Wallerawang Power Station Project Demolition

Noise and Vibration Management Plan

Prepared by

Liberty Industrial Pty Ltd

For

Revision No.	Revision Date	Authority	Changes
A	10.02.21	JS	Draft for Consultation
B	23.02.21	JS	Addressing Greenspot comments
C	09.04.2021	ADL	Addressing Additional Greenspot comments

PREPARED: John Stevanoni Date: 23 02 2021

Principal Environmental Engineer

ACCEPTED: Alwin De Leon Date: 23 02 2021

Project Manager

GLOSSARY AND ABBREVIATIONS

ACM	Asbestos Containing Material
ALARP	Mitigate risk to “As Low As Reasonably Practical”;
ANZECC	Australian and New Zealand Environment and Conservation Council
ARCP	Asbestos Removal Control Plan
AWS	Automatic Weather Station
Code of Practice	A practical guide to achieve the standards of health and safety required under the model Work Health and Safety (WHS) Act and model WHS Regulations
DA	Development Approval (DA015/19) issued by Lithgow City Council on the 26th of September 2019
Environmental Aspect	means the interaction, relationship or impact of an operation or activity with the Environment including
Environmental Law	relating to the storage, handling or transportation of waste, dangerous goods or hazardous material relating to Workplace health and safety; or which has as one of its purposes or effects the protection of the Environment
Environmental Notice	means any direction, order, demand, license or other requirement from a Government Agency to take action or refrain from taking any action in respect of the Site or the Works in connection with any Environmental Law
EPA	Environment Protection Authority
HESQ	Health Environment Safety Quality
Liberty	Liberty Industrial
NSWEE&S	New South Wales Environment, Energy and Science with the Department of Industry and Environment
SEE	Wallerawang Power Station Demolition Statement of Environmental Effects (SSE) (Aurecon 2018)
Site	means a project site or work area where the company is undertaking activities on behalf of a client
Standards	Standards are published documents setting out specifications and procedure
WPS	Wallerawang Power Station
DEMP	Demolition Environmental Management Plan
DDR	Decommission, Demolition and Rehabilitation
The Project	The Wallerawang Power Station Decommission, Demolition and Rehabilitation Project
NRAR	Natural Resource Access Regulator
EPA	Environment Protection Authority
EPL 766	Environment Protection Licence number 766

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1 REQUIREMENT MATRIX

Development Approval Conditions

Table 1 – Key Noise and Vibration Development Approval Conditions

DCC No	Condition Requirement	Document Reference
Schedule A 1(d)	The applicant is required to prepare and submit to Council for approval the following plans relating to the demolition of the Wallerawang Power Station Site: c) Noise and Vibration Management Plan	This Plan
Schedule B (5)	Demolition shall only be undertaken during the following standard construction hours, as defined in DA as; (a) 7.00 am to 6.00 pm Mondays to Fridays (b) 8.00 am to 1.00 pm Saturdays (c) At no time on Sundays or Public Holidays This includes truck movements leaving and entering site Works undertaken outside the hours stipulated in this approval is permitted in the following circumstances:	Section 2.4
Schedule B (6)	Works undertaken outside the hours stipulated in this approval is permitted in the following circumstances: (a) Where construction noise does not cause audible noise at any sensitive receiver; (b) For the delivery of materials required outside these hours by the Police or other authorities for safety reasons; or (c) Where it is required in an emergency to avoid the loss of lives, property and/or to prevent environmental harm	Section 2.4
Schedule B (11)	All works carried out on site during demolition/ excavation/ earthworks shall comply with the NSW Protection of the Environment Operations Act 1997 and the Department of the Environment and Climate Change Noise Control Guideline – Construction Site Noise and AS 2436-1981 – “Guide to Noise on Construction, Maintenance and Demolition Sites”	This plan
Schedule B (12)	Should complaints of noise nuisance be substantiated, council may require the acoustic treatment of the identified noise source/s to ensure compliance with Councils requirements on noise. An acoustic assessment & report will be required to ensure that the intrusive noise from plant does not exceed 5 dB (A) above the background noise	Section 2.4
EPL 766	All relevant conditions contained with Environment Protection Licence 766 (EPL766)	

2 INTRODUCTION

2.1 PURPOSE

This Noise and Vibration Management Plan (NVMP) has been prepared by Liberty Industrial (Liberty) for the Wallerawang Power Station Demolition project.

It is the policy of Liberty to ensure a high standard of care to minimise the impact on the environment, immediate work sites, and the local community.

This NVMP addresses the applicable requirements of:

(d) Development Approval (DA) (DA015/19) issued by Lithgow City Council on the 26th of September 209.

(e) Wallerawang Power Station Demolition Statement of Environmental Effects (SSE) (Aurecon 2018)

(f) Environment Protection Licence (EPL) 766

(g) Applicable New South Wales and Australian Environmental Legislation;

2.2 REVISION CHANGES OF THIS NVMP

Changes to the NVMP shall only be implemented with the approval of the Project Manager.

This NVMP will be revised to address learnings identified through continual improvement and as necessary.

2.3 DISTRIBUTION LIST

A controlled copy of this NVMP is to be distributed to the following parties for comment and review

(h) Liberty Industrial Directors, Senior Management, Project Manager, Project Engineer, HSEQ Manager and Site Supervisors;

(i) Greenspot Project Managers

(j) Lithgow City Council (LCC)

(k) NSW Environment Protection Authority (EPA)

Following review, it will be submitted to LCC for approval prior to physical commencement of the Project.

