

Liddell Power Station Battery Energy Storage System Construction Noise Management Sub Plan

Environmental Management Strategy

05-May-2025

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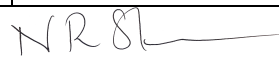
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Table of Contents

Glossary and terms	i
1.0 Introduction	1
1.1 Background	1
1.2 Site details	1
1.3 Project description	2
1.4	6
1.5 Construction activities	7
1.6 Relevant approvals and conditions	7
1.6.1 Project approvals	7
1.6.2 Development consent conditions	7
1.7 Scope, purpose and objectives	8
1.8 Related reports and plans	9
2.0 Legislation and guidelines	9
2.1 Standards and guidelines	9
2.1.1 Interim Construction Noise Guideline	9
2.1.2 NSW Road Noise Policy	9
2.1.3 Noise Policy for Industry	9
3.0 Environmental impact assessment	10
4.0 Roles and responsibilities	10
5.0 Environmental setting and potential impacts	10
5.1 Background noise environment	10
5.2 Background noise levels	10
5.3 Sensitive receivers	11
5.4 Potential impacts	14
6.0 Noise management objectives	14
6.1 Noise management levels	14
6.2 Sleep disturbance	15
6.3 Construction traffic	15
6.4 Maximum noise levels for plant and equipment	15
6.4.1 Correction Factors	15
7.0 Environmental management measures	16
7.1 Out of hours work protocol	18
7.1.1 Construction hours	18
7.1.2 Justification of OOHW	18
7.1.3 OOHW application and approval	18
Construction Noise Impact Statement	19
7.2 Community notifications	19
8.0 Compliance and reporting	19
8.1 Monitoring and reporting	19
8.1.1 Verification of predicted noise levels	20
8.1.2 Residential noise monitoring	20
8.1.3 Reporting	20
8.2 Incidents and complaints	21
8.3 Document review and update	21
Appendix A	
Construction noise levels	A

Glossary and terms

Term	Description
AECOM	AECOM Australia Pty Ltd
AGLM	AGL Macquarie Pty Ltd
ASL	Above Sea Level
BAW	Bayswater Ancillary Works
BESS	Battery Energy Storage System
BESS Project (the)	Stage 2 of the Liddell Battery and Bayswater Ancillary Works Project consisting of the construction of a BESS with the storage capacity to facilitate a maximum discharge of up to 500 MW for a four-hour period, or up to 2 GWh
CCTV	Closed-circuit television
CNIS	Construction Noise Impact Statement
CNMP	Construction Noise Management Plan
DPE	Department of Planning and Environment (now DPHI)
DPHI	Department of Planning, Housing and Infrastructure (formerly DPE)
EIS	Environmental Impact Statement
EMS	Environmental Management Strategy
EP&A Act	<i>Environmental Planning and Assessment Act 1979</i> (NSW)
EPA	Environment Protection Authority
EPL	Environment Protection Licence
GWh	Gigawatt hours
ha	hectares
ICNG	Interim Construction Noise Guideline
km	kilometre
kV	Kilovolt
LBBAWP	Liddell Battery and Bayswater Ancillary Works Project, consisting of a battery energy storage system at Liddell, decoupling works, and works associated with the ongoing operation of Bayswater
MW	Megawatt
NEM	National Energy Market
NML	Noise Management Level
NPI	Noise Policy for Industry
POEO Act	<i>Protection of the Environment Operations Act 1997</i> (NSW)
RBL	Rating Background Levels
RTS	Response to Submissions
SEARs	Secretary's Environmental Assessment Requirements
Site (the)	Location of the existing solar array area to be used for the BESS
SSD	State Significant Development

Term	Description
SWL	Sound Power Level
V	Volt
WOAOW	Bayswater Water and Other Associated Operational Works project, which involves improvements to the management of ancillary processes at Bayswater power station and to facilitate an improved rehabilitation outcome for the ash disposal area. These works may occur at the same time as the LBBAWP.

1.0 Introduction

AECOM Australia Pty Ltd (AECOM) was commissioned by AGL Macquarie Pty Limited (AGLM) to prepare a Construction Noise Management Plan (CNMP) for a Battery Energy Storage System (BESS) to be constructed as part of the Liddell Battery and Bayswater Ancillary Works Project (LBBAWP), NSW.

The LBBAWP is a State Significant Development (SSD) under the *State Environmental Planning Policy (State and Regional Development) 2011*¹, and is subject to Part 4, Division 4.7 of the *Environmental Planning and Assessment Act 1979* (EP&A Act).

An Environmental Impact Statement (EIS) was prepared in March 2021 in accordance with the Secretary's Environmental Assessment Requirements (SEARs). Development consent (SSD-8889679) was issued by the Department of Planning and Environment (DPE) (now Department of Planning, Housing and Infrastructure (DPHI)) on 8 March 2022.

1.1 Background

AGLM is progressing with plans to facilitate the efficient, safe and reliable continuation of electricity-generating works from the Bayswater and Liddell sites. The LBBAWP will be carried out in the following stages:

- Stage 1 - Decoupling Works: Alternative network connection arrangements for the Liddell 33 Kilovolt (kV) switching station that provides electricity to the infrastructure required for the ongoing operation of Bayswater power station, to associated ancillary infrastructure and to potential third-party industrial energy users
- Stage 2 - BESS: Replacement of a portion of Liddell's dispatchable electricity supply is required for the National Energy Market (NEM), including the construction of a grid-connected utility-scale BESS with a capacity of up to 500 megawatts (MW) and 2 gigawatt hours (GWh)
- Stage 3 - Bayswater Ancillary Works (BAW): Works associated with Bayswater power station, which may include upgrades to ancillary infrastructure, such as pumps, pipelines, conveyor systems, roads and assets, to enable maintenance, repairs, replacement or expansion
- Consolidated consents: Surrender and consolidation of various existing development approvals required for the ongoing operation of AGLM assets.

