 49** with train pass-bys considered on an average and peak basis.

Table 49 24 Hour Existing/Approved, Proposed and Potential Rail Noise (dBA re 20 µPa)

Distance to Receiver	Receiver[1]	Cumulative Base Trains[2]			Cumulative Project Trains[3]			Noise Level Increase		Cumulative Potential Trains[4]		
		$L_{Aeq(24hour)}$		L_{Amax} 5%	$L_{Aeq(24hour)}$		L_{Amax} 5%	$L_{Aeq(24hour)}$		$L_{Aeq(24hour)}$		L_{Amax} 5%
		Average	Peak		Average	Peak		Average	Peak	Average	Peak	
0-20 m	Nil	63	65	93	64	65	93	0.2	0.6	64	66	93
20-40 m	R1-R2	61	62	87	61	63	87	0.2	0.6	61	63	87
40-60 m	R4-R12	59	60	83	59	61	83	0.2	0.6	60	61	83
60-80 m	R13-R33	58	59	81	58	60	81	0.2	0.6	58	60	81
80-100 m	R34-R35	57	58	79	57	59	79	0.2	0.6	58	59	79

Note 1: Train noise level calculated to the maximum distance within the receiver range (refer **Appendix I**).
Note 2: Cumulative Base from existing/approved and proposed rail traffic as per **Table 48**.
Note 3: Cumulative Project from base rail traffic plus proposed Project rail traffic as per **Table 48**.
Note 4: Cumulative Potential from base rail traffic plus proposed Project plus potential Project as per **Table 48**.

9.4 Rail Traffic Noise Assessment - EPA Trigger Levels

The following assessments are derived from the predicted $L_{Aeq(24hour)}$ and maximum (5% exceedance) levels presented in **Table 49** and the EPA's rail noise trigger levels presented **Table 47**:

- A comparison of the cumulative Base $L_{Aeq(24hour)}$ rail noise with the cumulative Project levels indicates that the 24 hour rail noise would increase by 0.2 dBA (average) and 0.6 dBA (peak) as a result of the Project. Note, the increase in average rail noise levels is due to the exclusive use of larger (1,300 m) trains for the Project, rather than trains up to 1,300 m as per existing operations.
- The cumulative Base $L_{Aeq(24hour)}$ rail noise meets the 60 dBA trigger level at a distance of 41 m (average) to 58 m (peak) and greater. Approximately, 9 receivers (R1-R2, R4-R10 as shown in **Appendix I**) currently exceed the 60 dBA trigger level as a result of the cumulative Base (peak) rail movements.
- The cumulative Project $L_{Aeq(24hour)}$ rail noise would meet the 60 dBA trigger level at a distance of 43 m (average) to 67 m (peak) and greater. Approximately 9 additional receivers (R11-R19 as shown in **Appendix I**) would exceed the 60 dBA trigger level as a result of the cumulative Project (peak) rail movements.
- The cumulative Potential $L_{Aeq(24hour)}$ rail noise level meets the 60 dBA goal at a distance of 47 m (average) to 72 m (peak) and greater. Approximately 7 additional receivers (R19-R26 as shown in **Appendix I**) would exceed the 60 dBA trigger level as a result of the cumulative Potential (peak) rail movements.

- The cumulative Base maximum pass-by noise level (largely controlled by general freight trains) would be unchanged by the Project and would continue to meet the 85 dBA trigger level at a distance of 50 m and greater. Approximately 6 receivers (R1-R2, R4-R7 as shown in **Appendix I**) currently exceed the 85 dBA trigger level as a result of the cumulative Project (peak) rail movements.

The OEH guideline indicates that where the cumulative noise level exceeds the noise assessment trigger levels and Project-related noise increases greater 0.5 dBA are predicted, then all feasible and reasonable noise mitigation measures should be implemented. As a general principle, where the reduction of existing noise levels can be achieved through feasible and reasonable measures, a reduction in noise levels to meet the noise assessment trigger levels is the primary objective. In all cases where the L_{Aeq} noise level increases are more than 2 dBA, strong justification should be provided as to why it is not feasible or reasonable to reduce the increase.

Note, the average Project-related rail noise level increase is 0.2 dBA (therefore less than 0.5 dBA) and the peak Project-related rail noise level increase is 0.6 dBA (therefore slightly greater than 0.5 dBA). This noise level increase would not be perceptible to most people. It is concluded that the assessment of "all of feasible and reasonable noise mitigation measures" is not warranted to achieve a negligible 0.6 dBA noise reduction for the Project.

9.5 ARTC Environment Protection Licence Section L6 - Noise Limits

Noise emissions from the North Coast Railway are regulated via ARTC's EPL No 3142 (review date 7 November 2013), attached as **Appendix H2**. The intent of the relevant EPL conditions is to control airborne noise by two principal means:

- Noise Limits.
- Management of noise via Pollution Reduction Programmes (PRPs).

Maximum locomotive source noise levels and tonality criteria for stationary and in-service test conditions are specified in EPL Condition L6 *Noise Limits*. EPL Section L6 nominates airborne noise limits at receiver locations as follows.

> *L6.1.1 General Noise Limits*
>
> *It is an objective of this Licence to progressively reduce noise levels to the goals of 65 dB(A)Leq, (day time from 7am - 10pm), 60 dB(A)Leq, (night time from 10pm - 7am) and 85dB(A) (24 hour) max pass-by noise, at one metre from the façade of affected residential properties through the implementation of the Pollution Reduction Program.*

The goals do not represent unobtrusive noise levels. Rather, the objectives recognise that rail operations are inherently noisy and represent a compromise between what may be desirable from a community point of view (ie maintaining amenity) and what is necessary to enable trains to operate. It should be noted that the North Coast Railway does not currently have a PRP; however the stated objectives of the PRP provide guidance for noise regulation for the railway. Based on the foregoing, the guideline noise assessment criteria for the North Coast Railway are presented in **Table 50**.

Table 50 ARTC Guideline Rail Noise Goals

Railway	Licence Holder	Descriptor	Rail Traffic Goal
North Coast Railway	ATRC EPL 3142	Daytime $L_{Aeq(15hour)}$	65 dBA
		Night-time $L_{Aeq(9hour)}$	60 dBA
		Maximum L_{Amax}	85 dBA

The ARTC's EPL noise goals are similar to the EPA's rail noise assessment trigger levels; however the EPA trigger levels have an averaging period of 24 hours, rather than daytime (15 hours) and night-time (9 hours), which are used for the ARTC's goals. Rail traffic noise levels have also been predicted using the same noise modelling procedure discussed in **Section 9.2** for comparison against the ARTC's EPL noise goals. The daytime $L_{Aeq(15hour)}$ and maximum (5% exceedance) noise levels for the existing/approved, proposed and potential rail traffic are presented in **Table 51**.

Table 51 Daytime Existing, Approved and Proposed Rail Traffic Noise (dBA re 20 µPa)

Distance to Receiver	Receiver[1]	Cumulative Base Trains[2]			Cumulative Project Trains[3]			Noise Level Increase		Cumulative Potential Trains[4]		
		$L_{Aeq(15hour)}$		L_{Amax} 5%	$L_{Aeq(15hour)}$		L_{Amax} 5%	$L_{Aeq(15hour)}$		$L_{Aeq(15hour)}$		L_{Amax} 5%
		Average	Peak		Average	Peak		Average	Peak	Average	Peak	
0-20 m	Nil	64	65	93	64	66	93	0.1	0.7	64	66	93
20-40 m	R1-R2	61	63	87	61	63	87	0.1	0.7	62	64	87
40-60 m	R4-R12	60	61	83	60	62	83	0.1	0.7	60	62	83
60-80 m	R13-R33	58	60	81	59	61	81	0.1	0.7	59	61	81
80-100 m	R34-R35	58	59	79	58	60	79	0.1	0.7	58	60	79

Note 1: Train noise level calculated to the maximum distance within the receiver range (refer **Appendix I**).
Note 2: Cumulative Base from existing/approved and proposed rail traffic as per **Table 48**.
Note 3: Cumulative Project from base rail traffic plus proposed Project rail traffic as per **Table 48**.
Note 4: Cumulative Potential from base rail traffic plus proposed Project plus potential Project as per **Table 48**.

Similarly, the night-time $L_{Aeq(9hour)}$ and maximum (5% exceedance) noise levels for the existing/approved, propose and potential rail traffic are presented in **Table 52**.

Table 52 Night-time Existing, Approved and Proposed Rail Traffic Noise (dBA re 20 µPa)

Distance to Receiver	Receiver[1]	Cumulative Base Trains[2]			Cumulative Project Trains[3]			Noise Level Increase		Cumulative Potential Trains[4]		
		$L_{Aeq(9hour)}$		L_{Amax} 5%	$L_{Aeq(9hour)}$		L_{Amax} 5%	$L_{Aeq(9hour)}$		$L_{Aeq(9hour)}$		L_{Amax} 5%
		Average	Peak		Average	Peak		Average	Peak	Average	Peak	
0-20 m	Nil	62	64	93	63	65	93	0.3	1.2	63	66	93
20-40 m	R1-R2	59	61	87	60	63	87	0.3	1.2	60	63	87
40-60 m	R4-R12	58	60	83	58	61	83	0.3	1.2	59	61	83
60-80 m	R13-R33	57	58	81	57	60	81	0.3	1.2	58	60	81
80-100 m	R34-R35	56	58	79	56	59	79	0.3	1.2	57	59	79

Note 1: Train noise level calculated to the maximum distance within the receiver range (refer **Appendix I**).
Note 2: Cumulative Base from existing/approved and proposed rail traffic as per **Table 48**.
Note 3: Cumulative Project from base rail traffic plus proposed Project rail traffic as per **Table 48**.
Note 4: Cumulative Potential from base rail traffic plus proposed Project plus potential Project as per **Table 48**.

9.6 Rail Traffic Noise Assessment - ARTC Noise Goals

The following assessments are derived from the predicted daytime and night-time rail traffic levels presented in **Table 51** and **Table 52**, respectively and the ARTC's noise goals presented in **Table 50**:

- A comparison of the daytime cumulative Base $L_{Aeq(15hour)}$ rail noise with the cumulative Project indicates that the daytime rail noise would increase by 0.1 dBA (average) to 0.7 dBA (peak) as a result of the Project. The increase in average rail noise level is due to the exclusive use of larger (1,300 m) trains for the Project, rather than trains "up to" 1,300 m as per existing operations.
- The daytime cumulative Base $L_{Aeq(15hour)}$ rail noise meets the 65 dBA goal at a distance of 14 m (average) to 20 m (peak) and greater. Noise levels at all receivers (as shown in **Appendix I**) currently meet the daytime noise goal of 65 dBA as a result of the cumulative Base (peak) rail movements.

- The daytime cumulative Project $L_{Aeq(15hour)}$ rail noise level meets the 65 dBA goal at a distance of 15 m (average) to 24 m (peak) and greater. Approximately 1 receiver (R1 as shown in **Appendix I**) would exceed the daytime noise goal of 65 dBA as a result of the cumulative Project (peak) rail movements.
- The daytime cumulative Potential $L_{Aeq(15hour)}$ rail noise level meets the 65 dBA goal at a distance of 16 m (average) to 25 m (peak) and greater. No additional receivers (as shown in **Appendix I**) would exceed the 65 dBA trigger level as a result of the cumulative Potential (peak) rail movements.
- A comparison of the night-time cumulative Base $L_{Aeq(9hour)}$ rail noise with the cumulative Project levels indicates that the night-time rail noise would increase by 0.3 dBA (average) to 1.2 dBA (peak) as a result of the Project.
- The cumulative Base $L_{Aeq(9hour)}$ night-time rail noise meets the 60 dBA goal at a distance of 31 m (average) to 49 m (peak) and greater. Approximately 6 receivers (R1, R2, R4-R7 shown in **Appendix I**) currently exceed the night-time noise goal of 60 dBA as a result of the cumulative Base (peak) rail movements.
- The night-time cumulative Project $L_{Aeq(9hour)}$ rail noise level meets the 60 dBA goal at a distance of 34 m (average) to 66 m (peak) and greater. Approximately 10 additional receivers (R8-R17 as shown in **Appendix I**) would exceed the 60 dBA trigger level as a result of the cumulative Project (peak) rail movements.
- The night-time cumulative Potential $L_{Aeq(9hour)}$ rail noise level meets the 60 dBA goal at a distance of 40 m (average) to 72 m (peak) and greater. Approximately 9 additional receivers (R18-R26 as shown in **Appendix I**) would exceed the 60 dBA trigger level as a result of the cumulative Potential (peak) rail movements.
- The cumulative Base maximum pass-by noise level (largely controlled by general freight trains) would be unchanged by the Project and would continue to meet the 85 dBA goal at a distance of 50 m and greater. Approximately 6 receivers (R1, R2, R4-R7 as shown in **Appendix I**) currently exceed the 85 dBA trigger level as a result of the cumulative Project (peak) rail movements.

9.7 ARTC Noise Management Strategies

The ARTC has a twin approach to the management and implementation of reasonable and feasible rail noise mitigation measures along the North Coast Railway as summarised below:

- Management and increased use of existing infrastructure in the context of the ARTC's EPL. This includes a number of initiatives in the EPL including the following:
    i. The requirement to test new and substantially modified locomotives.
    ii. Objectives for noise emissions contained in the EPL.
    iii. Under a PRP, the ARTC has undertaken to trial a trackside monitoring programme to audit the noise performance of freight locomotives. This information is provided to locomotive operators as a basis for consideration of noise control measures.
    iv. Implementation of a noise complaint hotline.
- Undertaking specific project assessments for new projects including the implementation of all feasible and reasonable noise mitigation treatments. Noise studies are conducted and noise treatments are included within the planning approvals in accordance with the IGANRIP (e.g. the recent Maitland to Minimbah upgrade).

Furthermore, the ARTC is involved in participation with industry and state government agencies in the development of a trial noise abatement programme aimed at mitigating noise for receivers which are exposed to existing acute rail noise.

9.8 Consideration of EPA Rail Noise Guideline (Draft for Consultation)

In addition to the goals and trigger levels assessed in the sub-sections above, in February 2012, the EPA released a new *Rail Noise Guideline* (EPA, 2012) as a draft for consultation. At the time of writing, this draft was available for public comment. For completeness, consideration has been given to alternative trigger levels as presented **Appendix H3** and summarised in **Table 53**.

Table 53 Draft for Consultation Rail Noise Guideline Trigger Levels

Railway	Descriptor	Trigger Levels
North Coast Railway	Daytime $L_{Aeq(15hour)}$	60 dBA
	Night-time $L_{Aeq(9hour)}$	55 dBA
	L_{Amax} (95th percentile)	80 dBA

The following assessments are derived using the same methodology and rail movements previously presented for comparison with the Rail Noise Guideline trigger levels presented in **Table 53**:

- A comparison of the daytime cumulative Base $L_{Aeq(15hour)}$ rail noise with the cumulative Project indicates that the daytime rail noise would increase by 0.1 dBA (average) to 0.7 dBA (peak) as a result of the Project. The increase in average rail noise level is due to the exclusive use of larger (1,300 m) trains for the Project, rather than trains “up to” 1,300 m as per existing operations.
- The daytime cumulative Base $L_{Aeq(15hour)}$ rail noise meets the 60 dBA trigger level at a distance of 47 m (average) to 68 m (peak) and greater.
- The daytime cumulative Project $L_{Aeq(15hour)}$ rail noise level meets the 60 dBA trigger level at a distance of 49 m (average) to 82 m (peak) and greater.
- The daytime cumulative Potential $L_{Aeq(15hour)}$ rail noise level meets the 60 dBA trigger level at a distance of 52 m (average) to 86 m (peak) and greater.
- A comparison of the night-time cumulative Base $L_{Aeq(9hour)}$ rail noise with the cumulative Project levels indicates that the night-time rail noise would increase by 0.3 dBA (average) to 1.2 dBA (peak) as a result of the Project.
- The cumulative Base $L_{Aeq(9hour)}$ night-time rail noise meets the 55 dBA goal at a distance of 108 m (average) to 174 m (peak) and greater.
- The night-time cumulative Project $L_{Aeq(9hour)}$ rail noise level meets the 55 dBA goal at a distance of 117 m (average) to 239 m (peak) and greater.
- The night-time cumulative Potential $L_{Aeq(9hour)}$ rail noise level meets the 55 dBA goal at a distance of 138 m (average) to 265 m (peak) and greater.
- The cumulative Base maximum pass-by noise level (largely controlled by general freight trains) would be unchanged by the Project and would continue to meet the 80 dBA goal at a distance of 83 m and greater.

Further to the above, the assessment under the *Rail Noise Guideline* (EPA, 2012) would not change the impacts relative to the EPA trigger levels or ARTC noise goals; rather the offset distance to meet the criteria would be larger.

10 ROAD TRANSPORT NOISE IMPACT ASSESSMENT

The detailed assessment of the Project-related road transport impacts are presented in the Stratford Extension Project Road Traffic Assessment (Appendix N of the Project EIS) (Halcrow, 2012). Consistent with Halcrow (2012) this road noise assessment focuses on The Bucketts Way, Wenham Cox Road and Bowens Road.

10.1 Traffic Noise Criteria

The Bucketts Way is classified by Roads and Maritime Services (RMS) as a regional road (which is essentially a sub-arterial road [Halcrow, 2012]), whereas Wenham Cox Road and Bowens Road are both classified as local roads under Gloucester Council's road hierarchy (Halcrow, 2012). The NSW Road Noise Policy (OEH, 2011) is the relevant policy for the assessment of road noise in NSW. (Note: whilst the DGRs refer to the Environmental Criteria for Road Traffic Noise (Section 1.2), this document has been superseded by the Road Noise Policy). The NSW Road Noise Policy adopts a classification scheme for assessing noise impacts on an existing road network from additional traffic generated by the Project as presented in **Table 54**.

Table 54 Road Traffic Noise Assessment Criteria for Residential Land Uses (dBA re 20 µPa)

Road	Type of Project and Land Use	Total Traffic Noise Criteria[1,3]	Relative Increase Criteria[2,3]
The Bucketts Way	Land use developments generating additional traffic on existing sub-arterial roads	Daytime 60 $L_{Aeq(15hour)}$	Existing $L_{Aeq(15hour)}$[4] plus 12 dBA
		Night-time 55 $L_{Aeq(9hour)}$	Existing $L_{Aeq(9hour)}$ plus 12 dBA
Wenham Cox Road Bowens Road	Land use developments generating additional traffic on existing local roads	Daytime 55 $L_{Aeq(1hour)}$	Not applicable
		Night-time 50 $L_{Aeq(1hour)}$	

Note 1: Total traffic noise level from existing (2011) and Project (Years 1 and 11) related traffic for comparison with the Criteria.
Note 2: Relative increase noise level generated by the Project (Years 1 and 11) for comparison with the Criteria.
Note 3: Daytime 0700 hrs to 2200 hrs, Night-time 2200 hrs to 0700 hrs.
Note 4: L_{Aeq} = equivalent continuous noise level.

In relation to situations where exceedances of the road traffic noise assessment criteria are predicted, the NSW Road Noise Policy relevantly provides:

> *Where existing traffic noise levels are above the noise assessment criteria, the primary objective is to reduce these through feasible and reasonable measures to meet the assessment criteria. A secondary objective is to protect against excessive decreases in amenity as the result of a project by applying the relative increase criteria.*
>
> *In assessing feasible and reasonable mitigation measures, an increase of up to 2 dB represents a minor impact that is considered barely perceptible to the average person.*
>
> *…*
>
> *For existing residences and other sensitive land uses affected by additional traffic on existing roads generated by land use developments, any increase in the total traffic noise level should be limited to 2 dB above that of the corresponding 'no build option'.*

In practice, noise level increases of less than 2 dBA are generally achieved when the Project-related percentage increase to the existing light and heavy traffic is no greater than 60%.

The NSW Road Noise Policy describes a number of process steps for applying the criteria. In general accordance with these steps, this assessment has:

- Identified a study area, which has been defined as the portion of The Bucketts Way in the vicinity of Stratford and Craven (north and south of the SCM access road), Wenham Cox Road and Bowens Road.
- All receivers (ie residences and other sensitive land uses) in the vicinity of the study area have been identified, including the Stratford Public School, Stratford cemetery and St John's Anglican Church (**Appendix B**).
- Tabulated road traffic flows within the study area, due to existing traffic, cumulative sources and the Project (**Section 10.3** and **Section 10.4**).

- Calculated noise levels associated with existing traffic and Project-related traffic and compared the predicted increase against the Relative Increase Criteria (**Section 10.3**).
- Compared predicted noise levels against the Total Traffic Noise Criteria (**Section 10.3**).

The SCM Access Road is a private road with a speed limit ranging from 40 to 60 kilometres per hour (kph) (then 20 kph near the administration buildings). The NSW Road Noise Policy recommends that noise from vehicles travelling on private roads should be assessed as an industrial noise source under the NSW INP (rather than road traffic); this is particularly the case if the access road is used for coal haulage. While the SCM Access Road is not used for coal haulage, the nearest potentially affected privately-owned receiver 31(1) Isaac to the SCM Access Road has been selected to assess the cumulative mine operating and road SCM Access Road traffic noise impacts (refer to **Section 10.5**).

10.2 Existing Traffic Noise at The Bucketts Way

A traffic noise survey was conducted in May 2011 to quantify the existing (near-field) traffic noise adjacent to The Bucketts Way. The measurement methodology and analysis procedures are described in **Appendix D**. The unattended noise logger data and the on-site weather conditions were analysed on a daily basis and are presented in **Table 55** and graphically as statistical 24 hour ambient noise profiles in **Appendices E5** and **E6**.

Table 55 Unattended Free Field Total Traffic Noise Monitoring Results - May 2011

Location	Position	Leq(15hour)[1]	Leq(9hour)[1]
North of Mine Access	21 m from centre of The Bucketts Way	61 dBA	55 dBA
South of Mine Access	10 m from centre of The Bucketts Way	63 dBA	57 dBA

Note 1: Measured free field traffic noise level.

The measured traffic noise levels have been used to calculate the nominal off-set distances from the centre of The Bucketts Way to meet the daytime and night-time total traffic noise criteria (refer **Table 54**) as presented in **Table 56**.

Table 56 Nominal Off-set Distance to Meet the Total Traffic Noise Criteria May 2011

Location	Off-set Distance	Leq(15hour)[1]	Leq(9hour)[1]
North of Mine Access	31.5 m from centre of The Bucketts Way	60 dBA	55 dBA
South of Mine Access	21.5 m from centre of The Bucketts Way	60 dBA	55 dBA

Note 1: Total traffic noise level inclusive of 2.5 dBA facade correction.

10.3 Traffic Noise Impact Sub-Arterial Road - The Bucketts Way

The existing base traffic and additional Project related traffic flows on The Bucketts Way in the vicinity of Stratford and Craven are presented in **Table 57**. For the purposes of noise impact assessment, the daytime and night-time existing base traffic and Project-related traffic flows are shown together, with the relative percentage increase in parentheses.

Table 57 Existing Base and Additional Project Traffic Flows - The Bucketts Way

Time Period	Existing Base[1]	Additional Project Year 1	Cumulative Project Year 1 (% increase)[2]	Additional Project Year 11	Cumulative Project Year 11 (% increase)[2]
The Bucketts Way (north of mine access)					
Daytime 15 hour traffic	1931	109	2040 (6%)	85	2016 (4%)
Night-time 9 hour traffic	259	95	354 (37%)	71	330 (27%)
The Bucketts Way (south of mine access)					
Daytime 15 hour traffic	1877	50	1927 (3%)	44	1921 (2%)
Night-time 9 hour traffic	215	24	239 (11%)	18	233 (8%)

Source: after Halcrow (2012).

Note 1: Existing base traffic inclusive of the approved Stratford Mining Complex.

Note 2: Cumulative traffic includes traffic from the AGL Gloucester Gas Project and Rocky Hill Coal Project.

Relative Increase Assessment Criteria

The maximum daytime increase is anticipated to occur on The Bucketts Way (north of mine access) in Year 1 where the relative increase in traffic flow due to the Project is approximately 6%. This increase corresponds to a negligible 0.2 decibels (dB) increase in the existing daytime $L_{Aeq(15\ hour)}$ traffic noise levels. Similarly, the maximum night-time increase is anticipated to occur on The Bucketts Way (north of mine access) in Year 1 where the relative increase in traffic flow due to the Project is approximately 37%. This increase corresponds to a marginal 1.4 dB increase in the existing night-time (9 hr) traffic noise levels. In both cases the relative increase in traffic noise due to the Project is less than 12 dBA. Furthermore, the relative increase is less than 2 dBA and in accordance with the Road Noise Policy represents a minor impact that is considered barely perceptible.

Total Traffic Noise Assessment Criteria

The relative increases in the Project-related traffic noise have been used to update the nominal minimum off-set distances from the centre of The Bucketts Way required to meet the daytime and night-time total traffic noise criteria (refer **Table 54**) as presented in **Table 58**.

Table 58 Nominal Off-set Distance to Meet the Total Traffic Noise Criteria Year 1 and Year 11

Location	Off-set Distance	Leq(15hour)[1]	Leq(9hour)[1]
North of Mine Access	35.0 m from centre of The Bucketts Way	60 dBA	55 dBA
South of Mine Access	23.5 m from centre of The Bucketts Way	60 dBA	55 dBA

Note 1: Total traffic noise level inclusive of 2.5 dBA facade correction.

10.4 Traffic Noise Impact Local Roads - Wenham Cox Road and Bowens Road

The existing peak hourly base traffic and additional Project-related traffic flows on local roads in the vicinity of Stratford and Craven are presented in **Table 59**. Note that there are no anticipated Project-related traffic flow increases and therefore the relative percentage increase is nil in all cases.

Table 59 Existing Base and Additional Project Traffic Flows - Local Roads

Time Period	Existing Base[1]	Additional Project Year 1	Cumulative Project Year 1 (% increase)[2]	Additional Project Year 11	Cumulative Project Year 11 (% increase)[2]
Wenham Cox Road					
Daytime peak hourly traffic	15	0	15 (0%)	0	15 (0%)
Night-time peak hourly traffic	8	0	8 (0%)	0	8 (0%)
Bowens Road					
Daytime peak hourly traffic	7	0	7 (0%)	0	7 (0%)
Night-time peak hourly traffic	4	0	4 (0%)	0	4 (0%)

Source: after Halcrow (2012).

Note 1: Existing base traffic inclusive of the approved Stratford Mining Complex.

Note 2: Cumulative traffic includes traffic from the AGL Gloucester Gas Project and Rocky Hill Coal Project.

10.5 Cumulative Mine Operating and Traffic Noise Impact - SCM Access Road

The existing peak hourly base traffic and additional Project related traffic flow movements are presented in **Table 60**. For the purposes of noise impact assessment, the existing traffic and additional Project daily traffic are shown together with the morning and afternoon peak hour flows. The nearest potentially affected property relative to the SCM Access Road is receiver 31(1) Isaac, with an off-set distance of 550 m.

Table 60 Existing SCM and Project Related Traffic Flows

Time Period	Existing Base			Additional Project		
	Light	Heavy	Total	Light	Heavy	Total
2013 Flows						
Afternoon Peak Hour (Daytime)	46	1	47	68	1	69
Morning Peak Hour (Night-time)	76	6	82	46	4	50
2024 Flows						
Afternoon Peak Hour (Daytime)	46	1	47	38	1	39
Morning Peak Hour (Night-time)	76	6	82	19	1	20

Source: after Halcrow (2012).

Traffic noise predictions were based on the methodology endorsed by the US Environmental Protection Agency Report 550/9-74-004 dated March 1974, with modifications based on equations in Appendix A-13 and certain amendments recommended in the UK Calculation of Road Traffic Noise (Department of Transport Welsh Office, 1988). The prediction methodology is generally conservative and takes into account vehicle volume, speed, type, pass-by duration and incorporates local topography with a 100% angle of view to the SCM Access Road (and no façade reflection for intrusive noise). The predicted intrusive operating noise levels and corresponding traffic noise levels are presented in **Table 61** together with the cumulative noise levels.

Table 61 31(1) Isaac - Project Operating, Traffic and Cumulative Intrusive Noise (dBA re 20 µPa)

Time Period	Operating Intrusive Level[1]			Traffic Intrusive Level			Cumulative Intrusive Level			Intrusive PSNL		
	Day-time	Evening	Night-time	Day-time	Evening	Night-time	Day-time	Evening	Night-time	Day-time	Evening	Night-time
Project Year 2												
Afternoon Peak (Daytime)	35	38	-	29	29	-	36	39	-	35	35	-
Morning Peak (Night-time)	-	-	39	-	-	31	-	-	40	-	-	35
Project Year 7 and Year 10												
Afternoon Peak (Daytime)	34	38	-	28	28	-	35	39	-	35	35	-
Morning Peak (Night-time)	-	-	40	-	-	30	-	-	40	-	-	35

Note 1: All predicted noise levels from the worst case meteorological conditions in **Table 9**.
Note 2: Receiver 31(1) Isaac is subject to an existing Landholder Agreement.
Note 3: Predicted $L_{Aeq(15minute)}$ noise level complies with the intrusive PSNL.
Note 4: Predicted marginal noise exceedance 1 to 2 dBA above intrusive PSNL.
Note 5: Predicted moderate noise exceedance 3 to 5 dBA above intrusive PSNL.

The cumulative intrusive noise levels increase by a marginal 1 dBA relative to the operating intrusive noise levels due to the SCM access road noise for the Project Year 2; however the night-time noise level would remain at 40 dBA $L_{Aeq(15minute)}$ for the Project Year 7 and Year 10. Given the marginal 1 dBA increase at the closest receiver, inclusion of the SCM access road at other receivers is not considered necessary.

11 BLASTING IMPACT ASSESSMENT

11.1 Blasting Assessment Criteria

11.1.1 Australian Standard Criteria

AS 2187: Part 2-2006 "*Explosives - Storage and Use - Part 2: Use of Explosives*" provides guidance in assessing blast-induced ground (and structural) vibration and airblast effects on buildings and their occupants and details are presented in Appendix J of AS 2187.

Recommended vibration limits are based on international standards (or studies) as presented in Appendix J Tables J4.5(A) and J4.5(B) of AS 2187, for human comfort and structural building damage respectively. Similarly, recommended human comfort and structural damage airblast limits are presented in Appendix J Tables J5.4(A) and J5.4(B) AS 2187, respectively.

The guideline *"Assessing Vibration: A Technical Guideline"* (DEC, 2006) specifically does not consider blasting-induced vibration and, therefore, this guideline is not discussed further.

11.1.2 Human Comfort Noise and Vibration Criteria

Ground vibration and airblast levels which cause human discomfort are lower than recommended structural damage limits. Therefore, compliance with the lowest applicable human comfort criteria generally ensures that the potential to cause structural damage is negligible. The OEH currently adopts the ANZEC *Technical Basis for Guidelines to Minimise Annoyance due to Blasting Overpressure and Ground Vibration* dated September 1990 for assessing potential annoyance from blasting during daytime hours, as follows:

- The recommended maximum level for airblast is 115 dB Linear.

- The level of 115 dB Linear may be exceeded on up to 5% of the total number of blasts over a period of 12 months. The level should not exceed 120 dB Linear at any time.
- The recommended maximum for ground vibration is 5 mm/s, Peak Vector Sum (PVS) vibration velocity. It is recommended however, that 2 mm/s (PVS) be considered as the long-term regulatory goal for the control of ground vibration.
- The PVS level of 5 mm/s may be exceeded on up to 5% of the total number of blasts over a period of 12 months. The level should not exceed 10 mm/s at any time.

The ANZEC criteria are generally consistent with AS 2187: Part 2-2006 Appendix J Tables J4.5(A) and J5.4(A) with respect to vibration and airblast human comfort respectively.

11.1.3 Livestock Comfort Noise and Vibration Criteria

In a study (*"Responses of Farm Animals to Sonic Booms"* [Casaday and Lehmann, 1967]) animal installations were selected for observations on animal behaviour under sonic boom conditions. The number of animals observed in this study included approximately 10,000 commercial feedlot beef cattle, 100 horses, 150 sheep and 320 lactating dairy cattle. Booms during the test period were scheduled at varying intervals during the morning hours Monday to Friday of each week.

Results of the study showed that the reactions of the sheep and horses to sonic booms were slight. Dairy cattle were little affected by sonic booms (125 dB to 136 dB). Only 19 of 104 booms produced even a mild reaction, as evidenced by a temporary cessation of eating, rising of heads, or slight startle effects in a few of those being milked. Milk production was not affected during the test period, as evidenced by total and individual milk yield. The researchers developed a summary by species and farms indicating that the few abnormal behavioural changes observed were well within the range of activity variation within a group of animals. They defined these changes as horses jumping up and galloping around the paddock, bellowing of dairy cattle, and increased activity by beef cattle (Casaday and Lehmann, 1967). In order to provide for a conservative assessment, the lowest airblast exposure studied (125 dB) was adopted as a criterion for the purposes of assessment of livestock impacts.

Similarly, an investigation (Heggies Pty Ltd, 2006) was conducted to determine the vibration levels experienced by cattle during typical short-term road transportation together with any vibration-induced health affects as observed by a registered veterinary surgeon. The study concluded that cattle are commonly exposed to vibration levels in excess of 200 mm/s during road transportation with no adverse effects on the cattle's health including levels of stress and contentment. It was consequently presumed that there would only be an effect on the cattle's health at vibration levels well in excess of 200 mm/s.

11.1.4 Building Damage Airblast Criteria

In relation to building damage airblast criteria, AS 2187: Part 2-2006 Appendix J J5.4(B) recommends a maximum airblast of 133 dB Linear Peak.

11.1.5 Building Damage Vibration Criteria

The applicable building damage vibration criteria AS 2187: Part 2-2006 Appendix J J4.5(B) is derived from British Standard 7385: Part 2-1993 *Evaluation and Measurement for Vibration in Buildings Part 2. Guideline to damage levels from ground borne vibration*. The standard sets guideline values for building vibration based on the lowest vibration levels above which damage has been credibly demonstrated. These levels have been established to give a minimum risk of vibration-induced damage, where minimal risk for a named effect is usually taken as a 95% probability of no effect.

Sources of vibration which are considered in the standard include blasting (carried out during mineral extraction or construction excavation), demolition, piling, ground treatments (e.g. compaction), construction equipment, tunneling, road and rail traffic and industrial machinery.

The recommended limits (guide values) for transient vibration to ensure minimal risk of cosmetic damage to residential and industrial buildings are presented numerically in **Table 62** and graphically in **Figure 2**.

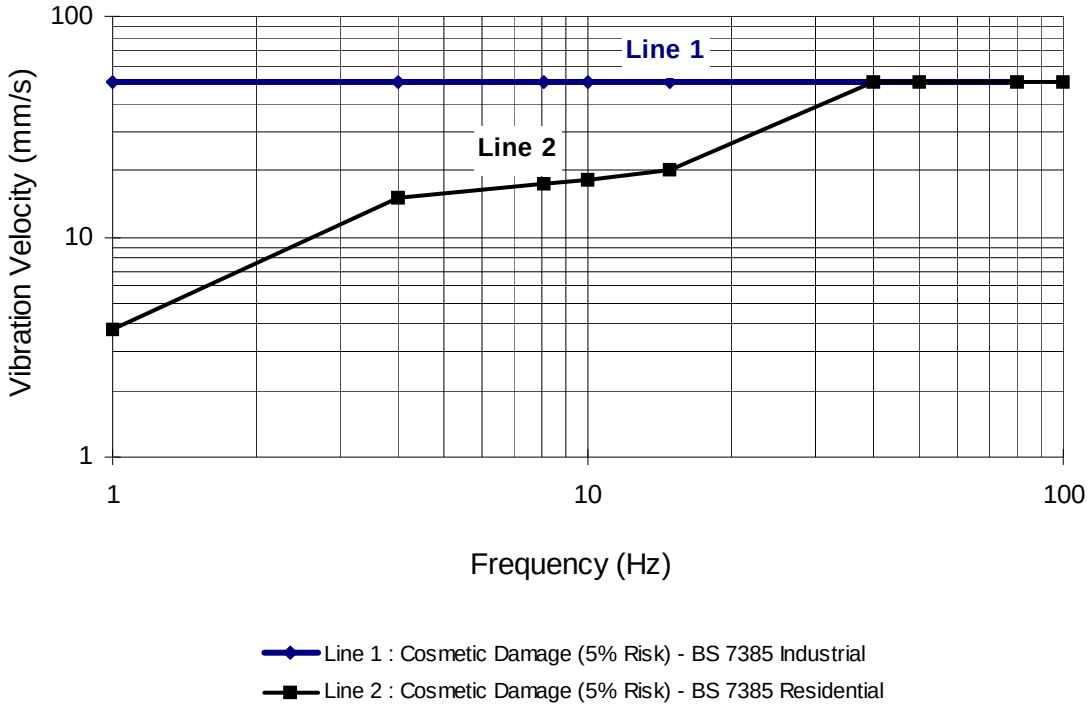
Table 62 Transient Vibration Guide Values - Minimal Risk of Cosmetic Damage

Line	Type of Building	PCPV in Frequency Range of Predominant Pulse[1, 2]	
		4 to 15 Hz	15 Hz and Above
1	Reinforced or framed structures Industrial and heavy commercial buildings	50 mm/s at 4 Hz and above	-
2	Unreinforced or light framed structures Residential or light commercial type buildings	15 mm/s at 4 Hz increasing to 20 mm/s at 15 Hz	20 mm/s at 15 Hz increasing to 50 mm/s at 40 Hz and above

Note 1: Peak Component Particle Velocity - PCPV.
Note 2: Hertz - Hz.

The standard states that the guide values in **Figure 2** relate predominantly to transient vibration which does not give rise to resonant responses in structures, and to low-rise buildings.

Figure 2 Graph of Transient Vibration Guide Values for Cosmetic Damage



The standard goes on to state that minor damage is possible at vibration magnitudes which are greater than twice those given in **Table 62** and major damage to a building structure may occur at values greater than four times the tabulated values. It is noteworthy that extra to the guide values nominated in **Table 62**, the standard states that:

> *Some data suggests that the probability of damage tends towards zero at 12.5 mm/s peak component particle velocity. This is not inconsistent with an extensive review of the case history information available in the UK.*

Also that:

> *A building of historical value should not (unless it is structurally unsound) be assumed to be more sensitive.*

Based on the foregoing discussion a conservative vibration damage assessment criterion of 12.5 mm/s (PCPV) would be applicable to all privately owned residential dwellings.

Two non-Aboriginal heritage sites (the Stratford Cemetery [Site 12] and Craven heritage precinct [Site 10] - **Appendix B2**) identified in the Non-Aboriginal Heritage Assessment (Heritage Management Consultants, 2012) (Appendix J of the EIS) have been included in the blasting assessment.

The same vibration damage assessment criterion of 12.5 mm/s (PCPV) is applicable to the Stratford Cemetery and Craven heritage precinct.

11.1.6 Pipe Work Vibration Damage Criteria

The AGL Gloucester Gas Project includes the construction and operation of a high pressure gas transmission pipeline from Stratford to a delivery station at Hexham in NSW and also a number of low pressure gas gathering lines to deliver gas from the wells to the central processing facility. Accordingly, consideration has been given to potential vibration effects on such infrastructure.

As described in Section 2 of the EIS, only proposed gas wells and associated infrastructure located outside of existing mining tenements at the Stratford Mining Complex and Project MLAs have been considered for the purposes of this EIS.

The German Standard DIN 4150-3:1999 "*Structural Vibration Part 3: Effects of vibration in structures*" provides guideline values for evaluating the effect of vibration on buried pipework. The values are based on the assumption that pipes have been manufactured and laid using current technology. Additional considerations may be required at junctions. The recommended limits for short-term vibration to ensure minimal risk of damage are presented in **Table 63**.

Table 63 Guideline Values for Vibration - Effects of Short-Term Vibration on Buried Pipework

Pipe Material	PCPV Vibration Measured on the Pipe (mm/s)
Steel (including welded pipes)	100
Clay, concrete, reinforced concrete, pre-stressed concrete, metal (with or without flange)	80
Masonry, plastic	50

As it is understood that the high pressure gas transmission pipeline would be of steel construction or similar, based on the foregoing discussion a vibration damage assessment criterion of 50 mm/s (PCPV) and 100 mm/s (PCPV) would be applicable to surface and buried steel pipe work, respectively. In addition, the low pressure gas gathering lines would be made of Polyethylene. Accordingly, a vibration damage assessment criterion of 50 mm/s (PCPV) would be applicable.

11.1.7 High Voltage Electricity Transmission Line Damage Criteria

As discussed in the **Section 3.3**, partial realignment of an existing 132 kV electricity transmission line is proposed as shown on the Project Site General Arrangement Plan (**Appendix B2**). The same electricity transmission line is located at the Duralie Extension Project where Duralie Coal Pty Ltd has adopted a safe blast design vibration criterion of 60 mm/s (PCPV) and a vibration limit of 100 mm/s (PCPV).

11.1.8 Archaeological/Geological Vibration Damage Criteria

The Aboriginal Cultural Heritage Assessment (Kayandel Environmental Services, 2011) (Appendix I of the Project EIS) has identified a potential Aboriginal site of significance as shown on **Appendix B2** reference CTS-1. The site is located outside of the Project disturbance area and approximately 440 m from the Project open pit mining operations.

There are no regulatory criteria nominated in Australia for the assessment of damage to archaeological/geological structures from vibration. Research, however, has been undertaken by the US Army Corps of Engineers into the effects of large surface blasts on the dynamic stability of nearby unlined tunnels of various diameters in sandstone and granite (*Blast Vibration Monitoring and Control* [Dowding, 1985]). The results of the research indicated that intermittent rock fall or observable damage was not observed until vibration levels exceeded 460 mm/s.

The German Standard DIN 4150-3:1999 "*Structural Vibration Part 3: Effects of vibration in structures*" does not specifically include criteria for assessing the "short-term" (ie blasting) effects of vibration on geological structures. However as mentioned above, the DIN 4150-3 does include guideline vibration velocity of 80 mm/s for evaluating the effects of "short-term" vibration on buried clay and concrete pipework. The application of this criterion to geological structures is considered conservative and introduces a five-fold safety factor by comparison to the observable damage value of 460 mm/s.

11.2 Proposed Open Pit Blasting Practices

Assessment of the potential ground-borne vibration and airblast emissions arising from waste rock blasting has been based on the indicative Project blast design parameters presented in **Table 64** which generally represent a continuation of the currently approved blasting practices.

