

Liddell Decoupling Works - Construction Noise Management Plan

Revision no: Rev B

AGL Macquarie Pty Limited

Liddell Battery and Bayswater Ancillary Works Project
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Liddell Decoupling Works - Construction Noise Management Plan

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Acronyms and abbreviations

Acronym or abbreviation	Description
BAW	Bayswater Ancillary Works
CEMP	Construction Environmental Management Plan
CNIS	Construction Noise Impact Statement
DECC	Department of Environment, Climate Change and Water
Decibel (db)	A measure of sound level. The decibel is a logarithmic way of describing a ratio. The ratio may be power, sound pressure, voltage, intensity or other parameters. In the case of sound pressure, it is equivalent to 10 times the logarithm (to base 10) of the ratio of a given sound pressure squared to a reference sound pressure squared.
DPE	Department of Planning and Environment
EMS	Environmental Management Strategy
EPA	Environment Protection Authority
GWh	Gigawatt hours
ICNG	Interim Construction Noise Guideline
$L_{Aeq(15min)}$	The A-weighted equivalent continuous (energy average) A-weighted sound pressure level of the construction works under consideration over a 15-minute period and excludes other noise sources such as from industry, road, rail and the community
L_{Amax}	The A-weighted maximum noise level only from the construction works under consideration, measured using the fast time weighting on a sound level meter
MW	Megawatt
NMLs	Noise Management Levels
NMP	Noise Management Plan
NVA	Noise and Vibration Assessment
OOHW	Out of Hours Work

1. Introduction

1.1 Context

This Noise Management Plan (NMP) has been developed to address Development Consent Condition C1(e)(i) issued for the Project by the Planning Secretary of the NSW Department of Planning and Environment (DPE). This condition requires a subplan to manage the environmental impacts from construction and decommissioning noise. All relevant conditions are outlined below in Table 1-1.

Table 1-1. Conditions of Approval

Condition	Requirement	NMP Reference
C1	Prior to commencing construction, the Applicant must prepare an Environmental Management Strategy for the development to the satisfaction of the Secretary. This strategy must include a subplan on construction and decommissioning noise, including an out-of-hours protocol.	N/A
A8	Specifies that notice of the commencement date must be given to the Department at least two weeks prior to the following activities: (a) physical commencement of the development; (b) pre-construction activities; (c) construction of the battery energy storage system; (d) construction of the decoupling works; (e) construction of the Bayswater ancillary works; and (f) decommissioning.	N/A
B12	Specifies that noise generated by any construction is managed in accordance with the Interim Construction Noise Guideline (DECC, 2009), or its latest version; and that all reasonable and feasible steps to minimise noise from construction and operational activities must be taken.	Sections 3.1, 5.1 and 6
B13	Specifies that 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.	Sections 3.4 and 5.3
B14	Specifies the activities which may be carried out outside of the recommended construction hours, including decoupling works required to be completed during station outages.	Section and 5.3

1.2 Purpose and Scope

The purpose of this NMP is to provide details of the mitigation and management measures proposed to address potential noise impacts resulting from the Project. All works undertaken by the Project Contractor must comply with the mitigation measures outlined in this document. This NMP has been developed to address the construction and decommissioning activities specifically occurring in relation to Decoupling Works, in line with the conditions of approval provided by the NSW DPE. The objective of this NMP is to ensure that the development meets its regulatory requirements.

1.3 Project Description

This NMP addresses only the Decoupling Works stage of the project, which will be progressed first in a staged approach to the project. The Decoupling Works are required to be completed first to provide an alternative network connection arrangement for the Liddell 33 kV switching station, which provides electricity to infrastructure required for the ongoing operation of the Bayswater Power Station (**Bayswater**). The Decoupling Works will allow for the shutdown and demolition of the Liddell Power Station, without disrupting operations at Bayswater.

1.3.1 Project Overview

AGLM are progressing plans to facilitate the efficient, safe and reliable continuation of electricity generating works from Bayswater and Liddell. The Project would consist of the following:

Decoupling works: Alternative network connection arrangements for the Liddell 33 Kilovolt (kV) switching station that provides electricity to infrastructure required for the ongoing operation of Bayswater and associated ancillary infrastructure and potential third-party industrial energy users

- **The Battery:** A grid connected Battery Energy Storage System with capacity of up to 500 megawatt (MW) and 2 gigawatt hours (GWh)
- **Decoupling works:** Alternative network connection arrangements for the Liddell 33 Kilovolt (kV) switching station that provides electricity to infrastructure required for the ongoing operation of Bayswater and associated ancillary infrastructure and potential third-party industrial energy users
- **Bayswater Ancillary Works (BAW):** Works associated with Bayswater 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:** A modern consolidated consent for the continued operation of Bayswater through the voluntary surrender and consolidation into this application of various existing development approvals required for the ongoing operation of AGLM assets.