This management plan has been developed for Stage 2 only (i.e. the BESS), which is hereinafter referred to as 'the BESS Project'.

1.2 Site details

The AGLM landholding is located approximately 15 kilometres (km) southeast of Muswellbrook, 25 km northwest of Singleton, and approximately 165 km west northwest of Sydney in NSW. The total area of the AGLM landholding is approximately 10,000 ha, including the Bayswater and Liddell power station operational areas, the Ravensworth rehabilitation area, Lake Liddell and surrounding buffer lands.

Surrounding the AGLM landholding is predominantly land uses heavily influenced by industrial activity. The local area is dominated by large-scale infrastructure associated with Bayswater and Liddell power stations and open-cut mining activities. Agricultural clearing for the purposes of grazing is also present within and surrounding the AGLM landholding.

Elevations within approximately 10 kilometres of the AGLM landholding range from around 100 to 500 metres above sea level.

The majority of the AGLM landholding has been previously disturbed during the construction and operation of Liddell and Bayswater power stations and historic agricultural activity. The BESS will be located within the site of the existing solar array area (the site), shown as 'Area 2' in Figure 1-1. This location was selected as it is in close proximity to Liddell Power Station and is on previously disturbed

¹ Now State Environmental Planning Policy (Planning Systems) 2021

operational lands no longer required for Liddell operations. Stockpiling for the BESS Project will be located within the former coal yards area and the existing solar array area, respectively during Stage 2 (Figure 1-4).

The solar array area consists of approximately 5 ha of solar thermal equipment. This consists predominantly of steel pipes used for heat absorption and water and steam transfer, mirror reflectors, and steel mounting structures, as shown in Figure 1-2. The former coal yard covers an area of about 20 ha and consists of approximately 5 km of conveyor and associated stacker / reclaimer equipment.

1.3 Project description

The BESS Project involves the construction, operation and decommissioning of a BESS with the storage capacity to facilitate a maximum discharge of up to 500 MW for up to a four-hour period or up to 2 GWh. The BESS will be located within 'Area 2' the existing solar array area and will be connected to the existing TransGrid 330kV substation via a new 330kV high-voltage power line (refer to Figure 1-1).

The BESS Project will involve the demolition of the existing solar array area for construction of the BESS and the former coal yard infrastructure for stockpiling purposes. Other redundant equipment may also require demolition and deconstruction to support construction of the BESS Project. The disturbance area for the BESS is expected to be around 20 hectares (ha). The BESS will be mounted on slab footings and will be containerised or otherwise enclosed in a formalised layout.

The approximate component requirements to achieve the maximum storage capacity for the BESS (based on indicative information provided by potential technology providers) are as follows:

- Approximately 900 pre-assembled battery enclosures containing lithium-ion type batteries, internal cooling and fire suppression systems
- Approximately 148 medium voltage skid (inverter and transformers)
- Approximately 148 of 630 Volt (V) to 33 kV step-up transformers
- One control room, two electrical rooms, one social facility room and four storage rooms
- 33kV reticulation system and collector switchrooms
- Overhead, underground, or a combination of both, subject to detailed design, 330 kV line to connect to TransGrid 330 kV substation
- Two 33 kV / 33kV / 330 kV three-winding transformers and 330 kV connection equipment
- Ancillary infrastructure, including water tanks for bushfire protection purposes, lightning protection, security fencing and closed-circuit television (CCTV).

An indicative layout of the BESS is shown in Figure 1-3.





