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Northern Coal Services

Northern Coal Logistics Project

Noise and Vibration Impact Assessment

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Northern Coal Services

Northern Coal Logistics Project

Noise and Vibration Impact Assessment

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Executive Summary

SLR has been commissioned by Centennial Northern Coal Services Pty Limited (Northern Coal Services) to conduct a Noise Impact Assessment (NIA) for the Northern Coal Logistics Project (the Project) located between Fassifern and Dora Creek, on the western side of Lake Macquarie, New South Wales.

The Project centres on the utilisation and upgrading of the existing surface infrastructure at the Newstan Colliery Surface Site and the Mandalong Mine – Cooranbong Entry Site (Cooranbong Entry Site), along with the utilisation of existing private haul roads. These facilities are integral to the on-going handling, processing and transport of coal from the underground of Newstan Colliery and Mandalong Mine into domestic and export markets. The Project will allow for improved and flexible coal handling arrangements across Newstan Colliery and Mandalong Mine to deliver the range of coal products required to meet domestic and export markets demands. It will also facilitate the continuation of existing coal handling operations.

Broadly, the objective of the noise assessment was to conduct noise modelling of the existing and proposed operations at both Newstan Colliery Surface Site and the Cooranbong Entry Site to identify the potential impacts of noise from its current and proposed operations; and to provide recommendations with regard to noise management strategies and mitigation measures where necessary, with the aim of achieving the Project Specific Noise Criteria (PSNC).

Operational Noise Assessment

Newstan Colliery Surface Site

Six scenarios were modelled as part of this NIA for the Newstan Colliery Surface Site to assess the effectiveness of proposed mitigation measures and determine impacts from infrastructure proposed to be constructed and operated by the Project.

Scenario 1 (Existing Operation)

This scenario represents the operations currently being undertaken at the Newstan Colliery Surface Site. This scenario has 2 front end loaders operating at the rail loop stockpile and the dozer operations are restricted at night (i.e. between 10.00 pm and 7.00 am).

Scenario 2

Scenario 2 represents the Project with only the existing Coal Preparation Plant (CPP) in operation and manual loading of trains being continued. The main difference between Scenario 1 and Scenario 2 is that Scenario 2 has an additional front end loader in operation at the rail loop stockpile and the dozer operates unrestricted at night.

Scenario 3

Scenario 3 represents the Project with only the existing CPP in operation and manual loading of trains being continued. The main difference between Scenario 2 and Scenario 3 is that Scenario 3 includes the implementation of noise mitigation measures on the existing CPP and transfer tower (detailed in **Section 9.2**) This scenario is designed to assess the benefits obtained by completing the implementation of these mitigation measures.

Executive Summary

Scenario 4

Scenario 4 represents the Project with two CPPs in operation at the site and manual loading of trains being continued. This scenario assumes that the mitigation measures on the existing CPP and transfer tower are completed and that the new CPP is constructed with Colorbond sheet metal cladding only.

Scenario 5

Scenario 5 represents the Project with two CPPs in operation at the site and manual loading of trains being continued. This scenario assumes that the mitigation measures on the existing CPP and transfer tower are completed and that the new CPP is constructed including noise attenuating cladding. This scenario is designed to assess the benefits obtained by cladding the new CPP with noise attenuating panels.

Scenario 6

Scenario 6 represents the Project with two CPPs in operation at the site with an automatic train loading facility in operation. This scenario assumes that the mitigation measures on the existing CPP and transfer tower are completed and that the new CPP is constructed with a noise attenuating cladding. This scenario is designed to assess the benefits obtained by installing an automatic train loading facility at the site.

Operational noise levels are predicted to exceed the Project Specific Noise Criteria at night during calm conditions by up to 1 dBA and by up to 4 dBA during night time temperature inversions at receptor NC3 for the current existing and approved operations.

Once the mitigation works (detailed in **Section 9.2**) to the existing CPP and transfer tower currently being implemented are completed, a 2 dBA exceedance is predicted during night time temperature inversions at NC3.

Once a second CPP is constructed with Colorbond sheet metal cladding and in operation at the Newstan Colliery Surface Site a 2 dBA exceedance is predicted at night during calm conditions and a 5 dBA exceedance during night time temperature inversions at NC3.

If the new CPP is clad in noise attenuating panels, a 2 dBA exceedance is predicted during night-time temperature inversions at NC3.

Noise modelling shows that manual loading of trains can continue to be undertaken 24 hours a day, seven days a week at the Newstan Colliery Surface Site utilising up to three front end loaders and a dozer with only a 2 dBA exceedances at NC3 during a night time temperature inversion so as long as the proposed mitigation measures are completed and the new CPP is constructed and clad with noise attenuating panels.

The current Newstan Colliery Development Consent DA 73-11-98 approves the implementation of an automated product handling and train loading system when the threshold of exporting more than 3 Mtpa through the Newstan rail loading facilities is reached. To date this threshold has not been reached and the manual loading of trains occurs.

Executive Summary

The noise modeling results demonstrate that once the mitigation measures to the existing CPP and transfer tower are completed, the Project can continue to operate with manual loading of trains with the only minor exceedances predicted at NC3 at night during a temperature inversion. The construction of an automatic train loading facility provides little benefit to the overall noise predictions and as such, is not required to be constructed to manage noise levels on site. Instead, the automatic train loading facility will be constructed when operational efficiencies require it or to meet other environmental criteria (specifically, air quality criteria).

Cooranbong Entry Site

Operational noise levels from the Cooranbong Entry Site are predicted to meet the Project Specific Noise Criteria at all residential locations considered in the assessment.

Sleep Disturbance Assessment

Newstan Colliery Surface Site

The predicted L_{Amax} noise levels are predicted to meet the sleep disturbance criteria for night-time operation at the Newstan Colliery Surface Site under temperature inversion weather conditions (worst case scenario) at all assessed receiver locations.

Cooranbong Entry Site

The L_{Amax} noise levels are predicted to meet the sleep disturbance criteria for night-time operation at the Cooranbong Entry Site under temperature inversion weather conditions (worst case scenario) at all assessed receiver locations.

Road Traffic Noise Assessment

Newstan Colliery Surface Site

The calculated day and night-time road traffic noise level at the nearest roadside residential receivers meets the criteria detailed in the NSW Road Noise Policy (RNP) under all prediction scenarios.

Cooranbong Entry Site

Road traffic volumes associated with the Cooranbong Entry Site are not proposed to increase as a result of the Project and therefore have not been considered as part of this assessment.

Construction Noise Assessment

Newstan Colliery Surface Site

The modelling results indicate that the predicted $L_{Aeq(15minute)}$ noise levels from proposed construction activities are below the 'Noise Affected' construction noise goals at all assessed residences.

The calculated day time construction road traffic noise level at the nearest roadside receivers meets the criteria detailed in the RNP under all prediction scenarios.

Cooranbong Entry Site

Executive Summary

Construction activities are not proposed for the Cooranbong Entry Site and therefore have not been included as part of this assessment.

Construction employee (for re-development of Newstan Colliery Surface Site) traffic access via the Cooranbong Entry Site may be utilised and therefore has been included in this assessment. The calculated day time construction road traffic noise level at the nearest roadside receivers meets the criteria detailed in the RNP under all prediction scenarios.

Rail Noise Assessment

Predicted existing rail traffic noise levels excluding trains associated with Newstan Colliery already exceed the day $L_{Aeq(15hour)}$ and night-time $L_{Aeq(9hour)}$ trigger levels for residents within 25 m of the rail line. Furthermore, the existing rail noise maximum passby noise level is predicted to exceed the relevant trigger levels at residences within 100 m of the rail line.

The rail noise levels associated with the Project are predicted to increase the day $L_{Aeq(15hour)}$ by up to 0.7 dBA and night-time $L_{Aeq(9hour)}$ by up to 1.1 dBA. This negligible noise level increase will not be noticeable by most people.

Vibration Assessment

Given the separation distance between mining operations and the nearest potentially affected residential locations vibration levels from the Project during operation and construction activity is predicted to be negligible and below levels for human perception at the nearest residential locations. Hence, vibration levels are also predicted to be below the criteria for “minimal risk of cosmetic damage” at surrounding residential premises.

Cumulative Assessment

Cumulative Operational Noise

Potential cumulative noise impacts from existing and successive developments are embraced by the INP procedures by ensuring that the appropriate noise emission criteria (and consent limits) are established with a view to maintaining acceptable noise amenity levels for residences. Therefore, the cumulative impact of the proposed development with existing industrial noise sources has been assessed in the determination of the amenity levels at surrounding potentially noise sensitive areas.

Cumulative Construction Noise

The proposed infrastructure to be constructed at the Newstan Colliery Surface Site will be constructed simultaneously with normal surface mining operations. As such, construction activities will be difficult to distinguish for normal surface mining activities. As a conservative approach, the predictive cumulative operational and construction activities have been assessed against the Industrial Noise Policy (INP) project specific noise criteria.

The predicted cumulative operational and construction noise levels show that cumulative noise level will meet the project specific noise levels at all assessment receiver locations.

Blasting Assessment

Blasting activities are not proposed during the operation or construction of the Project and therefore have not been included as part of this assessment.

Executive Summary

Noise Management

In order to maintain noise levels at the Newstan Colliery Surface Site once a second CPP is in operation, Northern Coal Services will constructed the new CPP with noise attenuating panels.

With mitigation measures implemented, the results of the noise modeling demonstrate that manual loading of trains can continue to be undertaken 24 hours a day, seven days a week at the Newstan Colliery Surface Site utilising up to 3 front end loaders and a dozer resulting in only a 2 dBA exceedances at NC3 during a night time temperature inversions.

As modeling has been undertaken based on a worst case operational scenario, these exceedances are not predicted to occur all the time. As such, and in order to manage potential noise exceedances at receivers surrounding the Newstan Colliery Surface Site, a real time noise monitor is currently being installed. The real time noise monitor is currently scheduled to be operational in 2014.

The real time noise monitoring system will be designed to alert staff at the Newstan Colliery Surface Site when noise levels are approaching the Project Specific Noise Criteria. It will also be designed to determine the directionality of the noise source to enable noise sources from the Newstan Surface Site to be distinguished from surrounding noise source contributions (i.e. the rail line).

The real time noise monitoring system will enable the operations of the Newstan Colliery Surface Site to be managed to maintain noise levels below the Project Specific Noise Criteria.

A detailed noise monitoring and management plan will be prepared to support the Project.

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1 INTRODUCTION

SLR Consulting Australia Pty Ltd (SLR) has been commissioned by Centennial's Northern Coal Services Pty Limited (Northern Coal Services) to conduct a Noise Impact Assessment (NIA) for the Northern Coal Logistics Project (the Project) located at Fassifern and Dora Creek on the western side of Lake Macquarie, New South Wales.

The Project centres on the utilisation and upgrading of the existing surface infrastructure at the Newstan Colliery Surface Site and the Mandalong Mine – Cooranbong Entry Site (Cooranbong Entry Site), along with the existing private haul roads. These facilities are integral to the on-going handling, processing and transport of coal from the underground Newstan Colliery and Mandalong Mine to domestic and export markets. The Project will allow for improved and flexible coal handling arrangements at Newstan Colliery and Mandalong Mine to deliver the range of coal products required to meet domestic and export market demands.

Broadly, the objective of the NIA was to conduct noise modelling of the existing and proposed operations at both the Newstan Colliery Surface Site, Cooranbong Entry Site and Hawkmount Quarry to identify the potential impacts of noise from the respective operations; and to provide recommendations with regard to noise management strategies and mitigation measures where necessary, with the aim of achieving the project specific noise criteria.

1.1 Acoustic Terminology

The following report uses specialist acoustic terminology. An explanation of common terms is provided in **Appendix A**.

2 STATUTORY REQUIREMENTS

The Scope for the NIA has been designed to address the Director General's Requirements (DGR's) with regard to the assessment of noise emissions. Comments on the DGR's have also been provided by other government agencies. These have been reviewed with regard to their relevance to the assessment of noise impacts. Where relevant, these have also been addressed within the NIA. A summary of the DGR's and relevant comments is provided in **Table 1** together with the relevant section of the NIA addressing the particular DGR/comment.

Table 1 Director General's Requirements and Government Agency Comments

Requirement	Relevant Section of NIA Report
Director-General's Requirements	
Noise – including a quantitative assessment of potential:	
- Construction, operational and off-site transport noise impacts	Section 11 Section 9 Section 10
- Reasonable and feasible mitigation measures, including evidence that there are no such feasible mitigation measures other than those proposed	Section 15
- Monitoring and management measures, in particular real-time and attended noise monitoring	Section 15
EPA Comments	
In relation to noise, the following matters should be addressed (where relevant) as part of the EIS:	
- Construction noise associated with the proposed development should be assessed using the *Interim Construction Noise Guideline* (DECC, 2009).	Section 11
- 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).	Section 13
- 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* (ANZECC, 1990).	Section 5.9
- 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.*	Section 9
- 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).	Section 10
- Noise from new or upgraded public roads should be assessed using the *Environmental Criteria for Road Traffic Noise* (EPA, 1999).	Section 10
- 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	Section 12

Requirement	Relevant Section of NIA Report
http://www.environment.nsw.gov.au/noise/railnoise.htm	
Lake Macquarie City Council Comments	
Noise impact is proposed to be addressed by the applicant by providing a noise impact assessment of the project. In this regard, the applicant is to satisfy the requirements of the NSW Office of Environment and Heritage Industrial Noise Policy.	Refer to entire NIA

Attachment 1 to the EARs also provides relevant technical and policy guidelines. These, and others, that have been identified as relevant to this assessment, are provided in **Table 2**.

Table 2 Technical and Policy Guidelines – Noise and Vibration

Guideline	Comment
Specified in EARs	
NSW Industrial Noise Policy (EPA, 2000)	This assessment also refers to the Application Notes to the INP (approved December 2010)
Environmental Noise Management – Assessing Vibration: a technical guide (DECC, 2006)	
NSW Road Noise Policy (DECCW, 2011)	
Technical basis for guidelines to minimise annoyance due to blasting overpressure and ground vibration (ANZECC)	Assessment of blasting emissions is not within the scope of this NVIA
Environmental Assessment Requirements for Rail Traffic – Generating Development (OEH)	This Interim Guideline is now provided as Appendix 2 of the Rail Infrastructure Noise Guideline (EPA, 2013)
Other Relevant Guidelines	
Australian Standard AS1055:1997 Description and Measurement of Environmental Noise Parts 1, 2 and 3	
Rail Infrastructure Noise Guideline (EPA, 2013)	
NSW Interim Construction Noise Guideline (DECC, 2009)	
German Standard DIN4150 Part 3:1999 Structural Vibration: effects of vibration on structures	
British Standard BS6472-1:2008 Guide to evaluation of human exposure to vibration in buildings – Vibration sources other than blasting	

This NIA has been prepared with reference to all the technical and policy guidelines provided in **Table 2**.

3 PROJECT DESCRIPTION

3.1 Overview and Objectives

Newstan Colliery is an existing underground coal mine owned and operated by Centennial Newstan Pty Limited (Centennial Newstan). It is located on the western side of Lake Macquarie approximately 140 kilometres north of Sydney in New South Wales (NSW). The Newstan Colliery Surface Site is located approximately four kilometres north of the township of Toronto and in close proximity to the townships of Fassifern and Wakefield.

The Cooranbong Entry Site is an existing coal delivery and handling facility owned and operated by Centennial Mandalong Pty Limited (Centennial Mandalong). It is also located on the western side of Lake Macquarie approximately 130 kilometres north of Sydney NSW and two kilometres north of the township of Dora Creek.

The Cooranbong Private Haul Road, owned by Centennial Mandalong, links the Newstan Colliery Surface Site and the Cooranbong Entry Site via the Newstan-Eraring Private Haul Road, owned by Eraring Energy. The Newstan-Eraring Private Haul Road links the Newstan Colliery Surface Site to the Eraring Power Station. The Awaba Colliery Private Haul Road links the Awaba Colliery Surface Site to the Newstan Eraring Private Haul Road. **Figure 1** shows regional setting of the Project Application Area consisting of the Newstan Colliery Surface Site and Cooranbong Entry Site along with the private haul roads.

The Project, in conjunction with Centennial's Newstan Extension of Mining Project and Mandalong Southern Extension Project, stems from the long-term strategy Centennial has developed for its future operations in the Newcastle Coalfield to provide the infrastructure and flexibility required to meet future opportunities in both the domestic and export coal markets.

The Project centres on the utilisation of the existing surface infrastructure at Newstan Colliery and Cooranbong Entry Site, along with the existing private haul roads. These facilities are integral to the on-going handling, processing and transport of coal from the underground workings of Newstan Colliery and Mandalong Mine (including the proposed Newstan Colliery Extension of Mining Project and Mandalong Southern Extension Project) to domestic and export markets.

Newstan Colliery and Mandalong Mine currently cumulatively produce up to 10 million tonnes per annum (Mtpa) of run-of-mine (ROM) coal. Given that this is approximately 50 percent of Centennial's annual ROM coal production, these mining operations represent a major component to the success of Centennial Coal.

The objectives of the Project include:

- Allow for improved and flexible coal handling arrangements across Newstan Colliery and Mandalong Mine to deliver the range of coal products required to meet domestic and export markets demands;
- Maximising the use of existing surface infrastructure and equipment across Centennial's northern holdings;
- Secure increased employment and socio-economic flow-on benefits; and
- Continue to conduct coal handling, processing and transport operations in an environmentally responsible manner to ensure the potential for adverse impact is minimised.

Figure 1 Regional Locality

The Project proposes to:

- Re-develop and upgrade the existing coal preparation and handling infrastructure at the Newstan Colliery Surface Site to enable continued utilisation for the receipt, handling and processing of up to 8 million tonnes per annum (Mtpa) ROM coal from the Newstan Colliery (up to 4.5 Mtpa), the Awaba Colliery (up to 0.88 Mtpa) and Mandalong Mine (up to 6 Mtpa);
- Continue to utilise the existing coal handling infrastructure at the Cooranbong Entry Site to enable the receipt, handling and processing of up to 6 Mtpa of ROM coal from Mandalong Mine;
- Increase the volume of coal transported from the Cooranbong Entry Site to Newstan Colliery Surface Site, via truck using existing private haul roads, from 4 Mtpa to up to 6 Mtpa;
- Increase the volume of coal transported from the Cooranbong Entry Site to Eraring Power Station, using the existing dedicated overland conveyor, from 4 Mtpa to up to 6 Mtpa;
- Increase the volume of coal transported from the Newstan Colliery Surface Site to Eraring Power Station, via truck using existing private haul roads, from 2 Mtpa to up to 4.5 Mtpa;
- Increase the volume of coal transported from the Newstan Colliery Surface Site rail loading facilities by train to the Port of Newcastle and/or Port Kembla (for export) and/or Vales Point Power Station from 3 Mtpa to up to 8 Mtpa;
- Continue to transport up to 0.5 Mtpa of middlings by truck via private haul roads from Newstan Colliery Surface Site to Cooranbong Entry Site for subsequent supply to the Eraring Power Station via a dedicated overland conveyor;
- Continue to transport up to 0.88 Mtpa of material (including coal and stone from construction activities undertaken as part of the Newstan Colliery Extension of Mining Project) by truck via private haul roads from the Awaba Colliery Surface Site to the reject emplacement areas at the Newstan Colliery Surface Site;
- Transport reject material from the Newstan Colliery Surface Site to the Newstan Colliery Northern Reject Emplacement Area (NREA), the Newstan Colliery Southern Reject Emplacement Area (SREA) and/or Hawkmount Quarry via existing private haul roads;
- Increase the volume of water discharged via licenced discharge points at the Newstan Colliery Surface Site and Cooranbong Entry Site;
- Provide employment for up to 120 full-time personnel;
- Provide a life of operation of 30 years from the granting of development consent; and
- Operate 24 hours per day, seven days per week.

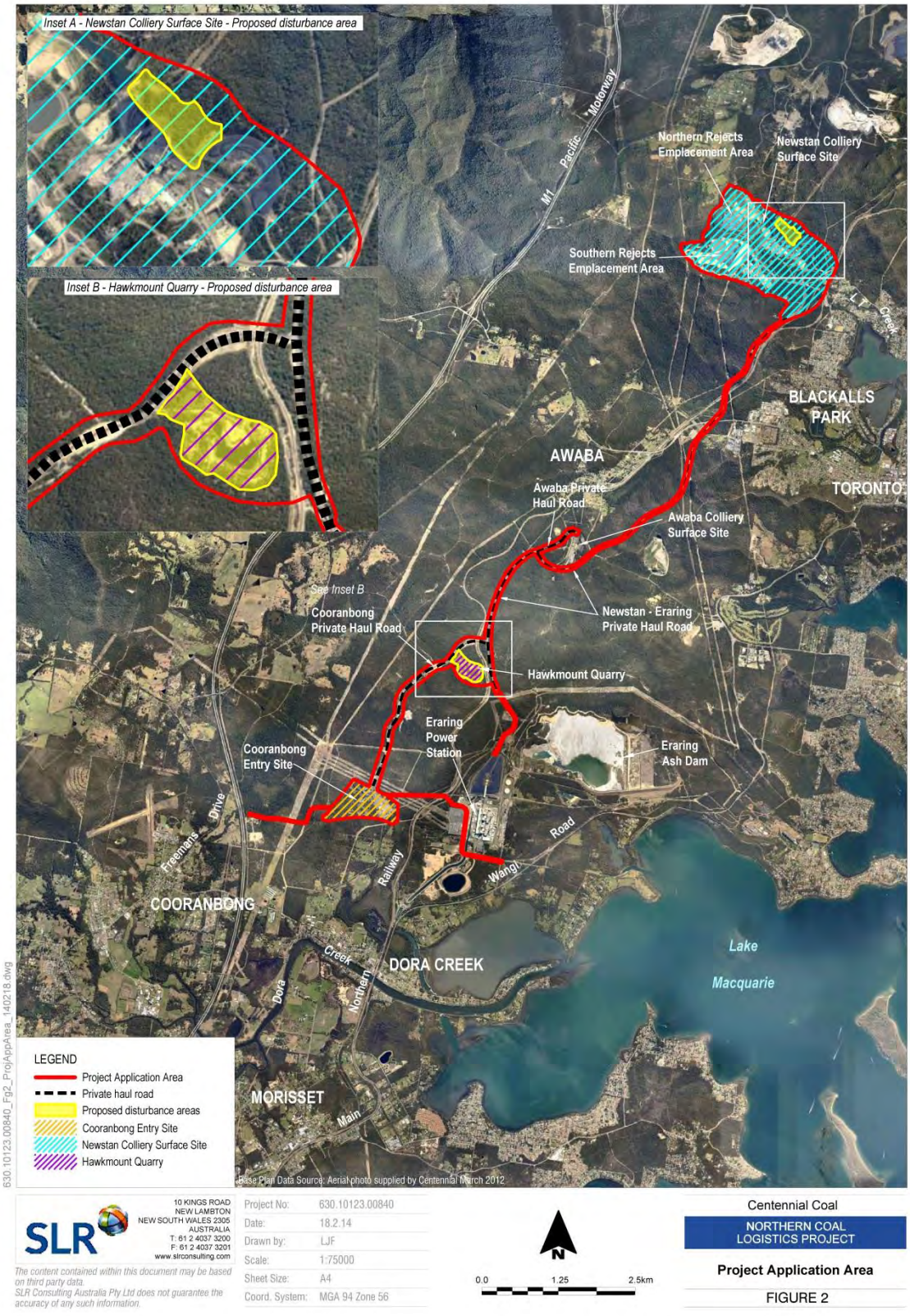
3.2 Project Application Area

The application area for the Project is on the western side of Lake Macquarie within the Lake Macquarie Local Government Area (LGA). As shown in **Figure 2,** the Project Application Area includes:

- The existing Newstan Colliery Surface Site, encompassing the coal preparation and handling infrastructure, reject emplacement areas, water management infrastructure and rail loading infrastructure, near Fassifern. The exceptions to this are the mine ventilation shafts and ventilation fans, which form part of the Newstan Extension of Mining Project;
- The proposed extension to the Newstan Colliery Surface Site to accommodate new coal handling and processing infrastructure;
- The existing surface infrastructure at the Cooranbong Entry Site near Dora Creek, comprising a coal handling plant (CHP), coal stockpiles, workshop building and water management infrastructure. The exceptions to this are the mine ventilation shaft, ventilation fan and the Borehole Dam, which form part of the Mandalong Southern Extension Project;

- The existing Hawkmount Quarry (Crown land controlled by Lake Macquarie City Council) comprising a disused quarry located immediately to the east of the Cooranbong Private Haul Road between Newstan Colliery Surface Site and Cooranbong Entry Site; and
- The existing Cooranbong Private Haul Road, Awaba Private Haul Road and Newstan-Eraring Private Haul Road which link the Newstan Colliery Surface Site, Awaba Colliery Surface Site, Cooranbong Entry Site and Eraring Power Station.

Figure 2 Project Application Area



3.3 Life of Operation

To service the coal handling, processing and transport requirements of Centennial's Newstan Colliery and Mandalong Mine, Northern Coal Services proposes a life of operation for the Project of 30 years from the granting of development consent.

3.4 Operational Hours

Northern Coal Services proposes to undertake the coal handling, processing and transportation operations of the Project 24 hours a day, seven days per week.

3.5 Operational Employment

The coal handling, processing and transportation operations of the Project will require approximately 120 full-time personnel (Centennial employees and contracting staff). All personnel will be based at either the Newstan Colliery Surface Site or the Cooranbong Entry Site and will utilise existing buildings, amenities and car parking facilities.

3.6 Surface Infrastructure

The Project will utilise the existing surface infrastructure and facilities at the Newstan Colliery Surface Site and the Cooranbong Entry Site, along with the existing private haul roads. Additional infrastructure is proposed and is detailed below.

3.6.1 Newstan Colliery Surface Site

The Northern Coal Logistics Project proposes the re-development and upgrade of the Newstan Colliery Surface Site, which currently encompassing coal handling and preparation infrastructure, rail loading infrastructure and rejects emplacement facilities, adjacent to Miller Road on the outskirts of Fassifern. The proposed upgrade of the Newstan Colliery Surface Site will comprise:

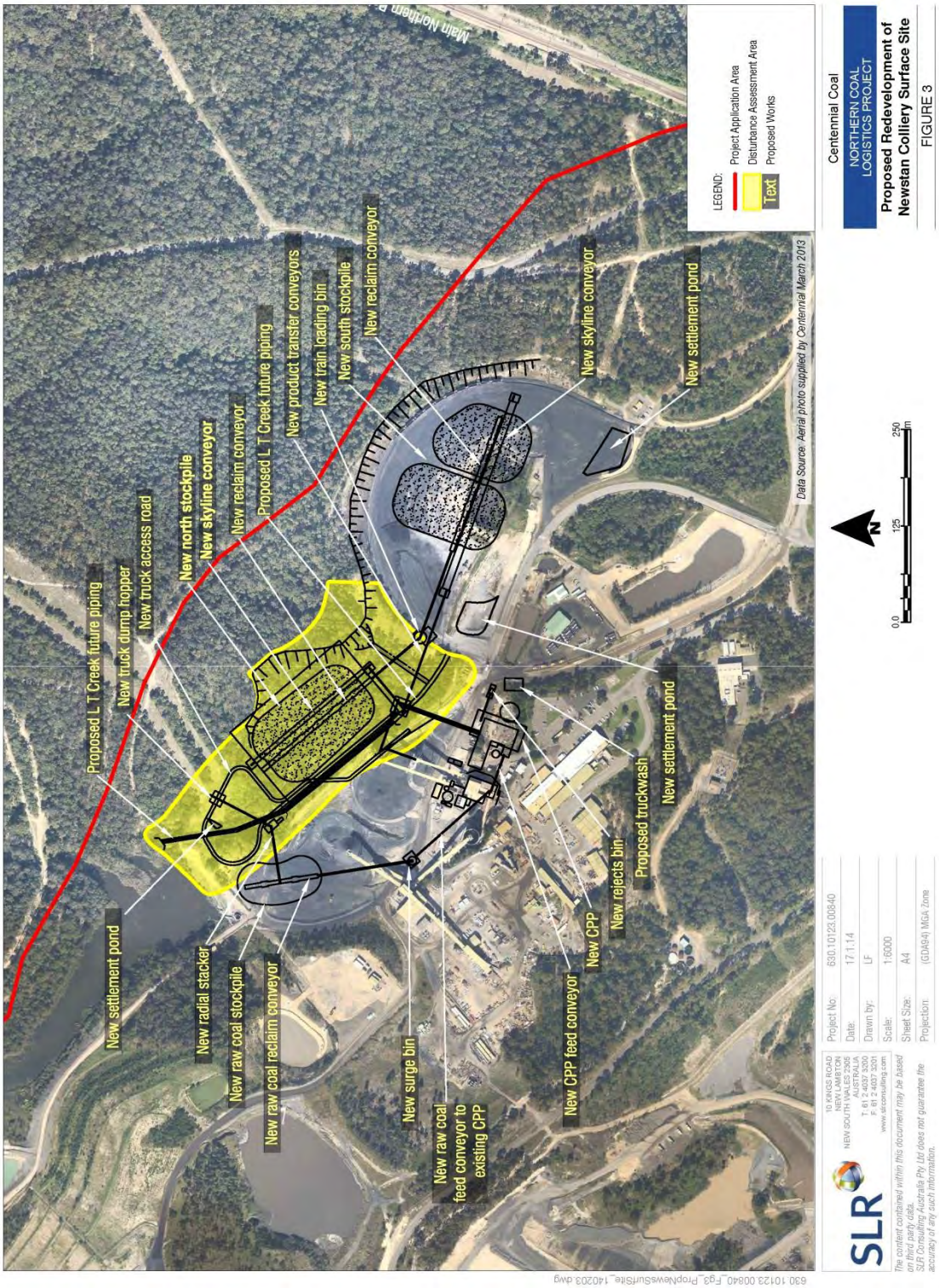
- Extensions to the existing coal stockpile areas and installation of new coal stockpile areas;
- The installation and operation of an additional new Coal Preparation Plant (CPP); and
- The installation and operation of new Coal Handling Plant (CHP) infrastructure.

The re-developed Newstan Colliery Surface Site will include a high level of automation, which will enable the coal handling and preparation activities to be more efficient (for example, will reduce the multiple handling of ROM and product coal) and involve less mobile equipment movements (for example, front end loaders and dozers). The re-developed site will have the capacity to receive, process and dispatch up to 8 Mpta of ROM coal from the Newstan Colliery (up to 4.5 Mtpa), the Awaba Colliery (up to 0.88 Mtpa) and Mandalong Mine (up to 6 Mtpa).

The design and installation of the new coal handling and preparation infrastructure will also include the incorporation of dust suppression systems and stockpile sprays, enclosed conveyor gantries for noise and dust reduction and light and sound barrier walls.

Figure 3 illustrates the conceptual layout of the re-developed site, and the below sub-sections overview some of the primary infrastructure items/modules proposed for construction or continued use at the Newstan Colliery Surface Site.

Figure 3 Proposed Re-development of Newstan Colliery Surface Site



Coal Handling Plant and Coal Preparation Plant

Coal will be delivered from the underground workings of the Newstan Colliery to the surface at the Newstan Colliery Surface Site via the drift conveyor, which forms part of Centennial's Newstan Colliery Extension of Mine Project. Once the coal reaches the surface it will become part of the Northern Coal Logistics Project.

The new CHP will include the installation of a new road receival facility, transfer and sizing stations, transfer conveyors, a radial arm stacker, extension of the existing ROM coal stockpile, a new ROM coal reclaim tunnel and ROM coal surge bin reclaim tunnels and an automated train loading system.

The existing CPP will continue to operate in its current configuration, with some upgrades. A new CPP will be constructed and will include the installation of new coal preparation equipment, including large, fine and ultra-fine circuits, that has been designed to maximise recovery of semi soft coal product in all size fractions and minimise the production of tailings.

Reject Emplacement Areas

The Project's production waste management strategy incorporates the emplacement of coarse rejects at the existing NREA, which is nearing completion, the existing SREA and the Hawkmount Quarry, It also incorporates the continued disposal of tailings within the existing tailings dam at the SREA.

Mechanical Workshops and Service Buildings

The mechanical workshops and service buildings will continue to be utilised for maintenance work (major maintenance and rebuilding activities to be undertaken on a contract basis off-site). Spillage and runoff from these facilities will continue to be managed by a sump and oil separator.

Administration Buildings and Bathhouse

Personnel will continue to utilise the existing administration buildings and bathhouse facilities, which are capable of catering for the current and proposed manning levels.

Car Park

Personnel, contractors and visitors will continue to utilise the existing sealed car parking area, which is accessed off the adjoining Miller Road and provides approximately 300 parking spaces. An additional onsite area provides approximately 40 car parking spaces for the heavy vehicle transport contracting company. There are additional overflow car parking areas contained within the site if required.

Other Infrastructure Items

Other items of infrastructure at the Newstan Colliery Surface Site include the following:

- Control room;
- Equipment and materials laydown areas;
- Reagents farm;
- Diesel refuelling station and hydrocarbon storage;
- Machinery washdown bay and oil separators;
- Fire fighting and emergency equipment store;
- Compressor shed;
- Solcenic tanks;
- Water management infrastructure;

- Electrical sub-stations and switch-rooms; and
- Emergency services helipad.

3.6.2 Cooranbong Entry Site

The Project proposes the continued use of the coal handling infrastructure at the Cooranbong Entry Site approximately two kilometres north of Dora Creek. It was approved as part of the Mandalong Mine in 1998 under Development Consent DA 97/800 (refer to **Appendix B** for current approved DA).