Table 64 Indicative Project Blast Design Parameters

Parameter	Typical Ranges
Bench Height	2 to 20 m
Burden and Spacing	6 m x 6 m
Stemming	4 m (aggregate)
Hole Diameter	150 to 230 mm
Number of Holes	Typically between 800 and 1,300 holes
Holes per Delay	Typically 1 to 4 holes
Explosive Type	Wet product - Fortis Coal (Powergel) Moist/Dry - Fortan Coal (Energan - Heavy ANFO) Dry - ANFO
Maximum Instantaneous Charge (MIC)	RWP and BRNOC - MIC 400 kilograms (kg) ANOC and SEOC - MIC 680 kg to 1,500 kg

To determine the blasting emissions levels at the nearest potentially affected receivers, the measured ground vibration and airblast levels from the SCM and DCM blasting monitoring programme were collated and analysed. The blasting emission database, whilst generally comprehensive, does not include the MIC per delay for each blast design. The data were therefore distilled to determine conservative 50% and 5% exceedance ground vibration and airblast site laws, as follows:

$$PVS\ (50\%) = 529*(R/Q^{1/2})^{-1.42}$$
$$PVS\ (5\%) = 1{,}297*(R/Q^{1/2})^{-1.42}$$
$$SPL\ (50\%) = 140 - 14*(\log(R) - \tfrac{1}{3}\log(Q))$$
$$SPL\ (5\%) = 146 - 14*(\log(R) - \tfrac{1}{3}\log(Q))$$

where,

PVS = PVS vibration velocity (mm/s)
SPL = Peak airblast noise level (dB Linear)
R = Distance between charge and receiver (m)
Q = Charge mass per delay (kg)

11.3 Predicted Ground Vibration and Airblast Levels

By adopting the suggested design, blast vibration and airblast emissions were predicted to the nearest potentially affected receivers as presented **Table 65** for the Roseville West Pit Extension and BRNOC (MIC 400 kg) as well as the Avon North Open Cut and Stratford East Open Cut (MIC 680 kg to 1,500 kg).

Table 65 Predicted Resultant Ground Vibration and Peak Air Blast Levels

ID/Landholder	Roseville West Pit Extension and BRNOC				Avon North Open Cut and Stratford East Open Cut							
	Ground Vibration[1] (mm/s)		Airblast[1] (dB re 20 µPa)		Ground Vibration[1] (mm/s)				Airblast[1] (dB re 20 µPa)			
	MIC 400 kg		MIC 400 kg		MIC 680 kg		MIC 1,500 kg		MIC 680 kg		MIC 1,500 kg	
	50%	5%	50%	5%	50%	5%	50%	5%	50%	5%	50%	5%
Stratford/Craven Rural Receivers												
1 Fraser	0.3	0.7	101	107	0.3	0.7	0.5	1	101	107	103	109
5(1) Bignell	0.4	0.9	103	109	0.3	0.8	0.6	1	101	108	103	109
5(2) Bignell	0.3	0.9	102	108	0.3	0.8	0.6	2	102	108	103	109
7 Burrell	0.3	0.8	102	108	0.6	1	1	3	104	110	106	112
9(1) Williams	0.6	2	105	111	0.4	1	0.8	2	103	109	104	110
9(2) Williams	0.6	2	105	111	0.4	1	0.8	2	103	109	104	110
10 Whatmore & Whatmore	0.6	1	104	110	0.4	0.9	0.7	2	102	108	104	110
11 Walker, Walker, Walker & Walker	0.7	2	105	111	0.4	1	0.7	2	102	108	104	110
16 Pickett	0.9	2	106	112	0.5	1	0.8	2	103	109	105	111
17 Fisher & Smith	1	3	107	113	0.5	1	0.9	2	103	110	105	111
23 Bagnall	0.4	0.9	103	109	0.0	5	3	8	109	115	111	117
24 Harris	0.2	0.4	99	105	0.4	1	0.8	2	103	109	104	110
25 Thompson	0.7	2	105	111	0.4	1	0.7	2	102	108	104	110
26 Lowrey & Lowrey	0.7	2	105	111	0.4	1	0.7	2	102	108	104	110
27 Gloucester Shire Council	1	3	108	114	0.5	1	0.9	2	104	110	105	111
34 Hall & Hall	0.4	0.9	103	109	0.4	0.9	0.6	2	102	108	103	109
36 Wallace & Wallace	0.3	0.8	102	108	0.5	1	0.8	2	103	109	105	111
36a(1) Berecry	0.2	0.4	99	105	0.3	0.8	0.6	1	102	108	103	109
36a(2) Berecry	0.2	0.4	99	105	0.3	0.8	0.6	1	101	107	103	109
38 Johnson & Johnson	0.5	1	104	110	0.3	0.8	0.6	1	102	108	103	109
39 Standen	0.4	0.9	103	109	1	3	2	4	106	112	108	114
43 Moseley	0.4	1	103	109	0.3	0.7	0.5	1	101	107	103	109
44 Cross & Jane	0.3	0.8	102	108	0.6	1	1	3	104	110	106	112
47 Digges, Digges, Hart & Hart	0.2	0.5	100	106	2	4	3	7	108	114	110	116
48 Rounsley	0.2	0.5	100	106	1	3	2	5	106	113	108	114
50 Porter	0.2	0.4	99	105	0.7	2	1	3	105	111	107	113

ID/Landholder	Roseville West Pit Extension and BRNOC				Avon North Open Cut and Stratford East Open Cut							
	Ground Vibration[1] (mm/s)		Airblast[1] (dB re 20 µPa)		Ground Vibration[1] (mm/s)				Airblast[1] (dB re 20 µPa)			
	MIC 400 kg		MIC 400 kg		MIC 680 kg		MIC 1,500 kg		MIC 680 kg		MIC 1,500 kg	
	50%	5%	50%	5%	50%	5%	50%	5%	50%	5%	50%	5%
53 Barnes & Barnes	0.2	0.5	100	106	2	5	4	9	109	115	111	117
54 Hughes & Carrysong Pty Ltd	0.2	0.5	100	106	1	3	2	6	107	113	109	115
55 Hancock & Hancock	0.2	0.5	100	106	0.9	2	2	4	106	112	107	113
56 McCalden & McCalden	0.2	0.4	99	105	0.7	2	1	3	105	111	106	112
58(1) Blanch & Blanch	0.2	0.4	100	106	1	2	2	4	106	112	108	114
58(2) Blanch & Blanch	0.2	0.5	100	106	1	3	2	5	107	113	108	114
59 Cassar & Cassar	0.2	0.5	100	106	2	4	3	7	108	114	110	116
60 Healy & Greenwood	0.2	0.5	100	106	2	5	4	9	109	115	111	117
65 Weismantle	0.1	0.3	98	104	0.5	1	0.9	2	104	110	105	111
69 Hooper & Bartholmew	0.2	0.4	99	105	0.6	1	1	3	104	110	106	112
70 Knight	0.1	0.3	98	104	0.8	2	1	3	105	111	107	113
71 Burnet & Burnet	0.2	0.4	99	105	0.5	1	0.8	2	103	109	105	111
202 Wenham	1	3	107	113	0.5	1	0.9	2	103	109	105	111
265 Stenstrom & Stenstrom	0.1	0.4	99	105	0.2	0.4	0.3	0.7	98	104	100	106
274 Wilson & Wilson	0.2	0.5	100	106	0.2	0.5	0.3	0.8	99	105	101	107
275 Pace Farm Pty Ltd	0.3	0.6	101	107	0.2	0.6	0.4	1	100	106	102	108
276 Luscombe & Luscombe	0.2	0.5	100	106	0.2	0.4	0.3	0.8	99	105	100	106
279 Cullum & Cullum	0.3	0.7	101	107	0.2	0.6	0.4	1	100	106	102	108
281 Lewis & Lewis	1	3	108	114	0.5	1	0.9	2	103	109	105	111
282 Ross	0.3	0.8	102	108	0.2	0.6	0.4	1	100	106	102	108
283 Nolan	0.3	0.8	102	108	0.2	0.6	0.4	1	100	106	102	108
284 Perrin & Perrin	0.5	1	103	109	0.3	0.8	0.5	1	101	107	103	109
285 Carter & Carter	0.3	0.7	101	107	0.2	0.6	0.4	1	100	106	102	108
287 Sinderberry & Rinkin	0.3	0.7	102	108	0.3	0.7	0.5	1	101	107	102	108
288 Perrin	0.3	0.8	102	108	0.3	0.7	0.5	1	101	107	102	108
289 Mcintosh	0.6	1	104	110	0.4	1	0.7	2	102	108	104	110
290 Ryan & Tordoff	0.2	0.6	101	107	0.3	0.7	0.5	1	101	107	103	109
291 Crawley & Crawley	0.4	0.9	102	108	0.3	0.8	0.6	2	102	108	103	109
292(1) Fisher & Fisher	0.2	0.5	100	106	0.3	0.6	0.5	1	100	107	102	108
293 Braunton	0.2	0.5	100	106	0.3	0.7	0.5	1	101	107	102	108
294 Morcom & Morcom	0.2	0.5	100	106	0.3	0.7	0.5	1	101	107	102	108
295 Bush & Bush	0.2	0.5	100	106	0.3	0.7	0.5	1	101	107	103	109
296 Watson & Watson	0.3	0.7	101	107	0.4	1	0.8	2	103	109	104	110
303 JSTC Newcastle Pty Ltd	0.2	0.4	99	105	0.5	1	0.9	2	103	110	105	111
304 Abeysekera & Abeysekera	0.2	0.4	99	105	0.5	1	0.9	2	104	110	105	111
307 Wolfenden & Wolfenden	0.1	0.3	98	104	0.4	1	0.7	2	102	108	104	110
316 Country Rail Infrastructure Authority	1	3	107	113	0.5	1	0.9	2	103	109	105	111

ID/Landholder	Roseville West Pit Extension and BRNOC				Avon North Open Cut and Stratford East Open Cut							
	Ground Vibration[1] (mm/s)		Airblast[1] (dB re 20 µPa)		Ground Vibration[1] (mm/s)				Airblast[1] (dB re 20 µPa)			
	MIC 400 kg		MIC 400 kg		MIC 680 kg		MIC 1,500 kg		MIC 680 kg		MIC 1,500 kg	
	50%	5%	50%	5%	50%	5%	50%	5%	50%	5%	50%	5%
Craven												
Cr.7 Pryce-Jones	0.4	0.9	103	109	2	5	4	9	109	115	111	117
Stratford												
S1 Rees	1	3	108	114	0.5	1	1	2	104	110	105	111
S3 Yeatman	1	4	108	114	0.6	1	1	3	104	110	105	112
S4 Grady & Grady	1	3	107	113	0.5	1	0.9	2	103	109	105	111
S5 Britnell	1	3	108	114	0.5	1	0.9	2	104	110	105	111
S6 Threadgate & Threadgate	1	3	107	114	0.5	1	0.9	2	103	110	105	111
S8 Forbes	1	3	108	114	0.5	1	0.9	2	104	110	105	111
S9 Greenham & Greenham	1	3	108	114	0.5	1	0.9	2	104	110	105	111
S10 Germon	1	3	108	114	0.5	1	1	2	104	110	105	111
S11 Glew	1	3	108	114	0.5	1	1	2	104	110	105	111
S12 Mitchell & Mitchell	1	3	108	114	0.6	1	1	2	104	110	105	111
S13 Wells & Wells	1	3	108	114	0.6	1	1	2	104	110	105	111
S14 Bignell	1	3	107	113	0.5	1	0.9	2	103	109	105	111
S15 Minister for Education	1	3	108	114	0.6	1	1	2	104	110	105	111
S18 Whittall & Whittall	2	4	109	115	0.6	1	1	3	104	110	106	112
S19 Carroll	2	4	109	115	0.6	2	1	3	104	110	106	112
S20 McGrath	1	3	107	113	0.5	1	0.9	2	103	109	105	111
S21 Adams	1	3	107	113	0.5	1	0.9	2	103	109	105	111
S23 Bartlett	1	3	108	114	0.5	1	0.9	2	103	109	105	111
S24 Mavay	1	3	108	114	0.5	1	0.9	2	104	110	105	111
S26 Young	1	3	108	114	0.5	1	0.9	2	104	110	105	111
S27 Brown & Brown	1	3	108	114	0.5	1	1	2	104	110	105	111
S28 Morris & Morris	1	3	108	114	0.5	1	1	2	104	110	105	111
S29 Bagnall & Bagnall	1	3	108	114	0.6	1	1	2	104	110	105	111
S30 Baker	1	4	108	114	0.6	1	1	2	104	110	105	111
S31 Richards	2	4	108	114	0.6	1	1	3	104	110	105	111
S33 Langtry, Gilbert & Gilbert	2	4	108	115	0.6	1	1	3	104	110	105	111
S34 Ashby	2	4	109	115	0.6	1	1	3	104	110	106	112
S35 Rodgers & Bekker	2	4	109	115	0.6	1	1	3	104	110	106	112
S36 Platt & Platt	2	4	109	115	0.6	1	1	3	104	110	106	112
S37 Pryor & Pryor	2	4	109	115	0.6	1	1	3	104	110	106	112
S38 Kirkman	2	4	109	115	0.6	1	1	3	104	110	106	112
S39(1) Nicholls & Husband	2	4	109	115	0.6	2	1	3	104	110	106	112
S39(2) Nicholls & Husband	2	5	109	115	0.6	2	1	3	104	110	106	112
S40 Curtis	1	3	108	114	0.5	1	0.9	2	103	109	105	111
S41 Mcclure & Aplin	1	3	108	114	0.5	1	0.9	2	104	110	105	111
S43 Squire	1	3	108	114	0.5	1	1	2	104	110	105	111

ID/Landholder	Roseville West Pit Extension and BRNOC				Avon North Open Cut and Stratford East Open Cut							
	Ground Vibration[1] (mm/s)		Airblast[1] (dB re 20 µPa)		Ground Vibration[1] (mm/s)				Airblast[1] (dB re 20 µPa)			
	MIC 400 kg		MIC 400 kg		MIC 680 kg		MIC 1,500 kg		MIC 680 kg		MIC 1,500 kg	
	50%	5%	50%	5%	50%	5%	50%	5%	50%	5%	50%	5%
S47 Potts	2	4	108	114	0.6	1	1	2	104	110	105	111
S48 Farley & Farley	2	4	109	115	0.6	1	1	3	104	110	105	111
S49 Blanch	2	4	109	115	0.6	1	1	3	104	110	105	111
S50 Vanderdrift & Blanch	2	4	109	115	0.6	1	1	3	104	110	106	112
S51 Trenholme	2	4	109	115	0.6	1	1	3	104	110	106	112
S52 Farley & Barry	2	4	109	115	0.6	1	1	3	104	110	106	112
S53 Arthur	2	4	109	115	0.6	1	1	3	104	110	106	112
S54 Adams	2	4	109	115	0.6	1	1	3	104	110	106	112
S56 Collins & Collins	1	3	108	114	0.5	1	0.9	2	104	110	105	111
S57 Gam	1	4	108	114	0.6	1	1	2	104	110	105	111
S58 Harrigan	1	4	108	114	0.5	1	1	2	104	110	105	111
S59 Grady & Grady	1	4	108	114	0.5	1	1	2	104	110	105	111
Receivers subject to Landholder Agreement												
14 Wenham & Wenham	2	4	109	115	0.6	1	1	3	104	110	106	112
15(1) Falla Superannuation	2	4	109	115	0.6	1	1	3	104	110	106	112
15(2) Falla Superannuation	2	5	110	116	0.7	2	1	3	105	111	106	112
15(3) Falla Superannuation	3	8	112	118	0.7	2	1	3	105	111	107	113
29 Ward	3	7	111	117	0.7	2	1	3	105	111	106	112
31(1) Isaac	2	5	109	115	0.6	1	1	3	104	110	105	112
31(2) Isaac	2	4	109	115	0.5	1	1	2	104	110	105	111
37 Worth	0.3	0.8	102	108	0.6	1	1	3	104	110	106	112
40 Leslie Allenby Blanch	0.4	1	103	109	1	3	2	5	107	113	108	114
42 Blanch	0.4	1	103	109	2	5	3	8	109	115	111	117
297 Bosma	0.3	0.6	101	107	0.4	1	0.8	2	103	109	104	110
298 Yates	0.3	0.7	101	107	0.5	1	1	2	104	110	105	111
Cr.2 Boorer	0.4	0.9	103	109	1	4	3	6	108	114	109	115
Stratford/Craven Non-Residential Receivers												
30 Stratford Cemetery (Heritage Site 12)	2	5	109	115	0.6	1	1	3	104	110	106	112
S15 Stratford Public School	1	3	107	113	0.5	1	0.9	2	103	109	105	111
S25 St John's Anglican Church	1	3	108	114	0.5	1	0.9	2	104	110	105	111
Resource company-owned Receivers												
6 AGL	0.6	2	105	111	0.7	2	1	3	105	111	106	113
13(1) AGL	1	3	108	114	0.8	2	1	3	105	111	107	113
13(2) AGL	0.7	2	105	111	0.7	2	1	3	105	111	106	112
4(1) GRL	0.2	0.5	100	106	0.2	0.6	0.4	1	100	106	102	108
4(2) GRL	0.3	0.7	102	108	0.5	1	0.9	2	103	109	105	111
4(4) GRL	0.2	0.6	101	107	0.4	1	0.8	2	103	109	104	110
4 (5) GRL	0.2	0.5	100	106	0.4	1	0.7	2	102	108	104	110

ID/Landholder	Roseville West Pit Extension and BRNOC				Avon North Open Cut and Stratford East Open Cut							
	Ground Vibration[1] (mm/s)		Airblast[1] (dB re 20 µPa)		Ground Vibration[1] (mm/s)				Airblast[1] (dB re 20 µPa)			
	MIC 400 kg		MIC 400 kg		MIC 680 kg		MIC 1,500 kg		MIC 680 kg		MIC 1,500 kg	
	50%	5%	50%	5%	50%	5%	50%	5%	50%	5%	50%	5%
4(6) GRL	0.2	0.6	101	107	0.5	1	0.8	2	103	109	105	111
4(7) GRL	0.2	0.6	101	107	0.5	1	0.8	2	103	109	105	111
4(8) GRL	0.2	0.6	101	107	0.5	1	0.9	2	104	110	105	111
4(9) GRL	0.2	0.5	100	106	0.4	1	0.7	2	102	108	104	110
4(12) GRL	0.2	0.6	100	106	0.3	0.6	0.5	1	101	107	102	108
4(15) GRL	0.2	0.6	101	107	0.3	0.8	0.6	1	102	108	103	109
4(16) GRL	0.3	0.6	101	107	0.4	0.9	0.7	2	102	108	104	110
4(18) GRL	0.3	0.7	101	107	0.4	1	0.7	2	103	109	104	110
19(1) SCPL	0.3	0.8	102	108	0.7	2	1	3	104	110	106	112
19(2) SCPL	0.7	2	105	111	0.6	2	1	3	104	110	106	112
19(4) SCPL	1	4	108	114	0.6	1	1	2	104	110	105	111
19(5) SCPL	2	4	109	115	0.6	1	1	3	104	110	106	112
19(6) SCPL	0.4	0.9	102	108	1	3	2	5	106	112	108	114
19(7) SCPL	2	5	109	115	0.6	1	1	3	104	110	106	112
19(8) SCPL	0.4	0.9	103	109	1	3	3	6	108	114	109	115
19(9) SCPL	0.4	1	103	109	2	4	3	7	108	114	110	116
19(10) SCPL	0.4	1	103	109	2	4	3	7	108	114	110	116
19(11) SCPL	0.1	0.3	98	104	0.6	1	1	3	104	110	106	112
19(12) SCPL	0.4	1	103	109	2	4	3	7	108	114	110	116
19(13) SCPL	0.4	1	103	109	2	4	3	7	108	114	110	116
19(14) SCPL	0.4	1	103	109	2	4	3	7	109	115	110	116
19(15) SCPL	0.4	0.9	103	109	2	5	4	9	109	115	111	117
19(16) SCPL	0.4	0.9	102	109	2	5	4	9	109	115	111	117
19(17) SCPL	0.4	0.9	102	108	2	5	4	9	109	115	111	117
19(18) SCPL	0.4	0.9	102	108	2	5	4	9	109	115	111	117
19(19) SCPL	0.4	0.9	102	108	2	5	4	9	109	115	111	117
19(20) SCPL	0.4	0.9	102	108	2	5	4	9	109	115	111	117
19(21) SCPL	0.3	0.8	102	108	2	5	4	10	110	116	111	117
19(22) SCPL	0.2	0.6	101	107	2	6	4	10	110	116	112	118
19(23) SCPL	0.3	0.9	102	108	4	9	6	15	112	118	113	119
19(25) SCPL	0.3	0.7	101	107	7	17	13	31	115	121	116	122
19(26) SCPL	0.1	0.4	99	105	0.9	2	2	4	106	112	107	113
19(27) SCPL	0.1	0.3	98	104	0.6	1	1	2	104	110	105	111
19(28) SCPL	0.3	0.6	101	107	14	33	24	59	117	123	119	125
19(29) SCPL	1	3	107	113	1	3	2	5	107	113	108	114
19(30) SCPL	1	3	108	114	2	5	4	9	109	115	111	117
19(31) SCPL	0.2	0.6	100	107	4	10	7	17	112	118	114	120
19(32) SCPL	0.2	0.4	99	106	2	4	3	7	108	114	110	116
19(33) SCPL	0.8	2	106	112	3	8	6	14	111	117	113	119
19(34) SCPL	0.2	0.6	101	107	0.4	1	0.8	2	103	109	104	110
19(35) SCPL	0.1	0.3	97	103	0.4	0.9	0.7	2	102	108	104	110
19(36) SCPL	0.1	0.2	97	103	0.4	0.9	0.7	2	102	108	104	110
19(37) SCPL	0.1	0.3	97	103	0.4	0.9	0.6	2	102	108	104	110

ID/Landholder	Roseville West Pit Extension and BRNOC				Avon North Open Cut and Stratford East Open Cut							
	Ground Vibration[1] (mm/s)		Airblast[1] (dB re 20 µPa)		Ground Vibration[1] (mm/s)				Airblast[1] (dB re 20 µPa)			
	MIC 400 kg		MIC 400 kg		MIC 680 kg		MIC 1,500 kg		MIC 680 kg		MIC 1,500 kg	
	50%	5%	50%	5%	50%	5%	50%	5%	50%	5%	50%	5%
19(38) SCPL	0.3	0.7	101	107	0.5	1	0.9	2	104	110	105	111
19(39) SCPL	0.4	1	103	109	2	4	3	7	108	114	110	116
19(40) SCPL	0.6	1	105	111	7	17	12	30	114	120	116	122
19(41) SCPL	0.9	2	106	112	0.5	1	0.9	2	103	109	105	111
19(42) SCPL	0.4	1	103	109	2	5	4	9	110	116	111	117
19(43) SCPL	0.3	0.6	101	107	13	33	23	57	117	123	119	125
19(45) SCPL	0.4	0.9	103	109	1	3	2	6	108	114	109	115
19(46) SCPL	0.4	1	103	109	1	4	3	6	108	114	109	115
19(47) SCPL	0.4	1	103	109	2	6	4	10	110	116	111	117
Heritage Site 10 (Craven precinct)	0.4	1	103	109	2	4	3	7	108	114	110	116
CTS-1 Aboriginal Site	0.6	1	104	110	9	23	17	41	116	122	117	123

Note 1: Based on the indicative blast parameters presented in **Table 64**.
Note 2: Predicted blast emission level complies with the human comfort criteria of 5 mm/s and 115 dBLpk.
Note 3: Predicted blast emission level exceedance of 1 to 2 mm/s or 1 to 2 dB above the human comfort criteria of 5 mm/s and 115 dBLpk.
Note 4: Predicted blast emission level exceedance of 3 to 5 mm/s or 3 to 5 dB above the human comfort criteria of 5 mm/s and 115 dBLpk.
Note 5: Predicted blast emission level exceedance of > 5 mm/s or > 5 dB above the human comfort criteria of 5 mm/s and 115 dBLpk.
Note 6: Receiver not relevant to human comfort criteria.
Note 7: dBLpk = decibels linear peak.

11.4 Blasting Impact Assessment

11.4.1 Privately Owned Receivers - Impact Assessment

Receivers that are predicted to exceed the relevant ground vibration and/or air blast criteria are presented in **Table 66**.

Table 66 Privately Owned Receivers[1] with Criteria 5% Exceedances

Open Cut	> 5 to 7 mm/s or 116 to 117 dBLpk	8 to 10 mm/s or 118 to 120 dBLpk	11 to 12.5 mm/s or 120 to 133 dBLpk	> 12.5 mm/s or > 133 dBLpk
RWP and BRNOC (MIC 400 kg)	15(2)[3], 29[2,3]	15(3)[3]	-	-
ANOC and SEOC (MIC 680 kg)	-	-	-	-
ANOC and SEOC (MIC 1,500 kg)	54, Cr.2[2]	23, 42[3], 47, 53, 59, 60, Cr.7		-

Note 1: Refer to **Appendix B1** for land ownership details.
Note 2: Receivers identified in the existing SCM Project Approval (DA 23-98/99) as being in the Noise Affectation Zone.
Note 3: Receivers subject to an existing Landholder Agreement.

In the Avon North Open Cut and Stratford East Open Cut, SCPL would reduce the MIC to 680 kg where necessary to achieve the relevant ground vibration and/or air blast criteria at all receivers.

11.4.2 Resource Company-owned Receivers - Impact Assessment

A total of eleven resource company-owned receivers are predicted to exceed the relevant noise and vibration criteria with an MIC of 680 kg at the Avon North Open Cut and Stratford East Open Cut as presented in **Table 67**.

Table 67 Resource Company-owned Receivers[1] with Criteria 5% Exceedances

Open Cut	> 5 to 7 mm/s or 116 to 117 dBLpk	8 to 10 mm/s or 118 to 120 dBLpk	11 to 12.5 mm/s or 120 to 133 dBLpk	> 12.5 mm/s or > 133 dBLpk
RWP and BRNOC (MIC 400 kg)	-	-	-	-
ANOC and SEOC (MIC 680 kg)	19(21), 19(22), 19(42), 19(47)	19(23), 19(31), 19(33)	-	19(25), 19(28), 19(40), 19(43)
ANOC and SEOC (MIC 1,500 kg)	19(8), 19(9), 19(10), 19(32), 19(39), 19(45), 19(46)	19(12), 19(13), 19(14), 19(15), 19(16), 19(17), 19(18), 19(19), 19(20), 19(21), 19(30), 19(42), 19(47)	19(22)	19(23), 19(25), 19(28), 19(31), 19(33), 19(40), 19(43)

Note 1: Refer to **Appendix B1** for land ownership details.

11.4.3 Heritage Sites - Impact Assessment

As shown in **Table 65**, the Aboriginal heritage site CTS-1 is predicted to be below the relevant 80 mm/s criterion (Section **11.1.8**). Similarly, Sites 12 (Stratford Cemetery) and 10 (Craven heritage precinct) are both predicted to be below the building damage criteria.

11.4.4 Infrastructure and Livestock Impact Assessment

The predicted vibration safe working distances to surface pipe work, electricity transmission line and archaeological/geological workings are presented in **Table 68** together with livestock vibration and airblast safe working distances.

Table 68 Predicted Safe Working Distances

Open Cut	Surface Pipe Work /Low Pressure Gathering Line Vibration Criteria 50 mm/s	Buried Pipe Work/High Pressure Line Vibration Criteria 100 mm/s	Powerline Vibration Criteria 60 mm/s	Livestock Vibration Criteria 200 mm/s	Livestock Airblast Criteria 125 dBLpk
RWP and BRNOC (MIC 400 kg)	197 m (5%)	121 m (5%)	173 m (5%)	74 m (5%)	219 m (5%)
ANOC and SEOC (MIC 680 kg)	257 m (5%)	158 m (5%)	226 m (5%)	97 m (5%)	261 m (5%)
ANOC and SEOC (MIC 1,500 kg)	382 m (5%)	234 m (5%)	336 m (5%)	144 m (5%)	340 m (5%)

In regards to the predicted safe working distances provided in **Table 68**:

- As described in **Section 11.1.6**, only AGL Gloucester Gas Project infrastructure located outside of existing mining tenements at the Stratford Mining Complex and Project MLAs has been considered for the purposes of this EIS. Therefore, the safe working distances for surface and buried pipe work described above are only relevant in those areas of the site where Project blasting may occur in close proximity to tenement boundaries. These safe working distances would be considered by SCPL during consultation with AGL regarding final placement of relevant infrastructure,
- The proposed powerline realignment is located outside of the relevant safe working distance, other than a small portion adjacent to the southern limb of the Stratford East Open Cut (under the 1,500 kg MIC). These safe working distances would be considered by SCPL during consultation with TransGrid regarding final placement of powerline infrastructure,
- SCPL would consult with nearby landholders with the aim of excluding livestock from the livestock safe working distances provided in **Table 68**.

11.4.5 Flyrock Impact Assessment

Flyrock is any solid material ejected from the blast site by the force of the blast.

There are generally two areas within the blast from which flyrock has the potential to be produced. These are at the blasthole collar (where the stemming length has not been optimised and the explosive column is too close to the upper surface of the rock mass creating crater effects - rifling) and at the face of the blast (where there could be less than optimum burden on a blasthole whereby the explosives gases are able to vent to atmosphere - blowouts, producing flyrock).

Flyrock would be managed through appropriate blast design in order minimise flyrock risk to the public using Wenham Cox Road, Bowens Road, Wheatleys Lane and Glen Road or nearby residential receivers.

In terms of collar ejection, the proposed stemming length of 4 m is considered acceptable for the proposed blasthole lengths and has been selected in order to safely contain the explosives and separate them from the collar of the blasthole. Aggregate would be used as the stemming material to contain the explosives within the blasthole.

Burden on the front-row blastholes would be checked in order to identify any areas of less than optimum burden and, if required, inert material (rather than explosives) would be placed at this location in the blasthole.

Operational experience indicates that the majority of blasts result in either no flyrock or limited flyrock less than 50 m from the blast. Occasional anomalous blast events have resulted in flyrock being recorded around 100 m to 150 m from blasts.

The NSW Department of Trade and Investment, Regional Infrastructure and Services Division of Resources and Energy and the RMS has previously permitted open pit blasting to be carried-out at distances of 500 m (or greater) without the need for road closure, and hence it is not expected that any management measures for The Bucketts Way would be required for the Project blasting.

In addition, consistent with previous operational experience at the Stratford Mining Complex and DCM, potential flyrock impacts would be managed at the following privately-owned properties during blast events within 500 m of the property boundary:

- 31 Isaac;
- 15 Falla; and
- 14 Wenham.

Similarly, SCPL would consult with the above nearby landholders and would revise the Blast Management Plan for the Project to address the management of livestock in proximity to blasting activities. In addition, a Landholder Agreement has been put into place between SCPL and all three privately owned properties.

11.5 Review of Existing Blast Management Plan

It is recommended that the existing Blast Management Plan be reviewed and revised for the Project to include:

- Review of vibration and airblast monitoring locations.
- Development and ongoing review of "site laws" (ie site based prediction equations) for ground vibration and airblast.
- Human and livestock safety control measures and notification procedures in relation to Wenham Cox Road, Bowens Road, Wheatleys Lane and Glen Road and nearby residential receivers within 500 m of blast events.
- Occupants of dwellings within 2 km of a proposed blast would be given the opportunity to be notified prior to all blast events for the Project.
- Establishment of an appropriate exclusion zone around blast events, including the positioning of sentries on public access points for privately owned properties within 500 m of a blast event.

12 SUMMARY OF FINDINGS

12.1 Construction Impact Assessment

As shown the Project Site General Arrangement Plan (**Appendix B2**), proposed construction works are generally limited, but would include public road realignments of Wheatleys Lane, Bowens Road and Wenham Cox/Bowens Road. The use of the ICNG is considered appropriate as the public road realignments are a discrete, short-term activity (involving a relatively modest bulk earthworks fleet anticipated to take up to approximately 12 weeks). The work would be undertaken by a separate construction contractor.

The ICNG recommends a CNML equivalent to the daytime RBL plus 10 dBA within standard hours (ie daytime) and RBL plus 5 dBA outside standard hours (ie evening and night-time).

Representative construction scenarios for the road realignments were modelled.

All receivers were predicted to be below the highly affected CNML. Similarly, all predicted intrusive $L_{Aeq(15minute)}$ construction noise levels are below the respective daytime CNMLs of 42 dBA at all Stratford/Craven dwellings and 40 dBA at all Other Rural dwellings and any construction noise impacts are therefore considered acceptable.

12.2 Project and Cumulative Mine Operating Noise Assessment Criteria

12.2.1 Project Operating Assessment Criteria

The NSW EPA has regulatory responsibility for the control of noise from "scheduled premises" under the *Protection of the Environment Operations Act 1997*. In implementing the INP, the OEH has two broad objectives.

- Controlling intrusive noise levels in the short-term; and
- Maintaining noise amenity levels for particular land uses over the medium to long-term.

In accordance with the INP's Chapter 2 Industrial Noise Criteria and associated Application Notes (9 June 2011), the PSNLs for the residential, industrial and other localities are presented in **Table 69** for intrusive noise and amenity levels. These criteria are nominated for the purposes of assessing potential noise impacts from the Project.

Table 69 Project Specific Noise Levels and Assessment Criteria (dBA re 20 µPa)

Locality	Land Use	Intrusive $L_{Aeq(15minute)}$[1]			Amenity $L_{Aeq(period)}$[1]		
		Day	Evening	Night	Day	Evening	Night
Stratford/Craven	Village Residential[2]	37	36	35	50	45	40
	Village Vacant Land[3]						
Other Rural	Rural Residential[2]	35	35	35	50	45	40
	Rural Vacant Land[3]						
Parkers Road	Industrial	Intrusive noise criteria not applicable			70	70	70
Any	School[4]	Intrusive noise criteria not applicable			External 45 when in use		
Any	Church[4], Cemetery[4]	Intrusive noise criteria not applicable			External 50 when in use		
Any	Active Recreation	Intrusive noise criteria not applicable			External 55 when in use		

Note 1: Daytime 0700 hrs to 1800 hrs, Evening 1800 hrs to 2200 hrs, Night-time 2200 hrs to 0700 hrs.
Note 2: At the most-affected point within 30 m of the residential area.
Note 3: Where exceedances are predicted over 25% of the vacant land area.
Note 4: External criteria equivalent to internal criteria plus 10 dBA.

The INP states that the PSNLs have been selected to preserve the amenity of at least 90% of the population living in the vicinity of industrial noise sources from the adverse effects of noise for at least 90% of the time. Provided the PSNLs are achieved, then most people would consider the resultant noise levels acceptable. In those cases where the PSNLs are not achieved, it does not automatically follow that all people exposed to the noise would find the noise unacceptable.

12.2.2 Project Sleep Disturbance Assessment Criteria

The INP Application Notes dated 9 June 2011 guideline (refer **Appendix F**) suggests that the $L_{A1(1minute)}$ level of 15 dBA above the RBL is a suitable criterion for assessing sleep disturbance for the night-time period. The Project night-time $L_{A1(1minute)}$ SDNLs are presented in **Table 70** together with the comparable SCM consented $L_{A1(1minute)}$ noise limit.

Table 70 Night-time $L_{A1(1minute)}$ Sleep Disturbance Noise Levels (dBA re 20 µPa)

Locality	Approved $L_{A1(1minute)}$ SCM Night-time[1] Limit	Project $L_{A1(1minute)}$ Night-time[1] Criteria
Stratford/Craven Village	45	45
Stratford/Craven Rural	45	45

Note 1: Monday to Saturday 2200 hrs to 0700 hrs; Sundays and Public Holidays 2200 hrs to 0800 hrs.

As described in **Section 5.3**, the sleep disturbance criteria are not considered by the EPA to be ideal, because the research into disturbance of sleep remains inconclusive and therefore it is not possible to develop noise level criteria for sleep disturbance that would have the equivalent level of confidence as those criteria used for annoyance reactions. For example an external $L_{A1(1minute)}$ noise criteria of 60 dBA would appear to be consistent with the current research in relation to this matter.

12.2.3 Project and Cumulative Mine Noise Impact Assessment Methodology

In view of the foregoing, **Table 71** presents the methodology for assessing the Project operating noise levels against the intrusive and amenity PSNLs (**Table 21**) and the $L_{A1(1minute)}$ SDNLs (**Table 22**) together with cumulative amenity noise levels (**Table 20**) for assessing operating noise levels from existing, approved and proposed mining developments in the vicinity of the Project.

Table 71 Project & Cumulative Mine Noise Impact Assessment Methodology (dBA re 20 µPa)

Assessment Source	Assessment Parameter	Assessment Criteria	Noise Management Zone[1]		Noise Affectation Zone
			Marginal	Moderate	
Project	PSNL Intrusive	RBL plus 5 dBA	1 to 2 dBA above assessment criteria	3 to 5 dBA above assessment criteria	> 5 dBA above assessment criteria[2]
	PSNL Amenity	INP acceptable			
	SDNL LA1(1minute)	RBL plus 15 dBA			
Mine Developments	Cumulative Amenity	INP acceptable	1 to 2 dBA above assessment criteria	3 dBA above assessment criteria	> 3 dBA above assessment criteria[3]

Note 1: Depending on the degree of predicted exceedance of the relevant assessment parameter potential noise impacts in the noise management zone could range from marginal to moderate (in terms of the perceived noise increase).

Note 2: Exposure to Project noise levels greater than 5 dBA above the relevant PSNL and or SDNL may be considered unacceptable by some landowners.

Note 3: Exposure to cumulative mine noise levels greater than 3 dBA above the relevant INP acceptable noise level may be considered unacceptable by some landowners.

12.2.4 Investigation of Reasonable and Feasible Noise Mitigation

SCPL is obligated under the current Project Approval requirements to implement all reasonable and feasible noise mitigation measures. The previously-approved noise mitigation measures described in **Section 6.1** have been adopted for the noise impact assessment of the proposed Project. In addition, further investigation of reasonable and feasible noise mitigation measures was conducted in consultation with SCPL particularly in relation to night-time operations. A number of iterative steps were undertaken to develop noise mitigation measures for the proposed Project, including:

- Extensive preliminary noise modelling scenarios representative of the predicted maximum Project noise emissions to identify any potential noise exceedances.
- Ranking the highest noise contributors and progressively introducing noise mitigation measures to appreciably reduce noise levels.
- Evaluating various combinations of noise control and management measures to assess their relative effectiveness.
- Agreement by SCPL to adopt a range of noise control and management measures (including low noise equipment and operational controls) to appreciably reduce noise emissions associated with the proposed Project as presented in **Table 27** and **Table 28**.

12.3 Project and Cumulative Mine Operating Noise Impact Assessment

12.3.1 Privately Owned Dwellings and Vacant Land

A summary of the exceedances at privately owned dwellings and vacant land of the PSNLs, SDNLs and INP's acceptable noise amenity levels is presented in **Table 72**.

Table 72 Summary Privately Owned Receivers[1] and Vacant Land with Criteria Exceedances

Exceedance Range	**1 to 2 dBA above PSNL**	**3 to 5 dBA above PSNL**	**> 5 dBA above PSNL**
Intrusive $L_{Aeq(15minute)}$	15(2) Falla Superannuation[3] 23 Bagnall 31(2) Isaac[3] 296 Watson & Watson, 297 Bosma[3] 298 Yates[3]	15(3) Falla Superannuation[3] 29 Ward[2,3] 31(1) Isaac[2,3] 36 Wallace & Wallace 44 Cross & Jane 60 Healy & Greenwood 37 Worth[3]	39 Standen 42 Blanch[3] Cr.2 Boorer[3] Cr.7 Pryce-Jones 40 Blanch[2,3]
Exceedance Range	**1 to 2 dBA above SDNL**	**3 to 5 dBA above SDNL**	**> 5 dBA above SDNL**
Sleep Disturbance $L_{A1(1minute)}$	36 Wallace & Wallace 44 Cross & Jane 37 Worth[3]	39 Standen 42 Blanch[3] Cr.2 Boorer[3] Cr.7 Pryce-Jones 31(1) Isaac[2,3] 40 Blanch[2,3]	-
Exceedance Range	**1 to 2 dBA above PSNL**	**3 to 5 dBA above PSNL**	**> 5 dBA above PSNL**
Amenity $L_{Aeq(period)}$	42 Blanch[3] Cr.7 Pryce-Jones 40 Blanch[2,3]	-	-
Exceedance Range	**1 to 2 dBA above INP Acceptable**	**3 dBA above INP Acceptable**	**> 3 dBA above INP Acceptable**
Cumulative Amenity $L_{Aeq(period)}$	39 Standen 42 Blanch[3] Cr.2 Boorer[3] Cr.7 Pryce-Jones	40 Blanch[2,3]	-
Exceedance Range	**1 to 5 dBA above PSNL**		**> 5 dBA above PSNL**
Vacant Land Intrusive $L_{Aeq(15minute)}$	-	-	32 Mcintosh & Mcintosh[2,3] 35 Dillon & Dillon[3] Cr.1 Wood[2,3] 51 Gloucester Printing Services Pty Ltd

Note 1: Refer to **Appendix B5** for land ownership details.
Note 2: Properties identified in the existing SCM Project Approval (DA 23-98/99) as being in the Noise Affectation Zone.
Note 3: Properties subject to an existing Landholder Agreement.

It is relevant to note that all of the receivers with predicted night-time $L_{A1(1minute)}$ criteria exceedances would fall within the noise affectation zone for intrusive noise impacts, with the exception of receivers 31(1), 36, 37 and 44. Of these, receiver 31(1) and 37 are subject to an existing Landholder Agreement and the remainder are in the marginal (1 dBA to 2 dBA exceedance) management zone.

Similarly, all of the predicted cumulative amenity exceedances are predicted to be in the Project affectation zone (>5 dBA over the PSNL).

Therefore, consistent with the discussion in **Section 5.4**, all of these receivers would be offered either:

- Reasonable and feasible acoustical mitigation at the receivers; or
- Negotiated agreements.

12.4 Rail Transport Impact Assessment

Noise impacts from existing operations on the rail system or new rail traffic-generating developments are addressed in the EPA's rail noise guideline "*Environment Assessment Requirements for Rail Traffic - Generating Developments"* dated 26 February 2011 attached as **Appendix H1**. Rail noise assessment trigger levels are reproduced in **Table 73**.

Table 73 EPA Guideline Rail Noise Trigger Levels

Descriptor	Noise Assessment Trigger Level
$L_{Aeq(24hour)}$	60 dBA
Maximum Passby L_{Amax} (95th percentile)	85 dBA
Project related rail noise increase	> 0.5 dBA

Note 1: 95th percentile equates to the 5% exceedance value.

The rail noise assessment considers train movements along the North Coast Railway generally between the Stratford Mining Complex and the DCM, where trains travelling to and from the respective mines will pass nearby receivers including dwellings within Wards River (refer **Appendix I**). The following assessments are derived from the predicted $L_{Aeq(24hour)}$ and maximum (5% exceedance) presented in **Table 49** and the OEH's rail noise trigger levels presented in **Table 73**:

- A comparison of the cumulative Base $L_{Aeq(24hour)}$ rail noise with the cumulative Project levels indicates that the 24 hour rail noise would increase by 0.2 dBA (average) and 0.6 dBA (peak) as a result of the Project. The increase in average rail noise level is due to the exclusive use of larger (1,300 m) trains for the Project, rather than trains "up to" 1,300 m as per existing operations.
- The cumulative Base $L_{Aeq(24hour)}$ rail noise meets the 60 dBA trigger level at distances of 41 m (average) to 58 m (peak) and greater. Approximately 9 receivers (R1-R2, R4-R10 as shown in **Appendix I**) currently exceed the 60 dBA trigger level as a result of the cumulative Base (peak) rail movements.
- The cumulative Project $L_{Aeq(24hour)}$ rail noise would meet the 60 dBA trigger level at distances of 43 m (average) to 67 m (peak) and greater. Approximately 9 additional receivers (R11-R19 as shown in **Appendix I**) would exceed the 60 dBA trigger level as a result of the cumulative Project (peak) rail movements.
- The cumulative Potential $L_{Aeq(24hour)}$ rail noise level meets the 60 dBA goal at distances of 47 m (average) to 72 m (peak) and greater. Approximately 7 additional receivers (R19-R26 as shown in **Appendix I**) would exceed the 60 dBA trigger level as a result of the cumulative Potential (peak) rail movements.
- The cumulative Base maximum pass-by noise level (largely controlled by general freight trains) would be unchanged by the Project and would continue to meet the 85 dBA trigger level at distances of 50 m and greater. Approximately 6 receivers (R1-R2, R4-R7 as shown in **Appendix I**) currently exceed the 85 dBA trigger level as a result of the cumulative Project (peak) rail movements.