Once the NVMP has been approved, it will be integrated into the WPS DEMP. A hardcopy will be kept onsite and updated as required by the Project Environmental Advisor, as well as a controlled PDF version being uploaded into the project management database. All Contractors and Subcontractors will be provided a copy to ensure their works are consistent with the DEMP.

3 PROJECT BACKGROUND

Wallerawang Power Station (WPS) is a former coal-fired power station owned by Greenspot Wallerawang Pty Ltd (Greenspot).WPS is located adjacent to the township of Wallerawang, approximately 14 kilometres (km) from Lithgow and 160 km west of Sydney, in the Central Tablelands of NSW. WPS began operation in 1957, initially consisting of four 30 megawatt (MW) units, with two 60 MW units being added in 1961 and 500 MW units being added in 1976 and 1980. The 30 MW and 60 MW units were decommissioned in the 1990's and their above ground infrastructure was salvaged or demolished at that time.

In November 2014, EnergyAustralia announced it would permanently close WPS due to ongoing reduced energy demand, lack of access to competitively priced coal and the powers station's high operating costs. The WPS has since been deregistered as an electricity generation facility with EnergyAustralia commencing some DDR activities. In September 2020, Greenspot Acquired the WPS site and surrounding buffer lands from EnergyAustralia. The last of the decommissioning works and completion of the Project will be undertaken by Greenspot with Liberty as the principal contractor.

The Project will take approximately 18 months to complete, commencing on site in the first half of 2021.

Under current plans, key infrastructure on site will be retained including the turbine hall structure, cooling tower, coal dome and administration building.

In parallel with completing the Project, Greenspot will progress with their development of an industrial park concept plan for the WPS site and buffer lands, seeking approvals for a variety of uses.

Greenspot's primary objective is to revitalise what would otherwise be a stranded asset, and in doing so, to generate opportunities for economic activity and employment. The desired outcome is a hub of economic activity of which the local community and the broader region is justifiably proud.

3.1 PROJECT OBJECTIVES

The objectives of the Project are to:

- maximises the recovery of valuable resources in a safe, environmentally-compliant, cost effective and timely manner
- protect the workforce from exposure to hazards and risks
- protect the surrounding environment and community from avoidable impacts in compliance with the planning approvals.

Liberty as a licensed demolition contractor, they would prepare and implement a variety of management plans and a demolition work plan consistent with AS2601-2001

3.2 GENERAL DESCRIPTION OF THE SITE AND WORK DOMAINS

The description of the site and work domains is provided in Section 2.1 of the DEMP.

3.3 HOURS OF WORK

Demolition shall only be undertaken during the following standard construction hours, as defined in DA as;

(a) 7.00 am to 6.00 pm Mondays to Fridays

(b) 8.00 am to 1.00 pm Saturdays

(c) At no time on Sundays or Public Holidays

This includes truck movements leaving and entering site

Works undertaken outside the hours stipulated in this approval is permitted in the following circumstances:

(a) Where construction noise does not cause audible noise at any sensitive receiver;
(b) For the delivery of materials required outside these hours by the Police or other authorities for safety reasons; or
(c) Where it is required in an emergency to avoid the loss of lives, property and/or to prevent environmental harm

Should complaints of noise nuisance be substantiated, council may require the acoustic treatment of the identified noise source/s to ensure compliance with Council's requirements on noise. An acoustic assessment & report will be required to ensure that the intrusive noise from plant does not exceed 5 dB (A) above the background noise

4 NOISE AND VIBRATION BACKGROUND

4.1 LOCATION AND SITE CONTEXT

WPS is in the Central West Region of NSW, immediately north-east of the township of Wallerawang. The site covers an area of approximately 80 hectares (ha) and is bound by the Main Western Railway Line, Main Street and Castlereagh Highway. The Cox's River bisects the site and flows southward into Lake Wallace, a man-made reservoir that was used to provide cooling water to WPS (Figure 2).

The site has been progressively developed since the first stages of the WPS were constructed in 1957 and is a highly modified industrial area with few environmental features. The areas surrounding the WPS include a mix of residential, industrial, buffer areas and rural land uses. Several abandoned open cut mines and operating underground coal mines are near the site.

Most of the land surrounding the site is buffer land owned by Greenspot. There are also two new switchyards and a deconstructed switchyard owned by TransGrid next to the site. There are a number of transmission lines and easements, and right of access corridors to TransGrid properties surrounding the site. Mount Piper Power Station, is approximately five km north-west of the site.

