Noise and Vibration Impact Assessment (SLR, 2012)

Appendix - I

global environmental solutions

Springvale Colliery

Bore 8 Dewatering Facility

Noise and Vibration Impact Assessment

Report Number 630.10123.00320R1

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Springvale Coal Pty Ltd
PO Box 198
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Springvale Colliery

Bore 8 Dewatering Facility

Noise and Vibration Impact Assessment

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1 INTRODUCTION

SLR Consulting Australia Pty Ltd (SLR Consulting) has been commissioned by Springvale Coal Pty Ltd (Springvale Coal) to provide a Noise and Vibration Impact Assessment (NVIA) for the proposed installation of the Bore 8 dewatering facility associated with the Springvale Colliery. This report presents the results and findings of the NVIA.

The noise assessment has been prepared with reference to Australian Standard AS 1055:1997 *Description and Measurement of Environmental Noise* Parts 1, 2 and 3 and in accordance with the Environment Protection Authority (EPA) NSW Industrial Noise Policy (INP) (and associated Application Notes). Where issues relating to noise are not addressed in the INP, such as construction noise and road traffic noise, reference has been made to the Interim Construction Noise Guideline (ICNG) and NSW Road Noise Policy (RNP).

2 PROJECT DESCRIPTION

2.1 Bore 8

Springvale Colliery (Springvale) is an underground coal mine located within the NSW Western Coalfield, approximately 15 kilometres north-west of Lithgow.

Springvale seeks to modify development consent S91/06569/001 under section 75W of the *Environmental Planning and Assessment Act 1979* to allow for the construction and operation of the additional dewatering facility within the Newnes State Forest on the Newnes Plateau.

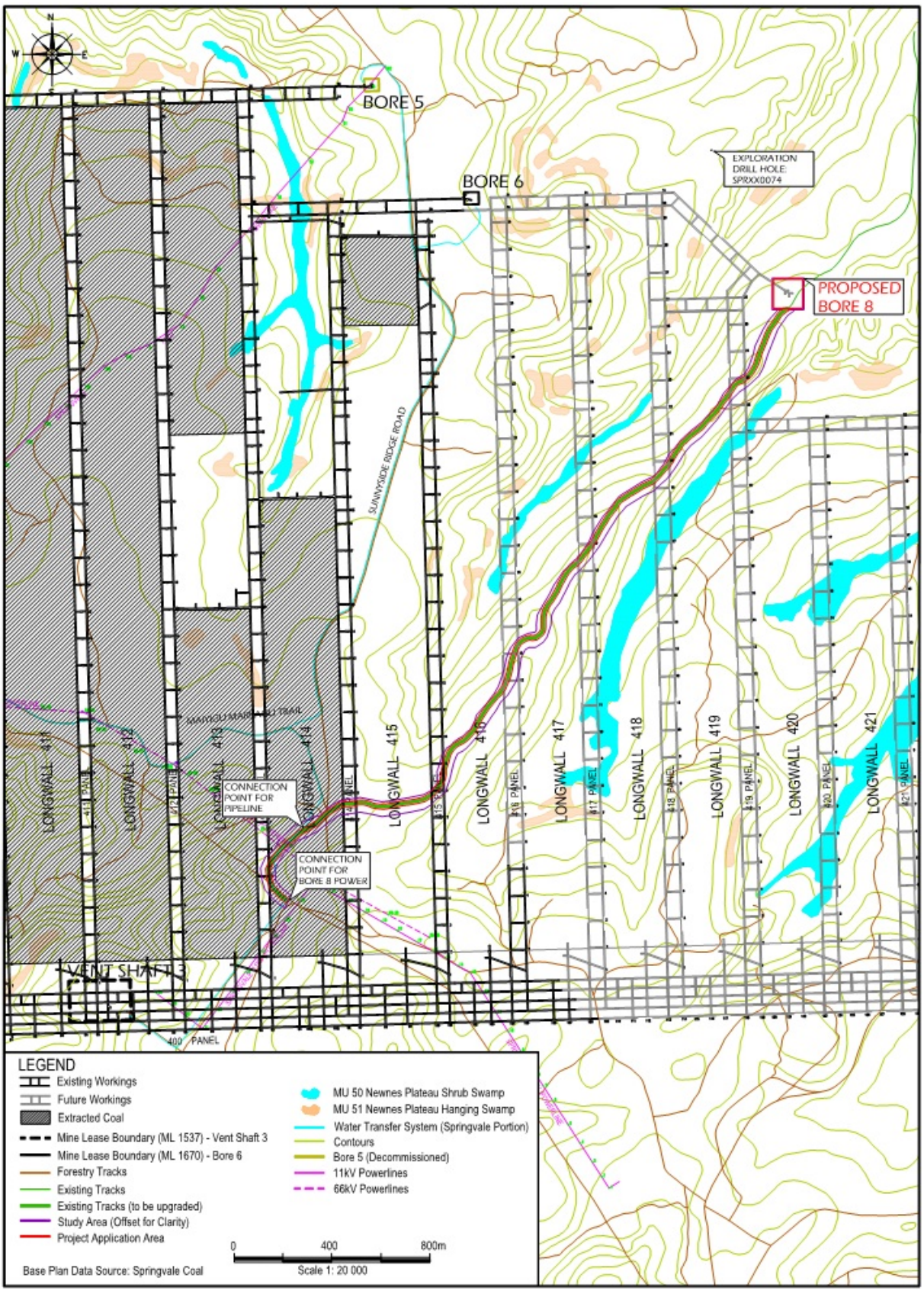
The proposed Bore 8 dewatering facility is required to facilitate the progress of mine workings further to the east of existing workings at Springvale, and need to be established ahead of the workings to ensure water levels in the mine can be safely kept at manageable levels. The bore will form a critical part of Springvale's existing dewatering system as longwall mining progresses. Water pumped out of the underground workings at Bore 8 will be transferred via predominantly underground pipelines to Wallerawang Power Station, as part of the existing Springvale - Delta Water Transfer Scheme (DWTS).