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1.3.2 Decoupling works

The key construction and decommissioning elements for the decoupling works of the Project addressed in this NMP include:

- Establishment of new 330 kV / 33 kV transformer compounds adjacent to the Liddell switchyard. The 33 kV / 330 kV transformers are expected to be around 7 metres in height
- Installation of new switch/control room building/s, and equipment near the existing Liddell transition point inclusive of auxiliary supplies
- Installation of new 33 kV cables to connect the 330 kV / 33 kV station transformers to the existing 730 and 731 33 kV feeders to the new 33 kV switch room
- Connection to the Liddell switchyard.

The following works may also be required within the Liddell switchyard:

- 330 kV tie ins
- Removal of existing Liddell station transformer 330 kV landing spans
- Earth grid tie-in to the earth grid of the 330 kV /33 kV transformer compounds
- Replacement of protection panel equipment, installation and proofing of new rerouted protection and control cables
- Commissioning works.

2. Regulatory Requirements

2.1 Relevant Legislation, Guidelines and Conditions

All legislation relevant to the NMP will be included in the Environmental Management Strategy (EMS). The main guidelines, standards and policies relevant to this NMP include:

- *Interim Construction Noise Guideline* (Department of Environment, Climate Change and Water, 2009) (ICNG)

- *NSW Road Noise* (Department of Environment, Climate Change and Water, 2011)

The Minister's Conditions of Approval for the Project, relevant to the NMP, are listed in Table 1-1.

2.2 Other Requirements Relevant to the Development of this Plan

Additional environmental requirements established in the Environmental Impact Statement have been detailed in Table 2-1.

Table 2-1. Environmental management measures for noise impacts.

Reference	Environmental management measures	Timing
NV1	The CEMP would identify project construction activities with the potential to have noise impacts and the controls required to avoid, minimise and mitigate these impacts. The standard techniques for controlling noise impacts during construction are presented in the ICNG. During construction, relevant standard measures as outlined in Section 6 of the ICNG will be implemented.	Construction

3. Noise Objectives and Impacts

3.1 Construction Noise Management Levels

The ICNG was used to determine construction Noise Management Levels (NMLs) for the Project which are to act as noise criteria for the construction and decommissioning phase of works, displayed in Table 3-1 and Table 3-2. The undertaken Noise and Vibration Assessment (NVA) found that noise levels were not predicted to exceed standard hours, evening hours, or night-time NMLs at any stage. This assessment will be verified with ongoing monitoring as per Section 6, reviewed in comparison to the elected construction noise criteria.

Table 3-1: Construction NMLs for residential receivers

Receiver	NML $L_{eq\ 15\ min}$ dB(A)			
	Day (standard hours)	Day (non-standard hours)	Evening	Night
R01	47	42	41	41
R02	47	42	41	41
R03	47	42	41	41
R04	45	40	35	35
R05	45	40	35	35
R06	45	40	35	35
R07	45	40	35	35
R08	45	40	35	35
R09	45	40	35	35
R10	45	40	35	35
R11	45	28	31	33
R12	47	42	41	41
R13	47	42	41	41
R14	47	42	41	41
R15	45	28	31	33

Table 3-2: ICNG NMLs for non-residential receivers

Non-residential receiver type	Noise management level, $L_{Aeq}(15min)$ (applies when properties are being used)
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)

3.2 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 stages and is not predicted to be exceeded during any construction stage.

3.3 Construction Traffic

In accordance with the *Road Noise Policy* increases to the total traffic noise level as a result of the development is 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 NVA 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.

3.4 Construction hours

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

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

Exceptions to conducting construction activities outside of these hours may occur for the following activities in accordance with the Infrastructure Approval Condition B14:

construction that causes $L_{Aeq}(15minute)$ noise levels that are:

- no more than 5 dB above Rating Background Level at any residence in accordance with the Interim Construction Noise Guideline (DECC, 2009); and
- 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
- Decoupling works required to be completed during station outages; or
- for the delivery of materials required by the police or other authorities for safety reasons; or
- where it is required in an emergency to avoid the loss of lives, property and/or to prevent environmental harm.