The primary items of existing infrastructure proposed for continued use at the Cooranbong Entry Site are shown on **Figure 4** and summarised below.

Coal Handling Plant

ROM coal delivered to the Cooranbong Entry Site from Mandalong Mine will continue to be handled and processed through the coal handling plant (CHP), which comprises aerial conveyor systems, a rotary breaker and sizer, a crushing plant, coal bins and coal stockpiles.

Mechanical Workshops and Service Buildings

The mechanical workshops and service buildings will continue to be utilised for maintenance work (major maintenance and rebuilding activities to be undertaken on a contract basis off-site). Spillage and runoff from the workshop will continue to be managed by a sump and oil separator.

Administration Buildings and Bathhouse

Personnel will continue to utilise the existing administration buildings and bathhouse facilities, which are capable of catering for the current and proposed manning levels.

Figure 4 Mandalong Mine - Cooranbong Entry Site

Car Park

Personnel and visitors will continue to utilise the existing sealed car parking area, which is accessed off the adjoining Gradwells Road and provides around 200 parking spaces. Approximately 14 employees are currently based at the Cooranbong Entry Site and the Project does not propose increased manning levels at this site for operational purposes. On this basis, the existing car parking is capable of accommodating the current and proposed manning levels.

Other Infrastructure Items

Other items of infrastructure at the Cooranbong Entry Site proposed for continued use include the following:

- Equipment and materials storage areas;
- Machinery washdown bay;
- Fire fighting and emergency equipment store;
- Compressor building;
- Electrical sub-station;
- Water management infrastructure; and
- Emergency services helipad.

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3.6.3 Hawkmount Quarry

The Project's production waste management strategy incorporates the emplacement of coarse rejects at the existing Hawkmount Quarry. The quarry has not been used for extraction purposes for several years, and there is no evidence of any closure or rehabilitation activities.

Hawkmount Quarry is located adjacent to and accessed from the Cooranbong Private Haul Road owned by Centennial Mandalong. It is estimated it will provide an additional 400,000 cubic metres of capacity for coarse rejects emplacement.

3.6.4 Private Haul Roads

The Project proposes the continued use of the existing private haul roads that link Awaba Colliery Surface Site, Newstan Colliery Surface Site, Cooranbong Entry Site, Hawkmount Quarry and Eraring Power Station. As shown on **Figure 2**, the Cooranbong Private Haul Road links the Newstan Colliery Surface Site and the Cooranbong Entry Site via the Newstan-Eraring Private Haul Road. This initial section of the haul route is approximately 3.4 kilometres long and is owned by Centennial Mandalong. The Newstan-Eraring Private Haul Road linking Newstan Colliery to Eraring Power Station is approximately 13 kilometres long and is owned by Eraring Energy. These private haul roads are sealed to minimise dust and noise generation and have been constructed to include surface water drainage and management.

In addition, the Project proposes the continued use of the Awaba Private Haul Road linking Awaba Colliery Surface Site to the Newstan-Eraring Private Haul Road. The Project proposes the continued transport up to 880,000 tpa of material from Awaba Colliery Surface Site to Newstan Colliery Surface Site / Eraring Power Station utilising this haul road.

3.7 Landform and Topography

3.7.1 Newstan Colliery Surface Site

The Newstan Colliery Surface Site is located in gently undulating terrain bordered by vegetation. The site has an approximate elevation of 30 metres AHD at the pit top area and an approximate elevation of 72 metres AHD (highest point) at the SREA.

3.7.2 Cooranbong Entry Site

The Cooranbong Entry Site typically has an elevation of 10 metres to 14 metres AHD. The site has been excavated into the floor of a small valley and is surrounded to the south, west and north by ridges with elevations of typically 40 to 50 metres AHD.

4 SENSITIVE RECEIVERS

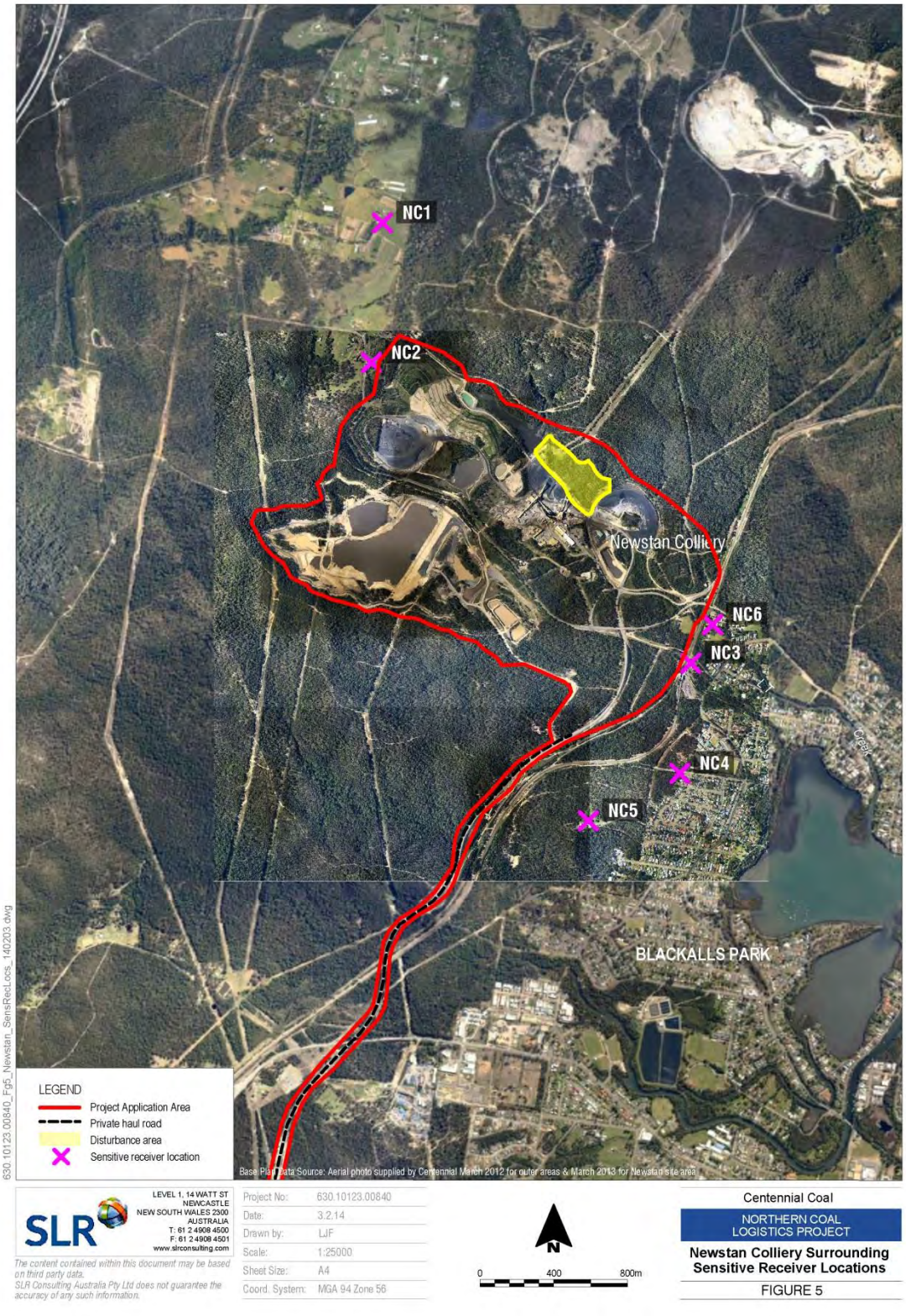
4.1 Newstan Colliery Surface Site

A number of residences and sensitive receivers are located in the area surrounding the Newstan Colliery Surface Site. The nearest residences and sensitive receivers have been identified to be considered as part of the NIA. A list of the nearest sensitive receivers identified are presented in **Table 3** and shown in **Figure 5**.

Table 3 Nearest Sensitive Receivers

Receiver ID*	Location	Location (m, MGA56)		Elevation (m, AHD)
		Easting	Northing	
NC1	Dwelling - Jefferson Road, Wakefield	365780	6351882	40
NC2	Dwelling - Miller Road, Fassifern	365720	6351115	58
NC3	Dwelling - Wallsend Road, Fassifern	367463	6349487	12
NC4	Dwelling - Narara Street, Fassifern	367399	6348880	27
NC5	Dwelling - Reynolds Street, Fassifern	366904	6348626	7
NC6	Fassifern Primary School	367581	6349694	11

Figure 5 Newstan Colliery Surrounding Sensitive Receiver Locations



4.2 Cooranbong Entry Site

A number of sensitive receivers are located in the area surrounding the Cooranbong Entry Site. A list of the nearest sensitive receivers identified are presented in **Table 4** and shown in **Figure 6**.

Table 4 Nearest Sensitive Receivers

Receiver ID	Location	Location		Elevation (m, AHD)
		Easting	Northing	
22	Dwelling – Gradwells Road, Dora Creek	360000	6340497	26
23	Dwelling – Gradwells Road, Dora Creek	360227	6340525	14
26	Dwelling – Gradwells Road, Dora Creek	360202	6340461	12
28	Dwelling – Gradwells Road, Dora Creek	360078	6340255	15
30	Dwelling – Gradwells Road, Dora Creek	359299	6339789	7
31	Dwelling – Gradwells Road, Dora Creek	359722	6340040	12
32	Dwelling – Gradwells Road, Dora Creek	360190	6340230	6
33	Dwelling – Gradwells Road, Dora Creek	359182	6339821	12
35	Dwelling – Gradwells Road, Dora Creek	359870	6339908	8

Figure 6 Mandalong Mine – Cooranbong Entry Site Surrounding Sensitive Receiver Locations

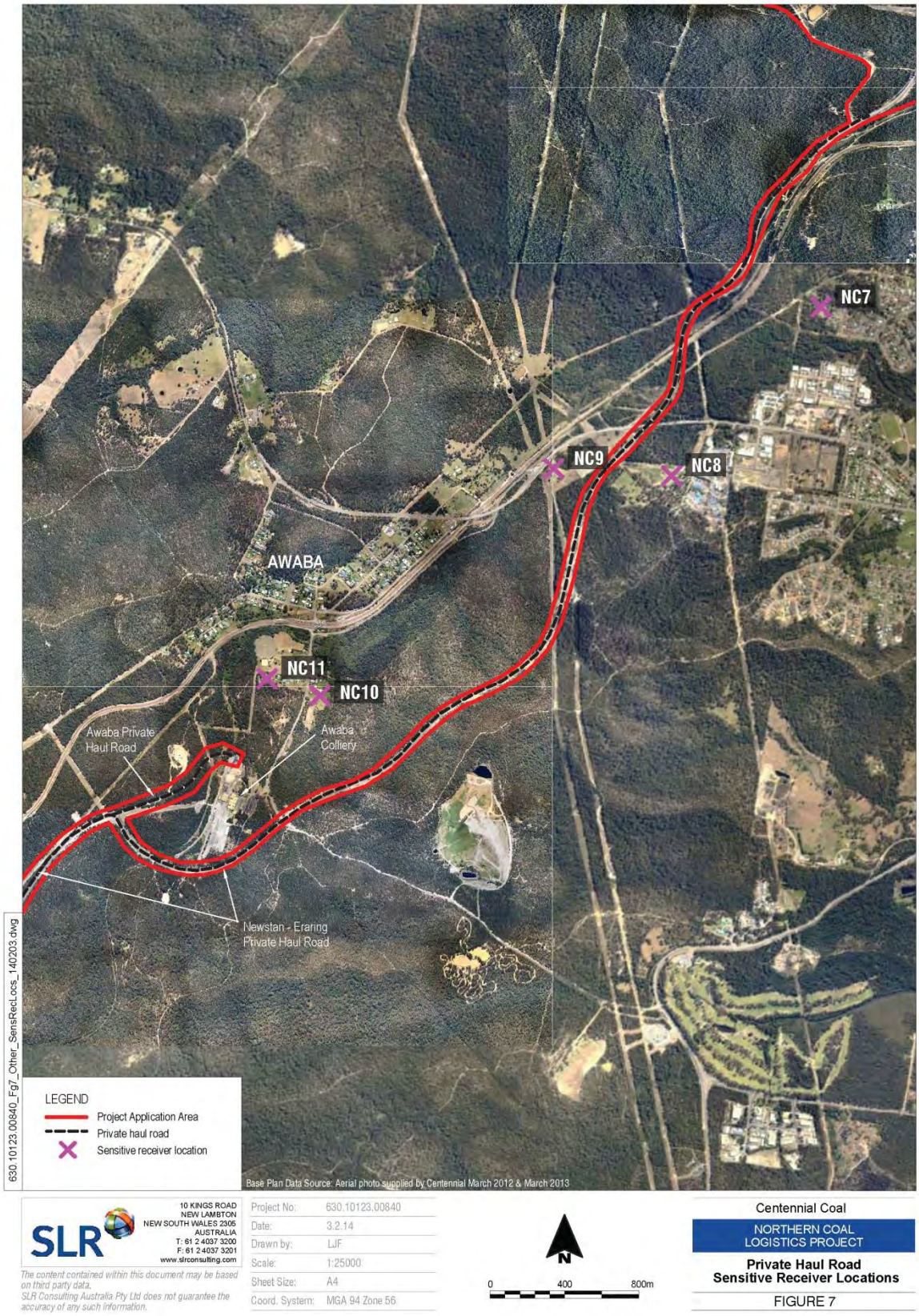
4.3 Private Haul Road Noise Sensitive Receiver Locations

For the purpose of assessing potential noise impacts from the Newstan-Eraring Private Haul Road (no close residents along the other haul roads) the residential locations in **Table 5** and shown in **Figure 7** have been considered.

Table 5 Other Noise Sensitive Receiver Locations

Receptor ID	Location	Location		Elevation (m, AHD)
		Easting	Northing	
NC7	Dwelling - John Street, Blackalls Park	366547.62	6348055.45	13
NC8	Dwelling - Toronto Street, Toronto	365739.80	6347141.79	33
NC9	Dwelling - Awaba Road, Awaba	365104.22	6347180.55	24
NC10	Dwelling - Sydney Street, Awaba	363830.58	6345944.15	28
NC11	Dwelling - Olney Street, Awaba	363548.27	6346041.88	33

Figure 7 Private Haul Road Noise Sensitive Receiver Locations



5 NOISE IMPACT ASSESSMENT PROCEDURES

5.1 General Objectives – NSW Industrial Noise Policy

Responsibility for the control of noise emission in NSW is vested in Local Government and the EPA. The Industrial Noise Policy (INP) was released in January 2000 and provides a framework and process for deriving noise criteria for consents and licences that will enable the relevant authority to regulate premises that are scheduled under the Protection of the Environment Operations Act, 1997.

The specific policy objectives are:

- To establish noise criteria that would protect the community from excessive intrusive noise and preserve amenity for specific land uses.
- To use the criteria as the basis for deriving project specific noise levels.
- To promote uniform methods to estimate and measure noise impacts, including a procedure for evaluating meteorological effects.
- To outline a range of mitigation measures that could be used to minimise noise impacts.
- To provide a formal process to guide the determination of feasible and reasonable noise limits for consents or licences that reconcile noise impacts with the economic, social and environmental considerations of industrial development.
- To carry out functions relating to the prevention, minimisation and control of noise from premises scheduled under the Act.

The policy sets two separate noise criteria to meet environmental noise objectives; one to account for intrusive noise and the other to protect the amenity of particular land uses.

Assessing Intrusiveness

For assessing intrusiveness, the background noise level must be measured. The intrusiveness criterion essentially means that the equivalent continuous noise level (L_{Aeq}) of the source should not be more than five decibels above the measured background level (L_{A90}).

Assessing Amenity

The amenity assessment is based on noise criteria specific to land use and associated activities (**Table 6**). The criteria relate only to industrial-type noise and do not include road, rail or community noise. The existing noise level from industry is measured. If it approaches the criterion value, then noise levels from new industries need to be designed so that the cumulative effect does not produce noise levels that would significantly exceed the criterion (**Table 7**).

Table 6 Amenity Criteria Recommended L_{Aeq} Noise Levels from Industrial Noise Sources

Type of Receiver	Indicative Noise Amenity Area	Time of Day	Recommended $L_{Aeq(Period)}$ Noise Level (dBA)	
			Acceptable	Recommended Maximum
Residence	Rural	Day	50	55
		Evening	45	50
		Night	40	45
	Suburban	Day	55	60
		Evening	45	50
		Night	40	45
	Urban	Day	60	65
		Evening	50	55
		Night	45	50
	Urban/Industrial Interface (for existing situations only)	Day	65	70
		Evening	55	60
		Night	50	55
School classrooms - internal	All	Noisiest 1 hour period when in use	35	40
Hospital wards - internal - external	All	Noisiest 1 hour period	35 50	40 55
Place of worship - internal	All	When in use	40	45
Area specifically reserved for passive recreation (eg National Park)	All	When in use	50	55
Active recreation area (eg school playground, golf course)	All	When in use	55	60
Commercial premises	All	When in use	65	70
Industrial premises	All	When in use	70	75

Note: Monday - Saturday: Daytime 7.00 am to 6.00 pm; Evening 6.00 pm to 10.00 pm; Night-time 10.00 pm to 7.00 am. Sundays, Public Holidays: Daytime 8.00 am - 6.00 pm; Evening 6.00 pm - 10.00 pm; Night-time 10.00 pm - 8.00 am. The L_{Aeq} index corresponds to the level of noise equivalent to the energy average of noise levels occurring over a measurement period.

Table 7 Modification to Acceptable Noise Level (ANL)* to Account for Existing Levels of Industrial Noise

Total Existing L_{Aeq} Noise Level from Industrial Noise Sources	Maximum L_{Aeq} Noise Level for Noise from New Sources Alone, dBA
≥ Acceptable noise level plus 2 dBA	If existing noise level is *likely to decrease* in future acceptable noise level minus 10 dBA If existing noise level is *unlikely to decrease* in future existing noise level minus 10 dBA
Acceptable noise level plus 1 dBA	Acceptable noise level minus 8 dBA
Acceptable noise level	Acceptable noise level minus 8 dBA
Acceptable noise level minus 1 dBA	Acceptable noise level minus 6 dBA
Acceptable noise level minus 2 dBA	Acceptable noise level minus 4 dBA
Acceptable noise level minus 3 dBA	Acceptable noise level minus 3 dBA
Acceptable noise level minus 4 dBA	Acceptable noise level minus 2 dBA
Acceptable noise level minus 5 dBA	Acceptable noise level minus 2 dBA
Acceptable noise level minus 6 dBA	Acceptable noise level minus 1 dBA
< Acceptable noise level minus 6 dBA	Acceptable noise level

* ANL = recommended acceptable L_{Aeq} noise level for the specific receiver, area and time of day from **Table 6**

The NSW INP states that, in some areas, the level of road traffic noise may be high enough to make noise from an industrial source effectively inaudible, even though the L_{Aeq} noise level from that industrial noise source may exceed the recommended acceptable amenity noise level shown in **Table 6**. In such cases, the amenity criterion for noise from the industrial application becomes the $L_{Aeq(period),traffic}$ minus 10 dBA and replaces the amenity criteria provided in **Table 6**.

This criterion may be applied only if all of the following apply:

- Traffic noise is identified as the dominant noise source at this site.
- The existing traffic noise level is 10 dB or more above the acceptable noise level for the area.
- It is highly unlikely the road traffic noise levels would decrease in the future.

Morning Shoulder Periods

There will be situations that call for different assessment periods. For example, where early morning (5.00 am to 7.00 am) operations are proposed, it may be unduly stringent to expect such operations to be assessed against the night-time criteria, especially if existing background noise levels are steadily rising in these early morning hours. In these situations, appropriate noise level targets may be negotiated with the regulatory/consent authority on a case-by-case basis. As a rule of thumb it may be appropriate to assign a shoulder period rating background level as the mid-point value between the rating background levels of the two assessment periods that are on either side of the shoulder period.

The objective is to achieve environmental amenity in a feasible and reasonable manner. In an assessment of the likely level of noise impact, the time of day is only one of several relevant factors - such as noise level and character, and the activities affected by the noise. Noise of a lower level, and with no intrusive characteristics such as tones and impulses, can often be more acceptable over a longer period of the day than noise at a high level and/or with intrusive characteristics.

It is relevant to note the assessment of the morning shoulder period (6.00 am to 7.00 am) has been adopted for the Newstan Colliery operations.

5.2 INP Noise Mitigation Strategy

The INP Project Specific Noise Criteria are the more stringent of either the amenity or intrusive criteria. The INP states that these criteria have been selected to protect 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 criteria in the INP are achieved, it is unlikely that most people would consider the resultant noise levels excessive.

In those cases where the INP project specific criteria 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 INP project specific assessment criteria can be generally 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)

In view of the foregoing, **Table 8** presents the methodology for assessing noise levels which may exceed the INP Project Specific Noise Criteria.

Table 8 Noise Impact Assessment Methodology

Assessment Criteria	Project Specific Criteria	Noise Management Zone	Noise Affectation Zone
Intrusive	Rating background level plus 5 dBA	≤ 5 dBA above project specific criteria	> 5 dBA above project specific criteria
Amenity	INP based on existing industrial level	≤ 5 dBA above project specific criteria	> 5 dBA above project specific criteria

For the purposes of assessing the potential noise impacts the project specific, management and affectation criteria are further defined as follows:

Project Specific Criteria

Most people in the broader community would generally consider exposure to noise levels at or below the Project Specific Noise Criteria acceptable.

Noise Management Zone

Depending on the degree of exceedance of the Project Specific Noise Criteria (1 dBA to 5 dBA) noise impacts could range from negligible to moderate. It is recommended that management procedures be implemented, when noise exceedences between 1 dBA and 5 dBA are predicted, including:

- Prompt response to any community issues of concern.
- Noise monitoring on site and within the community.
- Refinement of onsite noise mitigation measures and plant operating procedures where practical.
- Consideration of acoustical mitigation at receivers.
- Consideration of negotiated agreements with property holders.

Noise Affectation Zone

Exposure to noise levels exceeding the project-specific criteria by more than 5 dB(A) may be considered unacceptable by some property holders. As a result, it is recommended that the proponent explore the following recommendations:

- Discussions with relevant property holders to assess concerns and provide solutions.
- Implementation of acoustical mitigation at receivers.
- Negotiated agreements with property holders, where required.

5.3 INP – Modification of Existing Industrial Premises

The INP states that where there is a proposal to upgrade or expand an existing industrial operation there may be a need to establish achievable noise limits and, if necessary, implement a noise reduction plan. The approach is designed to allow established industries to adapt to changes in the noise expectations of the community while remaining economically viable.

The INP recognises that many existing industrial sources were designed for higher noise emission levels than those set out in the policy and that in some cases industries may have been in existence before neighbouring noise sensitive developments or even noise legislation were introduced.

Where noise emissions from the site exceed the project specific noise levels, the regulatory authorities and the noise source manager need to negotiate achievable noise limits for the site. Therefore, the project specific noise levels should not be applied as mandatory noise limits but, rather, should supply the initial target levels and drive the process of assessing all feasible and reasonable control measures. For sites with limited noise mitigation options the achievable noise levels may sometimes be above the project specific noise levels.

Efforts should be aimed at achieving a reduction in noise in a manner that provides the greatest benefit to residents without undue impact on the existing business.

Appendix C presents the INP guidance with regard to the assessment of noise from the modification of existing industrial premises.

5.4 Assessing Sleep Disturbance

The potential for sleep arousal has been assessed using the guidance provided in the INP Application Notes.

The INP Application Notes (last updated 12 July 2012) recognises that the current $L_{A1(1minute)}$ sleep disturbance criteria of 15 dBA above the prevailing $L_{A90(15minute)}$ level is not ideal. The assessment of potential sleep disturbance is complex and poorly understood and the EPA believes that there is insufficient information to determine a suitable alternative criteria.

The INP guideline suggests that the $L_{A1(1minute)}$ level of 15 dBA above the RBL is a suitable screening criteria for sleep disturbance for the night-time period.

Guidance regarding potential for sleep disturbance is also provided in the NSW Road Noise Policy (RNP). The RNP calls upon a number of studies that have been conducted into the effect of maximum noise levels on sleep. The RNP acknowledges that, at the current level of understanding, it is not possible to establish absolute noise level criteria that would correlate to an acceptable level of sleep disturbance. However, the RNP provides the following conclusions from the research on sleep disturbance:

- maximum internal noise levels below 50 - 55 dBA are unlikely to awaken people from sleep

- one or two noise events per night, with maximum internal noise levels of 65 - 70 dBA, are not likely to affect health and wellbeing significantly.

It is generally accepted that internal noise levels in a dwelling, with the windows open, are 10 dBA lower than external noise levels. Based on a worst case minimum attenuation, with windows open, of 10 dBA, the first conclusion above suggests that short term external noises of 60 dBA to 65 dBA are unlikely to cause awakening reactions. The second conclusion suggests that one or two noise events per night with maximum external noise levels of 75 dBA to 80 dBA are not likely to affect health and wellbeing significantly.

5.5 Road Traffic Noise

The RNP sets out noise criteria applicable to particular types of projects, road category and land use for the purpose of defining traffic noise impacts.

Table 9 presents the most relevant RNP criteria for residential land uses affected by noise from a freeway, arterial or sub-arterial road. Noise levels provided in **Table 9** are external noise levels and refer only to road traffic noise; they do not include ambient noise from other sources. Furthermore, the RNP provides criteria for non-residential land uses affected by proposed road projects and traffic generating developments and are presented in **Table 10**.

Table 9 Road Traffic Noise Assessment Criteria for Residential Land Uses

Road category	Type of project/land use	Assessment criteria – dB(A)	
		Day (7 a.m.–10 p.m.)	Night (10 p.m.–7 a.m.)
Freeway/ arterial/ sub-arterial roads	Existing residences affected by additional traffic on existing freeways/arterial/sub-arterial roads generated by land use developments	LAeq, (15 hour) 60 (external)	LAeq, (9 hour) 55 (external)
Local roads	Existing residences affected by additional traffic on existing local roads generated by land use developments	LAeq, (1 hour) 55 (external)	LAeq, (1 hour) 50 (external)

Note: 1. Land use developers must meet internal noise goals in the Infrastructure SEPP (Department of Planning NSW 2007) for sensitive developments near busy roads (see **Appendix C10** of the RNP for details).
2. Sub-arterial roads previously designated as 'collector roads' in the Environmental criteria for road traffic noise.

Table 10 Road Traffic Noise Assessment Criteria for Non-residential Land Uses Affected by Proposed Road Projects and Traffic Generating Developments

Existing sensitive land Use	Assessment criteria – dB(A)		Additional considerations
	Day (7 a.m.–10 p.m.)	Night (10 p m.–7 a.m.)	
1.School classrooms	LAeq, (1 hour) 40 (internal) when in use		In the case of buildings used for education or health care, noise level criteria for spaces other than classrooms and wards may be obtained by interpolation from the 'maximum' levels shown in Australian Standard 2107:2000 (Standards Australia 2000).

Note: Land use developers must meet internal noise goals in the Infrastructure SEPP (Department of Planning NSW 2007) for sensitive developments near busy roads.

The RNP also provides the following with regard to the use of private haul roads:

C4 Private haul roads

Noise from vehicles travelling on private roads associated with an industrial activity, such as a mine or quarry, is to be assessed as an industrial noise source under the NSW Industrial Noise Policy (Environment Protection Authority 2000). Further guidance on this approach is provided in the 'Application Notes' to the policy.

5.6 Construction Noise

The Interim Construction Noise Guideline (DECCW, 2009) (ICNG) states that "*noise from industrial sources (for example, factories, quarrying, mining, and including construction associated with quarrying and mining)*" are examples of noise that is not covered by the ICNG. However, the ICNG has been referenced with regard to this assessment for the following reasons:

- some of the construction activities associated with the Project will be conducted for a relatively short duration; and
- The Project construction activity, particularly earthworks, will generate noise of a very different nature to that produced during operation of the facility.

The EPA released the ICNG in July 2009. This policy sets out noise management levels for residential and other noise-sensitive receivers and how they are to be applied. The policy suggests restriction to the hours of construction that apply to activities that generate noise at residences above the 'highly affected' noise management level. A summary of the noise management levels is contained in **Table 11**.

Table 11 Noise at Residences using Quantitative Method

Time of day	Management level Laeq(15minute)	How to apply
Recommended standard hours Monday to Friday 7am to 6pm Saturday 8am to 1pm No work Sundays or public holidays	Noise Affected RBL** + 10 dB	The noise affected level represents the point above which there may be some community reaction to noise. • Where the predicted or measured Laeq (15 min) is greater than the noise affected level, the proponent should apply all feasible and reasonable work practices to meet the noise affected level. • The proponent should also inform all potentially impacted residents of the nature of works to be carried out, the expected noise levels and duration, as well as contact details.
	Highly noise affected 75 dBA	The highly noise affected level represents the point above which there may be strong community reaction to noise. • Where noise is above this level, the relevant authority (consent, determining or regulatory) may require respite periods by restricting the hours that the very noisy activities can occur, taking into account: 1. times identified by the community when they are less sensitive to noise (such as before and after school for works near schools, or mid-morning or mid-afternoon for works near residences 2. if the community is prepared to accept a longer period of construction in exchange for restrictions on construction times.
Outside recommended standard hours	Noise Affected RBL** + 5 dB	A strong justification would typically be required for works outside the recommended standard hours. • The proponent should apply all feasible and

Time of day	Management level Laeq(15minute)	How to apply
		reasonable work practices to meet the noise affected level. • Where all feasible and reasonable practices have been applied and noise is more than 5 dB(A) above the noise affected level, the proponent should negotiate with the community. • For guidance on negotiating agreements see section 7.2.2.

*Noise levels apply at the property boundary that is most exposed to construction noise, and at a height of 1.5m above ground level. If the property boundary is more than 30m from the residence, the location for measuring or predicting noise levels is at the most noise-affected point within 30m of the residence. Noise levels may be higher at upper floors of the noise-affected residence.
**RBL: Rating Background Level, as defined in the NSW Industrial Noise Policy (EPA, 2000).

5.7 Rail Traffic Noise

5.7.1 EPA Rail Infrastructure Noise Guideline

The EPA released "Rail Infrastructure Noise Guideline" (RING) in May 2013. Appendix 2 of the RING provides requirements for rail traffic-generating developments. These are reproduced as follows:

Land-use developments other than rail projects that are likely to generate additional rail traffic on an existing rail network 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: $L_{Aeq,15hr}$ 65 dB(A), $L_{Aeq,9hr}$ 60 dB(A), and L_{Amax} (95th percentile) 85 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.*
- *Where the L_{Aeq} noise level increases are more than 2 dB(A), which is equivalent to approximately 60 per cent of the total line or corridor rail traffic, and exceeds the relevant noise assessment trigger level, 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 6.*

Mitigating noise from rail traffic-generating developments

For a traffic-generating development like a coal mine, the proponent would not have control over the public rail infrastructure. Consequently they would have limited opportunities to implement mitigation, such as noise barriers. In such cases, control of noise and vibration at the source is the most effective means of mitigation. However, the land-use developer responsible for the additional rail traffic (such as a mine, quarry or industrial site) could contract to a rail service provider who would use best practice rolling stock, including locomotives approved to operate on the NSW rail network in accordance with environment protection licences issued by the EPA. At property (architectural) treatments should be considered for affected receivers, if reasonable.

5.8 Assessing Vibration

5.8.1 Human Response

The EPA released *Assessing Vibration: a technical guideline* (the Guideline) in February 2006. The Guideline presents preferred and maximum vibration values for use in assessing human responses to vibration and provides recommendations for measurement and evaluation techniques. The Guideline is based on British Standard BS 6472-1998 *Evaluation of human exposure to vibration in buildings (1-80Hz)* which is similar to Australian Standard AS-2670.2-1990 but includes additional guidelines in relation to intermittent vibration. The criteria presented in the Guideline are non-mandatory. Where all feasible and reasonable mitigation measures have been applied and vibration values are still beyond the maximum value, the operator would need to negotiate directly with the affected community.

Section 2.4 of the Guideline provides acceptable values for intermittent vibration in terms of vibration dose values (VDV) which requires the measurement of the overall weighted rms acceleration over the frequency range 1 Hz to 80 H. To calculate VDV the following formula is used:

$$VDV = \left[\int_0^T a^4(t)dt \right]^{0.25}$$

where VDV is the vibration dose value in $m/s^{1.75}$, *a(t)* is the frequency-weighted acceleration in m/s^2 and *T* is the total period of the day (in seconds) during which vibration may occur.

The acceptable VDV are reproduced here in **Table 12**.

Table 12 Acceptable Vibration Dose Values for Intermittent Vibration

Location	Daytime		Night-time	
	Preferred Value	Maximum Value	Preferred Value	Maximum Value
Residences	0.20 $m/s^{1.75}$	0.40 $m/s^{1.75}$	0.13 $m/s^{1.75}$	0.26 $m/s^{1.75}$

Note: Daytime is 7.00 am to 10.00 pm.

There is a low probability of adverse comment or disturbance to building occupants at vibration values below the preferred values. Adverse comment or complaints may be expected if vibration values approach the maximum values. The guideline states that activities should be designed to meet the preferred values where an area is not already exposed to vibration.

5.8.2 Human Perception

The human perception intermittent vibration dose levels at residences for the project are provided in **Table 13** from the *British Standard BS 6472:1992*.