Bore 8 will be constructed as per Bore 6, the existing dewatering facility in use at Springvale Colliery, and will include the construction of a facility consisting of four dewatering boreholes each with a submersible pump. Establishment of access tracks and ancillary infrastructure corridor totalling 10 m wide will also be required, utilising existing tracks where possible. 11 kV powerlines and water pipelines will be buried in the infrastructure corridor alongside the access tracks. Following installation of the pipelines and powerlines, the infrastructure corridor will be rehabilitated leaving a 5 m wide track to Bore 8.

The final footprint of Bore 8 will be approximately 0.32 hectares (ha). However, an area of 0.77 ha will initially need to be cleared of vegetation and the area graded to form a level pad for construction of the boreholes, allowing for the movement of heavy vehicles and the installation of sumps to contain drilling fluids, as well as the storage of all required equipment and spares within the dewatering facility compound. Surface water controls will also need to be installed on the outside of this footprint, with construction disturbance therefore occurring within an area totalling 1.44 ha.

The Bore 8 Project Application area is illustrated in **Figure 1**.

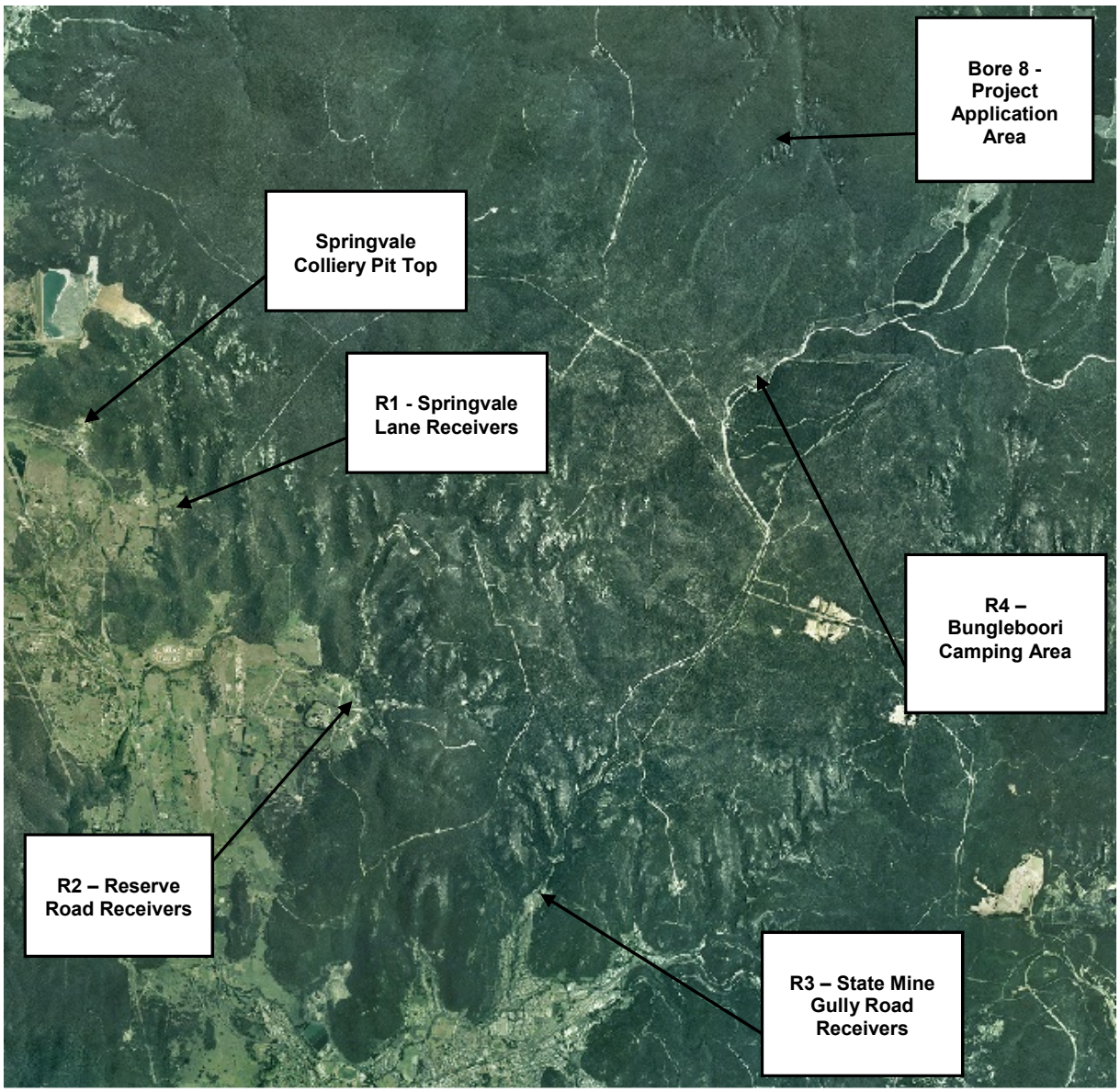
Figure 1 Project Application Area



2.2 Location of Project Receivers