The OEH guideline indicates that where the cumulative noise level exceeds the noise assessment trigger levels and Project-related noise increases greater 0.5 dBA are predicted, then all feasible and reasonable noise mitigation measures should be implemented. As a general principle, where the reduction of existing noise levels can be achieved through feasible and reasonable measures, a reduction in noise levels to meet the noise assessment trigger levels is the primary objective. In all cases where the L_{Aeq} noise level increases are more than 2 dBA, strong justification should be provided as to why it is not feasible or reasonable to reduce the increase.

Note that the average Project related rail noise level increase is 0.2 dBA (therefore less than 0.5 dBA) and the peak Project related rail noise level increase is 0.6 dBA (therefore slightly greater than 0.5 dBA). It is concluded that the assessment of "all of feasible and reasonable noise mitigation measures" is not warranted to achieve a negligible 0.6 dBA noise reduction for the Project.

12.5 Road Transport Impact Assessment

The Bucketts Way is classified by RMS as a regional road, whereas Wenham Cox Road and Bowens Road are both classified as local roads under Gloucester Council's road hierarchy. The NSW Road Noise Policy adopts a similar classification scheme for assessing noise impacts on an existing road network from additional traffic generated by the Project as presented in **Table 74**.

Table 74 Road Traffic Noise Assessment Criteria for Residential Land Uses (dBA re 20 µPa)

Study/Receiver Area	Road	Type of Project and Land Use	Total Traffic Noise Criteria[1,3]	Relative Increase Criteria[2,3]
In the vicinity of Stratford and Craven Villages	The Bucketts Way	Land use developments generating additional traffic on existing sub-arterial roads	Daytime 60 LAeq(15hour)	Existing LAeq(15hour) plus 12 dBA
			Night-time 55 LAeq(9hour)	Existing LAeq(9hour) plus 12 dBA
	Wenham Cox Road Bowens Road	Land use developments generating additional traffic on existing local roads	Daytime 55 LAeq(1hour)	Not applicable
			Night-time 50 LAeq(1hour)	

Note 1: Total traffic noise level from existing (2011) and Project (2013 and 2014) related traffic for comparison with the Criteria.
Note 2: Relative increase noise level generated by the Project (2013 and 2014) for comparison with the Criteria.
Note 3: Daytime 0700 hrs to 2200 hrs, Night-time 2200 hrs to 0700 hrs.

Where the total traffic noise levels are above the relevant criteria, the primary objective is to reduce the levels through feasible and reasonable noise mitigation to meet the relevant criteria. A secondary objective is to protect against excessive decreases in the amenity as a result of the Project by applying the relative increase criteria. In accordance with the NSW Road Noise Policy, in assessing feasible and reasonable noise mitigation, a total traffic noise level increase of up to 2 dBA represents a minor impact that is considered barely perceptible and is generally achieved when the Project related percentage increase to the existing light and heavy traffic is no greater than 60%.

Sub-Arterial Road - The Bucketts Way

The maximum daytime increase is anticipated to occur on The Bucketts Way (north of mine access) in 2013 where the relative increase in traffic flow due to the Project is approximately 6%. This increase corresponds to a negligible 0.2 dB increase in the existing daytime $L_{Aeq(15hour)}$ traffic noise levels. Similarly, maximum night-time increase is anticipated to occur on The Bucketts Way (north of mine access) in 2013 where the relative increase in traffic flow due to the Project is approximately 37%. This increase corresponds to a marginal 1.4 dB increase in the existing night-time (9hour) traffic noise levels. In both cases the relative increase in traffic noise due to the Project is less than 12 dBA. Furthermore, the relative increase is less than 2 dBA and in accordance with the RNP represents a minor impact that is considered barely perceptible.

Local Roads - Wenham Cox Road and Bowens Road

There are no anticipated Project related traffic flow increases and therefore the relative percentage increase is nil.

SCM Access Road - Cumulative Mine Operating and Traffic Noise

The SCM Access Road is a private road with a speed limit of 50 kph. The NSW Road Noise Policy recommends that noise from vehicles travelling on private roads should be assessed as an industrial noise source under the NSW INP (rather than road traffic). The SCM Access Road is not used for coal haulage and the nearest potentially affected is receiver 31(1) Isaac, where it is concluded that the cumulative intrusive noise levels increase by a marginal 1 dBA relative to the operating intrusive noise levels due to the SCM access road noise.

12.6 Blasting Impact Assessment

12.6.1 Privately Owned Dwellings

A total of three privately-owned dwellings exceed the relevant ground vibration and/or air blast criteria with an MIC of 400 kg at the Roseville West Pit Extension as presented in **Table 75**.

Table 75 Privately Owned Dwellings[1] with Vibration and/or Air blast 5% Exceedances

Open Cut	> 5 to 7 mm/s or 116 to 117 dBLpk	8 to 10 mm/s or 118 to 120 dBLpk	11 to 12.5 mm/s or 120 to 133 dBLpk	> 12.5 mm/s or > 133 dBLpk
RWP and BRNOC (MIC 400 kg)	15(2) Falla Superannuation[2], 29 Ward[2]	15(3) Falla Superannuation[2]	-	-

Note 1: Refer to **Appendix B5** for land ownership details.
Note 2: Properties subject to an existing Landholder Agreement.

12.6.2 Infrastructure and Livestock

The predicted vibration safe working distances to surface and buried pipe work, electricity transmission line and archaeological/geological workings are presented in **Table 76** together with livestock vibration and air blast safe working distances.

Table 76 Predicted Vibration and Air blast Safe Working Distances 5% Exceedance

Open Cut	Surface Pipe Work /Low Pressure Gathering Line Vibration Criteria 50 mm/s	Buried Pipe Work/High Pressure Line Vibration Criteria 100 mm/s	Electricity Line Vibration Criteria 60 mm/s	Livestock Vibration Criteria 200 mm/s	Livestock Airblast Criteria 125 dBLpk
RWP and BRNOC (MIC 400 kg)	197 m (5%)	121 m (5%)	173 m (5%)	74 m (5%)	219 m (5%)
ANOC and SEOC (MIC 680 kg)	257 m (5%)	158 m (5%)	226 m (5%)	97 m (5%)	261 m (5%)
ANOC and SEOC (MIC 1,500 kg)	382 m (5%)	234 m (5%)	336 m (5%)	144 m (5%)	340 m (5%)

Note 1: Refer to **Appendix B5** for land ownership details.

APPENDICES A TO J

SCM DEVELOPMENT CONSENT (DA 23-98/99) EXTRACTS

ACQUISITION UPON REQUEST

1. Upon receiving a written request for acquisition from an owner of the land listed in Table 1, the Applicant shall acquire the land in accordance with the procedures in Conditions 5-6 of Schedule 4.

Table 1: Land subject to acquisition upon request

29 - Ward	40 – Blanch
31 -Isaac	41 – Devereaux
32 - Mcintosh	315 – Bagnall
33 - Battaglini	Cr 1 – Wood

Note: To identify the locations referred to in Table 1, see the figure in Appendix 3.

NOISE

Noise Criteria

2. Except for the land referred to in Table 1, the Applicant shall ensure that the noise generated by the Stratford Mining Complex does not exceed the criteria in Table 2 at any residence on privately-owned land or on more than 25 percent of any privately-owned land.

Table 2: Noise criteria dB(A)

Location	***Day***	***Evening***	***Night***	
	$L_{Aeq(15minute)}$	$L_{Aeq(15minute)}$	$L_{Aeq(15minute)}$	$L_{A1(1minute)}$
Craven Village	35	35	40	45
39 - Standen				
42 - D Blanch				
36 - Wallace	35	35	37	45
34 - Hall	35	35	36	45
25 - Thompson				
298 - Yates				
291 - Stackman				
All other privately-owned land	35	35	35	45

Notes:
- *To identify the locations referred to in Table 2, see the figure in Appendix 3;*
- *For the purposes of this condition, the Craven Village is comprised on the properties fisted as Cr 2-8 in the figure in Appendix 3; and*
- *Noise generated by the Stratford Mining Complex is to be measured in accordance with the relevant procedures and exemptions (including certain meteorological conditions) of the NSW Industrial Noise Policy.*

However, these criteria do not apply if the Applicant has a written agreement with the relevant landowner to exceed the criteria, and the Applicant has advised the Department in writing 01 the terms of this agreement.

Noise Acquisition Criteria

3. If the noise generated by the Stratford Mining Complex exceeds the criteria in Table 3 at any residence on privately-owned land or on more than 25 percent of any privately-owned land, then upon receiving a written request for acquisition from the landowner, the Applicant shall acquire the land in accordance with the procedures in Conditions 5-6 01 Schedule 4.

Table 3: Noise acquisition criteria dB(A) $L_{Aeq(15minute)}$

Location	Day	Evening	Night
Stratford Village Craven Village	42	41	40
All other privately-owned land	40	40	40

Notes:

- *Noise generated by the Stratford Mining Complex is to be measured in accordance with the relevant procedures and exemptions (including certain meteorological conditions) of the NSW Industrial Noise Policy;*
- *For the purposes of this condition, the Craven Vii/age is comprised on the properties listed as Cr 2-8 in the figure in Appendix 3, and the Stratford Village is the land shown as urban development on the figure in Appendix 3; and*
- *For this condition to apply, the exceedences of the criteria must be systemic.*

Additional Noise Mitigation Measures

4. Upon receiving a written request from the owner of any residence:
   (a) on the land listed in Table 1;
   (b) in the Craven Village (see the land listed as Cr 2-8 in the figure in Appendix 3);
   (c) on the land listed as 39 and 42 in the figure in Appendix 3;
   (d) on the land listed as R8-12 in the figure in Appendix 3;
   (e) on privately-owned land where subsequent noise monitoring shows that the noise generated by the Stratford Mining Complex is greater than or equal to $L_{Aeq(15\ minute)}$ 38 dB(A), or on privately owned land between the Stratford and Duralie mines where the maximum passby rail traffic noise from the Stratford Mining Complex exceeds 85dBA,

   the Applicant shall implement additional noise mitigation measures (such as double glazing, insulation, and/or air conditioning) at the residence in consultation with the owner. These measures must be reasonable and feasible.

   If within 3 months of receiving this request from the owner, the Applicant and the owner cannot agree on the measures to be implemented, or there is a dispute about the implementation of these measures, then either party may refer the matter to the Director-General for resolution.

Rail Noise

5. By the end of December 2011, or as otherwise agreed by the Director-General, the Applicant shall only receive or dispatch locomotives on/off site that are approved to operate on the NSW rail network in accordance with the noise limits in ARTC's EPL (No. 3142).

6. Unless the Director-General agrees otherwise, the Applicant shall ensure that the Stratford rail loop is only occupied simultaneously by two trains at night on:
   (a) no more than 40 times in a calendar year before the end of 2013;
   (b) no more than 25 times in a calendar year from the start of 2014; and
   (c) no more than once a week.

Operating Conditions

7. The Applicant shall:
   (a) implement best practice noise management, including all reasonable and feasible noise mitigation measures to minimise the operational, low frequency and rail noise generated by the development; and
   (b) regularly assess the real-time noise monitoring and meteorological forecasting data and relocate, modify, and/or stop operations on site to ensure compliance with the relevant conditions of this consent, to the satisfaction of the Director-General.

Noise Management Plan

8. The Applicant shall prepare and implement a Noise Management Plan for the Stratford Mining Complex to the satisfaction of the Director-General. This plan must:
   (a) be prepared in consultation with DECCW and ARTC, and submitted to the Director-General for approval by the end of May 2011 or prior to the proposed construction of the new rail loop on site, whichever is sooner;

(c) describe the noise mitigation measures that would be implemented to ensure compliance with the relevant conditions of this consent, including:
- the measures to minimise construction noise during the construction of the proposed new rail loop;
- the scheduling measures that would be implemented to minimise the occurrence of two trains simultaneously occupying the Stratford rail loop at night;
- the measures that would be implemented on site to offset the noise generated by the development on site when two trains are simultaneously occupying the Stratford rail loop at night;
- a real-time noise management system that employs both reactive and proactive mitigation measures; and
- a detailed program to replace or attenuate the existing plant on site;

(d) include a noise monitoring program that:
- uses a combination of real-time and supplementary attended monitoring measures to evaluate the performance of the development;
- includes a program to monitor the actual sound power levels of the plant on site, compare it with the benchmark levels used in the most recent EA for the development, and evaluate the effectiveness of any attenuation; and
- includes a protocol for determining exceedances of the relevant conditions of this consent.

BLASTING

Blasting Criteria

9. The Applicant shall ensure that the blasting on the site does not cause exceedances of the criteria in Table 4.

Table 4: Blasting criteria

Location	***Airblast overpressure (d8(Lin Peak))***	***Ground vibration (mm(s)***	***Allowable exceedance***
Residence on privately owned land	115	5	5% of the total number of blasts over a period of 12 months
	120	10	0%

However, these criteria do not apply if the Applicant has a written agreement with the relevant landowner to exceed the criteria, and the Applicant has advised the Department in writing of the terms of this agreement.

Blasting Hours

10. The Applicant shall only carry out blasting on site between 9am and 5pm Monday to Saturday inclusive. No blasting is allowed on Sundays, public holidays, or at any other time without the written approval of the Director-General.

Blasting Frequency

11. The Applicant shall not carry out more than:
(a) 1 blast a day on site, unless an additional blast is required following a misfire; and
(b) 3 blasts a week, averaged over any 12 month period.

Property Inspections

12. If the Applicant receives a written request for the owner of any privately-owned land within 2 kilometres of the approved open cut mining pit on site for a property inspection to establish the baseline condition of any buildings and/or structures on their land, or to have a previous property inspection report updated, then within 2 months of receiving this request the Applicant shall:

(a) commission a suitably qualified, experienced and independent person, whose appointment has been approved by the Director-General, to:
   - establish the baseline condition of the buildings and/or structures on the land or updated the previous property inspection;
   - inspect the condition of any building or structure on the land, and recommend measures to minimise the potential blasting impacts of the development on these buildings and/or structures; and

(b) give the landowner a copy of the new or updated property inspection report.

Property Investigations

13. If the owner of any privately-owned land claims in writing that the buildings and/or structures on his/her land have been damaged as a result of blasting on site, then within 2 months of receiving this claim the Applicant shall:
    (a) commission a suitably qualified, experienced and independent person, whose appointment has been approved by the Director-General, to investigate the claim; and
    (b) give the landowner a copy of the property investigation report.

    If this independent property investigation confirms the landowner's claim, and both parties agree with these findings, then the Applicant shall repair the damages to the satisfaction of the Director-General.

    If the Applicant or landowner disagrees with the findings of the independent property investigation, then either party may refer the matter to the Director-General for resolution.

Operating Conditions

14. During mining operations on site, the Applicant shall:
    (a) implement best blasting practice to:
       - protect the safety of people and livestock in the surrounding area;
       - protect public or private property in the surrounding area; and
       - minimise the dust and fume emissions from blasting on site; and
    (b) operate a suitable system to enable the public to get up-to-date information on the proposed blasting schedule on site, to the satisfaction of the Director-General.

Blast Management Plan

15. The Applicant shall prepare and implement a Blast Management Plan for the development to the satisfaction of the Director-General. This plan must:
    (a) be prepared in consultation with DECCW, and submitted to the Director-General for approval by the end of May 2011;
    (b) describe the blast mitigation measures that would be implemented on site to ensure compliance with the relevant conditions of this consent;
    (c) describe the measures that would be implemented to ensure the public can get up-to-date information on the proposed blasting schedule on site; and
    (d) include a blast monitoring program to evaluate the performance of the development.

6.3 Blast Management and Monitoring

Overpressure

(a) [29]The overpressure level from blasting operations on the premises must not:

(i) Exceed 115dB (Linear Peak) for more than 5% of the total number of blasts over a period of 12 months; and

(ii) Exceed 120dB (Linear Peak) at any time,

The airblast overpressure values stated above apply when the measurements are performed with equipment having a lower cut-off frequency of 2Hz or less. If the instrumentation has a higher cut off frequency then a correction of 5dB should be added to the measured value. Equipment with a lower cut-off frequency exceeding 10Hz should not be used for the purpose of measuring airblast overpressure.

Ground vibration (ppv)

(b) [30]Ground vibration peak particle velocity from the blasting operations at noise sensitive receivers must not:

(i) Exceed 5mm/s for more than 5% of the total number of blasts over a period of 12 months; and

(ii) Exceed 10mm/s at any time, when measured at any point within one (1) metre of any affected residence or other noise sensitive location such as a school or hospital.

Time of blasting

(c) [31]Blasting operations on the premises may only take place between 9.00 am and 5.00 pm Mondays to Saturdays inclusive.

(d) [32]The hours of operation for blasting operations specified in this condition may be varied if the EPA, having regard to the effect that the proposed variation would have on the amenity of the residents in the locality, gives written consent to the variation.

Frequency of blasting

(e) [33]Blasting at the premises is limited to one (1) blast each day on which blasting is permitted unless under extenuating circumstances as determined by the Mine Manager. In such cases when an additional blast is deemed necessary the EPA shall be notified in writing within twenty four hours of the additional blast occurring.

Blasting/Vibration Management Plan

(f) The Applicant shall prepare and implement a Blasting/Vibration Management Plan to the satisfaction of the Director-General, prior to the commencement of any blasting. The Plan must include, but not be limited to, the following matters:

(i) compliance standards;

(ii) mitigation measures;

(iii) remedial action;

(iv) monitoring methods and program;

(v) monitoring program for flyrock distribution;

[29] EPA General Terms of Approval
[30] EPA General Terms of Approval
[31] EPA General Terms of Approval
[32] EPA General Terms of Approval
[33] EPA General Terms of Approval

(vi) measures to be undertaken to demonstrate that the Bowens Road North mine is achieving best practice in minimising air blast overpressure, ground vibration levels, fumes and odours from blasting activities. This shall include specific reference to best practice measures employed to meet the blasting criteria under subclauses 6.3(a) and 6.3(b) at the Ellis, Atkins and Clarke residences;

(vii) measures to protect underground utilities (e.g.: rising mains, subsurface telecommunication and electric cables) and livestock on non-mine owned land;

(viii) measures to consider the blasting activities from the Stratford mine. This shall include details of the proposed measures to ensure that cumulative blast related impacts are managed;

(ix) procedures for the notification of occupiers of buildings and residents prior to detonation of each blast;

(x) measures to ensure no damage by flyrock to people, property, livestock and powerlines; and

(xi) details of the inter-relationship of this plan with the blasting requirements of the development consent for Stratford Coal Mine.

(g) The applicant shall, as a minimum, advise occupiers of buildings and residents within two (2) kilometres of blasting locations of future blasting events on at least a monthly basis, and of any changes to the proposed blast schedules.

(h) Upon written request of the owner of any dwellings located within two (2) kilometres of the blasting locations, the Applicant shall arrange at its own costs, for the inspection by a technically qualified person agreed to by both parties, to record the material condition of any structure on such property within 14 days of receipt of the request. The Applicant shall supply a copy of any inspection report, certified by the person who undertook the inspection, to the relevant property owner within fourteen (14) days of receipt of the report.

(i) The Applicant shall, in consultation with GSC and RTA, prepare a Road Closure Management Plan to the satisfaction of the Director-General prior to the commencement of any blasting within 500 metres of any public road (including but not limited to Wenhams Cox Road and Bowens Road). The Plan shall include, but not be limited to, the following matters:

(i) details of the proposed safety management measures during the period of the road closure and blast;

(ii) details of the procedures for closing the relevant road and the period which the road will be closed during blasting activities;

(iii) methods for ensuring the safety of road users and the general public during the blast period;

(iv) strategies for informing road users and the local community of the proposed road closure;

(v) details of the procedures for permitting the passage of emergency vehicles during the road closure. This shall also include details of the proposed methods for sufficiently notifying emergency service providers of the proposed times and period of the road closures;

(vi) methods for clearing the road of any debris resulting from a blast; and

(vii) details of the disruptions that are likely to occur during the closure period.

(j) The Applicant shall incur the costs for any damage to any public road resulting from any blast related activities. The repairs shall be undertaken to a standard acceptable to GSC and/or the RTA as relevant.

Blast Monitoring

(k) The applicant must monitor ground vibration and overpressure of all blasts.

(l) [34]Ground vibration or the overpressure must be measured at all noise sensitive sites (e.g.. residences, hospitals, schools etc), selected in consultation with the EPA.

[34] EPA General Terms of Approval

6.4A Noise Criteria

(a) Apart from the land that is subject to acquisition upon request under the Stratford development consent (DA 23-98199), the Applicant shall ensure that the noise generated by the Stratford Mining Complex does not exceed the criteria in Table 4 at any residence on privately-owned land or on more than 25 percent of any privately-owned land.

Table 4: Noise criteria dB(A)

Location	Day	Evening	Night	
	$L_{Aeq(15\ minute)}$	$L_{Aeq(15\ minute)}$	$L_{Aeq(15\ minute)}$	$L_{A1(1\ minute)}$
Craven Village	35	35	40	45
39 - Standen				
42 - D Blanch				
36 - Wallace	35	35	37	45
34 - Hall	35	35	36	45
25 - Thompson				
298 - Yates				
291 - Stackman				
All other privately-owned land	35	35	35	45

Notes:
- *To identify the locations referred to in Table 4, see the figure in Appendix 5;*
- *For the purposes of this condition, the Craven Village is comprised on the land listed as Cr 2-8 in the figure in Appendix 5; and*
- *Noise generated by the Stratford Mining Complex is to be measured in accordance with the relevant procedures and exemptions (including certain meteorological conditions) of the NSW Industrial Noise Policy.*

However, these criteria do not apply if the Applicant has a written agreement with the relevant landowner to exceed the criteria, and the Applicant has advised the Department in writing of the terms of this agreement.

6.4B Noise Acquisition Criteria

3. If the noise generated by the Stratford Mining Complex exceeds the criteria in Table 5 at any residence on privately-owned land or on more than 25 percent of any privately-owned land, then upon receiving a written request for acquisition from the landowner, the Applicant shall acquire the land in accordance with the procedures in Condition 11.2.

Table 5: Noise acquisition criteria dB(A) $L_{Aeq(15min)}$

Location	Day	Evening	Night
Stratford Village Craven Village	42	41	40
All other privately-owned land	40	40	40

Notes:
- *Noise generated by the Stratford Mining Complex is to be measured in accordance with the relevant procedures and exemptions (including certain meteorological conditions) of the NSW Industrial Noise Policy;*
- *For the purposes of this condition, the Craven Vii/age is comprised of the land listed as Cr 2-Cr 8 in the figure in Appendix 5, and the Stratford Village is the land shown as urban development on the figure in Appendix 5; and*
- *For this condition to apply, the exceedances of the criteria must be systemic.*

6.4C Operating Conditions

(a) The Applicant shall:

(i) implement best practice noise management, including all reasonable and feasible noise mitigation measures to minimise the operational, low frequency and rail noise generated by the development; and

(ii) regularly assess the real-time noise monitoring and meteorological forecasting data and relocate, modify, and/or stop operations on site to ensure compliance with the relevant conditions of this consent,

to the satisfaction of the Director-General.

6.4D Noise Management Plan

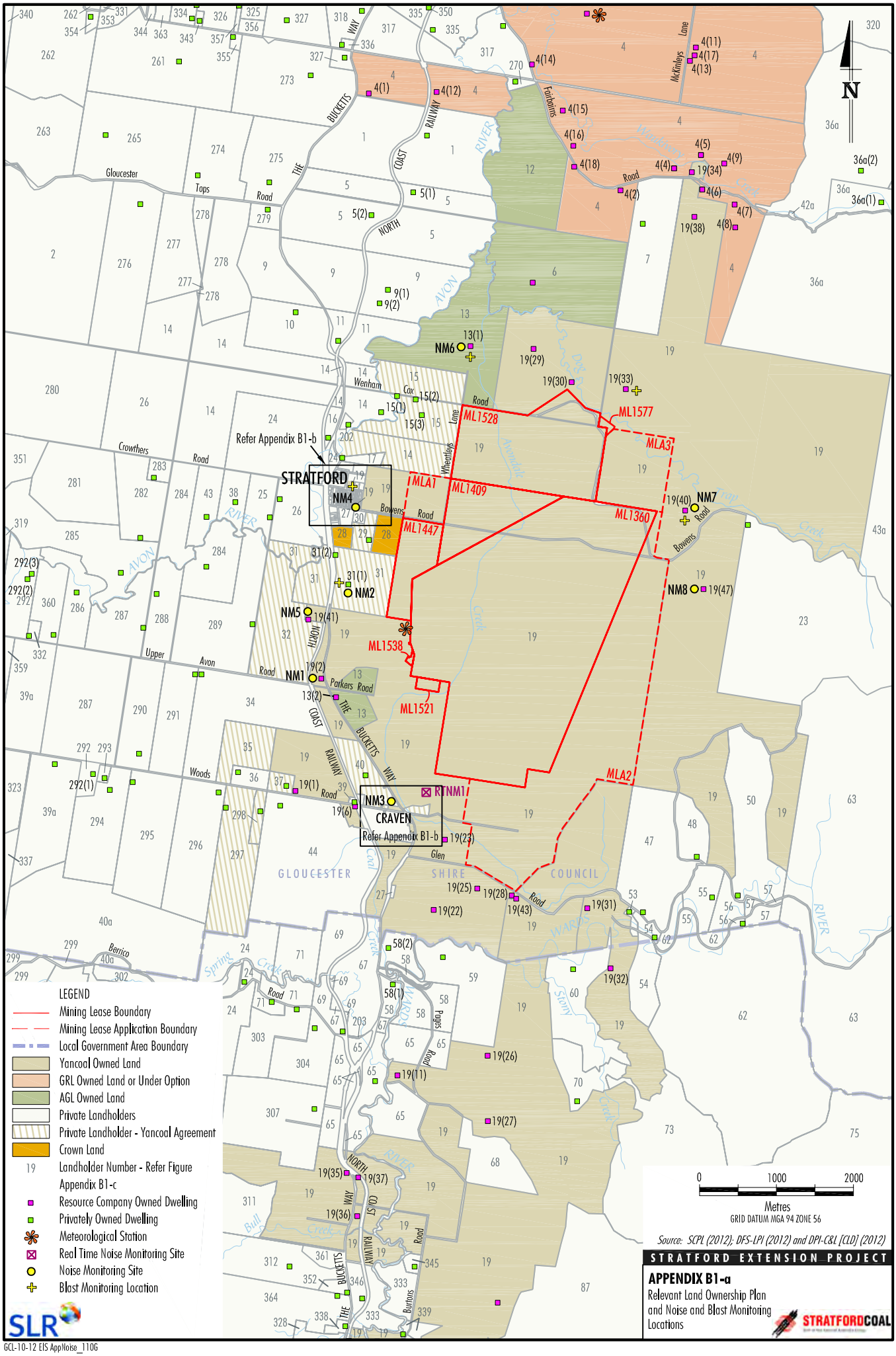
(a) The Applicant shall prepare and implement a Noise Management Plan for the Stratford Mining Complex to the satisfaction of the Director-General. This plan must:

(i) be prepared in consultation with DECCW, and submitted to the Director-General for approval by the end of May 2011;

(ii) describe the noise mitigation measures that would be implemented to ensure compliance with the relevant conditions of this consent, including:
- a real-time noise management system that employs both reactive and proactive mitigation measures; and
- a detailed program to replace or attenuate the existing plant on site;

(iii) include a noise monitoring program that:
- uses a combination of real-time and supplementary attended monitoring measures to evaluate the performance of the development;
- includes a program to monitor the actual sound power levels of the plant on site, compare it with the benchmark levels used in the most recent environmental assessment for the Stratford Mining Complex, and evaluate the effectiveness of any attenuation; and
- includes a protocol for determining exceedances of the relevant conditions of this consent.

(b) The Applicant shall implement the approved Noise Management Plan for the Bowens Road North mine until it is replaced by the approved Noise Management Plan for the Stratford Mining Complex.



GCL-10-12 EIS AppNoise_110G


STRATFORD
William Street
Bridge Street
Anne Street
Avon Street
High Street
Wood Street
Shakespeare Street
Hetley Street
Crowthers Road
Bowens Road
THE BUCKETS WAY
Stratford Public School
St John's Anglican Church
Stratford Cemetery
AVON RIVER
S1
S2
S3
S4
S5
S6
S7
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S11
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S13
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S15
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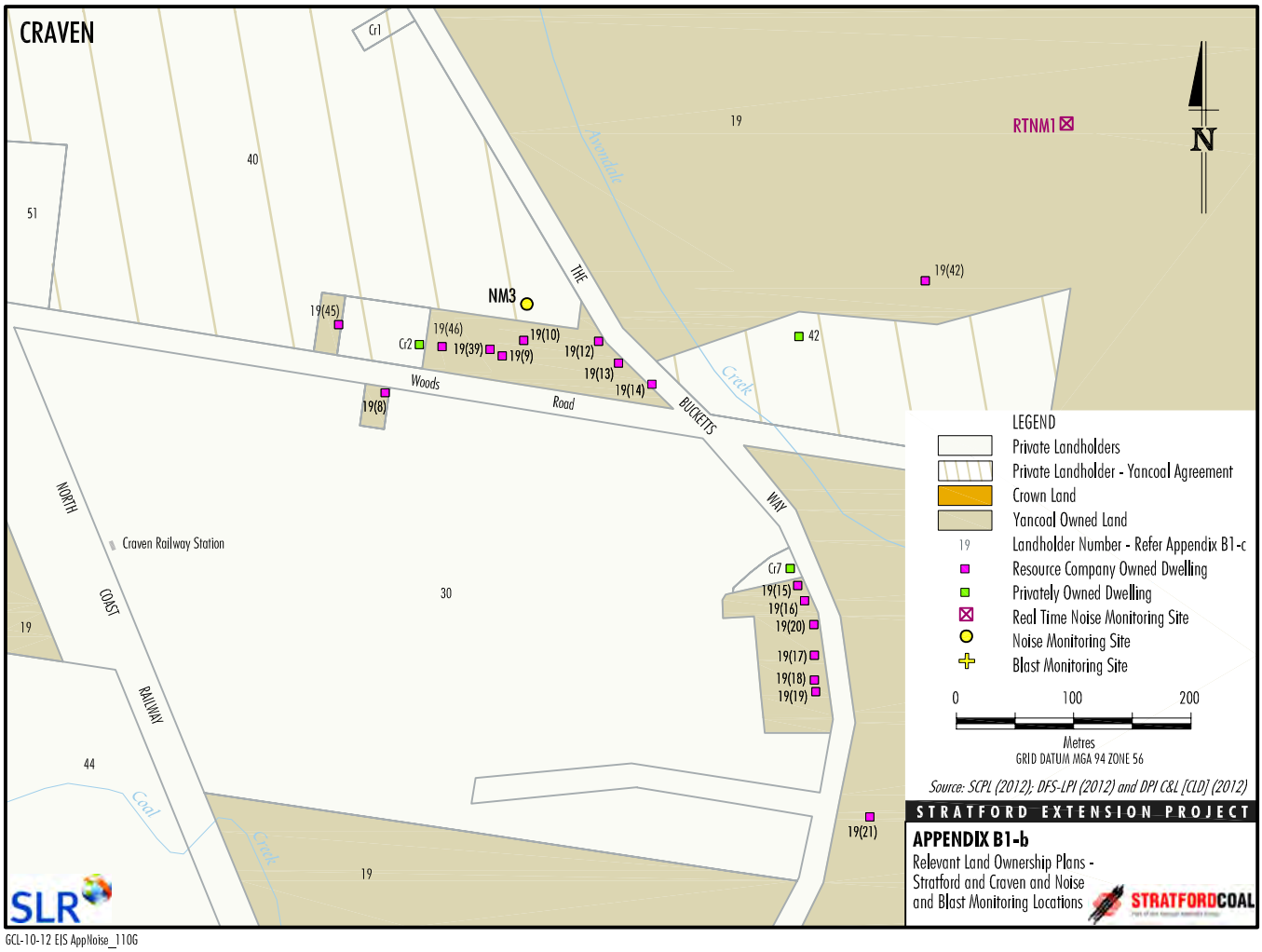
S54
S55
S56
S57
S58
S59
S60
19(4)
19(5)
19(7)
NM4
N


CRAVEN
RTNM1
NM3
THE BUCKETS WAY
Woods Road
NORTH COAST RAILWAY
Craven Railway Station
Coal Creek
Cr1
Cr2
Cr7
19(8)
19(9)
19(10)
19(12)
19(13)
19(14)
19(15)
19(16)
19(17)
19(18)
19(19)
19(20)
19(21)
19(39)
19(42)
19(45)
19(46)
N
0
100
200
Metres
GRID DATUM MGA 94 ZONE 56
LEGEND
Private Landholders
Private Landholder - Yancoal Agreement
Crown Land
Yancoal Owned Land
Landholder Number - Refer Appendix B1-c
Resource Company Owned Dwelling
Privately Owned Dwelling
Real Time Noise Monitoring Site
Noise Monitoring Site
Blast Monitoring Site
Source: SCPL (2012); DFS-LPI (2012) and DPI C&L [CLD] (2012)
STRATFORD EXTENSION PROJECT
APPENDIX B1-b
Relevant Land Ownership Plans - Stratford and Craven and Noise and Blast Monitoring Locations
SLR
STRATFORDCOAL

1 Wendy Jane Fraser
2 Farley (Gloucester) Pty. Limited
4 Gloucester Resources Limited
5 Norman Edward Bignell
6 AGL Gloucester Le Pty Ltd in 70/100 Share & AGL Gloucester MG Pty Ltd in 30/100 Share as Tenants in Common
7 Mary Blanche Burrell
9 Norman John Williams
10 Kenneth James Whatmore & Anne Grace Whatmore
11 Brian Keith Walker, Lesley Jane Walker, Tyson Brian Walker & Lacey Maree Walker
12 AGL Upstream Investments Pty Limited
13 AGL Energy Limited
14 Allen James Wenham & Pamela Diane Wenham
15 GS & GL Falla Superannuation Pty Limited
16 Judith Helen Pickett
17 Darren James Fisher & Claire Louise Smith
19 Yancoal Australia Limited
23 Ross Lewis Bagnall
24 Geoffrey Lawrence Harris
25 Marisa Thompson
26 Kevin John Lowrey & Robyn Lowrey
27 The Council of the Shire of Gloucester
28 Crown Land
29 Edwin Dennis Ward & Rhonda Fay Ward
30 The State of New South Wales
31 Allan Stanley Isaac
32 Eliza Ann Ruth Mcintosh & Ronald Keith Mcintosh
34 Graham Wesley Hall & Kim Lorraine Hall
35 Leo John Dillon & Isobel Robyn Dillon
36 Graham Lindsay Wallace & Marion Frances Wallace
36a Anthony Stanford Berecry
37 Timothy James Worth
38 Paul Michael Johnson & Judith Anne Johnson
39 Paula Anne Standen
39a Woods Road Pty Ltd
40 Leslie Allenby Blanch
40a Howard Kerr Williams & Margaret Russell Williams
42 Douglas John Blanch
42a William Rainsford Ribbons
43 Vicki Colleen Moseley
43a Lymarn Holdings Pty Limited
44 Peter Michael Cross & Kylie Jane
47 David Charles Digges, Carolyn Denise Digges, Timothy Charles Hart & Elizabeth Mary Hart
48 Marion Iris Rounsley
50 Neil James Porter
51 Gloucester Printing Services Pty Ltd
53 William Charles Barnes & Cheryl Freda Barnes
54 Kenneth John Hughes & Carrysong Pty Limited
55 Allan James Hancock & Lynda Margret Hancock
56 Gerald McCalden & Patricia Brawdley McCalden
57 Pamela Brawdley Harrison
58 Douglas William Blanch & Evelyn Fay Blanch
59 Guy William Cassar & Cecile Elizabeth Cassar
60 Graeme Healy & Philip Weston Greenwood
62 Dorothy May Beeston
63 National Parks and Wildlife Service
65 Noeline Elizabeth Weismantle
67 Ian Robert Bowen
68 Julie Dawn Lyford
69 Ralph Hooper & Bronwyn Ann Bartholmew
70 Robert George Knight
71 Anthony Douglas Burnet & Robyn Annette Burnet
73 Rodney John Pearce & Anne Jeanette Pearce
75 Geoffrey Ashton Wilson
87 Pacific Property Investments Ltd
202 Paul Phillip Wenham
203 Samuel Taylor
261 Frank Murray Hooke & Susan Elizabeth Hooke
262 Noel Albert Davis & Elizabeth Therese O'Sullivan
263 Patrick Michael Ryan
265 Hans Joran Stenstrom & Janete Stenhouse Stenstrom
270 Jason David Collins & Michelle Isobel Barrett
273 Baker Place Investments Pty Limited & Dr PW Brady Pty Limited as Tenants in Common in Equal Shares
274 Warren Neil Wilson & Colleen Therese Wilson
275 Pace Farm Pty Limited
276 Alan Luscombe & Carol Luscombe
277 John William Farley
278 Mark Anthony Campbell & Roseleen Linette Campbell
279 John Donald Cullum & Rachel Anne Cullum
280 Clifford John Bramley & Terri Louise Bramley
281 Colin William Lewis & Lesley Ann Lewis
282 Peter Stephen Ross
283 Janet Nolan
284 Alec Gregory Perrin & Noreen Nita Jean Perrin
285 Marshall Leon Carter & Theresa Kathleen Carter
286 Gerard Roland Burley
287 Dorothy Kay Sinderberry & Carole Martha Rinkin
288 Alec Gregory Perrin
289 Eliza Ann Ruth Mcintosh
290 Anne Frances Ryan & Darcy Tordoff
291 Trevor Allan Crawley & Coleen Dawn Crawley
292 James Reginald Fisher & Rhonda Patricia Fisher
293 Kerry Elizabeth Braunton
294 Gregory Vincent Morcom & Karen Morcom
295 William John Bush & Danielle Elizabeth Bush
296 Peter Geoffrey Watson & Heather Irene Watson
297 William Marten Bosma
298 Eric Allan Yates
299 Malcolm Ronald Lee
300 Bevan Douglas Hokin & Di Hokin
301 Folio Identifier Pty Limited
302 Edwin John Walton & Wendy Walton
303 JSTC Newcastle Pty Limited
304 Ernie Danzil Abeysekera & Sharee Ann Abeysekera
306 Gregory Hunt & Catherine Hunt
307 Graham John Wolfenden & Rosalind Mary Wolfenden
311 Paul Berthold & Carolyn Berthold
312 Allen James Harrison & Darlene Marie Harrison
316 Country Rail Infrastructure Authority
317 Adrian Kenneth Boorer/ Beverley Ruth Boorer
318 Albert Malcolm Timothy Sopher/ Gloria June Sopher
319 Allan John Maslen
320 Andrew Charles Vintner/ Kevin Thomas Vintner
323 Burmah Pastoral Co Pty Limited
325 Charles Robert Norman
326 Charnich Pty Limited
327 Dallas Reginald Andrews
328 Daphne May Chapman
331 Delese Ellen May Buckton
332 Erol William Hastings/ Lorraine Hastings
333 Gary Bruce Grant
334 Gary Douglas Randall/ Gai Lorraine Randall
335 Graeme Harold Harris
336 Gregory James Channon/ Tonia Alice Edwards
337 Gregory Thomas Price/ Dianne Elizabeth Price
338 Jason Bruce Steward/ Maria Eliana Steward
339 John Andersen
340 John Robert Higgins
343 Kerrie Banks
344 Kerry Anne Hartigan/ Antonino Virzi
345 Lliam Woolfrey
346 Lorraine Bruce
350 Raymond Keith Saunders/ Barbara Jayne Saunders
351 Roger Speaight/ Elisabeth Aili Maria Speaight
352 Ross Sidney Edwards
353 Ryan Garth Harris
354 Scott Ernest Hoy/ Leanne Margaret Barrett
355 Sue-Ellen Margaret Kingston/ Anthony Gerard Kingston
356 Thelma Elaine Mott
357 Victor Steven Pham/ Katherine Dawn Pham
359 William Kilpatrick Hunter/ Kay Edith Hunter
360 Ter Geoffrey Mason/ Sandra Joy Mason/ Valda Doreen
361 Helen Teresa Whelan
363 Linda Trudgeon
364 Heatscape Pty Limited
Cr.1 William Deane Wood
Cr.2 Rodger Malcolm Boorer
Cr.7 David Robert Pryce-Jones
S1 Gary Owen Rees
S3 Irene Myrtle Yeatman
S4 Belinda Maree Grady & Terry Raymond Grady
S5 Christopher James Britnell
S6 Gary Wayne Threadgate & Julie Frances Threadgate
S7 Raymond James Cawley & Lucinda Cawley
S8 Neville Charles Forbes
S9 Peter John Greenham & Beverley May Greenham
S10 Louise Frances Germon
S11 Adam John Glew
S12 Grant James Mitchell & Cecily Maree Mitchell
S13 Ian Mark Wells & Jody Ann Wells
S14 Kathleen Edith Bignell
S15 Minister for Education
S18 Keith Matthew John Whittall & Janelle Fiona Whittall
S19 Rodney Lawrence Carroll
S20 Sandra Ellen McGrath
S21 Marie Anne Adams
S22 Telstra Corporation Limited
S23 Marie Fay Bartlett
S24 David Carl John Mavay
S25 The Trustees of Church Property for the Diocese of Newcastle
S26 Margaret Elaine Young
S27 Terry Leonard Brown & Elizabeth Florence Brown
S28 David Charles Morris & Yvette Marie Morris
S29 Robert Charles Bagnall & Lyndell Joy Bagnall
S30 Kam Daryl Baker
S31 Tracey Louise Richards
S32 Peter Kelly
S33 Greta Alexandra Langtry, Jennifer Gilbert & Neville Bertram Gilbert
S34 Edward George Ashby
S35 Mark Rodgers & Korinna Yvette Bekker
S36 Kenneth George Platt & Ruth Lynne Platt
S37 Malcolm Neville Pryor & Helen Leone Pryor
S38 Stephen Russell Kirkman
S39 Lizabeth Joye Nicholls & Raymond John Husband
S40 Peter John Curtis
S41 Desmond Brice McClure & Coral Ann Aplin
S42 Stephen Ronald Murray & Wilma Joy Murray
S43 Deanne Donna Squire
S44 Ann Elizabeth Flack
S45 Daniel John Keywood, Dale Martin Keywood, Kelly Hazel Keywood & Amanda Margaret Hawkins
S46 Stephen Thomas Parker & Jean Maree Parker
S47 John Victor Potts
S48 James Bryson Farley & Glenda Laurel Farley
S49 Lindy Jayne Blanch
S50 Sheryl Fay Vanderdrift & Lindy Jane Blanch
S51 Gregory John Trenholme
S52 Ronald John Farley & Theresa Jane Barry
S53 Trevor Arthur
S54 Scott Anthony Adams
S55 Beryl Veronica Mostyn & Tony James Mostyn
S56 Graham John Collins & Elizabeth Collins
S57 Mavis Jean Gam
S58 Marilyn Dorothy Harrigan
S59 Terry Raymond Grady & Belinda Maree Grady
S60 Deanne Donna Squires

