

CEMP Appendix B5

Construction Noise and Vibration Management Plan

Kamay Ferry Wharves

June 2023

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The document is uncontrolled when printed. One controlled hard copy of the CNVMP as part of the CEMP and supporting documentation will be maintained by the Quality Manager at the Project office [and on the project website].

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Glossary/Abbreviations

| Abbreviations | Expanded Text |
|---------------------------------------|---|
| Ambient noise | The all-encompassing noise associated within a given environment at a given time, usually composed of sound from all sources near and far. |
| ANZEC | Australian and New Zealand Environment Council |
| Attenuation | The reduction in the level of sound or vibration. |
| CEMP | Construction Environmental Management Plan |
| CEMS | Contractor's Environmental Management System |
| CMO | HESQ compliance database software |
| Contractor | McConnell Dowell Contractors (Aust) Pty Ltd (MCD) |
| CCS | Community Communication Strategy |
| CMP | Construction Monitoring Program |
| CNVMP | Construction Noise and Vibration Management Sub Plan |
| dB(A) | Decibels using the A-weighted scale measured according to the frequency of the human ear. |
| dB _{L_{Aeq}(15 min)} | The 'equivalent continuous sound level', Leq, is used to describe the level of a time-varying sound or vibration measurement. When the dB(A) weighting is applied, the level is denoted dB L _{Aeq} . L _{Aeq15 min} represents the dB(A) weighted energy-average level of a 15 minute measurement. |
| DIN | Deutsches Institut für Normung e.V in English, the German Institute for Standardisation |
| DPE | NSW Department of Planning and Environment |
| EIS | Environmental Impact Statement |
| Environmental aspect | Defined by AS/NZS ISO 14001:2015 as an element of an organisation's activities, products or services that can interact with the environment. |
| Environmental impact | Defined by AS/NZS ISO 14001:2015 as any change to the environment, whether adverse or beneficial, wholly or partially resulting from an organisation's environmental aspects. |

| Abbreviations | Expanded Text |
|--------------------------|--|
| Environmental objective | Defined by AS/NZS ISO 14001:2015 as an overall environmental goal, consistent with the environmental policy, that an organisation sets itself to achieve. |
| Environmental target | Defined by AS/NZS ISO 14001:2015 as a detailed performance requirement, applicable to the organisation or parts thereof, that arises from the environmental objectives and that needs to be set and met in order to achieve those objectives. |
| EPA | NSW Environment Protection Authority |
| EP&A Act | <i>Environmental Planning and Assessment Act 1979</i> |
| EPBC Act | <i>Environmental Protection and Biodiversity Conservation Act 1999</i> |
| EPBC – CoA | <i>Environmental Protection and Biodiversity Conservation Act 1999</i> Conditions of Approval |
| ER | Environmental Representative |
| ERG | Environmental Review Group |
| EWMS | Environmental Work Method Statements |
| Feasible and reasonable | Consideration of best practice taking into account the benefit of proposed measures and their technological and associated operational application in the NSW and Australian context. Feasible relates to engineering considerations and what is practical to build. Reasonable relates to the application of judgement in arriving at a decision, taking into account mitigation benefits and cost of mitigation versus benefits provided, community views and nature and extent of potential improvements. |
| High-frequency cetaceans | Cetaceans which consist of porpoises and river dolphins. |
| HSEQ | Health, Safety, Environment and Quality |
| ICNG | Interim Construction Noise Guideline |
| LAeq (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. |
| LA (max) | the A-weighted maximum noise level only from the construction works under consideration, measured using the fast time weighting on a sound level meter. |

| Abbreviations | Expanded Text |
|--------------------------|---|
| Low-frequency cetaceans | Cetaceans which consist of baleen whales such as humpback whales |
| MCD | McConnell Dowell Contractors (Aust) Pty Ltd |
| MCoA | Minister's Conditions of Approval |
| Mid-frequency cetaceans | Cetaceans which consist of toothed whales except porpoises and river dolphins |
| NMLs | Noise Management Levels |
| NPWS | National Parks and Wildlife Service |
| OOHW | Out of hours works. Out of hours is anytime of standard working hours |
| Piling | Any impact driving and/or vibro-driving of piles |
| PK | Peak Pressure |
| PMS | Project Management System |
| PNL | Predicted Noise Level |
| PPV | Peak particle velocity |
| RBL | The Rating Background Level for each period is the medium value of the ABL values for the period over all of the days measured. There is therefore an RBL value for each period (day, evening and night) |
| REMM | Revised Environmental Management Measures |
| Re-strike testing | Testing of an installed pile to confirm that the pile has been installed to the appropriate engineering standards. |
| rms | Root-mean-square |
| RMS - Roads and Maritime | Now Transport for NSW (TfNSW) |
| SEL | Sound exposure level (SEL) is most often used to compare the total energy in impulsive signals with different time durations, average pressure levels and temporal characteristics. Impulsive underwater noise sources for which the SEL noise descriptor is useful include piling, blasting and geophysical surveys. |
| Site | Area defined by the construction boundary at La Perouse and Kurnell |
| SPL | Sound pressure level (SPL) is the sound pressure expressed in the decibel (dB) scale and with the standard reference pressures of 1 μ Pa for water. |

| Abbreviations | Expanded Text |
|---------------------------|--|
| Standard working hours | Monday to Friday 7am to 6pm, Saturday 8am to 1pm, no work on Sundays or public holidays |
| Low speed | 4 knots or less, except in circumstances where the Harbour Master (or their Delegate) or a Pilot considers that a higher speed is necessary to maintain a safe navigation. |
| SWP | Sound Power Level |
| TfNSW / Transport for NSW | Transport for New South Wales |
| TTS / PTS | Temporary (TTS) or Permanent (PTS) Threshold Shifts. |

1 Introduction

1.1 Context

This Construction Noise and Vibration Management Sub Plan (CNVMP) forms part of the Construction Environmental Management Plan (CEMP) for the Kamay Ferry Wharves Project (the Project) as shown in Figure 1-1.

This CNVMP has been prepared to address the requirements of the Minister’s Conditions of Approval (MCoA), *Environment Protection and Biodiversity Conservation Act 1999* (EPBC) Conditions of Approval (EPBC-CoA) and the Revised Environmental Management Measures (REMMs) listed in the Kamay Ferry Wharves Environmental Impact Statement (EIS) and all applicable legislation.

This CNVMP describes how McConnell Dowell Constructors (Aust) Pty Ltd (McConnell Dowell) will minimise and manage impacts from noise and vibration throughout the delivery of the Project. These potential impacts will require management and mitigation in accordance with relevant legislation and government policies.

This CNVMP and Monitoring Program (Attachment E) are to be endorsed by the project Environmental Representative (ER) no later than one month before the commencement of construction. Construction is not to commence until the CEMP and all required Sub-plans and Monitoring Programs have been endorsed by the ER or approved by the Planning Secretary.

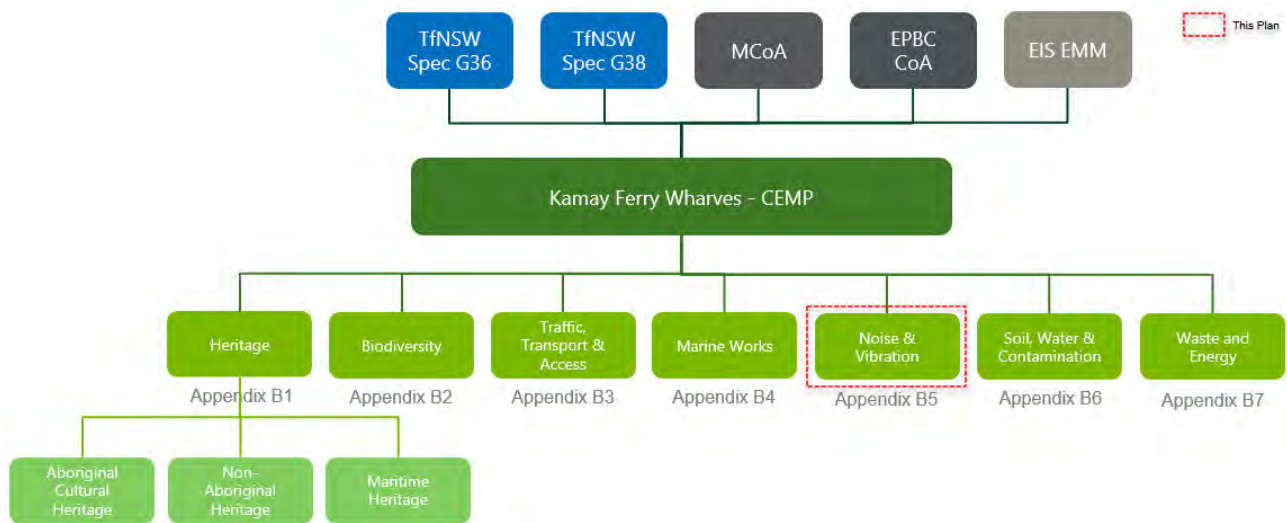


Figure 1-1 CEMP and Sub Plans

1.2 Background and project description

Transport for New South Wales (TfNSW) is constructing new ferry wharves at La Perouse and Kurnell in Botany Bay. Refer to background and project description in Section 2.1 of the CEMP. This would allow for an alternative connection between La Perouse and Kurnell other than by road. The primary purpose of this infrastructure would be to enable the operation of a public ferry service. It would also provide supplementary temporary mooring for non-ferry commercial vessels (such as whale watching vessels) and recreational boating.

A detailed description of the Project is provided Chapter 5 of the EIS. The Kamay Ferry Wharves EIS assessed the noise and vibration impacts of construction and operation on sensitive receivers and structures of the Project in Chapter 15 and Chapter 16.

As part of the EIS development, detailed surface and underwater construction and operational noise and vibration assessments were prepared to address the Environmental Assessment Requirements issued by the Department of Planning and Environment (DPE). The noise and vibration assessments were included in the EIS as Appendix O Surface Noise and Vibration Impact Assessment Report, Appendix P Underwater Noise Assessment.

1.3 Scope of this CNVMP

Implementing this CNVMP effectively will ensure that the Project meets the requirements of the MCoA, EPBC-CoA and REMMs (see Attachment B) are met.

This CNVMP has been prepared in accordance with:

- the REMMs
- Australian Standard/New Zealand Standard ISO 14001
- Ministers Conditions of Approval (MCoA) granted to the project on 21st July 2022.
- EPBC Conditions of Approval (MCoA) granted to the project on 16th March 2023.

Compliance of the CVNMP with key documents is outlined below in Table 1-1. The CNVMP will include:

- Context and description of the Project
- The required endorsements and approvals for the works to be complete
- Measures to identify and ensure competence, training and awareness of site workers
- Incident and non-conformance management and reporting
- Monitoring, inspections and auditing
- Construction control regarding environmental issues on noise and vibration management
- Security and site facilities.