Figure 1-2 Existing solar array area

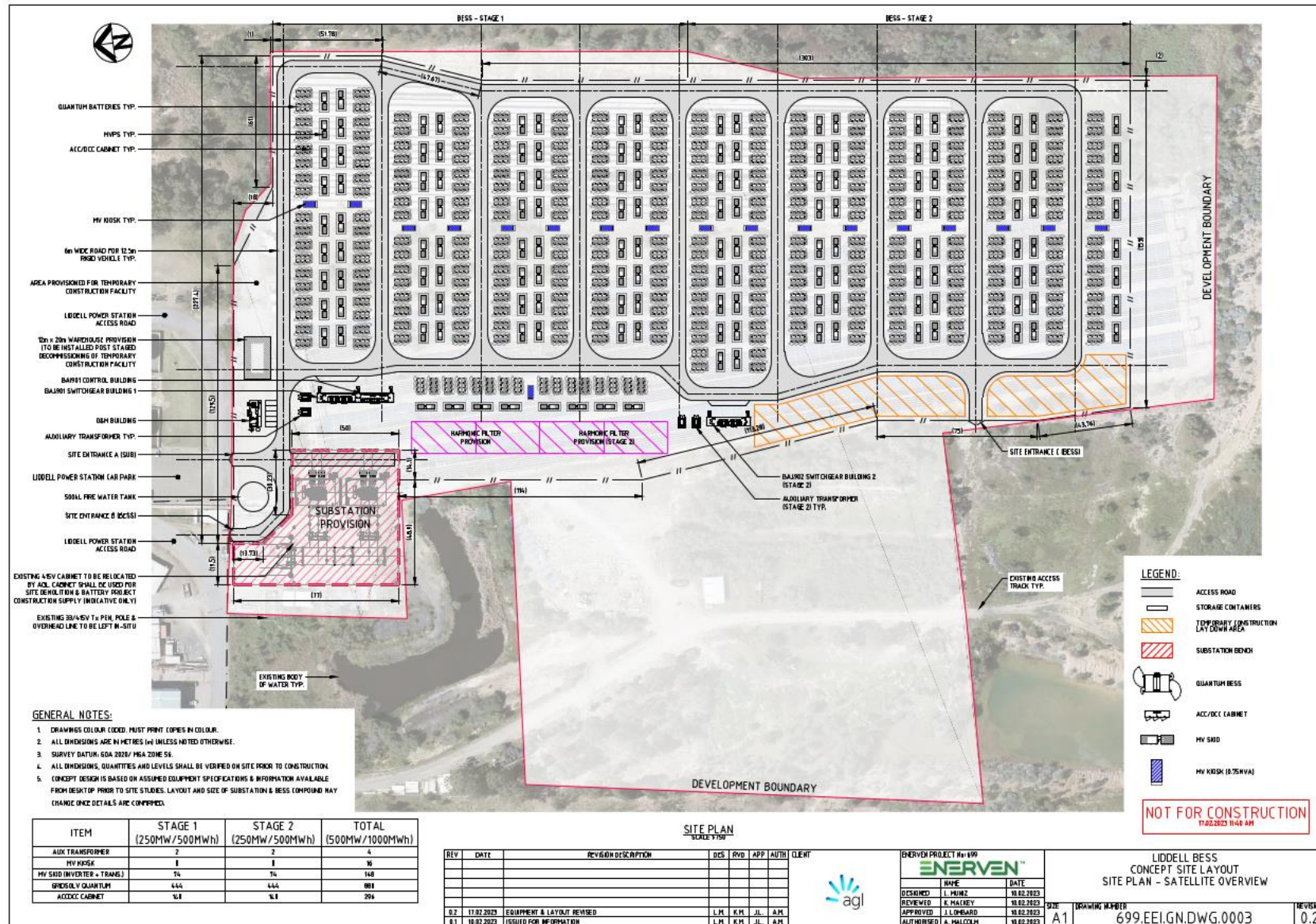


Figure 1-3 Preliminary site layout (indicative only)



Figure 1-4 Stage 1 and Stage 2 stockpile locations

1.5 Construction activities

Construction works associated with the BESS Project would be likely to involve:

- Installation and maintenance of environmental controls, including temporary and permanent water management infrastructure
- Establishment of access from the Liddell access road
- Demolition or deconstruction of existing infrastructure as required, including the existing solar array area and former coal yard infrastructure
- Establishment of a hardstand pad and construction laydown areas, including dedicated stockpiling areas
- Cut and fill to battery compound, transformer compounds, footings and construction laydown area
- Trenching of 33kV reticulation system
- Trenching and/or overhead transmission line (OHL) installation to the existing TransGrid 330 kV substation
- Trimming of vegetation within the transmission line easement may be required to facilitate the installation of the OHL and provide overhead access
- Structural works to support enclosures, inverters, transformers, buildings and transformer compounds
- Delivery, installation and electrical fit-out
- Testing and commissioning activities
- Removal of construction equipment and reinstatement of construction areas.

Potential noise risks are outlined in Section 5.4.

1.6 Relevant approvals and conditions

1.6.1 Project approvals

Liddell power station was commissioned in 1971 and formed part of AGLM's integrated power generation complex. This complex also incorporates Bayswater power station (commissioned in 1985) and a range of supporting water management, coal supply, power supply and control system infrastructure.

Bayswater and Liddell power stations are regulated under several planning approvals. Most development at the site pre-dates current planning requirements enforced through the EP&A Act, however, alterations and additions after 1 September 1980 were subject to the provisions of the Act.

Development consent (SSD-8889679) was granted for the LBBAWP on 8 March 2022, which includes the voluntary surrender and consolidation of various existing development approvals into SSD-8889679.

In accordance with Section 55 of the *Protection of the Environment Operations Act 1997* (POEO Act), Liddell operated under Environment Protection Licence (EPL) 2122, which is still active for the site even though power generation operations have ceased for the power station. Bayswater is operated under EPL 779.

1.6.2 Development consent conditions

In accordance with SSD-8889679 development consent condition C1, an Environmental Management Strategy (EMS) has been prepared for the BESS Project to provide a strategic framework for the environmental management of the development. A range of subplans has been developed to support the EMS and address development consent condition C1(e)(i).

This CNMP has been developed to manage potential construction and decommissioning impacts arising from the BESS Project. The relevant conditions are outlined below in Table 1.

Table 1 Development consent conditions – noise management

Condition	Requirement	Reference
C1	<p>Prior to commencing construction, the Applicant must prepare an Environmental Management Strategy for the development to the satisfaction of the Secretary. This strategy must:</p> <p>(e) include:</p> <p>(i) the following subplans:</p> <ul style="list-style-type: none"> • soil, stormwater, water quality, flood and spoil management; • construction and decommissioning noise, including an out-of-hours works protocol; • air quality management; • contamination, including an unexpected finds protocol • waste management; and • traffic. 	This management plan
A12	<p>The Applicant must ensure that all plant and equipment used on site, or in connection with the development, is:</p> <p>(a) maintained in a proper and efficient condition; and</p> <p>(b) operated in a proper and efficient manner.</p>	Section 7.0, specifically management measures N3
B12	<p>The Applicant must:</p> <p>(a) ensure that noise generated by any construction is managed in accordance with the Interim Construction Noise Guideline (DECC, 2009), or its latest version; and</p> <p>(b) take all reasonable and feasible steps to minimise noise from construction and operational activities.</p>	Relevant guidelines are detailed in Section 2.1 and management measures are outlined in Section 7.0, specifically management measure N1
B13	<p>All construction work at the premises must be conducted between 7 am and 6 pm Monday to Friday and between 8 am and 1 pm Saturdays and at no time on Sundays and public holidays, unless an out of hours protocol is included within an approved Construction Environment Management Plan or the Planning Secretary agrees otherwise.</p>	<p>Section 7.0, specifically management measure N2</p> <p>Section 7.1</p>
B14	<p>The following activities may be carried out outside the recommended construction hours:</p> <p>(a) construction that causes LAeq(15minute) noise levels that are:</p> <p>(i) no more than 5 dB above Rating Background Level at any residence in accordance with the Interim Construction Noise Guideline (DECC, 2009); and</p> <p>(ii) no more than the Noise Management Levels specified in Table 3 of the Interim Construction Noise Guideline (DECC, 2009) at other sensitive land uses;</p> <p>or</p> <p>(c) for the delivery of materials required by the police or other authorities for safety reasons; or</p> <p>(d) where it is required in an emergency to avoid the loss of lives, property and/or to prevent environmental harm.</p>	Section 7.1