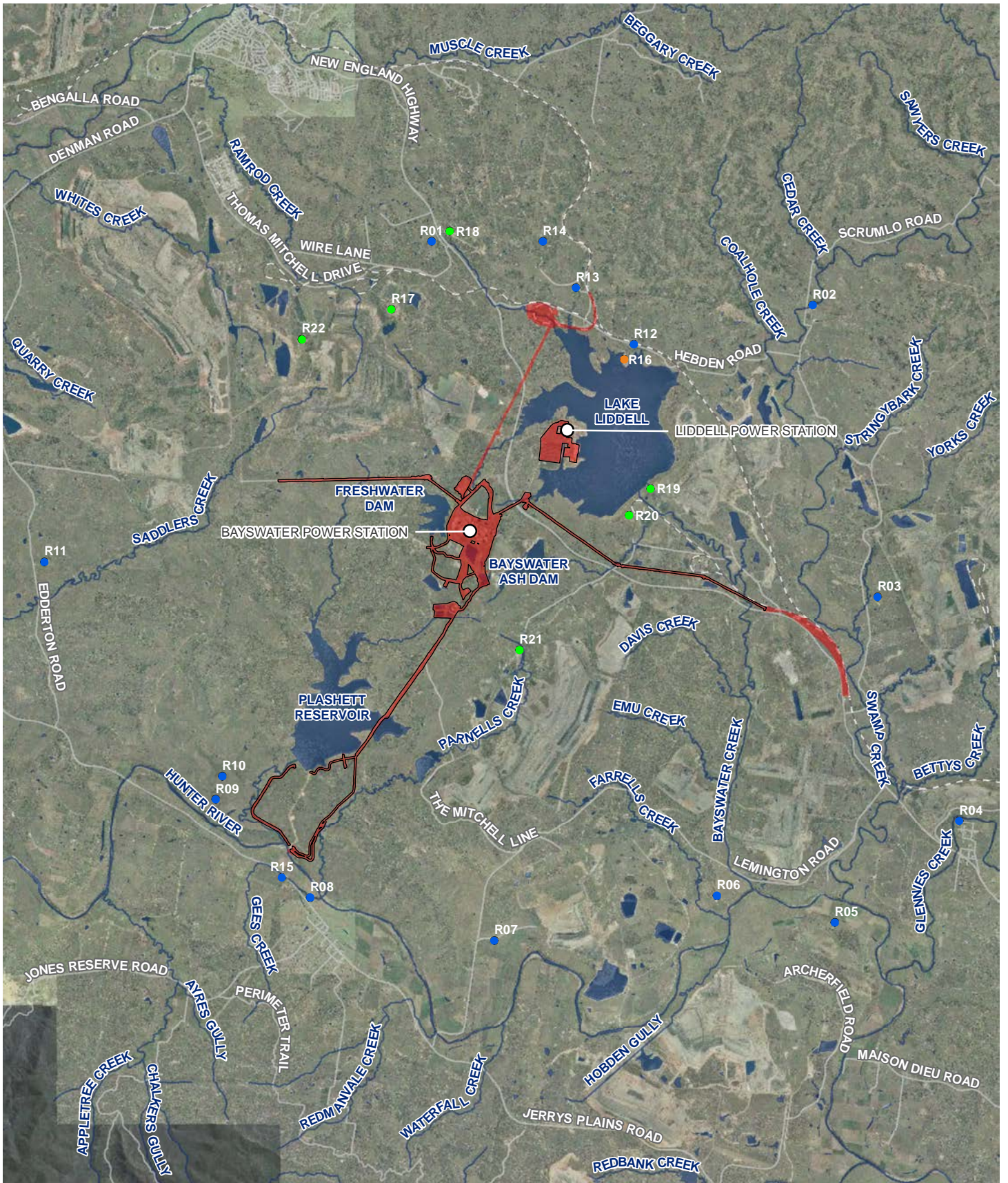
All work to be completed outside of standard hours is to follow the Out of Hours Work Protocol, see Section 5.4

4. Existing Environment

The Project site is located entirely within the AGLM landholding, with Decoupling Works generally being undertaken near the Liddell power station on previously disturbed operational lands no longer required for Liddell operations. The area is dominated by industrial activity including mining and power generation, with large-scale infrastructure being the predominant surrounding land use.

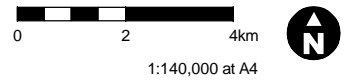
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Social infrastructure and sensitive receivers are limited in the locality of the Project, with the closest sensitive receiver to the Decoupling Work areas being the Lake Liddell Recreation Area approximately 2km to the north. The 20 sensitive receivers identified within the vicinity of the project, including 15 residential receivers, have been detailed in Figure 1.