Table 1-1 Compliance of the CNVMP with Key Documents

| Ref. | Compliance Obligation | Compliance Reference |
|----------------------------------|---|--|
| Ministers Conditions of Approval | | |
| C7 | <p>The CEMP Sub-plans must state how:</p> <ul style="list-style-type: none"> a) the environmental performance outcomes identified in the documents listed in MCoA A1 will be achieved; b) the mitigation measures identified in the documents listed in MCoA A1 will be implemented; c) the relevant terms of the MCoA will be complied with; and d) issues requiring management during construction (including cumulative impacts), as identified through ongoing environmental risk analysis, will be managed through SMART principles. | <ul style="list-style-type: none"> a) Section 4.3 b) Section 8 c) Attachment B d) Attachment E |

| Ref. | Compliance Obligation | Compliance Reference |
|--|--|--|
| C9 | <p>The Noise and Vibration CEMP Sub-plan must include measures to minimise vibration impacts on Aboriginal and historic heritage, including:</p> <ul style="list-style-type: none"> a) monitoring of vibration impacts in the immediate area of AHIMS Site # 45-6-0653 (Site 6 La Perouse), including procedures to be followed should any impact or damage occur; b) identification of smaller equipment or hand tools for use in the following locations: <ul style="list-style-type: none"> i. the La Perouse Monument inside the Anzac Parade Loop, which is near the construction boundary and may be impacted if large vibration generating equipment is used; ii. the Coursed Stone Sea Wall, which is located at Kurnell and will be within 5-10 metres of Piling; iii. the Captain Cook Monument, which is set on sandstone bedrock and is within the construction boundary and adjacent to Monument Track, where a utilities trench will be installed; and iv. landscape works close to the ferry shelter shed, where there is potential for indirect vibration impacts to the structure. | <p>This Plan</p> <ul style="list-style-type: none"> a) Section 7.6.2 and Attachment E (Section E-4.1) b) Section 7.6.1 |
| Revised Environmental Management Measures (REMMs) | | |
| SN1 | <p>A Construction Noise and Vibration Management Plan (NVMP) will be prepared and implemented as part of the CEMP. The plan will generally follow the approach of the Interim Construction Noise Guideline (NSW DECC, 2009) and provide details of construction management measures and procedures.</p> | This Plan |
| | <p>The plan will include:</p> <ul style="list-style-type: none"> a. An Out of Hours Works Protocol and provision to cover working outside of the standard hours set by the Construction Noise and Vibration Strategy (ST-157/4.1, Transport for NSW, 2020j) | Attachment A |
| | <ul style="list-style-type: none"> b. Identify all potential significant noise and vibration generating activities | Section 6.2 Section 7 |

| Ref. | Compliance Obligation | Compliance Reference |
|------|--|---|
| | c. Noise and vibration management measures such as restrictions on working hours, staging, placement and operation of work compounds, parking and storage areas, temporary noise barriers, haul road maintenance, equipment selection and controlling the location and use of vibration generating equipment | Section 8 |
| | d. A monitoring and reporting program to assess performance against relevant noise and vibration criteria | Section 12.3 Attachment E |
| | e. Consultation arrangements with affected neighbours and sensitive receivers, including notification and complaint handling procedures | Section 12.4 Community Consultation Strategy |
| | f. Consultation with NSW EPA, Randwick City Council, Sutherland Shire Council and National Parks and Wildlife Service for preparation of the NVMP | Section 3 |
| | g. Contingency measures in the event of non-compliance with noise and vibration criteria. | Attachment E |

1.4 Environmental management systems overview

The Contractor's Environmental Management System (CEMS) overview is described in Section 4.4 of the CEMP.

2 Purpose and objectives

2.1 Purpose

This CNVMP forms part of the Construction Environmental Management Plan (CEMP). It is part of a suite of plans that together outline how McConnell Dowell will manage potential noise and vibration impacts during construction of the Project to ensure an integrated approach to meeting contract requirements.

2.2 Objectives

The key objective of the CNVMP is to ensure all MCoA, EPBC-CoA, REMMs and licence and/or permit requirements relevant to noise and vibration are described, scheduled and assigned responsibility as outlined in:

- The EIS prepared for the Project
- Ministers Conditions of Approval (MCoA) granted to the project on 21st July 2022.
- EPBC Conditions of Approval

To achieve this objective, McConnell Dowell will undertake the following:

- Ensure appropriate controls and procedures are implemented during construction activities to avoid or minimise potential adverse impacts to sensitive land based receptors and marine fauna in relation to noise and vibration from the Project.
- Ensure appropriate controls and procedures are implemented to prevent nuisance, unreasonable noise and disturbance in relation to noise and vibration generated by the Project.
- Ensure appropriate measures are implemented to address the relevant conditions of the MCoA and EPBC-CoA.
- Ensure appropriate measures are implemented to comply with all relevant legislation and other requirements as described in Section 5 of this CNVMP.
- Define reporting triggers and procedures for any non-compliances.

2.3 Targets

The following targets have been established for the management of noise and vibration impacts during the Project:

- Ensure full compliance with the relevant legislative requirements, MCoA, EPBC-CoA and REMMs
- Implement feasible and reasonable noise mitigation measures with the aim of achieving the construction noise management levels detailed in the *Interim Construction Noise Guideline* (DECC, 2009)
- Complaints from the community and stakeholders are minimised.

3 Consultation

3.1 Consultation for preparation of the CNVMP

Several stakeholders were consulted in the development of this CNVMP in accordance with MCoA Condition C6.

Table 3-1 Construction Noise & Vibration Management Plan consultation

| Stakeholder | Date | Status |
|--|----------|--------|
| Randwick City Council | May 2023 | Closed |
| Sutherland Shire Council | May 2023 | Closed |
| National Parks and Wildlife Service | May 2023 | Closed |
| NSW Environment Protection Authority (EPA) | May 2023 | Closed |

3.2 Consultation for preparation of the Construction Monitoring Program – Noise & Vibration

As required by MCoA C14 relevant government agencies were consulted in the development of this Construction Monitoring Program – Noise & Vibration (Attachment E).

Table 3-2 Construction Monitoring Program – Noise & Vibration consultation

| Stakeholder | Date | Status |
|--|----------|--------|
| NSW Environment Protection Authority (EPA) | May 2023 | Closed |

3.3 Ongoing Consultation

Consultation with local community members such as affected neighbours and sensitive receivers will be conducted prior to and during construction through measures such as community notification, the project information phone line, enquires email and complaint handling procedures in accordance with Section 11 of the Community Communication Strategy.

4 Existing environment

The following sections summarise the noise and vibration impacts within and adjacent to the Site as described in the EIS.

The key reference documents are Chapter 15 and Chapter 16 of the EIS and the noise and vibration assessments which are included in the EIS as:

- Appendix O Surface Noise and Vibration Impact Assessment Report
- Appendix P Underwater Noise Assessment.

4.1 Sensitive receivers

The existing noise environment at La Perouse and Kurnell is influenced by the mix of land use activities including residential, commercial, industrial and recreational which are present in and surrounding the Project areas. The following describes the sensitive receivers surrounding the Project areas and the noise monitoring that was carried out to determine the existing noise environment.

The noise and vibration assessment considered a range of sensitive receivers in the local area, based on land use type and those which were closest to the Project area. These receiver types are a representative sample of the land uses around the Project area and of people who visit and reside in the area.

Underwater noise can impact marine mammals (whales, dolphins, porpoise, seals and dugong), fish, sharks, rays, sea turtles, marine reptiles, birds, invertebrates, squid, and crustaceans. It can also affect divers and other recreational users. The following section lists the receivers in Botany Bay that could be impacted by underwater noise. It also considers the ambient underwater noise environment.

The location of the nearest noise sensitive receivers at La Perouse and Kurnell is shown in Figure 4-1 and Figure 4-2.

A detailed land use survey has been undertaken (Attachment D) in accordance with MCoA E41 to confirm sensitive land users that may be potentially exposed to construction noise and vibration, construction ground-borne noise and operational noise.