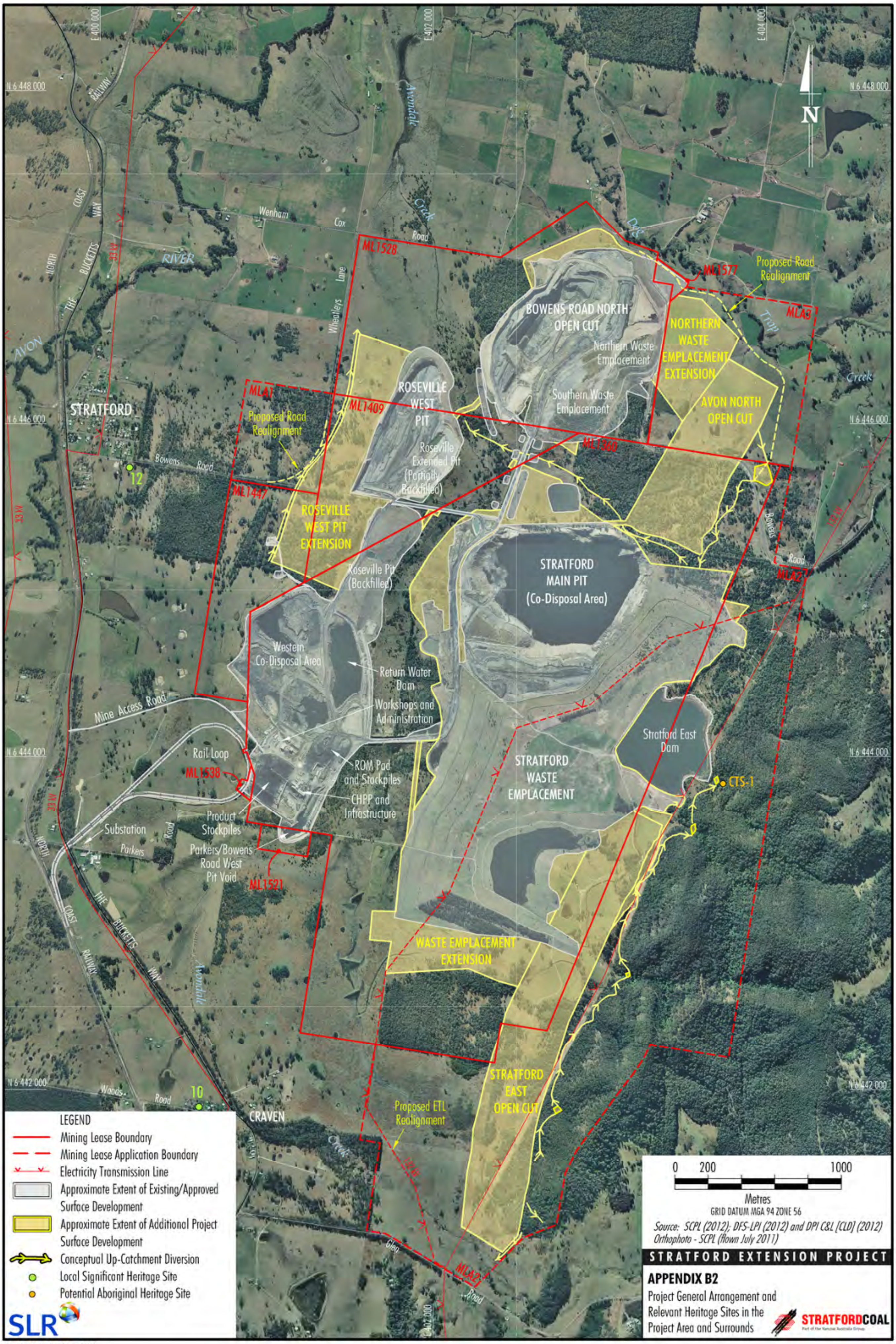
Source: SCPL (2012); DFS-LPI (2012) and DPI-C&L [CLD] (2012)

STRATFORD EXTENSION PROJECT

FIGURE B1-c
Relevant Land Ownership List

SLR

STRATFORDCOAL



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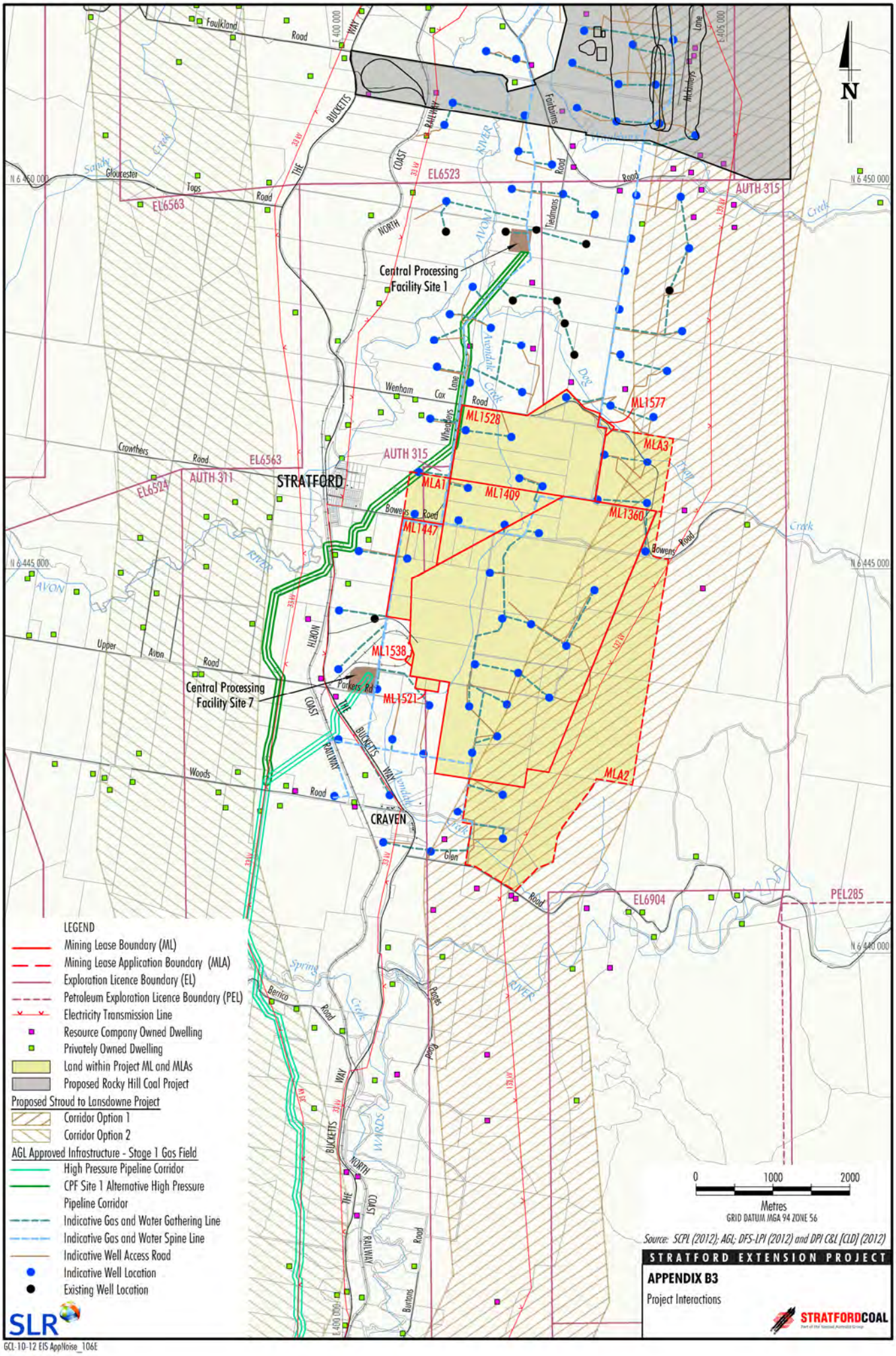
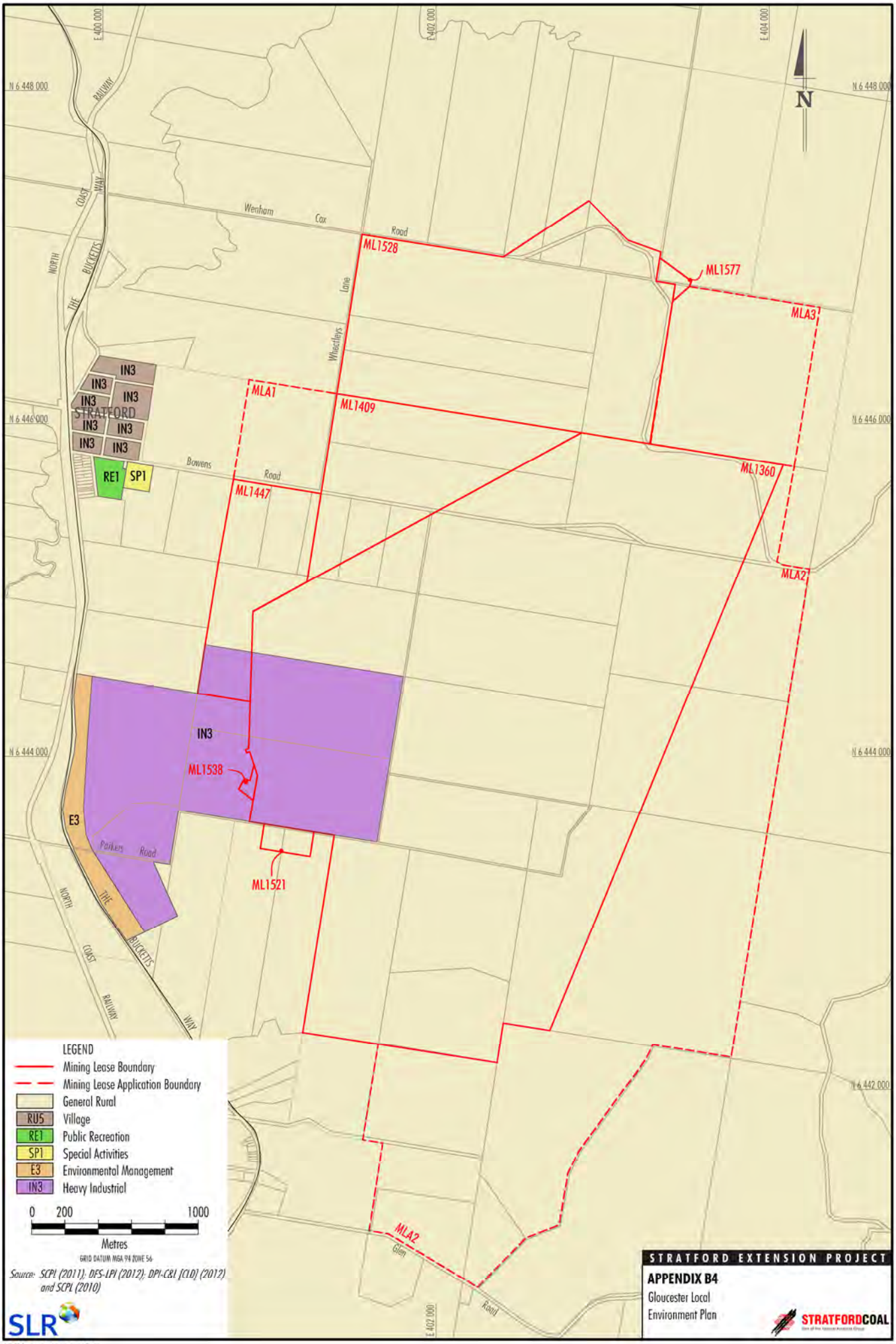

N
Central Processing Facility Site 1
Central Processing Facility Site 7
STRATFORD
CRAVEN
EL6523
EL6563
EL6524
EL6904
PEL285
AUTH 315
AUTH 311
ML1528
ML1577
MLA3
ML1409
ML1360
MLA1
ML1447
ML1538
ML1521
MLA2
Faulkland Road
Gloucester Tops Road
Wenham Cox Lane Road
Crowthers Road
Upper Avon Road
Woods Road
Parkers Rd
Bowens Road
Glen Road
Berrico Road
Buckets Way
Railway
Avon River
Avondale Creek
Dog Creek
Spring Creek
Sandy Creek
Tedmans Road
Fairbairns Road
McKinleys Lane
N 6 450 000
N 6 445 000
N 6 440 000
E 400 000
E 405 000
0
1000
2000
Metres
GRID DATUM MGA 94 ZONE 56
Source: SCPL (2012); AGL; DFS-LPI (2012) and DPI C&L [CLD] (2012)
LEGEND
Mining Lease Boundary (ML)
Mining Lease Application Boundary (MLA)
Exploration Licence Boundary (EL)
Petroleum Exploration Licence Boundary (PEL)
Electricity Transmission Line
Resource Company Owned Dwelling
Privately Owned Dwelling
Land within Project ML and MLAs
Proposed Rocky Hill Coal Project
Proposed Stroud to Lansdowne Project
Corridor Option 1
Corridor Option 2
AGL Approved Infrastructure - Stage 1 Gas Field
High Pressure Pipeline Corridor
CPF Site 1 Alternative High Pressure Pipeline Corridor
Indicative Gas and Water Gathering Line
Indicative Gas and Water Spine Line
Indicative Well Access Road
Indicative Well Location
Existing Well Location
STRATFORD EXTENSION PROJECT
APPENDIX B3
Project Interactions
SLR
STRATFORDCOAL
GCL-10-12 EIS AppNoise_106E



GCL-10-12 EIS AppNoise_103E

LAND OWNERSHIP LIST

Property Number/ Landholder		MGA Dwelling Co-ordinates		ENM Dwelling Co-ordinates		
Full Name	**Abbreviated Name**	**East (m)**	**North (m)**	**East (m)**	**North (m)**	**Elevation (m)**
Stratford/Craven Rural Properties						
1 Wendy Jane Fraser	1 Fraser	401091	6450637	5091	14637	121
5(1) Norman Edward Bignell	5(1) Bignell	400375	6449598	4375	13598	125
5(2) Norman Edward Bignell	5(2) Bignell	400913	6449897	4913	13897	112
7 Mary Blanche Burrell	7 Burrell	403898	6449487	7898	13487	124
9(1) Norman John Williams	9(1) Williams	400585	6448630	4585	12630	122
9(2) Norman John Williams	9(2) Williams	400476	6448456	4476	12456	126
10 Kenneth James Whatmore & Anne Grace Whatmore	10 Whatmore & Whatmore	399785	6448103	3785	12103	135
11 Brian Keith Walker, Lesley Jane Walker, Tyson Brian Walker & Lacey Maree Walker	11 Walker, Walker, Walker & Walker	399938	6447966	3938	11966	126
16 Judith Helen Pickett	16 Pickett	399809	6446707	3809	10707	120
17 Darren James Fisher & Claire Louise Smith	17 Fisher & Smith	399989	6446442	3989	10442	116
23 Ross Lewis Bagnall	23 Bagnall	405264	6445571	9264	9571	164
24 Geoffrey Lawrence Harris	24 Harris	398719	6439632	2719	3632	120
25 Marisa Thompson	25 Thompson	399051	6445673	3051	9673	136
26 Kevin John Lowrey & Robyn Lowrey	26 Lowrey & Lowrey	399182	6445907	3182	9908	126
27 Gloucester Shire Council	27 Gloucester Shire Council	399924	6446165	3924	10165	122
34 Graham Wesley Hall & Kim Lorraine Hall	34 Hall & Hall	398163	6443633	2163	7633	136
36 Graham Lindsay Wallace & Marion Frances Wallace	36 Wallace & Wallace	398636	6442359	2637	6359	156
36a(1) Anthony Stanford Berecry	36a(1) Berecry	406999	6449768	10999	13768	144
36a(2) Anthony Stanford Berecry	36a(2) Berecry	406734	6450180	10734	14180	158
38 Paul Michael Johnson & Judith Anne Johnson	38 Johnson & Johnson	398602	6445871	2602	9871	144
39 Paula Anne Standen	39 Standen	400155	6441970	4155	5970	138
43 Vicki Collen Moseley	43 Moseley	398229	6445679	2229	9679	146
44 Peter Michael Cross & Kylie Jane	44 Cross & Jane	399186	6441925	3186	5925	156
47 David Charles Digges, Carolyn Denise Digges, Timothy Charles Hart & Elizabeth Mary Hart	47 Digges, Digges, Hart & Hart	403899	6440541	7899	4541	175
48 Marion Iris Rounsley	48 Rounsley	404600	6441264	8600	5264	250
50 Neil James Porter	50 Porter	405132	6440758	9132	4758	200
53 William Charles Barnes & Cheryl Freda Barnes	53 Barnes & Barnes	403724	6440543	7724	4543	167
54 Kenneth John Hughes & Carrysong Pty Limited	54 Hughes & Carrysong Pty Ltd	404051	6440211	8051	4211	160
55 Allan James Hancock & Lynda Margret Hancock	55 Hancock & Hancock	404795	6440729	8795	4729	233
56 Gerald McCalden & Patricia Brawdley McCalden	56 McCalden & McCalden	405199	6440389	9199	4389	208
58(1) Douglas William Blanch & Evelyn Fay Blanch	58(1) Blanch & Blanch	400651	6439599	4651	3599	93
58(2) Douglas William Blanch & Evelyn Fay Blanch	58(2) Blanch & Blanch	400595	6440074	4595	4074	98
59 Guy William Cassar & Cecile Elizabeth Cassar	59 Cassar & Cassar	401301	6439953	5301	3953	100
60 Graeme Healy & Philip Weston Greenwood	60 Healy & Greenwood	402995	6439798	6995	3798	158
65 Noeline Elizabeth Weismantle	65 Weismantle	400419	6438342	4419	2342	86
69 Ralph Hooper & Bronwyn Ann Bartholmew	69 Hooper & Bartholmew	399996	6438993	3996	2993	100
70 Robert George Knight	70 Knight	403112	6438451	7112	2451	184
71 Anthony Douglas Burnet & Robyn Annette Burnet	71 Burnet & Burnet	399079	6439371	3079	3371	118
202 Paul Phillip Wenham	202 Wenham	400073	6446873	4074	10873	116
265 Hans Joran Stenstrom & Janete Stenhouse Stenstrom	265 Stenstrom & Stenstrom	396917	6450640	917	14640	152
274 Warren Neil Wilson & Colleen Therese Wilson	274 Wilson & Wilson	398111	6450114	2111	14114	160

LAND OWNERSHIP LIST

Property Number/ Landholder		MGA Dwelling Co-ordinates		ENM Dwelling Co-ordinates		
Full Name	**Abbreviated Name**	**East (m)**	**North (m)**	**East (m)**	**North (m)**	**Elevation (m)**
275 Pace Farm Pty Limited	275 Pace Farm Pty Ltd	399045	6450024	3045	14024	152
276 Alan Luscombe & Carol Luscombe	276 Luscombe & Luscombe	397368	6449746	1368	13746	154
279 John Donald Cullum & Rachel Anne Cullum	279 Cullum & Cullum	399024	6449675	3024	13675	154
281 Colin William Lewis & Lesley Ann Lewis	281 Lewis & Lewis	399829	6445897	3829	9897	123
282 Peter Stephen Ross	282 Ross	397369	6445406	1369	9406	146
283 Janet Nolan	283 Nolan	397543	6446191	1543	10191	200
284 Alec Gregory Perrin & Noreen Nita Jean Perrin	284 Perrin & Perrin	398225	6445031	2225	9031	132
285 Marshall Leon Carter & Theresa Kathleen Carter	285 Carter & Carter	397115	6444952	1115	8952	150
287 Dorothy Kay Sinderberry & Carole Martha Rinkin	287 Sinderberry & Rinkin	397408	6444238	1408	8239	142
288 Alec Gregory Perrin	288 Perrin	397578	6444676	1578	8676	136
289 Eliza Ann Ruth Mcintosh	289 Mcintosh	398823	6444282	2823	8282	132
290 Anne Frances Ryan & Darcy Tordoff	290 Ryan & Tordoff	397348	6442601	1348	6601	154
291 Trevor Allan Crawley & Coleen Dawn Crawley	291 Crawley & Crawley	398079	6443632	2079	7632	136
292(1) James Reginald Fisher & Rhonda Patricia Fisher	292(1) Fisher & Fisher	396751	6442336	751	6336	154
293 Kerry Elizabeth Braunton	293 Braunton	396904	6442283	904	6283	163
294 Gregory Vincent Morcom & Karen Morcom	294 Morcom & Morcom	396973	6442131	973	6131	166
295 William John Bush & Danielle Elizabeth Bush	295 Bush & Bush	397270	6442231	1270	6231	155
296 Peter Geoffrey Watson & Heather Irene Watson	296 Watson & Watson	398386	6442098	2386	6098	158
303 JSTC Newcastle Pty Limited	303 JSTC Newcastle Pty Ltd	399400	6439276	3400	3276	126
304 Ernie Danzil Abeysekera & Sharee Ann Abeysekera	304 Abeysekera & Abeysekera	399634	6439030	3634	3030	114
307 Graham John Wolfenden & Rosalind Mary Wolfenden	307 Wolfenden & Wolfenden	399631	6437981	3631	1981	109
316 Country Rail Infrastructure Authority	316 Country Rail Infrastructure Authority	399779	6445870	3779	9870	120
Craven						
Cr.7 David Robert Pryce-Jones	Cr.7 Pryce-Jones	400906	6441710	4906	5710	138
Stratford						
S1 Gary Owen Rees	S1 Rees	400026	6446310	4026	10311	118
S3 Irene Myrtle Yeatman	S3 Yeatman	400164	6446274	4164	10274	120
S4 Belinda Maree Grady & Terry Raymond Grady	S4 Grady & Grady	399925	6446294	3925	10294	116
S5 Christopher James Britnell	S5 Britnell	399943	6446233	3944	10233	120
S6 Gary Wayne Threadgate & Julie Frances Threadgate	S6 Threadgate & Threadgate	399927	6446209	3927	10209	120
S8 Neville Charles Forbes	S8 Forbes	399972	6446200	3972	10200	121
S9 Peter John Greenham & Beverley May Greenham	S9 Greenham & Greenham	400003	6446267	4003	10267	120
S10 Louise Frances Germon	S10 Germon	399990	6446196	3990	10196	121
S11 Adam John Glew	S11 Glew	400008	6446193	4008	10193	122
S12 Grant James Mitchell & Cecily Maree Mitchell	S12 Mitchell & Mitchell	400030	6446189	4030	10189	122
S13 Ian Mark Wells & Jody Ann Wells	S13 Wells & Wells	400067	6446167	4067	10167	123
S14 Kathleen Edith Bignell	S14 Bignell	399896	6446166	3896	10166	121
S15 Minister for Education	S15 Minister for Education	400001	6446076	4001	10076	125
S18 Keith Matthew John Whittall & Janelle Fiona Whittall	S18 Whittall & Whittall	400154	6446054	4154	10054	125
S19 Rodney Lawrence Carroll	S19 Carroll	400230	6446040	4230	10040	123
S20 Sandra Ellen McGrath	S20 McGrath	399834	6446056	3834	10056	125

LAND OWNERSHIP LIST

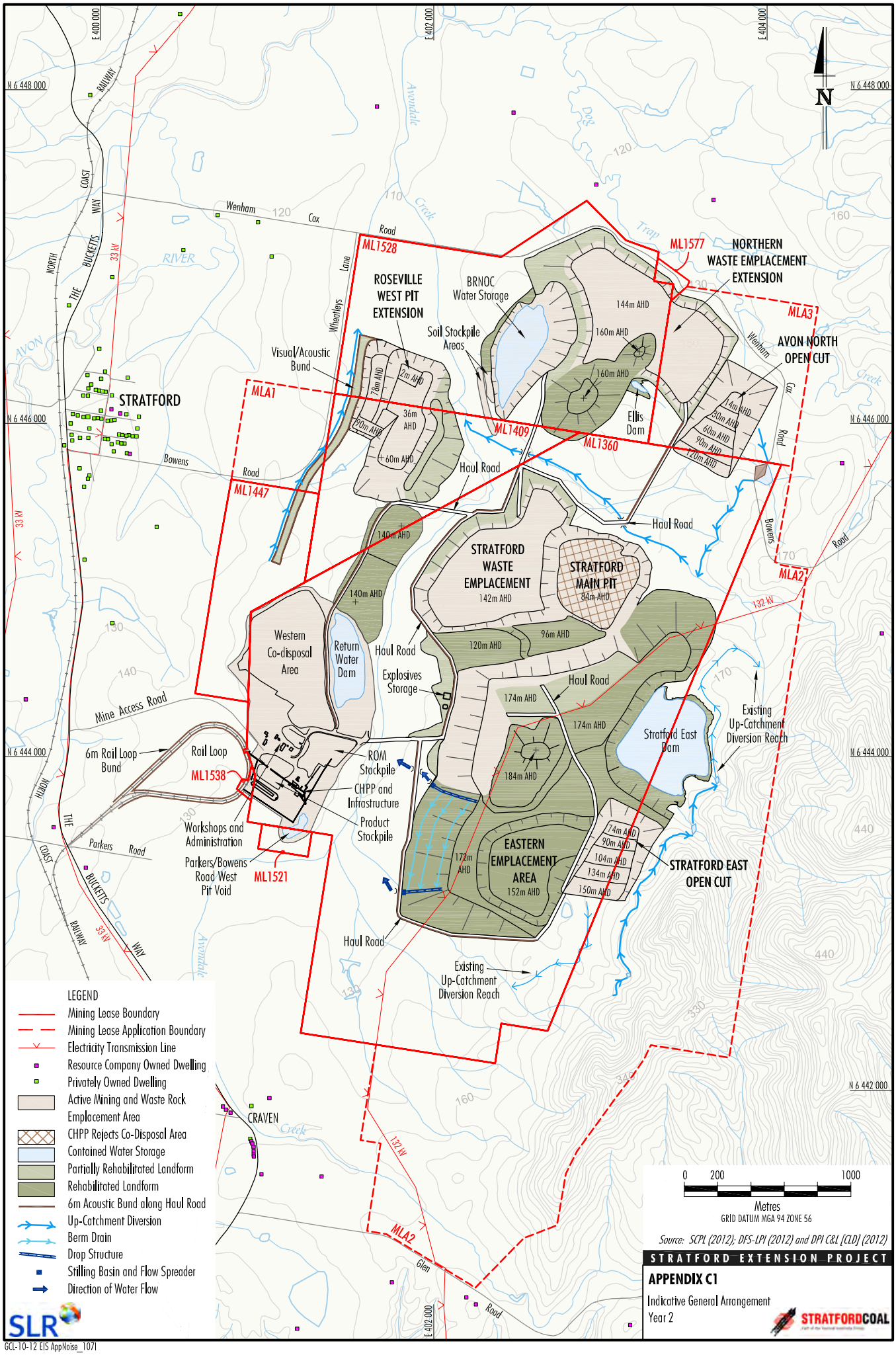
Property Number/ Landholder		MGA Dwelling Co-ordinates		ENM Dwelling Co-ordinates		
Full Name	**Abbreviated Name**	**East (m)**	**North (m)**	**East (m)**	**North (m)**	**Elevation (m)**
S21 Marie Anne Adams	S21 Adams	399817	6446016	3817	10016	125
S23 Marie Fay Bartlett	S23 Bartlett	399862	6446047	3862	10047	125
S24 David Carl John Mavay	S24 Mavay	399895	6446037	3896	10037	125
S26 Margaret Elaine Young	S26 Young	399933	6445969	3933	9969	125
S27 Terry Leonard Brown & Elizabeth Florence Brown	S27 Brown & Brown	399961	6446030	3961	10030	125
S28 David Charles Morris & Yvette Marie Morris	S28 Morris & Morris	399983	6446032	3983	10032	125
S29 Robert Charles Bagnall & Lyndell Joy Bagnall	S29 Bagnall & Bagnall	400005	6446027	4005	10027	125
S30 Kam Daryl Baker	S30 Baker	400042	6446015	4042	10015	125
S31 Tracey Louise Richards	S31 Richards	400065	6446017	4065	10017	125
S33 Greta Alexandra Langtry, Jennifer Gilbert & Neville Bertram Gilbert	S33 Langtry, Gilbert & Gilbert	400083	6446020	4084	10020	125
S34 Edward George Ashby	S34 Ashby	400110	6445933	4110	9933	125
S35 Mark Rodgers & Korinna Yvette Bekker	S35 Rodgers & Bekker	400129	6445930	4129	9930	125
S36 Kenneth George Platt & Ruth Lynne Platt	S36 Platt & Platt	400154	6445926	4155	9926	125
S37 Malcolm Neville Pryor & Helen Leone Pryor	S37 Pryor & Pryor	400169	6445928	4169	9928	125
S38 Stephen Russell Kirkman	S38 Kirkman	400192	6445922	4192	9922	125
S39(1) Lizabeth Joye Nicholls & Raymond John Husband	S39(1) Nicholls & Husband	400220	6445969	4220	9969	124
S39(2) Lizabeth Joye Nicholls & Raymond John Husband	S39(2) Nicholls & Husband	400216	6445921	4216	9921	124
S40 Peter John Curtis	S40 Curtis	399826	6445931	3826	9931	124
S41 Desmond Brice Mcclure & Coral Ann Aplin	S41 Mcclure & Aplin	399876	6445913	3876	9913	124
S43 Deanne Donne Squire	S43 Squire	399926	6445913	3926	9913	124
S47 John Victor Potts	S47 Potts	400026	6445907	4026	9907	125
S48 James Bryson Farley & Glenda Laurel Farley	S48 Farley & Farley	400043	6445904	4043	9904	125
S49 Lindy Jayne Blanch	S49 Blanch	400065	6445875	4065	9875	125
S50 Sheryl Fay Vanderdrift & Lindy Jane Blanch	S50 Vanderdrift & Blanch	400078	6445832	4078	9832	125
S51 Gregory John Trenholme	S51 Trenholme	400102	6445885	4102	9885	125
S52 Ronald John Farley & Theresa Jane Barry	S52 Farley & Barry	400125	6445879	4125	9879	125
S53 Trevor Arthur	S53 Arthur	400143	6445879	4143	9879	125
S54 Scott Anthony Adams	S54 Adams	400158	6445821	4158	9821	125
S56 Graham John Collins & Elizabeth Collins	S56 Collins & Collins	399874	6445730	3875	9730	123
S57 Mavis Jean Gam	S57 Gam	399933	6445687	3933	9687	124
S58 Marilyn Dorothy Harrigan	S58 Harrigan	399924	6445668	3924	9668	124
S59 Terry Raymond Grady & Belinda Maree Grady	S59 Grady & Grady	399901	6445620	3901	9620	124
Privately Owned Receivers subject to Landholder Agreement						
14 Allen James Wenham & Pamela Diane Wenham	14 Wenham & Wenham	400501	6447037	4501	11037	115
15(1) GS & GL Falla Superannuation Pty Limited	15(1) Falla Superannuation	400704	6447249	4704	11249	116
15(2) GS & GL Falla Superannuation Pty Limited	15(2) Falla Superannuation	400945	6447205	4945	11205	120
15(3) GS & GL Falla Superannuation Pty Limited	15(3) Falla Superannuation	401025	6446996	5025	10996	126
29 Ward[1]	29 Ward	400338	6445378	4338	9378	128
31(1) Allan Stanley Isaac[1]	31(1) Isaac	400069	6444804	4069	8804	128
31(2) Allan Stanley Isaac	31(2) Isaac	399905	6445182	3905	9182	126
37 Timothy James Worth	37 Worth	399196	6442224	3196	6224	148
40 Leslie Allenby Blanch[1]	40 Leslie Allenby Blanch	400303	6442317	4303	6317	132

Property Number/ Landholder		MGA Dwelling Co-ordinates		ENM Dwelling Co-ordinates		
Full Name	**Abbreviated Name**	**East (m)**	**North (m)**	**East (m)**	**North (m)**	**Elevation (m)**
42 Douglas John Blanch	42 Blanch	400904	6441904	4904	5904	140
297 Bosma	297 Bosma	398468	6441900	2468	5900	160
298 Eric Allan Yates	298 Yates	398929	6441852	2929	5852	151
Cr.2 Boorer	Cr.2 Boorer	400586	6441898	4586	5898	136
Stratford/Craven Non-Residential Receivers						
30 Stratford Cemetery	30 Stratford Cemetery	400157	6445746	4157	9746	125
S15 Minister for Education - Stratford Public School	S15 Stratford Public School	399856	6446112	3856	10112	123
S25 St John's Anglican Church	S25 St John's Anglican Church	399924	6446040	3924	10040	125
Resource company-owned Receivers						
6 AGL Energy Limited	6 AGL	402468	6448722	6468	12722	120
13(1) AGL Energy Limited	13(1) AGL	401661	6447896	5661	11896	115
13(2) AGL Energy Limited	13(2) AGL	399911	6443332	3911	7332	140
4(1) Gloucester Resources Limited	4(1) GRL	400334	6451184	4334	15184	147
4(2) Gloucester Resources Limited	4(2) GRL	403609	6449924	7609	13924	108
4(4) Gloucester Resources Limited	4(4) GRL	404308	6450210	8309	14210	108
4(5) Gloucester Resources Limited	4 (5) GRL	404654	6450379	8654	14380	116
4(6) Gloucester Resources Limited	4(6) GRL	404671	6449935	8671	13935	126
4(7) Gloucester Resources Limited	4(7) GRL	405093	6449734	9093	13734	132
4(8) Gloucester Resources Limited	4(8) GRL	405101	6449443	9101	13443	148
4(9) Gloucester Resources Limited	4(9) GRL	404957.18	6450271.4	8957	14271	136
4(12) Gloucester Resources Limited	4(12) GRL	401211	6451189	5211	15189	112
4(15) Gloucester Resources Limited	4(15) GRL	402856	6450955	6856	14955	106
4(16) Gloucester Resources Limited	4(16) GRL	402998	6450505	6998	14505	112
4(18) Gloucester Resources Limited	4(18) GRL	403009	6450229	7009	14229	115
19(1) Stratford Coal Pty Ltd	19(1) SCPL	399383	6442114	3383	6114	155
19(2) Stratford Coal Pty Ltd	19(2) SCPL	399716	6443576	3716	7576	132
19(4) Stratford Coal Pty Ltd	19(4) SCPL	400065	6446084	4065	10084	125
19(5) Stratford Coal Pty Ltd	19(5) SCPL	400117	6446058	4117	10059	125
19(6) Stratford Coal Pty Ltd	19(6) SCPL	400157	6441916	4157	5917	138
19(7) Stratford Coal Pty Ltd	19(7) SCPL	400176	6445817	4176	9817	125
19(8) Stratford Coal Pty Ltd	19(8) SCPL	400556	6441861	4556	5861	135
19(9) Stratford Coal Pty Ltd	19(9) SCPL	400653	6441889	4653	5890	135
19(10) Stratford Coal Pty Ltd	19(10) SCPL	400670	6441902	4670	5902	135
19(11) Stratford Coal Pty Ltd	19(11) SCPL	400712	6438416	4713	2416	102
19(12) Stratford Coal Pty Ltd	19(12) SCPL	400741	6441910	4741	5910	136
19(13) Stratford Coal Pty Ltd	19(13) SCPL	400753	6441890	4753	5890	136
19(14) Stratford Coal Pty Ltd	19(14) SCPL	400780	6441865	4780	5865	137
19(15) Stratford Coal Pty Ltd	19(15) SCPL	400909	6441695	4909	5696	140
19(16) Stratford Coal Pty Ltd	19(16) SCPL	400910	6441680	4910	5680	140
19(17) Stratford Coal Pty Ltd	19(17) SCPL	400918	6441633	4918	5633	140
19(18) Stratford Coal Pty Ltd	19(18) SCPL	400918	6441612	4918	5612	141
19(19) Stratford Coal Pty Ltd	19(19) SCPL	400920	6441603	4920	5603	142
19(20) Stratford Coal Pty Ltd	19(20) SCPL	400920	6441660	4920	5660	142
19(21) Stratford Coal Pty Ltd	19(21) SCPL	400965	6441497	4965	5497	142
19(22) Stratford Coal Pty Ltd	19(22) SCPL	401183	6440571	5183	4571	136

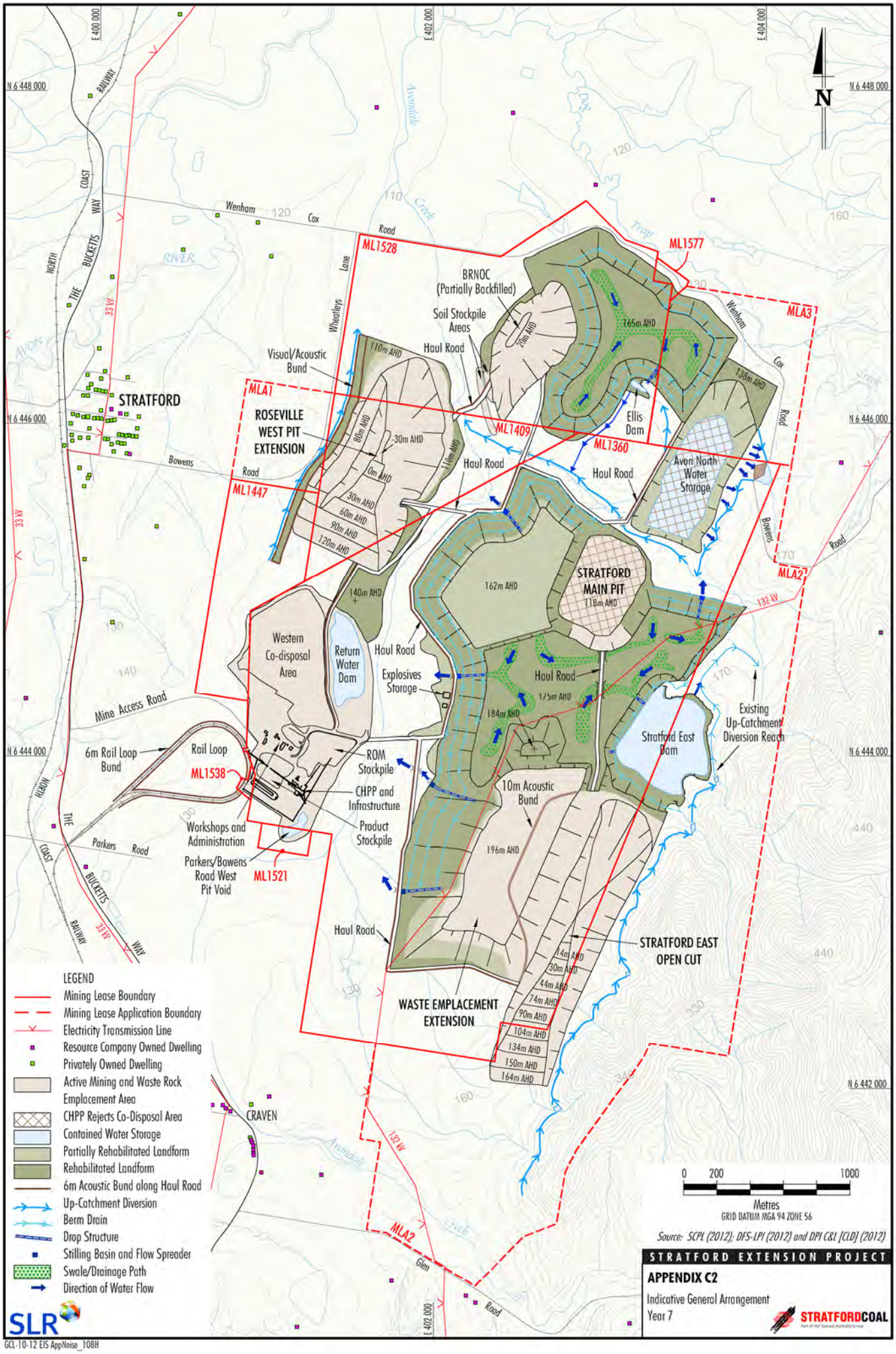
LAND OWNERSHIP LIST

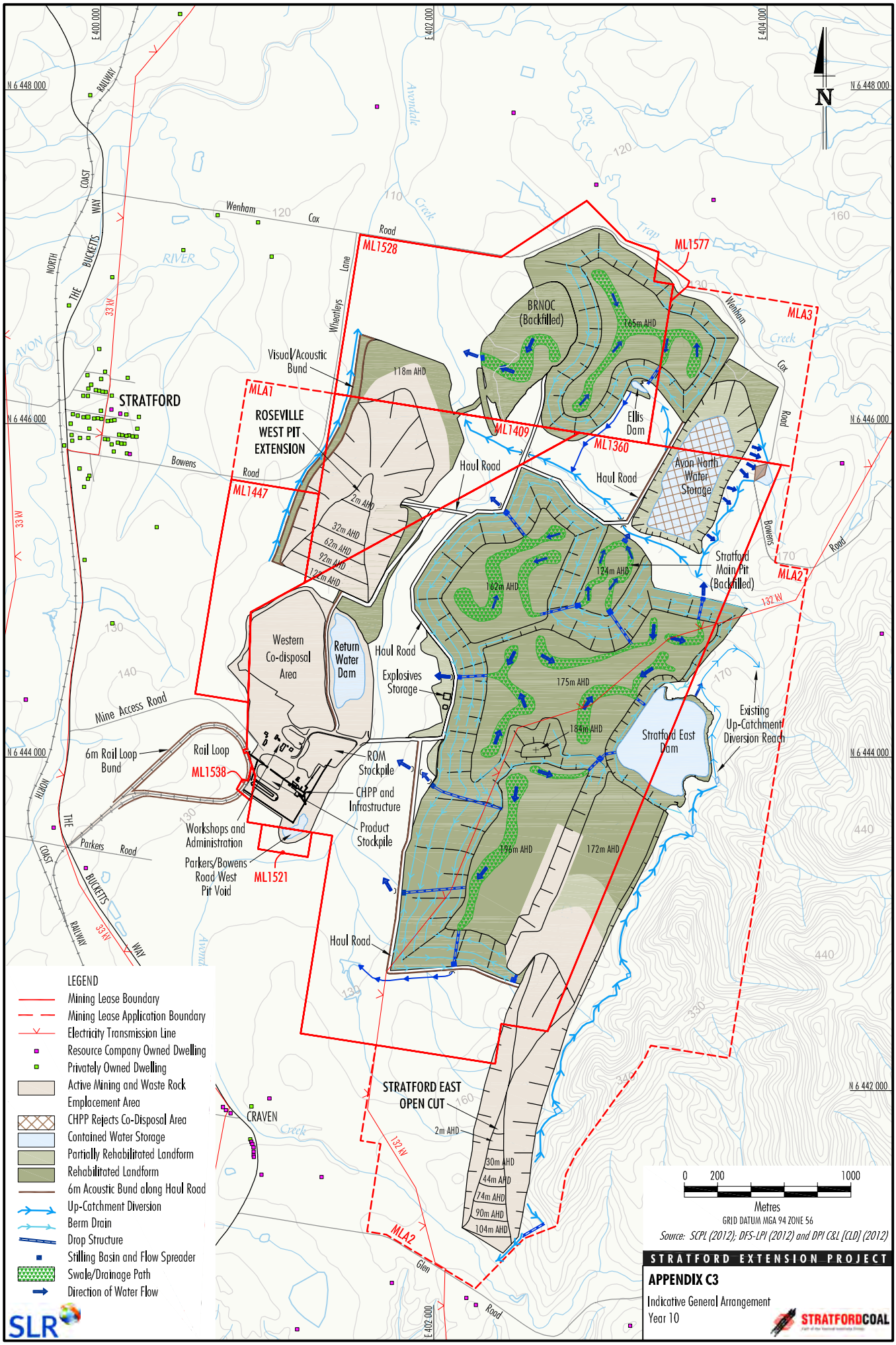
Property Number/ Landholder		MGA Dwelling Co-ordinates		ENM Dwelling Co-ordinates		
Full Name	**Abbreviated Name**	**East (m)**	**North (m)**	**East (m)**	**North (m)**	**Elevation (m)**
19(23) Stratford Coal Pty Ltd	19(23) SCPL	401324	6441493	5324	5493	145
19(25) Stratford Coal Pty Ltd	19(25) SCPL	401747	6440848	5747	4848	147
19(26) Stratford Coal Pty Ltd	19(26) SCPL	401882	6438673	5882	2673	146
19(27) Stratford Coal Pty Ltd	19(27) SCPL	401887	6437822	5887	1822	148
19(28) Stratford Coal Pty Ltd	19(28) SCPL	402195	6440756	6195	4756	170
19(29) Stratford Coal Pty Ltd	19(29) SCPL	402478	6447861	6478	11861	115
19(30) Stratford Coal Pty Ltd	19(30) SCPL	402973	6447427	6973	11427	122
19(31) Stratford Coal Pty Ltd	19(31) SCPL	403177	6440591	7177	4591	205
19(32) Stratford Coal Pty Ltd	19(32) SCPL	403484	6439810	7484	3810	182
19(33) Stratford Coal Pty Ltd	19(33) SCPL	403679	6447341	7679	11341	130
19(34) Stratford Coal Pty Ltd	19(34) SCPL	404536.8	6450159.7	8537	14160	112
19(35) Stratford Coal Pty Ltd	19(35) SCPL	400048	6437153	4048	1153	86
19(36) Stratford Coal Pty Ltd	19(36) SCPL	400187	6436589	4187	589	96
19(37) Stratford Coal Pty Ltd	19(37) SCPL	400180	6437098	4180	1098	86
19(38) Stratford Coal Pty Ltd	19(38) SCPL	404569	6449579	8569	13579	136
19(39) Stratford Coal Pty Ltd	19(39) SCPL	400642	6441894	4642	5894	136
19(40) Stratford Coal Pty Ltd	19(40) SCPL	404449	6445763	8449	9763	167
19(41) Stratford Coal Pty Ltd	19(41) SCPL	399550	6444348	3550	8348	126
19(42) Stratford Coal Pty Ltd	19(42) SCPL	401013	6441953	5013	5953	145
19(43) Stratford Coal Pty Ltd	19(43) SCPL	402251	6440714	6251	4714	170
19(45) Stratford Coal Pty Ltd	19(45) SCPL	400513	6441915	4513	5915	136
19(46) Stratford Coal Pty Ltd	19(46) SCPL	400606	6441897	4606	5897	136
19(47) Stratford Coal Pty Ltd	19(47) SCPL	404687	6444736	8687	8736	248
Vacant Lands						
32 Eliza Ann Ruth Mcintosh & Ronald Keith Mcintosh[1]	**32 Mcintosh & Mcintosh**	**-**	**-**	**-**	**-**	**-**
35 Leo John Dillon & Isobel Robyn Dillon	**35 Dillon & Dillon**	**-**	**-**	**-**	**-**	**-**
51 Gloucester Printing Services Pty Ltd	**51 Gloucester Printing Services Pty Ltd**	**-**	**-**	**-**	**-**	**-**
Cr.1 William Deane Wood[1]	**Cr.1 Wood**	**-**	**-**	**-**	**-**	**-**

Note 1: Receivers identified in the existing SCM Project Approval (DA 23-98/99) as being in the Noise Affectation Zone.