Table 13 Human Perception Values for Intermittent Vibration

Vibration dose values (m/s$^{1.75}$) above which various degrees of adverse comment may be expected in residential buildings			
Place	**Low probability of adverse comment**	**Adverse comment possible**	**Adverse comment probable**
Residential building 16 hours day*	0.2 to 0.4	0.4 to 0.8	0.8 to 1.6
Residential building 8 hours night	0.13	0.26	0.51

Note: *Daytime is 7.00 am to 10.00 pm.

1. Below these ranges adverse comment is not expected.
2. Above these ranges adverse comment is very likely.

5.8.3 Building Response

British Standard 7385: Part 2-1993 "*Evaluation and measurement for vibration in buildings Part 2*" provides criteria against which the likelihood of building damage from ground vibration can be assessed.

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

The standard states that the guide values relate predominantly to transient vibration which does not give rise to resonant responses in structures, and to low-rise buildings. Where the dynamic loading caused by continuous vibration is such as to give rise to dynamic magnification due to resonance, especially at the lower frequencies where lower guide values apply, then the guide values may need to be reduced by up to 50%. Since the nearest buildings could potentially experience resonance effects, a conservative level of continuous "minimal risk of cosmetic damage" criterion has been adopted here and is shown in **Table 14**.

Table 14 Transient Vibration Guide Values – Minimal Risk of Cosmetic Damage

Type of Building	**Peak Component Particle Velocity in Frequency Range of Predominant Pulse**	
	4 Hz to 15 Hz	**15 Hz and Above**
Reinforced or framed structures - Industrial and heavy commercial buildings	25 mm/s at 4 Hz and above	
Unreinforced or light framed structures - Residential or light commercial type buildings	7.5 mm/s at 4 Hz increasing to 10 mm/s at 15 Hz	10 mm/s at 15 Hz increasing to 25 mm/s at 40 Hz and above

Note: Values referred to are at the base of the building being considered.

Furthermore, **Table 15** outlines the adopted structural damage vibration limits for residential dwellings from the German Standard *DIN 4150: Part 3-1999* for the proposed development.

Table 15 Adopted Long-term Structural Vibration Velocity Limits on Structures

Line	Type of Structure	Guideline values for velocity, v_i, in mm/s, of vibration in horizontal plane of highest floor, at all frequencies
1	Building used for commercial purposes, industrial buildings, and buildings of similar design	10
2	Dwellings and buildings of similar design and/or occupancy	5
3	Structures that, because of their particular sensitivity to vibration, cannot be classified under lines 1 and 2 and are great intrinsic value (e.g. listed buildings under preservation order)	2.5

5.9 Blasting Assessment

Blasting activities are not proposed during the operation or construction of the Project and therefore have not been included as part of this assessment.

6 EXISTING ACOUSTICAL AND METEOROLOGICAL ENVIRONMENT

6.1 Newstan Colliery Surface Site

An ambient noise survey conducted as part of SLR's previous report 'Newstan Colliery Noise Impact Assessment' (refer to report 630.10002.00000R1) dated 28 April 2011, has been used to establish the Project Specific Noise Criteria.

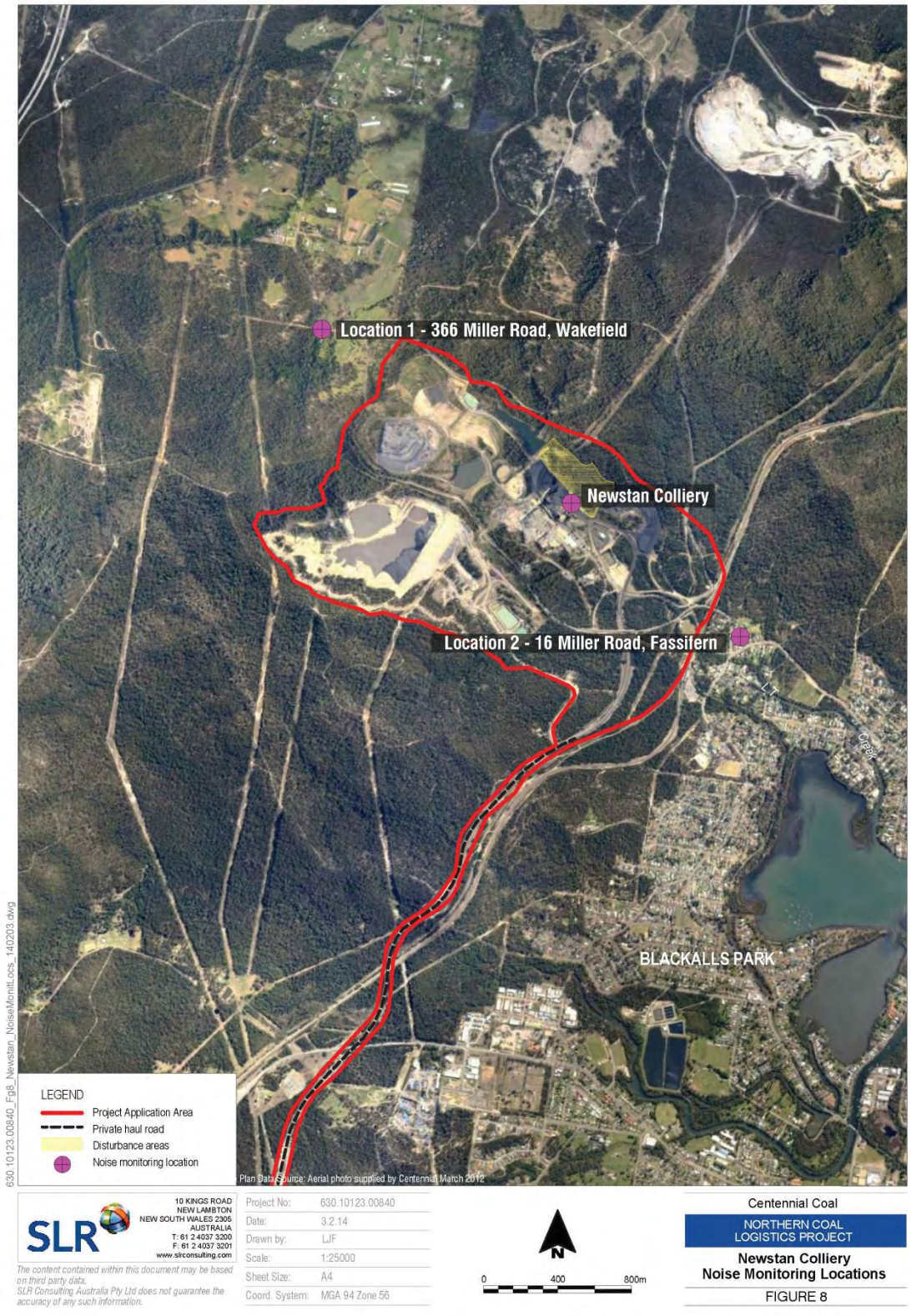
6.1.1 General Methodology

Ambient noise surveys were conducted to characterise and quantify the existing acoustical environment in the area surrounding the Newstan Colliery Surface Site. A background monitoring survey was undertaken at two (2) residential locations on Miller Road, Wakefield (west of Newstan) and Miller Road, Fassifern (east of Newstan), considered representative of the nearest potentially-affected noise-sensitive receivers to the Newstan Colliery Surface Site. The noise monitoring locations are shown in **Figure 8**.

The background noise monitoring consisted of continuous, unattended noise logging and operator attended noise surveys. The operator attended noise surveys help to define noise sources and the character of noise in the area and are, therefore, used to qualify unattended noise logging results.

All acoustic instrumentation employed throughout the monitoring programme was designed to comply with the requirements of AS IEC 61672.1-2004 *Electroacoustics - Sound level meters – Specifications* and carries current NATA or manufacturer calibration certificates. Instrument calibration was checked before and after each measurement survey, with the variation in calibrated levels not exceeding ±0.5 dBA.

Figure 8 Newstan Colliery Noise Monitoring Locations



6.1.2 Unattended Continuous Noise Monitoring

Background noise levels were monitored by SLR. The objective of the background noise survey was to measure $L_{A90(period)}$ and $L_{Aeq(15minute)}$ noise levels at the nearest potentially affected residential locations during the day, evening and night-time periods to enable the determination of the intrusiveness and amenity criteria for the Project.

Background noise levels were monitored at two separate locations, considered to be representative of the nearest potentially affected receivers, from Tuesday 14 September 2010 to Wednesday 22 September 2010, inclusive. Details of monitoring locations are provided in **Table 18** and **Figure 9**.

Table 16 Ambient Noise Monitoring Locations

Location	Address Location Description	Logger Serial No.
Location 1	366 Miller Road, Wakefield	16-306-039
Location 2	16 Miller Road, Fassifern	16-103-494

ARL Type EL316 noise loggers were used to monitor the ambient noise levels at each location. The noise loggers were programmed to record statistical noise level indices continuously in 15 minute intervals, including L_{amax}, L_{A1}, L_{A50}, L_{A90}, L_{A99}, L_{amin} and L_{aeq}. Precautions were taken to minimise influences from extraneous noise sources and reflections from adjacent buildings.

Weather data for the survey period was obtained from the Bureau of Meteorology (BOM) weather station located at Cooranbong (approximately 15.5 km south west of the Newstan Colliery Surface Site). Noise data corresponding to periods of rainfall and/or wind speeds in excess of 5 m/s (approximately 9 knots) were discarded in accordance with INP data exclusion methodology. A summary of the results of the background surveys is given in **Table 17**.

The morning shoulder has been considered because of the operation of the SREA, NREA and Hawkmount Quarry during the 6.00 am to 7.00 am time period.

Table 17 Summary of Existing Ambient Noise Levels

Location	Period	Measured Background L_{A90} Noise Level	Adopted Rating Background Level	Measured $L_{Aeq(Period)}$	Estimated Existing Industrial (non-Newstan) Contribution L_{Aeq}
Location 1 366 Miller Road, Wakefield	Morning Shoulder	41 dBA	41 dBA	51 dBA	None discernible
	Day	36 dBA	36 dBA	49 dBA	
	Evening	39 dBA	36 dBA*	51 dBA	
	Night	31 dBA	31 dBA	46 dBA	
Location 2 16 Miller Road, Fassifern	Morning Shoulder	40 dBA	40 dBA	53 dBA	
	Day	39 dBA	39 dBA	53 dBA	
	Evening	39 dBA	39 dBA	52 dBA	
	Night	30 dBA	30 dBA	50 dBA	

Note: Daytime 7.00 am to 6.00 pm; Evening 6.00 pm to 10.00 pm; Night-time 10.00 pm to 7.00 am
Morning Shoulder 6.00 am to 7.00 am
On Sundays and Public Holidays, Daytime 8.00 am to 6.00 pm; Evening 6.00 pm to 10.00 pm; Night-time 10.00 pm to 8.00 am

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
L_{aeq} – The equivalent continuous noise level is defined as the level of noise equivalent to the energy average of noise levels occurring over a measurement period.
*Has been adjusted in accordance with INP Application Notes

The results of long-term unattended background noise monitoring indicates that the calculated Rating Background Level (RBL, defined in the INP) for the evening period is higher than the RBL for the day time period at monitoring location 1. These situations can often arise due to increased noise from, for example, insects or frogs during the evening in the warmer months or due to temperature inversion conditions during winter.

The RBL is used in determining relevant noise criteria for an industrial development. The intrusiveness criterion essentially means that the equivalent continuous noise level (L_{Aeq}) of the source should not be more than five decibels above the measured background level (L_{A90}).

In determining Project Specific Noise Criteria the INP Application Notes state that the community's expectation also needs to be considered. The community generally expects greater control of noise during the more sensitive evening and night-time periods than the less sensitive daytime period. Therefore, in determining project-specific noise criteria for a particular development, it is generally recommended that the intrusive noise criteria for evening be set at no greater than the intrusive noise criteria for daytime. The intrusive noise criteria for night-time should be no greater than the intrusive noise level for day or evening.

In this case, given that the lowest measured RBL between the day, evening and night- time period was during the day at monitoring location 1, the day RBL would be utilised in determining relevant Project Specific Noise Criteria for the evening time period at location 1.

The background noise levels presented in **Table 17** have not been affected by noise from the existing Newstan Colliery activities and therefore are applicable levels to be used in the establishment of Project Specific Noise Criteria.

6.2 Cooranbong Entry Site

An ambient noise survey conducted as part of SLR's previous report 'Mandalong Mine – Cooranbong Entry Site Noise Impact Assessment' (refer to report 670.10120-R1) dated 18 April 2012, has been used to establish the Project Specific Noise Criteria.

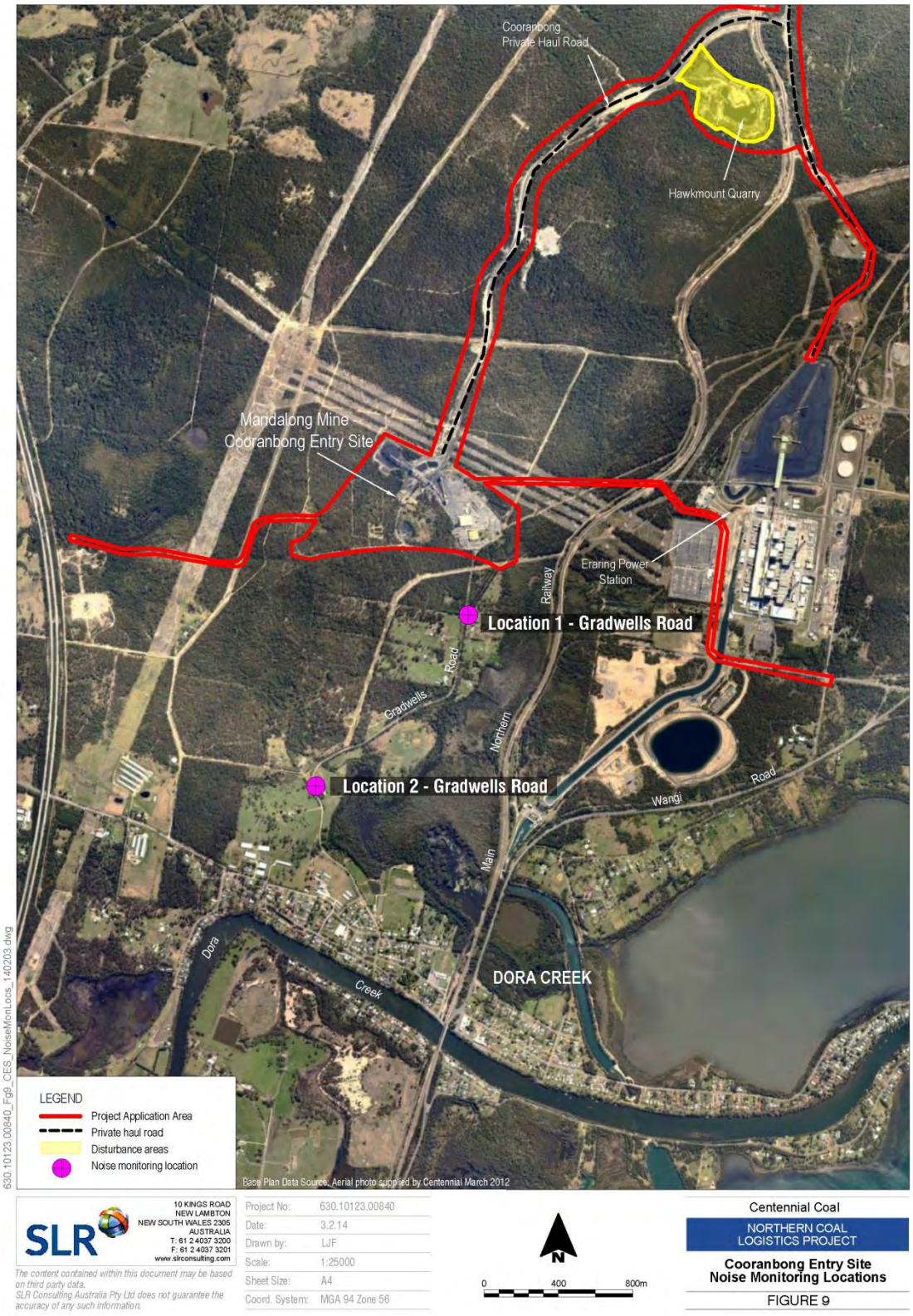
6.2.1 General Methodology

Ambient noise surveys were conducted to characterise and quantify the existing acoustical environment in the area surrounding the Project Site. A background monitoring survey was undertaken at two (2) residential locations on Gradwells Road considered representative of the nearest potentially-affected noise-sensitive receivers to the Project Site. The noise monitoring locations are shown in **Figure 9**.

The background noise monitoring consisted of continuous unattended noise logging and operator attended noise surveys. The operator attended noise surveys help to define noise sources and the character of noise in the area and are, therefore, used to qualify unattended noise logging results.

All acoustic instrumentation employed throughout the monitoring programme was designed to comply with the requirements of AS IEC 61672 (parts 1 and 2) 2004 "Electroacoustics – Sound Level Meters" and carries current NATA or manufacturer calibration certificates. Instrument calibration was checked before and after each measurement survey, with the variation in calibrated levels not exceeding ±0.5 dBA.

Figure 9 Cooranbong Entry Site Noise Monitoring Locations



6.2.2 Unattended Continuous Noise Monitoring

Background noise levels were monitored by SLR. The objective of the background noise survey was to measure $L_{A90(period)}$ and $L_{aeq(15minute)}$ noise levels at the nearest potentially affected residential locations during the day, evening and night-time periods to enable the determination of the intrusiveness and amenity criteria for the Project.

Background noise levels were monitored at two separate locations, considered to be representative of the nearest potentially affected receivers, from Wednesday 11 August 2010 to Thursday 19 August 2010, inclusive at logger location 1 and from Wednesday 31 August 2011 to Saturday 10 September 2011, inclusive at logger location 2. Details of monitoring locations are provided in **Table 18** and **Figure 9**.

Table 18 Ambient Noise Monitoring Locations

Location	Address Location Description	Logger Serial No.
Location 1	Gradwells Road, Dora Creek	194528
Location 2	Gradwells Road, Dora Creek	16-306-039

ARL Type EL215 and EL316 noise loggers were used to monitor the ambient noise levels at each location. The noise loggers were programmed to record statistical noise level indices continuously in 15 minute intervals, including L_{amax}, L_{A1}, L_{A50}, L_{A90}, L_{A99}, L_{amin} and L_{aeq}. Precautions were taken to minimise influences from extraneous noise sources and reflections from adjacent buildings.

Weather data for the survey period was obtained from the BOM weather station located at Cooranbong (approximately 5 km south west of the Cooranbong Entry Site). Noise data corresponding to periods of rainfall and/or wind speeds in excess of 5 m/s (approximately 9 knots) were discarded in accordance with INP data exclusion methodology. A summary of the results of the background surveys is given in **Table 17**.

Table 19 Summary of Existing Ambient Noise Levels

Location	Period	Measured Background L_{A90} Noise Level	Adopted Rating Background Level	Measured $L_{Aeq(Period)}$	Estimated Existing Industrial (non-Cooranbong) Contribution L_{aeq}
Location 1	Daytime	37 dBA	37 dBA	56 dBA	40 dBA
	Evening	41 dBA	37 dBA*	49 dBA	43 dBA
	Night-time	40 dBA	37 dBA*	50 dBA	43 dBA
Location 2	Daytime	37 dBA	37 dBA	52 dBA	39 dBA
	Evening	44 dBA	37 dBA*	49 dBA	43 dBA
	Night-time	40 dBA	37 dBA*	49 dBA	43 dBA

Note: Daytime 7.00 am to 6.00 pm; Evening 6.00 pm to 10.00 pm; Night-time 10.00 pm to 7.00 am
Morning Shoulder 6.00 am to 7.00 am
On Sundays and Public Holidays, Daytime 8.00 am to 6.00 pm; Evening 6.00 pm to 10.00 pm; Night-time 10.00 pm to 8.00 am

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
LA_{eq} – The equivalent continuous noise level is defined as the level of noise equivalent to the energy average of noise levels occurring over a measurement period.

*Has been adjusted in accordance with INP Application Notes

The results of long-term unattended background noise monitoring indicates that the calculated Rating Background Level (RBL, defined in the INP) for the evening and night-time period is higher than the RBL for the day time period at monitoring locations 1 and 2. These situations can often arise due to increased noise from, for example, insects or frogs during the evening in the warmer months or due to temperature inversion conditions during winter.

The RBL is used in determining relevant noise criteria for an industrial development. The intrusiveness criterion essentially means that the equivalent continuous noise level (L_{aeq}) of the source should not be more than five decibels above the measured background level (L_{A90}).

In determining Project Specific Noise Criteria the INP Application Notes state that the community's expectation also needs to be considered. The community generally expects greater control of noise during the more sensitive evening and night-time periods than the less sensitive daytime period. Therefore, in determining project-specific noise criteria for a particular development, it is generally recommended that the intrusive noise criteria for evening be set at no greater than the intrusive noise criteria for daytime. The intrusive noise criteria for night-time should be no greater than the intrusive noise level for day or evening.

In this case, given that the lowest measured RBL between the day, evening and night- time period was during the day at monitoring locations 1 and 2, the day RBL would be utilised in determining relevant Project Specific Noise Criteria for the evening and night-time time period at locations 1 and 2.

The background noise levels presented in **Table 19** have not been affected from the existing Cooranbong Entry Site activities and therefore are applicable levels to be used in the establishment of Project Specific Noise Criteria.

6.3 Awaba Colliery

An ambient noise survey conducted as part of SLR's previous report 'Awaba Colliery Mining Project Part 3A Application Noise Impact Assessment' (refer to report 630.02497-R2 Revision 3) dated 24 February 2011, has been used to establish the Project Specific Noise Criteria.

It is relevant to note that Awaba Colliery does not form part of the project application area. However, it is representative of the existing environment around the Awaba Private Haul Road, which is proposed to be utilised by the Project.

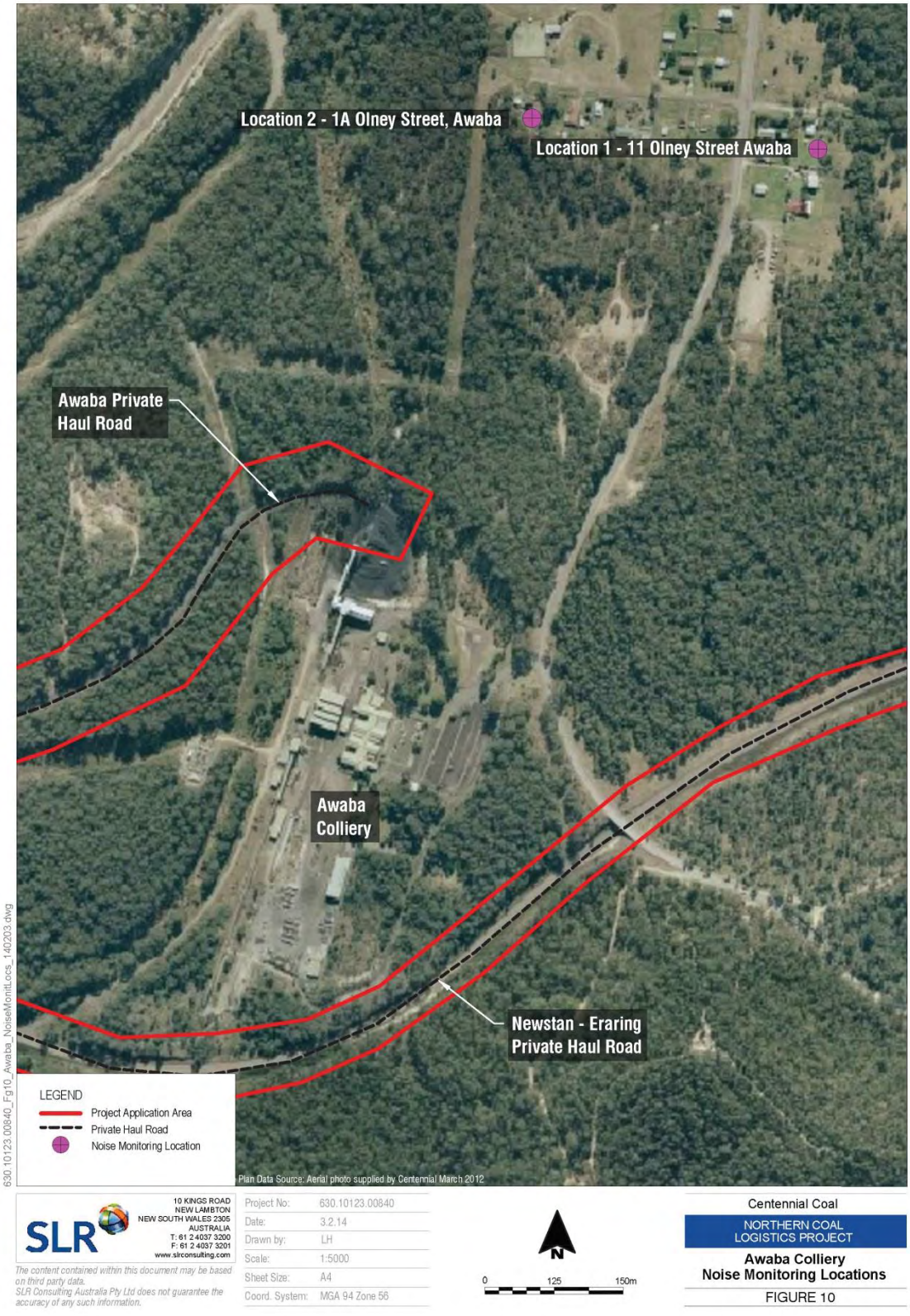
6.3.1 General Methodology

Ambient noise surveys were conducted to characterise and quantify the existing acoustical environment in the area surrounding the Awaba Colliery. A background monitoring survey was undertaken at two (2) residential locations on Olney Street, Awaba, considered representative of the nearest potentially-affected noise-sensitive receivers to the Awaba Colliery. The noise monitoring locations are shown in **Figure 10.**

The background noise monitoring consisted of continuous, unattended noise logging and operator attended noise surveys. The operator attended noise surveys help to define noise sources and the character of noise in the area and are, therefore, used to qualify unattended noise logging results.

All acoustic instrumentation employed throughout the monitoring programme was designed to comply with the requirements of AS IEC 61672.1-2004and carries current NATA or manufacturer calibration certificates. Instrument calibration was checked before and after each measurement survey, with the variation in calibrated levels not exceeding ±0.5 dBA.

Figure 10 Awaba Colliery Noise Monitoring Locations



6.3.2 Unattended Continuous Noise Monitoring

Background noise levels were monitored by SLR. The objective of the background noise survey was to measure $L_{A90(period)}$ and $L_{Aeq(15minute)}$ noise levels at the nearest potentially affected residential locations during the day, evening and night-time periods to enable the determination of the intrusiveness and amenity criteria for the project.

Background noise levels were monitored at two separate locations, considered to be representative of the nearest potentially affected receivers, from Tuesday 30 March to Friday 9 April 2010, inclusive. Details of monitoring locations are provided in **Table 18**.

Table 20 Ambient Noise Monitoring Locations

Location	Address Location Description	Logger Serial No.
Location 1	11 Olney Street, Awaba Logger located in backyard, on Eastern boundary fence.	16-306-039
Location 2	1A Olney Street, Awaba Logger located in backyard, on Eastern boundary fence.	16-203-509

ARL Type EL316 noise loggers were used to monitor the ambient noise levels at each location. The noise loggers were programmed to record statistical noise level indices continuously in 15 minute intervals, including L_{Amax}, L_{A1}, L_{A50}, L_{A90}, L_{A99}, L_{Amin} and L_{Aeq}. Precautions were taken to minimise influences from extraneous noise sources and reflections from adjacent buildings.

Weather data for the survey period was obtained from the BOM weather station located at Cooranbong (approximately 13 km south west of the Awaba Colliery Surface Site). Noise data corresponding to periods of rainfall and/or wind speeds in excess of 5 m/s (approximately 9 knots) were discarded in accordance with INP data exclusion methodology. A summary of the results of the background surveys is given in **Table 21**.

Table 21 Summary of Existing Ambient Noise Levels

Location	Period	Background L_{A90} Noise Level	Adopted Rating Background Level	Measured $L_{Aeq(Period)}$	Estimated Existing Industrial Contribution L_{Aeq}
		Rating Background Level			
Location 1 11 Olney Street, Awaba	Day	33 dBA	33 dBA	50 dBA	None discernible
	Evening	38 dBA	33 dBA*	52 dBA	
	Night	36 dBA	33 dBA*	45 dBA	
Location 2 1A Olney Street, Awaba	Day	33 dBA	33 dBA	51 dBA	
	Evening	34 dBA	33 dBA*	53 dBA	
	Night	31 dBA	31 dBA	47 dBA	

Note: Daytime 7.00 am to 6.00 pm; Evening 6.00 pm to 10.00 pm; Night-time 10.00 pm to 7.00 am
Morning Shoulder 6.00 am to 7.00 am
On Sundays and Public Holidays, Daytime 8.00 am to 6.00 pm; Evening 6.00 pm to 10.00 pm; Night-time 10.00 pm to 8.00 am
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
L_{Aeq} - The equivalent continuous noise level is defined as the level of noise equivalent to the energy average of noise levels occurring over a measurement period
*Has been adjusted in accordance with INP Application Notes

The results of long-term unattended background noise monitoring indicates that the calculated Rating Background Level (RBL, defined in the INP) for the evening and night-time period is higher than the RBL for the day time period at monitoring locations 1. Also, The results of long-term unattended background noise monitoring for the evening period is higher than the RBL for the day time period at monitoring locations 2. These situations can often arise due to increased noise from, for example, insects or frogs during the evening in the warmer months or due to temperature inversion conditions during winter.

The RBL is used in determining relevant noise criteria for an industrial development. The intrusiveness criterion essentially means that the equivalent continuous noise level (L_{Aeq}) of the source should not be more than five decibels above the measured background level (L_{A90}).

In determining Project Specific Noise Criteria the INP Application Notes state that the community's expectation also needs to be considered. The community generally expects greater control of noise during the more sensitive evening and night-time periods than the less sensitive daytime period. Therefore, in determining project-specific noise criteria for a particular development, it is generally recommended that the intrusive noise criteria for evening be set at no greater than the intrusive noise criteria for daytime. The intrusive noise criteria for night-time should be no greater than the intrusive noise level for day or evening.

In this case, given that the lowest measured RBL between the day, evening and night- time period was during the day at monitoring locations 1, the day RBL would be utilised in determining relevant project specific noise criteria for the evening and night-time time period at locations 1. Furthermore, that the lowest measured RBL between the day, evening period was during the day at monitoring locations 2, the day RBL would be utilised in determining relevant Project Specific Noise Criteria for the evening period at locations 2.

It is noted that the monitoring period coincided with the Easter long-weekend and school holiday period. It is anticipated that this would not significantly affect the measured ambient noise levels in the area. It is also noted that mining operations were not being conducted at Awaba Colliery for the duration of the unattended monitoring due to a scheduled shut-down period. Therefore the background noise levels presented in **Table 21** have not been affected by existing Awaba Colliery activities and are applicable levels to be used in the establishment of Project Specific Noise Criteria.

7 EFFECTS OF METEOROLOGY ON NOISE LEVELS

7.1 Wind

Wind has the potential to increase noise at a receiver when it is light and stable and blows from the direction of the source of the noise. As the strength of the wind increases the noise produced by the wind will obscure noise from most industrial and transport sources.

Wind effects need to be considered when wind is a feature of the area under consideration (in accordance with the INP). Where wind blows from the source to the receiver at speeds up to 3 m/s for more than 30% of the time in any season, then wind is considered to be a feature of the area and noise level predictions must be made under these conditions.

The INP provides two methods to assess wind effects; analysis of relevant weather data to determine whether wind is a feature based on the frequency of occurrence and wind speed (*detailed approach*) or simply assume that wind is a feature of the area (*simple approach*). Wind speed and direction data, among other parameters, have been measured at the BoM automated weather station (AWS) at Cooranbong (Station Number 061412) for many years. Thus, a detailed approach has been utilised for the purpose of this assessment.

In order to determine the prevailing conditions for the Project Application Area, four (4) years of weather data (2008, 2009, 2010 and 2011) was obtained from the BoM AWS at Cooranbong (Station Number 061412), approximately 5 km southwest of the Cooranbong Entry Site.

This data was analysed to determine the frequency of occurrence of winds of speeds up to 3 m/s in each season during the day, evening and night time periods. The results of the wind analysis for daytime, evening, and night-time winds are presented in **Table 22**, **Table 23** and **Table 24.**

respectively. In each table, the wind directions and percentage occurrence are those dominant during each season. The percentage occurrence figures provided in bold are those that exceed the 30% threshold.

Table 22 Seasonal Frequency of Occurrence of Wind Speed Intervals – Daytime

Period	Calm	Wind Direction	0.5 – 2 m/s	2 – 3 m/s	0.5 – 3 m/s
Summer	3.3%	S±45^0	5.1%	8.7%	13.8%
Autumn	15.6%	SSW±45^0	7.4%	10.4%	17.8%
Winter	20.7%	SW±45^0	12.6%	6.9%	19.5%
Spring	6.4%	ESE±45^0	5.3%	8.3%	13.6%

Table 23 Seasonal Frequency of Occurrence of Wind Speed Intervals – Evening

Period	Calm	Wind Direction	0.5 – 2 m/s	2 – 3 m/s	0.5 – 3 m/s
Summer	29.1%	S±45^0	13.5%	10.3%	23.8%
Autumn	53.2%	SSW±45^0	9.0%	4.9%	13.9%
Winter	57.6%	NNW±45^0	14.3%	3.7%	18.0%
Spring	46.0%	NNW±45^0	9.3%	4.1%	13.4%

Table 24 Seasonal Frequency of Occurrence of Wind Speed Intervals – Night

Period	Calm	Wind Direction	0.5 – 2 m/s	2 – 3 m/s	0.5 – 3 m/s
Summer	53.7%	SSW±45^0	15.6%	8.2%	23.8%
Autumn	66.1%	SSW±45^0	8.9%	4.7%	13.6%
Winter	62.3%	NNW±45^0	11.1%	3.8%	15.0%
Spring	61.9%	NNW±45^0	7.4%	3.9%	11.3%

From the above weather data, significant wind (i.e. wind speed of up to 3 m/s) was recorded but not more than the assessment threshold of 30% during the period between 2008 and 2011 and therefore prevailing winds were not considered in this assessment.