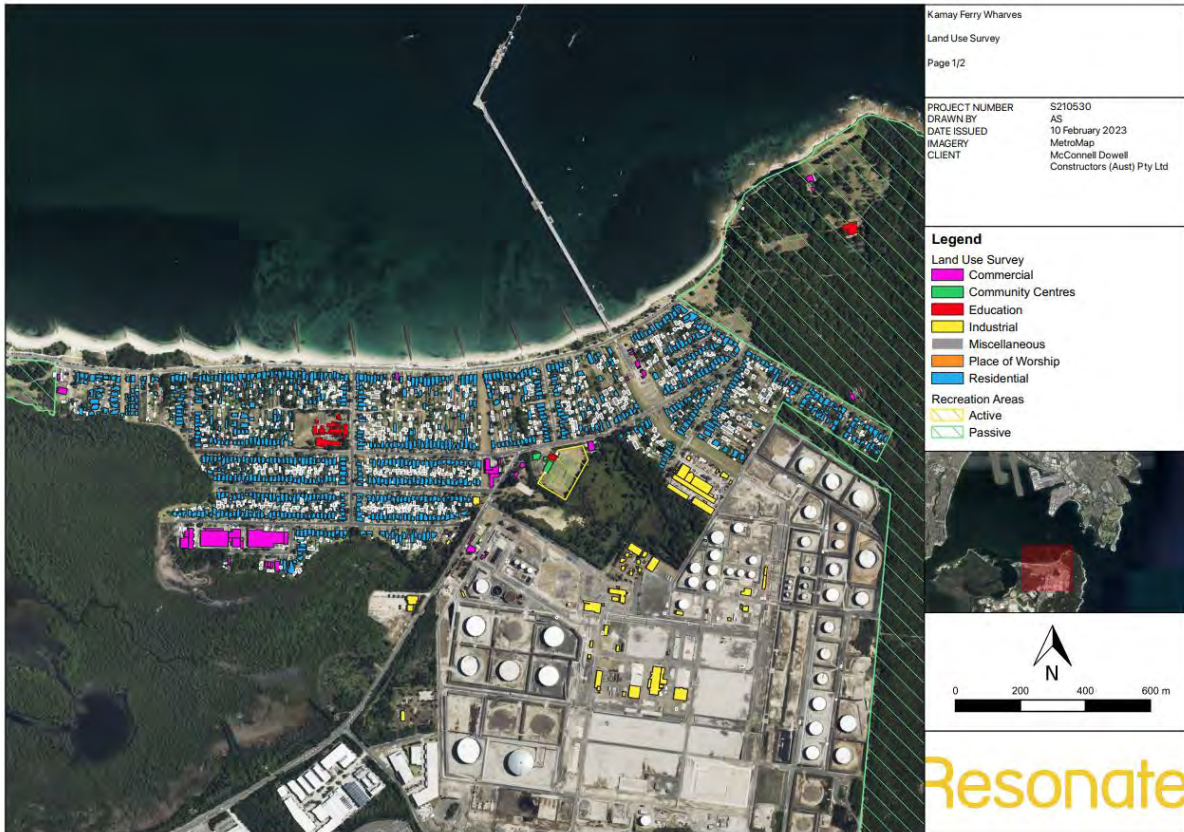


Figure 4-1 Nearest noise sensitive receivers at Kurnell

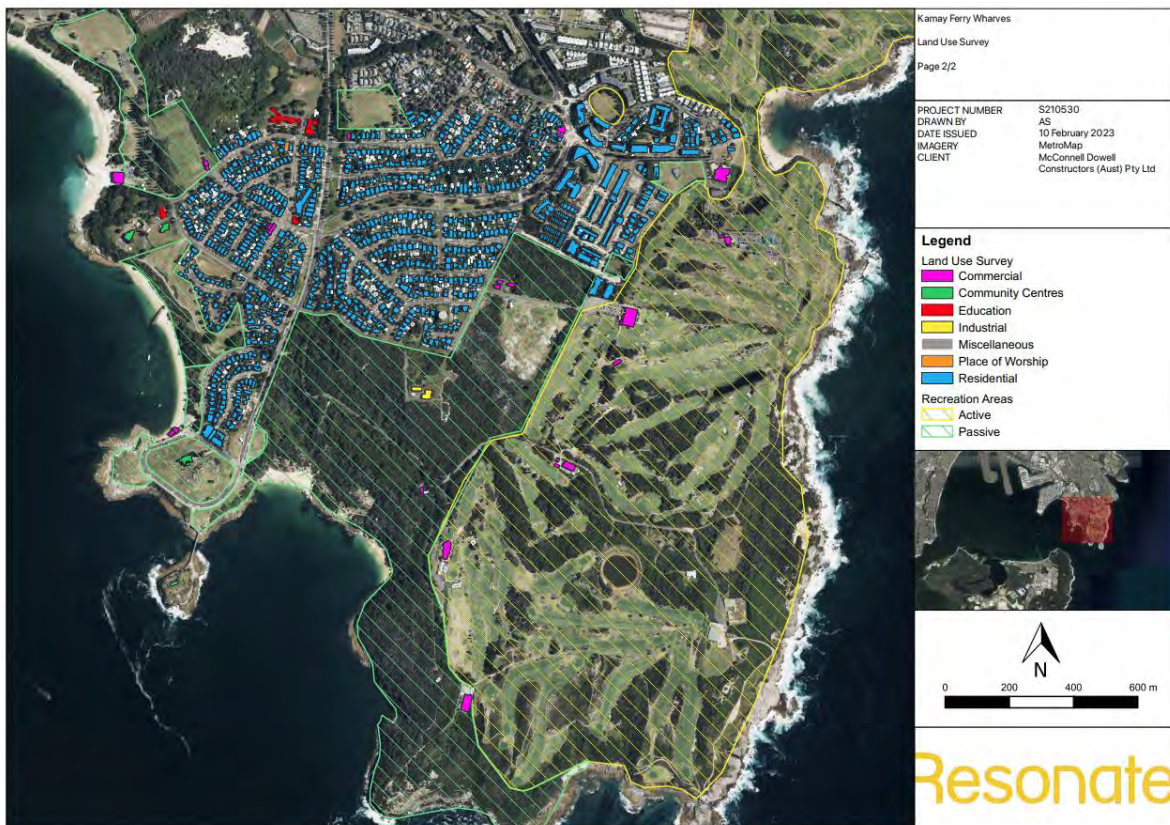


Figure 4-2 Nearest noise sensitive receivers at La Perouse

4.2 Ambient noise

During the development of the EIS, both short and long-term land-based noise monitoring was carried out to determine the existing noise environment (EIS Appendix O – Section 2.3).

Unattended noise loggers were placed at 51-52 Endeavour Avenue, La Perouse and 3/1 Captain Cook Drive, Kurnell. These loggers monitored between Tuesday 3 March and Thursday 2 April 2020.

The long-term monitoring results show a typical trend for residential areas, with lower ambient and background noise levels at night than during the day. This is a characteristic of suburban areas where the ambient noise environment is primarily influenced by road traffic, occasional overhead plane noise and occasional shipping noise.

The short-term noise monitoring results show that the existing noise environment is similar for both La Perouse and Kurnell. On a weekday morning, the noise levels in La Perouse range between 54-62 dBL_{Aeq15min} and in the afternoon at Kurnell the noise levels range from 52-60 dBL_{Aeq15min}.

The noise monitoring was carried out during lockdown restrictions due to coronavirus (Covid-19). This may have affected noise monitoring results. However, when compared to previous noise monitoring in the area, the results are representative of the typical noise environment.

While no underwater baseline monitoring was carried out near the Project areas, ambient underwater noise is likely to be influenced by shipping movements through the headlands. While ambient noise levels could peak at 190 dB (re: 1 µPa), this would only last for a short period while ships pass through the area. The ambient noise would also attenuate to around 120 to 150 dB (re: 1 µPa) (Bowles and Graves, 2007)¹ in the Project areas.

4.3 Environmental Performance Outcomes

As outlined in Appendix A of the EIS The project has been designed to avoid and minimise noise and vibration impacts on sensitive receivers as much as possible, including impacts to sensitive underwater receivers.

During construction there will be some noise and vibration impacts on the nearest sensitive receivers which will be minimised through the implantation of management measures outlined in Section 8 of this Plan and the use of safe working distances outlined in Section 5.3.4.

¹ Peak shipping noise levels drop to around 150 (re: 1 µPa) within 100 metres.

5 Construction noise and vibration criteria

The EPA recommends management levels and goals when assessing construction noise and vibration. These are outlined in:

- the Interim Construction Noise Guideline (ICNG), Assessing Vibration: a technical guideline
- the Australian and New Zealand Environment Council (ANZEC), Technical Basis for Guidelines to Minimise Annoyance due to Blasting Overpressure and Ground Vibration.

Relevant elements of these documents are summarised and discussed in this Section.

5.1 Construction hours

Construction works will only be undertaken during the following standard daytime hours:

- 7:00 am to 6:00 pm, Mondays to Fridays, inclusive;
- 8:00 am to 1:00 pm, Saturdays; and
- At no time on Sunday or public holidays.

In some cases, working outside of the standard working hours (out of hours work) may occur as permitted by the project planning approval under MCoA E44, these may include:

- a) **Safety and Emergencies**, including:
 - for the delivery of materials required by the NSW Police Force or other authority for safety reasons; or
 - where it is required in an emergency to avoid injury or the loss of life, to avoid damage or loss of property or to prevent environmental harm.
- b) **Low impact**, including:
 - construction that causes L-Aeq(15 minute) noise levels:
 - no more than 5 dB(A) above the rating background level at any residence and;
 - no more than the 'Noise affected' NMLs at other sensitive land user(s)
 - construction that causes LAFmax(15 minute) noise levels no more than 15 dB(A) above the rating background level at any residence; or
 - construction that causes:
 - continuous or intermittent vibration, measured at the most affected residence are no more than the preferred values for human exposure to vibration,
- c) **By Approval**, including:
 - where different construction hours are permitted or required under an EPL; or
 - negotiated agreements with directly affected residents and sensitive land user(s)
- d) **By Prescribed Activity**, including:
 - Piling between 10:00pm and 7:00am Monday-Friday inclusive
 - delivery of material that to directly support Piling.

If Out of Hours (OOH) work is required under MCoA E44(d) (by prescribed activity), justification must be provided to the ER in accordance with MCoA E51, outlining the following:

- the reasons for the OOH Work;
- a description of location and duration of the OOH Work;
- the noise characteristics and likely noise levels of the OOH Work;
- likely mitigation and management measures which aim to achieve the relevant noise management levels and vibration criteria under MCoA E44 (including the circumstances of when respite or relocation offers will be available and details about how the affected community can access these offers); and
- proposed community notifications which must be provided to impacted sensitive receivers in the community at least 10 days prior to the proposed OOH Work.

For situations that require working outside standard construction hours will be approved via OOHW assessments for the relevant activities (Section 12.1 and Attachment A).

That said, highly noise intensive works that result in an exceedance of the applicable NML at the same receiver must only be undertaken:

- a. between the hours of 8:00 am to 6:00 pm Monday to Friday;
- b. between the hours of 8:00 am to 1:00 pm Saturday; and
- c. if continuously, then not exceeding three hours, with a minimum cessation of highly noise intensive work of not less than one hour.

Note, as defined in the MCoA, 'continuously' includes any period during which there is less than one hour between ceasing and recommencing any of the work.

5.2 Construction noise criteria

5.2.1 Summary of noise goals

The Department of Environment and Climate Change NSW's Interim Construction Noise Guideline (ICNG) (DECC, 2009) provides guidelines for the assessment and management of construction noise. The ICNG focuses on applying a range of work practices to minimise construction noise impacts rather than focusing on achieving numeric noise levels.

The main objectives of the ICNG are to:

- Identify and minimise noise from construction works;
- Focus on applying all 'feasible' and 'reasonable' work practices to minimise construction noise impacts;
- Encourage construction during the recommended standard hours only, unless approval is given for works that cannot be undertaken during these hours;
- Reduce time spent dealing with complaints at the project implementation stage;
- Provide flexibility in selecting site-specific feasible and reasonable work practices to minimise noise impacts;
- Performance criteria for managing construction noise and vibration are;
- Ensure general compliance with the ICNG; and
- Compliance with vibration criteria set out in German Standard DIN 4150-3: Structural Vibration: Effects of Vibration on Structures.

5.2.2 Project airborne noise management levels

The Project's construction noise management levels (NMLs) are shown in ~~Table 5-1~~ **Table 5-1**. The rating background level (RBL) from a monitoring location in close proximity to the residential receivers was used to determine the NML for the Day, Evening and Night-time periods. The ICNG outlines how these levels are to be applied.

Table 5-1 Construction noise management levels (ICNG) at residential receivers

| Land use ID | Noise management level (NML) $\text{dB}_{\text{LAeq}(15 \text{ min})}$ |
|---|--|
| RES (standard hours)¹ | (daytime RBL 43 dB(A) ³ + 10 dB(A) =) 53 |
| RES (out of hours)² | (night-time RBL 38 dB(A) ⁴ + 5 dB(A) =) 43 |
| RES (sleep disturbance) | (night-time RBL 38 dB(A) ⁴ + 15 dB(A) =) 53 |

¹ – Monday to Friday 7am to 6pm, Saturday 8am to 1pm, no work on Sundays or public holidays

² – Out of standard hours

³ – Daytime RBL were measured to be 43 dB(A) at both La Perouse and Kurnell

⁴ – Night-time RBL were measured to be 38 dB(A) at both La Perouse and Kurnell

Table 5-2 Non-residential Noise Management Levels

| Usage | Receiver ID | Name | NML (external), $\text{dB}_{\text{LAeq} 15 \text{ minute}}^1$ |
|-------------------------|-------------|--|---|
| La Perouse | | | |
| Active recreation | ARC1 | Frenchman's Bay Reserve playground | 65 |
| | ARC2 | Congwong trail | 65 |
| Commercial premise | COM1 | The Boatshed | 70 |
| Community premise | CMU1 | La Perouse Local Aboriginal Land Council | 45 (Internal) |
| Childcare premise | CHC1 | Gujaga MACS Childcare Centre | 45 (Internal) |
| Cultural premise | CUL1 | La Perouse Museum | 45 (Internal) |
| | CUL2 | Macquarie watchtower | 45 (Internal) |
| Passive recreation area | PRC1 | Frenchman's beach | 60 |
| Kurnell | | | |
| Active recreation | ARC1 | Marton Park | 65 |
| | ARC2 | Yena walking track | 65 |
| Commercial premise | COM1 | Endeavour Coffee and Ice-cream | 70 |
| Childcare premise | CHC1 | Kurnell Preschool Kindergarten | 45 (Internal) |

| Usage | Receiver ID | Name | NML (external), dBLA _{eq 15minute} ¹ |
|-------------------------|-------------|---|---|
| Educational institution | EDU1 | Kamay Botany Bay Environmental Education Centre | 45 (Internal) |
| Industrial premise | IND1 | Caltex Kurnell terminal | 75 |
| Passive recreation area | PRC1 | Commemoration flat | 60 |
| Place of worship | POW1 | St John Fisher catholic church | 45 (Internal) |

5.2.3 Ground-borne noise criteria

Ground-borne noise is generated by vibration transmitted through the ground and into a structure. The ICNG specifies ground-borne noise management levels for residences. The ICNG management levels indicate when management actions will be implemented. These are as follows:

- day (7am to 6pm) $L_{eq,15min}$ 45 dB(A) at residences
- day (7am to 6pm) $L_{eq,15min}$ 50 dB(A) at commercial receivers
- evening (6pm to 10pm) $L_{eq,15min}$ 40 dB(A) at residences
- night-time (10pm to 7am) $L_{eq,15min}$ 35 dB(A) at residences.