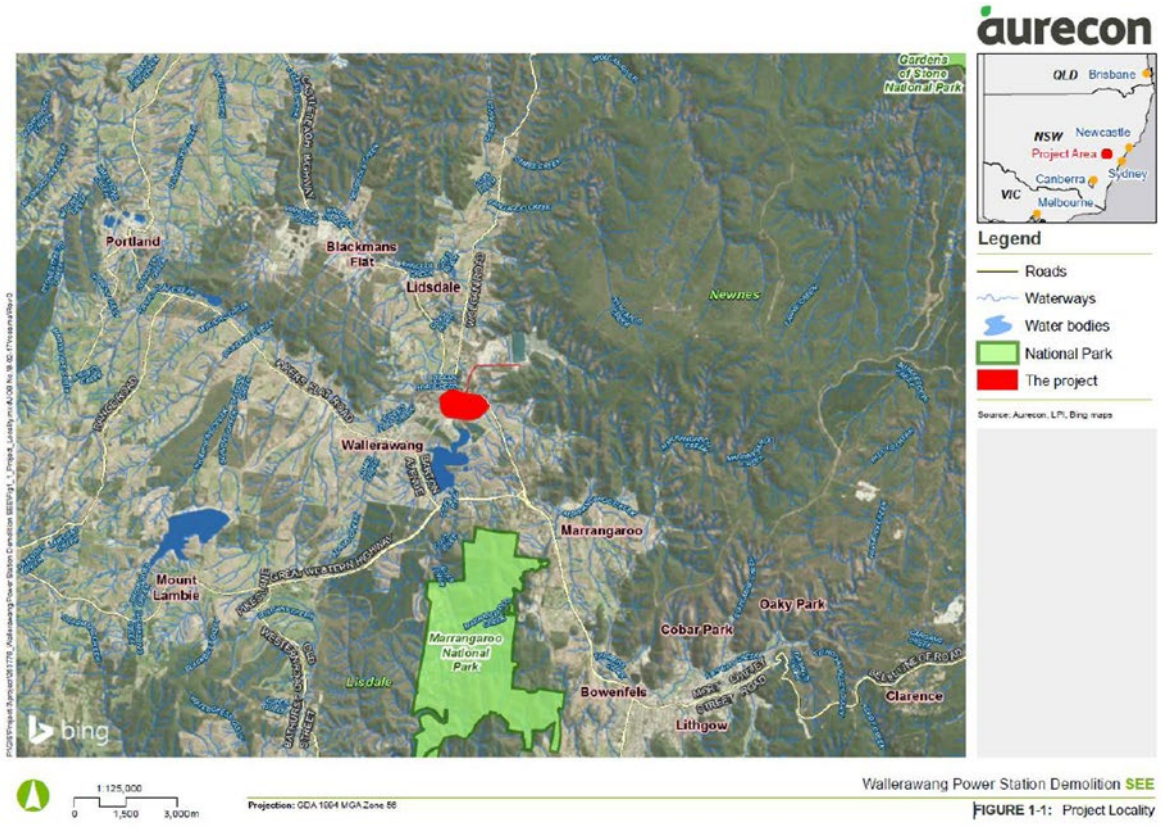

Figure 2 WPS Location

4.2 EXISTING ENVIRONMENT

Areas adjacent to the site generally consist of bushland, vacant cleared lands and residential, semirural and rural residential environments with dominant noise sources being road traffic, industrial and agricultural activities.

Key existing noise sources in the areas surrounding WPS generally include major roads, such as

Castlereagh Highway (B55), Great Western Highway (A32), local roads such as Main Street, Pipers

Flat Road and Barton Avenue, and industrial activities associated with nearby power stations, coal mines and quarries. There are only a few sensitive receivers near the proposed demolition work sites. Table 2 identifies noise catchment areas (NCAs) and representative receivers within these NCAs. The nearest residential receiver is approximately 400 metres to the north of the site, on Duncan Street, Lidsdale.

Table 2 - Sensitive Receiver Summary

Receiver ID	Representative Location	Distance from WPS (m)	Comments
NCA 1	1 Duncan Street, Lidsdale NSW	417	Representative location for residences along Duncan Street, Lidsdale NSW.
NCA 2	United Petrol Pump	248	Commercial property.
NCA 3	121 Main Street, Wallerawang NSW	880	Representative location for the Black Gold Country Cabins Motel.
NCA 4	55 Cripps Avenue, Wallerawang NSW	1280	Representative location for residences on southern side of Heel Street and Blaxland Street, Wallerawang NSW.

There is also St John the Evangelist's Church located adjacent to the site at 140 Main Street, Wallerawang. These properties have the potential to be impacted by noise and vibration from the Project. There are also several non-Aboriginal heritage listed items located within and adjacent to the site that have the potential to be impacted by vibration associated with the Project. A Heritage Management Plan has been prepared to assess the potential for and minimise any impacts on these properties.

4.2.1 Noise survey

A background noise survey was undertaken for the Project in 2013. The survey comprised eight attended noise measurement locations and two unattended measurement locations (refer to Figure 2). These locations were based on the relative distance from the site and proximity of the nearest sensitive residential receiver. The noise survey was conducted on 29/05/2013 and 30/05/2013 during the day and night time.

Ambient noise attended measurements were made using a Larson Davis 831 Type 1 sound level meter which was set to 'A' frequency weighting, 'F' time weighting, and was fitted with an approved windshield. Measurements were typically taken at a height of 1.2 metres and at least 3.5 metres from any reflecting structure other than the ground. The background noise measurements including the averaged A-weighted noise levels (L_{Aeq}), maximum A-weighted noise levels (L_{Amax}) and statistical A-weighted L_{A90} and L_{A10} noise levels[1] were conducted using a Larson Davis 831 Type 1 sound level meter equipped with a LD PRM831 pre-amplifier and a PCB 377B02 ½" microphone. A Larson Davis CAL200 was utilised to calibrate all sound level meters before and after each series of measurements with no significant calibration drift noted. The weather during the noise logging ranged from overcast to rainy conditions, and wind speeds less than 3 m/s at ground level. Measurements were typically taken in accordance with the *Australian Standard AS 1055-1997: Acoustics – Description and measurement of environmental noise.*

Unattended noise data loggers were also installed on site. The loggers were set to record continuously and average over 15-minute intervals (as per the Noise Policy for Industry (Environment Protection Authority, 2017), measuring the averaged A-weighted noise levels (L_{Aeq}), maximum A-weighted noise levels (L_{Amax}) and statistical A-weighted L_{A90} and L_{A10} noise levels. Unattended noise monitoring was undertaken at Location A and Location B (refer to Figure 3).