The nearest residential receivers to the site are located approximately 9 km to 10 km to the south west off Spring Vale Lane, Reserve Road and State mine Gully Road. Also approximately 3.6 km south of Bore 8 within the Newness State Forest is the Bungleboori camping area. The locations of sensitive receiver areas located in the vicinity of the Project Application Area are shown in **Figure 2**.

Figure 2 Project Locality Map



Within the project area the Newness State forest is used for recreational purposes other than camping such as walking, picnicking, mountain bike riding, trail bike riding and four wheel drive touring. Therefore it should be noted that any of the roads or tracks surrounding the Project Area could potentially be utilised for recreational purposes.

3 EXISTING CONSENT CONDITIONS

Development Consent S91/06569/001 does not contain any consent conditions with regard to noise emissions from Springvale Colliery operations at surrounding residential receivers. Notwithstanding the above, noise emissions from the operation of the proposed Bore 8 dewatering facility have been assessed in **Section 7** of this report.

4 METEOROLOGY - INP ASSESSMENT OF PREVAILING WEATHER CONDITIONS

4.1 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.

Synthetically generated meteorological data has been produced for the site using the CALMET meteorological model as part of the Springvale Air Quality and Greenhouse Gas Assessment (refer SLR Consulting report *630.10123.00330-R1 Springvale Bores Air Quality Impact Assessment & Greenhouse Gas Assessment*). The modelling process has provided a meteorological dataset for the 2008 calendar years, over the Bore 8 Project Application Area.