Legend

- | | | | | | |
|--|------------------|----------------------------|--------------------|---------|-----------|
| | Development site | Sensitive Receivers | | Railway | |
| | Project area | | Industrial | | Road |
| | | | Passive Recreation | | Waterway |
| | | | Residential | | Waterbody |



Data sources

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Figure 1 Noise sensitive receivers around the Project

5. Noise Control Measures

5.1 Noise Impact

Potential noise impacts during construction may vary greatly depending on the intensity and location of construction activities, the type of equipment used, existing background noise levels, intervening terrain, and prevailing weather conditions.

Potential noise and vibration sources during construction include:

- Operation of mobile and stationary construction plant and equipment
- Operation of construction compounds and other ancillary facilities (known as fixed sources)
- Construction vehicle movements.

5.2 Mitigation and Management Measures

To ensure construction and decommissioning noise levels remain below NMLs standard mitigation measures outlined in Table are to be undertaken. These have been derived from the standard mitigation measures contained within the *Construction Noise and Vibration Guideline (RMS, 2016)*.

Table 5-1. Noise Mitigation Measures

Measure	Details	Timing	Responsibility
NMP1	Wherever possible and safe, limit works to standard hours of construction.	During construction	Principal EPC Contractor
NMP2	Select low-noise plant and equipment. Ensure equipment mufflers operate in a proper and efficient manner.	Prior to and during construction	Principal EPC Contractor
NMP3	Where possible, use quieter and less vibration emitting construction methods.	During construction	Principal EPC Contractor
NMP4	Only have necessary equipment on-site and turn off when not in use.	During construction	Principal EPC Contractor
NMP5	Complete routine monitoring to evaluate construction noise levels and evaluate whether the mitigation measures in place are adequate or require revision.	During construction	Principal EPC Contractor
NMP6	Vehicle movements, including deliveries outside standard hours, should be minimised and avoided where possible.	During construction	Principal EPC Contractor
NMP7	All plant and equipment is to be well maintained and where possible, fitted with silencing devices.	Prior to and during construction	Principal EPC Contractor
NMP8	Use only the necessary size and powered equipment for tasks.	During construction	Principal EPC Contractor
NMP9	Implement training to induct staff on noise sensitivities.	Prior to and during construction	Principal EPC Contractor
NMP10	Where possible, consider the application of less intrusive alternatives to reverse beepers such as 'squawker' or 'broadband' alarms.	During construction	Principal EPC Contractor
NMP11	Where possible, avoid the simultaneous operation of two or more noisy plant close to receivers. The offset distance between noisy plant and sensitive receivers should be maximised.	During construction	Principal EPC Contractor
NMP12	Plan traffic flow, parking and loading/unloading areas to minimise reversing movements.	Prior to and during construction	Principal EPC Contractor
NMP13	Where possible, concentrate noisy activities at one location and move to another as quickly as possible.	During construction	Principal EPC Contractor

Measure	Details	Timing	Responsibility
NMP14	Where possible, scheduling works to occur at different times of the day to prevent multiple noisy activities from taking place at the same time.	During construction	Principal EPC Contractor
NMP15	Where possible, scheduling works to take place at different locations on site to prevent noisy activities from taking place near one another which will limit the amplification of the noise.	Prior to and during construction	Principal EPC Contractor

5.3 Construction Noise Impact Statements

Where works are expected to result in a greater noise impact than those predicted in the NMP, a Construction Noise and Vibration Impact Statement (CNVIS) should be undertaken. CNVISs will be employed to inform and direct noise and vibration management for the works undertaken as part of the Project.

Each CNVIS should:

- Detail the scope of works covered by the CNVIS
- Detail the nearest noise and vibration sensitive receivers
- Provide justification for any Out of Hours Work, if required
- Provide the noise and vibration objectives and criteria
- Detail the predicted noise and vibration impacts
- Provide appropriate noise and vibration management measures and monitoring requirement

5.4 Out of Hours Work

Ordinary hours of work are described in Development Consent Condition B13 (see Table 1-1). Per these conditions, wherever possible, works should be undertaken during the standard construction hours of 7am – 6pm Monday to Friday and 8am – 1pm Saturday. However certain works may be undertaken outside of those times, so long as those works fall in line with Condition B14.

Out of hours works are allowed for Decoupling Works required to be completed during station outages. To prevent unnecessary impact on nearby sensitive receivers where this occurs an Out of Hours Work (OOHW) Protocol will apply as detailed below.