The data set utilised for the purpose of the NIA may differ to that utilised in other environmental impact assessments including, but not limited to, air quality. Whilst the starting point for each assessment may be similar, the requirements for meteorological data vary, as stated in guidance documentation from the appropriate regulatory authorities.

The factors considered in selecting the meteorological data for use in an air quality impact assessment can be considerably different to those that need to be considered when compiling data for a noise impact assessment.

Worst case noise impacts tend to occur under conditions of low wind speeds when there is little atmospheric turbulence to dissipate the noise emissions. Impacts resulting from particulate emissions tend to be greatest under moderate to strong wind speeds, when wind-blown dust is generated and particulate matter can be carried significant distances before settling out of the air.

Dust impacts are also assessed based on longer term averages (24-hour and annual averages), whereas noise and odour nuisance impacts are more likely to be associated with peak events.

Furthermore, the weather dataset as a whole is required to contain different meteorological parameters to assess the noise impacts or air quality impacts. For example, for air quality impacts, the mixing heights in the dataset are required to assess the vertical dispersion of pollutants which can have a significant impact on the resultant ground level concentration at the discrete receptors. Whereas for noise impacts, the mixing heights do not directly influence the noise levels experienced.

For these reasons, the meteorological data used in this assessment is likely to differ from that used in the assessment of air quality impacts from the Project.

Appendix D provides further discussion with regard to the requirements for weather data and how it is analysed for the purpose of the NIA.

7.2 Temperature Inversion

Temperature inversions, when they occur, have the ability to increase noise levels by focusing sound waves. Temperature inversions occur predominantly at night during the winter months. For a temperature inversion to be a significant characteristic of the area it needs to occur for approximately 30% of the total night-time during winter, or about two nights per week.

Meteorological data was available from the BoM AWS at Cooranbong (Station Number 061412) to allow the determination of the percentage occurrence of temperature inversions during winter nights. The most complete temperature inversion data was contained in the years 2008 to 2011.

The INP states: '*Temperature inversions occur during E, F and G stability categories. These three categories are considered to represent weak, moderate and strong inversions respectively. For noise-assessment purposes, only moderate and strong inversions are considered significant enough to require assessment*'.

In dispersion modelling, stability class is used to categorise the rate at which a plume will disperse. In the Pasquill-Gifford stability class assignment scheme there are six stability classes, A through to F. Class A relates to unstable conditions, such as might be found on a sunny day with light winds. Class F relates to stable conditions, such as those that occur when the sky is clear, the winds are light and an inversion is present. The intermediate classes B, C, D and E relate to intermediate dispersion conditions. A seventh class, G, has also been defined to accommodate extremely stable conditions such as might be found in arid rural areas.

An analysis of the occurrence of each stability class has been conducted and is provided in **Table 25**

Table 25 Seasonal Frequency of Occurrence of Temperature Inversion – Night

Stability Class	Winter
A	0.0%
B	0.0%
C	0.0%
D	9.3%
E	7.6%
F	**33.6%**
G	**49.4%**
F+G	83.0%

Results of the analysis is provided in **Table 25** indicate that temperature inversions occur in the area and have therefore been considered as part of this noise assessment.

8 PROJECT SPECIFIC NOISE CRITERIA

8.1 Newstan Colliery Surface Site

8.1.1 Operational Noise Design Criteria

The noise emission design criteria for the Project have been established with reference to the INP outlined in **Section 5** of this report.

The ambient noise survey conducted as part of SLR's previous report 'Newstan Colliery Noise Impact Assessment' (refer to report 630.10002.00000R1) dated 28 April 2011, Identified that local and distant continuous road traffic, rail noise, the natural environment and residential activity are the main contributors to the ambient noise environment during the all monitoring periods at each monitoring location. As such, the acoustical environment typifies a suburban environment; "*an area that has local traffic with characteristically intermittent traffic flows or with some limited commerce or industry"* (INP). Therefore, the residences in the general area have been assessed as "suburban" receiver types.

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The amenity criteria have been established using the results of ambient noise measurements. At both monitoring locations, the existing industrial L_{eq} noise levels are more than 6 dBA below the acceptable noise levels described in **Table 6** therefore, the amenity criteria is equal to the acceptable noise level (refer **Section 5.1**).

In accordance with the INP, the project specific noise levels reflect the most stringent noise level requirements from the noise levels derived from both the intrusive and amenity criteria. Applying the most stringent requirement as the Project Specific Noise Criteria ensures that both intrusive noise is limited and amenity is protected.

The resulting operational Project Specific Noise Criteria for residences and sensitive receiver locations NC1 to NC6 (see **Figure 5**) will be based on L_{A90} and L_{Aeq} noise levels measured at Location 1 - 366 Miller Road, Wakefield and Location 2-16 Miller Road, Fassifern (see **Figure 8**). The noise environment at Location 1 - 366 Miller Road, Wakefield has been assumed to be representative of the noise environments at Residences NC1 to NC2. Similarly the noise environment at Location 2 - 16 Miller Road, Fassifern has been assumed to be representative of the noise environment at Residences NC3 to NC6.

Intrusive criteria for morning shoulder has been determined based on measured RBL. Amenity criteria for the morning shoulder has been calculated as the arithmetic average of that for day and night periods.

The resulting operational Project Specific Noise Criteria for the Project are shown in **Table 26**.

Table 26 Project Specific Noise Criteria

Location	Period	Measured Background Noise Level (LA90)	Adopted RBL LA90	Intrusiveness Criteria LAeq(15minute)	Amenity Criteria LAeq(Period)	Project Specific Noise Criteria LAeq(15min)
NC1 NC2	Morning Shoulder	41 dBA	41 dBA	46 dBA	48 dBA	**46 dBA**
	Day	36 dBA	36 dBA	41 dBA	55 dBA	**41 dBA**
	Evening	39 dBA	36 dBA	41 dBA	45 dBA	**41 dBA**
	Night	31 dBA	31 dBA	36 dBA	40 dBA	**36 dBA**
NC3 NC4 NC5	Morning Shoulder	40 dBA	40 dBA	45 dBA	48 dBA	**45 dBA**
	Day	39 dBA	39 dBA	44 dBA	55 dBA	**44 dBA**
	Evening	39 dBA	39 dBA	44 dBA	45 dBA	**44 dBA**
	Night	30 dBA	30 dBA	35 dBA	40 dBA	**35 dBA**
NC6	Noisiest 1-hour period when in use	N/A			35 dBA – School classroom internal	**35 dBA (School Classroom internal)**
	When in use				55 dBA School Playground	**55 dBA (School Playground)**

Note: Daytime 7.00 am to 6.00 pm; Evening 6.00 pm to 10.00 pm; Night-time 10.00 pm to 7.00 am
Morning Shoulder 6.00 am to 7.00 am

8.1.2 Sleep Disturbance Noise Goals

The relevant sleep disturbance noise goals for each residential area are provided in **Table 27**.

Table 27 Sleep Disturbance Noise Goals

Location	Period	Measured Background Noise Level (LA90)	Adopted RBL* LA90	Sleep Disturbance Noise Goal
NC1 and NC2	Morning Shoulder	41 dBA	41 dBA	**56 dBA**
	Night	31 dBA	31 dBA	**46 dBA**
NC3, NC4, NC5	Morning Shoulder	40 dBA	40 dBA	**55 dBA**
	Night	30 dBA	30 dBA	**45 dBA**
NC6		N/A	N/A	N/A	**N/A**

Note: Daytime 7.00 am to 6.00 pm; Evening 6.00 pm to 10.00 pm; Night-time 10.00 pm to 7.00 am
Morning Shoulder 6.00 am to 7.00 am

* For the purposes of determining the relevant sleep disturbance noise goal the adopted RBL has been calculated such that the background noise level excludes the existing contribution of Newstan Colliery.

* For the purposes of determining the relevant project specific noise criteria the adopted RBL has been chosen such that the intrusive noise goal (RBL+5dBA) for evening is no greater than that determined for the daytime period and the intrusive noise goal for night is no greater than that determined for the day or evening period. This is consistent with information provided in the EPA *Application Notes - NSW Industrial Noise Policy*.

The RNP provides further guidance with regard to sleep disturbance and calls upon a number of studies that have been conducted into the effect of maximum noise levels on sleep. The EPA policy document acknowledges that, at the current level of understanding, it is not possible to establish absolute noise level criteria that would correlate to an acceptable level of sleep disturbance. However, the RNP provides that maximum internal noise levels below 50 dBA to 55 dBA are unlikely to cause awakening reactions and one or two events per night, with maximum internal noise levels of 65 dBA to 70 dBA (inside dwellings) are not likely to significantly affect health and wellbeing.

8.2 Cooranbong Entry Site

8.2.1 Operational Noise Design Criteria

The noise emission design criteria for the project have been established with reference to the INP outlined in **Section 5** of this report.

The ambient noise conducted as part of SLR's previous report 'Mandalong Mine – Cooranbong Entry Site Noise Impact Assessment' (refer to report 670.10120-R1) dated 18 April 2012, Identified that local and distant continuous road traffic, rail noise, the natural environment and continuous noise from Eraring Power Station are the main contributors to the ambient noise environment. As such, the acoustical environment typifies a urban environment; "*an area with an acoustical environment that: is dominated by 'urban hum' or industrial source noise, has through traffic with characteristically heavy and continuous traffic flows during peak periods, is near commercial districts or industrial district"* (INP). Therefore, the residences in the general area have been assessed as "urban" receiver types.

The amenity criteria have been established using the results of ambient noise measurements. At both monitoring locations, the existing industrial L_{eq} noise levels are more than 6 dBA below the acceptable noise levels described in **Table 6** for the day and evening periods, therefore, the amenity criteria is equal to the acceptable noise level (refer **Section 5.1**). However, the existing industrial L_{Aeq} noise level is 2 dBA below the acceptable noise levels described in **Table 6** for the night-time period therefore, the amenity criteria is equal to the acceptable noise level minus 4dB (refer **Section 5.1**).

The resulting operational Project Specific Noise Criteria for residences (see **Figure 6**) will be based on L_{A90} and L_{Aeq} noise levels measured at Logger Location 1 and Logger Location 2 (see **Figure 9**). The noise environment at Location 1 has been assumed to be representative of the noise environment at Residences 22, 23, 26, 28 and 32. Similarly the noise environment at Location 2 has been assumed to be representative of the noise environment at Residences 30, 31, 33 and 35.

The resulting operational Project Specific Noise Criteria for the Project are shown in **Table 28**.

Table 28 Project Specific Noise Criteria

Location	Period	Measured Background Noise Level (L_{A90})	Adopted RBL L_{A90}	Intrusiveness Criteria $L_{Aeq(15minute)}$	Amenity Criteria $L_{Aeq(Period)}$	Project Specific Noise Criteria $L_{Aeq(15min)}$
Residential Receiver Locations 22, 23, 26, 28, 32	Day	37 dBA	37 dBA	42 dBA	60 dBA	**42** dBA
	Evening	41 dBA	37 dBA	42 dBA	50 dBA	**42** dBA
	Night	40 dBA	37 dBA	42 dBA	41[1] dBA	**41**[1] dBA
Residential Receiver Locations 30, 31, 33, 35	Day	37 dBA	37 dBA	42 dBA	60 dBA	**42** dBA
	Evening	44 dBA	37 dBA	42 dBA	50 dBA	**42** dBA
	Night	40 dBA	37 dBA	42 dBA	41[1] dBA	**41**[1] dBA

Notes: Daytime 7.00 am to 6.00 pm; Evening 6.00 pm to 10.00 pm; Night-time 10.00 pm to 7.00 am Morning Shoulder 6.00 am to 7.00 am

1. As described in Section 5.1, a modification factor of minus 4 dBA has been applied to acceptable noise level to account for existing level of industrial noise.

* For the purposes of determining the relevant project specific noise criteria the adopted RBL has been chosen such that the intrusive noise goal (RBL+5dBA) for evening is no greater than that determined for the daytime period and the intrusive noise goal for night is no greater than that determined for the day or evening period. This is consistent with information provided in the EPA *Application Notes - NSW Industrial Noise Policy*.

8.2.2 Sleep Disturbance Noise Goals

The relevant sleep disturbance noise goals for each residential area are provided in **Table 29**.

Table 29 Sleep Disturbance Noise Goals

Location	Period	Measured Background Noise Level (L_{A90})	Adopted RBL* L_{A90}	Sleep Disturbance Noise Goal
All Residential Receiver Locations surrounding Mandalong Mine – Cooranbong Entry Site	Night	40 dBA	37 dBA	**52 dBA**

* For the purposes of determining the relevant sleep disturbance noise goal the adopted RBL has been calculated such that the background noise level excludes the existing contribution from the Project Site.

8.3 Private Haul Roads

8.3.1 Operational Noise Design Criteria

The noise emission design criteria for the project have been established with reference to the INP outlined in **Section 5** of this report.

The ambient noise survey conducted as part of SLR's previous report ' Awaba Colliery Mining Project Part 3A Application Noise Impact Assessment' (refer to report 630.02497-R2 Revision 3) dated 24 February 2011, identified that local road traffic, rail noise , the natural environment and residential activity are the main contributors to the ambient noise environment. As such, the acoustical environment typifies a suburban environment; "*an area that has local traffic with characteristically intermittent traffic flows or with some limited commerce or industry"* (INP). Therefore, the residences in the general area have been assessed as "suburban" receiver types.

The amenity criteria have been established using the results of ambient noise measurements. At both monitoring locations, the existing industrial L_{Aeq} noise levels are more than 6 dBA below the acceptable noise levels described in **Table 6** therefore, the amenity criteria is equal to the acceptable noise level (refer to **Section 5.1**).

The resulting operational Project Specific Noise Criteria for residences NC7 to NC11 (see **Figure 7**) will be based on the lower of the two L_{A90} and L_{Aeq} noise levels measured at Location 1 – 11 Olney Street, Awaba and Location 2 – 1A Olney Street, Awaba (see **Figure 10**). The noise environment at Location 2 – 1A Olney Street, Awaba has been assumed to be representative of the noise environment at Residences NC7 to NC11.

The resulting operational Project Specific Noise Criteria for the Project are shown in **Table 30**.

Table 30 Project Specific Noise Criteria

Location	Period	Measured Background Noise Level (LA90)	Adopted RBL* LA90	Intrusiveness Criteria $L_{Aeq(15minute)}$	Amenity Criteria $L_{Aeq(Period)}$	Project Specific Noise Criteria
Residential Location NC7 to NC11	Day	33 dBA	33 dBA	38 dBA	55 dBA	**38 dBA**
	Evening	34 dBA	33 dBA	38 dBA	45 dBA	**38 dBA**
	Night	31 dBA	31 dBA	36 dBA	40 dBA	**36 dBA**

Note: Daytime 7.00 am to 6.00 pm; Evening 6.00 pm to 10.00 pm; Night-time 10.00 pm to 7.00 am
* For the purposes of determining the relevant project specific noise criteria the adopted RBL has been chosen such that the intrusive noise goal (RBL+5dBA) for evening is no greater than that determined for the daytime period and the intrusive noise goal for night is no greater than that determined for the day or evening period. This is consistent with information provided in the EPA *Application Notes - NSW Industrial Noise Policy*.

8.3.2 Sleep Disturbance Noise Goals

The relevant sleep disturbance noise goals for each residential area are provided in **Table 31**.

Table 31 Sleep Disturbance Noise Goals

Location	Period	Measured Background Noise Level (LA90)	Adopted RBL* LA90	Sleep Disturbance Noise Goal
Residential Receivers NC7 to NC11	Night	31 dBA	31 dBA	**46 dBA**

* For the purposes of determining the relevant sleep disturbance noise goal the lowest measured RBL (for day, evening and night-time periods) has been adopted.

8.4 Road Traffic Noise Goals

Table 9 and **Table 10** provide the relevant project specific operational and construction road traffic noise goals that are applicable for the Project.

Table 32 Project Specific Road Traffic Noise Assessment Criteria for Residential Land Uses

Road	Assessment criteria – dB(A)	
	Day (7 a.m.–10 p.m.)	**Night (10 p.m.–7 a.m.)**
Newport Road Miller Road Macquarie/Fassifern Road	LAeq, (15 hour) 60 (external)	LAeq, (9 hour) 55 (external)
Gradwells Road	LAeq, (1 hour) 55 (external)	LAeq, (1 hour) 50 (external)

Table 33 Project Specific Road Traffic Noise Assessment Criteria for Non-Residential Land Uses Affected by Proposed Road Projects and Traffic Generating Developments

Existing sensitive land Use	Assessment criteria – dB(A)	
	Day (7 a.m.–10 p.m.)	**Night (10 p m.–7 a.m.)**
Fassifern Public School	LAeq, (1 hour) 40 (internal) when in use	-

Cooranbong Entry Site to Newstan Colliery Private aul roads

Noise from vehicles travelling on private road associated with the Project has been assessed as an industrial noise source under the NSW Industrial Noise Policy (Environment Protection Authority 2000).

8.5 Construction Noise Goals

8.5.1 Newstan Colliery Surface Site

Similar to the intrusive Project Specific Noise Criteria, the adopted project specific noise goal for construction activities is background (refer to **Table 17**) plus 10 dBA (L_{A90} + 10 dBA) for standard hours. **Table 34** presents the noise goals for construction activities at the Newstan Colliery Surface Site.

The resulting construction Project Specific Noise Criteria for residences and sensitive receiver locations R1 to R6 (see **Figure 5**) will be based on L_{A90} and L_{Aeq} noise levels measured at Location 1 – 366 Miller Road, Wakefield and Location 2-16 Miller Road, Fassifern (see **Figure 8**). The noise environment at Location 1 – 366 Miller Road, Wakefield will most likely be assumed to be representative of the noise environments at Residences NC1 to NC2. Similarly the noise environment at Location 2 – 16 Miller Road, Fassifern will most likely be assumed to be representative of the noise environments at Residences NC3 to NC6.

Table 34 Construction Noise Goals

Residential Location	Period	Noise Goal (Laeq,15minute) (dBA)	
		Noise Affected	**Highly Noise Affected**
NC1	Recommended Standard Hours	46 dBA	75 dBA
NC2		46 dBA	
NC3		49 dBA	
NC4		49 dBA	
NC5		49 dBA	
NC6		Internal noise level 45 dBA	N/A

Recommended standard hours for construction are between the hours of 7.00 am and 6.00 pm Monday to Friday.

8.5.2 Cooranbong Entry Site

Construction activities are not proposed to occur at this site as part of the Project. Therefore, assessment of construction noise is not required for this site.

8.6 Rail Noise Goals

Table 35 provides the relevant project specific rail noise goals that are applicable for the Project.

Table 35 Rail Noise Assessment Trigger Levels for Rail Traffic Generating Developments

Descriptor	Residential noise trigger levels (dBA)
LAeq(15hour)	60 dBA
LAeq(9hour)	55 dBA
Maximum Passby LAmax (95^{th} percentile)	80 dBA

Note: 95^{th} percentile equates to the 5% exceedance value.

8.7 Operational Vibration Goals

Table 12 & **Table 15** provide the relevant project specific operational vibration goals that are applicable for the Project

9 OPERATIONAL NOISE IMPACT ASSESSMENT

9.1 Acoustically Significant Noise Sources

Where possible, noise measurements have been conducted of acoustically significant plant and equipment utilised during operations at the surface facilities. Sound power levels of such plant have been determined and utilised for the purpose of this NIA. Where on-site measurements could not be conducted, sound power levels have been obtained from a SLR database of similar equipment. The relevant acoustically significant plant and equipment and the associated sound power levels are provided in **Table 36** and details of these levels are given in **Appendix B.**

It should be noted that the plant and equipment utilised underground is not anticipated to influence noise levels experienced at the nearest sensitive receptors and therefore plant and equipment used underground have not been considered as part of this NIA.

Furthermore, the proposed activities at Hawkmount Quarry have been assessed as part of the Newstan Surface Site Operations.

Table 36 Newstan Colliery Surface Site - Acoustically Significant Plant and Equipment

Plant and Equipment	Sound Power Level dBA
NEWSTAN COLLIERY SURFACE SITE	
SREA Operations	
Traxcavator	103
Compactor	106
2 x 27t Excavator	104
30t Excavator	104
Dozer D6T	107
2 x Dump Truck	103
Water Cart	105
Coal Truck (8 wheel truck)	103
Coal Truck Tipping Coal	102
NREA Operations	
Dozer D7	107
Coal Truck (8 wheel truck)	103
Coal truck tipping coal	102
Hawkmount Quarry Operations	
Front End Loader	106
Coal Truck tipping coal (8 wheel truck)	102
Coal Truck (8 wheel truck)	103
Coal Preparation Plant (CPP)	
Coal Preparation Plant (module 1) Ground Level	94[2]
Coal Preparation Plant (module 1) First Floor Level	97[2]
Coal Preparation Plant (module 1) Second Floor Level	98[2]
Coal Preparation Plant (module 1) Third Floor Level	95[2]

Plant and Equipment	Sound Power Level dBA
Coal Preparation Plant (module 1) Fourth Floor Level	94[2]
Coal Preparation Plant (module 2) All Floor levels	96[2]
Coal Preparation Plant Compressor	104
All Onsite Conveyors	97/100m
Trucks loading Coking Bin	106
Trucks Loading Reject Bin	106
Coal Handling Plant (CHP)	
Truck Loading at 2000t truck loading bin	105
Reclaim Conveyor Drive House	104
Reclaim Conveyor transfer House	118
Filling of the 4000t ROM Coal Bin	111
Filling of the 500t ROM Coal Bin	111
Conveyor Drift Drive	104
Loader	106
Dozer D9 (ROM Coal stockpile)	107
Truck Tipping Load at ROM Dump Hopper	102
2 x Vent Fan	93
Compressor House	101
Workshop (i.e. use of grinder)	104[1]
Coal Truck (8 wheel truck)	103
Forklift	93
Rail Loop	
4 x Coal Train Loco	101
Coal Train Wagons	92
Coal Train Loading Facility	105
Coal Train shunting	100
Dozer D11	111
Water Treatment Plant	
3 x Pumps	95[1]
COORANBONG ENTRY SITE	
Coal Handing Plant	
Coal Handling Plant (CHP)	100
Rotary Breaker	102
Rotary Breaker Drivehead House	108
Site Conveyors (per 100m)	97
Vent Fan	85
100,000t ROM Stockpile	
Front End Loader	112
Front End Loader (only required if transporting 4Mtpa to Newstan Colliery)	112
Dozer	107[1]

Plant and Equipment	Sound Power Level dBA
Coal Haul Truck	103
1200t Truck Loading Bin	
Coal Haul Truck Being Loaded with Coal	106
Coal Haul Truck	103
1500t Stockpile	
Front End Loader	112
Truck Dumping Coal	102
South Drift	
South drift drivehead house	104
South drift Conveyor	101
Servicing Shed	
Compressors	97
Exhaust Fan	92
Eraring Energy Operations	
Final Product Bin Drivehead house	109
Final Product Bin	95
Eraring Conveyor (per100m)	93

1 – Sound power levels for these sources have been obtained from a SLR database

2 – Internal Sound Pressure Level

All other sound power level data presented here has been obtained from noise measurements undertaken at the project site.

The Project will generate heavy vehicle traffic via the transportation of product coal, reject material and other material, as outlined above in **Section 3.6.4**, between Cooranbong Entry Site, Newstan Colliery Surface Site (including the SREA and NREA), Eraring Power Station, Hawkmount Quarry and Awaba Colliery Surface Site.

Importantly, all road haulage will be undertaken on the private haul roads (see **Section 3.6.4**) linking these facilities and will cumulatively generate, on average, 32 heavy vehicle movements per hour (16 two way trips per hour).

Table 37 provides the maximum onsite hourly haul road vehicle movements proposed for the Project.

Table 37 Coal Logistic Haul Road Vehicle Movements per Hour

Haul Road	Haul Road Vehicle Movements per Hour (two way traffic)			
	Morning Shoulder 6am – 7am	Day 7am – 6pm	Evening 6pm – 10pm	Night 10pm – 6am
Cooranbong Entry Site to Newstan Colliery Surface Site to Eraring Power Station to Awaba Colliery Surface Site	32	32	32	32

9.2 Existing and Approved Noise Mitigation

9.2.1 Newstan Colliery

In 2011, a noise impact assessment was undertaken by SLR to support a modification (Mod 4) to the Newstan Colliery Development Consent DA 73-11-98. The noise impact assessment identified a number of noise mitigation measures to be implemented in order for the operations at the Newstan Colliery Surface Site to achieve the relevant noise criteria.

The mitigation measures identified included:

Coal Preparation Plant (CPP Module 1)

- The sealing of all unnecessary openings in all the walls around the preparation plant;
- The continuance of the existing plant external walls down to the ground level;
- Fully enclosing exposed conveyors with the same Colorbond steel currently being used for the building and conveyors; and
- Replace alsynite panels on eastern wall with Colorbond steel.

Reclaim Conveyor Transfer House

- The sealing of all unnecessary openings in all the walls around the conveyor transfer house;
- The continuance of the existing plant external walls down to the ground level;
- Fully enclosing exposed conveyors with the same Colorbond steel currently being used for the building and conveyors; and
- Replace alsynite panels on eastern wall with Colorbond steel.

Implementation of these mitigation measures for the CPP Module 1 and the reclaim conveyor transfer house commenced in 2012 and are scheduled for completion in 2014.

Rail Loop Noise barrier

A 7.2 m high acoustic barrier on the south-eastern side of the coal train rail loop has been installed on site and provides noise mitigation for mobile plant operating around the rail loop stockpiles.

Private Haul Road

To manage noise from haulage trucks, Northern Coal Services has already adopted a fleet of haulage trucks that are designed to meet E5 European Standards and are typically quieter than standard haulage trucks used on public roads. The number of trucks operating on the haul roads is reduced by utilising larger capacity trucks and trailers to carry more material with additional efficiency gained by being able to back haul material from and between our northern operations and the power stations if and when required.

Table 38 identifies existing noise mitigation and management measures for the private haul roads.

Table 38 Noise Management and Mitigation Measures

Noise Management and Mitigation Measure	Implemented/To be Implemented
All haul trucks operations meet and pass Euro 5 standards.	Implemented
All haul trucks meet and surpass Australian ADR	Implemented

design standards regarding exhaust and engine braking noise.	
All haul truck engine braking systems are controlled by an ECU, so when used the system only operates when required reducing unwanted noise from the engine brake.	Implemented
All haul trucks are speed limited to 85 km/h.	Implemented
Air bag suspension is fitted to all haul truck trailers and dollys.	Implemented
Tread design on tyres used for all trailers are designed to reduce road rolling noise when traveling.	Implemented
Fully sealed haul road	Implemented
Stagger coal loading of haul trucks to prevent bunching	Implemented
12 Monthly haul road deformation inspections	Implemented

Reversing Alarms

"Quacker" type reversing alarms have been retrofitted to all onsite mobile equipment.

9.2.2 Cooranbong Entry Site

In 2012 a Noise Impact Assessment undertaken for the Cooranbong Entry Site as part of a modification (Mod 8) identified the need to clad the existing Coal Handling Plant (CHP) in noise attenuating panels in order for the site to achieve the Project Specific Noise Criteria. Cladding of the site commenced in 2013 and is scheduled for completion in 2014. The noise modeling undertaken for the Cooranbong Entry site as part of this Project has assumed that the cladding of the CHP at the Cooranbong Entry Site in noise attenuating panels has been completed.

Reversing Alarms

Quacker" type reversing alarms have been retrofitted to all onsite mobile equipment.

9.3 Operational Noise Modelling Assumptions

The Conservation of Clean Air and Water Europe (CONCAWE) prediction methodology was utilised within SoundPLAN 3D modelling software (Version 7.1), developed by Braunstein and Berndt Gmbh in Germany, to predict noise emissions from operation of the Project. A three-dimensional digital terrain map giving all relevant topographic information was used in the modelling process. The model used this map, together with noise source data, ground cover, shielding by barriers and/or adjacent buildings and atmospheric information to predict noise levels at the nearest potentially affected receivers.

Prediction of noise emission levels was carried out under calm and prevailing atmospheric conditions. Atmospheric parameters under which noise predictions were made are given in **Table 39**.

Table 39 Meteorological Parameters Considered for Noise Predictions

	Temperature	Humidity	Wind Speed	Wind Direction (degrees from north)	Temperature Inversion
Day (calm)	20°C	64%	n/a	n/a	n/a
Evening (calm)	17°C	78%	n/a	n/a	n/a
Night (calm)	13°C	88%	n/a	n/a	n/a
Inversion (Night only)	13°C	88%	n/a	n/a	Class F Stability Category

Sound power levels of relevant plant and equipment have been obtained from measurements of plant already operating at the site or have been sourced from a SLR database of similar equipment. Noise from all sources that contribute to the total noise from the site have been examined to identify characteristics that may cause greater annoyance (for example tonality, impulsiveness etc). The appropriate modifying factors, as outlined in the INP, have been applied where these characteristics are considered to be present.

Assumptions made in modelling noise emissions from the subject site include the following:

- All acoustically significant plant and equipment operates simultaneously.
- Mobile noise sources, such as delivery and product despatch trucks, were modelled at typical locations and assumed to operate in repetitive cycles.
- All existing mitigation measures identified in **Section 9.2** have been implemented.

Assumed noise source locations for the purpose of noise modelling are shown in **Figure 11**, **Figure 12** and **Figure 13**.

Figure 11 Newstan Colliery Surface Site Location of Plant and Equipment

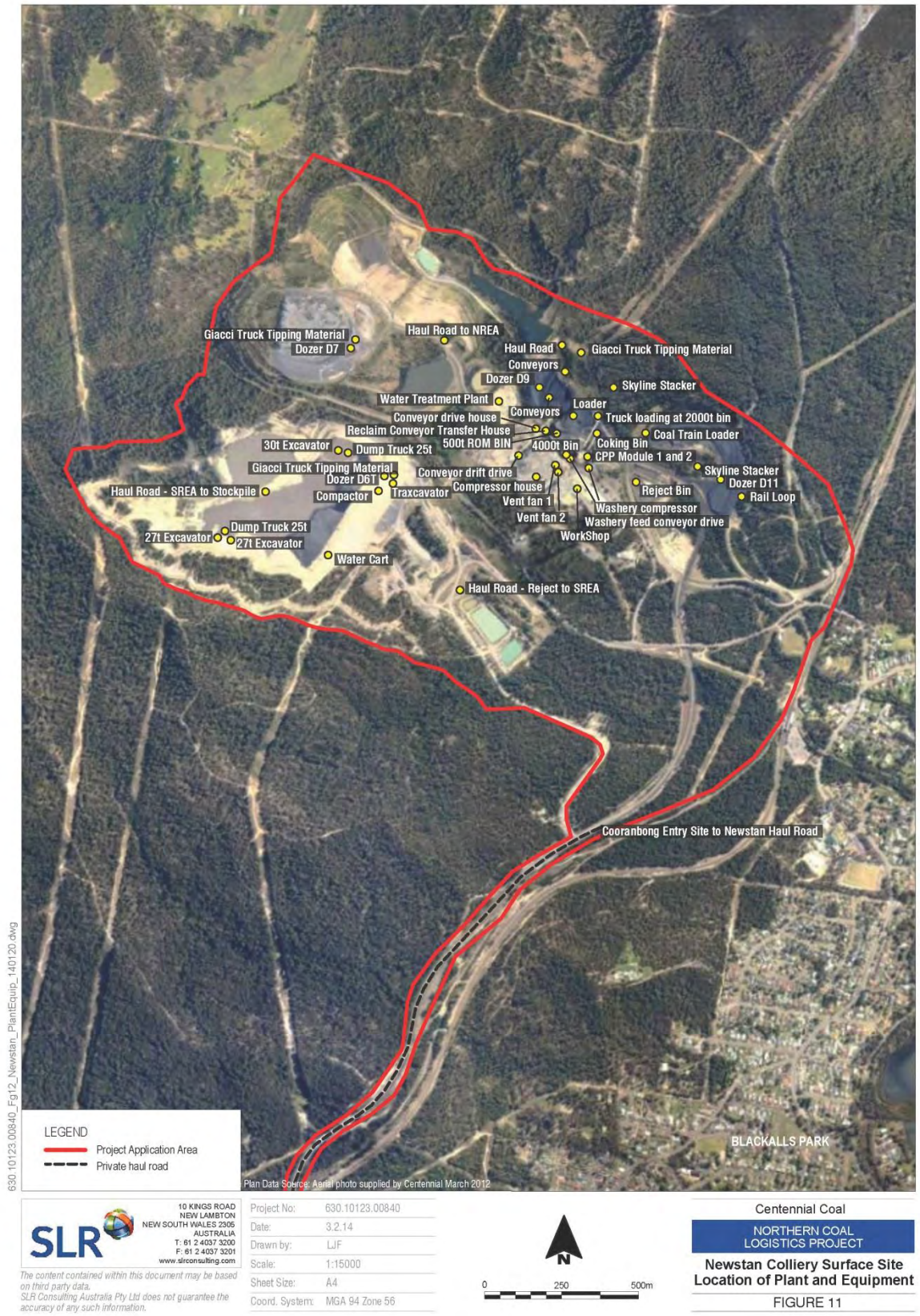


Figure 12 Hawkmount Quarry Location of Plant Equipment

Figure 13 Cooranbong Entry Site Location of Plant and Equipment

9.4 Operational Scenarios – Noise Model Summary

The operational scenarios modelled during each period are summarised below with operating equipment detailed in **Table 40** and **Table 41** for the Newstan Colliery Surface Site and the Cooranbong Entry Site, respectively. A tick (✓) indicates that the equipment is in operation during the relevant period. A cross (×) indicates that the equipment is not in operation during the relevant period. Where there is a number in brackets following a tick, this represents the number of pieces of the equipment that has been considered in the noise model during the relevant period. It should be noted that the operational scenarios modelled are likely to represent acoustically worst-case scenarios. Furthermore, optional additional operational scenarios were also modelled and the results are presented in **Appendix E.**

Six scenarios were modelled as part of this NIA for the Newstan Colliery Surface Site to assess the effectiveness of currently proposed mitigation measures and determine impacts from infrastructure proposed to be constructed and operated by the Project. These are described as follows.