Wind speed and direction data produced by the CALMET run for the 2008 calendar year 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 **Table 1**, **Table 2** and **Table 3**.

The percentage occurrence figures provided in bold are those that exceed the 30% threshold.

Table 1 Seasonal Frequency of Occurrence of Wind Speed Intervals – Daytime

Period	Calm	Wind Direction	0.5 to 2 m/s	2 to 3 m/s	0.5 to 3 m/s
Summer	0.4%	ENE±45	2.7%	7.5%	10.2%
Autumn	1.9%	NE±45	5.6%	6.5%	12.1%
Winter	0.8%	W±45	3.6%	7.3%	10.8%
Spring	0.9%	NNE±45	3.9%	6.1%	10.0%

Table 2 Seasonal Frequency of Occurrence of Wind Speed Intervals – Evening

Period	Calm	Wind Direction	0.5 to 2 m/s	2 to 3 m/s	0.5 to 3 m/s
Summer	1.1%	ESE±45	5.2%	20.0%	25.2%
Autumn	2.5%	ESE±45	7.2%	16.5%	23.7%
Winter	1.6%	WSW±45	3.4%	11.9%	15.3%
Spring	1.4%	E±45	4.3%	15.2%	19.4%

Table 3 Seasonal Frequency of Occurrence of Wind Speed Intervals – Night

Period	Calm	Wind Direction	0.5 to 2 m/s	2 to 3 m/s	0.5 to 3 m/s
Summer	3.5%	ESE±45	11.8%	15.8%	27.6%
Autumn	2.4%	SSW±45	21.3%	14.6%	**35.9%**
Winter	2.1%	SW±45	9.5%	13.4%	22.9%
Spring	1.5%	WSW±45	7.0%	12.1%	19.1%

Seasonal wind records indicate that winds are a feature of the area during the night-time period as they exceed the 30% threshold. Therefore, winds during the night-time have been considered as part of this assessment.

4.2 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.

The INP Section 5.2, Temperature Inversions, states:

> *"Assessment of impacts is confined to the night noise assessment period (10.00 pm to 7.00 am), as this is the time likely to have the greatest impact - that is, when temperature inversions usually occur and disturbance to sleep is possible."*
>
> *"Where inversion conditions are predicted for at least 30% (or approximately two nights per week) of total night-time in winter, then inversion effects are considered to be significant and should be taken into account in the noise assessment".*

An assessment of atmospheric stability conditions has also been prepared from the meteorological data set described above. The annualised night-time frequency of occurrence of atmospheric stability classes are presented in **Table 4**, together with estimated Environmental Lapse Rates (ELR).

Table 4 Winter Night-time Atmospheric Stability Frequency of Occurrence

Stability Class	Occurrence Percentage Night-time	Estimated ELR[1] ^{o}C/100 m	Qualitative Description
A	0.0%	<-1.9	Lapse
B	0.0%	-1.9 to-1.7	Lapse
C	1.8%	-1.7 to-1.5	Lapse
D	39.0%	-1.5 to-0.5	Neutral
E	19.9%	-0.5 to 1.5	Weak Inversion
F	39.3%	1.5 to 4.0	Moderate Inversion
G	0.0%	>4.0	Strong Inversion

[1]ELR (Environmental Lapse Rate).

In accordance with the INP the frequency of occurrence of moderate or F Class (ie 1.5 ^{o}C/100 m up to 4.0^{o}C/100 m) temperature inversions is greater than 30% during the winter night-time period and therefore this weather condition is included in the assessment.

5 NOISE MODELLING METHODOLOGY

A computer model was used to predict noise emissions from the operation and construction of the Bore 8 dewatering facility. The operational noise modelling was undertaken using SoundPLAN v7.0 software, developed by Braunstein and Berndt Gmbh in Germany. 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.

Topographic contours and drawings of the proposed modification site were supplied by Springvale Coal for the purpose of modelling noise from the proposed construction and operation of Bore 8. Prediction of noise under calm and prevailing atmospheric conditions was conducted. Atmospheric parameters under which noise predictions were made are given in **Table 5**.