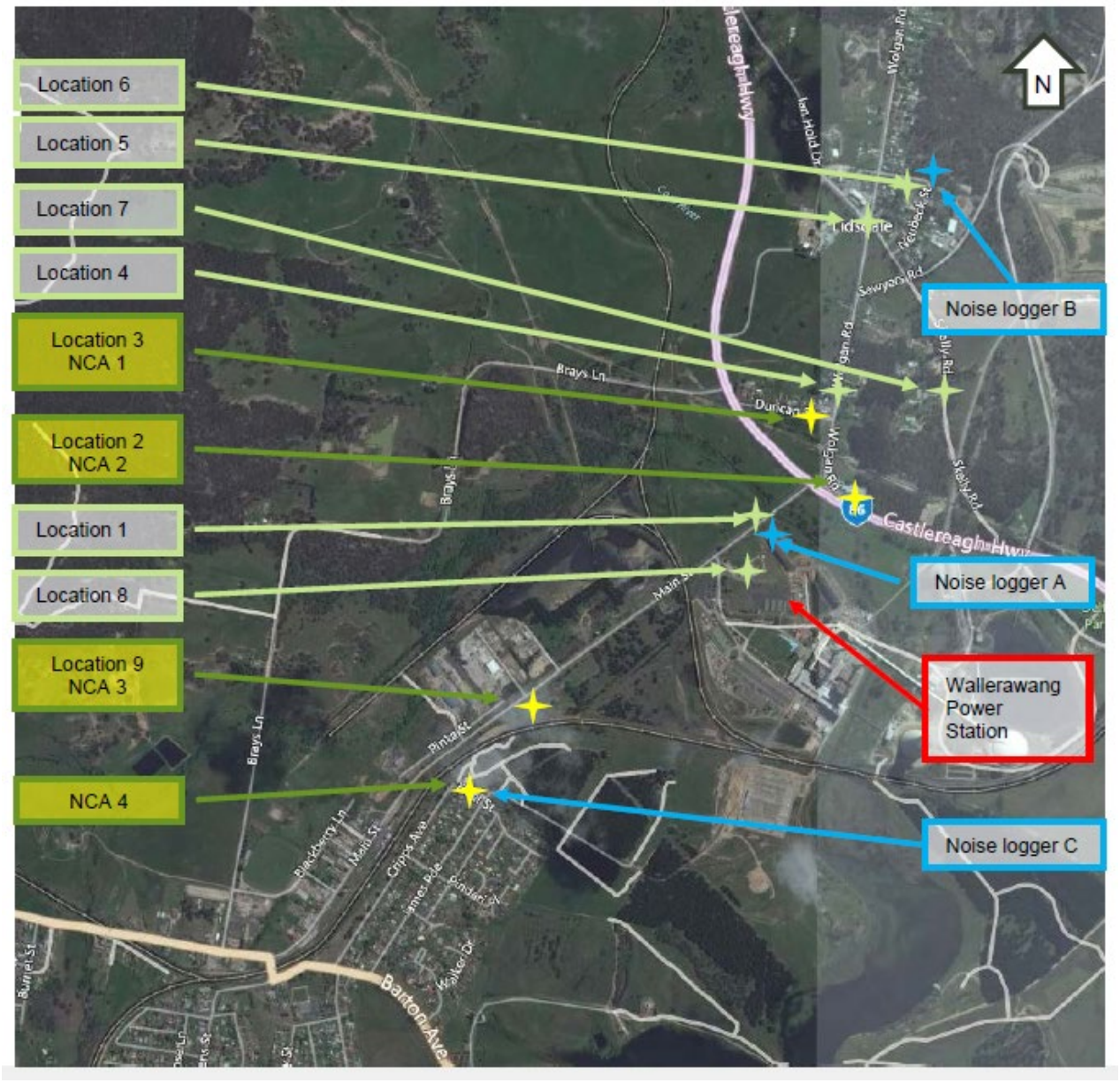

Figure 3 Noise Measurement Locations

The results of the attended and unattended noise monitoring are shown in Table 3 and Table 4 respectively.

Table 3 - Summary of Attended Nosie Locations

Location	Period	Noise metric (dB (A))				
		LAeq#	LAeq#	LA10*	LAmin	LAmax
1	Day	62	55	65	54	80
	Night	56	56	57	55	64
2	Day	65	56	68	55	83
	Night	58	53	56	52	76
3	Day	51	48	52	47	63

	Night	47	45	47	44	66
4	Day	63	47	63	46	83
	Night	46	46	47	44	61
5	Day	52	37	50	35	71
	Night	43	41	44	40	56
6	Day	46	39	49	36	62
	Night	Equipment Malfunction				
7	Day	42	39	43	37	69
	Night	41	39	42	38	62
8	Day	66	66	67	65	68
	Night	67	67	67	66	68
9	Day	46	44			
	Night	42	40			

^ LA90 refers to the A-weighted noise level which is exceeded for 90% of the measuring period. It is usually used as the descriptor for background noise level during the measurement period.

* LA10 refers to the A-weighted noise level which is exceeded for 10% of the measuring period. It is usually used as the descriptor for background noise level during the measurement period.

LAeq refers to A-weighted equivalent continuous sound pressure level over a measurement period. It is used to quantify the average noise level over a time period.