GCL-10-12 EIS AppNoise_107I


E 400 000
E 402 000
E 404 000
N 6 448 000
N 6 446 000
N 6 444 000
N 6 442 000
N
RAILWAY
NORTH BUCKETTS WAY
THE COAST
33 kV
Wenham
Cox
Road
Lane
Wheatleys
Bowens
Parkers
Mine Access Road
Avondale
Creek
RIVER
ML1528
ML1577
MLA3
MLA1
MLA2
ML1409
ML1360
ML1447
ML1538
ML1521
STRATFORD
ROSEVILLE WEST PIT EXTENSION
BRNOC (Partially Backfilled)
Soil Stockpile Areas
Visual/Acoustic Bund
Haul Road
Ellis Dam
Avon North Water Storage
STRATFORD MAIN PIT
Western Co-disposal Area
Return Water Dam
Explosives Storage
Stratford East Dam
Existing Up-Catchment Diversion Reach
6m Rail Loop Bund
Rail Loop
ROM Stockpile
CHPP and Infrastructure
Product Stockpile
Workshops and Administration
Parkers/Bowens Road West Pit Void
10m Acoustic Bund
STRATFORD EAST OPEN CUT
WASTE EMPLACEMENT EXTENSION
CRAVEN
Glen
LEGEND
Mining Lease Boundary
Mining Lease Application Boundary
Electricity Transmission Line
Resource Company Owned Dwelling
Privately Owned Dwelling
Active Mining and Waste Rock Emplacement Area
CHPP Rejects Co-Disposal Area
Contained Water Storage
Partially Rehabilitated Landform
Rehabilitated Landform
6m Acoustic Bund along Haul Road
Up-Catchment Diversion
Berm Drain
Drop Structure
Stilling Basin and Flow Spreader
Swale/Drainage Path
Direction of Water Flow
0
200
1000
Metres
GRID DATUM MGA 94 ZONE 56
Source: SCPL (2012); DFS-LPI (2012) and DPI C&I [CLD] (2012)
STRATFORD EXTENSION PROJECT
APPENDIX C2
Indicative General Arrangement
Year 7
STRATFORDCOAL
SLR
GCL-10-12 EIS AppNoise_108H



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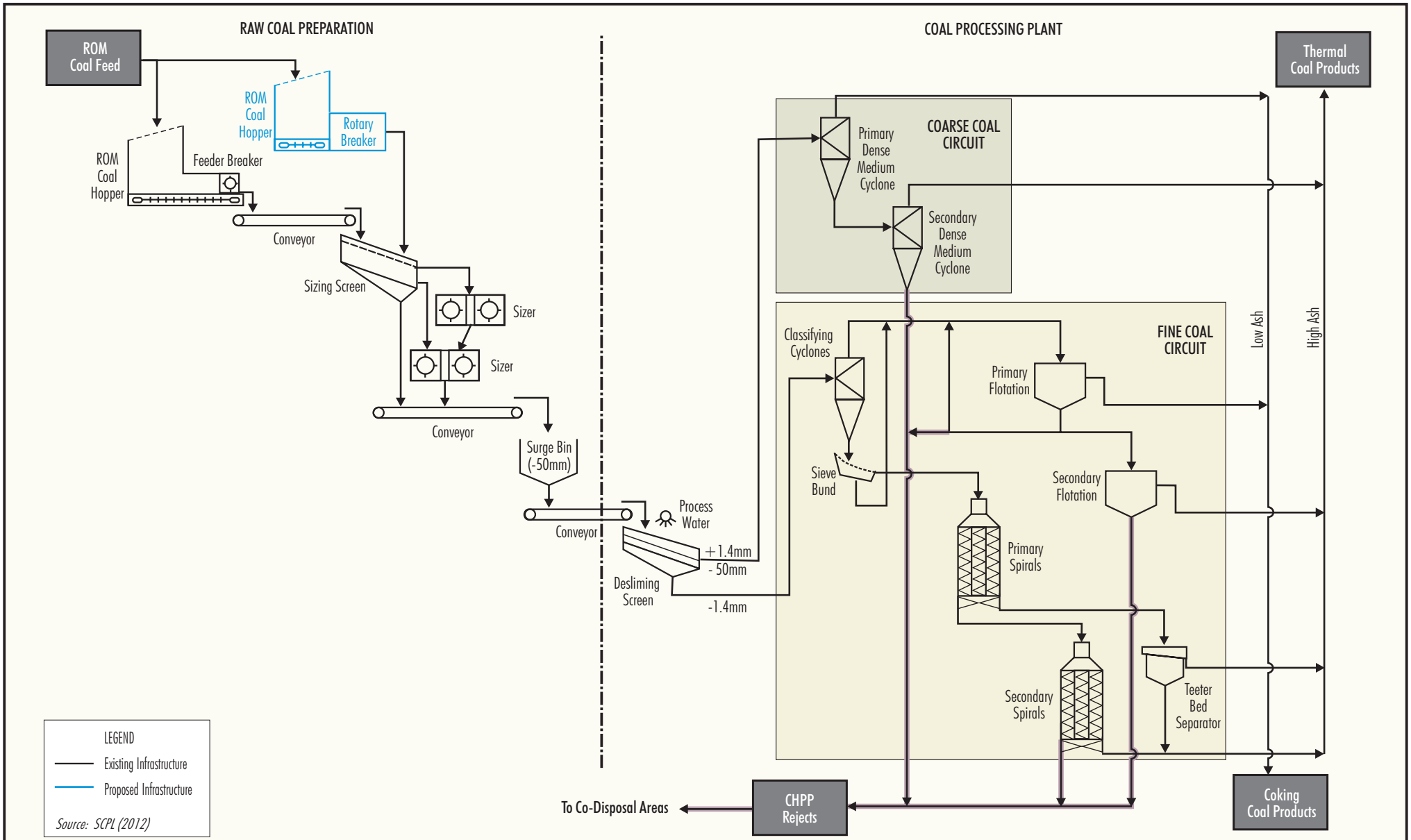


STRATFORD EXTENSION PROJECT

APPENDIX C4

Indicative CHPP Operations Flowsheet

SLR

STRATFORDCOAL

GCL-10-02 EIS AppNoise_002C

AMBIENT NOISE MONITORING RESULTS

Overview of Methodology

A noise monitoring programme was conducted in November 2007 to quantify background noise levels (ie all noise sources) and to estimate industrial noise only (ie in the absence of transport, natural and domestic noise) at three representative residential receiver areas in the vicinity of the Straftord Coal Mine in relation to the proposed Project.

In order to supplement the unattended logger measurements and to assist in identifying the character and duration of the noise sources, operator-attended daytime, evening, and night-time surveys were also conducted at all the vicinity of the logging locations. The background noise monitoring programme was implemented in accordance with AS 1055-1997 *Acoustics-Description and Measurement of Environmental Noise* and the *NSW Industrial Noise Policy* (INP) (New South Wales Environment Protection Authority, 2000).

One unattended logger was installed near the train to quantify the existing noise level associated with the transport of coal.

Instrumentation and Measurement Parameters

All acoustic instrumentation employed throughout the noise monitoring programme has been designed to comply with the requirements of Australian Standard (AS) 1259.2-1990 *Sound Level Meters* and carries current National Association of Testing Authorities (NATA) or manufacturer calibration certificates.

A description of instrumentation, designated type and serial numbers is shown in **Table D1**.

Table D1 Acoustic Instrumentation Schedule

ID/Landowner	Location	Instrumentation
19(1) SCPL (ambient noise survey)	Woods Road	16-301-472
53 Barnes (ambient noise survey)	Glen Road	16-203-506
68 Lyford (ambient noise survey)	Pages Road	194591
19(1) SCPL (rail traffic survey)	Woods Road	16-207-041
The Bucketts Way (road traffic survey)	South of Mine Access Road	16-306-041
The Bucketts Way (road traffic survey)	North of Mine Access Road	16-306-038

All instrumentation was programmed to record continuously the noise exceedance levels in 15 minute intervals including the L_{Amax}, L_{A1}, L_{A10}, L_{A50}, L_{A90}, L_{A99}, L_{Amin} and the L_{Aeq}. Instrument calibration was conducted before and after each measurement survey, with the variation in calibrated levels not exceeding ±0.5 dBA.

Weather Monitoring Station

Meteorological data were obtained from the two permanent automatic weather stations located at the Stratford and Duralie Mines.

Unattended Background Noise Monitoring Results

The unattended background noise logger data from each monitoring location, together with the on-site weather conditions were analysed on a daily basis.

The statistical noise exceedance levels (L_{AN}) are the levels exceeded for N% of the interval period. The L_{A90} represents the level exceeded for 90% of the interval period and is referred to as the average minimum or background noise level. The L_{A10} is the level exceeded for 10% of the time and is usually referred to as the average maximum noise level. The L_{Aeq} is the equivalent continuous sound pressure level and represents the steady sound level which is equal in energy to the fluctuating level over the interval period.

Prior to further analysis, the background noise data from each location which correlated with periods of unstable weather (e.g. rainfall greater than 0.5 millimetres [mm] or wind speed greater than 5 metres per second [m/s]) were discarded. The acceptable background noise data were then processed in accordance with the INP "Appendix B - Applying the Background Noise Policy" to derive the Monday to Sunday background noise levels presented in **Table D2**.

Table D2 Unattended Noise Logger Results 2007 (dBA re 20 µPa)

Ref/Landholder	Measured RBL All Noise Sources			Measured LAeq(period)[1] All Noise Sources			Estimated LAeq(period)[1] Industrial Noise Only		
	Day	Evening	Night	Day	Evening	Night	Day	Evening	Night
19 SCPL (formerly Campbell)	33	35	34	53	52	50	<44	<39	<34
53 Barnes	33	36	35	46	50	46	<44	<39	<34
68 Lyford	34	37	36	48	52	50	<44	<39	<34
Train									
Road									

Note 1: Daytime 0700 hrs to 1800 hrs, Evening 1800 hrs to 2200 hrs and Night-time 2200 hrs to 0700 hrs.
RBL = rating background level.
µPa = micro Pascal.

Operator-Attended Background Noise Survey Results

Operator-attended noise surveys of 15 minutes duration were conducted with a precision integrating sound level meter in order to qualify the results obtained with the unattended noise loggers. During the attended noise surveys, the operator identified the character and duration of acoustically significant background noise sources. Wherever applicable the operator quantified local traffic flow and made a qualitative assessment of the prevailing weather conditions.

The daytime, evening and night-time operator-attended noise survey for all four residential monitoring locations are presented below:

19 SCPL (formerly Campbell)

Date/Start Time Weather		Primary Noise Descriptor (dBA re 20uPa)					Typical maximum Levels LAmax - dBA
		Leq	L1	L10	L50	L90	
Evening 20/11/07 1918 hrs wind 1.5 – 3.5 m/s from NE	Ambient	43	48	45	42	39	Road 40
	Industrial	Estimated LAeq 35 dBA					Mine 35 Birds 45 Wind 45
Night 21/11/07 0109 hrs 2 Okta Wind calm	Ambient	41	45	42	40	39	Birds 43
	Industrial	Estimated LAeq <30 dBA					Insects / frogs 41-43 Mine rumble 25 Plane 43 Trucks/dozer 23-28 Trucks (road) 43 Dog 25
Day 30/11/07 0751 hrs 8 Okta 19°C 76% Wind calm	Ambient	48	57	53	40	35	Domestic activities 59-61
	Industrial	Can hear the work on the rail line Truck + FEL contribution 30-32					Birds 56-62 Highway audible Train 52-55

53 Barnes

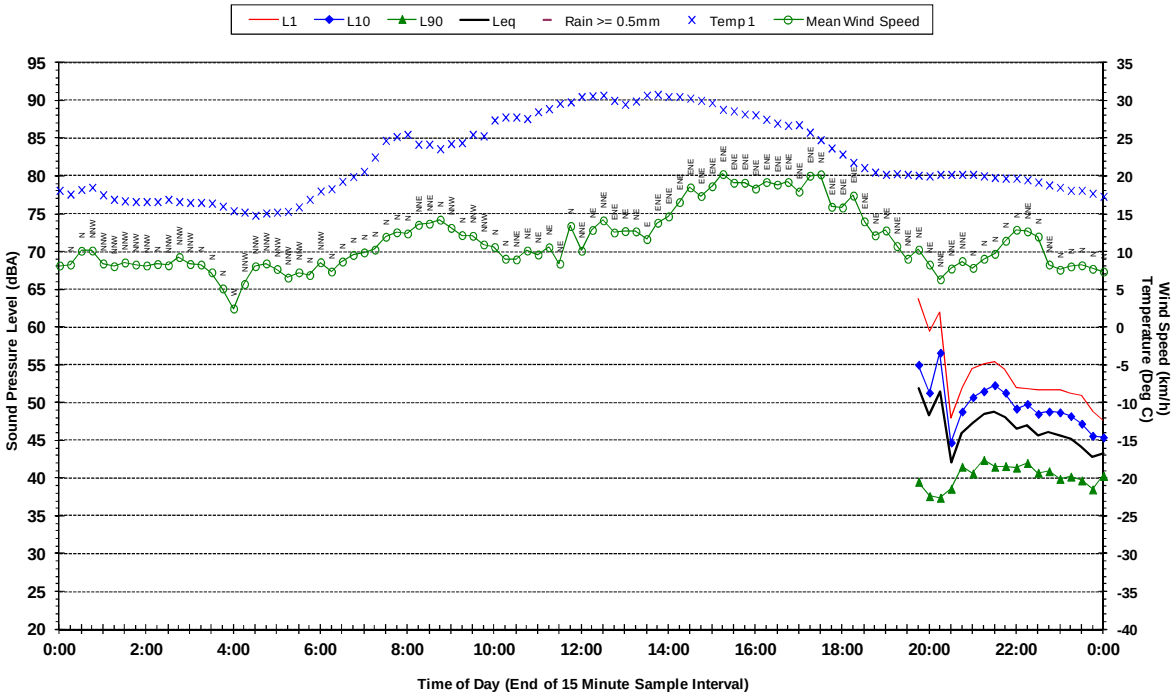
Date/Start Time Weather		Primary Noise Descriptor (dBA re 20uPa)					Typical maximum Levels LAmax - dBA
		Leq	L1	L10	L50	L90	
Day 20/11/07 1510 hrs Wind calm	Ambient	41	49	43	39	36	Wind Birds Insects
	Industrial	Not discernable					
Night 20/11/07 2200 hrs 8 Okta Wind calm	Ambient	52	53	52	52	51	Insects (constant) 52-54
	Industrial	Not discernable					
Evening 29/11/07 1927 hrs 8 Okta 20.1^{o}C 74.4% Wind calm	Ambient	40	49	36	34	31	Birds 36-65 Plane Insects 35 Horses 45
	Industrial	Not discernable					

68 Lyford

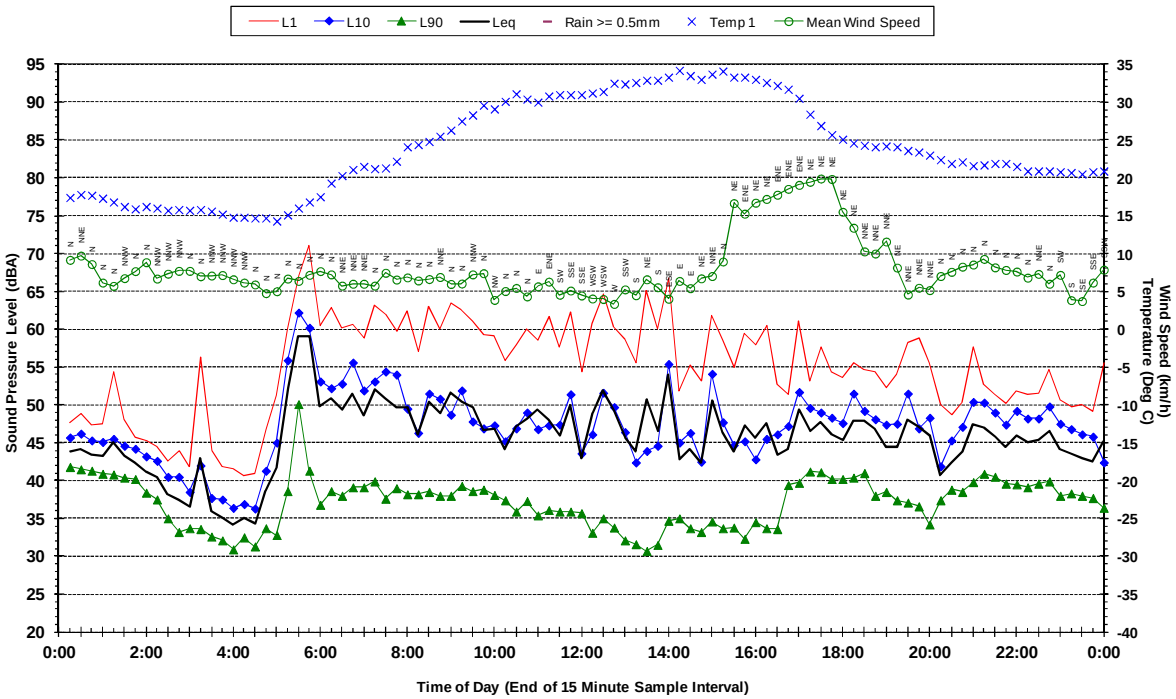
Date/Start Time Weather		Primary Noise Descriptor (dBA re 20uPa)					Typical maximum Levels LAmax - dBA
		Leq	L1	L10	L50	L90	
Day 20/11/07 1430 hrs Wind 2-3 m/s from NE	Ambient	38	45	40	36	33	Wind Insects Birds Cows
	Industrial	Not discernable					
Night 20/11/07 2221 hrs 8 Okta Wind calm-0.5 from NE	Ambient	47	49	49	47	43	Insects (constant-different freq) 45-50 Cows eating 30 Cows 49 Vehicles audible
	Industrial	Not discernable					
Evening 29/11/07 1907 hrs 8 Okta 20^{o}C 76% Wind calm	Ambient	42	50	44	40	35	Insects 41 Birds 62 Highway audibe Horses 53 Cows Plane 42-50
	Industrial	Not discernable					

UNATTENDED AMBIENT NOISE RESULTS NOVEMBER 2007 - 19 (1) SCPL

Statistical Ambient Noise Levels
19 (1) GCL - Tuesday 20 November 2007

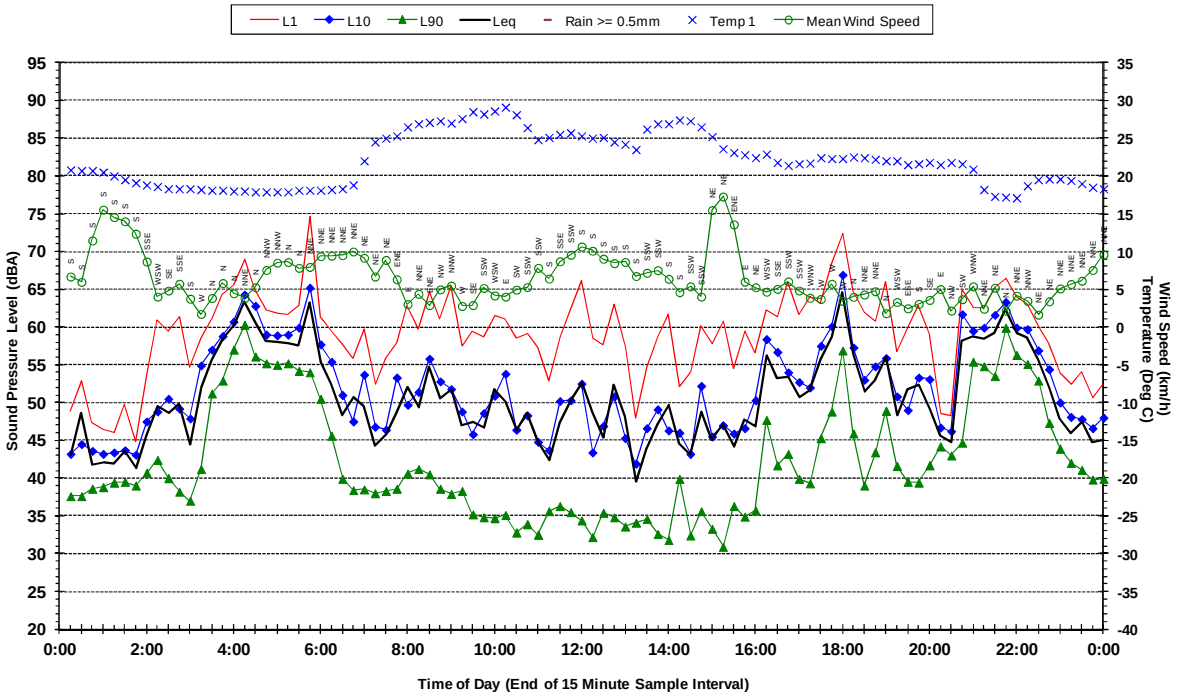


Statistical Ambient Noise Levels
19 (1) GCL - Wednesday 21 November 2007

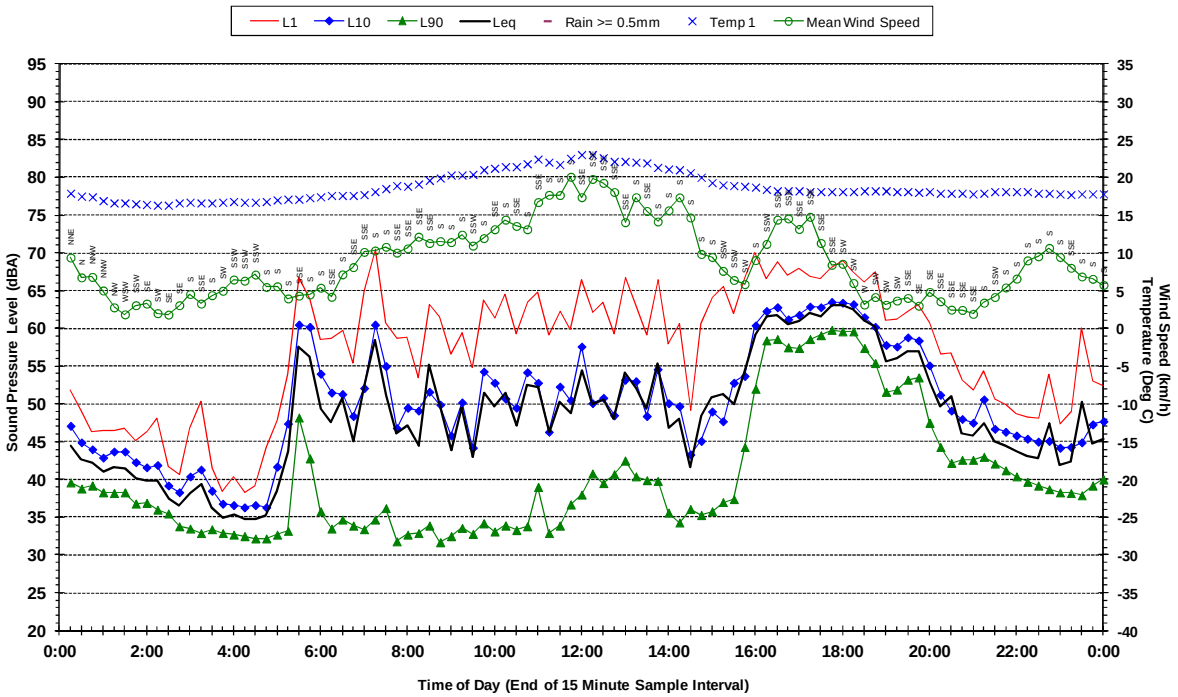


UNATTENDED AMBIENT NOISE RESULTS NOVEMBER 2007 - 19 (1) SCPL

Statistical Ambient Noise Levels
19 (1) GCL - Thursday 22 November 2007

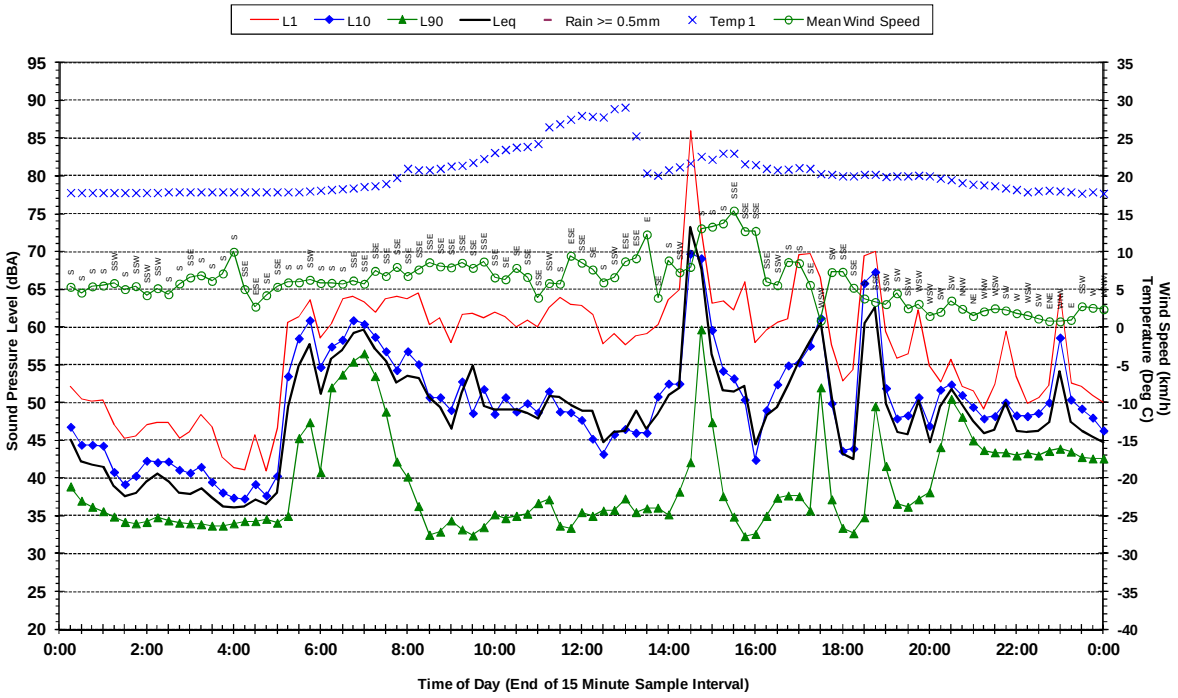


Statistical Ambient Noise Levels
19 (1) GCL - Friday 23 November 2007

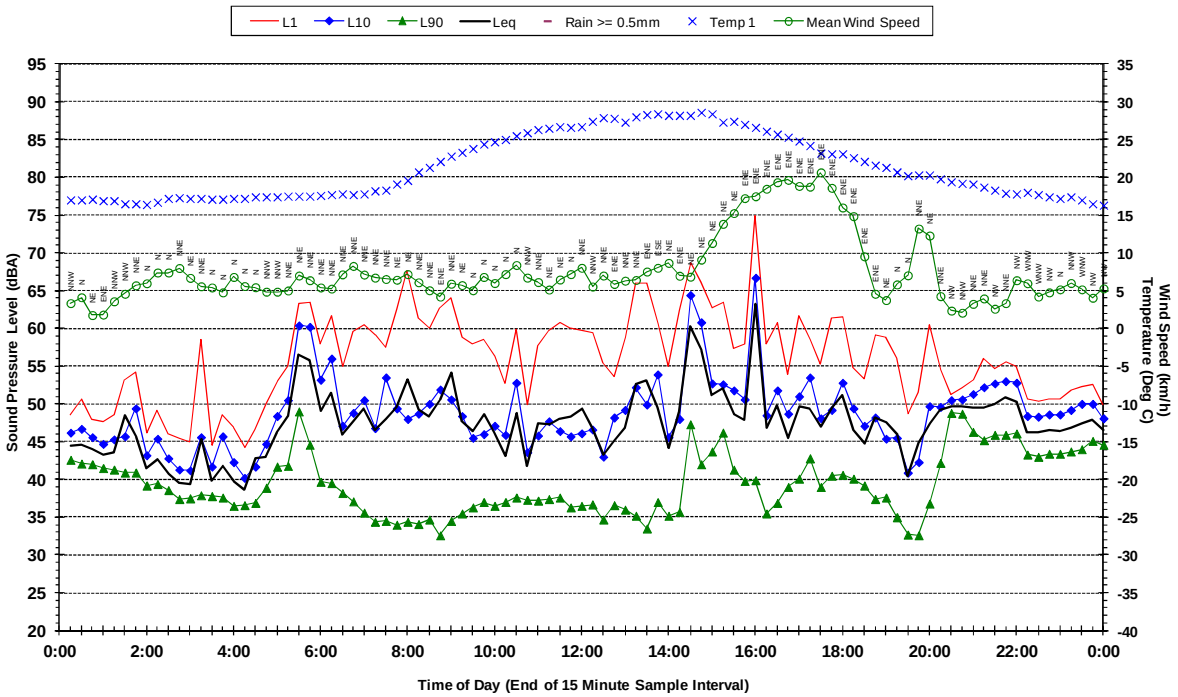


UNATTENDED AMBIENT NOISE RESULTS NOVEMBER 2007 - 19 (1) SCPL

Statistical Ambient Noise Levels
19 (1) GCL - Saturday 24 November 2007

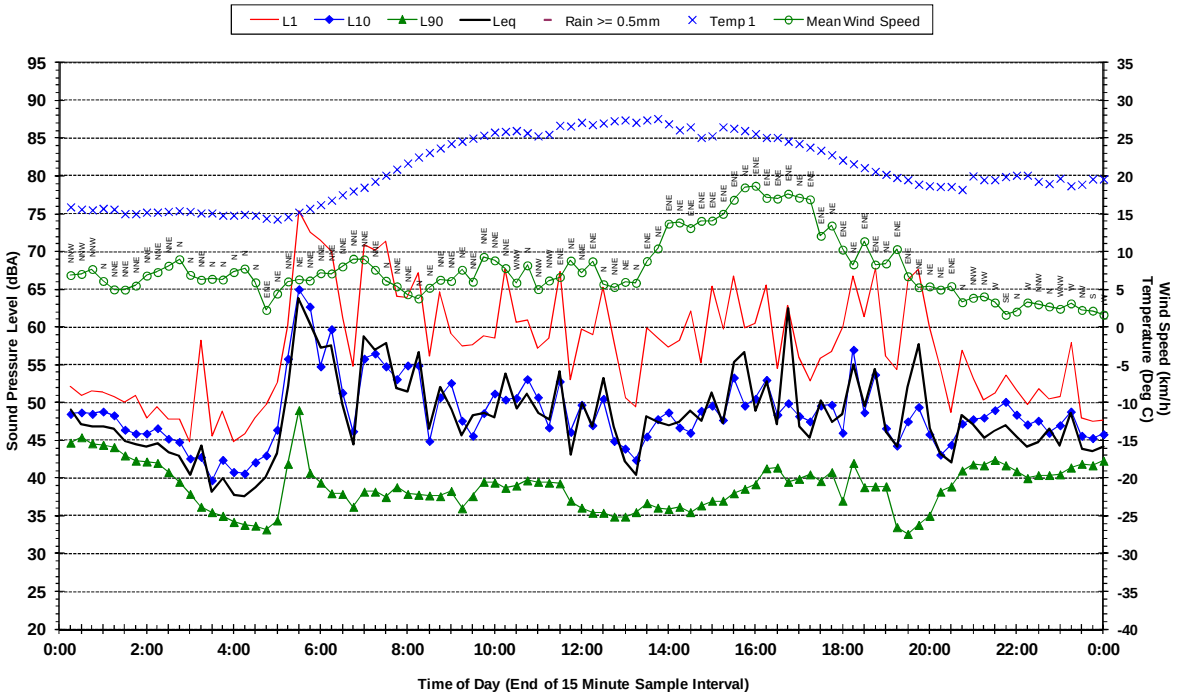


Statistical Ambient Noise Levels
19 (1) GCL - Sunday 25 November 2007

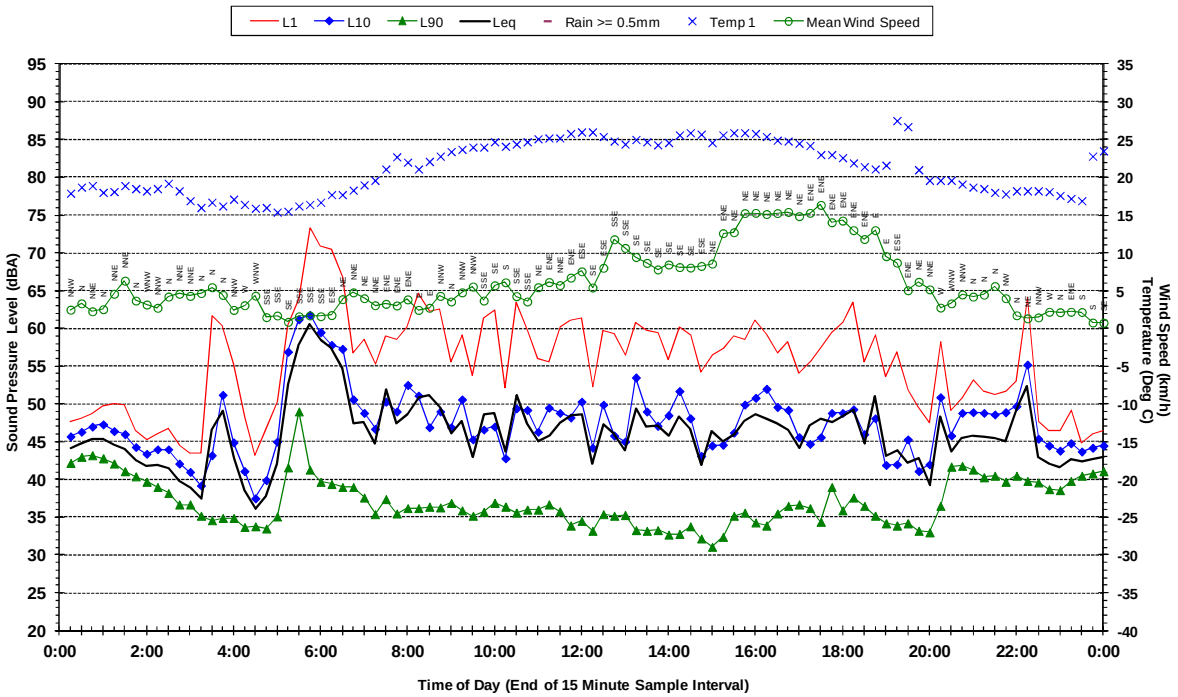


UNATTENDED AMBIENT NOISE RESULTS NOVEMBER 2007 - 19 (1) SCPL

Statistical Ambient Noise Levels
19 (1) GCL - Monday 26 November 2007

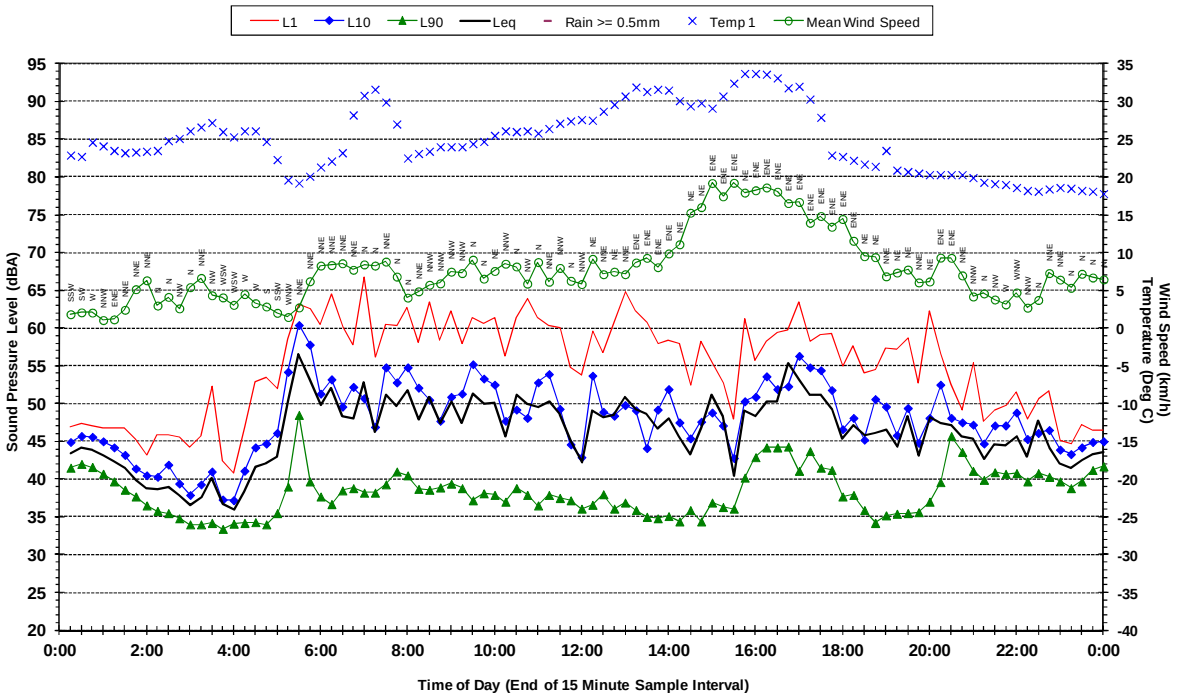


Statistical Ambient Noise Levels
19 (1) GCL - Tuesday 27 November 2007



UNATTENDED AMBIENT NOISE RESULTS NOVEMBER 2007 - 19 (1) SCPL

Statistical Ambient Noise Levels
19 (1) GCL - Wednesday 28 November 2007



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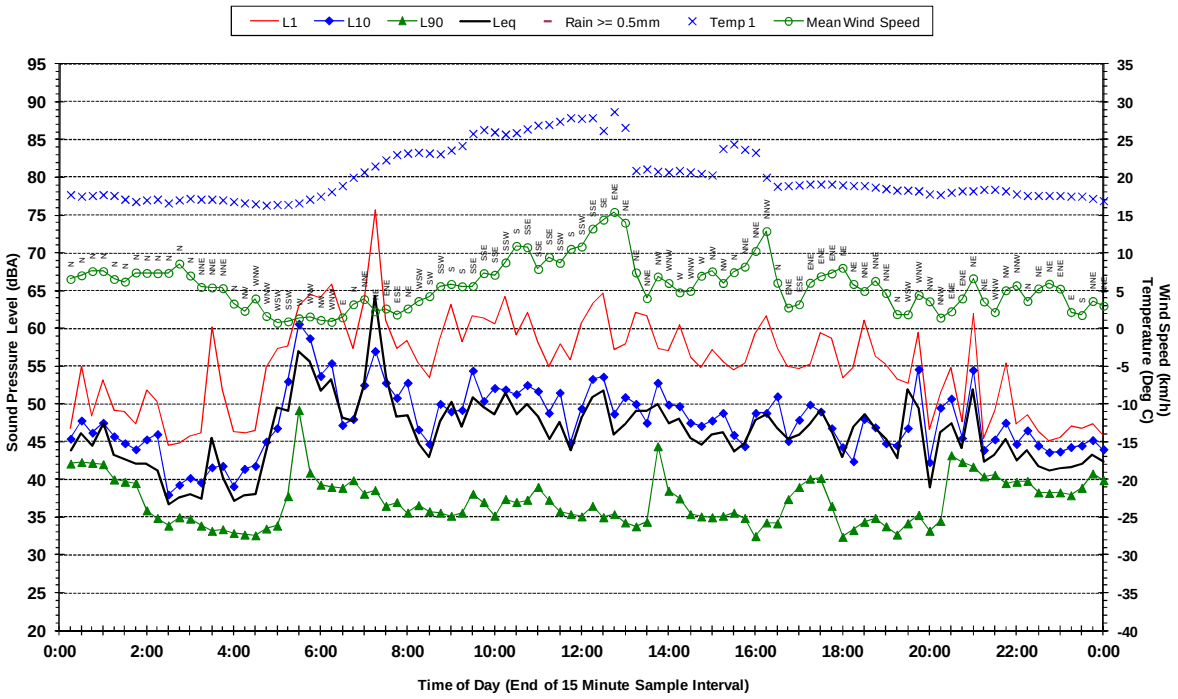
19 (1) GCL - Thursday 29 November 2007