Table 5 Meteorological Parameters for Noise Predictions

	Temperature	Humidity	Wind Speed	Wind Direction	Temperature Inversion
Calm (All periods)	20^{o}C	65%	N/A	N/A	N/A
Easterly Winds (Night-time)	10^{o}C	85%	3 m/s	S, SSW, SW	N/A
Inversion (Night-time)	10^{o}C	85%	N/A	N/A	F Class

6 CONSTRUCTION NOISE ASSESSMENT

Construction is estimated to take approximately six (6) months consisting of one (1) month to construct the pad, three (3) months to construct the boreholes and two (2) months for the installation and commission of Bore 8. Three (3) construction scenarios have been modelled for the project and are provided in **Table 6**.

Table 6 Construction Noise Modelling Scenarios

Scenario	Description	Proposed construction hours
Scenario 1	Establishment of access roads and ancillary infrastructure corridors. Formation a level pad for the construction of the bores including the clearing of vegetation and earthworks.	Monday to Friday 7am to 6pm Saturday 8am to 1pm No work Sundays or public holidays
Scenario 2	Drilling four (4) dewatering boreholes at Bore 8.	24 hours per day, 7 days per week.
Scenario 3	Civil works for the construction and commissioning of infrastructure at Bore 8	Monday to Friday 7am to 6pm Saturday 8am to 1pm No work Sundays or public holidays

Equipment in operation for each scenario is provided in **Table 7**. Equipment considered in operation is marked with a 'tick' (✓) and those not considered to be in operation are marked with a 'cross' (×). Where a 'tick' or 'cross' are separated by a slash indicates whether the selected equipment is operational during the day, evening period and night-time period respectively. For instance ✓/✓/× would indicate that the equipment is operational during the day and evening periods but not during the night-time period.

Table 7 Construction Equipment Considered

Equipment	Considered Onsite Activity		
	Scenario 1	Scenario 2	Scenario 3
Dozer	✓/×/×	×/×/×	×/×/×
Compactor	✓/×/×	×/×/×	×/×/×
Excavator	✓/×/×	×/×/×	×/×/×
Grader	✓/×/×	×/×/×	×/×/×
Water Cart	✓/×/×	✓/✓/✓	✓/×/×
Truck	✓/×/×	✓/✓/✓	✓/×/×
All Terrain Forklift	×/×/×	✓/✓/✓	✓/×/×
Drill Rig	×/×/×	✓/✓/✓	×/×/×
Generator	×/×/×	✓/✓/✓	✓/×/×
Compressor	×/×/×	✓/✓/✓	✓/×/×
Mud Pump	×/×/×	✓/✓/✓	×/×/×
Transit Mixer	×/×/×	×/×/×	✓/×/×
Crane	×/×/×	×/×/×	✓/×/×
Hand Tools (Grinder)	×/×/×	✓/✓/✓	✓/×/×
Hammering	×/×/×	✓/✓/✓	✓/×/×

Construction noise modelling has assumed that all the plant and equipment detailed in **Table 7** are operating simultaneously for a 15 minute period. As such, this provides a conservative assessment approach; actual noise levels are likely to be lower than predicted for much of the time. It should also be noted that only works associated with the drilling of the dewatering bores will be conducted outside of the ICNG recommended construction hours of 7:00 am to 6:00 pm Monday to Friday, 8:00am to 1:00 pm on Saturdays with no construction work on Sundays or public holidays.

Construction noise modelling has been carried out under the meteorological parameters identified in **Table 5**.

6.1 Sound Power Levels

The Sound Power Levels (SWL's) of the proposed construction plant and equipment have been obtained from a SLR Consulting database of similar plant and equipment and are provided in **Table 8**. Details of these levels are given in **Appendix A**.

Table 8 Construction Plant Sound Power Levels

Equipment	L_{Aeq} Sound Power Level (dBA)
Dozer	118
Compactor	110
Excavator	113
Grader	113
Water Cart	105
Truck	102
All Terrain Forklift	107
Drill Rig	104
Generator	95
Compressor	89
Mud Pump	99
Transit Mixer	109
Crane	106
Hand Tools (Grinder)	104
Hammering	98

6.2 Construction Noise Assessment Criteria

The ICNG sets out noise management levels, in relation to construction type activities, for residential and other sensitive receivers and how they are to be applied. A summary of the noise management levels from the ICNG is contained in **Table 9** and **Table 10**.