Table 4 - Summary of Unattended Nosie Locations

Location	**Period**	LAeq **(dB(A))**	RBL**2** **(dB(A))**
A	Day	72	71
	Night	72	72
B	Day	43	35
	Night	42	36
C	Day	55	45
	Night	42	33

5 NOISE CRITERIA

To adopt measured background noise levels for the Project, construction noise criteria for residential and noise sensitive receivers were established with consideration to the Interim Construction Noise Guideline (Department of Environment and Climate Change, 2009).

5.1 AIRBORNE NOISE FOR RESIDENCES

Table 5 sets out management levels for noise at residences and how they are to be applied. Restrictions to the hours of construction may apply to activities that generate noise at residences above the 'highly noise affected' noise management level.

The rating background level (RBL) is used when determining a noise management level. The RBL is the overall single-figure background noise level measured in each relevant assessment period (during or outside the recommended standard hours).

Table 5 – Noise Management Levels

Time of Day	Management level LAeq (15 min) *	How to apply
Recommended standard hours: Monday to Friday 7 am to 6 pm Saturday 8 am to 1 pm No work on 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 dB(A)	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 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.

Figure 1 - Noise at residents using quantitative assessment

* Noise levels apply at the property boundary that is most exposed to construction noise, and at a height of 1.5 metres above ground level. If the property boundary is more than 30 metres from the residence, the location for measuring or predicting noise levels is at the most noise-affected point within 30 metres of the residence. Noise levels may be higher at upper floors of the noise affected residence. The difference between internal noise levels and external noise levels is around 10dB with windows open for adequate ventilation

For non-residential receivers, the Noise Affected Levels are as follows:

- office/retail: LAeq, 15min 70 dBA
- places of worship: LAeq, 15min 45 dBA (internal noise level)
- active recreation areas: LAeq, 15min 65 dBA.

5.2 SLEEP DISTURBANCE AT RESIDENCES

Sleep disturbance criteria are generally considered in the assessment of any noise likely to occur during the night time. Below are the two most relevant criteria specific to sleep disturbance from the Noise Policy for Industry and World Health Organisation.

The NSW guidance relating to sleep disturbance are outlined in the Application notes – NSW Industrial noise policy. The following section summarises the sleep disturbance screening criterion: The then Department of Environment, Climate Change & Water (DECCW) (now the Office of Environment and Heritage) reviewed research on sleep disturbance in the NSW Road Noise Policy (RNP) (March 2011). This review concluded that the range of results is sufficiently diverse that it was not reasonable to issue new noise criteria for sleep disturbance. From the research, DECCW recognised that current sleep disturbance criterion of an LA1, (1 minute) not exceeding the LA90, (15 minute) by more than 15 dBA is not ideal. Nevertheless, as there is insufficient evidence to determine what should replace it, DECCW will continue to use it as a guide to identify the likelihood of sleep disturbance. This means that where the criterion is met, sleep disturbance is not likely, but where it is not met, a more detailed analysis is required.

The detailed analysis should cover the maximum noise level or LA1, (1 minute), that is, the extent to which the maximum noise level exceeds the background level and the number of times this happens during the night time period. Some guidance on possible impact is contained in the review of research results in the appendices to the RNP. Other factors that may be important in assessing the extent of impacts on sleep include:

- How often high noise events will occur
- Time of day (normally between 10pm and 7am)

- Whether there are times of day when there is a clear change in the noise environment (such as
- during early morning shoulder periods).

The LA1, (1 minute) descriptor is meant to represent a maximum noise level measured under 'fast' time response. DECCW will accept analysis based on either LA1, (1 minute) or LA, (Max). If the above screening criterion of LA90, (15 minute) + 15 dBA is exceeded further review of the noise source is recommended. The World Health Organization has published guidelines which reference a number of studies on sleep disturbance. The general conclusions provided in the Guideline for Community Noise (World Health Organization, 1999) suggest that for continuous noise, the sound pressure level should not exceed 30 dBA indoors, and for intermittent noise sources (short term or transient noise events), maximum levels (LAmax) should not exceed 45 dBA internally more than 10-15 times per night.

The conclusions made in the RNP Appendix B: Technical background to the road traffic noise criteria are as follows:

- Considering all of the foregoing information the following conclusions can be drawn:
- Maximum internal noise levels below 50-55 dBA are unlikely to cause awakening reactions
- One or two events per night with maximum internal noise levels of 65-70 dBA are not likely to affect
- health and wellbeing significantly.

5.3 MANAGEMENT NOISE CRITERIA

A demolition noise assessment criterion (Noise Management Level) was developed in accordance with the Interim Construction Noise Guideline and is summarised in Table 6.

Table 6 - Noise Management Criteria in accordance with Interim Construction Noise Guideline

Noise Catchment Area	**Rating background level (dB(A))**		**LAeq (15min) dBA Noise management levels**		LAmax dBA Sleep disturbance criteria
	Day	Night	Recommended standard hours Mon-Fri: 7am-6pm Sat: 8am-1pm	Outside standard hours	10pm-7am
NCA1	48	45	58	50	60
NCA2	56	53	70		N/A
NCA3	44	40	54	45	55
NCA4	45	33	55	38	48

By comparison to the noise limits recorded at different noise monitoring points under the EPL 766 section L3.1, the maximum noise levels shall not exceed 70 dBA, which the values in Table 6 complies with the criterion.