1.7 Scope, purpose and objectives

This CNMP has been developed in accordance with SSD-8889679 development consent condition C1 and to address relevant requirements associated with:

- SSD-8889679 development consent conditions
- EIS management measures which were amended in the Response to Submissions (RTS) (Jacobs 2021)
- Bayswater Water and Other Associated Operational Works (WOAOW) management measures
- AGL plans and procedures.

The purpose of this CNMP is to:

- Summarise potential construction and decommissioning noise impacts of the BESS Project as assessed in the EIS (Jacobs 2021)
- Identify environmental management measures to be implemented to minimise noise impacts.

The objective of this CNMP is to mitigate and manage potential construction and decommissioning noise impacts on the local environment as a result of the BESS Project and to maintain compliance with SDD-8889679. Operational noise management is not required.

All works undertaken by the Project Contractor must comply with the environmental management measures outlined in Section 7.0 of this plan.

1.8 Related reports and plans

There are environmental assessments, management plans and monitoring programs for existing and proposed operations within the AGLM landholdings. The following documents are considered related and may need to be read in conjunction with this CNMP:

- Liddell Decoupling Works Construction Noise Management Plan (Jacobs 2022) (Stage 1 LBBAWP).

2.0 Legislation and guidelines

2.1 Standards and guidelines

The main standards and guidelines relevant to this CNMP include:

- *Interim Construction Noise Guideline* (ICNG) (Department of Environment, Climate Change and Water 2009)
- NSW Road Noise Policy (Department of Environment, Climate Change and Water 2011)
- Noise Policy for Industry (Environment Protection Authority 2017)

2.1.1 Interim Construction Noise Guideline

The ICNG is the principal guidance for the assessment and management of construction noise in NSW. The main objective of the ICNG is to identify feasible and reasonable work practices to minimise construction noise impacts.

2.1.2 NSW Road Noise Policy

The NSW Road Noise Policy aims to identify the strategies that address the issue of road traffic noise from existing roads, new road projects, road redevelopment projects and new traffic-generating developments and defines criteria to be used in assessing the impact of this noise.

2.1.3 Noise Policy for Industry

The aim of the Noise Policy for Industry (NPI) is to provide noise levels that are used to assess environmental noise impacts from industrial premises and industrial development proposals. The Policy promotes the use of best-practice noise mitigation measures that are feasible and reasonable where potential impacts have been identified.

3.0 Environmental impact assessment

A Noise and Vibration Assessment was prepared by Jacobs (2021) in accordance with the SEARs issued for the LBBAWP and to support the EIS. The key purpose of the assessment was to identify noise sensitive receivers and background noise levels and predict noise levels that may be generated as result of the LBBAWP.

The WOAOW project was cumulatively assessed as part of the Noise and Vibration Assessment, as there is some uncertainty around the scheduling of construction programs for both projects, and an overlap may be likely. The construction stage from the WOAOW project with the probable highest noise emissions was assessed together with each of the LBBAWP construction stages to determine conservative worst-case cumulative noise levels at sensitive receivers.

The Noise and Vibration Assessment also recommended suitable mitigation and management measures which have been included in this CNMP in Section 7.0, where relevant to the BESS.

The EIS was placed on public exhibition for a period of 28 days, between 15 April 2021 to 12 May 2021. Following this, a RTS report (Jacobs 2021) was prepared to consider and respond to any submissions received during the exhibition period, which resulted in changes to some of the management measures from the EIS. Therefore, the management measures in the RTS report supersede those in the EIS, where changes have been made.

4.0 Roles and responsibilities

Section 4.3 of the EMS outlines key roles and responsibilities for both AGLM and the Project Contractor working on the BESS Project.

5.0 Environmental setting and potential impacts

5.1 Background noise environment

The noise environment surrounding the Project is dominated by industrial activity including mining and power generation, with large-scale infrastructure being the predominant surrounding land use.

The New England Highway runs between Liddell and Bayswater Power Stations, with access from the highway provided by a dedicated road network designed to service the power stations. The Great Northern Railway runs to the east of the AGLM landholding.

Social infrastructure and sensitive receivers are limited in the locality of the Project (refer to Section 5.3).

5.2 Background noise levels

The Noise and Vibration Assessment (Jacobs 2021) prepared for the EIS, adopted background noise levels from measurements undertaken by Jacobs in the area in June 2018, for the Bayswater Turbine Upgrade Project for AGLM. These measured levels are considered indicative representations of the Rating Background Levels (RBLs) in the surrounding area.

The NPI (EPA, 2017) provides minimum assumed RBLs, which are to be applied where measured RBLs are below 35 dB(A) for daytime periods and 30 dB(A) during evening and night-time periods.

Table 2 presents the measured RBLs for each residential receiver as well as the NPI's minimum RBLs, where required, which are (presented in brackets).