Scenario 1 (Existing Operation)

This scenario represents the operations currently being undertaken at the Newstan Colliery Surface Site.

Scenario 2

Scenario 2 represents the Project with only the existing CPP in operation and manual loading of trains being continued. The main difference between Scenario 1 and Scenario 2 is that Scenario 2 has an additional Front End Loader in operation at the Rail Loop stockpile and the dozer operates unrestricted at night.

Scenario 3

Scenario 3 represents the Project with only the existing CPP in operation and manual loading of trains being continued. The main difference between Scenario 2 and Scenario 3 is the completed implementation of noise mitigation measures on the existing CPP and transfer tower (refer to **Section 9.2**) are considered in Scenario 3. This scenario is designed to assess the benefits obtained by completing the implementation of these mitigation measures.

Scenario 4

Scenario 4 represents the Project with two CPPs in operation at the site and manual loading of trains being continued. This scenario assumes that the mitigation measures on the existing CPP and transfer tower (refer to **Section 9.2**) are completed and that the new CPP is constructed with Colorbond sheet metal cladding only.

Scenario 5 Scenario 5 represents the Project with two CPPs in operation at the site and manual loading of trains being continued. This scenario assumes that the mitigation measures on the existing CPP and transfer tower (refer to **Section 9.2**) are completed and that the new CPP is constructed with a noise attenuating cladding. This scenario is designed to assess the benefits obtained by cladding the new CPP with noise attenuating panels.

Scenario 6

Scenario 6 represents the Project with two CPPs in operation at the site with an automatic train loading facility in operation. This scenario assumes that the mitigation measures on existing CPP and transfer tower (refer to **Section 9.2**) are completed and that the new CPP is constructed with a noise attenuating cladding. This scenario is designed to assess the benefits obtained by installing an automatic train loading facility at the site.

Table 40 Operational Scenarios Considered in Noise Model – Newstan Colliery Surface Site

Plant and Equipment	Scenario 1				Scenario 2				Scenario 3				Scenario 4				Scenario 5				Scenario 6			
	Shoulder Period	Day	Evening	Night	Shoulder Period	Day	Evening	Night	Shoulder Period	Day	Evening	Night	Shoulder Period	Day	Evening	Night	Shoulder Period	Day	Evening	Night	Shoulder Period	Day	Evening	Night
SREA Operations																								
Traxcavator	✓	✓	×	×	✓	✓	×	×	✓	✓	×	×	✓	✓	×	×	✓	✓	×	×	✓	✓	×	×
Compactor	✓	✓	×	×	✓	✓	×	×	✓	✓	×	×	✓	✓	×	×	✓	✓	×	×	✓	✓	×	×
2 x 27t Excavator	✓	✓	×	×	✓	✓	×	×	✓	✓	×	×	✓	✓	×	×	✓	✓	×	×	✓	✓	×	×
30t Excavator	✓	✓	×	×	✓	✓	×	×	✓	✓	×	×	✓	✓	×	×	✓	✓	×	×	✓	✓	×	×
Dozer D6T	✓	✓	×	×	✓	✓	×	×	✓	✓	×	×	✓	✓	×	×	✓	✓	×	×	✓	✓	×	×
2 x Dump Truck	✓	✓	×	×	✓	✓	×	×	✓	✓	×	×	✓	✓	×	×	✓	✓	×	×	✓	✓	×	×
Water Cart	✓	✓	×	×	✓	✓	×	×	✓	✓	×	×	✓	✓	×	×	✓	✓	×	×	✓	✓	×	×
Coal Truck (8 wheel truck)	✓	✓	×	×	✓	✓	×	×	✓	✓	×	×	✓	✓	×	×	✓	✓	×	×	✓	✓	×	×
Coal Truck Tipping Coal	✓	✓	×	×	✓	✓	×	×	✓	✓	×	×	✓	✓	×	×	✓	✓	×	×	✓	✓	×	×
NREA Operations																								
Dozer D7	✓	✓	×	×	✓	✓	×	×	✓	✓	×	×	✓	✓	×	×	✓	✓	×	×	✓	✓	×	×
Coal Truck (8 wheel truck)	✓	✓	×	×	✓	✓	×	×	✓	✓	×	×	✓	✓	×	×	✓	✓	×	×	✓	✓	×	×
Coal truck tipping coal	✓	✓	×	×	✓	✓	×	×	✓	✓	×	×	✓	✓	×	×	✓	✓	×	×	✓	✓	×	×
Hawkmount Quarry Operations																								
Front End Loader	✓	✓	×	×	✓	✓	×	×	✓	✓	×	×	✓	✓	×	×	✓	✓	×	×	✓	✓	×	×
Coal Truck tipping coal (8 wheel truck)	✓	✓	×	×	✓	✓	×	×	✓	✓	×	×	✓	✓	×	×	✓	✓	×	×	✓	✓	×	×
Coal Truck (8 wheel truck)	✓	✓	×	×	✓	✓	×	×	✓	✓	×	×	✓	✓	×	×	✓	✓	×	×	✓	✓	×	×
Coal Preparation Plant (CPP)																								
Coal Preparation Plant (module 1) with colorbond sheet metal (opening at bottom)	✓	✓	✓	✓	✓	✓	✓	✓	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×

Plant and Equipment	Scenario 1				Scenario 2				Scenario 3				Scenario 4				Scenario 5				Scenario 6			
	Shoulder Period	Day	Evening	Night	Shoulder Period	Day	Evening	Night	Shoulder Period	Day	Evening	Night	Shoulder Period	Day	Evening	Night	Shoulder Period	Day	Evening	Night	Shoulder Period	Day	Evening	Night
Coal Preparation Plant (module 1) with colorbond sheet metal (close opening at bottom)	×	×	×	×	×	×	×	×	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Coal Preparation Plant (module 2) with colorbond sheet metal	×	×	×	×	×	×	×	×	×	×	×	×	✓	✓	✓	✓	×	×	×	×	×	×	×	×
Coal Preparation Plant (module 2) with sound attenuating panels	×	×	×	×	×	×	×	×	×	×	×	×	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Coal Preparation Plant Compressor	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
All Onsite Conveyors	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Trucks loading Coking Bin	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Trucks Loading Reject Bin	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Coal Handling Plant (CHP)																								
Truck Loading at 2000t truck loading bin	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Reclaim Conveyor Drive House	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Reclaim Conveyor transfer House	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Filling of the 4000t ROM Coal Bin	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Filling of the 500t ROM Coal Bin	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Conveyor Drift Drive	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Loader	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Dozer D9 (ROM Coal stockpile)	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Truck Tipping Load at ROM Dump Hopper	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
2 x Vent Fan – Only one fan operates at any one time	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Compressor House	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Workshop (i.e. use of grinder)	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Coal Truck (8 wheel truck)	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

Plant and Equipment	Scenario 1				Scenario 2				Scenario 3				Scenario 4				Scenario 5				Scenario 6			
	Shoulder Period	Day	Evening	Night	Shoulder Period	Day	Evening	Night	Shoulder Period	Day	Evening	Night	Shoulder Period	Day	Evening	Night	Shoulder Period	Day	Evening	Night	Shoulder Period	Day	Evening	Night
Forklift	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Transfer tower no mitigation	✓	✓	✓	✓	✓	✓	✓	✓	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×
Transfer tower with mitigation (colorbond sheet metal)	×	×	×	×	×	×	×	×	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Rail Loop																								
4 x Coal Train Loco	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Coal Train Wagons	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Coal Train Loading Facility	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	✓	✓	✓	✓
Coal Train shunting	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Dozer D11	✓	✓	✓	×	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Loader	✓ (2)	(2) ✓	(2) ✓	(2) ✓	(2) ✓	(3) ✓	(3) ✓	(3) ✓	(3) ✓	(3) ✓	(3) ✓	(3) ✓	(3) ✓	(3) ✓	(3) ✓	(3) ✓	(3) ✓	(3) ✓	(3) ✓	(3) ✓	×	×	×	×
Coal Truck (8 wheel truck)	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Water Treatment Plant																								
3 x Pumps	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

Note: Daytime 7.00 am to 6.00 pm; Evening 6.00 pm to 10.00 pm; Night-time 10.00 pm to 7.00 am
Morning Shoulder 6.00 am to 7.00 am

Table 41 Operational Scenario Considered in Noise Model – Cooranbong Entry site

Plant and Equipment	Day	Evening	Night
Coal Handing Plant			
Coal Handling Plant (CHP)	✓	✓	✓
Rotary Breaker	✓	✓	✓
Rotary Breaker Drivehead House	✓	✓	✓
Site Conveyors (per 100m)	✓	✓	✓
Vent Fan	✓	✓	✓
100,000t ROM Stockpile			
Front End Loader 2	✓	✓	✓
Front End Loader to Newstan Colliery)	✓	✓	✓
Dozer	✓	✓	✓
Coal Haul Truck	✓	✓	✓
1200t Truck Loading Bin			
Coal Haul Truck Being Loaded with Coal	✓	✓	✓
Coal Haul Truck	✓	✓	✓
3000t Stockpile			
Front End Loader	✓	✓	✓
Truck Dumping Coal	✓	✓	✓
South Drift			
South drift drivehead house	✓	✓	✓
South drift Conveyor	✓	✓	✓
Servicing Shed			
Compressors	✓	✓	✓
Exhaust Fan	✓	✓	✓
Eraring Energy Operations			
Final Product Bin Drivehead house	✓	✓	✓
Final Product Bin	✓	✓	✓
Eraring Conveyor (per100m)	✓	✓	✓

It is relevant to note that the existing operations at Cooranbong Entry Site are not going to change as a result of the Project with the exception of the haul truck movements between Cooranbong Entry Site and Newstan Colliery and the volume of coal handled at the Cooranbong Entry Site.

However, commitments were made during the previous Noise Impact Assessment (refer to SLR report 670.10120-R1 Mandalong Mine – Cooranbong Entry Site Noise Impact Assessment Dated 18 April 2012) to upgrade the cladding on the rotary crusher and CHP buildings. Our noise modelling has assumed the mitigation has been completed.

Table 42 provides the onsite hourly haul road vehicle movements associated with the Project.

Table 42 Haul Road Vehicle Movements per Hour Scenarios

Haul Road	Haul Road Vehicle Movements per Hour (two way traffic)		
	Day 7am – 6pm	**Evening 6pm – 10pm**	**Night 10pm – 7am**
Existing Scenario Cooranbong Entry Site to Newstan Colliery Surface Site to Eraring Power Station to Awaba Colliery Surface Site	28	28	28
Scenario 1 to 6 Cooranbong Entry Site to Newstan Colliery Surface Site to Eraring Power Station to Awaba Colliery Surface Site	32	32	32

9.5 Operational Noise Modelling Results and Discussion – Newstan Colliery Surface Site

Noise emission levels were predicted from the proposed development for the typical operational scenarios described in **Table 40** Predicted noise levels are provided in **Table 43**.

A noise contour map is provided in **Appendix F** for the Scenario 6 under worst case meteorological scenario considered. Levels shown in **Bold** are those that are predicted to exceed the Project Specific Noise Criteria.

Table 43 Predicted Noise Levels – Newstan Colliery Surface Site and Private Haul Roads

Location	Period	Predicted Noise Level $L_{aeq(15minute)}$ (dBA)												Project Specific Noise criteria
		Scenario 1		Scenario 2		Scenario 3		Scenario 4		Scenario 5		Scenario 6		
		Calm	Temp Inv	Calm	Temp Inv	Calm	Temp Inv	Calm	Temp Inv	Calm	Temp Inv	Calm	Temp Inv	
NC1	Morning Shoulder	<35	35	<35	35	<35	<35	<35	<35	<35	<35	<35	<35	46 dBA
	Day	<35	N/A	<35	N/A	<35	N/A	<35	N/A	<35	N/A	<35	N/A	41 dBA
	Evening	<35	N/A	<35	N/A	<35	N/A	<35	N/A	<35	N/A	<35	N/A	41 dBA
	Night	<35	<35	<35	35	<35	<35	<35	<35	<35	<35	<35	<35	36 dBA
NC2	Morning Shoulder	<35	36	<35	36	<35	35	<35	37	<35	35	<35	35	46 dBA
	Day	<35	N/A	<35	N/A	<35	N/A	<35	N/A	<35	N/A	<35	N/A	41 dBA
	Evening	<35	N/A	<35	N/A	<35	N/A	<35	N/A	<35	N/A	<35	N/A	41 dBA
	Night	<35	<35	<35	<35	<35	<35	<35	35	<35	<35	<35	<35	36 dBA
NC3	Morning Shoulder	<35	40	36	40	<35	38	37	40	<35	38	<35	37	45 dBA
	Day	36	N/A	36	N/A	<35	N/A	37	N/A	<35	N/A	<35	N/A	44 dBA
	Evening	36	N/A	36	N/A	<35	N/A	37	N/A	<35	N/A	<35	N/A	44 dBA
	Night	**36**	**39**	**36**	**39**	<35	**37**	**37**	**40**	<35	**37**	<35	**36**	35 dBA
NC4	Morning Shoulder	<35	36	<35	36	<35	<35	<35	36	<35	<35	<35	<35	45 dBA
	Day	<35	N/A	<35	N/A	<35	N/A	<35	N/A	<35	N/A	<35	N/A	44 dBA
	Evening	<35	N/A	<35	N/A	<35	N/A	<35	N/A	<35	N/A	<35	N/A	44 dBA
	Night	<35	35	<35	**36**	<35	<35	<35	35	<35	<35	<35	<35	35 dBA
NC5	Morning Shoulder	<35	35	<35	35	<35	<35	<35	36	<35	35	<35	<35	45 dBA

Location	Period	Predicted Noise Level $L_{aeq(15minute)}$ (dBA)												Project Specific Noise criteria
		Scenario 1		Scenario 2		Scenario 3		Scenario 4		Scenario 5		Scenario 6		
		Calm	Temp Inv	Calm	Temp Inv	Calm	Temp Inv	Calm	Temp Inv	Calm	Temp Inv	Calm	Temp Inv	
	Day	<35	N/A	<35	N/A	<35	N/A	<35	N/A	<35	N/A	<35	N/A	44 dBA
	Evening	<35	N/A	<35	N/A	<35	N/A	<35	N/A	<35	N/A	<35	N/A	44 dBA
	Night	<35	<35	<35	<35	<35	<35	<35	35	<35	<35	<35	<35	35 dBA
NC6	Morning Shoulder	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	Day	38	N/A	38	N/A	37	N/A	39	N/A	37	N/A	37	N/A	55dBA (School Playground)
		<35		<35		<35		35	N/A	<35		<35		35dBA (internal)
	Evening	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	Night	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
NC7	Morning Shoulder	<35	<35	<35	<35	<35	<35	<35	<35	<35	<35	<35	<35	45 dBA
	Day	<35	N/A	<35	N/A	<35	N/A	<35	N/A	<35	N/A	<35	N/A	44 dBA
	Evening	<35	N/A	<35	N/A	<35	N/A	<35	N/A	<35	N/A	<35	N/A	44 dBA
	Night	<35	<35	<35	<35	<35	<35	<35	<35	<35	<35	<35	<35	35 dBA
NC8	Morning Shoulder	<35	<35	<35	<35	<35	<35	<35	<35	<35	<35	<35	<35	36 dBA
	Day	<35	N/A	<35	N/A	<35	N/A	<35	N/A	<35	N/A	<35	N/A	38 dBA
	Evening	<35	N/A	<35	N/A	<35	N/A	<35	N/A	<35	N/A	<35	N/A	38 dBA
	Night	<35	<35	<35	<35	<35	<35	<35	<35	<35	<35	<35	<35	36 dBA
NC9	Morning Shoulder	<35	<35	<35	<35	<35	<35	<35	<35	<35	<35	<35	<35	36 dBA
	Day	<35	N/A	<35	N/A	<35	N/A	<35	N/A	<35	N/A	<35	N/A	38 dBA

Location	Period	Predicted Noise Level $L_{aeq(15minute)}$ (dBA)												Project Specific Noise criteria
		Scenario 1		Scenario 2		Scenario 3		Scenario 4		Scenario 5		Scenario 6		
		Calm	Temp Inv	Calm	Temp Inv	Calm	Temp Inv	Calm	Temp Inv	Calm	Temp Inv	Calm	Temp Inv	
	Evening	<35	N/A	<35	N/A	<35	N/A	<35	N/A	<35	N/A	<35	N/A	38 dBA
	Night	<35	<35	<35	<35	<35	<35	<35	<35	<35	<35	<35	<35	36 dBA
NC10	Morning Shoulder	<35	<35	<35	<35	<35	<35	<35	<35	<35	<35	<35	<35	36 dBA
	Day	<35	N/A	<35	N/A	<35	N/A	<35	N/A	<35	N/A	<35	N/A	38 dBA
	Evening	<35	N/A	<35	N/A	<35	N/A	<35	N/A	<35	N/A	<35	N/A	38 dBA
	Night	<35	<35	<35	<35	<35	<35	<35	<35	<35	<35	<35	<35	36 dBA
NC11	Morning Shoulder	<35	<35	<35	<35	<35	<35	<35	<35	<35	<35	<35	<35	36 dBA
	Day	<35	N/A	<35	N/A	<35	N/A	<35	N/A	<35	N/A	<35	N/A	38 dBA
	Evening	<35	N/A	<35	N/A	<35	N/A	<35	N/A	<35	N/A	<35	N/A	38 dBA
	Night	<35	<35	<35	<35	<35	<35	<35	<35	<35	<35	<35	<35	36 dBA

Note: Daytime 7.00 am to 6.00 pm; Evening 6.00 pm to 10.00 pm; Night-time 10.00 pm to 7.00 am
Morning Shoulder 6.00 am to 7.00 am

Results presented in **Table 43** indicate that operational noise levels are predicted to exceed the Project Specific Noise Criteria at night during calm conditions by up to 1 dBA and by up to 4 dBA during night time temperature inversions at NC3 for the current existing and approved operations (Scenario 1).

The results presented in **Table 43** indicate that significant benefits will be obtained once the current mitigation works to the existing CPP and transfer tower are completed. As represented by Scenario 3, once these mitigation measures have been completed, noise emissions are predicted to reduce by up to 2 dBA which results in a predicted 2 dBA exceedance during night time temperature inversions at NC3.

Scenarios 4 and 5 were designed to assess the impact of noise once a second CPP is constructed and in operation at the Newstan Colliery Surface Site. As is represented by Scenario 4, if the second CPP is constructed with Colorbond sheet metal cladding, a 2 dBA exceedance is predicted at night during calm conditions and a 5 dBA exceedance during night time temperature inversions at NC3. If the new CPP is clad in noise attenuating panels, a 2 dBA exceedance is predicted during night-time temperature inversions at NC3.

Scenario 6 is designed to assess the noise benefits gained from installing an automatic train loading facility should the current mitigation meausres be completed and the new CPP is clad with noise attenuating panels. As indicated by the results presented in**Table 43**,

the construction of an automatic train loading facility provides little benefit to the overall noise predictions with a 1 dBA exceedance still predicted at NC3 during night time temperature inversions. As such, it is not required to be constructed to manage noise levels on site. Instead, the automatic train loading facility will be constructed when operational efficiencies require it or to meet other environmental criteria (specifically, air quality criteria).

As is shown in the results of the noise modeling for the various scenarios, manual loading of trains can continue to be undertaken 24 hours a day, seven days a week at the Newstan Colliery Surface Site utilising up to 3 front end loaders and a dozer with only a 2 dBA exceedance at NC3 during a night time temperature inversion so as long as the current mitigation measures are completed and the new CPP is constructed and clad with noise attenuating panels.

9.6 Operational Noise Modelling Results and Discussion - Cooranbong Entry Site

Noise emission levels were predicted from the Cooranbong Entry Site for the typical operational scenario described in **Table 41**. This represents a worst case scenario with both conveyors, CHP infrastructure and truck loading operations occurring concurrently.

Predicted noise levels at the nearest potentially affected residential locations are provided in **Table 44**. A noise contour map is provided in **Appendix F** for the worst case meteorological scenario considered.

Table 44 Cooranbong Entry Site Operational Predicted Noise Levels

Location	Period	Predicted Noise Level $L_{aeq(15minute)}$ (dBA)		Project Specific Noise criteria (dBA)
		Calm	Temperature Inversion	
22	Day	<35	N/A	42
	Evening	<35	N/A	42
	Night	<35	<35	41
23	Day	<35	N/A	42
	Evening	<35	N/A	42
	Night	<35	37	41
26	Day	<35	N/A	42
	Evening	<35	N/A	42
	Night	<35	36	41
28	Day	<35	N/A	42
	Evening	<35	N/A	42
	Night	<35	<35	41
30	Day	<35	N/A	42
	Evening	<35	N/A	42
	Night	<35	<35	41
31	Day	<35	N/A	42
	Evening	<35	N/A	42
	Night	<35	<35	41
32	Day	<35	N/A	42
	Evening	<35	N/A	42
	Night	<35	<35	41
33	Day	<35	N/A	42
	Evening	<35	N/A	42
	Night	<35	<35	41
35	Day	<35	N/A	42
	Evening	<35	N/A	42
	Night	<35	<35	41

Note: Daytime 7.00 am to 6.00 pm; Evening 6.00 pm to 10.00 pm; Night-time 10.00 pm to 7.00 am

The results presented **Table 44** indicate that operational noise levels from the Cooranbong Entry Site are predicted to meet the Project Specific Noise Criteria at all residential locations considered in the assessment.

Since the operational scenario modelled is likely to represent an acoustically worst-case scenario, actual operational noise levels from the Cooranbong Entry Site are likely to be less than those predicted.

9.7 Sleep Disturbance Analysis

9.7.1 Newstan Colliery Surface Site

In assessing sleep disturbance, typical L_{Amax} noise levels of acoustically significantly plant and equipment to be used at the Newstan Colliery Surface Site (refer to **Table 45**) were used as input to the noise model.

The use of the L_{Amax} noise level provides a conservative approach since the $L_{A1(1minute)}$ noise level of a noise event is likely to be equal to or less than the L_{Amax}.

Table 45 L_{Amax} Sound Power Levels

Plant and Equipment	Sound Power Level dBA
SREA Operations	
Traxcavator	110
Compactor	118
2x 27t Excavator	120
30t Excavator	120
Dozer D6T	113
2x Dump Truck	112
Water Cart	112
Coal Truck (8 wheel truck)	104
Coal Truck Tipping Coal	108
NREA Operations	
Dozer D7	113
Coal Truck (8 wheel truck)	104
Coal truck tipping coal	108
Hawkmount Quarry Operations	
Front End Loader	118
Coal Truck tipping coal (8 wheel truck)	108
Coal Truck (8 wheel truck)	104
Coal Preparation Plant (CPP)	
Coal Preparation Plant (module 1) Ground Level	94
Coal Preparation Plant (module 1) First Floor Level	97
Coal Preparation Plant (module 1) Second Floor Level	98
Coal Preparation Plant (module 1) Third Floor Level	95
Coal Preparation Plant (module 1) Fourth Floor Level	94
Coal Preparation Plant (module 2) All Floor levels	96
Coal Preparation Plant Compressor	115
All Onsite Conveyors	113
Trucks loading Coking Bin	120
Trucks Loading Reject Bin	120
Coal Handling Plant (CHP)	
Truck Loading at 2000t truck loading bin	120
Reclaim Conveyor Drive House	107

Plant and Equipment	Sound Power Level
Reclaim Conveyor transfer House	118
Filling of the 4000t ROM Coal Bin	115
Filling of the 500t ROM Coal Bin	115
Conveyor Drift Drive	107
Loader	118
Dozer D9 (ROM Coal stockpile)	113
Truck Tipping Load at ROM Dump Hopper	108
2 x Vent Fan	96
Compressor House	108
Workshop (i.e. use of grinder)	109
Coal Truck (8 wheel truck)	104
Forklift	109
Rail Loop	
4 x Coal Train Loco	101
Coal Train Wagons	106
Coal Train Loader	120
Coal Train shunting	109
Dozer D11	120
Water Treatment Plant	
3 x Pumps	101

L_{Amax} noise level predictions were made at the nearest residential locations surrounding the Newstan Colliery Surface Site under adverse weather conditions (temperature inversion) at night and the results are presented in **Table 46**. Details of these levels are given in **Appendix B**.

Table 46 Predicted L_{Amax} Noise Levels from Newstan Colliery Surface Site and Private Haul Roads

Location	Period	Predicted Sleep Disturbance Noise Level L_{max} (dBA)	Project Specific Noise Criteria
NC1	Morning Shoulder	<45	**56 dBA**
	Night	<45	**46 dBA**
NC2	Morning Shoulder	<45	**56 dBA**
	Night	<45	**46 dBA**
NC3	Morning Shoulder	45	**55 dBA**
	Night	45	**45 dBA**
NC4	Morning Shoulder	<45	**55 dBA**
	Night	<45	**45 dBA**
NC5	Morning Shoulder	<45	**55 dBA**
	Night	<45	**45 dBA**
NC6	Morning Shoulder	N/A	N/A
	Night	N/A	N/A
NC7	Morning Shoulder	<45	**45 dBA**

Location	Period	Predicted Sleep Disturbance Noise Level L_{max} (dBA)	Project Specific Noise Criteria
	Night	<45	
NC8	Morning Shoulder	<45	
	Night	<45	
NC9	Morning Shoulder	<45	
	Night	<45	
NC10	Morning Shoulder	<45	
	Night	<45	
NC11	Morning Shoulder	<45	
	Night	<45	

The L_{Amax} noise levels in **Table 46** are predicted to meet the Project Specific Noise Criteria for night-time operation at the Project site under temperature inversion weather conditions (worst case scenario) at all receiver locations.

9.7.2 Cooranbong Entry Site

In assessing sleep disturbance, typical L_{Amax} noise levels of acoustically significantly plant and equipment to be used at the Cooranbong Entry Site (refer to **Table 47**) were used as input to the noise model.

Table 47 L_{Amax} Sound Power Levels

Plant and Equipment	Sound Power Level dBA
Coal Handing Plant	
Coal Handling Plant (CHP)	100
Rotary Breaker	102
Rotary Breaker Drivehead House	112
Site Conveyors (per 100m)	103
Vent Fan	91
100,000t ROM Stockpile	
Front End Loader	124
Dozer	124
Coal Haul Truck	115
1200t Truck Loading Bin	97
Coal Haul Truck Being Loaded with Coal	
Coal Haul Truck	120
1500t Stockpile	
Front End Loader	124
Truck Dumping Coal	111
South Drift	
South drift drivehead house	108
South drift Conveyor	106
Servicing Shed	
Compressors	101
Exhaust Fan	95

Plant and Equipment	Sound Power Level dBA
Eraring Energy Operations	
Final Product Bin Drivehead house	118
Final Product Bin	100
Eraring Conveyor (per100m)	97

LAmax noise level predictions were made at the nearest residential locations surrounding the Project Site under adverse weather conditions at night and the results are present in **Table 48**.

Table 48 Predicted Sleep Disturbance Noise Levels

Location	Period	Predicted Sleep Disturbance Noise Level L_{max} (dBA)	Project Specific Noise Goal
		Scenario 1	
22	Night-time (temperature Inversion)	<45	**46 dBA**
23		<45	
26		<45	
28		<45	
30		<45	
31		<45	
32		<45	
33		<45	
35		<45	

The LAmax noise levels shown in **Table 48** are predicted to meet the Project Specific Noise Criteria for night-time operations at the Cooranbong Entry Site under temperature inversion weather conditions (worst case scenario) at all receiver locations.

10 ROAD TRAFFIC NOISE IMPACT ASSESSMENT

10.1 Methodology and Assumptions

Road traffic noise levels from the Project have been predicted using with the Federal Highway Administration Model – the FHWA. The modelling allows for traffic volume and mix, vehicle speed, reflections off building surfaces, ground absorption and shielding from ground topography and physical noise barriers.

The calculation algorithms are generally considered to be mathematically more rigorous than those of the CoRTN method, leading to greater accuracy and a wider range of validity at low traffic flows.

All reported noise levels are “facade-corrected”, that is, predicted noise levels have been adjusted upwards to include a notional 2.5 dBA reflection within the noise model computation.

The predicted levels are for receiver points 1.5 m above the external ground level.

Three (3) scenarios were modelled for the purposes of this traffic noise impact assessment:

- Scenario 1 - assumes existing traffic volumes without the proposed Northern Coal Logistics Project.
- Scenario 2 - assumes existing traffic volumes with the proposed Northern Coal Logistics Project and the Newstan Extension of Mining Project traffic operating at the Newstan Colliery Surface Site.
- Scenario 3 - the 10 year projection scenario; assumes ten years growth in traffic volumes with the proposed Northern Coal Logistics Project and the Newstan Extension of Mining Project traffic operating at the Newstan Colliery Surface Site.

10.2 Newstan Colliery Surface Site

10.2.1 Operational Road Traffic Parameters

Existing and additional employee traffic to and from the Newstan Colliery Surface Site associated with operation of the Project will use the following roads:

Miller Road

Miller Road (previously known as Fassifern Road) is a local collector road that connects Fassifern to the Wakefield area. Typically Miller Road is a two lane two way sealed rural road. The current speed zoning on Miller Road in the vicinity of Newstan Colliery is 80 km/h.

Macquarie Road/Fassifern Road

Macquarie Road / Fassifern Road is also a local collector road that connects Fassifern to both the Toronto and Fennell Bay areas thereby providing a link to the sub-arterial road network (Awaba Road and Main Road). This road is typically a two lane two way urban road with kerb and gutter and piped longitudinal drainage. The current speed zoning in the vicinity of Miller Road is 60 km/h though a variable school speed zone exists around the Miller Road intersection.

Road traffic volume information was provided by Intersect Traffic and reference has been made to the following:

- Traffic Impact Assessment – Northern Coal Services – Northern Coal Logistics Project 2014
- Draft Traffic Impact Assessment – Newstan Colliery Extension of Mining Project 2013

Details of parameters utilised in the noise model are provided in **Table 49**.

Table 49 Road Traffic Volumes Utilised in Noise Model

Scenario	Road Description	Road Traffic Speed km/h	Peak Hour Vehicle Movements	AADT	Day (15 hour) Traffic Flow 7am to 10pm	Night (9 hour) Traffic Flow 10pm to 7am	Heavy Vehicle % Day 7am to 10pm	Heavy Vehicle % Night 10pm to 7am
Scenario 1	Miller Road (east of Newstan Colliery Entry)	60	191	1910	1795	115	10	10
	Miller Road (West of Newstan Colliery Entry)	80	141	1410	1325	85	10	10
	Fassifern Road (west)	60	329	3290	3093	197	10	10
	Macquarie Road (East)	60	364	3640	3422	218	10	10
Scenario 2	Miller Road (east of Newstan Colliery Entry)	60	377	2397	2168	229	10	10
	Miller Road (West of Newstan Colliery Entry)	80	188	1532	1419	113	10	10
	Fassifern Road (west)	60	429	3553	3294	259	10	10
	Macquarie Road (East)	60	450	3864	3594	270	10	10
Scenario 3	Miller Road (east of Newstan Colliery Entry)	60	396	2588	2347	241	10	10
	Miller Road (West of Newstan Colliery Entry)	80	202	1673	1551	122	10	10
	Fassifern Road 292(west)4568	60	462	3882	3603	279	10	10
	Macquarie Road (East)	60	486	4228	3936	292	10	10

It is relevant to note that since the Newstan-Eraring Private Haul Road is a private haul road, road traffic noise associated with this road has been assessed in accordance with the INP, as stated in the RNP with regard to assessment of private haul roads.

10.2.2 Road Traffic Noise Prediction Results

Table 50 and **Table 51** provide the modelling results for the operational road traffic noise levels associated with the Project.