5.3.1 Blasting Criteria

Blast criteria are typically based on guidelines prescribed by the Australian and New Zealand Environment and Conservation Council (ANZECC). These guidelines provide recommended maximum levels and blast overpressure and ground vibration to maintain the amenity of residents. Further details on blast safety and criteria are provided in Australian Standard 2187.2-2006 Explosive – Storage, Transport.

Where Blasting is required the guidelines are:

- maximum blast overpressure: 115 dB(L)
- maximum peak particle vibration velocity: 5 millimetres per second.

These targets should be met for all but 5% of blasts, and in no case should the blast overpressure exceed 120 dB(L) or peak particle velocity exceed 10 millimetres per second. The guidelines also provide a long-term goal of 2 millimetres per second for peak particle vibration velocity.

The EPL 766 Blasting criteria are as follows:

- L4.1 Blasting in or on the premises must only be carried out between 9am and 5pm, Monday to Saturday. Blasting in or on the premises must not take place on Sundays or Public Holidays without the prior approval of the EPA.
- L4.2 Blasting at the premises is limited to the following:

    a) A maximum of 1 blast per day; and

    b) A maximum of 1 blast per week.

- L4.3 The air blast overpressure level from blasting operations at the premises must not exceed 120dB (Lin Peak) at any time at any noise sensitive locations. Error margins associated with any monitoring equipment used to measure this are not to be taken into account in determining whether or not the limit has been exceeded.
- L4.4 The air blast overpressure level from blasting operations at the premises must not exceed 115dB (Lin Peak) at any noise sensitive locations for more than five per cent of the total number of blasts over each reporting period. Error margins associated with any monitoring equipment used to measure this are not to be taken into account in determining whether or not the limit has been exceeded.
- L4.5 Ground vibration peak particle velocity from the blasting operations at the premises must not exceed 10mm/sec at any time at any noise sensitive locations. Error margins associated with any monitoring equipment used to measure this are not to be taken into account in determining whether or not the limit has been exceeded.
- L4.6 Ground vibration peak particle velocity from the blasting operations at the premises must not exceed 5mm/sec at any noise sensitive locations for more than five per cent of the total number of blasts over each reporting period. Error margins associated with any monitoring equipment used to measure this are not to be taken into account in determining whether or not the limit has been exceeded.

As such blasting events will be modelled and verified to ensure compliance with this criterion and a Blast Management Plan will be prepared.

6 NOISE AND VIBRATION POTENTIAL IMPACTS

Demolition activities have the potential to create noise and vibration impacts if activities are not managed properly.

The Project has the potential to impact upon sensitive receivers due to: noise and vibration impacts associated with the demolition activities, increased traffic noise and vibrations from work vehicles entering and exiting the site to deliver and dispose of materials and equipment noise and vibration impacts from blasting activities associated with the demolition works. Blasts would be planned and timed taking into consideration the distance to nearby sensitive receivers.

A Blast Management Plan would be prepared prior to blasting activities, and further management measures would be identified at that stage.

An assessment of potential noise impacts has been undertaken and is discussed further below.

6.1 CONSTRUCTION NOISE

Potential construction noise impacts for the project were predicted in the acoustics assessment through a construction noise model developed using SoundPlan noise modelling software.

6.1.1 Construction Noise Sources

The demolition activities described in Section 2.3 of this SEE would require the use of noise generating plant and equipment. The individual sound power levels (SWLs) of anticipated demolition equipment required for the project have been referenced from *AS2436-2000 Guide to noise and vibration control on construction demolition and maintenance sites* and are summarised in Table 7. This is indicative only and is subject to change as required for the project.

The predicted noise at the NCA is then provided in Table 8.

Table 7 – Anticipated demolition equipment sound levels (indicative only and subject to change)

Activity	Mobile Plant	Sound Power Level
Dismantling	Hand tools (electric)	102
	Crane (mobile)	104
	Scissor lift	106
	Jackhammer (handheld)	117
	20T excavator	100
	Delivery truck x2	108
	Workforce vehicles	106
Total		119
Removal and relocation of fixed equipment	Hand tools (electric)	102
	Crane (mobile)	104
	Scissor lift	106
	Jackhammer (handheld)	117
	20T excavator	100
	Flat Bed Truck	106
Total		118

Demolition	200T Excavator	112
	20T Excavator x2	100
	Excavator (hydraulic hammer)	118
	Delivery Truck x2	108
Total=		120
Stack Demolition	Excavator (hydraulic Hammer)	118
Total=		118
Earthworks (stockpiling)	Dozer (D11)	112
	20T Excavator	100
	Delivery Truck	108
Total=		114

Table 8 Indicative predicted noise at the sensitive NCA

Activity	**Mobile Plant**	**Sound Power Level**	Predicted Noise level (LAeq) **(dBA)**			
			NCA 1	NCA 2	NCA 3	NCA 4
Noise Management Levels Standard Construction Hours			**58**	**70**	**54**	**55**
Dismantling	Hand tools (electric)	102	40	45	34	31
	Crane (mobile)	104	42	47	36	33
	Scissor lift	106	44	49	38	35
	Jackhammer (handheld)	117	55	60	49	46
	20T excavator	100	38	43	32	29
	Delivery truck x2	108	46	51	40	37
	Workforce vehicles	106	44	49	38	35
Cumulative noise		119	57	62	51	47
Removal and relocation of fixed equipment	Hand tools (electric)	102	40	45	34	31
	Crane (mobile)	104	42	47	36	33
	Scissor lift	106	44	49	38	35
	Jackhammer (handheld)	117	55	60	49	46
	20T excavator	100	38	60	49	46
	Flat Bed Truck	106	44	49	38	35
Cumulative noise		118	56	61	50	47
Demolition	200T Excavator	112	50	55	44	41