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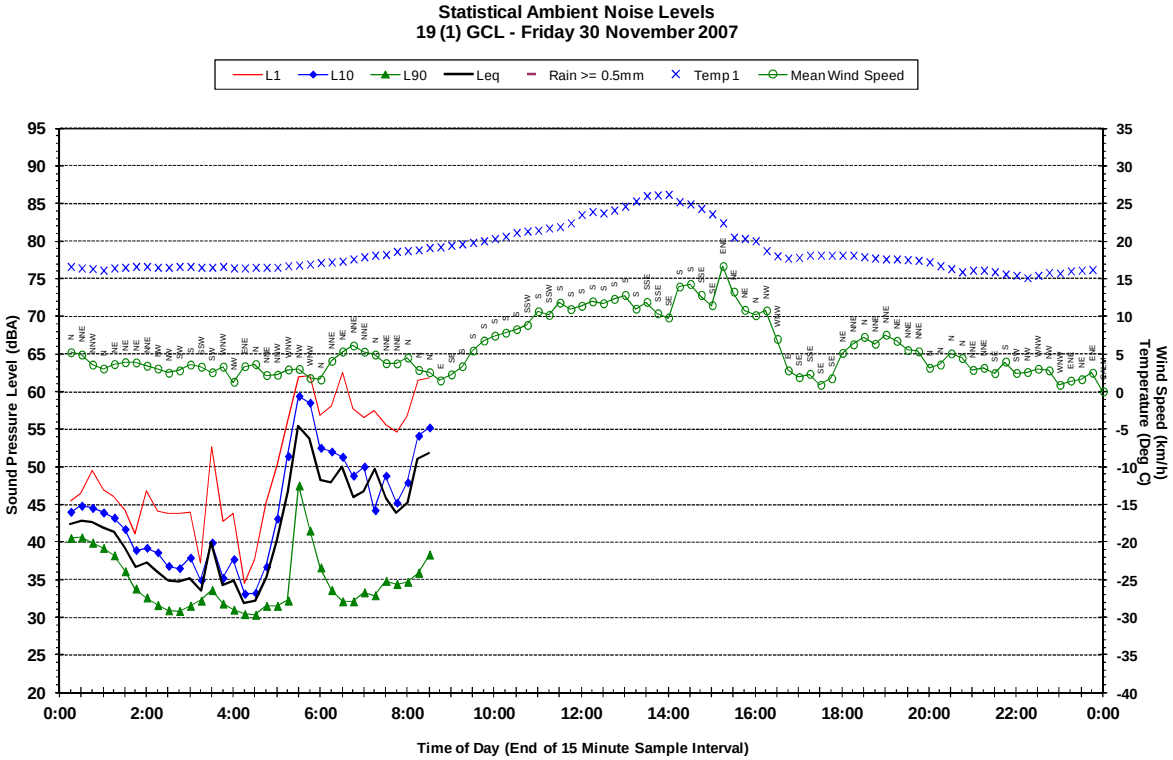

UNATTENDED AMBIENT NOISE RESULTS NOVEMBER 2007 - 53 BARNES

Statistical Ambient Noise Levels
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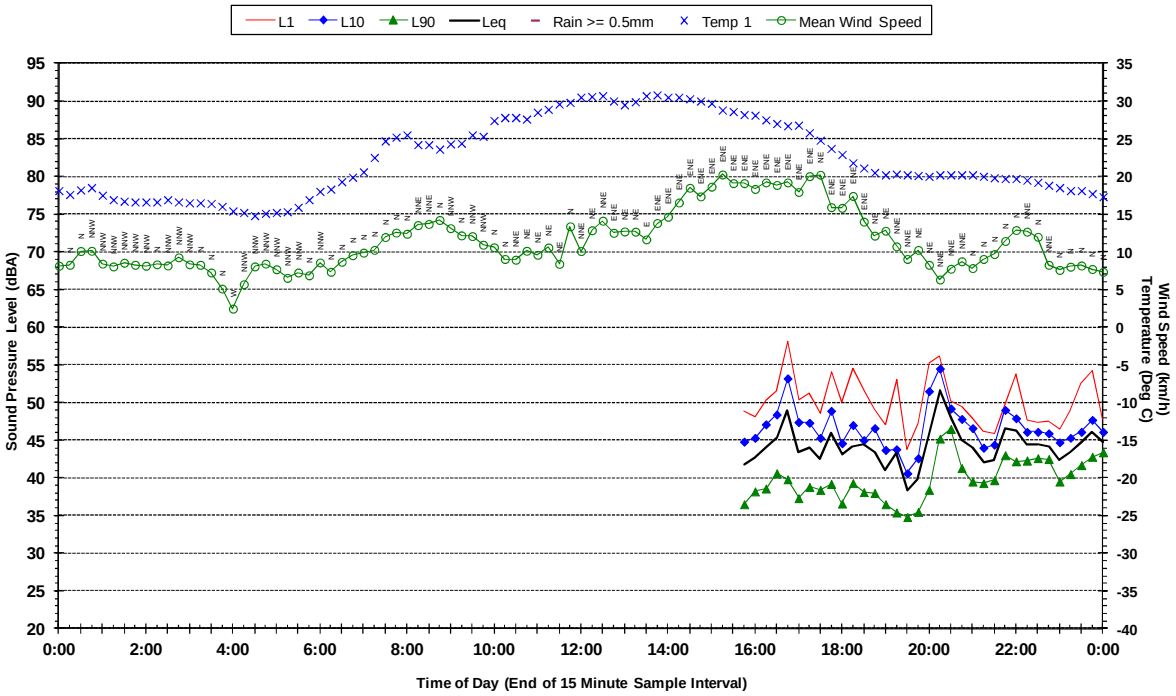

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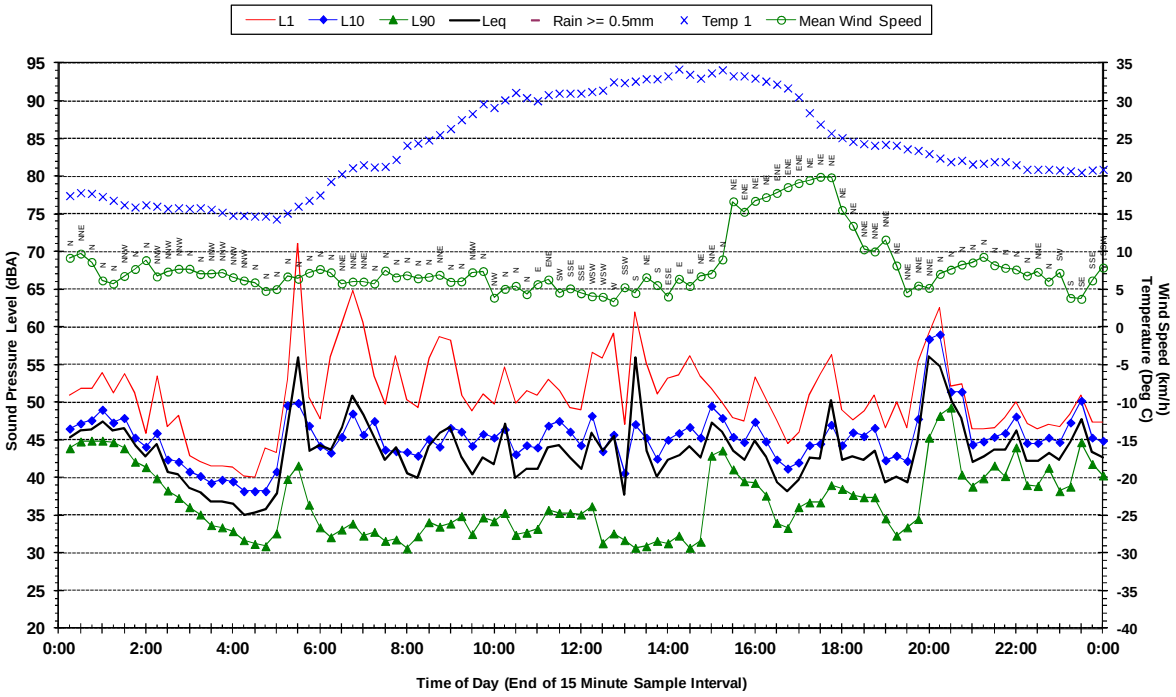

UNATTENDED AMBIENT NOISE RESULTS NOVEMBER 2007 - 53 BARNES

Statistical Ambient Noise Levels
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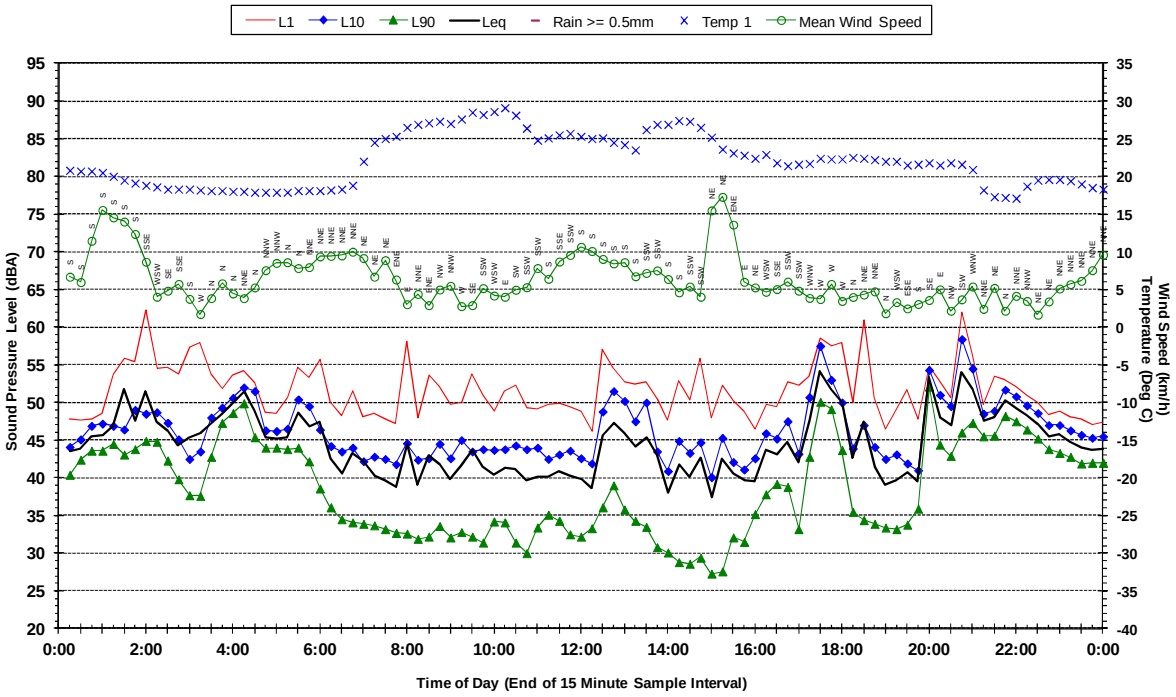

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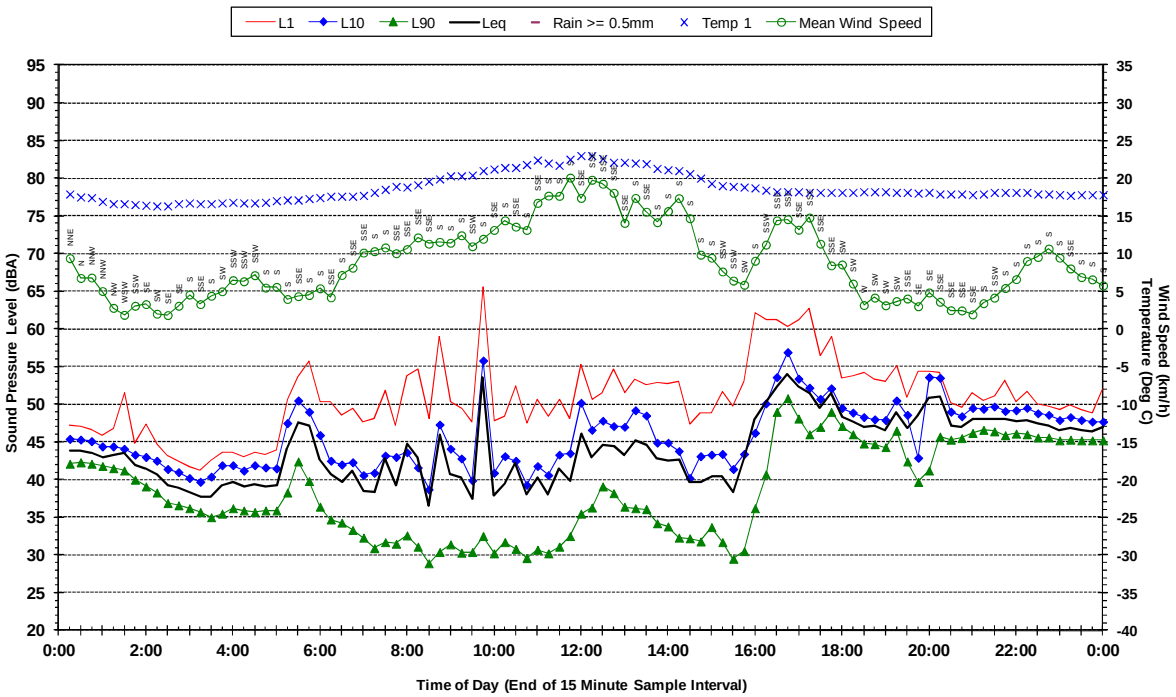

UNATTENDED AMBIENT NOISE RESULTS NOVEMBER 2007 - 53 BARNES

Statistical Ambient Noise Levels
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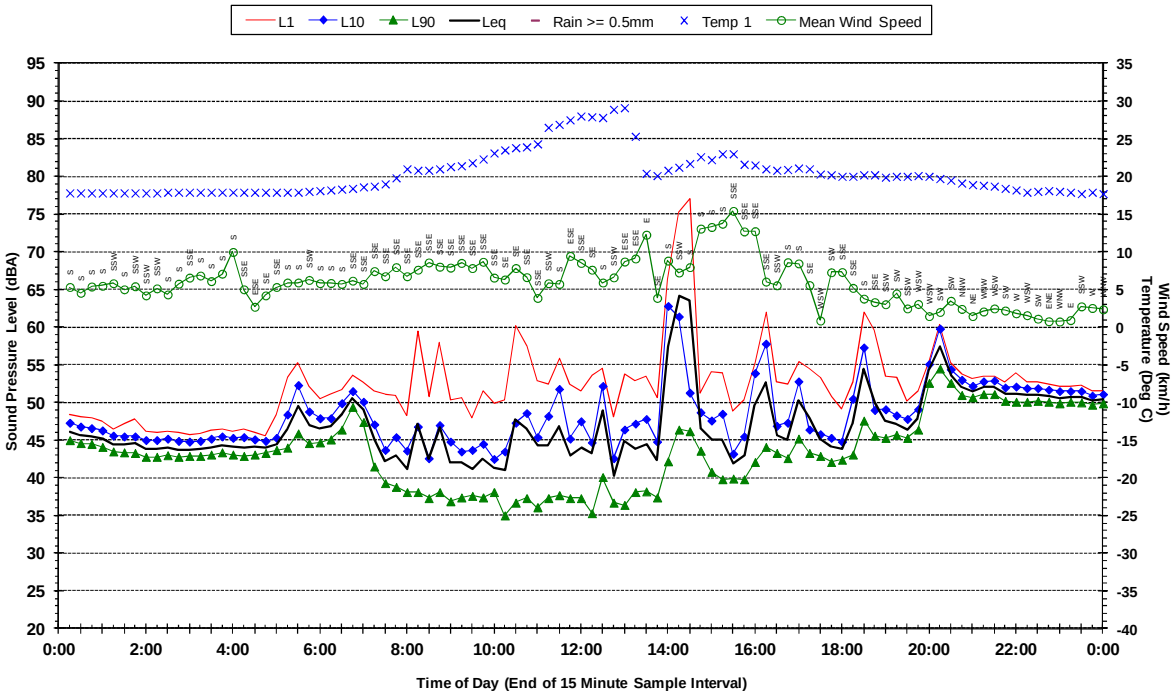

Statistical Ambient Noise Levels
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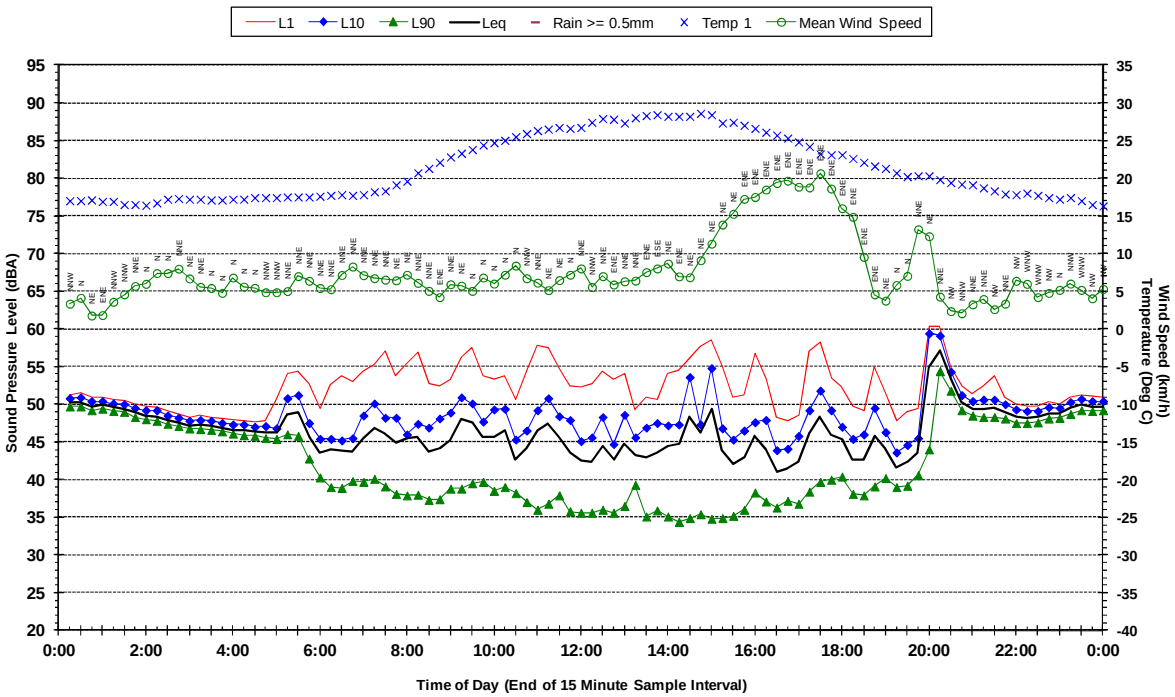

UNATTENDED AMBIENT NOISE RESULTS NOVEMBER 2007 - 53 BARNES

Statistical Ambient Noise Levels
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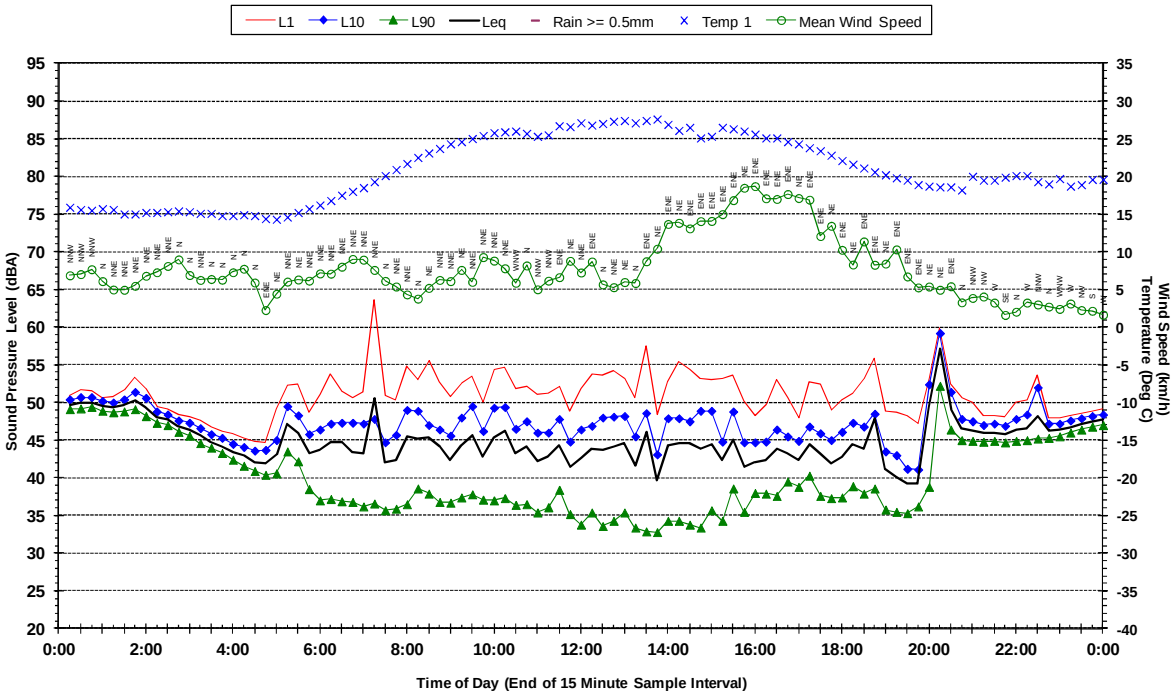

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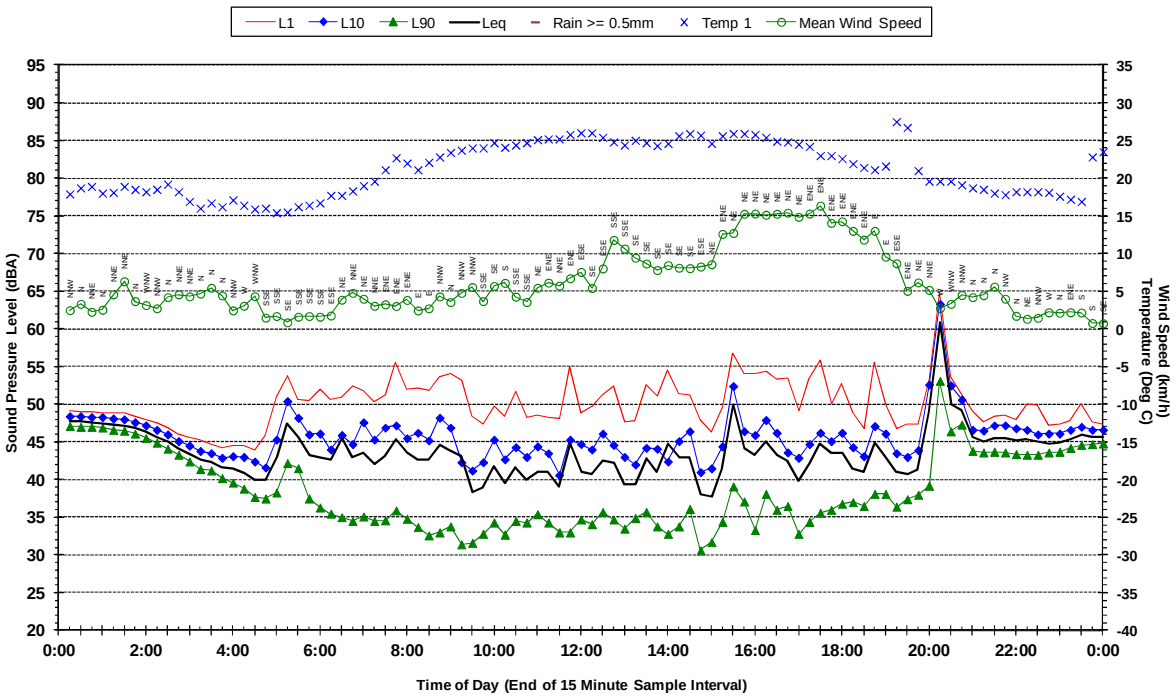

UNATTENDED AMBIENT NOISE RESULTS NOVEMBER 2007 - 53 BARNES

Statistical Ambient Noise Levels
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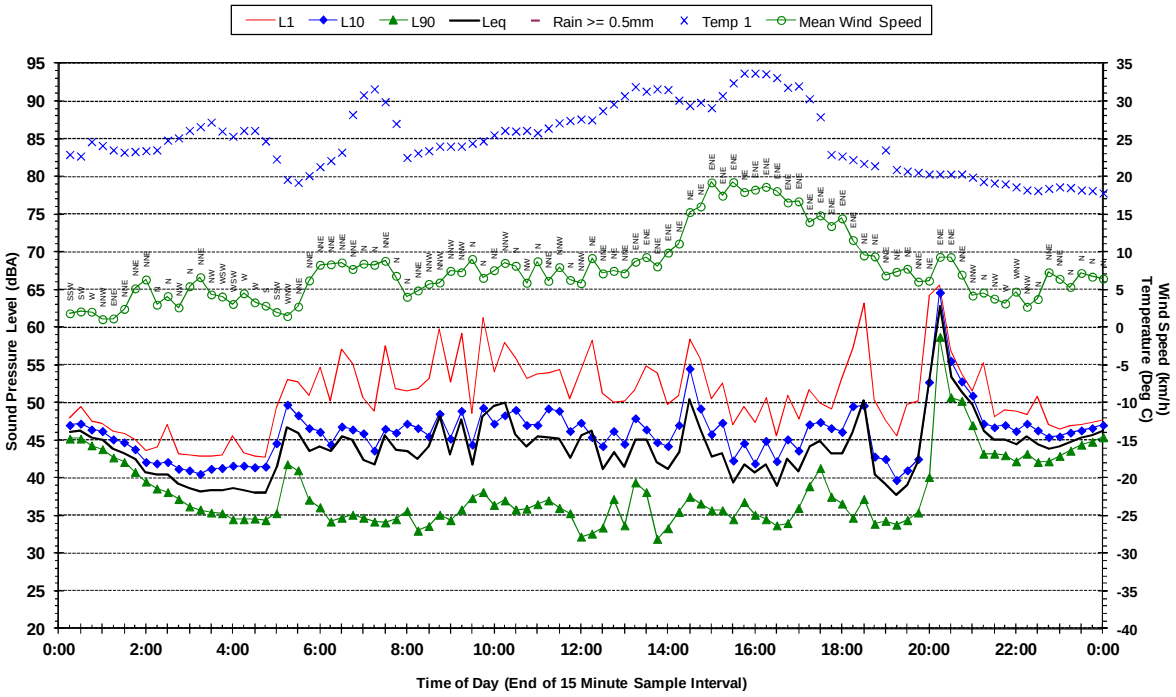

Statistical Ambient Noise Levels
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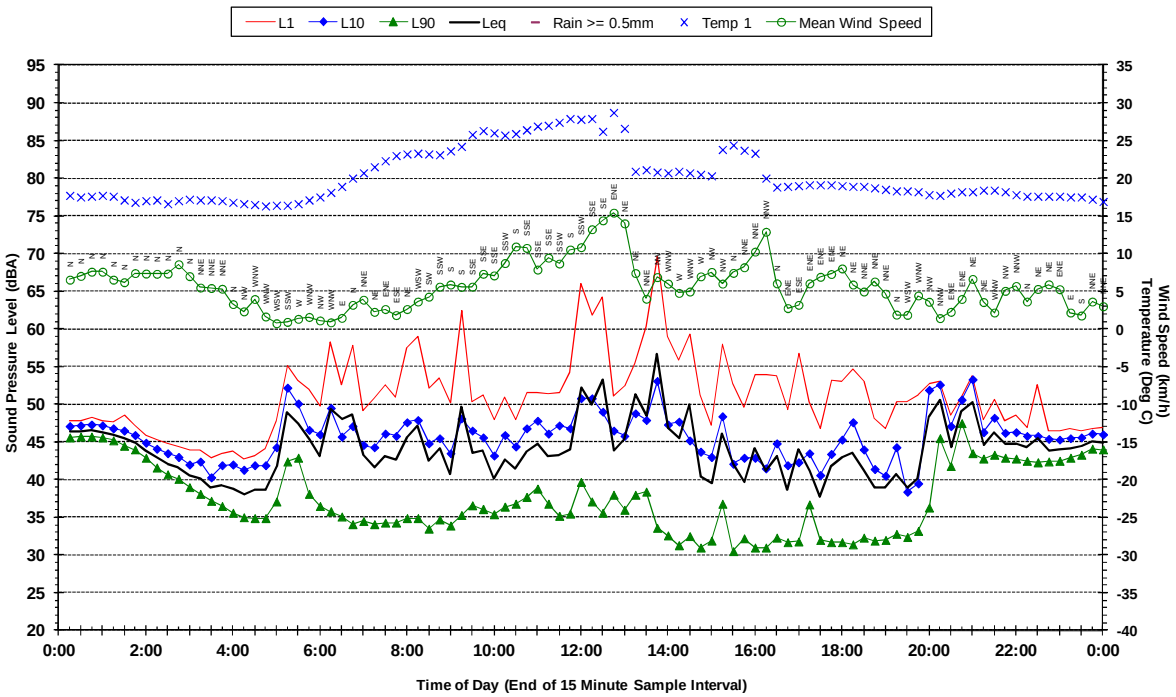

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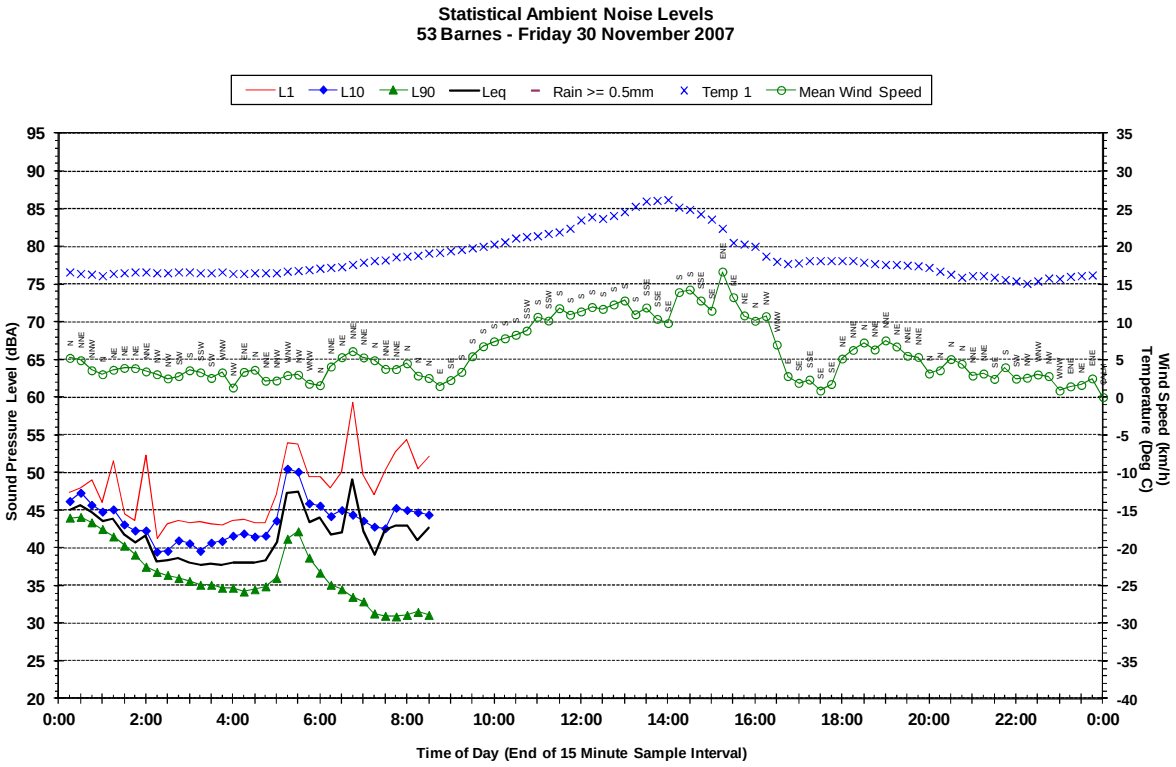
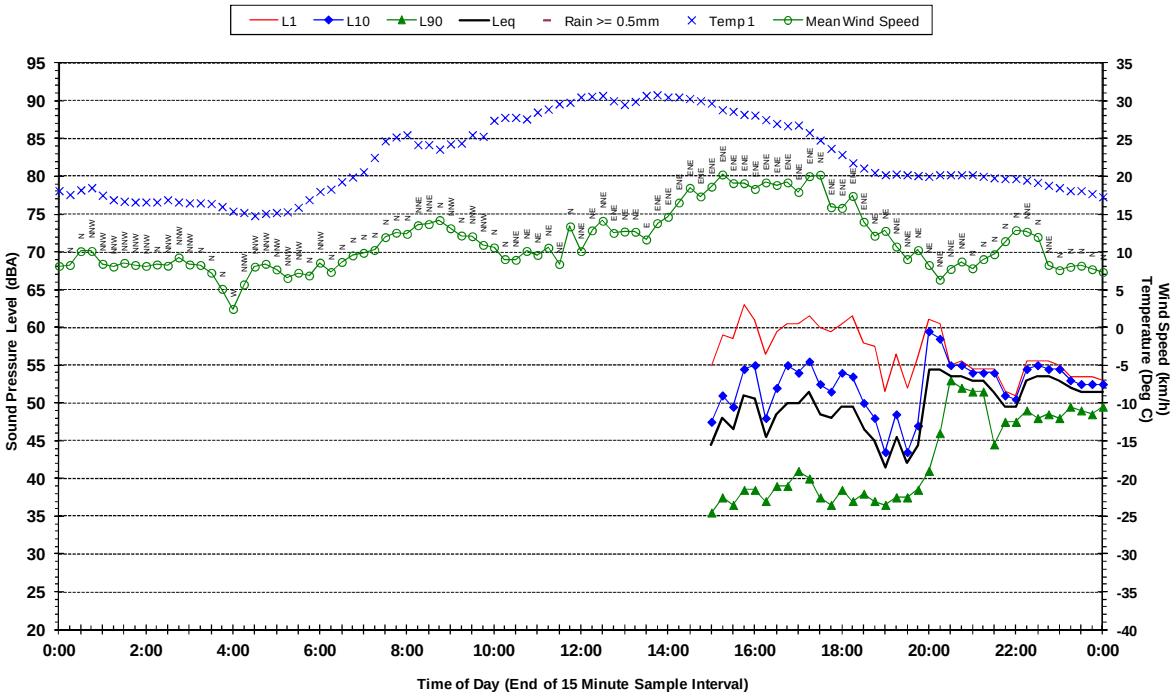
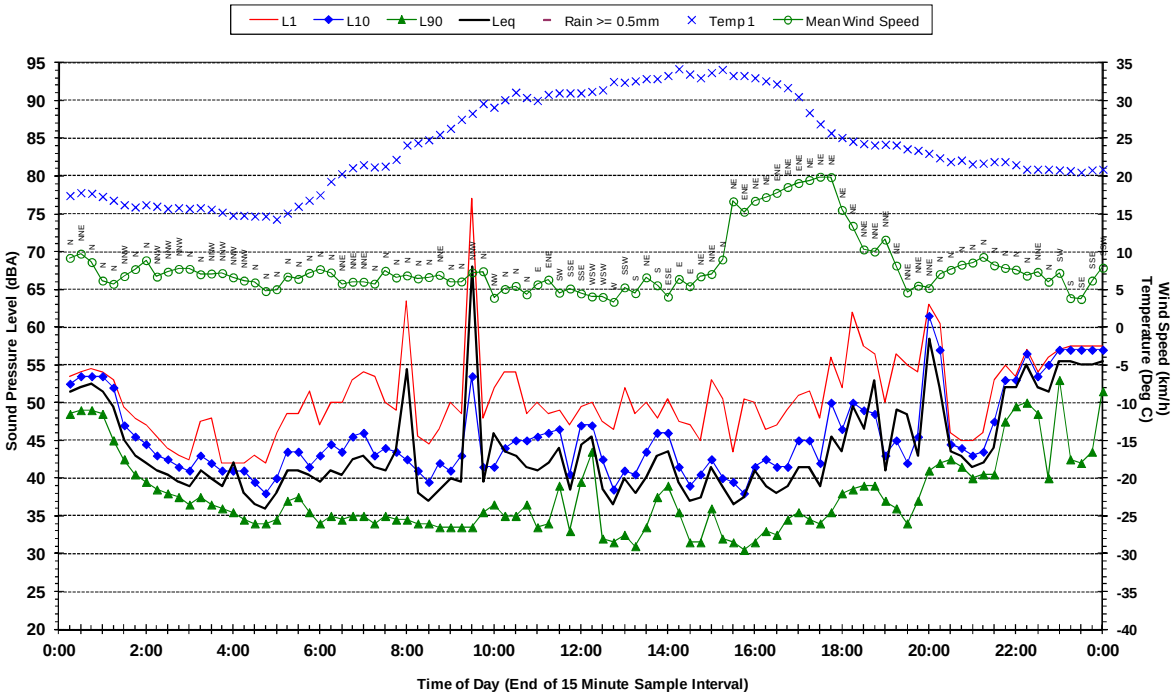


UNATTENDED AMBIENT NOISE RESULTS NOVEMBER 2007 - 68 LYFORD

Statistical Ambient Noise Levels
68 Lyford - Tuesday 20 November 2007



Statistical Ambient Noise Levels
68 Lyford - Wednesday 21 November 2007



UNATTENDED AMBIENT NOISE RESULTS NOVEMBER 2007 - 68 LYFORD

Statistical Ambient Noise Levels
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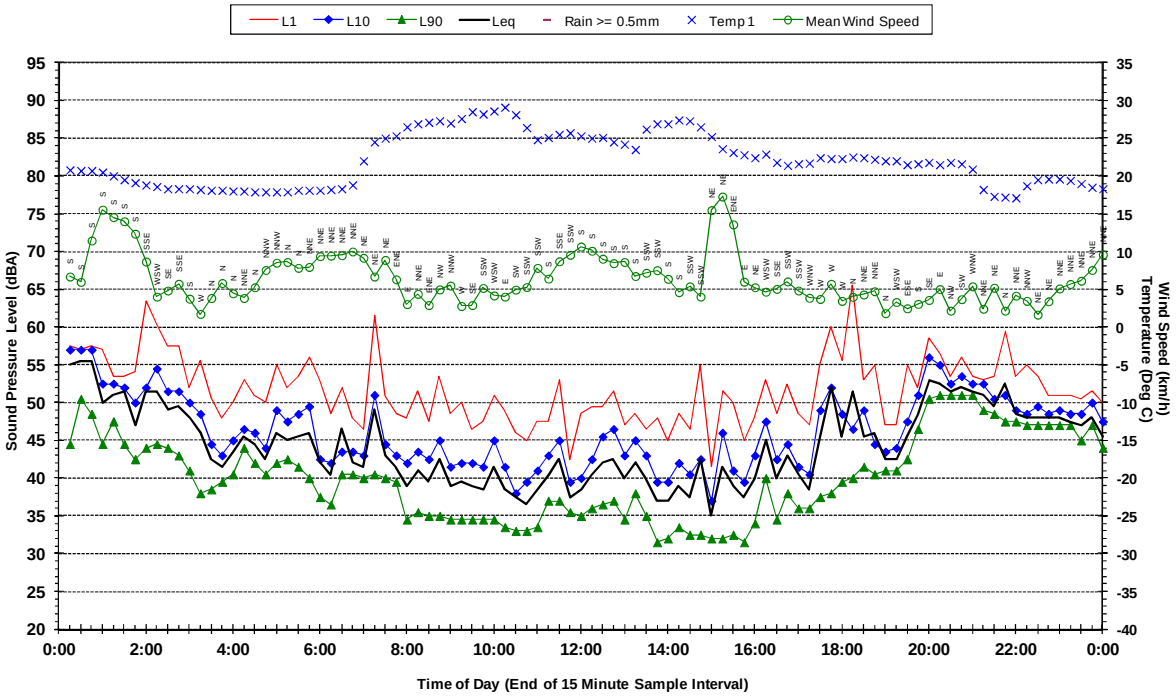
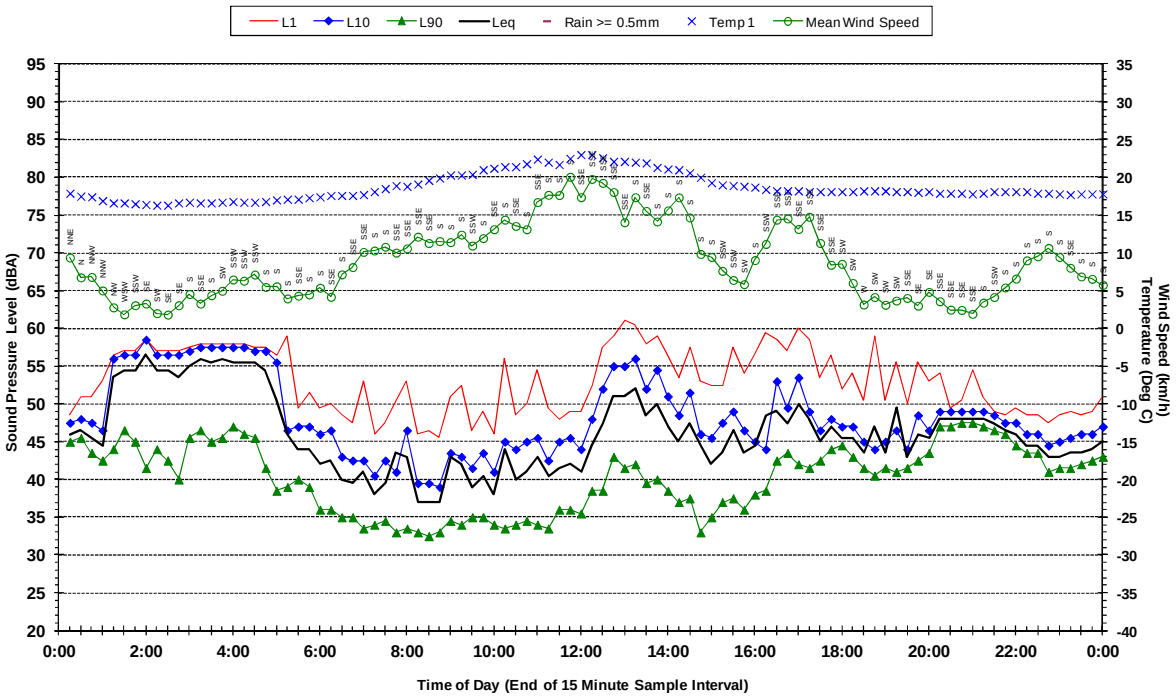
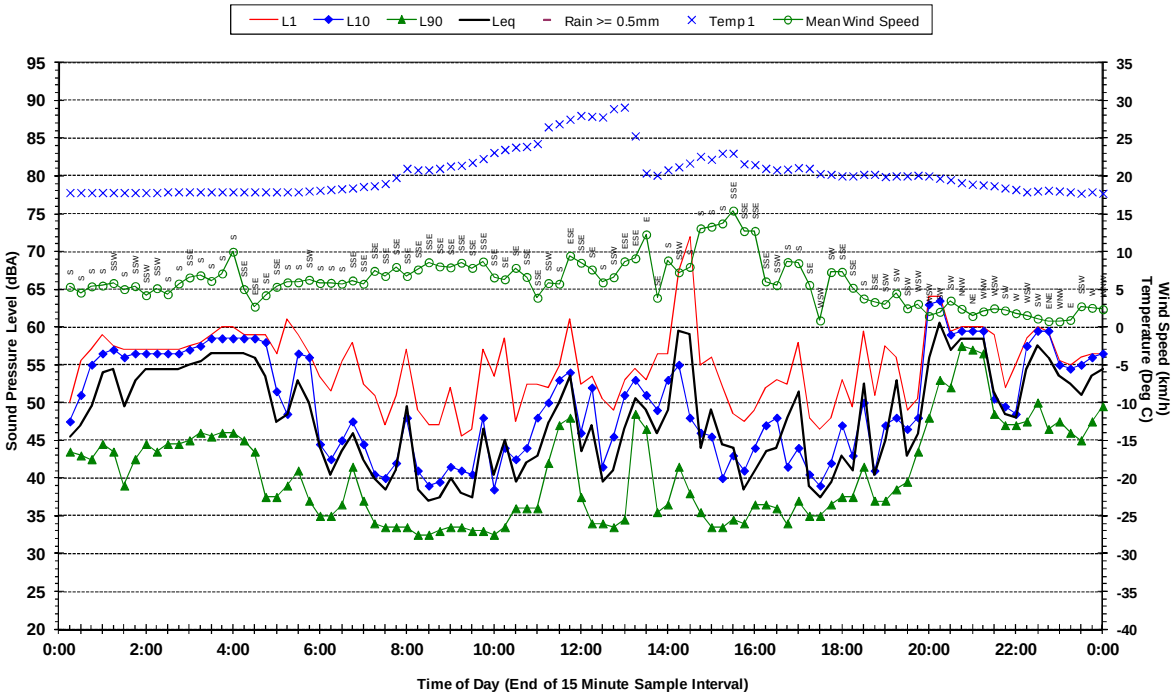