Table 50 Newstan Colliery Operational Road Traffic Noise Prediction Results (Residential)

Scenario	Road Description	Prediction Results (dBA) @ 10m		Criteria	
		Day (15 hour) 7am to 10pm	Night (9 hour) 10pm to 7am	Day (15 hour) 7am to 10pm	Night (9 hour) 10pm to 7am
Scenario 1	Miller Road (east of Newstan Colliery Entry)	54.0	44.3	60	55
	Miller Road (West of Newstan Colliery Entry)	52.7	43.0		
	Fassifern Road (west)	54.6	44.9		
	Macquarie Road (East)	55.1	45.3		
Scenario 2	Miller Road (east of Newstan Colliery Entry)	54.9	47.3	60	55
	Miller Road (West of Newstan Colliery Entry)	53.0	44.3		
	Fassifern Road (west)	54.9	46.1		
	Macquarie Road (East)	55.3	46.2		
Scenario 3	Miller Road (east of Newstan Colliery Entry)	54.6	47.5	60	55
	Miller Road (West of Newstan Colliery Entry)	53.4	44.6		
	Fassifern Road (west)	55.3	46.4		
	Macquarie Road (East)	55.7	46.6		

Table 51 Newstan Colliery Operational Road Traffic Noise Prediction Results (School)

Year	Road Description	Prediction Results (dBA) @ 30m	Criteria
		LAeq, (1 hour) (internal) when in use	**LAeq, (1 hour) (internal) when in use**
Scenario 1	Miller Road (east of Newstan Colliery Entry) 60km/hr	36.7	40 dBA
Scenario 2		39.6	
Scenario 3		39.9	

Based upon the expected peak road traffic movements presented in **Table 49**, the calculated day time $L_{Aeq(15hour)}$ and night-time $L_{Aeq(9hour)}$ noise level at the nearest roadside residential receivers (assumed to be approximately 10m from the edge of the road) meets the criteria detailed in the RNP under all prediction scenarios.

The calculated, worst case $L_{Aeq(1hour)}$ (when in use) noise level at the Fassifern Primary School (assumed to be approximately 30m from the edge of the road) based on existing and proposed traffic volumes is predicted to meet the criteria detailed in the RNP.

10.3 Cooranbong Entry Site

Operational road traffic volumes associated with the Cooranbong Entry Site are not proposed to increase as a result of the Project and therefore have not been considered as part of this assessment.

11 CONSTRUCTION NOISE IMPACT ASSESSMENT

11.1 Newstan Colliery

11.1.1 Construction Equipment Sound Power Levels

Construction at the Newstan Colliery Surface Site will consist of various phases including the following:

- Site establishment.
- Civil works.
- Structural mechanical installation.

Not all infrastructure at the Newstan Colliery Surface Site will be constructed simultaneously rather when they are required to meet operational efficiency requirements or other environmental criteria. As such, construction activities may occur from time to time throughout the life of the Project.

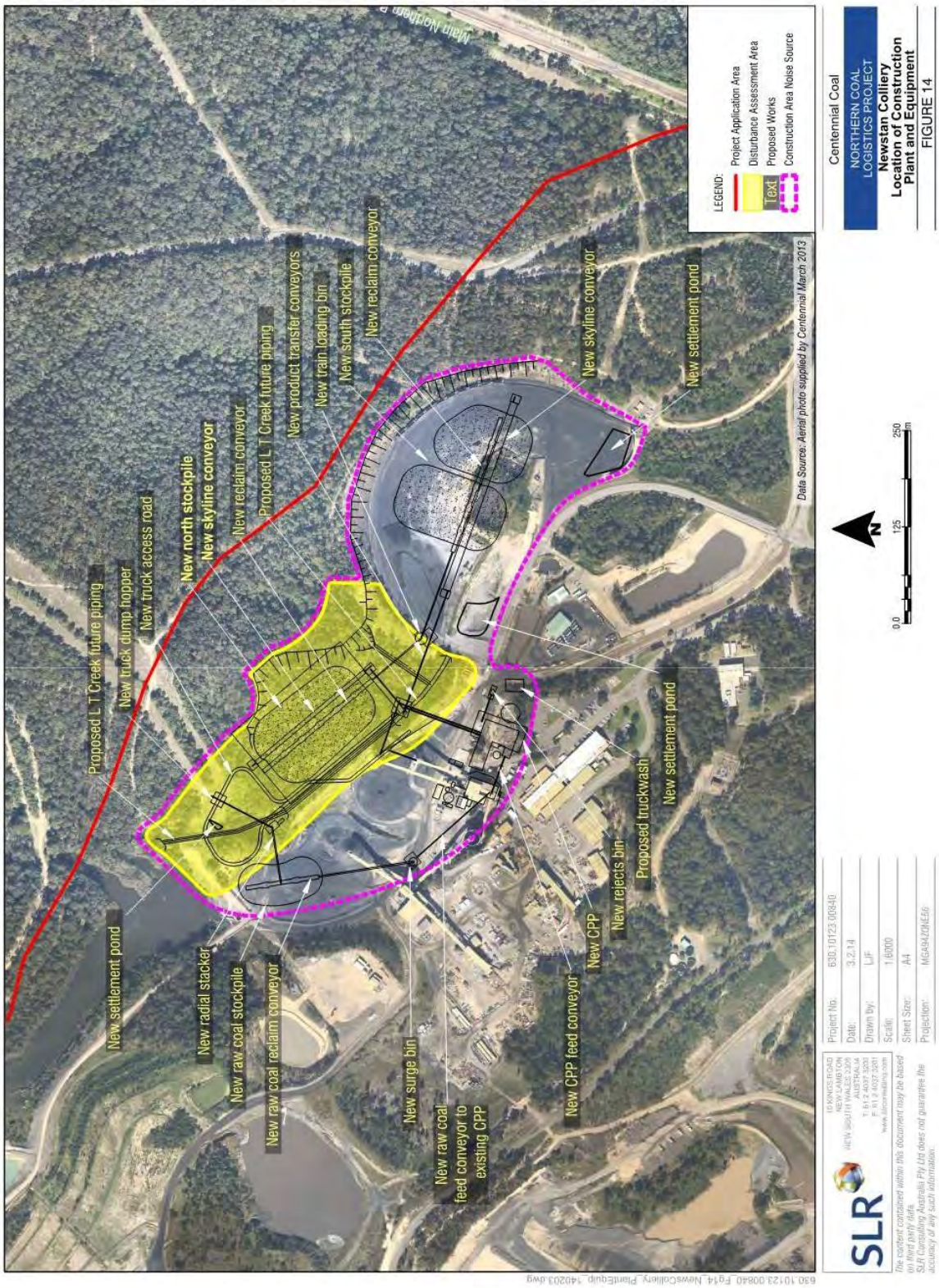
To assess the worst case construction noise scenario, this NIA has assumed all construction activities proposed to occur on site will occur simultaneously. The sound power levels of the major noise generating plant that has been assumed for the construction of the infrastructure at the Newstan Colliery Surface Site as part of the Project are given in **Table 52**. Sound power levels for equipment used in the assessment have been obtained from a SLR database of similar equipment. Details of these levels are given in **Appendix G**.

Table 52 Acoustically Significant Equipment Sound Power Levels

Construction Activity	Plant Equipment	Quantity	dBA
Site Establishment	30 Tonne Articulated Dump Truck	2	110
	16 Tonne Roller	1	107
	12 Tonne Tip Truck	1	105
Civil Works	Bored Piling Rig 20t	2	112
	40t Excavator	3	110
	30 Tonne Articulated Dump Truck	4	110
	Grader	2	109
	16 Tonne Roller	2	107
	Backhoe	2	100
	Concrete Boom Pump	2	108
	Concrete Vibrators	4	106
	6.5m3 Concrete Truck	3	107
Structural Mechanical Installation	Concrete Boom Pump	1	108
	Concrete Vibrators	2	106
	25 Tonne Franna	3	102
	6.5m3 Concrete Truck	2	107
	12 Tonne Tip Truck	1	105
	Cranes	9	102
	Diesel Welders	6	101
	Compressors	3	107

Construction Activity	Plant Equipment	Quantity	dBA
	Diesel Electric Generators	6	102
	Angle Grinder	10	110
	Arc Welder	2	100
	Drop Saw	4	110
	Hammer Drill	2	106
	Impact/Rattle Gun	4	106

Figure 14 Location of Construction Plant Equipment



11.2 Construction Noise Modelling Results

Noise levels generated from the proposed construction activities were predicted at all potentially affected residential receiver locations surrounding the Newstan Colliery Surface Site (see **Figure 5**). A summary of the results of these predictions are contained within **Table 53**.

Table 53 Predicted Construction Noise Levels at Residential Receivers

Residential Receiver Location	Predicted $L_{Aeq(15minute)}$ Noise Level (dBA)	Construction Design Goal $L_{Aeq(15minute)}$ (dBA)	
		Noise Affected	Highly Noise Affected
Site Establishment			
NC1	<35	46 dBA	75 dBA
NC2	<35	46 dBA	
NC3	<35	49 dBA	
NC4	<35	49 dBA	
NC5	<35	49 dBA	
NC6	<35[1]	Internal noise level 45 dBA	N/A
Civil Works			
NC1	<35	46 dBA	75 dBA
NC2	<35	46 dBA	
NC3	<35	49 dBA	
NC4	<35	49 dBA	
NC5	<35	49 dBA	
NC6	<35[1]	Internal noise level 45 dBA	N/A
Structural Mechanical Installation			
NC1	<35	46 dBA	75 dBA
NC2	<35	46 dBA	
NC3	36	49 dBA	
NC4	<35	49 dBA	
NC5	<35	49 dBA	
NC6	<36[1]	Internal noise level 45 dBA	N/A

Note: Construction may only occur between the hours of 7.00 am and 6.00 pm Monday to Friday, and 8.00 am to 1.00 pm Saturdays. No construction work is to take place on Sundays or Public Holidays

1. These are external noise levels. As a conservative estimate, the difference between external to internal noise levels for a typical dwelling comprising of standard construction and windows open for adequate ventilation is 10 dB. As a result, the internal noise level for receiver NC6 is <35 dBA during Site establishment, <35dBA during Civil works and <36 dBA during structural mechanical installation works. These internal noise levels comply with the internal construction noise criteria 45 dBA.

The modelling results in **Table 53** indicate that the predicted $L_{Aeq(15minute)}$ noise levels from proposed construction activities are below the 'Noise Affected' construction noise goals at all assessed sensitive receivers.

11.2.1 Newstan Colliery Surface Site - Construction Traffic

Newstan Construction Road Traffic Parameters

Road traffic volume information for construction activities was provided by Intersect Traffic and reference has been made to the following:

- Traffic Impact Assessment – Northern Coal Services – Northern Coal Logistics Project 2014

At the peak of construction works it is likely that a maximum of 195 construction staff could be on-site at any one time. If a car occupancy rate of 1.2 is adopted to accommodate the scenario of some carpooling the likely construction employee traffic volumes on the external road network associated with travelling to and from the site would be in the order of 162 vtph.

To assume a worst case scenario it has been assumed construction traffic will access the site when both the Northern Coal Logistics Project and the Newstan Extension of Mining Project are operational from the Newstan Colliery Surface Site.

Table 54 details the traffic movements associated with construction of the Northern Coal Logistics Project.

Table 54 Newstan Colliery Construction Vehicle Movements per Hour

Scenario	Road Description	Road Traffic Speed km/h	Peak Hour Vehicle Movements	AADT	Day (15 hour) Traffic Flow 7am to 10pm	Night (9 hour) Traffic Flow 10pm to 7am	Heavy Vehicle %	
							Day 7am to 10pm	Night 10pm to 7am
Existing Traffic Volumes with Construction Traffic and the Coal Logistic Project and Newstan Extension Project Operational traffic (two way traffic)	Miller Road (east of Newstan Colliery Entry)	60	513	2669	2304	365	10	10
	Miller Road (West of Newstan Colliery Entry)	80	222	1600	1453	147	10	10
	Fassifern Road (west)	60	502	3699	3367	332	10	10
	Macquarie Road (East)	60	513	3990	3657	333	10	10

Newstan Colliery Construction Road Traffic Noise Prediction Results

Construction related road traffic noise predictions associated with residential receivers are provided in **Table 55**.

Table 55 Newstan Colliery Construction Road Traffic Noise Prediction Results (residential)

Year	Road Description	Prediction Results (dBA) @ 10m from road		Criteria	
		Day (15 hour) 7am to 10pm	Night (9 hour) 10pm to 7am	Day (15 hour) 7am to 10pm	Night (9 hour) 10pm to 7am
2012 Existing Traffic Volumes with Construction Coal Logistic Project (two way traffic)	Miller Road (east of Newstan Colliery Entry)	55.1	49.3	60	55
	Miller Road (West of Newstan Colliery Entry)	53.1	45.4		
	Fassifern Road (west)	55.0	47.1		
	Macquarie Road (East)	55.3	47.2		

As peak construction related traffic is unlikely to be accessing or leaving the site during school hours, no assessment of peak construction traffic noise at the Fassifern Primary School has been undertaken. Instead, an assessment of the impacts of noise from average hourly traffic volumes along Miller road has been undertaken. The results of average hourly traffic volumes at the Fassifern Primary School are shown in **Table 56**.

Table 56 Newstan Colliery Average Hourly Road Traffic Noise Prediction Results (School)

Scenario	Road Description	Prediction Results dBA @ 30m	Criteria
		LAeq, (1 hour) (internal) when in use	LAeq, (1 hour) (internal) when in use
Average hourly traffic volumes (two way traffic)	Miller Road (east of Newstan Colliery Entry)	36.9 dBA	40 dBA

Based upon the expected peak road traffic movements presented in **Table 54**, the calculated day time $L_{Aeq(15hour)}$ and night time $L_{Aeq(9hour)}$ noise level at the nearest roadside residential receivers surrounding the Newstan Colliery Surface Site (assumed to be approximately 10m from the edge of the road) meets the criteria detailed in the RNP.

The average hourly traffic movements meet the RNP $L_{Aeq(1hour)}$ noise criteria at the Fassifern primary School when the Fassifern Primary School is in use.

11.2.2 Cooranbong Entry Site – Construction Traffic

Construction activities are not proposed for the Cooranbong Entry Site and therefore have not been included as part of this assessment. Consideration has been given to construction employee traffic for the re-development of the Newstan Colliery Surface Site gaining access via the Cooranbong Entry Site. Construction employees would arrive at the Cooranbong Entry Site and then be transported to the Newstan Colliery Surface Site via bus along the existing private haul roads. As such, consideration of construction vehicle traffic noise has been included in this assessment.

Road traffic associated with construction of the Project from the Cooranbong Entry Site will be via the following roads:

Gradwells Road

Gradwells Road is a sealed two lane two way local road that runs north from Newport Road, Dora Creek. It provides access to properties along its length including Mandalong Mine – Cooranbong Entry Site. Gradwells Road is speed zoned at 80 km/h.

Newport Road

Newport Road is a local collector road that runs in an east west direction connecting Cooranbong and Dora Creek. Newport Road is speed zoned at 50 km/h

Cooranbong Entry Site Construction Road Traffic Parameters

Road traffic volume information was provided by Intersect Traffic and reference has been made to the following:

- Traffic Impact Assessment – Northern Coal Services – Northern Coal Logistics Project 2014

Table 57 details the traffic movements associated with the construction during the Northern Coal Logistics Project.

Table 57 Mandalong Mine – Cooranbong Entry Site Construction Vehicle Movements per Hour

Year	Road Description	Road Traffic Speed km/h	Peak Hour Vehicle Movements	AADT	Day (15 hour) Traffic Flow 7am to 10pm	Night (9 hour) Traffic Flow 10pm to 7am	Heavy Vehicle % Day 7am to 10pm	Heavy Vehicle % Night 10pm to 7am
Existing Traffic Volumes with Project construction traffic (two way traffic)	Gradwells Road (North)	80	**213**	**834**	**641**	**193**	10	10
	Newport Road (East)	50	**549**	**4194**	**3800**	**394**	10	10

Cooranbong Entry Site Construction Road Traffic Noise Prediction Results

Table 58 provides the construction road traffic noise predictions.

Table 58 Cooranbong Entry Site Construction Road Traffic Noise Prediction Results (residential)

Year	Road Description	Prediction Results (dBA) @ 10m		Criteria	
		Day (15 hour) 7am to 10pm	**Night (9 hour) 10pm to 7am**	**Day 7am to 10pm**	**Night 10pm to 7am**
Existing Traffic Volumes with Project construction traffic (two way traffic)	Gradwells Road (North)	55.0[1]	45.1[1]	LAeq, (1 hour) 55 (external)	LAeq, (1 hour) 50 (external)
	Newport Road (east)	57.3	49.7	LAeq, (15 hour) 60 (external)	LAeq, (9 hour) 55 (external)

Notes: 1. LAeq, (1 hour) prediction results

Based upon the expected peak road traffic movements presented in **Table 58**, the calculated day time $L_{Aeq(15hour)}$ and $L_{Aeq(1hour)}$ noise level at the nearest roadside residential receivers (assumed to be approximately 10m from the edge of the road) meets the criteria detailed in the RNP.

12 RAIL TRAFFIC NOISE IMPACT ASSESSMENT

12.1 Methodology

The calculation of the L_{Aeq} and the maximum passby levels have been conducted using the Nordic Rail Prediction Method (1994). 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). Parameters including the daytime $L_{Aeq(15hour)}$, night-time $L_{Aeq(9hour)}$, $L_{Aeq(15minute)}$ and maximum passby level (L_{Amax}) can then be determined by summing the effects of the individual noise sources and by incorporating the number of train events.

12.2 Assumptions

The existing Newstan Colliery Development Consent (DA73-11-98) permits the operation of up to 8 trains per day from the Newstan Colliery Surface Site. The Project does not propose to increase the number of trains above the current approved maximum of 8 trains per day.

Two scenarios were considered by the Noise Impact Assessment to determine the impacts from rail traffic from the Newstan Colliery Surface Site. The two scenarios considered are summarised below:

- **Scenario 1** – Background rail traffic noise with no trains associated with the Newstan Colliery operating.
- **Scenario 2** – Rail traffic noise associated with the proposed train movements associated with the Project (i.e. maximum of 8 trains per day).

Assumptions made (based on information provided by RailCorp and Northern Coal Services) for the purpose of the noise predictions are provided in **Table 59**.

Table 59 Daily Rail Traffic Volumes

Scenario	Type of Train	Daily Train Traffic		Total Train Length	Notch Setting	Ground absorption	Speed of Train
		Day 7am to 10pm	Night 10pm to 7am				
1. Existing Northern rail network without Newstan Colliery	Freight/coal Train - Diesel Engine	13	10	4 x Loco - 80m Wagons – 1000m	8	Soft	80 km
	Passenger Trains	72	19	160m	N/A	Soft	80 km
2. Existing Northern rail network with Newstan colliery operations	Freight/coal Train - Diesel Engine	13	10	4 x Loco - 80m Wagons – 1000m	8	Soft	80 km
	Electric Passenger	72	19	160m	N/A	Soft	80 km
	Newstan Coal trains	4	4	4 x Loco - 80m Wagons – 1000m	8	Soft	80km

12.3 Rail Traffic Noise Predictions

The daytime $L_{Aeq(15hour)}$, night-time $L_{Aeq(9hour)}$ and maximum (L_{Amax}) noise levels for the assumed train movements are presented in **Table 60**,and **Table 61** for various set back distances from the Northern Rail line.

Table 60 Scenario 1 Predicted Rail Traffic Noise Levels

Distance to Receiver	Predicted Noise Level			Residential noise trigger levels (dBA)		
	Average Day LAeq(15hour)	Average Night LAeq(9hour)	Passby LAmax	Day LAeq(15hour)	Night LAeq(9hour)	Passby LAmax
25	**61.5**	**61.5**	**86.8**	60	55	80
50	58.4	**58.4**	**83.6**			
100	55.3	**55.4**	**80.2**			
150	53.6	53.6	78.1			
200	52.3	52.3	76.6			
250	51.3	51.4	75.3			
500	48.3	48.3	70.8			
1000	45.3	45.3	65.5			

Table 61 Scenario 2 Predicted Rail Traffic Noise Levels

Distance to Receiver	Predicted Noise Level			Residential noise trigger levels (dBA)		
	Average Day LAeq(15hour)	Average Night LAeq(9hour)	Passby LAmax	Day LAeq(15hour)	Night LAeq(9hour)	Passby LAmax
25	**62.2**	**62.6**	**86.8**	60	55	80
50	59.0	**59.4**	**83.6**			
100	56.0	**56.4**	**80.2**			
150	54.2	54.6	78.1			
200	52.9	53.3	76.6			
250	52.0	52.4	75.3			
500	48.9	49.4	70.8			
1000	45.9	46.3	65.5			

As indicated in **Table 60** and **Table 61** predicted existing rail traffic noise levels without the Newstan Colliery train movements operating already exceed the day $L_{Aeq(15\ hour)}$ and night-time $L_{Aeq(9\ hour)}$ trigger levels for residents within 25m of the rail line. Furthermore, the existing rail noise maximum passby noise level without the Newstan Colliery train movements operating is predicted to exceed the relevant trigger levels at residences within 100m of the rail line.

The predicted rail noise levels as a result of the Project with a maximum of 8 trains per day will increase the day $L_{Aeq(15\ hour)}$ by up to 0.7dBA and night-time $L_{Aeq(9\ hour)}$ by up to 1.1 dBA above the existing rail noise with no Newstan Colliery trains in operation. This negligible noise level increase will not be noticeable by most people.

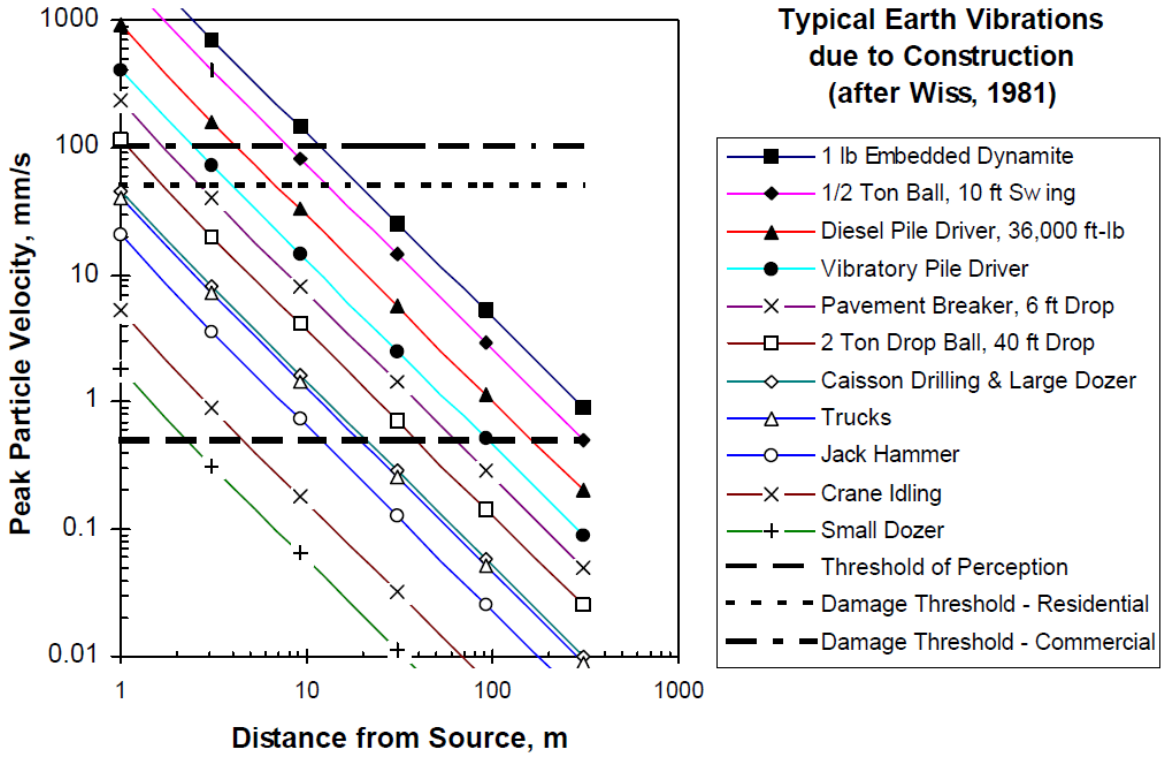
The rail noise maximum passby noise level is not predicted to increase as a result of the Project.

13 VIBRATION ASSESSMENT

The main vibration generating equipment to be used at the site will include trucks and dozers during both construction and operation of the Project.

The amplitude of vibrations from construction equipment diminishes with distance from the source. This attenuation of vibration is due to both geometrical spreading and dissipation of energy within the ground. *Construction Vibrations and Their Impact on Vibration-Sensitive Facilities* (Amick & Gendreau, ASCE, 2000) provides a common generic model of vibrations as a function of distance developed by Wiss (1981), as shown in **Figure 15**.

Figure 15 Construction vibrations as a function of distance, after Wiss (1981)



Source: *Construction Vibrations and Their Impact on Vibration-Sensitive Facilities* (Amick & Gendreau, ASCE, 2000)

Although not explicitly shown in **Figure 15** vibration generated by underground mining equipment (eg continuous miners) is likely to be less than that shown for a "2 Ton Drop Ball, 40 ft Drop".

Given the separation distance between the Project site and the nearest potentially affected residential locations (greater than 770 m between the proposed infrastructure at Newstan colliery and the nearest residence) vibration levels from activities at the Project site are predicted to be negligible and below levels of human perception at the nearest residences. Consequently, vibration generated at the Project site will be significantly below the criteria for "minimal risk of cosmetic damage" at the nearest residences.

14 CUMULATIVE NOISE ASSESSMENT

14.1 Cumulative Operational Noise

Potential cumulative noise impacts from existing and successive developments are embraced by the INP procedures by ensuring that the appropriate noise emission criteria (and consent limits) are established with a view to maintaining acceptable noise *amenity* levels for residences. Therefore, the cumulative impact of the proposed development with existing industrial noise sources has been assessed in the determination of the amenity levels at surrounding potentially noise sensitive areas.

14.1 Cumulative Construction Noise

The proposed infrastructure to be constructed at the Newstan Colliery Surface Site will be constructed simultaneously with normal surface mining operations. As such, construction activities will be difficult to distinguish for normal surface mining activities. As a conservative approach, **Table 62** presents the predictive cumulative operational and construction activities and assessed against the INP Project Specific Noise Criteria.

Scenario 3 was selected for the cumulative assessment as being a realistic operational scenario being undertaken while construction activities are being carried out.

Table 62 Predicted Cumulative Operational and Construction Noise Levels at Residential Receivers

Residential Receiver Location	Predicted $L_{Aeq(15minute)}$ Noise Level (dBA)			Project Specific Noise criteria (dBA)
	Site Establishment			
	Operational	**Construction**	**Total**	
NC1	<35 dBA	<35 dBA	<35 dBA	41 dBA
NC2	<35 dBA	<35 dBA	<35 dBA	41 dBA
NC3	<35 dBA	<35 dBA	37 dBA	44 dBA
NC4	<35 dBA	<35 dBA	<35 dBA	44 dBA
NC5	<35 dBA	<35 dBA	<35 dBA	44 dBA
NC6	37 dBA	<35 dBA	39 dBA external <35 dBA internal[1]	55 dBA Play ground 35 dBA Internal
	Civil Works			
	Operational	**Construction**	**Total**	
NC1	<35 dBA	<35 dBA	<35 dBA	41 dBA
NC2	<35 dBA	<35 dBA	<35 dBA	41 dBA
NC3	<35 dBA	<35 dBA	36 dBA	44 dBA
NC4	<35 dBA	<35 dBA	<35 dBA	44 dBA
NC5	<35 dBA	<35 dBA	<35 dBA	44 dBA
NC6	37 dBA	<35 dBA	38 dBA external <35 dBA internal[1]	55 dBA Play ground 35 dBA Internal
	Structural Mechanical Installation			
	Operational	**Construction**	**Total**	
NC1	<35 dBA	<35 dBA	<35 dBA	41 dBA
NC2	<35 dBA	<35 dBA	35 dBA	41 dBA

Residential Receiver Location	Predicted $L_{Aeq(15minute)}$ Noise Level (dBA)			Project Specific Noise criteria (dBA)
NC3	<35 dBA	36 dBA	38 dBA	44 dBA
NC4	<35 dBA	<35 dBA	<35 dBA	44 dBA
NC5	<35 dBA	<35 dBA	<35 dBA	44 dBA
NC6	37 dBA	<36[1] dBA	40 external <35 Internal	55 dBA Play ground 35 dBA Internal

Note: Construction may only occur between the hours of 7.00 am and 6.00 pm Monday to Friday, and 8.00 am to 1.00 pm Saturdays. No construction work is to take place on Sundays or Public Holidays

1. These are external noise levels. As a conservative estimate, the difference between external to internal noise levels with a dwelling comprising of standard construction and windows open for adequate ventilation is 10 dB.

The cumulative operational and construction noise levels presented in **Table 62** show that cumulative noise level will meet the project specific noise levels at all assessment receiver locations.

14.2 Newstan Extension of Mining Project

The scope of the proposed Newstan Extension of Mining Project at this stage has not been finalised and therefore potential cumulative noise impacts from this development have not been considered as part of this assessment. The cumulative noise impact of the Project and the Newstan Extension of Mining Project will be assessed during the environmental assessment for the Newstan Extension of Mining Project.

15 NOISE MONITORING MANAGEMENT AND MITIGATION

15.1 Operational Noise

Newstan Colliery Surface Site

In 2011, Centennial Newstan constructed a sound barrier adjacent to the rail loop stockpile to reduce potential noise impacts on nearby sensitive receivers from train loading activities and has retrofitted reversing alarms on operating equipment with the “quacker” type alarm system. Additionally, the fleet of coal haulage trucks utilised on site are designed to meet the E5 European Standards which are typically quieter than similar haulage trucks as well as purchasing a fleet of new locomotives which are quieter than standard locomotives utilised on the regional rail network.

Noise modelling undertaken for various operational scenarios indicate that operational noise levels are predicted to exceed the Project Specific Noise Criteria at night during calm conditions by up to 1 dBA and by up to 4 dBA during night time temperature inversions at NC3 for the current existing and approved operations.

To mitigate current noise impacts, Northern Coal Services will complete the implementation of noise mitigation measures previously identified for the existing CPP and transfer tower. These mitigation measures include:

Coal Preparation Plant (CPP Module 1)

- The sealing of all unnecessary openings in all the walls around the preparation plant;
- The continuance of the existing plant external walls down to the ground level;
- Fully enclosing exposed conveyors with the same Colorbond steel currently being used for the building and conveyors; and
- Replace alsynite panels on eastern wall with Colorbond steel.

Reclaim Conveyor Transfer House

- The sealing of all unneccesary openings in all the walls around the conveyor transfer house;
- The continuance of the existing plant external walls down to the ground level;
- Fully enclosing exposed conveyors with the same Colorbond steel currently being used for the building and conveyors; and
- Replace alsynite panels on eastern wall with Colorbond steel.

These mitigation measures will be completed in 2014.

In order to maintain noise levels at the Newstan Colliery Surface Site once a second CPP is in operation, Northern Coal Services will construct the new CPP with noise attenuating panels.

As modeling has been undertaken based on a worst case operational scenario, these exceedances are not predicted to occur all the time. As such, and in order to manage potential noise exceedances at receivers surrounding the Newstan Colliery Surface Site, a real time noise monitor is currently being installed. The real time noise monitor is currently scheduled to be operational in 2014.

The real time noise monitoring system will be designed to alert staff at the Newstan Colliery Surface Site when noise levels are approaching the Project Specific Noise Criteria. It will also be designed to determine the directionality of the noise source to enable noise sources from the Newstan Surface Site to be distinguished from surrounding noise source contributions (i.e. the rail line).

The real time noise monitoring system will enable the operations of the Newstan Colliery Surface Site to be managed to maintain noise levels below the Project Specific Noise Criteria. Once operational noise levels are approaching the Project Specific Noise Criteria, a review of potential noise sources can be undertaken with operational management measures put in place to reduce the potential for a noise exceedance to occur. Operational management measures may include temporary cessation of on site activities or implementation of additional noise mitigation.

A detailed noise monitoring and management plan will be prepared to support the Project. The noise management plan will include:

- Details of the operational activities carried out at the Newstan Colliery Surface Site
- Identification of the location of noise sensitive receivers
- Details of noise criteria to be achieved
- Details of noise monitoring programs
- Management options for reducing operation noise levels
- Staff responsibilities and accountabilities
- Noise reporting requirements

Cooranbong Entry Site

A real time noise monitor has been established at the Cooranbong Entry Site to monitor and manage noise levels at the site. Additionally, the CPP at the Cooranbong Entry Site is currently being clad in noise attenuating panels. This noise mitigation measure is currently scheduled for completion in 2014. Once these noise mitigation measures are implemented, no additional noise management is required to achieve the Project Specific Noise Criteria.

15.2 Construction

Although the onsite construction noise levels are predicted to be significantly below the relevant guidelines at the closest residential receivers Northern Coal Services will implement additional work practices during construction activities in order to maintain predicted construction noise levels to below the Noise Affected level at potentially affected residences. These measures may include:

- Minimising the sound power level of construction equipment where possible.
- Orientate equipment in such a way that the ‘high-noise’ side is directed away from the noise sensitive receivers where possible.
- Education of operators/contractors with regard to potential noise issues and encourage the implementation of quiet work practices.
- Arrangement of traffic flow at the site to minimise the need for reversing.
- Avoiding the use of PA systems and loud stereos outside.
- Turn off trucks and construction plant when not in use.
- Tipping and stockpiling materials as far away from neighbors as possible.

- A Construction Management Plan will be developed for the re-development of the Newstan Colliery Surface Site.

In additional to the construction noise management activities Northern Coal Services will:

- Undertake consultation with potentially-affected residences regarding the timing of acoustically significant events.
- Ensure a prompt response to any complaint with regard to noise.
- Undertake noise monitoring on site and within the community.
- Implement any additional noise management actions if and where required.