Table 9 Interim Construction Noise Guideline (Residences)

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[1] + 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[1] + 5 dB	A strong justification would typically be required for works outside the recommended standard hours. • The proponent should apply all feasible and 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.

[1]Rating Background Level as described by the NSW INP

Table 10 Interim Construction Noise Guideline at Sensitive Land Uses (other than residences)

Land Use	Management Level, LAeq(15minute) (applies when properties are being used)
Classrooms at schools and other educational institutions	Internal noise level 45 dBA
Hospital wards and operating theatres	Internal noise level 45 dBA
Places of worship	Internal noise level 45 dBA
Active recreation areas[1]	External noise level 65 dBA
Passive recreation areas[2]	External noise level 60 dBA
Community Centres	Depends on the intended use of the centre Refer to the recommended 'maximum' internal levels in AS2107 for specific uses.

1. Characterised by sporting activities and activities which generate their own noise or focus for participants, making them less sensitive to external noise intrusion.
2. Characterised by contemplative activities that generate little noise and where benefits are compromised by external noise intrusion, for example, reading, meditation.

In the absence of background noise monitoring at the nearest sensitive receivers, a Rating Background Level (RBL) of 30 dBA has been adopted at the nearest potentially affected residences during the daytime, evening and night-time periods.

The INP provides detailed methodology to determine the RBL and in cases where the RBL is found to be less than 30 dBA states the following:

Where the rating background level is found to be less than 30 dB(A), then it is set to 30 dB(A).

Therefore the use of an RBL of 30 dBA will result in conservative intrusive noise criteria for the development.

The project specific construction noise goals, presented in **Table 11** are applicable for the Project.

Table 11 Project Specific Construction Noise Goals

Receiver Location	Period	Construction Noise Goal $L_{Aeq(15minute)}$	
		Noise Affected	Highly Noise Affected
R1, R2, R3	Recommended standard hours	40 dBA	75 dBA
	Outside recommended standard hours	35 dBA	
R4	When in Use	60 dBA	

6.3 Construction Noise Assessment

The predicted intrusive $L_{Aeq(15\ minute)}$ construction noise level for each construction scenario at the nearest potentially affected receivers are presented in **Table 12** to **Table 14** together with the construction noise goals.

Table 12 Scenario 1 - Predicted Construction Noise Levels

Location	Period	Predicted Noise Level $L_{Aeq(15minute)}$ (dBA)			Construction Noise Goal $L_{Aeq(15minute)}$	
		Calm	Prevailing Wind	Temperature Inversion	Noise Affected	Highly Noise Affected
R1	Day	<20	N/A	N/A	40	75
R2		<20			40	75
R3		<20			40	75
R4		<20			60	

Table 13 Scenario 2 - Predicted Construction Noise Levels

Location	Period	Predicted Noise Level $L_{Aeq(15minute)}$ (dBA)			Construction Noise Goal $L_{Aeq(15minute)}$	
		Calm	Prevailing Wind	Temperature Inversion	Noise Affected	Highly Noise Affected
R1	Day	<20	N/A	N/A	40	75
	Evening	<20	N/A	N/A	35	N/A
	Night	<20	<20	<20	35	N/A
R2	Day	<20	N/A	N/A	40	75
	Evening	<20	N/A	N/A	35	N/A
	Night	<20	<20	<20	35	N/A
R3	Day	<20	N/A	N/A	40	75
	Evening	<20	N/A	N/A	35	N/A
	Night	<20	<20	<20	35	N/A
R4	Day	<20	N/A	N/A	60	
	Evening	<20	N/A	N/A	60	
	Night	<20	<20	<20	60	

Table 14 Scenario 3 - Predicted Construction Noise Levels

Location	Period	Predicted Noise Level $L_{Aeq(15minute)}$ (dBA)			Construction Noise Goal $L_{Aeq(15minute)}$	
		Calm	Prevailing Wind	Temperature Inversion	Noise Affected	Highly Noise Affected
R1	Day	<20	N/A	N/A	40	75
R2		<20			40	75
R3		<20			40	75
R4		<20			60	

As indicated in **Table 12** to **Table 14** the predicted construction noise levels are significantly below the respective construction noise goals at the nearest potentially affected receivers and any potential construction noise impacts are negligible.