These levels are only applicable when ground-borne noise levels are higher than airborne noise levels (i.e. for tunnelling works). These levels are to be assessed at the centre of the most affected habitable room.

5.2.4 Construction traffic noise criteria

The Construction Noise and Vibration Guideline (CNVG) (Roads and Maritime, 2016) outlines guidance for the assessment of road traffic noise generated by construction vehicles be taken from the Road Noise Policy (RNP) (NSW EPA, 2011). As the RNP provides guidance with relation to operational noise impacts, and noise from construction traffic is temporary, further guidance has been taken from the CNVG.

The RNP provides guidance on the assessment of noise impacts on sensitive receivers from additional road traffic generated by the project operating on a public road network. Where vehicles operate within the boundaries of a construction site, noise impacts generated by these vehicles are included in the overall $L_{eq,15min}$ construction site noise emissions undertaken in line with the ICNG.

The RNP makes a distinction between the assessment of freeway/arterial/sub-arterial roads and local roads. Freeway/arterial/sub-arterial roads are assessed over day (7 am to 10 pm) and night (10 pm to 7 am) periods. Table 5-3 presents a summary of the applicable road traffic criteria for residential receivers.

The CNVG states that 'an initial screening test should first be applied by evaluating whether noise levels will increase by more than 2 dB(A) due to construction traffic or a temporary reroute due to a road closure. Where increases are 2 dB(A) or less then no further assessment is required'.

Therefore, if the road traffic noise levels increase by more than 2 dB(A) as a result of the proposed construction traffic, and the criteria in Table 16 are exceeded, investigation of mitigation options would be required.

Table 5-3 Road traffic noise criteria for residential receivers on existing roads affected by additional traffic from land use developments

| Road type | Road traffic noise criteria | |
|-------------------------------|-----------------------------|-----------------------|
| | Day (7am to 10pm) | Night (10pm to 7am) |
| Freeway/Arterial/Sub-arterial | 60 $L_{eq,15hr}$ dB(A) | 55 $L_{eq,9hr}$ dB(A) |
| Local roads | 55 $L_{eq,1hr}$ dB(A) | 50 $L_{eq,1hr}$ dB(A) |

5.3 Construction vibration criteria

5.3.1 Human comfort

The recommended vibration limits for maintaining human comfort in residences and other relevant receiver types are given for continuous or impulsive and intermittent vibration in Table 5-4 and Table 5-5 respectively. These vibration limits will be used to determine safe minimum working distances for vibration intensive construction nearby sensitive receivers.

Table 5-4 Preferred and maximum weighted root-mean-square (rms) values for continuous and impulsive vibration acceleration (m/s^2) 1-80 Hz

| Location | Period | Preferred Values | | Maximum Values | |
|--|-----------------------|------------------|---------------|----------------|---------------|
| | | z-axis | x- and y-axes | z-axis | x- and y-axes |
| Continuous Vibration | | | | | |
| Critical areas ¹ | Day- or Night-time | 0.005 | 0.0036 | 0.01 | 0.0072 |
| Residences | Daytime 0700-2200h | 0.010 | 0.0071 | 0.020 | 0.014 |
| | Night-time 2200-0700h | 0.007 | 0.005 | 0.014 | 0.010 |
| Offices, schools, educational institutions and places of worship | Day- or Night-time | 0.020 | 0.014 | 0.040 | 0.028 |
| Impulsive Vibration | | | | | |
| Critical areas ¹ | Day- or Night-time | 0.005 | 0.0036 | 0.01 | 0.0072 |
| Residences | Daytime 0700-2200h | 0.30 | 0.21 | 0.60 | 0.42 |
| | Night-time 2200-0700h | 0.10 | 0.071 | 0.20 | 0.14 |
| Offices, schools, educational institutions and places of worship | Day- or Night-time | 0.64 | 0.46 | 1.28 | 0.92 |

| Location | Period | Preferred Values | | Maximum Values | |
|--|--------|------------------|---------------|----------------|---------------|
| | | z-axis | x- and y-axes | z-axis | x- and y-axes |
| 1 - Criteria for sensitive areas are only indicative, and have been provided as guidance to acceptable vibration levels for the use of sensitive equipment | | | | | |

Table 5-5 Acceptable vibration dose values for intermittent vibration (m/s^{1.75})

| Location | Daytime 0700-2200 h | | Night-time 2200-0700 h | |
|--|---------------------|---------------|------------------------|---------------|
| | Preferred Value | Maximum Value | Preferred Value | Maximum Value |
| Critical areas ¹ | 0.10 | 0.20 | 0.10 | 0.20 |
| Residences | 0.20 | 0.40 | 0.13 | 0.26 |
| Offices, schools, educational institutions and places of worship | 0.40 | 0.80 | 0.40 | 0.80 |
| 1 - Criteria for sensitive areas are only indicative, and there may be a need to assess intermittent vibration against impulsive or continuous criteria. | | | | |

5.3.2 Structural damage

Table 5-6 sets out the BS7385 criteria for cosmetic, minor and major damage.

Table 5-6 BS 7385-2 structural damage criteria

| Group | Type of structure | Damage level | Peak component particle velocity, mm/s ¹ | | |
|--|--|--------------------|---|----------------|-----------------|
| | | | 4 Hz to 15 Hz | 15 Hz to 40 Hz | 40 Hz and above |
| 1 | Reinforced or framed structures Industrial and heavy commercial buildings | Cosmetic | 50 | | |
| | | Minor ² | 100 | | |
| | | Major ² | 200 | | |
| 2 | Un-reinforced or light framed structures Residential or light commercial type buildings | Cosmetic | 15 to 20 | 20 to 50 | 50 |
| | | Minor ² | 30 to 40 | 40 to 100 | 100 |
| | | Major ² | 60 to 80 | 80 to 200 | 200 |
| 1 - Peak Component Particle Velocity is the maximum Peak particle velocity in any one direction (x, y, z) as measured by a tri-axial vibration transducer. | | | | | |
| 2 - Minor and major damage criteria established based on British Standard (BS) 7385 Part 2 (1993) Section 7.4.2 | | | | | |

Table 5-7 is based upon German Standard DIN 4150 - Part 3 'Structural vibration in buildings - Effects on Structure' (DIN 4150-3) which presents the recommended maximum limits over a range of frequencies (Hz), measured in any direction, and at the foundation or in the plane of the uppermost floor of a building or structure.

Table 5-7 DIN 4150-3 structural damage criteria

| Group | Type of structure | Vibration velocity, mm/s | | | |
|-------|--|-------------------------------|----------------|-----------------|---------------------------------|
| | | At foundation at frequency of | | | Plane of floor uppermost storey |
| | | 1 Hz to 10 Hz | 10 Hz to 50 Hz | 50 Hz to 100 Hz | All frequencies (Hz) |
| 1 | Buildings used for commercial purposes, industrial buildings and buildings of similar design | 20 | 20 to 40 | 40 to 50 | 40 |
| 2 | Dwellings and buildings of similar design and/or use | 5 | 5 to 15 | 15 to 20 | 15 |
| 3 | Structures that because of their particular sensitivity to vibration, do not correspond to those listed in Group 1 or 2 and have intrinsic value (eg buildings under a preservation order) | 3 | 3 to 8 | 8 to 10 | 8 |

5.3.3 Buried services

DIN 4150-3 sets out guideline values for vibration effects on buried pipework and reproduced in Table 5-8 below. These guidelines will be applied to buried services at the following locations:

- Sydney Water and Ausgrid services along Monument Track from the proposed Kurnell wharf to the corner of Prince Charles Parade and Captain Cook Drive;
- Sydney Water and Ausgrid services along Anzac Parade (west to east) from the proposed La Perouse wharf to the Frenchmans Bay Reserve Playground roundabout; and
- Ausgrid services and optic fibre relocation along Anzac Parade south of the proposed La Perouse wharf.

Table 5-8 Guideline values for short-term vibration impacts on buried pipework

| Pipe material | Guideline values for vibration velocity measured on the pipe, mm/s |
|--|--|
| Steel (including welded pipes) | 100 |
| Clay, concrete, reinforced concrete, pre-stressed concrete, metal (with or without flange) | 80 |
| Masonry, plastic | 50 |

| Pipe material | Guideline values for vibration velocity measured on the pipe, mm/s |
|---|--|
| <p>Note: For gas and water supply pipes within 2m of buildings, the levels given above will be applied. Consideration must also be given to pipe junctions with the building structure as potential significant changes in mechanical loads on the pipe must be considered.</p> | |

In addition, specific limits for vibration affecting high-pressure gas pipelines is provided in the United Kingdom (UK) National Grid's Specification for Safe Working in the Vicinity of National Grid High Pressure Gas Pipelines and Associated Installations – Requirements for Third Parties (report T/SP/SSW/22, UK National Grid, Rev 10/06, October 2006). This specification states that no piling is allowed within 15 m of a pipeline without an assessment of the vibration levels at the pipeline. The peak particle velocity (PPV) at the pipeline is limited to a maximum level of 75 mm/s, and where PPV is predicted to exceed 50 mm/sec the ground vibration is required to be monitored.

5.3.4 Minimum safe working distances

As a guide, the recommended minimum working distances for vibration intensive plant to be used for the Project are presented below in Table 5-9. This table provides an indication of the possibility of impact due to vibration generating plant and equipment onto nearby receivers.

The minimum working distances presented are indicative and will vary depending on the particular item of plant and local geotechnical conditions. They apply to cosmetic damage of typical buildings under typical geotechnical conditions.