	20T Excavator x2	100	38	43	32	29
	Excavator (hydraulic hammer)	118	56	61	50	47
	Delivery Truck x2	108	46	51	40	37
Cumulative noise		120	58	63	52	48
Stack Demolition	Excavator (hydraulic Hammer)	118	56	61	50	47
Cumulative noise		118	56	61	50	47
Earthworks (stockpiling)	Dozer (D11)	112	56	61	50	47
	20T Excavator	100	38	43	32	29
	Delivery Truck	108	46	51	40	37
Cumulative noise		114	57	61	50	47

Based on the worst-case scenario during demolition, the predicted noise levels from the project will comply with the noise criteria during the standard construction hours.

The Noise limit conditions of the EPL 766 are as follows:

- L3.1 Noise generated at the premises that is measured at each noise monitoring point established under this licence must not exceed the noise levels specified in Column 4 of the table below for that point during the corresponding time periods specified in Column 1 when measured using the corresponding measurement parameters listed in Column 2.

POINT 20

Time period	Measurement parameter	Measurement frequency	Noise level dB(A)
Night	LAmax	-	60
Evening	LAeq (15 minute)	-	50
Night	LAeq (15 minute)	-	50
Day	LAeq (15 minute)	-	58

POINT 21

Time period	Measurement parameter	Measurement frequency	Noise level dB(A)
Day	LAeq (15 minute)	-	70
Evening	LAeq (15 minute)	-	70
Night	LAeq (15 minute)	-	70

POINT 22

Time period	Measurement parameter	Measurement frequency	Noise level dB(A)
Day	LAeq (15 minute)	-	54
Evening	LAeq (15 minute)	-	45
Night	LAeq (15 minute)	-	45
Night	LAmax	-	55

POINT 23

Time period	Measurement parameter	Measurement frequency	Noise level dB(A)
Evening	LAeq (15 minute)	-	38
Night	LAeq (15 minute)	-	38
Night	LAmax	-	48
Day	LAeq (15 minute)	-	55

Note: The above noise limits do not apply at properties where the licensee has a written agreement with the landowner to exceed the noise limits.

- L3.2 For the purpose of Condition L3.1:

    a) Day is defined as the period from 7am to 6pm Monday to Saturday and 8am to 6pm Sundays and Public Holidays;
    b) Evening is defined as the period from 6pm to 10pm; and
    c) Night is defined as the period from 10pm to 7am Monday to Saturday and 10pm to 8am Sundays and Public Holidays.

- L3.3 The noise limits set out in condition L3.1 apply under all meteorological conditions except for the following:

a) Wind speeds greater than 3 metres/second at 10 metres above ground level; or
b) Stability category F temperature inversion conditions and wind speeds greater than 2 metres/second at 10 metres above ground level; or
c) Stability category G temperature inversion conditions.

- L3.4 For the purpose of condition L3.3:

a) Data recorded by the meteorological station identified as EPA Licence Point 24 must be used to determine meteorological conditions; and
b) Temperature inversion conditions (stability category) are to be determined by the sigma-theta method referred to in Part E4 of Appendix E to the NSW Industrial Noise Policy.

- L3.5 To determine compliance:

a) with the Leq(15 minute) noise limits in condition L3.1, the noise measurement equipment must be located:
    i) approximately on the property boundary, where any dwelling is situated 30 metres or less from the property boundary closest to the premises; or
    ii) within 30 metres of a dwelling façade, but not closer than 3 metres where any dwelling on the property is situated more than 30 metres from the property boundary closest to the premises; or, where applicable
    iii) within approximately 50 metres of the boundary of a National Park or Nature Reserve.
b) with the LA1(1 minute) noise limits in condition L3.1, the noise measurement equipment must be located within 1 metre of a dwelling façade.
c) with the noise limits in condition L3.1, the noise measurement equipment must be located:
    i) at the most affected point at a location where there is no dwelling at the location; or
    ii) at the most affected point within an area at a location prescribed by conditions L3.5(a) or L3.5(b).

- L3.6 A non-compliance of L3.1 will still occur where noise generated from the premises in excess of the appropriate limit is measured:

a) at a location other than an area prescribed by condition L3.5(a) and L3.5(b); and/or
b) at a point other than the most affected point at a location.

- L3.7 For the purposes of determining the noise generated at the premises the modification factors in Fact Sheet C of the Noise Policy for Industry (EPA, 2017) must be applied, as appropriate, to the noise levels measured by the noise monitoring equipment.

Noise and vibration impacts, if managed properly, can be minimised or avoided altogether through the development and implementation of this NVMP and mitigation measures (Section 6). Noise and vibration impact to nearby sensitive receivers due to the Project are expected to be minor and short term.