All potentially affected residents will be informed of the following prior to the commencement of acoustically significant construction activities on the Project:

- The nature and duration of the works to be carried out.
- The expected noise levels.
- Relevant contact details for site personnel.

16 CONCLUSION

SLR has been commissioned by Centennial Northern Coal Services Pty Limited (Northern Coal Services) to conduct a Noise Impact Assessment (NIA) for the Northern Coal Logistics Project (the Project) located at Fassifern on the western side of Lake Macquarie, New South Wales and in Dora Creek on the western side of Lake Macquarie, New South Wales.

The Project centres on the utilisation and upgrading of the existing surface infrastructure at the Newstan Colliery Surface Site and Cooranbong Entry Site, along with the utilisation of existing private haul roads. These facilities are integral to the on-going handling, processing and transport of coal from the underground of Newstan Colliery and Mandalong Mine (including the proposed Newstan Colliery Extension of Mining Project and Mandalong Southern Extension Project) into domestic and export markets. The Project will allow for improved and flexible coal handling arrangements across Newstan Colliery and Mandalong Mine to deliver the range of coal products required to meet domestic and export markets demands.

Broadly, the objective of the noise assessment was to conduct noise modelling of the existing and proposed operations at both Newstan Colliery Surface Site and the Cooranbong Entry Site to identify the potential impacts of noise from its current and proposed operations; and to provide recommendations with regard to noise management strategies and mitigation measures where necessary, with the aim of achieving the Project Specific Noise Criteria.

Operational Noise Assessment

Newstan Colliery Surface Site

Six scenarios were modelled as part of this NIA for the Newstan Colliery Surface Site to assess the effectiveness of currently proposed mitigation measures and determine impacts from infrastructure proposed to be constructed and operated by the Project.

Scenario 1 (Existing Operation)

This scenario represents the operations currently being undertaken at the Newstan Colliery Surface Site. This scenario has 2 Front End Loaders operating at the rail loop stockpile and the dozer operations are restricted at night (i.e. between 10pm and 7am).

Scenario 2

Scenario 2 represents the Project with only the existing CPP in operation and manual loading of trains being continued. The main difference between Scenario 1 and Scenario 2 is that Scenario 2 has an additional Front End Loader in operation at the Rail Loop stockpile and the dozer operates unrestricted at night.

Scenario 3

Scenario 3 represents the Project with only the existing CPP in operation and manual loading of trains being continued. The main difference between Scenario 2 and Scenario 3 is the implementation of noise mitigation measures on the existing CPP and transfer tower (detailed in **Section 9.2**) are considered to be implemented in Scenario 3. This scenario is designed to assess the benefits obtained by completing the implementation of these mitigation measures.

Scenario 4

Scenario 4 represents the Project with two CPPs in operation at the site and manual loading of trains being continued. This scenario assumes that the mitigation measures on the existing CPP and transfer tower are completed and that the new CPP is constructed with colorbond sheet metal cladding only.

Scenario 5

Scenario 5 represents the Project with two CPPs in operation at the site and manual loading of trains being continued. This scenario assumes that the mitigation measures on the existing CPP and transfer tower are completed and that the new CPP is constructed with a noise attenuating cladding. This scenario is designed to assess the benefits obtained by cladding the new CPP with noise attenuating panels.

Scenario 6

Scenario 6 represents the Project with two CPPs in operation at the site with an automatic train loading facility in operation. This scenario assumes that the mitigation measures on the existing CPP and transfer tower are completed and that the new CPP is constructed with a noise attenuating cladding. This scenario is designed to assess the benefits obtained by installing an automatic train loading facility at the site.

Operational noise levels are predicted to exceed the Project Specific Noise Criteria at night during calm conditions by up to 1 dBA and by up to 4 dBA during night time temperature inversions at NC3 for the current existing and approved operations.

Once the mitigation works to the existing CPP and transfer tower currently being implemented are completed, only a 2 dBA exceedance is predicted during night time temperature inversions at NC3.

Once a second CPP is constructed and in operation at the Newstan Colliery Surface Site, if it is constructed with colorbond sheet metal cladding, a 2 dBA exceedance is predicted at night during calm conditions and a 5 dBA exceedance during night time temperature inversions at NC3.

If the new CPP is clad in noise attenuating panels, only a 2 dBA exceedance is predicted during night-time temperature inversions at NC3.

Noise modelling shows that manual loading of trains can continue to be undertaken 24 hours a day, seven days a week at the Newstan Colliery Surface Site utilising up to 3 front end loaders and a dozer with only a 2 dBA exceedances at NC3 during a night time temperature inversion so as long as the current mitigation measures are completed and the new CPP is constructed and clad with noise attenuating panels.

The current Newstan Colliery Development Consent DA 73-11-98 approves the implementation of an automated product handling and train loading system when the threshold of exporting more than 3 Mtpa through the Newstan rail loading facilities is reached. To date this threshold has not been reached and the manual loading of trains occurs.

The noise modeling results demonstrate that once the mitigation measures to the existing CPP and transfer tower are completed, the Project can continue to operate with manual loading of trains with the only minor exceedances predicted at NC3 at night during a temperature inversion. The construction of an automatic train loading facility provides little benefit to the overall noise predictions and as such, is not required to be constructed to manage noise levels on site. Instead, the automatic train loading facility will be constructed when operational efficiencies require it or to meet other environmental criteria (specifically, air quality criteria).

Cooranbong Entry Site

Operational noise levels from the Cooranbong Entry Site are predicted to meet the Project Specific Noise Criteria at all residential locations considered in the assessment.

Sleep Disturbance Assessment

Newstan Colliery Surface Site

The predicted L_{Amax} noise levels in **Table 46** are predicted to meet the sleep disturbance criteria for night-time operation at the Newstan Colliery Surface Site under temperature inversion weather conditions (worst case scenario) at all receiver locations.

Cooranbong Entry Site

The L_{Amax} noise levels shown in **Table 48** are predicted to meet the sleep disturbance criteria for night-time operation at the Cooranbong Entry Site under temperature inversion weather conditions (worst case scenario) at all receiver locations.

Road Traffic Noise Assessment

Newstan Colliery Surface Site

The calculated day and night-time road traffic noise level at the nearest roadside residential receivers meets the criteria detailed in the NSW Road Noise Policy under all prediction scenarios.

Cooranbong Entry Site

Road traffic volumes associated with the Cooranbong Entry Site are not proposed to increase as a result of the Project and therefore have not been considered as part of this assessment.

Construction Noise Assessment

Newstan Colliery Surface Site

The modelling results indicate that the predicted $L_{Aeq(15minute)}$ noise levels from proposed construction activities are below the 'Noise Affected' construction noise goals at all residences.

The calculated day time construction road traffic noise level at the nearest roadside receivers meets the criteria detailed in the RNP under all prediction scenarios.

Cooranbong Entry Site

Construction activities are not proposed for the Cooranbong Entry Site and therefore have not been included as part of this assessment. However, construction employee traffic access via the Cooranbong Entry Site will be utilised and therefore has been included in this assessment.

The calculated day time construction road traffic noise level at the nearest roadside receivers meets the criteria detailed in the RNP under all prediction scenarios.

Rail Noise assessment

Predicted existing rail traffic noise levels without the Newstan Colliery trains already exceed the day $L_{Aeq(15\ hour)}$ and Night-time $L_{Aeq(9\ hour)}$ trigger levels for residents within 25m of the rail line. Furthermore, the existing rail noise maximum passby noise level is predicted to exceed the relevant trigger levels at residences within 100m of the rail line.

The predicted rail noise levels for the Project will increase the day $L_{Aeq(15\ hour)}$ by up to 0.7 dBA and Night-time $L_{Aeq(9\ hour)}$ by up to 1.1 dBA. This negligible noise level increase will not be noticeable by most people.

Vibration Assessment

Given the separation distance between mining operations and the nearest potentially affected residential locations vibration levels from the Project during operations is predicted to be negligible and below levels for human perception at the nearest residential locations.

Due to the separation distance to the nearest affected residential receptor, the level of vibration caused by construction activities is predicted to be below the level of human perception at any of the nearest receptors and therefore below the criteria for “minimal risk of cosmetic damage” at surrounding residential premises.

Cumulative Assessment

Cumulative Operational Noise

Potential cumulative noise impacts from existing and successive developments are embraced by the INP procedures by ensuring that the appropriate noise emission criteria (and consent limits) are established with a view to maintaining acceptable noise amenity levels for residences. Therefore, the cumulative impact of the proposed development with existing industrial noise sources has been assessed in the determination of the amenity levels at surrounding potentially noise sensitive areas.

Cumulative Construction Noise

The proposed infrastructure to be constructed at the Newstan Colliery Surface Site will be constructed simultaneously with normal surface mining operations. As such, construction activities will be difficult to distinguish for normal surface mining activities. As a conservative approach, the predictive cumulative operational and construction activities have been assessed against the INP project specific noise criteria.

The predicted cumulative operational and construction noise levels show that cumulative noise level will meet the project specific noise levels at all assessment receiver locations.

Blasting Assessment

Blasting activities are not proposed during the operation and construction of the project and therefore have not been included as part of this assessment.

Noise Management

In order to maintain noise levels at the Newstan Colliery Surface Site once a second CPP is in operation, Northern Coal Services will construct the new CPP with noise attenuating panels.

With mitigation measures implemented, the results of the noise modeling demonstrate that manual loading of trains can continue to be undertaken 24 hours a day, seven days a week at the Newstan Colliery Surface Site utilising up to 3 front end loaders and a dozer resulting in only a 2 dBA exceedances at NC3 during a night time temperature inversions.

As modeling has been undertaken based on a worst case operational scenario, these exceedances are not predicted to occur all the time. As such, and in order to manage potential noise exceedances at receivers surrounding the Newstan Colliery Surface Site, a real time noise monitor is currently being installed. The real time noise monitor is currently scheduled to be operational in 2014.

The real time noise monitoring system will be designed to alert staff at the Newstan Colliery Surface Site when noise levels are approaching the Project Specific Noise Criteria. It will also be designed to determine the directionality of the noise source to enable noise sources from the Newstan Surface Site to be distinguished from surrounding noise source contributions (i.e. the rail line).

The real time noise monitoring system will enable the operations of the Newstan Colliery Surface Site to be managed to maintain noise levels below the Project Specific Noise Criteria.

A detailed noise monitoring and management plan will be prepared to support the Project.

Acoustic Terminology

1 Sound Level or Noise Level

The terms "sound" and "noise" are almost interchangeable, except that in common usage "noise" is often used to refer to unwanted sound.

Sound (or noise) consists of minute fluctuations in atmospheric pressure capable of evoking the sense of hearing. The human ear responds to changes in sound pressure over a very wide range. The loudest sound pressure to which the human ear responds is ten million times greater than the softest. The decibel (abbreviated as dB) scale reduces this ratio to a more manageable size by the use of logarithms.

The symbols SPL, L or L_P are commonly used to represent Sound Pressure Level. The symbol L_A represents A-weighted Sound Pressure Level. The standard reference unit for Sound Pressure Levels expressed in decibels is 2E-5 Pa.

2 "A" Weighted Sound Pressure Level

The overall level of a sound is usually expressed in terms of dBA, which is measured using a sound level meter with an "A-weighting" filter. This is an electronic filter having a frequency response corresponding approximately to that of human hearing.

People's hearing is most sensitive to sounds at mid frequencies (500 Hz to 4000 Hz), and less sensitive at lower and higher frequencies. Thus, the level of a sound in dBA is a good measure of the loudness of that sound. Different sources having the same dBA level generally sound about equally loud.

A change of 1 dBA or 2 dBA in the level of a sound is difficult for most people to detect, whilst a 3 dBA to 5 dBA change corresponds to a small but noticeable change in loudness. A 10 dBA change corresponds to an approximate doubling or halving in loudness. The table below lists examples of typical noise levels

Sound Pressure Level (dBA)	Typical Source	Subjective Evaluation
130	Threshold of pain	Intolerable
120 110	Heavy rock concert Grinding on steel	Extremely noisy
100 90	Loud car horn at 3 m Construction site with pneumatic hammering	Very noisy
80 70	Kerbside of busy street Loud radio or television	Loud
60 50	Department store General Office	Moderate to quiet
40 30	Inside private office Inside bedroom	Quiet to very quiet
20	Unoccupied recording studio	Almost silent

Other weightings (eg B, C and D) are less commonly used than A:weighting. Sound Levels measured without any weighting are referred to as "linear", and the units are expressed as dB(lin) or dB.

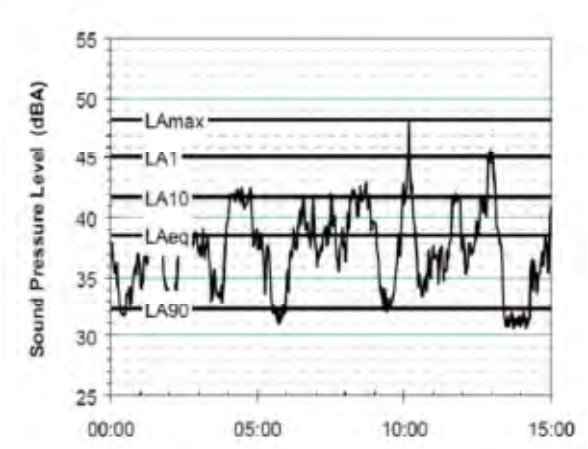
3 Sound Power Level

The Sound Power of a source is the rate at which it emits acoustic energy. As with Sound Pressure Levels, Sound Power Levels are expressed in decibel units (dB or dBA), but may be identified by the symbols SWL or LW, or by the reference unit 1E:12 W.
The relationship between Sound Power and Sound Pressure may be likened to an electric radiator, which is characterised by a power rating, but has an effect on the surrounding environment that can be measured in terms of a different parameter, temperature.

4 Statistical Noise Levels

Sounds that vary in level over time, such as road traffic noise and most community noise, are commonly described in terms of the statistical exceedance levels L_{AN}, where L_{AN} is the A-weighted sound pressure level exceeded for N% of a given measurement period. For example, the L_{A1} is the noise level exceeded for 1% of the time, L_{A10} the noise exceeded for 10% of the time, and so on.

The following figure presents a hypothetical 15 minute noise survey, illustrating various common statistical indices of interest.



Of particular relevance, are:

L_{A1} The noise level exceeded for 1% of the 15 minute interval.

L_{A10} The noise level exceed for 10% of the 15 minute interval. This is commonly referred to as the average maximum noise level.

L_{A90} The noise level exceeded for 90% of the sample period. This noise level is described as the average minimum background sound level (in the absence of the source under consideration), or simply the background level.

L_{Aeq} The A-weighted equivalent noise level (basically the average noise level). It is defined as the steady sound level that contains the same amount of acoustical energy as the corresponding time-varying sound.

When dealing with numerous days of statistical noise data, it is sometimes necessary to define the typical noise levels at a given monitoring location for a particular time of day. A standardised method is available for determining these representative levels.

This method produces a level representing the "repeatable minimum" L_{A90} noise level over the daytime and night-time measurement periods, as required by the EPA. In addition the method produces mean or "average" levels representative of the other descriptors (L_{Aeq}, L_{A10}, etc).

5 Tonality

Tonal noise contains one or more prominent tones (ie distinct frequency components), and is normally regarded as more offensive than "broad band" noise.

6 Impulsiveness

An impulsive noise is characterised by one or more short sharp peaks in the time domain, such as occurs during hammering.

7 Frequency Analysis

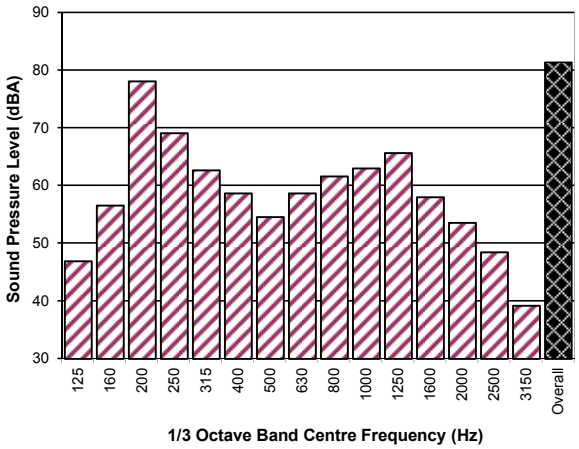
Frequency analysis is the process used to examine the tones (or frequency components) which make up the overall noise or vibration signal. This analysis was traditionally carried out using analogue electronic filters, but is now normally carried out using Fast Fourier Transform (FFT) analysers.

The units for frequency are Hertz (Hz), which represent the number of cycles per second.

Frequency analysis can be in:

- Octave bands (where the centre frequency and width of each band is double the previous band)
- 1/3 octave bands (3 bands in each octave band)
- Narrow band (where the spectrum is divided into 400 or more bands of equal width)

The following figure shows a 1/3 octave band frequency analysis where the noise is dominated by the 200 Hz band. Note that the indicated level of each individual band is less than the overall level, which is the logarithmic sum of the bands.



8 Vibration

Vibration may be defined as cyclic or transient motion. This motion can be measured in terms of its displacement, velocity or acceleration. Most assessments of human response to vibration or the risk of damage to buildings use measurements of vibration velocity. These may be expressed in terms of "peak" velocity or "rms" velocity.

The former is the maximum instantaneous velocity, without any averaging, and is sometimes referred to as "peak particle velocity", or PPV. The latter incorporates "root mean squared" averaging over some defined time period.

Vibration measurements may be carried out in a single axis or alternatively as triaxial measurements. Where triaxial measurements are used, the axes are commonly designated vertical, longitudinal (aligned toward the source) and transverse.

The common units for velocity are millimetres per second (mm/s). As with noise, decibel units can also be used, in which case the reference level should always be stated. A vibration level V, expressed in mm/s can be converted to decibels by the formula 20 log (V/V_o), where V_o is the reference level (1E-6 mm/s). Care is required in this regard, as other reference levels are used by some organizations.

9 Human Perception of Vibration

People are able to "feel" vibration at levels lower than those required to cause even superficial damage to the most susceptible classes of building (even though they may not be disturbed by the motion). An individual's perception of motion or response to vibration depends very strongly on previous experience and expectations, and on other connotations associated with the perceived source of the vibration. For example, the vibration that a person responds to as "normal" in a car, bus or train is considerably higher than what is perceived as "normal" in a shop, office or dwelling.

10 Over-Pressure

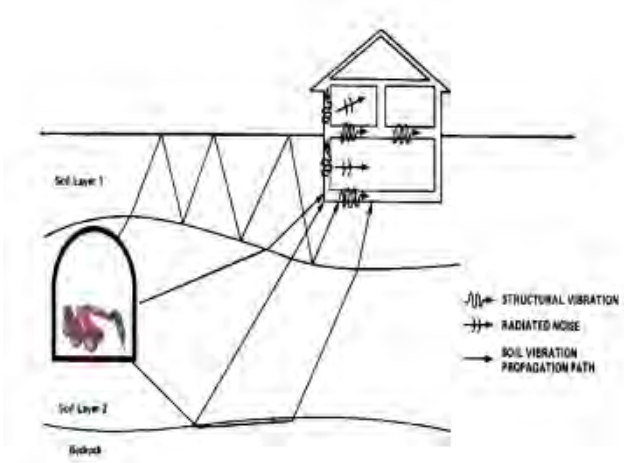
The term "over-pressure" is used to describe the air pressure pulse emitted during blasting or similar events. The peak level of an event is normally measured using a microphone in the same manner as linear noise (ie unweighted), at frequencies both in and below the audible range.

11 Regenerated Noise

Noise that propagates through a structure as vibration and is radiated by vibrating wall and floor surfaces is termed "regenerated noise", "structure-borne noise", or sometimes "ground-borne noise". Regenerated noise originates as vibration and propagates between the source and receiver through the ground and/or building structural elements, rather than through the air.

Typical sources of regenerated noise include tunnelling works, underground railways, excavation plant (eg rockbreakers), and building services plant (eg fans, compressors and generators).

The following figure presents the various paths by which vibration and regenerated noise may be transmitted between a source and receiver for construction activities occurring within a tunnel.



The term "regenerated noise" is also used to describe other types of noise that are emitted from the primary source as a different form of energy. One example would be a fan with a silencer, where the fan is the energy source and primary noise source. The silencer may effectively reduce the fan noise, but some additional noise may be created by the aerodynamic effect of the silencer in the airstream. This "secondary" noise may be referred to as regenerated noise.

	Operational Octave band sound Power Level Leq dB											
Plant/Equipment	**31Hz**	**63Hz**	**125Hz**	**250Hz**	**500Hz**	**1kHz**	**2kHz**	**4kHz**	**8kHz**	**16kHz**	**Total dB**	**Total dBA**
Newstan Colliery												
SREA Operations												
Traxcavator	97	98	103	101	103	98	93	87	81	73	109	103
Compactor	115	116	110	105	103	101	97	94	91	85	119	106
27t Excavator (2)	102	104	102	100	102	99	95	89	83	76	110	104
30t Excavator	102	104	102	100	102	99	95	89	83	76	110	104
Dozer D6T	116	109	114	101	102	101	100	91	82	72	119	107
Dump Truck (2)	112	108	109	98	96	96	99	91	86	80	115	103
Water Cart	105	105	102	104	101	99	98	91	86	86	111	105
Coal Truck (8 wheel truck)	90	92	90	86	86	83	82	75	71	62	97	89
Giacci tipping coal	117	115	103	96	97	96	94	93	90	84	120	102
NREA Operations												
Dozer D7	116	109	114	101	102	101	100	91	82	72	119	107
Giacci tipping coal	117	115	103	96	97	96	94	93	90	84	120	102
Coal Truck (8 wheel truck)	90	92	90	86	86	83	82	75	71	62	97	89
Hawkmount Quarry Operations												
Front End Loader	115	116	110	105	103	101	97	94	91	85	119	106
Coal Truck tipping coal (8 wheel truck)	117	115	103	96	97	96	94	93	90	84	120	102
Coal Truck (8 wheel truck)	90	92	90	86	86	83	82	75	71	62	97	89
Coal Preparation Plant (CPP)												
Coal Preparation Plant (module 1)												
Ground Floor (internal Sound pressure level)	99	94	91	92	91	90	85	80	75	63	102	94
First Floor (internal Sound pressure level)	100	98	94	93	93	93	91	85	78	69	104	97
Second Floor (internal Sound pressure level)	103	101	94	94	94	94	92	87	82	72	106	98
Third Floor (internal Sound pressure level)	107	101	95	93	91	90	88	85	81	72	109	95
Fourth floor (internal Sound pressure level)	104	100	93	91	89	88	86	84	79	69	106	94

Operational Sound Power Levels

	Operational Octave band sound Power Level Leq dB											
Plant/Equipment	**31Hz**	**63Hz**	**125Hz**	**250Hz**	**500Hz**	**1kHz**	**2kHz**	**4kHz**	**8kHz**	**16kHz**	**Total dB**	**Total dBA**
Coal Preparation Plant (module 2)												
All Floors (internal Sound pressure level)	103	99	94	93	92	91	89	85	80	70	106	96
Coal Preparation Plant Compressor	112	106	102	103	102	97	95	96	92	79	114	104
All onsite Conveyors	98	97	96	92	94	90	91	89	82	72	103	97
Truck Loading at Coking Bin	107	106	107	101	101	101	99	96	87	75	113	106
Truck Loading at Reject bin	107	106	107	101	101	101	99	96	87	75	113	106
Coal Handling Plant (CHP)	127	117	113	112	115	113	108	102	93	83	128	117
Truck Loading at 2000t truck loading bin	107	106	107	101	101	101	99	96	87	75	113	106
Reclaim Conveyor drive house	102	101	102	104	104	97	93	89	78	65	110	104
Reclaim Conveyor Transfer house	119	114	111	111	113	113	111	105	97	86	123	118
Filling of the 4000t ROM Coal Bin	121	120	120	112	107	104	103	96	90	80	126	111
Filling of the 500t ROM Coal Bin	121	120	120	112	107	104	103	96	90	80	126	111
Conveyor Drift Drive	102	101	102	104	104	97	93	89	78	65	110	104
Loader	115	116	110	105	103	101	97	94	91	85	119	106
D9 Dozer	116	109	114	101	102	101	100	91	82	72	119	107
Truck Tipping Load at ROM Dump Hopper	117	115	103	96	97	96	94	93	90	84	120	102
Vent Fan (2)	100	99	96	91	90	89	86	77	69	60	104	93
Compressor House	109	105	104	98	97	96	94	87	75	37	112	101
Workshop (i.e. use of grinder)	26	44	49	59	72	84	96	101	99	92	104	104
Coal Truck (8 wheel truck)	90	92	90	86	86	83	82	75	71	62	97	89
Rail Loop												
Coal Train Loco (4)	110	115	105	98	99	95	90	83	75	0	117	101
Coal Train Wagons	74	68	66	64	63	58	57	52	54	29	76	65
Coal Train Loader (clarence colliery)	108	103	105	102	102	99	97	97	88	79	112	105
Coal Train shunting	103	98	97	100	98	92	93	90	77	63	107	100
Dozer D11	113	119	113	110	109	106	103	99	91	91	122	111

Operational Sound Power Levels

	Operational Octave band sound Power Level Leq dB											
Plant/Equipment	**31Hz**	**63Hz**	**125Hz**	**250Hz**	**500Hz**	**1kHz**	**2kHz**	**4kHz**	**8kHz**	**16kHz**	**Total dB**	**Total dBA**
Water Treatment Plant												
Pumps (3)	70	78	91	88	89	91	90	80	66	9	97	95
Awaba Colliery												
Newstan Ventilation Fan	9	83	98	100	102	103	103	100	96	90	109	109
Substation	82	80	96	92	79	71	66	63	56	49	97	85
	Mandalong Mine - Cooranbong Entry Site											
Coal Handling Plant (CHP)	103	101	98	95	96	95	94	91	84	69	107	100
Rotary Breaker	96	91	96	97	97	98	95	85	78	60	105	102
Rotary Breaker Drivehead House	103	100	105	105	103	106	98	90	83	72	112	108
Site Conveyors (per 100m)	98	97	96	92	94	90	91	89	82	72	103	97
Vent Fan	90	90	89	87	84	77	74	70	61	49	96	85
100,000t ROM Stockpile												
Front End Loader	82	105	104	98	104	110	104	99	93	88	113	112
Front End Loader	82	105	104	98	104	110	104	99	93	88	113	112
Dozer	116	109	114	101	102	101	100	91	82	72	119	107
Coal Haul Truck	90	92	90	86	86	83	82	75	71	62	97	89
1200t Truck Loading Bin												
Coal Haul Truck Being Loaded with Coal	107	106	107	101	101	101	99	96	87	75	113	106
Coal Haul Truck	90	92	90	86	86	83	82	75	71	62	97	89
1500t Stockpile												
Front End Loader	82	105	104	98	104	110	104	99	93	88	113	112
Truck Dumping Coal	117	115	103	96	97	96	94	93	90	84	120	102
South Drift												
South drift drivehead house	107	110	107	102	103	99	94	87	82	62	114	104
South drift Conveyor	103	101	103	102	100	96	89	82	74	66	109	101
Servicing Shed												

Operational Sound Power Levels

	Operational Octave band sound Power Level Leq dB											
Plant/Equipment	**31Hz**	**63Hz**	**125Hz**	**250Hz**	**500Hz**	**1kHz**	**2kHz**	**4kHz**	**8kHz**	**16kHz**	**Total dB**	**Total dBA**
Compressors	100	97	102	99	96	90	86	79	69	59	107	97
Exhaust Fan	93	91	96	93	89	87	82	73	64	56	100	92
Eraring Energy Operations												
Final Product Bin Drivehead house	101	99	110	102	102	108	91	84	78	69	113	109
Final Product Bin	95	94	99	96	93	90	86	79	69	58	103	95
Eraring Conveyor (per100m)	93	93	99	95	92	87	81	75	66	54	102	93

Operational Sound Power Levels

Plant/Equipment	Operation Octave Band Sound Power levels Lmax db											
	31Hz	63Hz	125Hz	250Hz	500Hz	1kHz	2kHz	4kHz	8kHz	16kHz	Total dB	Total dBA
Newstan Colliery												
SREA Operations												
Traxcavator	104	105	109	108	110	105	100	94	88	80	115	110
Compactor	127	128	122	117	115	113	109	106	103	97	131	118
27t Excavator (2)	118	120	119	117	119	115	111	106	100	93	126	120
30t Excavator	118	120	119	117	119	115	111	106	100	93	126	120
Dozer D6T	123	115	121	108	109	108	106	98	89	79	126	113
Dump Truck (2)	121	117	118	106	105	105	108	99	95	89	124	112
Water Cart	112	112	109	111	108	106	105	98	93	93	119	112
Coal Truck (8 wheel truck)	103	105	103	99	100	97	95	88	85	75	110	102
Giacci tipping coal	123	122	109	102	103	102	100	99	96	90	126	108
NREA Operations												
Dozer D7	123	115	121	108	109	108	106	98	89	79	126	113
Giacci tipping coal	123	122	109	102	103	102	100	99	96	90	126	108
Coal Truck (8 wheel truck)	103	105	103	99	100	97	95	88	85	75	110	102
Hawkmount Quarry Operations												
Front End Loader	127	128	122	117	115	113	109	106	103	97	131	118
Coal Truck tipping coal (8 wheel truck)	123	122	109	102	103	102	100	99	96	90	126	108
Coal Truck (8 wheel truck)	103	105	103	99	100	97	95	88	85	75	110	102
Coal Preparation Plant (CPP)												
Coal Preparation Plant (module 1)												
Ground Floor (internal Sound pressure level)	99	94	91	92	91	90	85	80	75	63	102	94
First Floor (internal Sound pressure level)	100	98	94	93	93	93	91	85	78	69	104	97
Second Floor (internal Sound pressure level)	103	101	94	94	94	94	92	87	82	72	106	98
Third Floor (internal Sound pressure	107	101	95	93	91	90	88	85	81	72	109	95

	Operation Octave Band Sound Power levels Lmax db											
Plant/Equipment	**31Hz**	**63Hz**	**125Hz**	**250Hz**	**500Hz**	**1kHz**	**2kHz**	**4kHz**	**8kHz**	**16kHz**	**Total dB**	**Total dBA**
level)												
Fourth floor (internal Sound pressure level)	104	100	93	91	89	88	86	84	79	69	106	94
Coal Preparation Plant (module 2)												
All Floors (internal Sound pressure level)	103	99	94	93	92	91	89	85	80	70	106	96
Coal Preparation Plant Compressor	123	117	112	114	113	108	106	106	103	90	125	115
All onsite Conveyors	114	112	112	108	110	106	107	104	98	88	119	113
Truck Loading at Coking Bin	121	121	121	116	115	115	113	110	102	89	127	120
Truck Loading at Reject bin	121	121	121	116	115	115	113	110	102	89	127	120
Coal Handling Plant (CHP)	129	121	118	118	120	118	112	105	96	84	131	122
Truck Loading at 2000t truck loading bin	121	121	121	116	115	115	113	110	102	89	127	120
Reclaim Conveyor drive house	105	104	105	107	107	100	96	92	81	68	113	107
Reclaim Conveyor Transfer house	120	115	112	111	113	114	112	106	97	87	123	118
Filling of the 4000t ROM Coal Bin	125	124	124	116	111	108	106	100	94	84	129	115
Filling of the 500t ROM Coal Bin	125	124	124	116	111	108	106	100	94	84	129	115
Conveyor Drift Drive	105	104	105	107	107	100	96	92	81	68	113	107
Loader	127	128	122	117	115	113	109	106	103	97	131	118
D9 Dozer	123	115	121	108	109	108	106	98	89	79	126	113
Truck Tipping Load at ROM Dump Hopper	123	122	109	102	103	102	100	99	96	90	126	108
Vent Fan (2)	103	102	98	94	93	92	89	80	72	63	107	96
Compressor House	116	113	111	105	105	103	101	94	83	44	119	108
Workshop (i.e. use of grinder)	30	49	54	64	76	89	101	105	104	97	109	109
Coal Truck (8 wheel truck)	103	105	103	99	100	97	95	88	85	75	110	102
Rail Loop												
Coal Train Loco (4)	110	115	105	98	100	96	91	84	75	0	117	101
Coal Train Wagons	114	109	107	105	104	99	98	92	95	70	117	106

	Operation Octave Band Sound Power levels Lmax db											
Plant/Equipment	**31Hz**	**63Hz**	**125Hz**	**250Hz**	**500Hz**	**1kHz**	**2kHz**	**4kHz**	**8kHz**	**16kHz**	**Total dB**	**Total dBA**
Coal Train Loader (clarence colliery)	123	119	120	117	117	114	112	112	104	94	127	120
Coal Train shunting	112	107	106	109	107	101	102	99	86	72	116	109
Dozer D11	122	128	122	119	118	115	112	108	100	100	130	120
Water Treatment Plant												
Pumps (3)	76	84	97	94	95	97	96	86	72	9	103	101
Awaba Colliery												
Newstan Ventilation Fan	9	83	98	100	102	103	103	100	96	90	109	109
Substation	82	80	96	92	79	71	66	63	56	49	97	85
Mandalong Mine - Cooranbong Entry Site												
Coal Handling Plant (CHP)	103	101	97	95	95	95	94	90	83	69	107	100
Rotary Breaker	97	92	96	98	98	99	95	86	79	61	105	102
Rotary Breaker Drivehead House	106	104	109	109	107	110	101	94	87	76	116	112
Site Conveyors (per 100m)	104	102	102	98	100	96	97	94	88	78	109	103
Vent Fan	96	96	95	93	90	83	80	76	67	55	102	91
100,000t ROM Stockpile												
Front End Loader	94	117	116	110	116	122	116	111	105	100	125	124
Front End Loader	94	117	116	110	116	122	116	111	105	100	125	124
Dozer	125	117	123	110	111	110	108	100	91	81	128	115
Coal Haul Truck	98	100	98	94	95	92	90	83	80	70	105	97
1200t Truck Loading Bin												
Coal Haul Truck Being Loaded with Coal	121	121	121	116	115	115	113	110	102	89	127	120
Coal Haul Truck	103	105	103	99	100	97	95	88	85	75	110	102
1500t Stockpile												
Front End Loader	94	117	116	110	116	122	116	111	105	100	125	124
Truck Dumping Coal	126	125	112	105	106	105	103	102	99	93	129	111
South Drift												

Operational Sound Power Levels

	Operation Octave Band Sound Power levels Lmax db											
Plant/Equipment	**31Hz**	**63Hz**	**125Hz**	**250Hz**	**500Hz**	**1kHz**	**2kHz**	**4kHz**	**8kHz**	**16kHz**	**Total dB**	**Total dBA**
South drift drivehead house	111	113	110	106	107	103	98	91	86	66	118	108
South drift Conveyor	108	106	108	107	105	101	94	87	79	71	114	106
Servicing Shed												
Compressors	104	102	107	103	100	94	90	83	73	63	111	101
Exhaust Fan	97	95	99	96	93	90	85	77	67	60	104	95
Eraring Energy Operations												
Final Product Bin Drivehead house	109	108	119	111	111	117	100	93	87	78	122	118
Final Product Bin	100	98	104	101	98	95	91	84	74	63	108	100
Eraring Conveyor (per100m)	98	97	103	99	96	91	85	79	70	58	106	97

NSW INP Application Note - Modification of Existing Industrial Premises

Noise impact assessment for the modification of existing industrial premises

Background

(see INP Section 10)

Section 10 of the NSW Industrial Noise Policy (INP) outlines the application of the policy to existing industrial premises.