Table 2 Adopted rated background levels

Receiver	Measured noise level (2018) (L _{A90} dB(A))		
	Day (7am to 6pm)	Evening (6pm to 10pm)	Night (10pm to 7am)
RR01	37	36	36
RR02	37	36	36

Receiver	Measured noise level (2018) (L _{A90} dB(A))		
	Day (7am to 6pm)	Evening (6pm to 10pm)	Night (10pm to 7am)
RR03	37	36	36
RR04	23 (35)	26 (30)	28 (30)
RR05	23 (35)	26 (30)	28 (30)
RR06	23 (35)	26 (30)	28 (30)
RR07	23 (35)	26 (30)	28 (30)
RR08	23 (35)	26 (30)	28 (30)
RR09	23 (35)	26 (30)	28 (30)
RR10	23 (35)	26 (30)	28 (30)
RR11	23 (35)	26 (30)	28 (30)
RR12	37	36	36
RR13	37	36	36
RR14	37	36	36
RR15	23 (35)	26 (30)	28 (30)

5.3 Sensitive receivers

There are 22 receivers identified within the vicinity of the LBBAWP, including 15 residential receivers, one passive recreational area and six industrial premises.

The locations of the fifteen residential receivers are detailed below in Table 3 based on the distance to the development site of the whole LBBAWP. The nearest residential receiver to the LBBAWP is also the closest receiver to the BESS footprint, being R12 about 3.5 kilometres northeast.

All receivers are shown in Figure 5-1.

Table 3 Nearby representative sensitive receivers (UTM MGA Zone 56)

Receiver ID	X co-ordinate	Y co-ordinate	Approximate distance and direction to the LBBAWP (m)
RR01	306177	6421554	6300 north
RR02	316337	6419837	7800 north east
RR03	318041	6411978	3000 east
RR04	320245	6405818	8000 south east
RR05	316832	6403296	8800 south east
RR06	313729	6403903	8100 south east
RR07	307735	6402915	5300 south
RR08	302782	6404017	1100 south
RR09	300275	6406687	1000 south west
RR10	300383	6407252	1100 south west
RR11	295636	6412963	6800 west
RR12	311493	6418878	2700 north east
RR13	309979	6420335	3500 north east
RR14	309141	6421575	4700 north

Receiver ID	X co-ordinate	Y co-ordinate	Approximate distance and direction to the LBBAWP (m)
RR15	302022	6404606	700 south

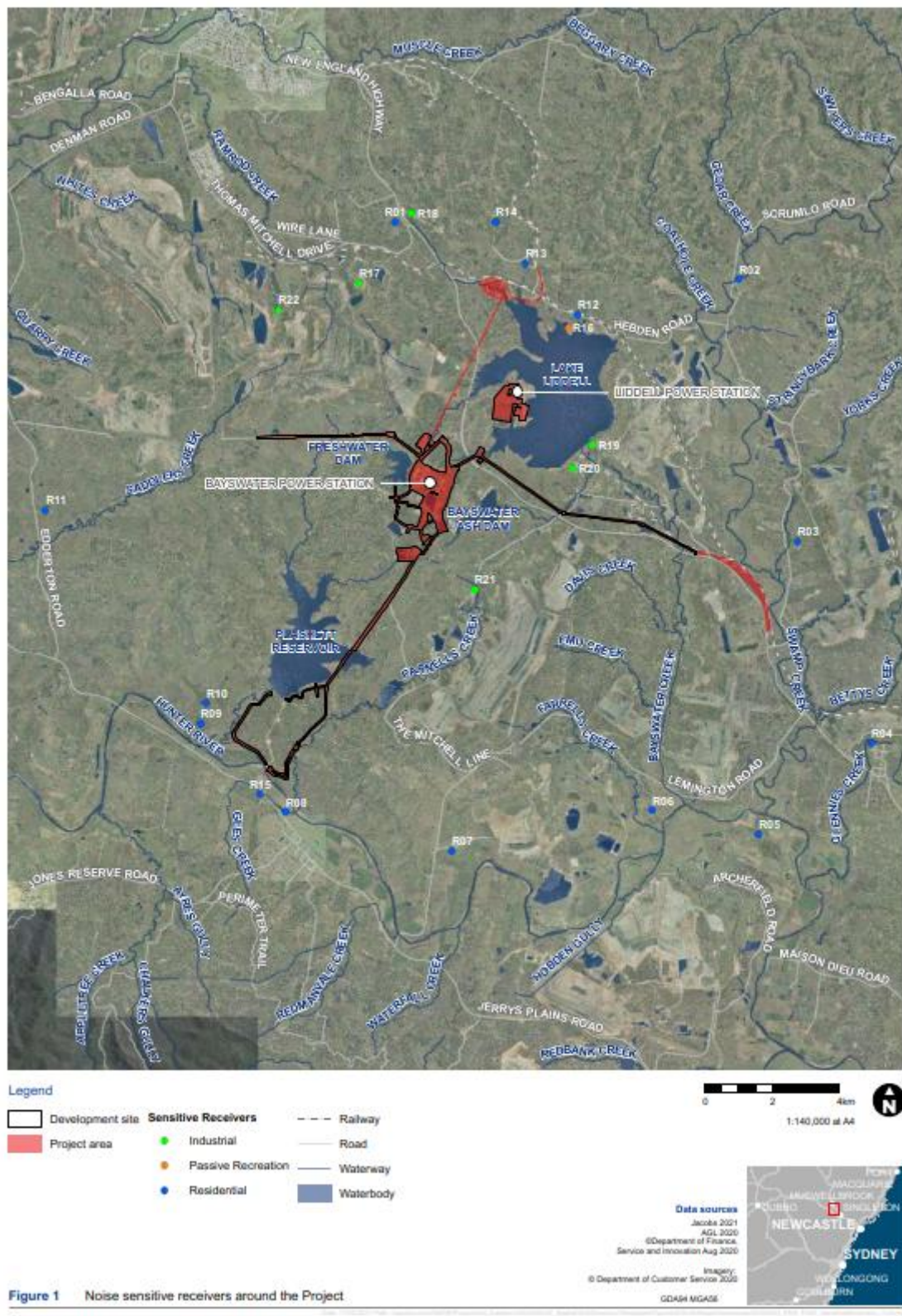


Figure 5-1 Noise sensitive receivers surrounding the LBBWP (source: Jacobs 2022)

5.4 Potential impacts

The key activities with the potential to generate noise impacts during the construction and decommissioning of the BESS Project include:

- Construction works requiring noisy plant and equipment, specifically:
 - Concrete works associated with concrete saws, pneumatic hammers and concrete vibrators
 - Structural works associated with air track drills and bulldozers
 - Platforming and road works associated with vibratory rollers, pavement profilers and concrete vibrators
- Operation of construction compounds and other ancillary facilities
- Construction vehicle movements
- Operation of inverter and battery units.