5.4.1 Justification of OOHW

All proposed OOHW, outside of those listed in Condition B14, require a full justification as why the works are required to be undertaken outside standard construction hours. There are several reasons why works can only be undertaken out of hours and these include, but are not limited to:

- Ensuring the safety of construction personnel
- Ensuring public safety
- Minimising disruption to road network users/ pedestrian during deliveries.

5.4.2 OOHW application and approval

Prior to undertaking OOHW activities an OOHW Application Form will be detailed for submission to the EPA, requesting the required hours for works to be undertaken. Where the OOHW is not listed and approved as per Condition B14 a Construction Noise Impact Statement (CNIS) is to be prepared to determine the potential noise impacts posed by the works and submitted as evidence.

5.4.3 Application of mitigation measures

When the OOHW Application has been reviewed and approved by the EPA 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 Principal Contractor.

5.4.4 OOHW community notifications

Notification to relevant impacted receivers will be provided between 5 and 14 days prior to OOHW taking place. Additional community notification may be undertaken where directed by the EPA.

5.4.5 OOHW monitoring

Attended noise monitoring is to be undertaken, at representative stages of the activity or work, to verify that noise levels resulting from OOHW are in accordance with the outcomes of the OOHW CNIS (if required). Noise and vibration monitoring should follow the procedures outlined in this NMP.

6. Training

All staff and contractors working on the construction of the Project will undergo education and training regarding noise and vibration impacts and management. Training would include:

- Toolbox Talks
- Work Inductions
- Meetings between contractors and environmental staff
- Posters and Educational Items

Training should detail:

- The contents of this NMP
- Legislation pertaining to noise and vibration impact and management
- Construction hours
- Nearby noise sensitive locations
- Complaint and Enquiry reporting
- Management measures listed in this NMP
- Specific responsibilities regarding the mitigation measures

7. Noise Monitoring

Noise monitoring will be undertaken throughout the construction and decommissioning phases of the Decoupling works, with results compared to predicted impacts and elected noise criteria. 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
- Review the work practices undertaken against the NMP
- Adopt any lessons learnt into future modelling, mitigation actions and training.

Both attended and unattended may be undertaken throughout the Project. Instances where attended noise monitoring will be required include:

- At the commencement of activities where it has been identified that verification monitoring is required, such as confirming 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
- As directed by the EPA
- As required by a CNIS
- As required by an OOHW Protocol
- Ongoing, case-by-case spot checks for noise intensive plant and equipment will be undertaken throughout construction to ensure compliance with the noise levels.

7.1 Noise Monitoring Parameters

All noise measurements will be undertaken to the following parameters:

- Sample Period: 15 minutes
- Frequency Weighting: A-Weighting
- Time Constant: Fast (125 milliseconds)

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.

Unattended noise monitoring will be performed to record at 15-minute sampling intervals.

As a minimum, L_{Aeq} , L_{Amax} , and L_{A90} A-weighted noise levels should be recorded.

7.2 Quality Assurance

All monitoring will be undertaken by suitably trained and competent personnel, who are experienced in undertaking noise measurements.

Noise monitoring equipment used will be at least Type 2 instruments and calibrated in accordance with manufacturer specifications and/or relevant Australian Standards. Records of equipment laboratory calibration will be maintained by AGLM and the Principal Contractor throughout the delivery of the Project. The calibration of the monitoring equipment will be checked in the field before and after the noise measurement period.

Noise measures while winds are greater than 5 m/s or while rainfall is present should be discarded, in line with the monitoring requirements of the Noise Policy for Industry (EPA, 2017).

Noise monitoring will be undertaken and recorded in accordance with the relevant noise measurement requirements in the reference standards and documents in Section 3.1. All monitoring records will be retained throughout the delivery of the Project. Noise monitoring records will be completed to record:

- 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 activities, and
- Noise due to other extraneous and environmental sources (e.g. traffic, aircraft, trains, dogs barking, insects).

8. Compliance

8.1 Roles and Responsibilities

Roles and responsibilities are outlined in Section 7.3 of the EMS.

8.2 Inspections

Inspections of the project site will occur as outlined in Section 7.6 of the EMS.

8.3 Monitoring and Reporting

Monitoring requirements are listed in Appendix B of the EMS.

8.4 Incidents and Complaints

Incident management will be managed in accordance with the process outlined in Section 7.5 of the EMS.

Complaints and enquiries will be managed in accordance with the process outlined in Section 6.3 of the EMS.

8.5 Document review and update

Continuous improvement of the NMP will be carried out through the continued evaluation of mitigation and management measures against environmental policies, objectives and targets and identifying where opportunities exist for improvement.

Document and records management for the Project is described in Section 7.8 of the EMS.