As well as being used to assess noise emissions from new industrial premises, the INP is also applied to situations where existing industrial premises are modified, expanded or upgraded.

Where a modification is proposed, the noise level targets for the premises (termed Project Specific Noise Levels) are to be determined firstly excluding any noise from the subject premises. The noise from the existing premises is then assessed against these targets to determine if there is a need to consider noise mitigation for existing operations. The predicted noise level from the proposed modification is then assessed, both in isolation and in combination with noise from the existing premises.

The total noise emissions from the modified premises should ideally not exceed the Project Specific Noise Levels. If the existing premises cannot achieve these targets, the allowable noise emissions from the proposed modification will be set so that the modification does not significantly increase the existing noise emissions.

Recommended approach

This application note outlines these processes together with the degree of information required to support a proper assessment of modifications to an existing industrial premises.

A noise impact assessment for the modification of existing industrial premises should include, as a minimum:

- existing noise criteria contained in consents, approvals or licences, that are applicable to the premises;
- Project Specific Noise Levels (PSNLs) for the premises determined in accordance with the INP and relevant application notes (see, for example, Appendix A4 of the INP). Note: care should be taken to exclude noise from the existing premises when quantifying background and existing industrial noise levels (further guidance is in the INP in Section 11.1.2);
- where application of the INP results in a PSNL more stringent than existing noise criteria, the PSNL should be adopted for noise assessment purposes. Note: the INP acknowledges that the PSNL is a goal sought to be achieved through the application of feasible and reasonable noise mitigation measures and is not necessarily applied as a statutory limit by default.
- measured or predicted noise levels from the existing premises at noise sensitive receiver locations;
- predicted noise contribution from the proposed modification, in isolation, at noise sensitive receiver locations; and
- cumulative noise levels from the entire premises (i.e. combined level from existing and proposed modification) compared to the PSNL.

Where noise from the existing premises exceeds the PSNL

Where it can be determined that noise from the existing premises alone is currently exceeding the PSNL, a preliminary analysis of potential noise mitigation measures, and conceptual noise reductions, needs to be undertaken for the existing premises. Note: this does not mean that in all circumstances noise mitigation to existing premises will be required as part of a modification. Decisions of this nature will be determined on a case by case basis, taking into account various factors, for example, feasible and reasonable mitigation options, the absolute level of noise and existing measures of community impact, including complaints.

Once the conceptual mitigated level of noise performance of the existing premises (i.e. what can be achieved) has been determined, the contribution noise level goal for the modification can be determined. The noise level goal for the modification should be set at least 10dB below the PSNL, or where it has been determined that the existing premises cannot achieve the PSNL, it should be set at least 10dB below the conceptual mitigated noise performance of the existing premises.

This approach is designed to ensure that noise from the modification does not become the limiting factor in noise from the entire premises potentially meeting the PSNL.

1 Introduction

This Appendix explains SLR Consulting's approach towards the analysis of meteorological conditions required for the noise impact assessment.

The meteorological data inputs required to estimate potential noise impacts vary from those required for other specific environmental impact assessments such as air quality or soil and land assessments.

For example, air quality models generally require a spatially and time varying meteorological field which takes into consideration surrounding land use and topography over an entire year to encompass meteorological variability on timescales appropriate to the air quality criteria (e.g. 1 hour, 24 hour and Annual). Noise impact assessments generally do not require this level of detail and require only the prevailing (dominant) meteorological characteristics during specific times of day and seasons.

Whilst the starting point for each assessment may be similar, the requirements for meteorological data vary as stated in guidance documentation from the appropriate regulatory authorities.

2 Meteorological Overview – Noise Impact Assessment

The NSW Industrial Noise Policy (INP) provides the methodology used for assessing meteorological conditions for noise impact assessments. The following excerpt is from the INP which describes the two approaches to assessing meteorological effects:

In assessing noise impacts, the criteria are expected to apply under weather conditions that would be expected to occur at a particular site for a significant period of time. These include conditions of calm, wind and temperature inversions. As the criteria are expected to apply under weather conditions characteristic of the area, it is important at the start of a noise assessment to assess the potential for such meteorological effects occurring, thus enabling better prediction of potential noise impacts.

Essentially, there are two underlying approaches to assessing these effects: the simple and the more detailed approach.

Simple approach

With the simple approach, the proponent may forego detailed analyses of meteorological data and simply apply given default meteorological parameters to predict noise levels. This approach assumes that meteorological effects are present for a significant amount of time, avoiding the need to quantify these effects in detail. It is conservative, in that it is likely to predict the upper range of increases in noise levels. Actual noise levels may be less than predicted. This approach is generally used to test whether further analyses are warranted.

Detailed approach

The detailed approach involves analysing meteorological data to determine whether inversion and/or wind effects are significant features warranting assessment. Where assessment is warranted, default parameters are available for use in predicting noise or, where preferred, measured values may be used instead. The detailed approach gives a more accurate prediction of noise increases due to meteorological factors—as a tradeoff for the additional work involved.

The INP recommends that for weather data to be suitable for the purpose of a noise impact assessment it should be collected within a 30km radius of the subject site and in the same topographical basin.

2.1 Assessing Temperature Inversions

Temperature inversions, when they occur, have the ability to increase noise levels by focusing sound waves. Temperature inversions occur predominantly at night during the winter months. For a temperature inversion to be a significant characteristic of the area it needs to occur for approximately 30% of the total night-time during winter, or about two nights per week.

Meteorological data from the nearest weather station to the project site, if available, is analysed in determining the percentage occurrence of temperature inversions during winter nights. It is typical that data relating to the occurrence of temperature inversions is not available from the nearest weather station. In this case, default values for inversion strength and corresponding wind speed for the purpose of noise modelling are provided in the INP and are reproduced here:

Non-arid areas (annual average rainfall greater than 500 mm):

Moderate (F-class stability category) inversions

- *3 °C/100 m temperature inversion strength for all receivers, plus a 2 m/s source-to-receiver component drainage-flow wind speed for those receivers where applicable. (See below for applicability of drainage-flow wind.)*

Arid and semi-arid areas (annual average rainfall less than 500 mm):

Strong (G-class stability category) inversions

- *8°C/100 m temperature inversion strength for all receivers, plus a 1 m/s source-to receiver component drainage-flow wind speeds for those receivers where applicable. (See below for applicability of drainage-flow wind.)*

Applicability of drainage-flow wind

The drainage-flow wind default value should generally be applied where a development is at a higher altitude than a residential receiver, with no intervening higher ground (for example, hills). In these cases, both the specified wind and temperature inversion default values should be used in the noise assessment for receivers at the lower altitude.

Furthermore, the INP states: '*Temperature inversions occur during E, F and G stability categories. These three categories are considered to represent weak, moderate and strong inversions, respectively. For noise-assessment purposes, only moderate and strong inversions are considered significant enough to require assessment'*.

2.2 Assessing Wind effects

Wind has the potential to increase noise at a receiver when it is light and stable and blows from the direction of the source of the noise. As the strength of the wind increases the noise produced by the wind will obscure noise from most industrial and transport sources.

Wind effects need to be considered when wind is a feature of the area under consideration (in accordance with the INP). Where wind blows from the source to the receiver at speeds up to 3 m/s for 30% (or more) of the time in any assessment period (day, evening, night) in any season, then wind is considered to be a feature of the area and noise level predictions should be made under these conditions.

There are two ways to assess wind effects:

1. Use a wind rose to determine whether wind is a feature of the area based on the frequency occurrence and wind speed. Care should be taken to assess the source-to-receiver components of wind that are relevant.
2. Simply assume that wind is a feature of the area and apply a 'maximum impact' scenario.

A default wind speed of 3 m/s (at 10m height) is proposed for assessing noise impacts. Where there is 30% or more occurrence of wind speeds below 3 m/s (source-to-receiver component), then use the highest wind speed (below 3 m/s) instead of the default.

3 Project Specific Approach

Wind data is readily available for the BoM AWS at Cooranbong (Station Number 061412) automatic weather station and has been recorded at this location for many years. Data used to determine the presence of temperature inversions is not recorded by this station. Hence, the NIA has used the 'detailed approach' in assessing winds relevant to the Project site and a 'simple approach' in assessing potential effects of temperature inversion.

Weather data was obtained from the BoM AWS at Cooranbong (Station Number 061412) automatic weather station for the periods of four (4) years of weather data (2008, 2009, 2010 and 2011) to provide a relevant and robust sample size.

Wind speed and direction data was analysed to determine the frequency of occurrence of winds up to speeds of 3 m/s for daytime, evening and night in each season. A summary of the most frequently occurring winds is contained within the NIA.

Meteorological data was available from the BoM AWS at Cooranbong (Station Number 061412) to allow the determination of the percentage occurrence of temperature inversions during winter nights. The most complete temperature inversion data was contained in the years 2008 to 2011.

Operational Noise Modelling Results

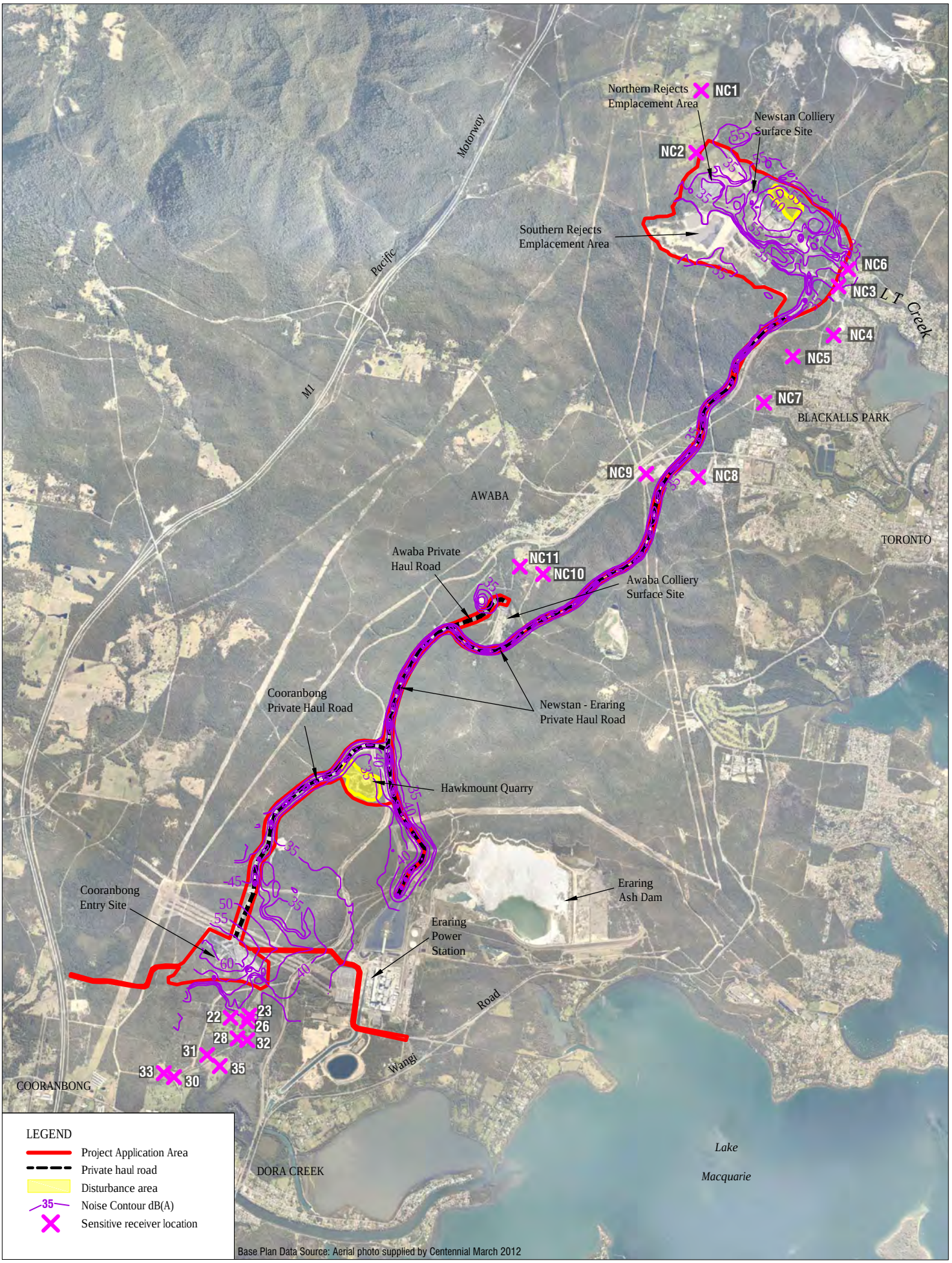
Operational Noise Modelling Scenarios

Plant and Equipment	Existing Operation				Scenario 1A				Scenario 1B				Scenario 1C				Scenario 1D				Scenario 1E				Scenario 2A				Scenario 2B				Scenario 2C				Scenario 2D				Scenario 2E				Scenario 2F				Scenario 3A				Scenario 3B			
	SP	D	E	N	SP	D	E	N	SP	D	E	N	SP	D	E	N	SP	D	E	N	SP	D	E	N	SP	D	E	N	SP	D	E	N	SP	D	E	N	SP	D	E	N	SP	D	E	N	SP	D	E	N	SP	D	E	N	SP	D	E	N
SREA Operations																																																						
Traxcavator	✓	✓	×	×	✓	✓	×	×	✓	✓	×	×	✓	✓	×	×	✓	✓	×	×	✓	✓	×	×	✓	✓	×	×	✓	✓	×	×	✓	✓	×	×	✓	✓	×	×	✓	✓	×	×	✓	✓	×	×	✓	✓	×	×	✓	✓	×	×
Compactor	✓	✓	×	×	✓	✓	×	×	✓	✓	×	×	✓	✓	×	×	✓	✓	×	×	✓	✓	×	×	✓	✓	×	×	✓	✓	×	×	✓	✓	×	×	✓	✓	×	×	✓	✓	×	×	✓	✓	×	×	✓	✓	×	×	✓	✓	×	×
27t Excavator (2)	✓	✓	×	×	✓	✓	×	×	✓	✓	×	×	✓	✓	×	×	✓	✓	×	×	✓	✓	×	×	✓	✓	×	×	✓	✓	×	×	✓	✓	×	×	✓	✓	×	×	✓	✓	×	×	✓	✓	×	×	✓	✓	×	×	✓	✓	×	×
30t Excavator	✓	✓	×	×	✓	✓	×	×	✓	✓	×	×	✓	✓	×	×	✓	✓	×	×	✓	✓	×	×	✓	✓	×	×	✓	✓	×	×	✓	✓	×	×	✓	✓	×	×	✓	✓	×	×	✓	✓	×	×	✓	✓	×	×	✓	✓	×	×
Dozer D6T	✓	✓	×	×	✓	✓	×	×	✓	✓	×	×	✓	✓	×	×	✓	✓	×	×	✓	✓	×	×	✓	✓	×	×	✓	✓	×	×	✓	✓	×	×	✓	✓	×	×	✓	✓	×	×	✓	✓	×	×	✓	✓	×	×	✓	✓	×	×
Dump Truck (2)	✓	✓	×	×	✓	✓	×	×	✓	✓	×	×	✓	✓	×	×	✓	✓	×	×	✓	✓	×	×	✓	✓	×	×	✓	✓	×	×	✓	✓	×	×	✓	✓	×	×	✓	✓	×	×	✓	✓	×	×	✓	✓	×	×	✓	✓	×	×
Water Cart	✓	✓	×	×	✓	✓	×	×	✓	✓	×	×	✓	✓	×	×	✓	✓	×	×	✓	✓	×	×	✓	✓	×	×	✓	✓	×	×	✓	✓	×	×	✓	✓	×	×	✓	✓	×	×	✓	✓	×	×	✓	✓	×	×	✓	✓	×	×
Coal Truck (8 wheel truck)	✓	✓	×	×	✓	✓	×	×	✓	✓	×	×	✓	✓	×	×	✓	✓	×	×	✓	✓	×	×	✓	✓	×	×	✓	✓	×	×	✓	✓	×	×	✓	✓	×	×	✓	✓	×	×	✓	✓	×	×	✓	✓	×	×	✓	✓	×	×
Coal Truck Tipping Coal	✓	✓	×	×	✓	✓	×	×	✓	✓	×	×	✓	✓	×	×	✓	✓	×	×	✓	✓	×	×	✓	✓	×	×	✓	✓	×	×	✓	✓	×	×	✓	✓	×	×	✓	✓	×	×	✓	✓	×	×	✓	✓	×	×	✓	✓	×	×
NREA Operations																																																						
Dozer D7	✓	✓	×	×	✓	✓	×	×	✓	✓	×	×	✓	✓	×	×	✓	✓	×	×	✓	✓	×	×	✓	✓	×	×	✓	✓	×	×	✓	✓	×	×	✓	✓	×	×	✓	✓	×	×	✓	✓	×	×	✓	✓	×	×	✓	✓	×	×
Coal Truck (8 wheel truck)	✓	✓	×	×	✓	✓	×	×	✓	✓	×	×	✓	✓	×	×	✓	✓	×	×	✓	✓	×	×	✓	✓	×	×	✓	✓	×	×	✓	✓	×	×	✓	✓	×	×	✓	✓	×	×	✓	✓	×	×	✓	✓	×	×	✓	✓	×	×
Coal truck tipping coal	✓	✓	×	×	✓	✓	×	×	✓	✓	×	×	✓	✓	×	×	✓	✓	×	×	✓	✓	×	×	✓	✓	×	×	✓	✓	×	×	✓	✓	×	×	✓	✓	×	×	✓	✓	×	×	✓	✓	×	×	✓	✓	×	×	✓	✓	×	×
Hawkmount Quarry Operations																																																					
Front End Loader	✓	✓	×	×	✓	✓	×	×	✓	✓	×	×	✓	✓	×	×	✓	✓	×	×	✓	✓	×	×	✓	✓	×	×	✓	✓	×	×	✓	✓	×	×	✓	✓	×	×	✓	✓	×	×	✓	✓	×	×	✓	✓	×	×	✓	✓	×	×
Coal Truck tipping coal (8 wheel truck)	✓	✓	×	×	✓	✓	×	×	✓	✓	×	×	✓	✓	×	×	✓	✓	×	×	✓	✓	×	×	✓	✓	×	×	✓	✓	×	×	✓	✓	×	×	✓	✓	×	×	✓	✓	×	×	✓	✓	×	×	✓	✓	×	×	✓	✓	×	×
Coal Truck (8 wheel truck)	✓	✓	×	×	✓	✓	×	×	✓	✓	×	×	✓	✓	×	×	✓	✓	×	×	✓	✓	×	×	✓	✓	×	×	✓	✓	×	×	✓	✓	×	×	✓	✓	×	×	✓	✓	×	×	✓	✓	×	×	✓	✓	×	×	✓	✓	×	×
Coal Preparation Plant (CPP)																																																					
Coal Preparation Plant (module 1) with colorbond sheet metal	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	×	×	×	×	✓	✓	✓	✓	×	×	×	×	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Coal Preparation Plant (module 1) with ritek panels	×	×	×	×	×	×	×	×	×	×	×	×	✓	✓	✓	✓	×	×	×	×	✓	✓	✓	✓	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×
Coal Preparation Plant (module 2) with colorbond sheet metal	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	✓	✓	✓	✓	×	×	×	×	✓	✓	✓	✓	✓	✓	✓	✓	×	×	×	×	✓	✓	✓	✓	×	×	×	×
Coal Preparation Plant (module 2) with Ritek panels	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	✓	✓	✓	✓	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	✓	✓	✓	✓
Coal Preparation Plant Compressor	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
All Onsite Conveyors	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Trucks loading Coking Bin	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Trucks Loading Reject Bin	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Coal Handling Plant (CHP)																																																					
Truck Loading at 2000t truck loading bin	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Reclaim Conveyor Drive House	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Reclaim Conveyor transfer House	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Filling of the 4000t ROM Coal Bin	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Filling of the 500t ROM Coal Bin	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Conveyor Drift Drive	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Loader	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Dozer D9 (ROM Coal stockpile)	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Truck Tipping Load at ROM Dump Hopper	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Vent Fan (2) – Only one fan operates at any one time	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Compressor House	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Workshop (i.e. use of grinder)	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Coal Truck (8 wheel truck)	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Forklift	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Transfer tower no mitigation	✓	✓	✓	✓	✓	✓	✓	✓	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	✓	✓	✓	✓	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×
Transfer tower with mitigation (colorbond sheet metal)	×	×	×	×	×	×	×	×	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	×	×	×	×	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Rail Loop																																																					
Coal Train Loco (4)	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Coal Train Wagons	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Coal Train Loading Facility	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	✓	✓	✓	✓	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	✓	✓	✓	✓	✓	✓	✓	✓
Coal Train shunting	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Dozer D11	✓	✓	✓	×	✓	✓	✓	✓	✓	✓	✓	×	✓	✓	✓	×	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Loader (2)	✓	✓	✓	✓	3✓	3✓	3✓	3✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	×	×	×	×	✓	✓	✓	✓	3✓	3✓	3✓	3✓	3✓	3✓	3✓	3✓	3✓	3✓	3✓	3✓	3✓	3✓	3✓	3✓	3✓	3✓	3✓	3✓	×	×	×	×
Coal Truck (8 wheel truck)	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Water Treatment Plant																																																					
Pumps (3)	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

Operational Noise Modelling Results Leq dBA (15 minute)

Scenario	Period	Weather Conditions	NC1	NC2	NC3	NC4	NC5	NC6	NC7	NC8	NC9	NC10	NC11
Existing	Morning Shoulder	Calm	<35	<35	36	<35	<35	38	<35	<35	<35	<35	<35
	Morning Shoulder	Temp	35	36	40	36	35	40	<35	<35	<35	<35	<35
	Day	Calm	<35	<35	36	<35	<35	38	<35	<35	<35	<35	<35
	Evening	Calm	<35	<35	36	<35	<35	38	<35	<35	<35	<35	<35
	Night	Calm	<35	<35	36	<35	<35	38	<35	<35	<35	<35	<35
	Night	Temp	<35	<35	39	35	<35	40	<35	<35	<35	<35	<35
1A	Morning Shoulder	Calm	<35	<35	36	<35	<35	38	<35	<35	<35	<35	<35
	Morning Shoulder	Temp	35	36	40	36	35	40	<35	<35	<35	<35	<35
	Day	Calm	<35	<35	36	<35	<35	38	<35	<35	<35	<35	<35
	Evening	Calm	<35	<35	36	<35	<35	38	<35	<35	<35	<35	<35
	Night	Calm	<35	<35	36	<35	<35	38	<35	<35	<35	<35	<35
	Night	Temp	35	<35	40	36	<35	40	<35	<35	<35	<35	<35
1B	Morning Shoulder	Calm	<35	<35	<35	<35	<35	37	<35	<35	<35	<35	<35
	Morning Shoulder	Temp	<35	35	38	<35	<35	39	<35	<35	<35	<35	<35
	Day	Calm	<35	<35	<35	<35	<35	37	<35	<35	<35	<35	<35
	Evening	Calm	<35	<35	<35	<35	<35	37	<35	<35	<35	<35	<35
	Night	Calm	<35	<35	<35	<35	<35	37	<35	<35	<35	<35	<35
	Night	Temp	<35	<35	37	<35	<35	39	<35	<35	<35	<35	<35
1C	Morning Shoulder	Calm	<35	<35	<35	<35	<35	37	<35	<35	<35	<35	<35
	Morning Shoulder	Temp	<35	<35	37	<35	<35	39	<35	<35	<35	<35	<35
	Day	Calm	<35	<35	<35	<35	<35	37	<35	<35	<35	<35	<35
	Evening	Calm	<35	<35	<35	<35	<35	37	<35	<35	<35	<35	<35
	Night	Calm	<35	<35	<35	<35	<35	37	<35	<35	<35	<35	<35
	Night	Temp	<35	<35	37	<35	<35	39	<35	<35	<35	<35	<35
2A	Morning Shoulder	Calm	<35	<35	<35	<35	<35	37	<35	<35	<35	<35	<35
	Morning Shoulder	Temp	<35	35	37	<35	<35	39	<35	<35	<35	<35	<35
	Day	Calm	<35	<35	<35	<35	<35	37	<35	<35	<35	<35	<35
	Evening	Calm	<35	<35	<35	<35	<35	37	<35	<35	<35	<35	<35
	Night	Calm	<35	<35	<35	<35	<35	37	<35	<35	<35	<35	<35
	Night	Temp	<35	<35	37	<35	<35	39	<35	<35	<35	<35	<35
2B	Morning Shoulder	Calm	<35	<35	36	<35	<35	38	<35	<35	<35	<35	<35
	Morning Shoulder	Temp	<35	36	39	35	35	40	<35	<35	<35	<35	<35
	Day	Calm	<35	<35	35	<35	<35	38	<35	<35	<35	<35	<35
	Evening	Calm	<35	<35	35	<35	<35	38	<35	<35	<35	<35	<35
	Night	Calm	<35	<35	36	<35	<35	38	<35	<35	<35	<35	<35
	Night	Temp	<35	<35	38	<35	<35	40	<35	<35	<35	<35	<35
2C	Morning Shoulder	Calm	<35	<35	<35	<35	<35	37	<35	<35	<35	<35	<35
	Morning Shoulder	Temp	<35	35	38	<35	35	39	<35	<35	<35	<35	<35
	Day	Calm	<35	<35	<35	<35	<35	37	<35	<35	<35	<35	<35
	Evening	Calm	<35	<35	<35	<35	<35	37	<35	<35	<35	<35	<35
	Night	Calm	<35	<35	<35	<35	<35	37	<35	<35	<35	<35	<35
	Night	Temp	<35	<35	37	<35	<35	39	<35	<35	<35	<35	<35
2D	Morning Shoulder	Calm	<35	<35	37	<35	<35	38	<35	<35	<35	<35	<35
	Morning Shoulder	Temp	35	36	40	37	36	40	<35	<35	<35	<35	<35
	Day	Calm	<35	<35	36	<35	<35	38	<35	<35	<35	<35	<35
	Evening	Calm	<35	<35	37	<35	<35	38	<35	<35	<35	<35	<35
	Night	Calm	<35	<35	37	<35	<35	38	<35	<35	<35	<35	<35
	Night	Temp	35	<35	40	36	35	40	<35	<35	<35	<35	<35
2E	Morning Shoulder	Calm	<35	<35	36	<35	<35	38	<35	<35	<35	<35	<35
	Morning Shoulder	Temp	<35	36	39	35	35	40	<35	<35	<35	<35	<35
	Day	Calm	<35	<35	35	<35	<35	38	<35	<35	<35	<35	<35
	Evening	Calm	<35	<35	35	<35	<35	38	<35	<35	<35	<35	<35
	Night	Calm	<35	<35	36	<35	<35	38	<35	<35	<35	<35	<35
	Night	Temp	<35	<35	38	<35	<35	40	<35	<35	<35	<35	<35
2F	Morning Shoulder	Calm	<35	<35	<35	<35	<35	37	<35	<35	<35	<35	<35
	Morning Shoulder	Temp	<35	35	38	<35	<35	39	<35	<35	<35	<35	<35
	Day	Calm	<35	<35	<35	<35	<35	37	<35	<35	<35	<35	<35
	Evening	Calm	<35	<35	<35	<35	<35	37	<35	<35	<35	<35	<35
	Night	Calm	<35	<35	<35	<35	<35	37	<35	<35	<35	<35	<35
	Night	Temp	<35	<35	37	<35	<35	39	<35	<35	<35	<35	<35
3A	Morning Shoulder	Calm	<35	<35	35	<35	<35	38	<35	<35	<35	<35	<35
	Morning Shoulder	Temp	<35	36	38	35	35	40	<35	<35	<35	<35	<35
	Day	Calm	<35	<35	35	<35	<35	38	<35	<35	<35	<35	<35
	Evening	Calm	<35	<35	35	<35	<35	38	<35	<35	<35	<35	<35
	Night	Calm	<35	<35	35	<35	<35	38	<35	<35	<35	<35	<35
	Night	Temp	<35	<35	38	<35	<35	40	<35	<35	<35	<35	<35
3B	Morning Shoulder	Calm	<35	<35	<35	<35	<35	37	<35	<35	<35	<35	<35
	Morning Shoulder	Temp	<35	35	37	<35	<35	39	<35	<35	<35	<35	<35
	Day	Calm	<35	<35	<35	<35	<35	37	<35	<35	<35	<35	<35
	Evening	Calm	<35	<35	<35	<35	<35	37	<35	<35	<35	<35	<35
	Night	Calm	<35	<35	<35	<35	<35	37	<35	<35	<35	<35	<35
	Night	Temp	<35	<35	36	<35	<35	39	<35	<35	<35	<35	<35

Noise Contour Maps



630.10123.00840_AppG_Scen6NoiseCont_140318.dwg

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Date:	18.3.14
Drawn by:	LJF
Scale:	1:60000
Sheet Size:	A4
Coord. System:	MGA 94 Zone 56

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0.0 1.0 2.0km

Centennial Coal

NORTHERN COAL LOGISTICS PROJECT

Noise Contour Map - Scenario 6 Predicted Operational Noise LAeq(15min)-Night-time Prevailing Winds

APPENDIX G

Construction Plant Equipment Sound Power Levels

Construction Activity	Plant item	Octave Band Centre Frequency (Hz) - dBL re 1pW											
		31.5	**63**	**125**	**250**	**500**	**1k**	**2k**	**4k**	**8k**	**16K**	**Overall dB**	**Overall dBA**
Site Establishment	30 Tonne Articulated Dump Truck	104	112	114	107	108	106	100	93	85	85	110	110
	16 Tonne Roller	96	101	106	109	104	102	99	93	87	87	116	107
	12 Tonne Tip Truck	106	107	98	95	96	98	99	98	93	93	108	105
Civils Works	Bored Piling Rig 20t	91	97	96	94	100	103	108	105	102	102	127	112
	40t Excavator	110	109	114	105	104	105	103	100	91	91	119	110
	30 Tonne Articulated Dump Truck	111	112	103	100	101	103	104	103	98	98	108	110
	Grader	101	107	109	110	106	104	99	94	81	80	117	109
	16 Tonne Roller	96	101	106	109	104	102	99	93	87	87	116	107
	Backhoe	81	90	89	88	93	90	84	97	91	80	105	100
	Concrete Boom Pump	66	66	64	83	89	100	101	101	102	97	112	108
	Concrete Vibrators	64	64	62	81	87	98	99	99	100	95	112	106
	6.5m3 Concrete Truck	65	65	63	82	88	99	100	100	101	96	112	107
Structural Mechanical Installation	Concrete Boom Pump	66	66	64	83	89	100	101	101	102	97	112	108
	Concrete Vibrators	64	64	62	81	87	98	99	99	100	95	112	106
	25 Tonne Franna	100	107	97	97	100	98	94	90	88	88	109	102
	6.5m3 Concrete Truck	105	112	102	102	105	103	99	95	93	93	109	107
	12 Tonne Tip Truck	103	110	100	100	103	101	97	93	91	91	109	105
	Cranes	100	107	97	97	100	98	94	90	88	88	109	102
	Diesel Welders	92	105	97	94	94	95	96	91	86	77	107	101
	Compressors	120	116	112	107	104	100	100	93	87	87	108	107
	Diesel Electric Generators	77	82	90	90	94	98	97	93	84	77	121	102
	Angle Grinder	101	114	106	103	103	104	105	100	95	86	107	110
	Arc Welder	91	104	96	93	93	94	95	90	85	76	107	100
	Drop Saw	101	114	106	103	103	104	105	100	95	86	107	110
	Hammer Drill	97	110	102	99	99	100	101	96	91	82	107	106
	Impact/Rattle Gun	97	110	102	99	99	100	101	96	91	82	107	106