Table 5-9 Minimum safe working distances

| Plant Item | Rating/Description | Minimum working distance (m) | | |
|------------------|----------------------------------|--|--|--|
| | | Cosmetic damage | | Human response (EPA, A Technical Guide, Assessing Vibration) Disturbance to building occupants |
| | | BS 7385 (Screening criterion of 25 mm/s) | DIN 4150 (Screening criterion of 3 mm/s) | |
| Vibratory roller | < 50 kN (Typically 1-2 tonnes) | 5 m | 11 m | 15 m to 20 m |
| | < 100 kN (Typically 2-4 tonnes) | 6 m | 13 m | 20 m |
| | < 200 kN (Typically 4-6 tonnes) | 12 m | 26 m | 40 m |
| | < 300 kN (Typically 7-13 tonnes) | 15 m | 31 m | 100 m |

| Plant Item | Rating/Description | Minimum working distance (m) | | |
|-------------------------|-----------------------------------|--|--|--|
| | | Cosmetic damage | | Human response (EPA, A Technical Guide, Assessing Vibration) Disturbance to building occupants |
| | | BS 7385 (Screening criterion of 25 mm/s) | DIN 4150 (Screening criterion of 3 mm/s) | |
| | > 300 kN (Typically 13-18 tonnes) | 20 m | 40 m | 100 m |
| | > 300 kN (> 18 tonnes) | 25 m | 50 m | 100 m |
| Small Hydraulic Hammer | (300 kg - 5 to 12t excavator) | 2 m | 5 m | 7 m |
| Medium Hydraulic Hammer | (900 kg – 12 to 18t excavator) | 7 m | 15 m | 23 m |
| Large Hydraulic Hammer | (1600 kg – 18 to 34t excavator) | 22 m | 44 m | 73 m |
| Vibratory pile driver | Sheet piles | 2 m to 20 m | 44 m | 20 m |
| Pile boring | ≤ 800 mm | 2 m (nominal) | 5 m | 10 m (nominal) |
| Piling rig – hammer | 12t down force | 15 m | 30 m | 50 m |
| Jackhammer | Hand-held | 1 m (nominal) | 3 m | 5 m |

5.4 Underwater noise criteria

5.4.1 Marine species

The document generally used to set trigger levels for marine piling in Australia is the 2012 South Australia Underwater Piling Noise Guidelines. These were based on data developed by Southall *et al.* in 2007. However, Southall *et al.* updated their data in 2019 based on new scientific findings. The South Australia guidelines also do not include threshold criteria for certain species that are likely present in Botany Bay.

The 2012 South Australia Underwater Piling Noise Guidelines are currently under review, with the new guidelines to include updated criteria based on Southall *et al.* 2019 data.

Therefore, various guidelines were used to define the trigger levels used in the Underwater Noise Assessment (Appendix P of the EIS).

The table below shows the weighted criteria adopted to assess the marine species impacts from piling while ~~Table 5-11~~ ~~Table 5-14~~ shows the weighted criteria adopted to assess the impacts from shipping movements.

Table 5-10 Threshold noise criteria summary (impulsive piling noise)

| Group | Behavioural response | Temporary hearing loss | Permanent hearing loss | Injury |
|-----------------------------------|----------------------|---|------------------------|---------|
| | * unweighted | All measured as sound exposure levels (L _{E,24h}) unless otherwise stated | | |
| Cetaceans (low frequency) | 160 SPL | 168 | 183 | - |
| Cetaceans (high frequency) | | 170 | 185 | - |
| Cetaceans (very high frequency) | | 140 | 155 | - |
| Sirenians (dugong) | | 175 | 190 | - |
| Otariids pinnipeds (seals) | | 188 | 203 | - |
| Sea turtles | 175 SEL | 189 | 204 | 207 |
| Fish (no swim bladder) | - | 186 | - | 216-219 |
| Fish (swim bladder non-hearing) | - | | - | 203-210 |
| Fish (swim bladder hearing) | - | | - | 203-207 |
| Fish (eggs/larvae) | - | - | - | 210 |
| Sharks | - | 186 | - | 216-219 |
| Birds (while diving) | *120 SPL | - | - | 190 SPL |
| Invertebrates (squid) | *162 SEL | - | - | - |
| Invertebrates (crayfish) | 202 PK | - | - | - |
| Humans (while diving) | *145 SPL | *167 SPL | - | 184 SPL |

Table 5-11 Threshold noise criteria summary (non-impulsive vessel noise)

| Group | Behavioural response | Temporary hearing loss | Permanent hearing loss | Injury |
|---------------------------------|----------------------|---|------------------------|--------|
| | *unweighted | All measured as sound exposure levels (L _{E,24h}) unless otherwise stated | | |
| Cetaceans (low frequency) | 120 SPL | 179 | 199 | - |
| Cetaceans (high frequency) | | 178 | 198 | - |
| Cetaceans (very high frequency) | | 153 | 173 | - |

| Group | Behavioural response | Temporary hearing loss | Permanent hearing loss | Injury |
|-----------------------------------|----------------------|------------------------|------------------------|-------------------|
| Sirenians (dugong) | | 186 | 206 | - |
| Otariids (seals) | | 199 | 219 | - |
| Sea turtles | | 200 | | 220 |
| Fish (no swim bladder) | - | - | - | - |
| Fish (swim bladder non-hearing) | - | - | - | - |
| Fish (swim bladder hearing) | - | *158 SPL 12hrs | - | *170 SPL 48hrs |
| Fish (eggs/larvae) | - | - | - | - |
| Sharks | - | - | - | - |
| Birds (while diving) | *120 SPL | - | - | 190 SPL |
| Invertebrates (squid) | *162 SEL | - | - | - |
| Invertebrates (crayfish) | 202 PK | - | - | - |
| Humans (while diving) | *145 SPL | *167 SPL | - | 184 SPL |

5.4.2 Humans

Table 5-12 Table 5-12 summarises how divers are impacted by underwater noise based on published information. This identifies that trained divers will be increasingly affected by noise up to 170 dB SPL above which noise is likely to be intolerably loud. Above 184 dB SPL there is the risk of physical injury.

Table 5-12 Effects of underwater sound on humans

| Received sound power level (dB) | Effect Source: Parvin, 2005 |
|---------------------------------|---|
| >184 | Liver haemorrhage and soft tissue damage likely* |
| >170 | Tolerance level for divers and swimmers. Sound causes lung and body vibration |
| 148-157 | The loudness and vibration levels become increasingly aversive. Some divers will contemplate aborting an open water dive. |
| 140-148 | A small number of divers rate the sound as “very severe” |
| 136-140 | The sound is clearly audible. Most divers tolerate the sound well with only “slight” aversion |
| 130 | Divers and swimmers able to detect body vibration |
| 80-100 | Auditory threshold |

*Based on extrapolation from animal models of pressure-induced damage

6 Environmental aspects and impacts

6.1 Construction activities

The Project will involve a range of activities incorporating various heavy machinery, plant and equipment that will operate in a number of locations across the Project. In order to assess the level of potential impact on noise and vibration sensitive receivers, the broad categories of construction activity likely to interact with these receivers are identified below.

- Site establishment
- Services works
- Temporary jetty construction
- Demolition of old jetty
- Wharf construction – piling
- Shore works
- Demobilisation

6.2 Impacts

The potential for noise and vibration impacts on sensitive receivers or structures will depend on a number of factors. Primarily impacts will be dependent on the nature, extent and magnitude of construction activities and their interaction with the natural environment. Factors that may affect potential impacts from construction would include:

- The type of equipment in use
- The number of equipment simultaneously in use
- Ground condition
- Topography and other physical barriers
- Proximity to sensitive receivers
- The condition of sensitive receivers
- Hours and/or duration of construction works

Noise and vibration impacts as a result of the Project are anticipated. Relevant aspects and the potential for related impacts have been considered in a risk assessment in Appendix D of the CEMP. Section 8 provides a suite of mitigation measures that will be implemented to avoid or minimise impacts on the receiving community and/or built environment.

7 Construction noise and vibration assessment

This section summarises the likely noise and vibration impacts from the construction of the Project.

7.1 Construction activities

Proposed construction equipment and activities are summarised in Table 7-1.

Equipment sound power levels have been determined by reference to TfNSW's *Construction Noise and Vibration Strategy*, AS2436 (Standards Australia, 2010), BS 5228-1:2009 (British Standards, 2009) and Resonate's measurement database. The equipment below has been assumed to operate concurrently and continuously over a full 15-minute period (a typical worst-case assumption).

The locations of equipment have been based the on the construction works areas in and around La Perouse and Kurnell as shown in Figure 7-1 and Figure 7-2.

Table 7-1 Construction equipment and associated sound power levels at both sites

| Indicative Plant / Equipment to be used | Quantity per 15 min | Operating duration in 15 min period (min) | Individual Equipment Sound Power Level, L_w^1 | |
|---|---------------------|---|---|-----------------|
| | | | dB $L_{Aeq(15min)}^2$ | dB L_{Amax}^3 |
| STAGE 1 - SITE ESTABLISHMENT | | | | |
| Compound setup | | | | |
| Construction area ⁴ : 1A | | | | |
| Truck with HIAB | 2 | 1.5 | 100 | - |
| Truck & Dog | 2 | 1.5 | 108 | - |
| Vibratory Roller (6T) | 1 | 1.5 | 109 | - |
| Skidsteer | 1 | 1.5 | 110 | - |
| Tree Trimming / Removal – Kurnell only | | | | |
| Construction area ⁴ : 1B | | | | |
| Wood Chipper | 1 | 3 | 116 | - |
| Chainsaw | 1 | 3 | 114 | - |
| Stump Grinder | 1 | 3 | 116 | - |
| Cherry Picker | 1 | 1.5 | 98 | - |
| Truck with HIAB | 2 | 1.5 | 113 | - |
| STAGE 2 – Service Works | | | | |
| Service Install – Sydney Water | | | | |
| Construction area ⁴ : 2A | | | | |
| Demo Saw | 1 | 7.5 | 118 | 126 |
| NDD Vacuum Truck | 1 | 1.5 | 109 | 117 |
| Excavator with Hammer (13T) | 1 | 7.5 | 118 | 126 |
| Compaction (Wacker Packer) | 1 | 7.5 | 106 | 114 |

| Indicative Plant / Equipment to be used | Quantity per 15 min | Operating duration in 15 min period (min) | Individual Equipment Sound Power Level, L_w ¹ | |
|---|---------------------|---|--|----------------------------|
| | | | dB $L_{Aeq(15min)}$ ² | dB L_{Amax} ³ |
| Tipper Truck | 1 | 1.5 | 110 | 118 |
| Lighting Towers (OOH only) | 2 | 15 | 80 | 88 |
| Service Install - Ausgrid | | | | |
| Construction area ⁴ : 2B | | | | |
| Demo Saw | 1 | 7.5 | 118 | 126 |
| NDD Vacuum Truck | 1 | 7.5 | 109 | 117 |
| Excavator with Hammer (13T) | 1 | 7.5 | 118 | 126 |
| Compaction (Wacker Packer) | 1 | 7.5 | 106 | 114 |
| Tipper Truck | 1 | 1.5 | 110 | 118 |
| Lighting Towers (OOH only) | 2 | 15 | 80 | 88 |
| Cherry Picker | 1 | 1.5 | 98 | 106 |
| Relocation – Fibre Optic – La Perouse only | | | | |
| Construction area ⁴ : 2C | | | | |
| NDD Vacuum Truck | 1 | 7.5 | 109 | 117 |
| Excavator with Hammer (13T) | 1 | 7.5 | 118 | 126 |
| Compaction (Wacker Packer) | 1 | 7.5 | 106 | 114 |
| Tipper Truck | 1 | 1.5 | 110 | 118 |
| Lighting Towers (OOH only) | 2 | 15 | 80 | 88 |
| STAGE 3 – Temporary Jetty | | | | |
| Construction – Rock Platform | | | | |
| Construction area ⁴ : 3A | | | | |
| Delivery Truck | 2 | 1.5 | 94 | - |
| Manitou | 1 | 1.5 | 97 | - |
| Excavator (13T) | 1 | 7.5 | 100 | - |
| Truck & Dog | 1 | 1.5 | 108 | - |
| Mobile Crane (60T) | 1 | 7.5 | 113 | - |
| Plate Compactor | 1 | 7.5 | 106 | - |
| Removal – Rock Platform | | | | |
| Construction area ⁴ : 3B | | | | |
| Excavator (30T) | 1 | 7.5 | 110 | - |
| Crawler Crane (60T KN / 200T LP) | 1 | 7.5 | 108 | - |
| Delivery Trucks | 2 | 1.5 | 94 | - |
| Construction – Steel Jetty – Kurnell only | | | | |