The Noise and Vibration Assessment (Jacobs 2021) found that noise levels were not predicted to exceed standard hours, evening hours or night-time NMLs, road traffic criteria and sleep disturbance criteria during any stage of construction. The assessment also predicted that the operation of the BESS would result in negligible noise levels at all residential and non-residential receivers.

6.0 Noise management objectives

6.1 Noise management levels

Construction is considered to have the potential to cause a noise impact if the predicted noise exceeds noise management levels (NMLs). Table 4 lists ICNG guidance for establishing construction NMLs at residential receivers.

Table 4 ICNG guidance for establishing construction NMLs at residential receivers

Time of day	Management level $L_{Aeq(15min)}$
Recommended standard hours: <ul style="list-style-type: none"> • Monday to Friday 7am to 6pm • Saturday 8am to 1pm • No work on Sundays or public holidays 	Noise affected RBL + 10 dB(A)
	Highly noise affected 75 dB(A)
Outside recommended standard hours: <ul style="list-style-type: none"> • All other times including public holidays 	Noise affected RBL + 5 dB(A)

Considering the adopted RBLs presented in Table 4, NMLs for the identified surrounding residential receivers are presented in Table 5. The ICNG also provides construction NMLs for non-residential land uses. Table 6 presents the NMLs for passive recreation areas and industrial facilities based on Table 3 of the ICNG.

Construction noise levels assessment in the EIS are presented in Appendix A. Ongoing monitoring will be undertaken to verify noise levels associated with construction and decommissioning works undertaken for the Project (refer to Section 8.1).

Table 5 Noise management levels for residential receivers

Receiver ID	Noise management level $L_{eq\ 15\ min\ dB(A)}$			
	Day (standard hours)	Day (non-standard hours)	Evening	Night
RR01	47	42	41	41
RR02	47	42	41	41
RR03	47	42	41	41

Receiver ID	Noise management level L_{eq} 15 min dB(A)			
	Day (standard hours)	Day (non-standard hours)	Evening	Night
RR04	45	40	35	35
RR05	45	40	35	35
RR06	45	40	35	35
RR07	45	40	35	35
RR08	45	40	35	35
RR09	45	40	35	35
RR10	45	40	35	35
RR11	45	28	31	33
RR12	47	42	41	41
RR13	47	42	41	41
RR14	47	42	41	41
RR15	45	28	31	33

Table 6 Noise management levels for non-residential receivers

None-residential receiver type	Noise Management Level L_{Aeq} (15 min) (applies when properties are in use)
Passive recreation areas (characterised by contemplative activities that generate little noise and where benefits are compromised by external noise intrusion, for example, reading, meditation)	External noise level – 60 dB(A)
Industrial	External noise level – 75 dB(A)

6.2 Sleep disturbance

A sleep disturbance screening criteria of 41 and 40 dB(A) has been elected for the northern and southern residential receiver groups, respectively. This criterion has been adopted by the Project for all construction, decommissioning and operational phases and is not predicted to be exceeded during construction.

6.3 Construction traffic

In accordance with the NSW Road Noise Policy, increases to the total traffic noise level as a result of the development are to be limited to 2 dB(A) for existing residences and other sensitive land uses affected by additional traffic on existing roads generated by land-use developments.

The Noise and Vibration Assessment (Jacobs, 2021) prepared for the EIS determined that worst-case estimations of the construction phase would not exceed this criterion, increasing noise levels by approximately 0.4 dB(A) during standard hours and 0.8dB(A) during night-time works.

6.4 Maximum noise levels for plant and equipment

All plant and equipment used throughout the construction and decommissioning of the BESS should have an operating Sound Power Level (SWL) less than or equal to those in Table 7.

6.4.1 Correction Factors

In accordance with the ICNG, the following plant and activities are proven to have annoying characteristics, and therefore the NML will decrease by 5dB(A) when assessing potential noise impacts:

- Use of 'beeper' style reversing or movement alarms, particularly at night-time

- Use of power saws, such as those used for cutting timber, rail lines, masonry, road pavement or steelwork
- Grinding metal, concrete or masonry
- Rock drilling
- Line drilling
- Vibratory rolling
- Rail tamping and regulating
- Bitumen milling or profiling
- Jackhammering, rock hammering or rock breaking
- Impact piling.

Table 7 Noise emissions

Plant / equipment	Total SWL dB(A)	Plant / equipment	Total SWL dB(A)
Truck (medium)	106	Grader	113
Road truck	111	Vibratory roller	109
Scissor lift	98	Concrete truck	109
Light vehicles	94	Water cart	107
Franna crane (20t)	98	Concrete pump	109
Excavator (tracked)	110	Concrete vibrator	113
Excavator (tracked)	116	Backhoe	114
Bulldozer D9	116	Asphalt truck	103
Concrete saw	118	Mobile crane	113
Vacuum truck	109	Welding equipment	105
Front end loader	112	Air track drill	124
Dump truck	111	Rigid trucks	106
Generator	103	Compressor	109
Pneumatic hammer	116		

7.0 Environmental management measures

The management measures provided in Table 8 and Table 9 will be implemented to manage noise levels during construction and decommissioning of the BESS Project. These include standard measures as outlined in Section 6 of the ICNG.