Statistical Ambient Noise Levels
68 Lyford - Friday 23 November 2007

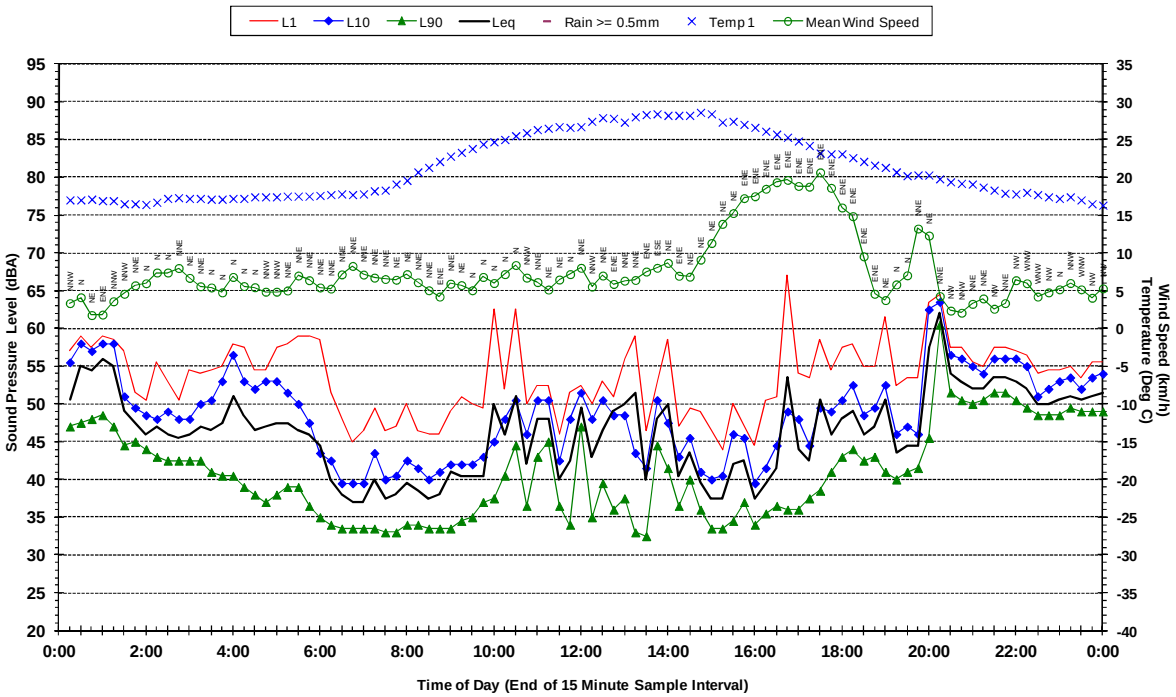


UNATTENDED AMBIENT NOISE RESULTS NOVEMBER 2007 - 68 LYFORD

Statistical Ambient Noise Levels
68 Lyford - Saturday 24 November 2007

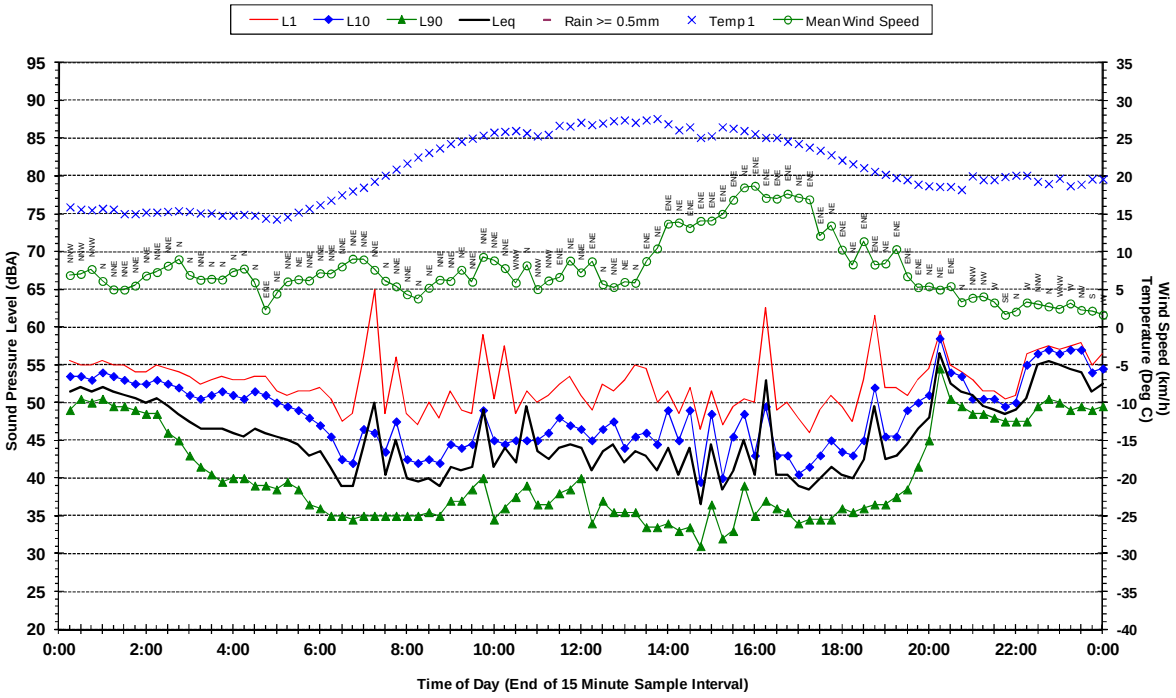


Statistical Ambient Noise Levels
68 Lyford - Sunday 25 November 2007



UNATTENDED AMBIENT NOISE RESULTS NOVEMBER 2007 - 68 LYFORD

Statistical Ambient Noise Levels
68 Lyford - Monday 26 November 2007



Statistical Ambient Noise Levels
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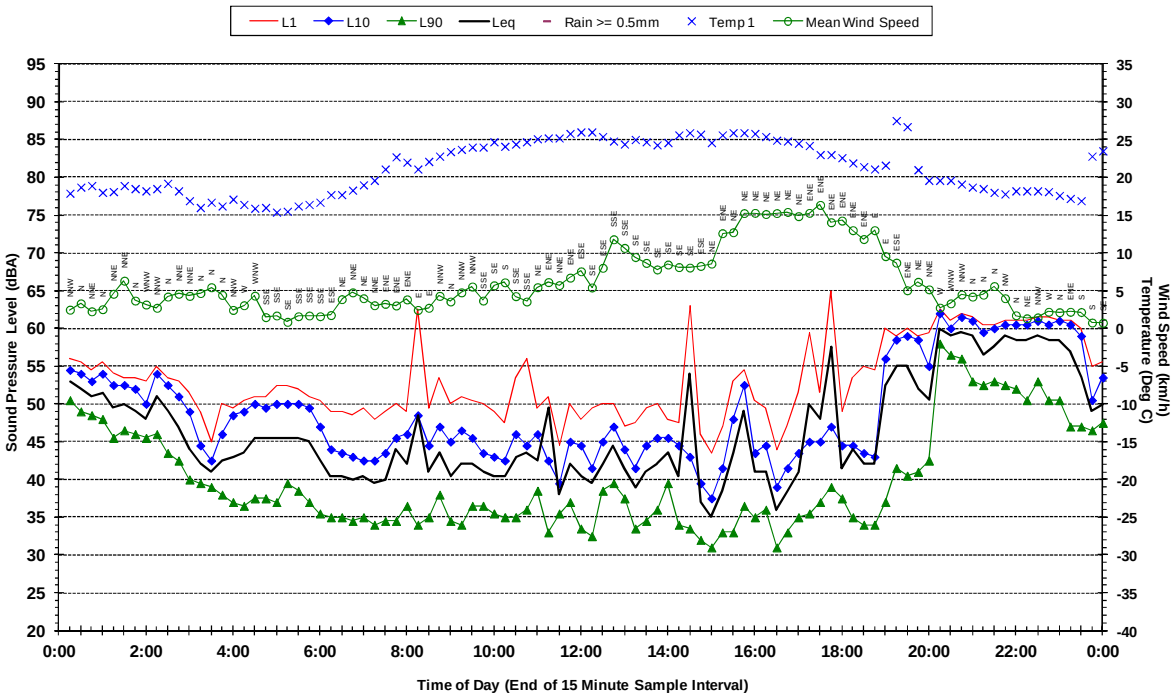

UNATTENDED AMBIENT NOISE RESULTS NOVEMBER 2007 - 68 LYFORD

Statistical Ambient Noise Levels
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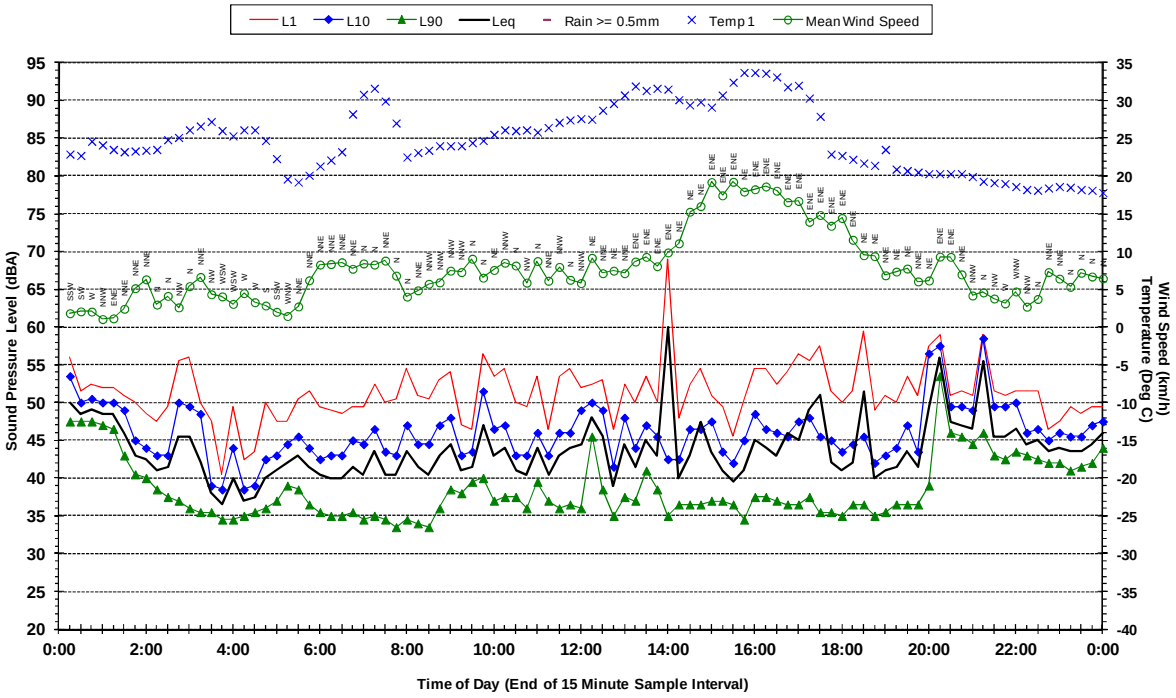
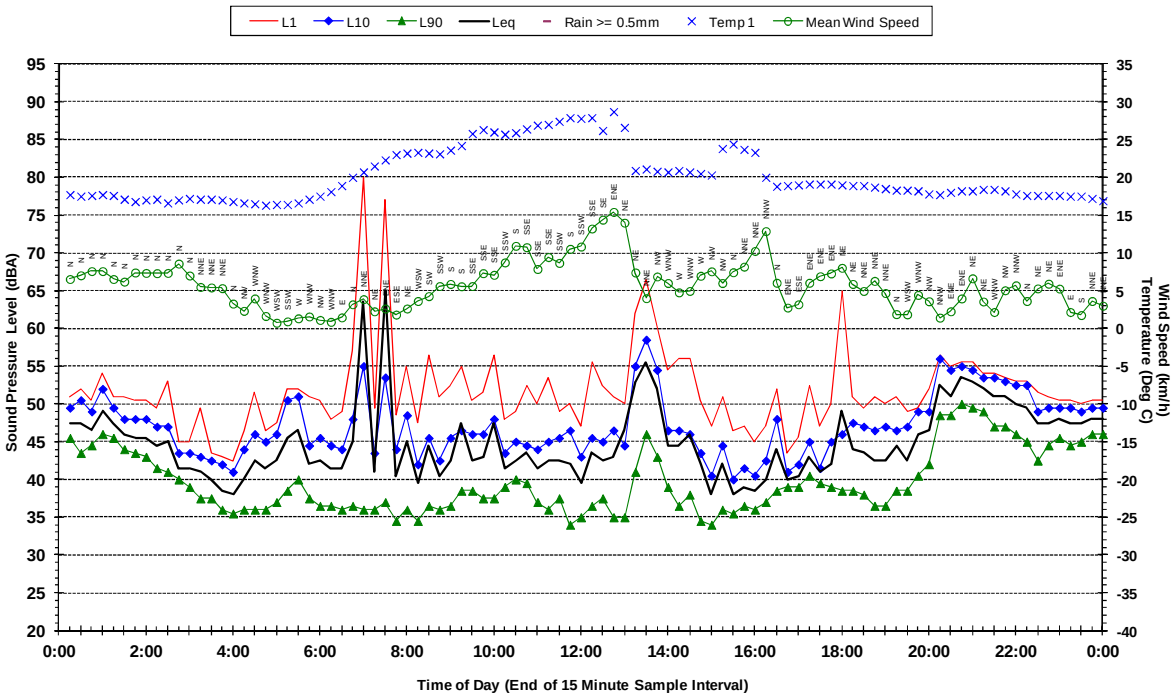
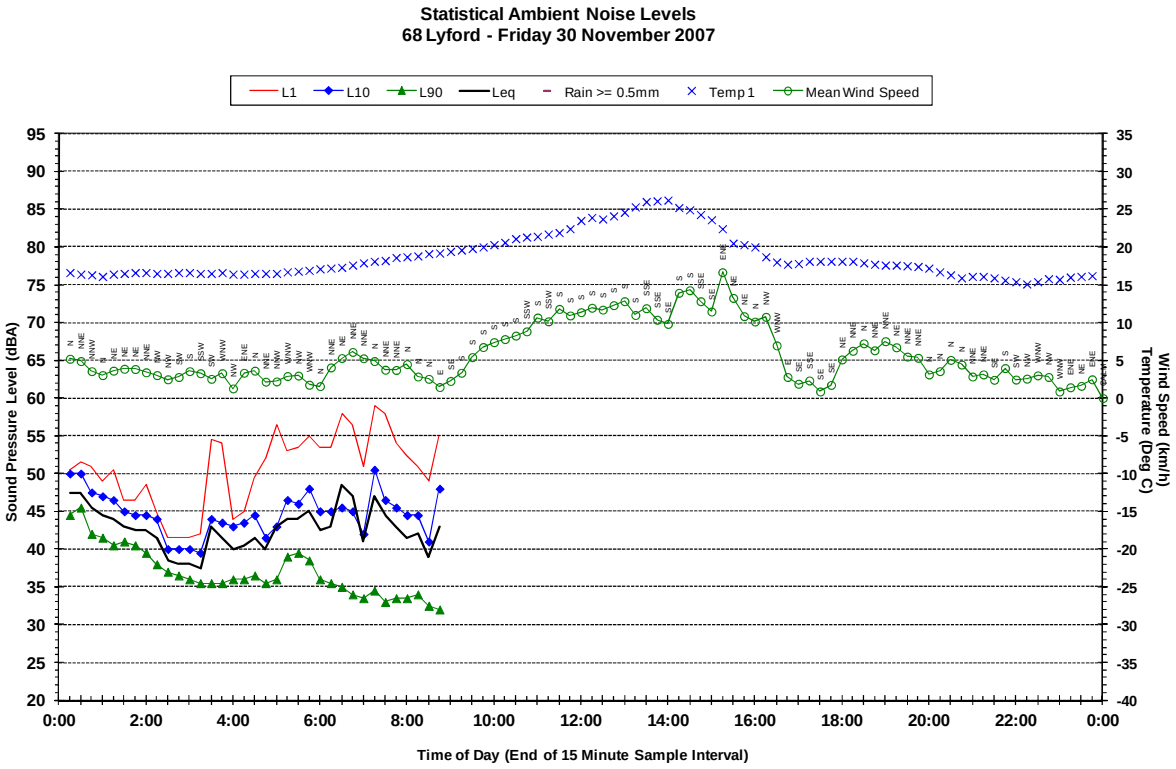


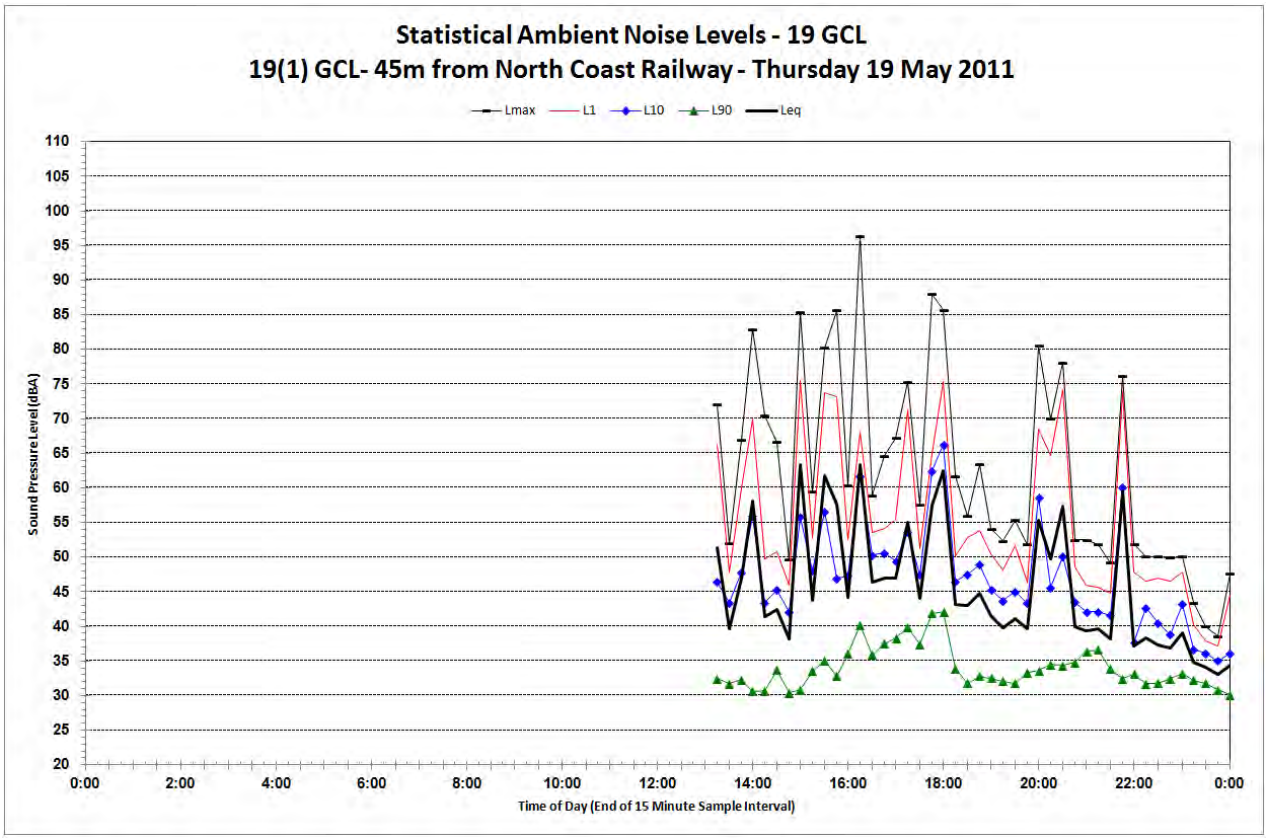
Statistical Ambient Noise Levels
68 Lyford - Thursday 29 November 2007

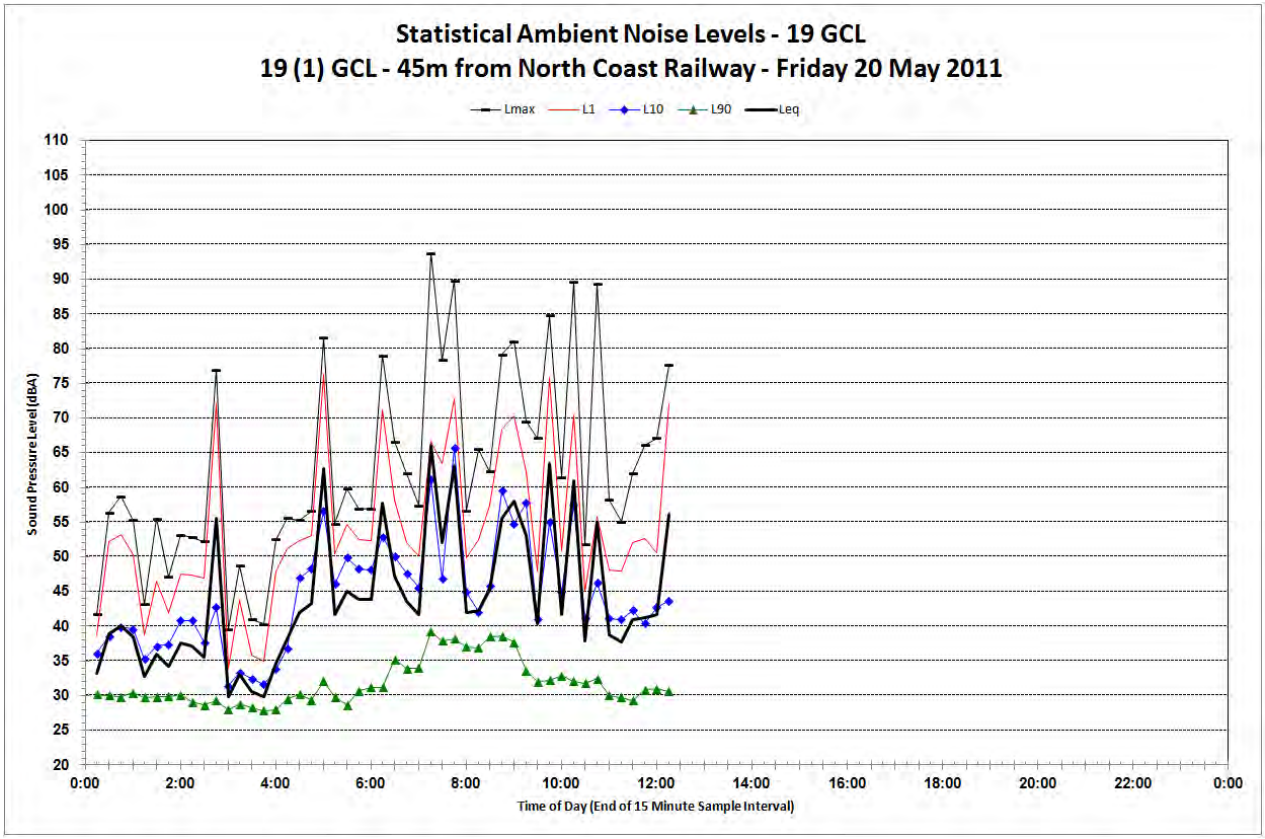


UNATTENDED AMBIENT NOISE RESULTS NOVEMBER 2007 - 68 LYFORD

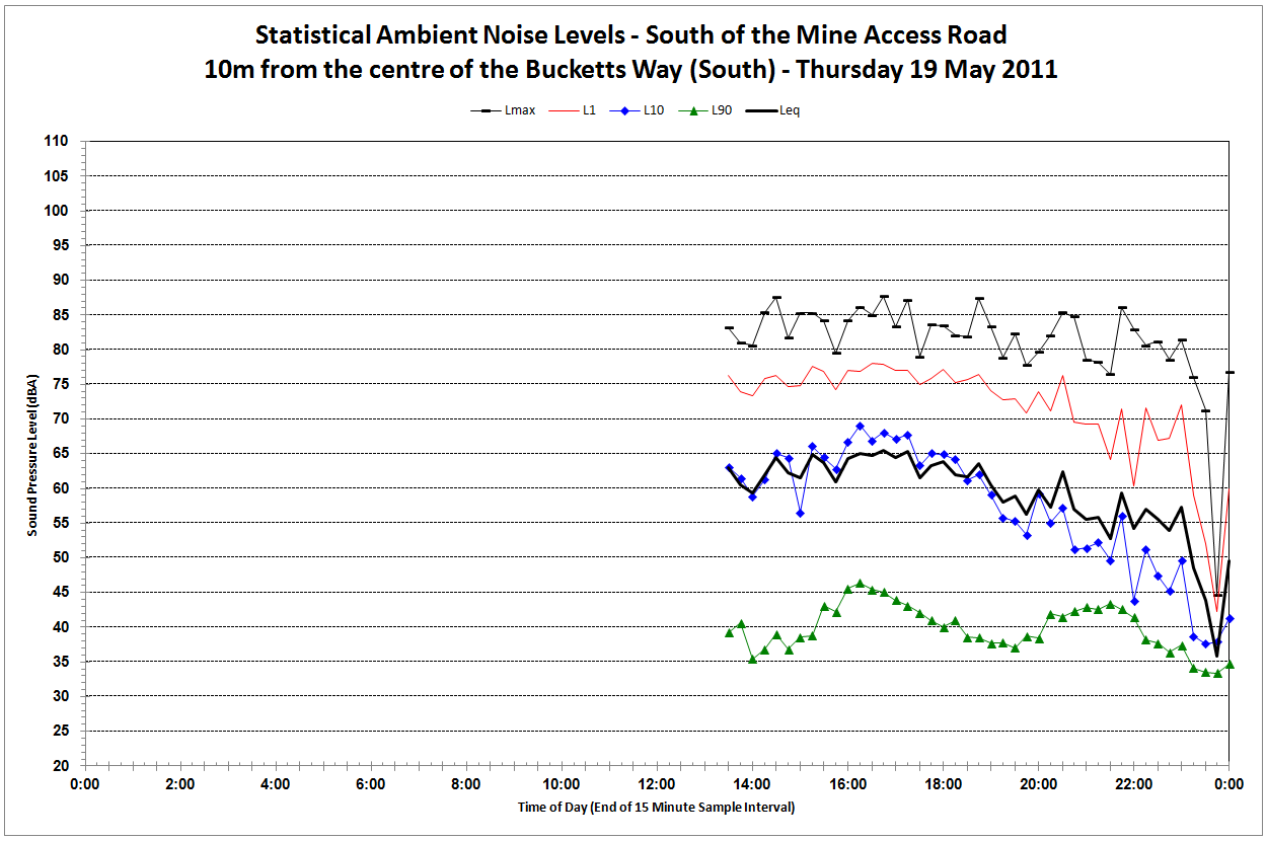


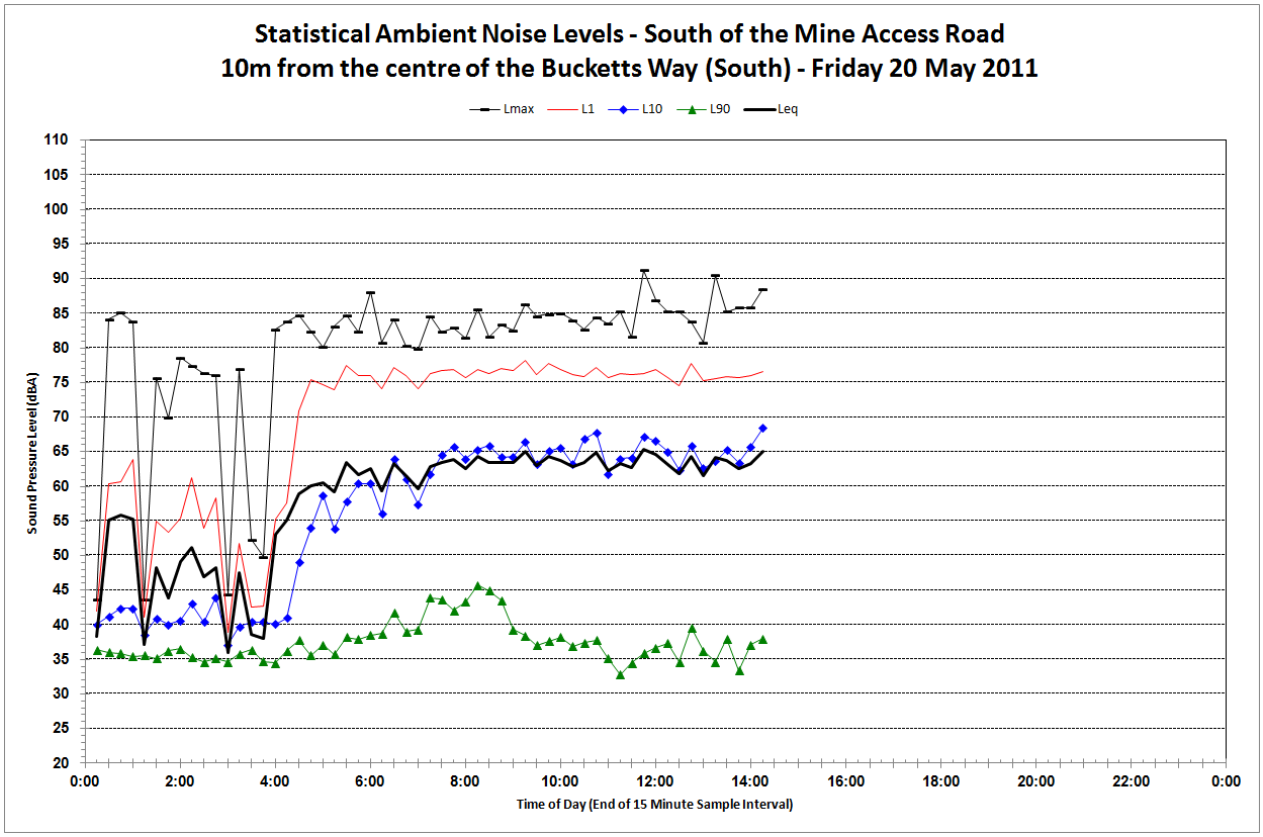
UNATTENDED RAIL NOISE RESULTS MAY 2011 - 19 (1) SCPL





UNATTENDED TRAFFIC NOISE RESULTS MAY 2011 - THE BUCKETT WAYS (SOUTH)





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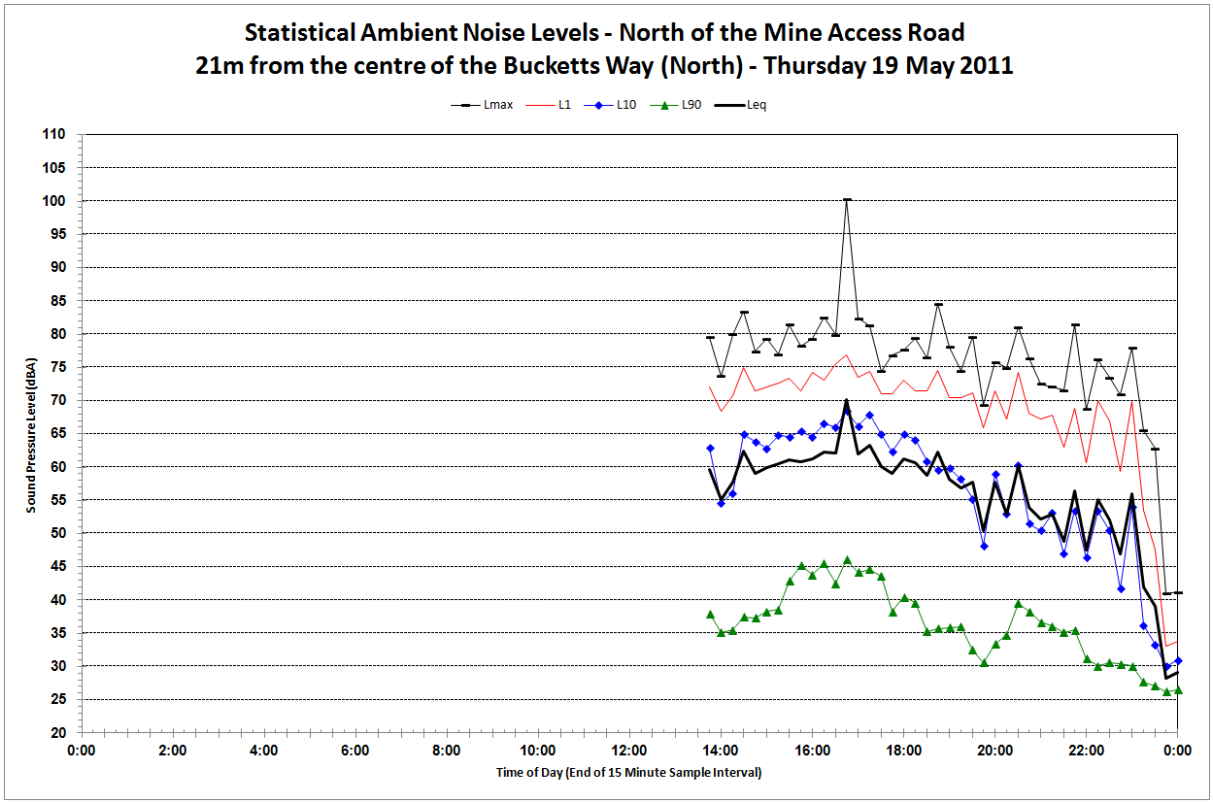
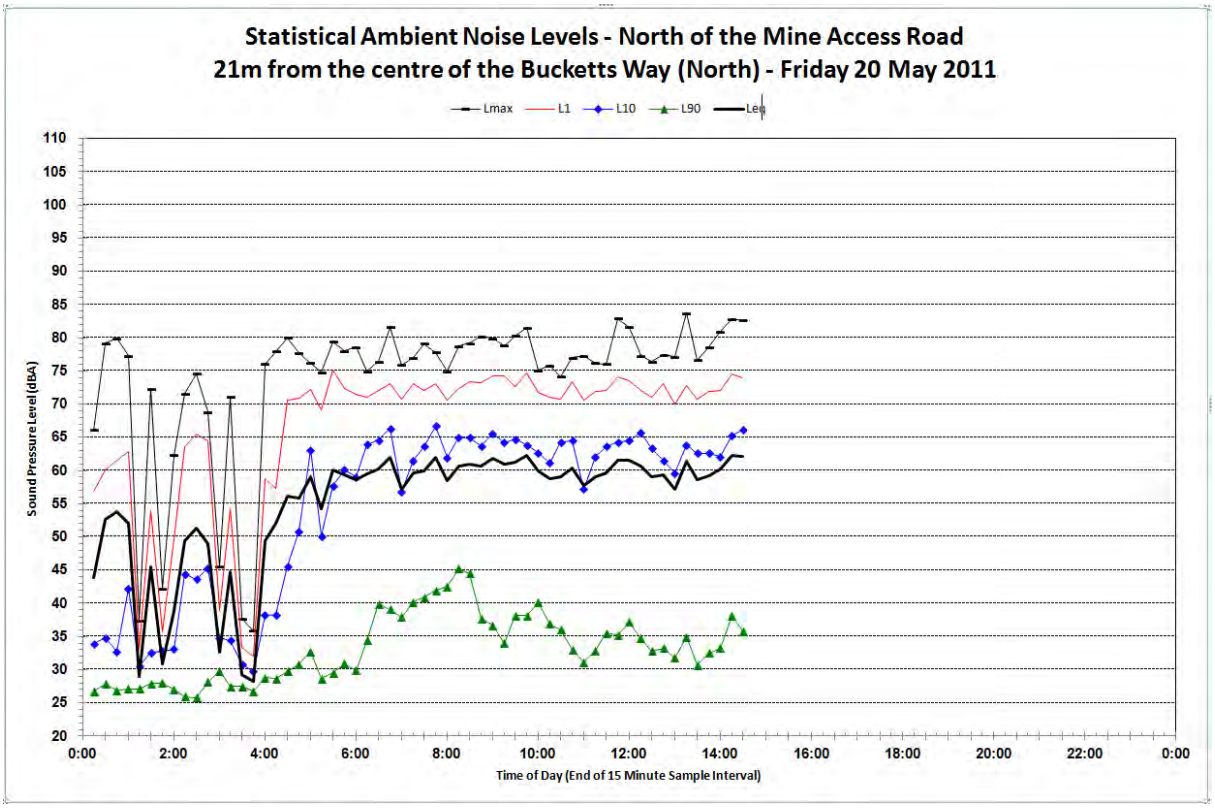




EPA INP APPLICATION NOTES - SLEEP DISTURBANCE

Peak noise level events, such as reversing beepers, noise from heavy items being dropped or other high noise level events, have the potential to cause sleep disturbance. The potential for high noise level events at night and effects on sleep should be addressed in noise assessments for both the construction and operational phases of a development. The NSW Industrial Noise Policy (INP) (New South Wales [NSW] Environmental Protection Agency [EPA], 2000) does not specifically address sleep disturbance from high noise level events.

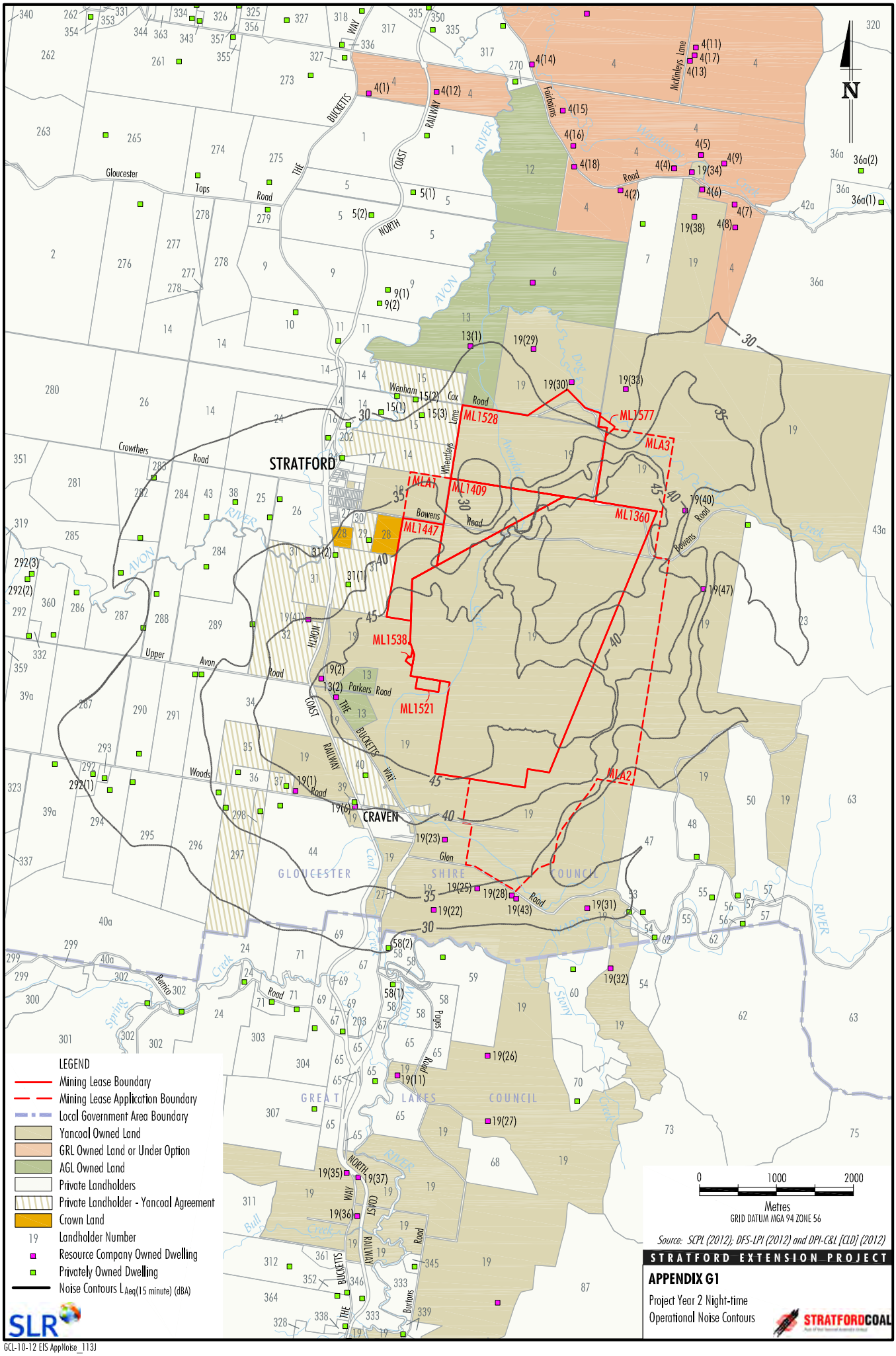
The NSW Department of Environment, Climate Change and Water (DECCW) reviewed research on sleep disturbance in the *NSW Environmental Criteria for Road Traffic Noise* (ECRTN) (EPA, 1999). This review concluded that the range of results is sufficiently diverse that it was not reasonable to issue new noise criteria for sleep disturbance.