| Indicative Plant / Equipment to be used | Quantity per 15 min | Operating duration in 15 min period (min) | Individual Equipment Sound Power Level, L_w ¹ | |
|--|---------------------|---|--|----------------------------|
| | | | dB $L_{Aeq(15min)}$ ² | dB L_{Amax} ³ |
| Construction area⁴: 3C | | | | |
| Excavator (30T) Auger | 1 | 7.5 | 106 | - |
| Excavator (30T) Impact Piling | 1 | 7.5 | 134 | - |
| Crawler Crane (60T KN / 200T LP) | 1 | 7.5 | 108 | - |
| Delivery Trucks | 2 | 1.5 | 94 | - |
| Removal – Steel Jetty – Kurnell only | | | | |
| Construction area⁴: 3D | | | | |
| Excavator (30T) | 1 | 7.5 | 110 | - |
| Crawler Crane (60T KN / 200T LP) | 1 | 7.5 | 108 | - |
| Delivery Trucks | 2 | 1.5 | 94 | - |
| Removal – Existing Jetty – Kurnell only | | | | |
| Construction area⁴: 0A | | | | |
| Rattle Gun | 2 | 3 | 104 | - |
| Hand Tools (Electric) | 4 | 3 | 94 | - |
| Flatbed | 1 | 1.5 | 107 | - |
| Excavator (30T) | 1 | 7.5 | 110 | - |
| STAGE 4 – Wharf Construction | | | | |
| Piling Works - Marine | | | | |
| Construction area⁴: 4A | | | | |
| Barge Crane (250T) | 1 | 7.5 | 106 | 114 |
| Jack Up Barge (80T) | 1 | 7.5 | 101 | 109 |
| Delivery Barge | 1 | 0.75 | 106 | 114 |
| Drill Rig (SD45) | 1 | 0.75 | 112 | 120 |
| Generator | 1 | 15 | 103 | 111 |
| Piling Hammer | 1 | 7.5 | 134 | 155 |
| Hydraulic Impact Hammer (12T) | 1 | 7.5 | 118 | 139 |
| Punt Boat (9m) | 1 | 0.75 | 106 | 114 |
| Piling Works - Landside | | | | |
| Construction area³: 4B | | | | |
| Excavator (30T) Auger | 1 | 7.5 | 106 | - |
| Excavator (30T) Impact Piling | 1 | 7.5 | 134 | - |

| Indicative Plant / Equipment to be used | Quantity per 15 min | Operating duration in 15 min period (min) | Individual Equipment Sound Power Level, L_w ¹ | |
|--|---------------------|---|--|----------------------------|
| | | | dB $L_{Aeq(15min)}$ ² | dB L_{Amax} ³ |
| Crawler Crane (60T KN / 200T LP) | 1 | 7.5 | 108 | - |
| Delivery Trucks | 2 | 1.5 | 94 | - |
| Pre-cast Delivery | | | | |
| Construction area ⁴ : 4C | | | | |
| Delivery Truck | 4 | 1.5 | 94 | 102 |
| Crawler Crane (60T KN / 200T LP) | 1 | 7.5 | 108 | 116 |
| Manitou | 1 | 7.5 | 97 | 105 |
| Plank Installation | | | | |
| Construction area ⁴ : 4D | | | | |
| Crawler Crane (60T KN / 200T LP) | 1 | 7.5 | 108 | - |
| Barge Crane (250T) | 1 | 7.5 | 106 | - |
| Semi Truck | 1 | 1.5 | 103 | - |
| Hand Tools | 4 | 3 | 94 | - |
| Deck Pour | | | | |
| Construction area ⁴ : 4E | | | | |
| Concrete Truck | 1 | 7.5 | 109 | - |
| Concrete Pump | 1 | 7.5 | 109 | - |
| Hand Tools (Electric) | 4 | 3 | 94 | - |
| Fit Out & Services | | | | |
| Construction area ⁴ : 4F | | | | |
| Hand Tools (Electric) | 4 | 3 | 94 | - |
| Delivery Trucks | 2 | 1.5 | 94 | - |
| Spider Cranes | 1 | 7.5 | 98 | - |
| Genset / Air Compressor | 1 | 3 | 109 | - |
| STAGE 5 – Shore Works | | | | |
| Abutment Construction / Hardscaping – La Perouse only | | | | |
| Construction area ⁴ : 5A | | | | |
| Concrete Truck | 1 | 1.5 | 109 | - |
| Excavator with Hammer (25T) | 1 | 7.5 | 122 | - |
| Excavator with Rock Saw (25T) | 1 | 7.5 | 118 | - |
| Concrete Pump | 1 | 7.5 | 109 | - |

| Indicative Plant / Equipment to be used | Quantity per 15 min | Operating duration in 15 min period (min) | Individual Equipment Sound Power Level, L_w ¹ | |
|---|---------------------|---|--|----------------------------|
| | | | dB L_{Aeq} (15min) ² | dB L_{Amax} ³ |
| Hand Tools (Electric) | 4 | 3 | 94 | - |
| Delivery Trucks | 2 | 1.5 | 94 | - |
| Abutment Construction / Hardscaping – Kurnell only | | | | |
| Construction area ⁴ : 5B | | | | |
| Concrete Truck | 1 | 7.5 | 109 | - |
| Excavator (25T) | 1 | 7.5 | 105 | - |
| Concrete Pump | 1 | 7.5 | 109 | - |
| Hand Tools (Electric) | 4 | 3 | 94 | - |
| Delivery Trucks | 2 | 1.5 | 94 | - |
| Service Installation (Wharf) | | | | |
| Construction area ⁴ : 5C | | | | |
| Excavator with Hammer (25T) | 1 | 7.5 | 122 | - |
| Plate Compactor | 1 | 7.5 | 106 | - |
| Delivery Trucks | 2 | 1.5 | 94 | - |
| Southern Carpark – La Perouse only | | | | |
| Construction area ⁴ : 5D | | | | |
| Demo Saw | 1 | 7.5 | 118 | - |
| Excavator with Hammer (25T) | 1 | 7.5 | 122 | - |
| Plate Compactor | 1 | 7.5 | 106 | - |
| Milling Machine (Small) | 2 | 3 | 104 | - |
| Delivery Trucks | 2 | 1.5 | 94 | - |
| Vibratory Roller (6T) | 1 | 7.5 | 109 | - |
| Landscaping | | | | |
| Construction area ⁴ : 5E | | | | |
| Delivery Trucks | 2 | 1.5 | 94 | - |
| Excavator (5T) | 1 | 7.5 | 95 | - |
| Hand Tools (Electric) | 4 | 3 | 94 | - |
| Generator | 1 | 1 | 103 | - |
| STAGE 6 – Demobilisation | | | | |
| Removal of Compound | | | | |
| Construction area ⁴ : 6A | | | | |
| Truck with HIAB | 1 | 7.5 | 113 | - |
| Truck & Dog | 1 | 7.5 | 108 | - |

| Indicative Plant / Equipment to be used | Quantity per 15 min | Operating duration in 15 min period (min) | Individual Equipment Sound Power Level, L_w ¹ | |
|---|---------------------|---|--|----------------------------|
| | | | dB L_{Aeq} (15min) ² | dB L_{Amax} ³ |
| Skidsteer | 1 | 7.5 | 107 | - |
| Excavator (8T) | 1 | 7.5 | 95 | - |

- 1 – Unweighted sound power level of each individual equipment / plant.
- 2 – Sound power level of the equipment with number of sources and time corrections.
- 3 – L_{Amax} is 8 dB above the L_{Aeq} value, except for impact piling which is 21 dB (exact level is dependent on a number of factors, so a conservative estimate has been utilised based on maximum levels).
- 4 – To view construction areas refer to Figure 7-1 and Figure 7-2.