7 OPERATIONAL NOISE ASSESSMENT

As outlined in **Section 2.1** the Bore 8 dewatering facility will form a critical part of Springvale's existing dewatering system as longwall mining progresses.

Four (4) submersible pumps along with two (2) 11kV to 3.3 kV transformers and ancillary equipment such as a high voltage switch room and control equipment will be located at the Bore 8 dewatering facility.

The SWL of the plant and equipment proposed for use at Bore 8 is provided in **Table 15**. Details of these levels are given in **Appendix A.**

Table 15 Bore 8 Plant and Equipment Sound Power Levels

Equipment	L_{Aeq} Sound Power Level (dBA)
Submersible pump (each)	93
11kV to 3.3kV transformer (ODAF[1])	83
High Voltage switching and control equipment	77

[1]ODAF – Oil Directed Air Forced (high noise level operational mode only used during periods of high load under high ambient air temperatures)

In order to provide a conservative prediction of noise levels from the operation of Bore 8 it has been assumed that all operational equipment is operating simultaneously with no attenuation from equipment enclosures. Operational noise modelling has been carried out under the meteorological parameters identified in **Table 5**. Predicted noise levels from the operation of Bore 8 at the nearest residential receivers is provided in **Table 16**.

Table 16 Bore 8 - Predicted Operational Noise Level

Location	Period	Predicted Noise Level $L_{Aeq(15minute)}$ (dBA)		
		Calm	Prevailing Wind	Temperature Inversion
R1	Day	<20	N/A	N/A
	Evening	<20	N/A	N/A
	Night	<20	<20	<20
R2	Day	<20	N/A	N/A
	Evening	<20	N/A	N/A
	Night	<20	<20	<20
R3	Day	<20	N/A	N/A
	Evening	<20	N/A	N/A
	Night	<20	<20	<20
R4	Day	<20	N/A	N/A
	Evening	<20	N/A	N/A
	Night	<20	<20	<20

As can be seen the noise level from operation of Bore 8 is negligible at all nearest noise sensitive receivers. Such a noise level is highly likely to be inaudible at all receivers and would have a negligible impact on cumulative industrial noise levels at these locations.

8 TRAFFIC NOISE ASSESSMENT

8.1 Transport and Personnel Movements

Access to the site by heavy vehicles will be via the Old Bells Line of Road at the Zig Zag Railway, Clarence. It is proposed that light vehicles will access the site either by the Old Bells Line of Road from Clarence or via the State Mine Gully Road from Lithgow. Both routes then converge with final access to the site off Blackfellows Hand Road on the Newnes State Forest.

There will be an increase in traffic (along public roads and Forest NSW tracks) and personnel during the six (6) months (approximately) of construction. Outside of this period traffic and personnel movements associated with the dewatering sites are minimal with the occasional light vehicle trip required for maintenance and inspection purposes only.

During the construction phase of the modification, it is envisioned that no more than eight (8) people (assumed 16 return vehicle trips) will be present on site. On occasion, this may peak higher with the requirements for crane operators, concrete truck deliveries, etc.

8.2 Road Traffic Noise Criteria

The RNP presents guidelines for road traffic noise assessment. The policy document provides road traffic noise criteria for proposed road, residential and industrial developments, as well as criteria for other sensitive land uses.

Table 17 presents the most relevant RNP criteria for the proposed construction activities that have the potential to increase road traffic noise levels.