From the research, the DECCW recognised that current sleep disturbance criterion of an $L_{A1(1minute)}$ not exceeding the $L_{A90(15minute)}$ by more than 15 A-weighted decibels (dBA) is not ideal. Nevertheless, as there is insufficient evidence to determine what should replace it, the DECCW will continue to use it as a guide to identify the likelihood of sleep disturbance. This means that where the criterion is met, sleep disturbance is not likely, but where it is not met, a more detailed analysis is required.

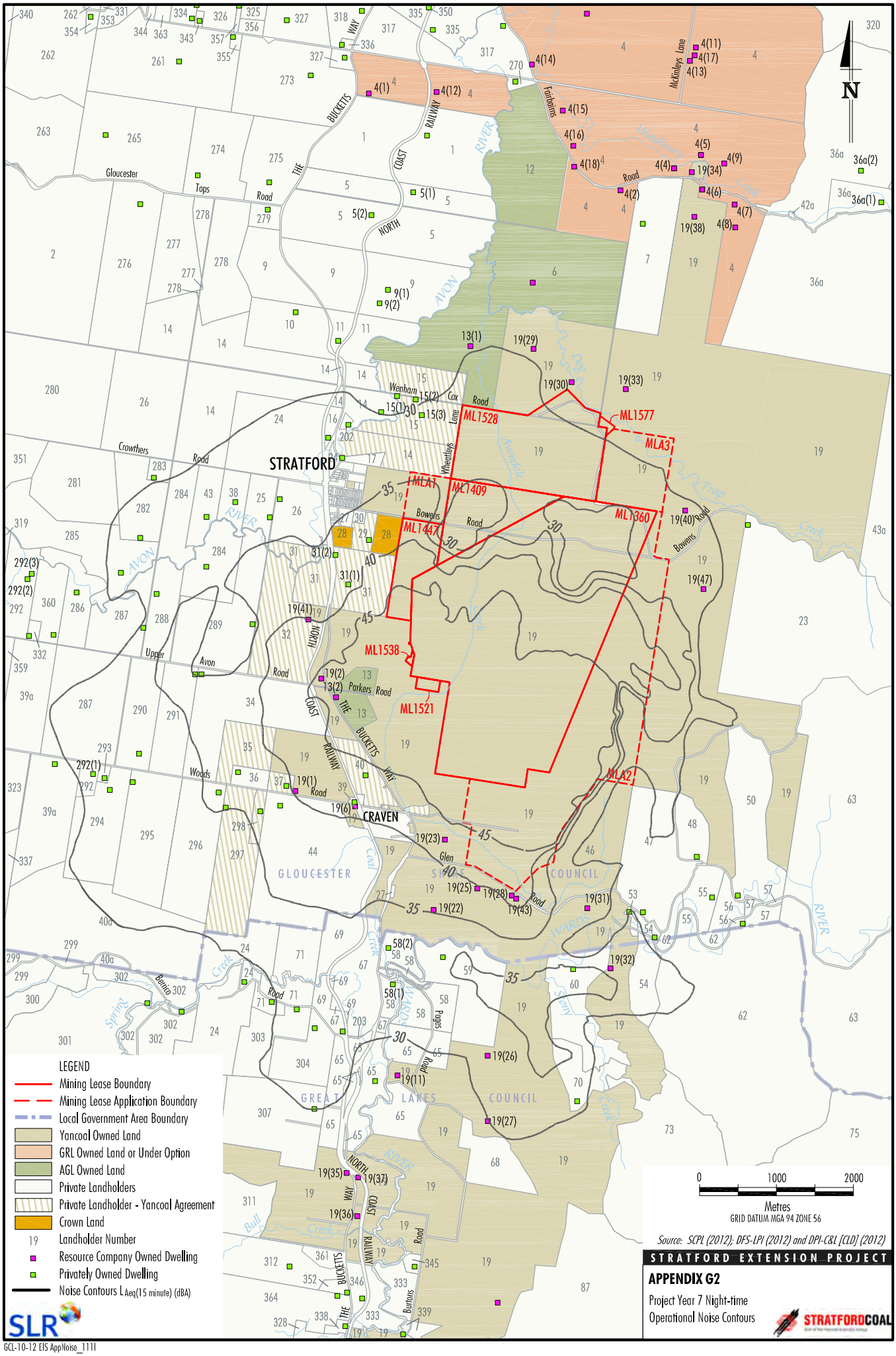
The detailed analysis should cover the maximum noise level or $L_{A1(1minute)}$, that is, the extent to which the maximum noise level exceeds the background level and the number of times this happens during the night-time period. Some guidance on possible impact is contained in the review of research results in the appendices to the ECRTN. Other factors that may be important in assessing the extent of impacts on sleep include:

- How often high noise events will occur.
- Time of day (normally between 2200 hrs and 0700 hrs).
- Whether there are times of day when there is a clear change in the noise environment (such as during early morning shoulder periods).

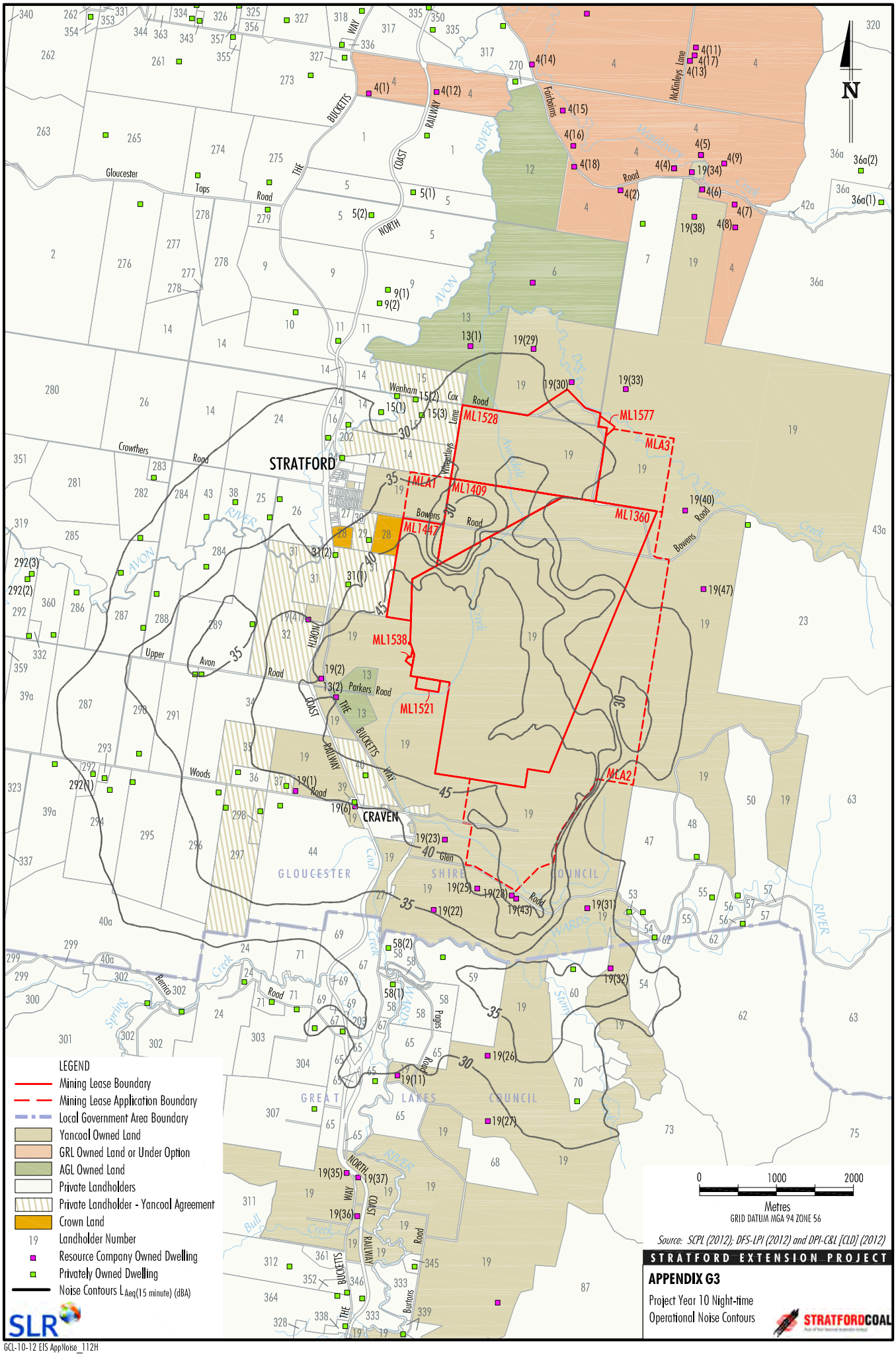
The $L_{A1(1minute)}$ descriptor is meant to represent a maximum noise level measured under “fast” time response. DECC will accept analysis based on either $L_{A1(1minute)}$ or L_{Amax}.



GCL-10-12 EIS AppNoise_113J



GCL-10-12 EIS AppNoise_1111


STRATFORD
CRAVEN
GLOUCESTER
GREAT LAKES COUNCIL
MidCoast COUNCIL
ML1528
ML1577
MLA3
MLA1
ML1409
ML1360
ML1447
ML1538
ML1521
MLA2
N
LEGEND
Mining Lease Boundary
Mining Lease Application Boundary
Local Government Area Boundary
Yancoal Owned Land
GRL Owned Land or Under Option
AGL Owned Land
Private Landholders
Private Landholder - Yancoal Agreement
Crown Land
19 Landholder Number
Resource Company Owned Dwelling
Privately Owned Dwelling
Noise Contours LAeq(15 minute) (dBA)
0
1000
2000
Metres
GRID DATUM MGA 94 ZONE 56
Source: SCPL (2012); DFS-LPI (2012) and DPI-C&L [CLD] (2012)
STRATFORD EXTENSION PROJECT
APPENDIX G3
Project Year 10 Night-time
Operational Noise Contours
SLR
STRATFORDCOAL
GCL-10-12 EIS AppNoise_112H

Rail noise

The NSW Government is developing a comprehensive approach to managing the environmental impacts of noise and vibration from the NSW rail system. Effective management of rail noise will require the combined efforts of rail infrastructure owners and developers, rail operators, train manufacturers, regulatory and planning authorities, and the community. The key parts of this approach include:

release of **Interim Guidelines for the Assessment of Noise from Rail Infrastructure Projects**

preparation of a noise management manual on best practices to mitigate rail noise and vibration

implementation of a rail noise abatement program, which aims to mitigate noise for those acutely affected by it by taking into account the results of a current trial by the rail agencies

release of environmental **planning guidelines for new residential developments along rail lines** (pdf format, 4.42MB)

development of rolling stock noise/emission standards.

The Department of Environment, Climate Change and Water is participating in the development of all of these components.

Environmental assessment requirements for rail traffic-generating developments

Land/use developments that are likely to generate additional rail traffic were previously assessed with reference to the Environmental Noise Control Manual. This manual is no longer in print and does not represent current government policy.

When reviewing the Environmental Assessments, Environmental Impact Statements, Statements of Environmental Effects, or Reviews of Environmental Factors for land/use developments, DECCW will assess these developments against the following requirements:

The typical offset distance/s of sensitive receivers from the rail line/s that are likely to be affected by increased rail movements should be identified.

The existing level of rail noise at the offset distance/s identified in point one above should be quantified using the noise descriptors LAeq,24hr and LAmax (95th percentile) dB(A).

The cumulative rail noise level (ie from existing, plus proposed, rail movements) should be predicted using a calibrated noise model (based on predicted increased rail movements) at the offset distances identified above.

The cumulative noise level should be compared with the rail noise assessment trigger levels: LAeq,24hr 60dB(A) and LAmax (95th percentile) 85dB(A).

Where the cumulative noise level exceeds the noise assessment trigger levels, and project/related noise increases are predicted, all feasible and reasonable noise mitigation measures should be implemented. As a general principle, where the reduction of existing noise levels can be achieved through feasible and reasonable measures, a reduction in noise levels to meet the noise assessment trigger levels is the primary objective. In all cases where the LAeq noise level increases are more than 2dB(A), strong justification should be provided as to why it is not feasible or reasonable to reduce the increase.

Notes:

1 A project/related noise increase is an increase of more than 0.5dB.

2 Ideally, the geographical extent of the rail noise assessment should be to where project /related rail noise increases are less than 0.5dB. This roughly equates to where project/related rail traffic represents less than 10% of total line/corridor rail traffic.

3 General guidance on the concept of 'feasible and reasonable' can be obtained from DECCW's **Interim Construction Noise Guideline**. However, in the context of rail noise, consideration of feasible and reasonable noise mitigation measures should extend, but not necessarily be limited, to:

the use of best practice rolling stock, including only locomotives that have received an 'approval to operate on the NSW rail network' in accordance with the noise limits L6.1 to L6.4 in **RailCorp** (L12208.pdf, 309KB) and **Australian Rail Track Corporation Ltd** (L3142.pdf, 259KB) Environment Protection Licences or a Pollution Control Approval issued pursuant to the former Pollution Control Act 1970

scheduling / limit movements during more sensitive times, to the extent practicable

using noise barriers and acoustic treatments.

L6 Noise Limits

L6.1 Approvals for Locomotives

The licensee must seek approval from the EPA prior to permitting operation on the "premises" of:

1. a class or type of locomotive, whether new or existing, that has not been operated on the NSW rail network; or
2. a locomotive that has been substantially modified since it was last used on the NSW rail network

EPA approval will be on the basis of compliance with the locomotive noise limits in Condition L6.2.

This condition L6 does not apply to the operation of a locomotive solely for the purposes of conducting noise or other tests that are required for the locomotive's acceptance by the EPA, the licensee or any person concerned with the design, manufacture, supply or acquisition of the locomotive, provided that multiple pass bys do not occur adjacent to residential premises in the course of the testing.

Note: EPA approval for a class or type of locomotive will require noise test results from a representative number of locomotives from that class or type.

L6.1 General Noise Limits

L6.1.1 General Noise Limits

It is an objective of this Licence to progressively reduce noise levels to the goals of 65 dB(A)Leq, (day time from 7am – 10pm), 60 dB(A)Leq, (night time from 10pm – 7am) and 85dB(A) (24 hr) max pass-by noise, at one metre from the façade of affected residential properties through the implementation of the Pollution Reduction Programs.

L6.2 EPA Locomotive Noise Limits

L6.2.1 General Noise Limits

Operating Condition	Speed & Location of Measurement	Noise Limit at a microphone height of 1.5 metres above ground level
Idle with compressor radiator fans and air conditioning operating at maximum load occurring at idle	Stationary 15 metre contour	70 dB(A) $_{Max}$
All other throttle settings under self load with compressor radiator fans and air conditioning operating	Stationary 15 metre contour	87 dB(A) $_{Max}$ 95 dB Linear $_{Max}$
All service conditions	As per Australian Standard AS2377-2002 (Acoustics – Methods for the measurement of railbound vehicle noise) except as otherwise approved by the EPA	87 dB(A) $_{Max}$ 95 dB Linear $_{Max}$

L6.2.2 Limits for Tonality

All external noise must be non-tonal. For the purpose of this condition, external noise is non-tonal if the sound pressure level in each unweighted (linear) one-third octave band does not exceed the level of the adjacent bands on both sides by:

a) 5 dB if the centre frequency of the band containing the tone is above 400 Hz; and
b) 8 dB if the centre frequency of the band containing the tone is between 160 and 400 Hz, inclusively; and
c) 15 dB if the centre frequency of the band containing the tone is below 160 Hz.

L6.2.3 Limits for Low-Frequency Noise

All external noise must not exhibit an undue low-frequency component. To comply with this requirement, linear noise levels must not exceed the A-weighted noise levels by more than 15 dB.

L6.3 Locomotive Noise Emission Test Methods

Application for approval as required by L6.1 must be supported by type testing of the locomotive using procedures that are consistent with the requirements of Australian Standard AS2377-2002 (Acoustics – Methods for the measurement of railbound vehicle noise) except as otherwise approved by the EPA. The type testing must provide all necessary measurement parameters for demonstrating compliance with the locomotive noise limits in L6.2.

Information supplied to the EPA as part of the application for approval must fulfil the requirements of Section 11 of AS2377-2002 for reporting.

Note: The measurement parameters required in L6.2 differ in some cases from those identified in AS2377-2002. The test procedures, measurement equipment and environmental conditions applied in supporting the application to the EPA for approval are to yield all parameters identified in L6.2 but are otherwise to be applied in a manner that is consistent with the requirements of AS2377-2002. The 15 metre contour specified in L6.2.1 is to be represented by the 12 measurement points shown in AS2377-2002, Figure 1.

L6.4 Approval of Locomotives Not Meeting All EPA Limits

The EPA may approve locomotives that do not comply with all limits prescribed by L6.2, provided that the application for approval demonstrates that:

a) the noise emission performance of the locomotive is consistent with current best practice; and

b) all measures for minimising the extent of any non-compliance have been investigated and those that are identified as reasonable and feasible have been implemented; and

c) none of the non-compliances will result in unacceptable environmental impacts.

EPA DRAFT NOISE REQUIREMENTS FOR RAIL TRAFFIC-GENERATING DEVELOPMENTS

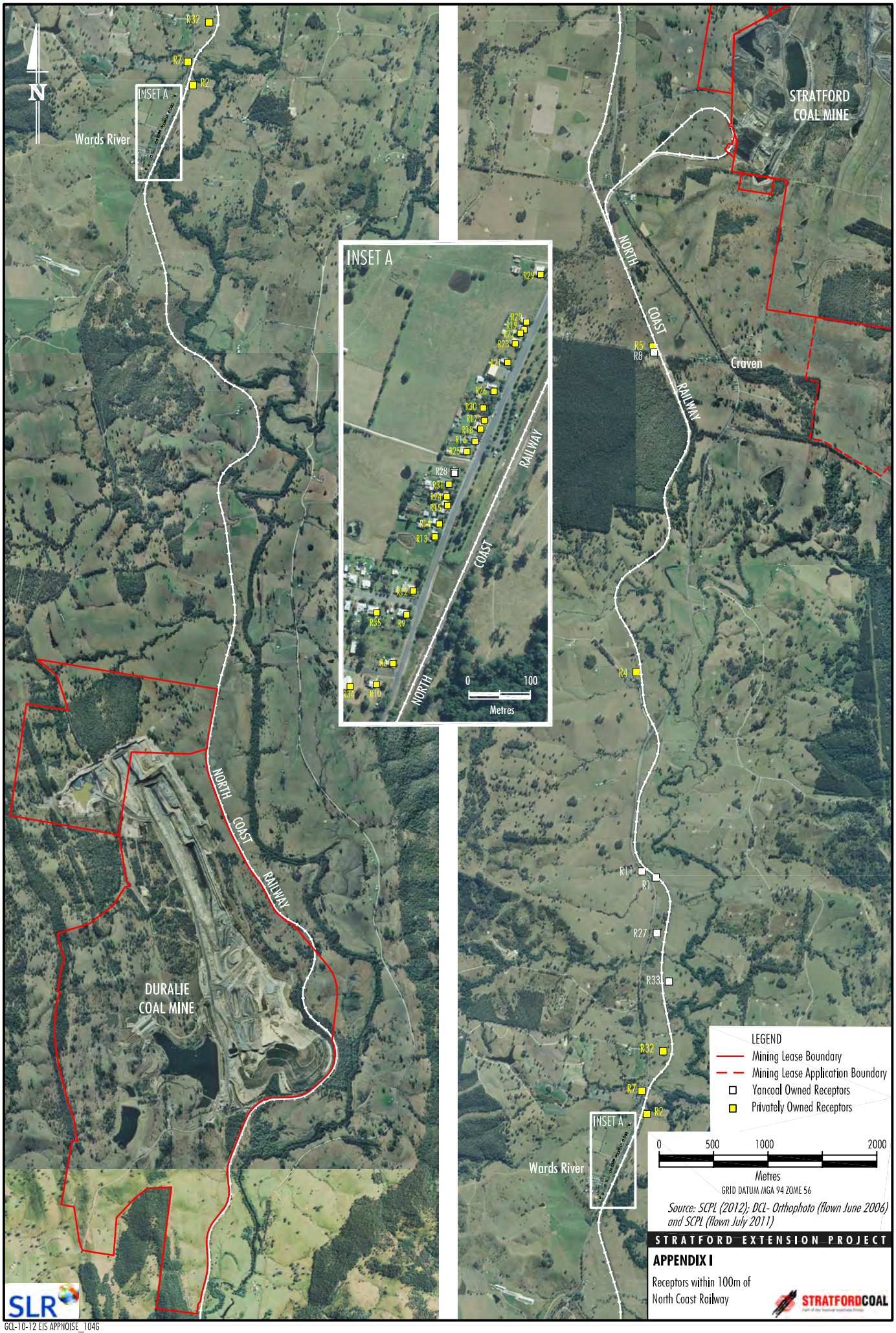
Appendix 2 Environmental assessment requirements for rail traffic-generating developments

Land-use developments other than rail projects that are likely to generate additional rail traffic should be assessed against the following requirements:

- Identify the typical offset distance/s of sensitive receivers from the rail line/s that are likely to be affected by increased rail movements.
- Quantify the existing level of rail noise at the offset distance/s identified above using the noise descriptors $L_{Aeq,15/9hr}$ and L_{Amax} (95th percentile) dB(A).
- Predict the cumulative rail noise level (i.e. from the existing and proposed rail movements) using a calibrated noise model (based on predicted increased rail movements) at the offset distances identified above.
- Compare the cumulative noise level with the rail noise assessment trigger levels: $L_{Aeq,15hr}$ 60 dB(A), $L_{Aeq,9hr}$ 55 dB(A), and L_{Amax} (95th percentile) 80 dB(A).
- Implement all feasible and reasonable noise mitigation measures where the cumulative noise level exceeds the noise assessment trigger levels and project-related noise increases are predicted. In general, where existing noise levels can be reduced through feasible and reasonable measures, the primary objective is to reduce the noise levels to meet the noise assessment trigger levels as a minimum. In all cases where the L_{Aeq} noise level increases are more than 2 dB(A), strong justification should be provided as to why it is not feasible or reasonable to reduce the increase.

Notes

1. A project-related noise increase is an increase of more than 0.5 dB over the day or night periods.
2. The geographical extent of the rail noise assessment ideally should be where project-related rail noise increases are less than 0.5 dB. This roughly equates to where project-related rail traffic represents less than 10 per cent of the total line or corridor rail traffic.
3. Guidance on the concept of 'feasible and reasonable' is outlined in Appendix 5.



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PROJECT YEAR 2 EVENING AND NIGHT-TIME INTRUSIVE AND MAXIMUM NOISE LEVELS

The predicted Project Year 2 evening and night-time intrusive $L_{Aeq(15minute)}$ and $L_{A1(1minute)}$ noise levels at the nearest receivers are presented in **Table J1** associated with the removal of waste rock at the Stratford East Open Cut under calm weather conditions only in accordance with **Table 9**.

Table J1 Year 2 Evening and Night-time Intrusive and $L_{A1(1minute)}$ Noise (dBA re 20 µPa)

ID No and Landholder	Evening Calm Intrusive	Night-time Calm Intrusive	Night-time Calm LA1(1min)
Stratford/Craven Rural Receivers			
1 Fraser	19	20	32
5(1) Bignell	21	21	34
5(2) Bignell	19	20	33
7 Burrell	18	19	33
9(1) Williams	23	24	36
9(2) Williams	24	24	37
10 Whatmore & Whatmore	24	24	37
11 Walker, Walker, Walker & Walker	24	25	37
16 Pickett	27	27	40
17 Fisher & Smith	26	27	41
23 Bagnall	26	26	43
24 Harris	15	15	35
25 Thompson	28	29	43
26 Lowrey & Lowrey	27	28	42
27 Gloucester Shire Council	26	27	42
34 Hall & Hall	25	26	44
36 Wallace & Wallace	29	29	47
36a(1) Berecry	5	5	16
36a(2) Berecry	6	7	29
38 Johnson & Johnson	26	27	41
39 Standen	32	32	49
43 Moseley	26	26	41
44 Cross & Jane	28	28	47
47 Digges, Digges, Hart & Hart	12	12	32
48 Rounsley	12	13	21
50 Porter	9	10	25
53 Barnes & Barnes	11	12	35
54 Hughes & Carrysong Pty Ltd	10	11	32
55 Hancock & Hancock	10	11	23
56 McCalden & McCalden	8	9	29
58(1) Blanch & Blanch	15	16	37
58(2) Blanch & Blanch	14	15	39
59 Cassar & Cassar	16	16	34
60 Healy & Greenwood	15	15	38
65 Weismantle	14	15	34
69 Hooper & Bartholmew	17	18	36
70 Knight	16	16	36
71 Burnet & Burnet	17	18	36
202 Wenham	25	26	40
265 Stenstrom & Stenstrom	13	14	26
274 Wilson & Wilson	16	17	30
275 Pace Farm Pty Ltd	17	17	31
276 Luscombe & Luscombe	14	14	27
279 Cullum & Cullum	19	19	33

PROJECT YEAR 2 EVENING AND NIGHT-TIME INTRUSIVE AND MAXIMUM NOISE LEVELS

ID No and Landholder	Evening Calm Intrusive	Night-time Calm Intrusive	Night-time Calm LA1(1min)
281 Lewis & Lewis	29	29	43
282 Ross	23	24	40
283 Nolan	24	24	38
284 Perrin & Perrin	25	26	39
285 Carter & Carter	23	24	40
287 Sinderberry & Rinkin	22	23	39
288 Perrin	23	24	42
289 Mcintosh	27	28	43
290 Ryan & Tordoff	23	24	42
291 Crawley & Crawley	25	26	44
292(1) Fisher & Fisher	19	19	36
293 Braunton	21	22	41
294 Morcom & Morcom	23	23	40
295 Bush & Bush	22	23	41
296 Watson & Watson	26	26	45
303 JSTC Newcastle Pty Ltd	19	20	37
304 Abeysekera & Abeysekera	18	19	36
307 Wolfenden & Wolfenden	17	17	34
316 Country Rail Infrastructure Authority	27	28	42
Craven			
Cr.7 Pryce-Jones	29	30	48
Stratford			
S1 Rees	26	26	40
S3 Yeatman	28	28	42
S4 Grady & Grady	25	25	39
S5 Britnell	26	26	40
S6 Threadgate & Threadgate	26	26	40
S8 Forbes	26	27	41
S9 Greenham & Greenham	26	27	41
S10 Germon	26	27	40
S11 Glew	26	27	42
S12 Mitchell & Mitchell	26	27	42
S13 Wells & Wells	28	28	42
S14 Bignell	26	27	40
S15 Minister for Education	29	29	43
S18 Whittall & Whittall	29	30	43
S19 Carroll	29	29	43
S20 McGrath	29	29	42
S21 Adams	29	29	42
S23 Bartlett	29	29	42
S24 Mavay	29	29	42
S26 Young	29	29	43
S27 Brown & Brown	29	29	43
S28 Morris & Morris	29	29	43
S29 Bagnall & Bagnall	29	29	43
S30 Baker	29	30	43
S31 Richards	29	30	43
S33 Langtry, Gilbert & Gilbert	29	30	43
S34 Ashby	29	30	43
S35 Rodgers & Bekker	29	30	43
S36 Platt & Platt	29	30	44

PROJECT YEAR 2 EVENING AND NIGHT-TIME INTRUSIVE AND MAXIMUM NOISE LEVELS

ID No and Landholder	Evening Calm Intrusive	Night-time Calm Intrusive	Night-time Calm LA1(1min)
S37 Pryor & Pryor	29	30	44
S38 Kirkman	29	30	44
S39(1) Nicholls & Husband	29	30	43
S39(2) Nicholls & Husband	29	30	44
S40 Curtis	29	29	43
S41 Mcclure & Aplin	29	30	43
S43 Squire	29	29	43
S47 Potts	29	30	43
S48 Farley & Farley	29	30	43
S49 Blanch	29	30	43
S50 Vanderdrift & Blanch	29	30	44
S51 Trenholme	29	30	44
S52 Farley & Barry	29	30	44
S53 Arthur	29	30	44
S54 Adams	29	30	44
S56 Collins & Collins	29	30	43
S57 Gam	29	30	44
S58 Harrigan	30	30	44
S59 Grady & Grady	30	30	44
Receivers subject to Landholder Agreement			
14 Wenham & Wenham	26	27	40
15(1) Falla Superannuation	25	25	39
15(2) Falla Superannuation	25	25	39
15(3) Falla Superannuation	29	29	41
29 Ward	31	31	46
31(1) Isaac	33	34	48
31(2) Isaac	31	32	46
37 Worth	27	28	47
40 Leslie Allenby Blanch	34	34	51
42 Blanch	32	32	48
297 Bosma	26	26	45
298 Yates	25	26	45
Cr.2 Boorer	32	33	48
Resource company-owned Receivers			
6 AGL	24	24	37
13(1) AGL	26	27	39
13(2) AGL	38	38	54
4(1) GRL	16	16	30
4(2) GRL	15	16	29
4(4) GRL	15	16	29
4 (5) GRL	16	16	31
4(6) GRL	17	17	29
4(7) GRL	15	16	30
4(8) GRL	18	18	31
4(9) GRL	16	17	31
4(12) GRL	17	17	31
4(15) GRL	16	16	30
4(16) GRL	16	17	31
4(18) GRL	17	18	32
19(1) SCPL	30	30	48
19(2) SCPL	35	35	54

PROJECT YEAR 2 EVENING AND NIGHT-TIME INTRUSIVE AND MAXIMUM NOISE LEVELS

ID No and Landholder	Evening Calm Intrusive	Night-time Calm Intrusive	Night-time Calm LA1(1min)
19(4) SCPL	29	29	43
19(5) SCPL	29	30	43
19(6) SCPL	32	32	48
19(7) SCPL	29	30	44
19(8) SCPL	32	33	48
19(9) SCPL	32	33	49
19(10) SCPL	32	33	49
19(11) SCPL	16	17	34
19(12) SCPL	32	33	48
19(13) SCPL	32	33	49
19(14) SCPL	32	32	48
19(15) SCPL	30	31	48
19(16) SCPL	30	30	48
19(17) SCPL	29	30	48
19(18) SCPL	30	30	48
19(19) SCPL	30	31	48
19(20) SCPL	30	31	48
19(21) SCPL	29	29	48
19(22) SCPL	23	23	42
19(23) SCPL	29	30	48
19(25) SCPL	25	25	43
19(26) SCPL	19	19	35
19(27) SCPL	17	17	34
19(28) SCPL	27	28	44
19(29) SCPL	26	26	39
19(30) SCPL	23	23	36
19(31) SCPL	13	14	38
19(32) SCPL	12	12	37
19(33) SCPL	23	23	37
19(34) SCPL	16	16	30
19(35) SCPL	13	13	33
19(36) SCPL	13	14	32
19(37) SCPL	13	13	33
19(38) SCPL	18	19	32
19(39) SCPL	32	33	49
19(40 SCPL	36	37	49
19(41) SCPL	31	31	48
19(42) SCPL	32	32	48
19(43) SCPL	26	27	44
19(45) SCPL	32	33	49
19(46) SCPL	32	33	48
19(47) SCPL	37	37	47

Note 1: Predicted $L_{Aeq(15minute)}$ noise level complies with the intrusive PSNL.
Note 2: Predicted marginal noise exceedance 1 to 2 dBA above intrusive PSNL.
Note 3: Predicted moderate noise exceedance 3 to 5 dBA above intrusive PSNL.
Note 4: Predicted appreciable noise exceedance > 5 dBA above intrusive PSNL.

EVENING AND NIGHT-TIME OPERATING YEAR 2 INTRUSIVE AND MAXIMUM NOISE LEVELS

The predicted Project Year 2 evening and night-time intrusive $L_{Aeq(15minute)}$ and $L_{A1(1minute)}$ noise levels at the nearest receivers are presented in **Table J2** associated with limited fleet operation for the removal of waste rock (two CAT 789XQ trucks, four CAT 785XQ trucks and one D10XQ operating in first gear on the Stratford East waste rock emplacement) at the Stratford East Open Cut coupled with unloading of coal from Duralie shuttle trains (ie no product coal loading) under adverse weather conditions in accordance with **Table 9**.

Table J2 Year 2 Evening and Night-time Intrusive and $L_{A1(1minute)}$ Noise (dBA re 20 µPa)

ID No and Landowner	Evening		Night-time		
	Calm	Wind	Calm	Inv. plus Drain.	LA1(1min)
Stratford/Craven Rural Receivers					
1 Fraser	17	26	17	19	30
5(1) Bignell	19	27	19	22	32
5(2) Bignell	17	27	18	20	31
7 Burrell	17	28	18	17	31
9(1) Williams	21	29	21	25	34
9(2) Williams	21	29	22	25	34
10 Whatmore & Whatmore	22	29	22	27	34
11 Walker, Walker, Walker & Walker	22	30	22	27	34
16 Pickett	24	31	25	30	37
17 Fisher & Smith	24	31	24	30	37
23 Bagnall	25	35	25	37	43
24 Harris	14	24	14	25	32
25 Thompson	26	29	27	34	41
26 Lowrey & Lowrey	25	29	26	33	40
27 Gloucester Shire Council	24	32	25	32	39
34 Hall & Hall	23	29	23	33	40
36 Wallace & Wallace	25	34	26	37	44
36a(1) Berecry	3	19	4	4	15
36a(2) Berecry	6	26	6	7	28
38 Johnson & Johnson	24	27	25	33	40
39 Standen	30	39	30	40	48
43 Moseley	24	26	24	32	40
44 Cross & Jane	26	36	26	38	45
47 Digges, Digges, Hart & Hart	11	28	11	30	37
48 Rounsley	11	17	12	19	25
50 Porter	9	25	9	27	34
53 Barnes & Barnes	10	30	11	32	39
54 Hughes & Carrysong Pty Ltd	9	27	10	29	36
55 Hancock & Hancock	9	23	10	26	33
56 McCalden & McCalden	7	26	8	28	35
58(1) Blanch & Blanch	14	28	14	29	36
58(2) Blanch & Blanch	13	30	13	31	38
59 Cassar & Cassar	15	26	15	28	35
60 Healy & Greenwood	15	30	15	32	38
65 Weismantle	13	25	13	27	33
69 Hooper & Bartholmew	16	27	16	28	34
70 Knight	15	27	16	29	35
71 Burnet & Burnet	16	26	16	27	34
202 Wenham	23	31	24	30	37
265 Stenstrom & Stenstrom	11	16	12	16	23
274 Wilson & Wilson	14	22	15	22	27
275 Pace Farm Pty Ltd	15	23	16	22	28

EVENING AND NIGHT-TIME OPERATING YEAR 2 INTRUSIVE AND MAXIMUM NOISE LEVELS

ID No and Landowner	Evening		Night-time		
	Calm	Wind	Calm	Inv. plus Drain.	LA1(1min)
276 Luscombe & Luscombe	12	17	13	17	25
279 Cullum & Cullum	17	25	17	23	30
281 Lewis & Lewis	26	32	27	33	40
282 Ross	21	24	22	31	38
283 Nolan	22	24	22	30	37
284 Perrin & Perrin	23	24	23	29	36
285 Carter & Carter	21	25	22	31	38
287 Sinderberry & Rinkin	20	25	21	29	35
288 Perrin	21	27	21	33	40
289 Mcintosh	25	28	26	32	39
290 Ryan & Tordoff	21	29	22	33	40
291 Crawley & Crawley	23	29	23	33	40
292(1) Fisher & Fisher	16	23	17	25	32
293 Braunton	19	28	20	31	38
294 Morcom & Morcom	20	28	21	31	38
295 Bush & Bush	20	29	21	32	38
296 Watson & Watson	23	33	24	36	43
303 JSTC Newcastle Pty Ltd	18	27	18	29	34
304 Abeysekera & Abeysekera	17	26	17	28	34
307 Wolfenden & Wolfenden	15	25	16	26	33
316 Country Rail Infrastructure Authority	25	32	25	32	39
Craven					
Cr.7 Pryce-Jones	28	38	28	40	47
Stratford					
S1 Rees	24	31	24	30	37
S3 Yeatman	25	33	26	32	39
S4 Grady & Grady	23	28	23	28	36
S5 Britnell	24	30	24	29	36
S6 Threadgate & Threadgate	24	29	24	29	36
S8 Forbes	24	30	25	30	37
S9 Greenham & Greenham	24	31	25	31	37
S10 Germon	24	30	25	29	37
S11 Glew	24	33	25	32	39
S12 Mitchell & Mitchell	25	33	25	32	39
S13 Wells & Wells	26	33	26	32	39
S14 Bignell	24	29	25	29	36
S15 Minister for Education	26	33	27	33	40
S18 Whittall & Whittall	27	34	27	33	40
S19 Carroll	26	34	27	32	40
S20 McGrath	26	33	27	33	39
S21 Adams	26	33	27	33	40
S23 Bartlett	26	33	27	33	39
S24 Mavay	26	33	27	33	39
S26 Young	26	33	27	33	40
S27 Brown & Brown	26	33	27	33	40
S28 Morris & Morris	26	33	27	33	40
S29 Bagnall & Bagnall	26	33	27	33	40
S30 Baker	26	33	27	33	40
S31 Richards	27	33	27	33	40
S33 Langtry, Gilbert & Gilbert	27	33	27	33	40
S34 Ashby	27	34	27	33	40

EVENING AND NIGHT-TIME OPERATING YEAR 2 INTRUSIVE AND MAXIMUM NOISE LEVELS

ID No and Landowner	Evening		Night-time		
	Calm	Wind	Calm	Inv. plus Drain.	LA1(1min)
S35 Rodgers & Bekker	27	34	27	33	40
S36 Platt & Platt	27	34	27	33	40
S37 Pryor & Pryor	27	34	27	33	40
S38 Kirkman	27	34	27	33	41
S39(1) Nicholls & Husband	27	34	27	33	40
S39(2) Nicholls & Husband	27	34	27	33	40
S40 Curtis	26	33	27	33	40
S41 Mcclure & Aplin	26	33	27	33	40
S43 Squire	26	33	27	33	40
S47 Potts	27	33	27	33	40
S48 Farley & Farley	27	33	27	33	40
S49 Blanch	27	33	27	33	40
S50 Vanderdrift & Blanch	27	34	27	34	41
S51 Trenholme	27	34	27	33	40
S52 Farley & Barry	27	34	27	33	41
S53 Arthur	27	34	27	34	41
S54 Adams	27	34	27	34	41
S56 Collins & Collins	27	33	27	33	40
S57 Gam	27	33	28	33	40
S58 Harrigan	27	33	28	33	40
S59 Grady & Grady	27	33	28	33	40
Receivers subject to Landholder Agreement					
14 Wenham & Wenham	24	32	24	29	37
15(1) Falla Superannuation	23	32	23	28	37
15(2) Falla Superannuation	23	31	24	28	36
15(3) Falla Superannuation	26	35	27	30	38
29 Ward	29	35	29	35	42
31(1) Isaac	31	35	31	38	45
31(2) Isaac	29	34	29	36	43
37 Worth	25	33	26	35	42
40 Leslie Allenby Blanch	31	41	32	42	49
42 Blanch	31	40	31	41	49
297 Bosma	24	33	24	36	43
298 Yates	23	31	24	33	40
Cr.2 Boorer	31	39	31	40	48
Resource company-owned Receivers					
6 AGL	21	32	22	21	34
13(1) AGL	24	33	24	26	36
13(2) AGL	35	41	36	44	52
4(1) GRL	14	23	15	19	27
4(2) GRL	14	23	14	13	27
4(4) GRL	14	25	14	13	27
4 (5) GRL	14	27	15	14	30
4(6) GRL	15	24	16	16	28
4(7) GRL	14	27	15	16	30
4(8) GRL	16	25	17	17	29
4(9) GRL	15	27	15	15	31
4(12) GRL	14	25	15	17	29
4(15) GRL	14	28	14	15	28
4(16) GRL	15	27	15	15	28
4(18) GRL	16	29	16	15	28

EVENING AND NIGHT-TIME OPERATING YEAR 2 INTRUSIVE AND MAXIMUM NOISE LEVELS

ID No and Landowner	Evening		Night-time		
	Calm	Wind	Calm	Inv. plus Drain.	LA1(1min)
19(1) SCPL	28	37	28	39	46
19(2) SCPL	32	38	32	41	49
19(4) SCPL	26	33	27	33	40
19(5) SCPL	27	33	27	33	40
19(6) SCPL	30	39	30	40	47
19(7) SCPL	27	34	27	34	41
19(8) SCPL	30	39	31	40	47
19(9) SCPL	30	39	31	40	48
19(10) SCPL	31	39	31	40	48
19(11) SCPL	15	25	15	27	33
19(12) SCPL	31	39	31	41	48
19(13) SCPL	31	40	31	41	48
19(14) SCPL	30	39	31	40	48
19(15) SCPL	29	39	29	41	48
19(16) SCPL	29	39	29	41	48
19(17) SCPL	28	39	29	40	47
19(18) SCPL	28	39	29	40	48
19(19) SCPL	29	39	29	40	47
19(20) SCPL	29	39	30	40	48
19(21) SCPL	28	38	28	39	46
19(22) SCPL	21	33	22	35	42
19(23) SCPL	28	39	29	40	47
19(25) SCPL	24	34	24	35	42
19(26) SCPL	18	26	18	28	35
19(27) SCPL	16	25	16	27	33
19(28) SCPL	26	35	27	37	44
19(29) SCPL	23	34	24	23	37
19(30) SCPL	22	31	22	22	35
19(31) SCPL	13	31	13	33	40
19(32) SCPL	11	29	12	31	38
19(33) SCPL	22	34	23	22	36
19(34) SCPL	14	26	15	15	29
19(35) SCPL	12	23	12	24	30
19(36) SCPL	12	23	12	24	30
19(37) SCPL	11	23	12	24	30
19(38) SCPL	17	28	17	17	31
19(39) SCPL	31	39	31	40	48
19(40) SCPL	36	41	36	43	48
19(41) SCPL	28	31	28	38	45
19(42) SCPL	30	40	31	41	49
19(43) SCPL	25	35	26	36	43
19(45) SCPL	31	39	31	40	48
19(46) SCPL	31	39	31	40	48
19(47) SCPL	36	39	36	41	47

Note 1: Presents the outer envelope (ie worst case) of the relevant noise enhancing meteorological conditions (e.g. winds and inversion conditions) in **Table 9** for each receiver.
Note 2: Predicted $L_{Aeq(15minute)}$ noise level complies with the intrusive PSNL.
Note 3: Predicted marginal noise exceedance 1 to 2 dBA above intrusive PSNL.
Note 4: Predicted moderate noise exceedance 3 to 5 dBA above intrusive PSNL.
Note 5: Predicted appreciable noise exceedance > 5 dBA above intrusive PSNL.