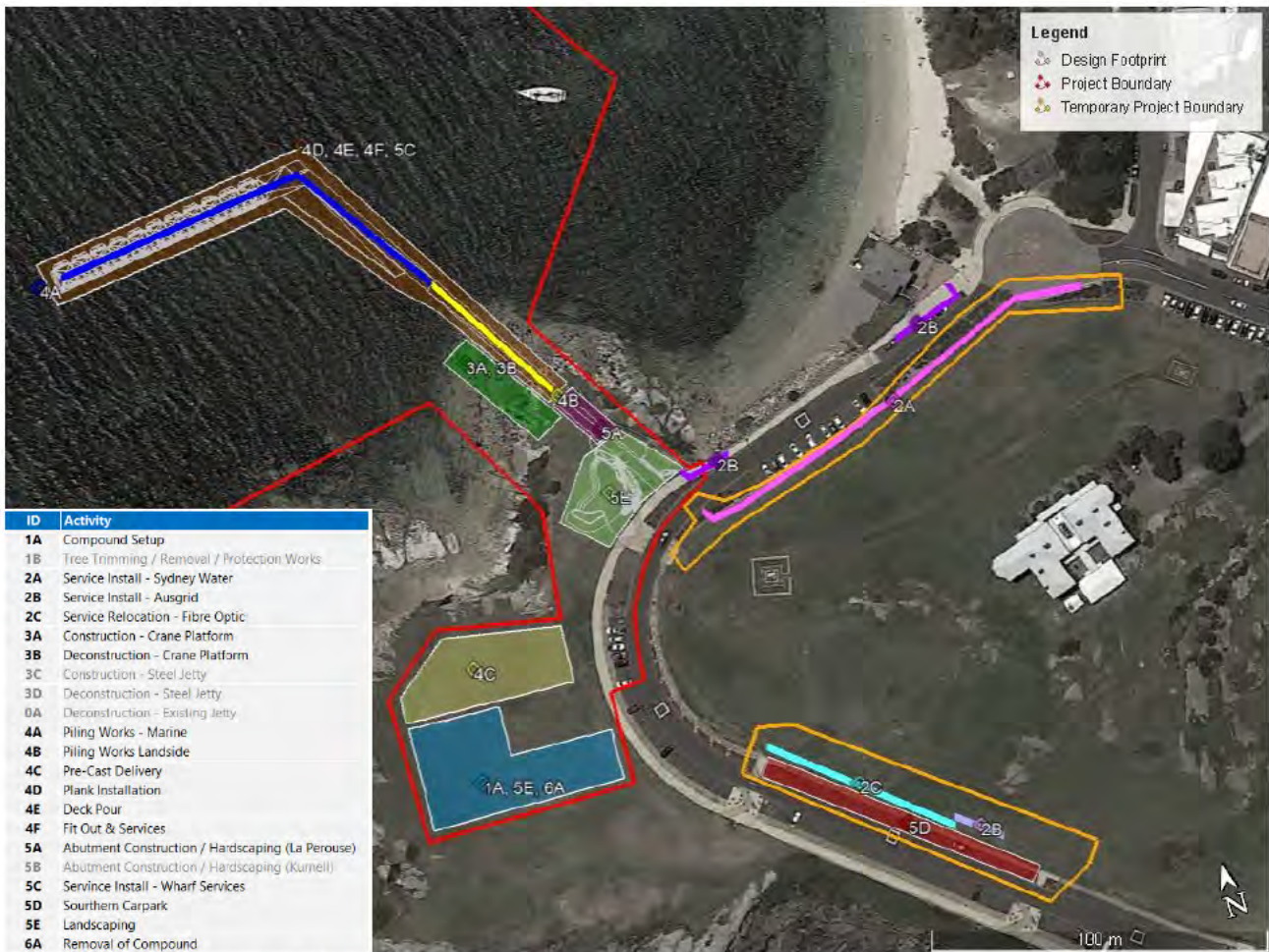


Figure 7-1 Construction Areas - La Perouse

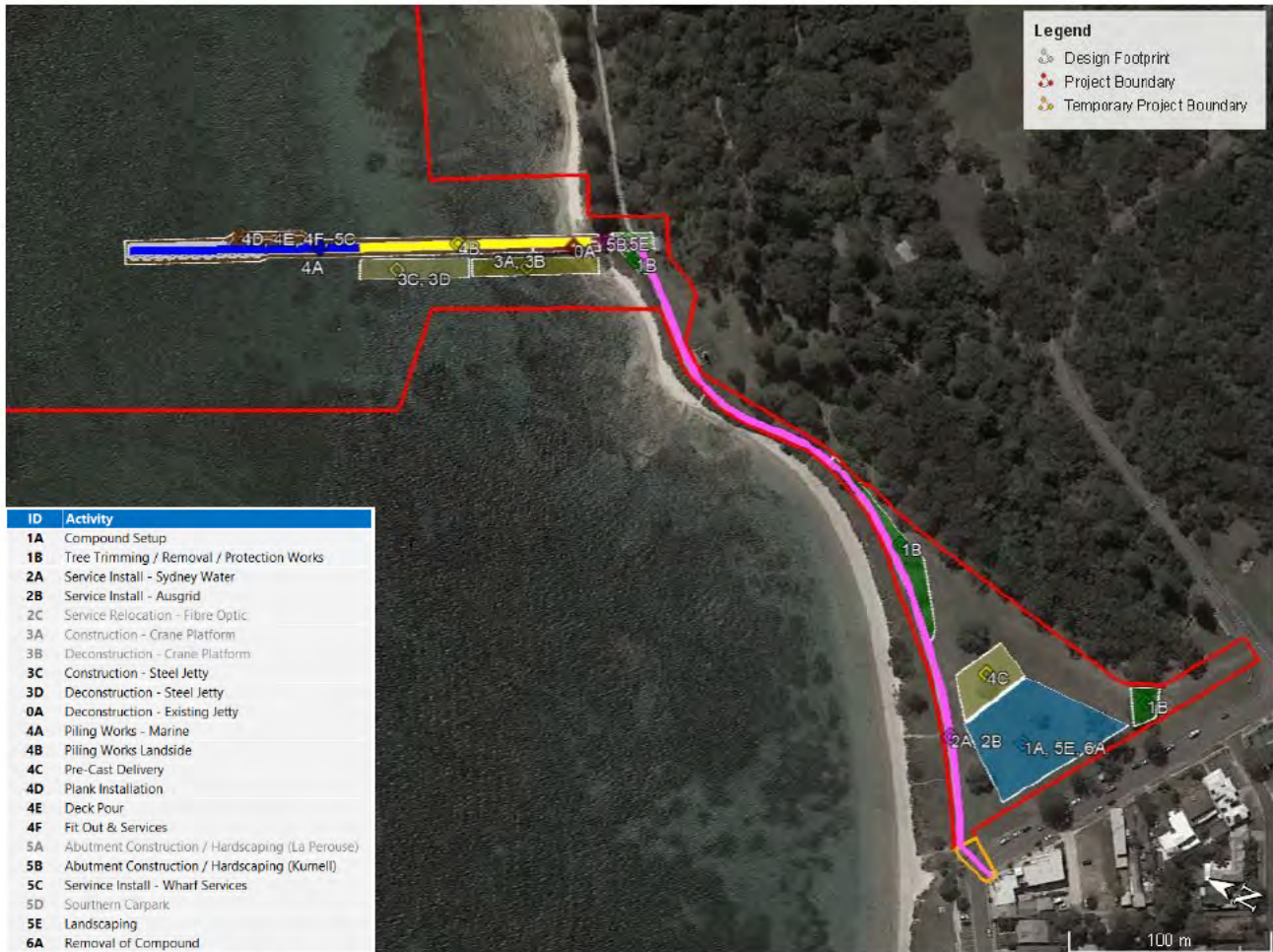


Figure 7-2 Construction Areas - Kurnell

7.2 Surface construction noise impacts

The construction noise predictions for the project as assessed in the EIS are shown in Table 7-2 and Table 7-3. The activities that are predicted to exceed the NML are shown in red and those predicted to exceed 75 dB are considered highly intrusive and are shown in bold.

At La Perouse, the highest predicted noise levels are associated with Stage 2 Service Works, Stages 4A and 4B Piling Works, Stage 5A Abutment Construction / hardscaping, Stage 5C Service Installation and Stage 5D Southern carpark works. These activities are predicted to exceed NMLs for sensitive receivers RES1-4, ARC1, COM1, CUL1 and CUL2. Compound setup, construction of rock platform, removal of rock platform, plank installation, deck pour, fit out & services works, landscaping and removal of compound would be the least noisy activities at La Perouse.

At Kurnell, the residential receivers are closer to the proposal site compared to the La Perouse site. Most of the exceedances have been predicted to be at residential receivers while other sensitive receivers have been predicted to comply with the NMLs. The highest predicted noise levels are associated with Stage 1 Site Establishment, Stage 2 Service Works, Stage 3C Construction of Steel Jetty, Stages 4A and 4B Piling Works, Stage 4C Pre-cast Delivery, Stage 5C Service Installation Wharf, Stage 5E landscaping and Stage 6A Removal of Compound. Demolition of old jetty, construction of rock platform, removal of rock platform, removal of steel jetty, plank installation, deck pour, fit out & services works and abutment construction/hardscaping would be the least noisy activities at Kurnell.

All activities proposed for Out of Hours Work must meet the requirements of MCoA E44 and E51 and approved under an Out of Hours Work Approval (OOHWA) as outlined in Attachment A.

Where the predicted $L_{Aeq(15min)}$ noise level is greater than the NMLs all feasible and reasonable work practices will be applied. Where the highly intrusive noise level of 75 dB is predicted to be exceeded, mitigation such as respite periods will be used to minimise these impacts.

Table 7-2 Construction noise predictions at La Perouse (L_{Aeq}(15min))

| ID | Period | | NML | Construction Stages | | | | | | | | | | | | | | | | |
|------|----------------|-------|-----|---------------------|-------------------------------------|--------------------------------|-------------------------------|-----------------------------------|------------------------------|----------------------------|------------------------------|------------------------|-------------------------|----------------|-------------------------|--|-----------------------------------|-----------------------|------------------|--------------------------|
| | | | | 1A – Compound Setup | 2A – Service Install – Sydney Water | 2B – Service Install - Ausgrid | 2C – Relocation – Fibre Optic | 3A – Construction – Rock Platform | 3B – Removal – Rock Platform | 4A – Piling Works - Marine | 4B – Piling Works - Landside | 4C – Pre-cast Delivery | 4D – Plank Installation | 4E – Deck Pour | 4F – Fit Out & Services | 5A – Abutment Construction / Hardscaping | 5C – Service Installation - Wharf | 5D – Southern Carpark | 5E - Landscaping | 6A – Removal of Compound |
| RES1 | Standard Hours | Day | 53 | 44 | 71 | 68 | 56 | 52 | 50 | 71 | 73 | 45 | 49 | 51 | 45 | 63 | 61 | 62 | 39 | 51 |
| | OOHW | Night | 43 | - | 71 | 68 | 56 | - | - | 71 | - | 45 | - | - | - | - | - | - | - | - |
| RES2 | Standard Hours | Day | 53 | 46 | 79 | 71 | 58 | 53 | 51 | 72 | 73 | 46 | 49 | 51 | 45 | 64 | 61 | 64 | 41 | 53 |
| | OOHW | Night | 43 | - | 79 | 71 | 58 | - | - | 72 | - | 46 | - | - | - | - | - | - | - | - |
| RES3 | Standard Hours | Day | 53 | 45 | 72 | 67 | 58 | 52 | 50 | 70 | 72 | 45 | 48 | 50 | 44 | 63 | 60 | 64 | 39 | 52 |
| | OOHW | Night | 43 | - | 72 | 67 | 58 | - | - | 70 | - | 45 | - | - | - | - | - | - | - | - |
| RES4 | Standard Hours | Day | 53 | 41 | 61 | 61 | 53 | 50 | 48 | 70 | 70 | 42 | 46 | 48 | 42 | 60 | 58 | 58 | 36 | 48 |
| | OOHW | Night | 43 | - | 61 | 61 | 53 | - | - | 70 | - | 42 | - | - | - | - | - | - | - | - |
| ARC1 | Standard hours | Day | 65 | 46 | 77 | 76 | 58 | 54 | 52 | 73 | 75 | 47 | 51 | 53 | 47 | 65 | 63 | 63 | 42 | 53 |
| ARC2 | Standard hours | Day | 65 | 40 | 54 | 57 | 54 | 45 | 43 | 64 | 65 | 40 | 40 | 42 | 36 | 55 | 52 | 61 | 32 | 47 |