Table 8 Environmental management measures – construction and decommissioning noise (EIS / RTS / development consent)

Reference	Environmental management measures	Responsibility	Timing
N1	<p>The Construction Environmental Management Plan (CEMP) will identify project construction activities with the potential to have noise impacts and the controls required to avoid, minimise and mitigate these impacts.</p> <p>The standard techniques for controlling noise impacts during construction are presented in</p>	Project Contractor	Construction

Reference	Environmental management measures	Responsibility	Timing
	the Interim Construction Noise Guideline (ICNG). During construction, relevant standard measures outlined in Section 6 of the ICNG will be implemented.		
N2	Working hours will adhere to Development Consent Conditions B13 and B14	Project Contractor	Construction Decommissioning
N3	All plant and equipment used on site or in connection with the BESS Project will be maintained and operated in a proper and efficient condition.	Project Contractor	Pre-construction Construction Decommissioning

Table 9 Environmental management measures – construction and decommissioning noise (other)

Reference	Environmental management measures	Responsibility	Timing
N4	Quieter and less vibration-emitting construction methods will be used, where reasonable and feasible	Project Contractor	Construction Decommissioning
N5	Only necessary equipment will be on-site, and all equipment will be turned off when not in use	Project Contractor	Construction Decommissioning
N6	Routine monitoring will be completed to evaluate construction noise levels and evaluate whether the mitigation measures in place are adequate or require revision. Attended and unattended monitoring to be undertaken as per Section 8 of this document.	Project Contractor	Construction Decommissioning
N7	Vehicle movements, including deliveries outside standard hours, will be minimised and avoided where reasonable and feasible	Project Contractor	Construction
N8	All plant and equipment will be well maintained, fitted with silencing devices and operated in an efficient manner	Project Contractor	Construction Decommissioning
N9	Only the necessary size and powered equipment will be used for tasks	Project Contractor	Construction Decommissioning
N10	Training will be implemented to induct staff on noise sensitivities	Project Contractor	Pre-construction Construction Decommissioning
N11	The application of less intrusive alternatives to reverse beepers, such as 'squawker' or 'broadband' alarms, will be considered	Project Contractor	Construction Decommissioning
N12	Simultaneous operation of two or more noisy plant close to receivers will be avoided, where reasonable and feasible. The offset distance between noisy plant and sensitive receivers will be maximised	Project Contractor	Construction Decommissioning
N13	Traffic flow, parking and loading/unloading areas will be planned to minimise reversing movements	Project Contractor	Construction Decommissioning
N14	Noisy activities will be concentrated at one location and moved to another as quickly as possible	Project Contractor	Construction Decommissioning
N15	Works will be scheduled to occur at different times of the day to prevent multiple noisy	Project Contractor	Construction Decommissioning

	activities from taking place at the same time, where reasonable and feasible		
N16	Works will be scheduled to take place at different locations on site to prevent noisy activities from taking place near one another, where reasonable and feasible, to limit the amplification of noise	Project Contractor	Pre-construction Construction Decommissioning

7.1 Out of hours work protocol

7.1.1 Construction hours

Most construction work will be undertaken during standard construction hours, which are defined as:

- 7:00 am to 6:00 pm, Monday to Friday
- 8:00 am to 1:00 pm on Saturday
- At no time on Sundays or Public Holidays.

However, the following activities may be carried out outside the recommended construction hours in accordance with Development Consent Conditions B14:

- (a) construction that causes LAeq(15minute) noise levels that are:
 - (i) no more than 5 dB above Rating Background Level at any residence in accordance with the Interim Construction Noise Guideline (DECC, 2009); and
 - (ii) no more than the Noise Management Levels specified in Table 3 of the Interim Construction Noise Guideline (DECC, 2009) at other sensitive land uses; or
- (c) for the delivery of materials required by the police or other authorities for safety reasons; or
- (d) where it is required in an emergency to avoid the loss of lives, property and/or to prevent environmental harm.

To avoid unnecessary impacts on nearby sensitive receivers, where Out of Hours Work (OOHW) occurs, it will be undertaken in accordance with this OOHW Protocol.

7.1.2 Justification of OOHW

Any work proposed to be undertaken out of standard construction hours, excluding those listed under Development Consent Condition B14, will require justification as to why the work needs to be undertaken as OOHW.

The following reasons may justify why work is required to be undertaken outside of standard construction hours, however, reasons are not limited to the below:

- Works predicted to cause noise levels that will not exceed NMLs
- Ensuring the safety of construction personnel
- Ensuring public safety
- In the event of an emergency to prevent environmental harm
- Minimising disruption to road network users.

7.1.3 OOHW application and approval

Prior to undertaking OOHW, an OOHW application will be prepared by the Project Contractor and submitted AGLM requesting approval. The OOHW application will include a description of the works planned, including timing (start/end), activities, location, plant/equipment and predicted noise levels.

Where noise levels are expected to exceed NMLs (refer to Section 6.1), a Construction Noise Impact Statement (CNIS) will be prepared and submitted with the OOHW application. The CNIS will assess any potential noise impacts from the works and recommend any additional mitigation measures which may be required.

Construction Noise Impact Statement

Where works are expected to exceed the NMLs identified in Section 6.1, a CNIS should be prepared. All OOHW must also be supported by a CNIS.

Each CNIS should:

- Detail the scope of works covered by the CNIS
- Detail the nearest noise and vibration-sensitive receivers
- Provide justification for any OOHW, if required
- Provide the noise objectives and criteria
- Detail the predicted noise impacts
- Provide appropriate noise and vibration management measures and monitoring requirements.