Table 17 Road Traffic Noise Assessment Criteria for Residential Land Uses

Road Category	Type of Project/Land Use	Assessment Criteria (dBA)	
		Day (7am to 10pm)	Night (10pm to 7am)
Local Roads	Existing residences affected by additional traffic on existing local roads generated by land use developments	$L_{Aeq(1hour)}$ 55 dBA (external)	$L_{Aeq(1hour)}$ 50 dBA(external)

8.3 Road Traffic Noise Assessment

8.3.1 Construction

Old Bells Line of Road

Based upon the expected road traffic movements presented in **Section 8.1** it has been assumed that eight (8) light vehicle movements and two (2) heavy vehicle movements may occur on the Old Bells Line of Road during a "worst case" hourly period. Typical L_{Amax} passby noise levels of heavy and light vehicles were used to predict road traffic noise levels from the roadway.

The calculated $L_{Aeq(1hour)}$ noise level at the nearest receiver (approximately 100m from the Old Bells Line of Road) is 38 dBA. This is significantly below the numerical criteria detailed in the RNP.

State Mine Gully Road

Based upon the expected road traffic movements presented in **Section 8.1** it has been assumed that eight (8) light vehicle movements may occur on the State Mine Gully Road and associated local roads in Lithgow during a "worst case" hourly period. Typical L_{Amax} passby noise levels of light vehicles were used to predict road traffic noise levels from the roadway.

The calculated $L_{Aeq(1hour)}$ noise level at the nearest roadside receivers (assumed to be approximately 5m from the edge of the road) is 44 dBA. This is significantly below the numerical criteria detailed in the RNP.

8.3.2 Operation

Traffic movements associated with the Bore 8 dewatering site will be minimal with the occasional light vehicle trip required for maintenance and inspection purposes and as such there will not be any significant road traffic noise associated with the operation of the Bore 8 dewatering facility.

9 VIBRATION ASSESSMENT

The main vibration generating activities will occur during the construction phase of the modification including the operation of mobile earthmoving equipment such as dozers, excavators, graders, compactors and trucks. Given the minimum separation distance of approximately 9 km between Bore 8 construction activities and the nearest potentially affected residential locations vibration levels from these activities is predicted to be negligible and below levels of human perception at the nearest residential receivers.

10 CONCLUSIONS

SLR Consulting has prepared a NVIA for the proposed construction and operation of the Bore 8 dewatering facility associated with the Springvale Colliery. The objectives of the NVIA were to identify the potential impacts of noise and vibration due to the construction and operation of Bore 8 at the nearest noise sensitive receivers.

Noise modelling has indicated that the noise emissions from the construction and operation of the Bore 8 dewatering facility would have a negligible impact at the nearest noise sensitive receivers.

Traffic generated by the construction of and operation of the Bore 8 dewatering facility is predicted to be within the NSW RNP criteria at all receiver locations.

Vibration levels from the construction and operation of the Bore 8 dewatering facility is predicted to be negligible and significantly below levels of human perception at the nearest residential receivers.

Equipment Sound Power Levels

Equipment Description	Octave Band Centre Frequency (Hz) – dB re 1pW										dB	dBA
	31.5	63	125	250	500	1000	2000	4000	8000	16000		
Construction Equipment												
Dozer	111	112	109	113	116	113	111	108	98		121	118
Compactor	99	104	109	112	107	105	102	96	90		116	110
Excavator	112	105	116	108	111	107	105	100	93		119	113
Grader	97	100	109	104	108	109	106	103	103	103	116	113
Water Cart	105	105	102	104	101	99	98	91	86	86	111	105
Truck	96	104	106	99	100	98	92	85	77	77	110	102
All Terrain Forklift	101	102	113	107	105	101	98	90	84	84	115	107
Drill Rig	97	108	102	102	100	100	98	92	82	71	111	104
Generator	105	100	95	90	91	86	91	73	69	59	107	95
Compressor	93	90	87	89	85	83	79	70	65	60	97	88
Mud Pump	70	81	91	96	93	96	92	83	75	67	101	99
Transit Mixer	105	112	107	109	104	104	101	97	88		116	109
Crane	104	112	106	102	102	101	97	97	77		114	106
Hand tools (grinder)	63	67	65	67	75	84	95	100	100	95	104	104
Hammering	108	107	87	93	89	94	93	88	94	79	111	98
Submersible pump (each)	94	75	85	90	87	90	86	77	69	61	95	93
Transformer ODAF	81	88	95	86	77	74	70	65	61	61	96	83
Control equipment	75	82	89	80	71	68	64	59	55	55	90	77