7 NOISE AND VIBRATION MITIGATION

The potential noise and vibration impact of the Project would be minimised by implementing the safeguards and mitigation measures identified in the following sections

7.1 SUMMARY OF MITIGATION MEASURES

Table 9 Noise and Vibration Mitigation Measures

ID	Environmental safeguards and mitigation measures
NV-1	The existing WPS Noise and Vibration Management Plan shall be updated as part of the demolition EMP.
NV-2	Where possible, less noisy plant would be selected for demolition.
NV-3	Examine and implement, where feasible and reasonable, the option of reducing noise from metal chutes and bins by placing damping material in the chute or bin.
NV-4	Avoid the use of reversing alarms by designing site layout to avoid reversing, such as by including drive through for parking and deliveries.
NV-5	Provide to nearby residents, reasonably ahead of time, information such as the expected duration of demolition works, what works are expected to be noisy, their duration, what is being done to minimise noise and when respite periods will occur. For works outside standard hours, inform affected residents and other sensitive land use occupants one week before commencement.
NV-6	Use a site information board at the front of the site with the name of the organisation responsible for the site and their contact details, hours of operation and regular information updates. This signage should be clearly visible from the outside and include after-hours emergency contact details.
NV-7	Provide a readily accessible contact point, for example, through a 24-hour toll-free information and complaints line.
NV-8	Noise generating activities shall be restricted to standard construction hours (7am to 6pm Monday to Friday and 8am to 1pm Saturday), unless otherwise agreed with LCC and the EPA.
NV-9	A Blast Management strategy shall be prepared and implemented prior to blasting activities required for demolition works. This plan would address the potential risks of blasting on the surrounding environment and control measures. The plan would be prepared in accordance with Section 4 of Australia Standard 2187.2-2006 Australia Standard *Explosives – Storage and Use, Part 2: Use of Explosives*

8 MONITORING

8.1 NOISE MEASUREMENT EQUIPMENT

All acoustic instrumentation employed throughout the attended monitoring program will comply with the requirements of AS IEC 61672.1-2004 *Electroacoustics – Sound level Meters- Specifications*. All sound level meters must have a current calibration certificate from a NATA accredited laboratory in accordance with NATA guidelines. Instrument calibration shall be checked before and after each measurement survey, with the variation in calibrated levels not exceeding ±0.5 dB.

8.2 ATTENDED RESIDENTIAL NOISE MONITORING PROCEDURE

The measurements will be conducted in accordance with the procedures outlined in Australian Standard AS1055 *Acoustics – Description and measurement of environmental noise* and in accordance with methods outlined in the NSW Industrial Noise Policy (INP) and the EPL 766. The following points should be followed when conducting noise monitoring:

- A field calibration should be conducted before and after measurements;
- The sound level meters must be set to A-weighting and Fast response;
- The sound level meters sample period should be set to 15 minutes;
- The following descriptors should be measured as a minimum: LA1, LAeq and LA90; and
- Measurements should be conducted a minimum of 3 metres from the nearest façade and/or solid fence/wall. If it is not possible to do this, corrections for façade reflection should be applied to the measurement results.

8.3 NOISE MONITORING OF EQUIPMENT

In addition to the residential noise monitoring procedures described above, the following equipment measurements will be undertaken:

- Noise emission levels of all critical items of mobile plant and equipment will be checked by the site environmental officer for compliance and conformance with noise limits appropriate to those items prior to the equipment going into regular service;
- For equipment and mobile plant used for construction works, LAeq measurements will be taken at an appropriate distance, normally 7m and converted to a Sound Power Level;
- An Equipment Noise Certificate, presenting relevant sound levels of the equipment tested, will be issued by the Construction Contractor's site environmental officer within the first week of the equipment commencing at the construction site.

The equipment sound power levels will be compared to the levels contained in Table 8. If noise checks on any equipment result in a prediction of non-compliance or non-conformance, quieter equipment will be substituted.

8.4 ATTENDED MONITORING SCHEDULE

Table 10 below provides a preliminary schedule for noise monitoring.

Table 10 Noise Monitoring Schedule

Monitoring Schedule	Measurement Procedure	Reporting

Initially at project commencement	Complete one round of operator-attended 15-minute noise monitoring on separate days at each NCA location	Reporting procedure as outlined in Section 6.6
During subsequent months	Carry out equipment noise level checks on any new (untested) critical items of plant and issue Equipment Noise Certificates	
	Carry out noise monitoring once a month	
	Carry out attended noise monitoring in the event of complaints and/or recorded exceedances. Continue noise monitoring after noise mitigation measures have been employed to confirm compliance and conformance	

8.5 REPORTING ON ATTENDED NOISE MONITORING

The following information must be included in the weekly reports when applicable:

- Field calibration results (before and after measurements);
- Measurement times and dates;
- Qualitative description of the noise environment during measurement;
- LA1, LAeq, LA90 and LAmax levels;
- Meteorological conditions during the measurements;
- Estimation of recorded noise contribution from other major noise sources.

The Site Supervisor shall establish and maintain a system of records which provides full documentation of all noise monitoring results, complaint handling and responses to non-compliances and non-conformances.

8.6 WORK PRACTICES

Workers and contractors shall be trained in work practices to minimise noise emission such as the following:

- Avoid dropping materials from a height.
- Place noise dampening material in empty bins before filling
- Avoid shouting and talking loudly outdoors.
- Turn off equipment when not being used.
- Carry out checks and ensure that noise attenuation equipment (e.g. vehicle mufflers) are in good condition.
- Plan work procedures to minimise noise.
- Carry out work only within the approved hours of operation.

8.7 AMENDMENTS TO THIS NOISE AND VIBRATION PLAN

Should changes to the Conditions of Approval schedule, nature of the works, equipment used during the works or locations of work change significantly during the course of the project, amendments to this plan and the calculations and recommendations contain herein, may be amended to reflect the changes.

A review should be carried out once a month by the Construction Contractor Project Manager and be revised if necessary.