Application of mitigation measures

When the OOHW application has been reviewed and approved by AGLM, any specific conditions that relate to the OOHW are to be:

- Actioned for implementation (such as any additional notification to the community)
- Tool-boxed to relevant workforce and site personnel before each shift to introduce/reinforce works restrictions, management measures and expected workforce behaviour
- Implemented during works and monitored by the Project Contractor.

7.2 Community notifications

Community notifications will be used to inform potentially impacted receivers of potential noise impacts. Impacted receivers will be notified at least five days prior to the commencement of any works associated with the activity that may exceed NMLs during standard construction hours or OOHW and/or prior to any OOHW commencing. This excludes activities specified in Development Consent Conditions B14. The notification will be via letter-box drop and will provide details of the:

- Proposed work
- Construction period and construction hours
- Contact information for proposal management staff
- Complaint and incident reporting
- How to obtain further information.

8.0 Compliance and reporting

8.1 Monitoring and reporting

Noise monitoring will be undertaken throughout construction and decommissioning of the BESS Project. There will be no operational monitoring associated with the BESS Project.

Instances where attended noise monitoring may be required include:

- At the commencement of activities to confirm that noise levels are consistent with those predicted and to confirm the effectiveness of mitigation
- In response to a complaint received regarding construction noise (where determined appropriate)
- Where there is a change in methodology that may result in an increase in noise levels
- Ongoing, case-by-case spot checks for noise-intensive plant and equipment.

Instances where attended or unattended noise monitoring may be required, depending on the duration of monitoring required:

- As directed by the EPA
- As required by a CNIS.

8.1.1 Verification of predicted noise levels

Routine attended noise monitoring will be undertaken at representative stages throughout construction and decommissioning to verify noise levels associated with construction and decommissioning activities.

Where monitoring has found noise impacts to be above the relevant criteria, the following actions would be undertaken:

- Stop any work that has been identified as the cause of the criteria exceedance
- Determine if any non-project noise sources may be causing the criteria exceedance
- Determine if a particular piece of equipment is the cause of the criteria exceedance and if any options exist to mitigate or replace the equipment
- Adopt any other mitigation or management measures where reasonable and feasible to reduce noise
- Adopt any lessons learnt into future modelling, mitigation actions and training.

8.1.2 Residential noise monitoring

Monitoring should be conducted in accordance with the procedures outlined in Australian Standard *AS 1055 Acoustics – Description and measurement of environmental noise* and in accordance with methods outlined in the Noise Policy for Industry.

The following should be followed when conducting residential noise monitoring:

- A field calibration should be conducted before and after measurements
- The sound level meters must be set to an A-weighting and Fast
- The sound level meters sample period should be set to 15 minutes
- The following descriptors should be measured as a minimum: LAeq, LMax, and LA90
- Measurements should be conducted a minimum of three 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.

Attended noise monitoring will be undertaken in 15-minute sampling intervals, repeated until a representative 15-minute period, free of extraneous noise has been obtained.

Should unattended noise monitoring be required in response to a CNIS or an EPA direction, this will be performed to record at 15-minute sampling intervals.

8.1.3 Reporting

The Project Contractor will establish and maintain a system of records that provides full documentation of all noise monitoring results, complaint handling and responses to non-compliances.

Details that should be included in the records include:

- Name of person undertaking the measurement
- Date and time of measurement, length of measurement and any measurement time intervals
- Type and model number of monitoring instrumentation
- Results of field calibration checks
- Measurement location details and number of measurements at each location

- Weather conditions during measurements
- Operation and activities of the noise sources under investigation
- Estimated contribution of the Project's activitiesNoise due to other extraneous and environmental sources (e.g. traffic, aircraft, trains, dogs barking, insects).

8.2 Incidents and complaints

Incident management will be managed in accordance with the process outlined in Section 4.5 of the EMS.

Complaints and enquiries will be managed in accordance with the process outlined in Section 5.3 of the EMS.

8.3 Document review and update

It is a requirement of the EMS that all associated plans, studies and strategies are reviewed and updated within three months of the following events:

- The submission of an environmental incident report
- The submission of an audit report
- The approval of any modification to the conditions of the development consent
- A direction of the Secretary.

Appendix A

Construction noise levels

Appendix A Construction noise levels

Table 10 Cumulative construction noise levels at residential receivers during battery works

Receiver	RR01	RR02	RR03	RR04	RR05	RR06	RR7	RR08	RR09	RR10	RR11	RR12	RR13	RR14	RR15
Day (standard hours) NML	47	47	47	33	33	33	33	33	33	33	33	47	47	47	33
Day (outside standard hours) NML	42	42	42	28	28	28	28	28	28	28	28	42	42	42	28
Evening NML	41	41	41	31	31	31	31	31	31	31	31	41	41	41	31
Night NML	41	41	41	33	33	33	33	33	33	33	33	41	41	41	33
Stage	Predicted noise level L_{Aeq} (15 mins) at receiver														
All stages	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20

Table 11 Cumulative construction noise levels at non-residential receivers during battery works

Receiver	RR16	RR17	RR18	RR19	RR20	RR21	RR22
Day (standard hours) NML	60	75	75	75	75	75	75
Stage	Predicted noise level L_{Aeq} (15 mins) at receiver						
Site establishment	26	<20	<20	<20	32	34	<20
Demolition and deconstruction of existing equipment	31	<20	<20	<20	34	34	<20
Establishment of hardstand pad and construction laydown areas	30	<20	<20	<20	34	34	<20
Cut and fill to battery compound	31	<20	<20	<20	34	34	<20
Structural works to support battery enclosures, inverters, transformers, building and transformer compounds	33	<20	<20	<20	36	34	<20
Delivery, installation and electrical fit-out of the battery	27	<20	<20	<20	33	34	<20