| ID | Period | | NML | Construction Stages | | | | | | | | | | | | | | | | |
|----------------------|----------------|-----|-----------------|---------------------|-------------------------------------|--------------------------------|-------------------------------|-----------------------------------|------------------------------|----------------------------|------------------------------|------------------------|-------------------------|----------------|-------------------------|--|-----------------------------------|-----------------------|------------------|--------------------------|
| | | | | 1A – Compound Setup | 2A – Service Install – Sydney Water | 2B – Service Install - Ausgrid | 2C – Relocation – Fibre Optic | 3A – Construction – Rock Platform | 3B – Removal – Rock Platform | 4A – Piling Works - Marine | 4B – Piling Works - Landside | 4C – Pre-cast Delivery | 4D – Plank Installation | 4E – Deck Pour | 4F – Fit Out & Services | 5A – Abutment Construction / Hardscaping | 5C – Service Installation - Wharf | 5D – Southern Carpark | 5E - Landscaping | 6A – Removal of Compound |
| PRC1 | Standard hours | Day | 60 | 41 | 59 | 59 | 52 | 51 | 49 | 72 | 71 | 42 | 48 | 50 | 44 | 61 | 60 | 57 | 36 | 48 |
| CHC1 | Standard hours | Day | 45 ¹ | 23 | 38 | 38 | 34 | 31 | 29 | 52 | 51 | 24 | 28 | 30 | 24 | 41 | 40 | 39 | 16 | 30 |
| COM1 | Standard hours | Day | 70 | 39 | 73 | 80 | 51 | 49 | 47 | 66 | 69 | 40 | 45 | 47 | 41 | 61 | 57 | 57 | 37 | 46 |
| CUL1 | Standard hours | Day | 45 ¹ | 39 | 63 | 61 | 54 | 45 | 43 | 63 | 65 | 39 | 41 | 43 | 37 | 57 | 53 | 60 | 34 | 46 |
| CUL2 | Standard hours | Day | 45 ¹ | 34 | 51 | 54 | 51 | 39 | 37 | 58 | 59 | 34 | 35 | 37 | 31 | 50 | 47 | 60 | 27 | 41 |
| CMU1 | Standard hours | Day | 45 ¹ | 24 | 38 | 38 | 34 | 32 | 30 | 53 | 52 | 24 | 29 | 31 | 25 | 41 | 41 | 39 | 17 | 31 |
| Note 1: Internal NML | | | | | | | | | | | | | | | | | | | | |

Table 7-3 Construction noise predictions at Kurnell (L_{Aeq}(15min))

| ID | Period | | NML | Construction Stages | | | | | | | | | | | | | | | | | | |
|------|-------------------|-------|-----|------------------------------|---------------------|------------------------------|-------------------------------------|--------------------------------|-----------------------------------|------------------------------|---------------------------------|----------------------------|----------------------------|------------------------------|------------------------|-------------------------|----------------|-------------------------|--|-----------------------------------|------------------|--------------------------|
| | | | | 0A – Demolition of Old Jetty | 1A – Compound Setup | 1B – Tree Trimming / Removal | 2A – Service Install – Sydney Water | 2B – Service Install - Ausgrid | 3A – Construction – Rock Platform | 3B – Removal – Rock Platform | 3C – Construction – Steel Jetty | 3D – Removal – Steel Jetty | 4A – Piling Works - Marine | 4B – Piling Works - Landside | 4C – Pre-cast Delivery | 4D – Plank Installation | 4E – Deck Pour | 4F – Fit Out & Services | 5B – Abutment Construction / Hardscaping | 5C – Service Installation - Wharf | 5E - Landscaping | 6A – Removal of Compound |
| RES1 | Standard Hours | Day | 53 | 43 | 71 | 65 | 84 | 84 | 46 | 44 | 66 | 44 | 64 | 66 | 55 | 42 | 44 | 38 | 45 | 54 | 63 | 78 |
| | OOHW ¹ | Night | 43 | - | - | - | 84 | 84 | - | - | - | - | 64 | - | 55 | - | - | - | - | - | - | - |
| RES2 | Standard Hours | Day | 53 | 48 | 38 | 54 | 58 | 58 | 50 | 48 | 70 | 48 | 69 | 71 | 38 | 47 | 49 | 43 | 50 | 59 | 37 | 45 |
| | OOHW ¹ | Night | 43 | - | - | - | 58 | 58 | - | - | - | - | 69 | - | 38 | - | - | - | - | - | - | - |
| RES3 | Standard Hours | Day | 53 | 42 | 58 | 60 | 74 | 74 | 45 | 43 | 65 | 43 | 64 | 65 | 50 | 41 | 43 | 37 | 44 | 53 | 50 | 65 |
| | OOHW ¹ | Night | 43 | - | - | - | 74 | 74 | - | - | - | - | 64 | - | 50 | - | - | - | - | - | - | - |
| RES4 | Standard Hours | Day | 53 | 42 | 58 | 64 | 60 | 60 | 45 | 43 | 64 | 42 | 63 | 64 | 50 | 40 | 42 | 36 | 44 | 52 | 50 | 65 |
| | OOHW ¹ | Night | 43 | - | - | - | 60 | 60 | - | - | - | - | 63 | - | 50 | - | - | - | - | - | - | - |

| ID | Period | | NML | Construction Stages | | | | | | | | | | | | | | | | | | |
|------|----------------|-----|-----------------|------------------------------|---------------------|------------------------------|-------------------------------------|--------------------------------|-----------------------------------|------------------------------|---------------------------------|----------------------------|----------------------------|------------------------------|------------------------|-------------------------|----------------|-------------------------|--|-----------------------------------|------------------|--------------------------|
| | | | | 0A – Demolition of Old Jetty | 1A – Compound Setup | 1B – Tree Trimming / Removal | 2A – Service Install – Sydney Water | 2B – Service Install - Ausgrid | 3A – Construction – Rock Platform | 3B – Removal – Rock Platform | 3C – Construction – Steel Jetty | 3D – Removal – Steel Jetty | 4A – Piling Works - Marine | 4B – Piling Works - Landside | 4C – Pre-cast Delivery | 4D – Plank Installation | 4E – Deck Pour | 4F – Fit Out & Services | 5B – Abutment Construction / Hardscaping | 5C – Service Installation - Wharf | 5E - Landscaping | 6A – Removal of Compound |
| EDU1 | Standard Hours | Day | 45 ¹ | 34 | 28 | 40 | 44 | 44 | 37 | 35 | 56 | 34 | 55 | 57 | 28 | 33 | 35 | 29 | 36 | 45 | 24 | 35 |
| PoW1 | Standard Hours | Day | 45 ¹ | 27 | 31 | 38 | 44 | 44 | 30 | 28 | 50 | 28 | 49 | 50 | 29 | 26 | 28 | 22 | 29 | 38 | 23 | 38 |
| ARC1 | Standard Hours | Day | 65 | 33 | 36 | 44 | 49 | 49 | 37 | 35 | 56 | 34 | 56 | 56 | 34 | 32 | 34 | 28 | 36 | 44 | 28 | 43 |
| ARC2 | Standard Hours | Day | 65 | 42 | 39 | 49 | 53 | 53 | 45 | 43 | 64 | 42 | 63 | 65 | 40 | 41 | 43 | 37 | 45 | 53 | 32 | 46 |
| PRC1 | Standard Hours | Day | 60 | 42 | 35 | 48 | 52 | 52 | 45 | 43 | 64 | 42 | 64 | 65 | 35 | 41 | 43 | 37 | 44 | 53 | 31 | 42 |
| CHC1 | Standard Hours | Day | 45 ¹ | 23 | 25 | 33 | 38 | 38 | 26 | 24 | 46 | 24 | 45 | 46 | 24 | 22 | 24 | 18 | 25 | 34 | 17 | 32 |
| COM1 | Standard Hours | Day | 70 | 43 | 70 | 62 | 92 | 92 | 46 | 44 | 66 | 44 | 65 | 66 | 54 | 42 | 44 | 38 | 45 | 54 | 62 | 77 |

| ID | Period | | NML | Construction Stages | | | | | | | | | | | | | | | | | | |
|----------------------|----------------|-----|-----|------------------------------|---------------------|------------------------------|-------------------------------------|--------------------------------|-----------------------------------|------------------------------|---------------------------------|----------------------------|----------------------------|------------------------------|------------------------|-------------------------|----------------|-------------------------|--|-----------------------------------|------------------|--------------------------|
| | | | | 0A – Demolition of Old Jetty | 1A – Compound Setup | 1B – Tree Trimming / Removal | 2A – Service Install – Sydney Water | 2B – Service Install - Ausgrid | 3A – Construction – Rock Platform | 3B – Removal – Rock Platform | 3C – Construction – Steel Jetty | 3D – Removal – Steel Jetty | 4A – Piling Works - Marine | 4B – Piling Works - Landside | 4C – Pre-cast Delivery | 4D – Plank Installation | 4E – Deck Pour | 4F – Fit Out & Services | 5B – Abutment Construction / Hardscaping | 5C – Service Installation - Wharf | 5E - Landscaping | 6A – Removal of Compound |
| IND1 | Standard Hours | Day | 75 | 36 | 40 | 48 | 50 | 50 | 39 | 37 | 58 | 36 | 58 | 59 | 38 | 35 | 37 | 31 | 38 | 47 | 32 | 47 |
| Note 1: Internal NML | | | | | | | | | | | | | | | | | | | | | | |

Due to the predicted exceedances of the NML in Table 7-2 and Table 7-3, additional noise mitigation measures presented in Section 9 will be implemented.

7.3 Construction ground-borne noise

As outlined in MCoA E46, the internal ground-borne noise goals for residential receivers to be as follows:

- a. evening (6:00 pm to 10:00 pm) – internal $L_{Aeq(15\text{ minute})}$ 40 dB(A); and
- b. night (10:00 pm to 7:00 am) – internal $L_{Aeq(15\text{ minute})}$ 35 dB(A).

Mitigation measures will be applied when the above specified ground-borne noise goals are exceeded.

That said, due to the distance between construction works and receivers, ground-borne noise impacts are expected to be negligible in comparison to airborne noise impacts. For this reason, ground-borne noise is not anticipated to be the controlling factor for these proposed works and therefore further assessment is not warranted. It is noted that the application of mitigation measures for the control of airborne noise emissions and vibration in accordance with the procedures in this CNVMP is expected to adequately address ground-borne noise.

7.4 Construction traffic noise

There is only expected to be around 40 to 50 vehicles arriving and leaving the site every day during construction. These traffic numbers are too low to cause any related noise impacts that would exceed the assessment criteria.

7.5 Underwater noise impacts

There would be two major underwater noise sources associated with the construction of the Project. During construction there is the need to pile the wharf foundations. This would generate impulsive noise for around eight months in Kurnell and La Perouse. The other noise source would be from construction vessels operating in the area for around 13 months.

Underwater noise impacts have been predicted based on the following inputs using a damped cylindrical spreading (DCS) sound propagation model². The DCS modelling assumptions are conservative, and include:

- Worst case grazing angle (mach cone angle) of 17 degrees
- Horizontal decay rate based on the plane wave reflection coefficient of sand.

Piling source levels were determined from the Caltrans Compendium³ for a 0.76 m diameter steel pipe pile. The source level for construction vessels is based on MacGillivray (2014)⁴ and McKenna et al⁵ (2012), consistent with the EIS.

² Lippert, Tristan, Michael A. Ainslie, and Otto von Estorff. "Pile driving acoustics made simple: Damped cylindrical spreading model." *The Journal of the Acoustical Society of America* 143.1 (2018): 310-317.

³ Rodkin, Richard, and Keith Pommerenck. "Caltrans compendium of underwater sound data from pile driving-2014 update." *INTER-NOISE and NOISE-CON Congress and Conference Proceedings*. Vol. 249. No. 3. Institute of Noise Control Engineering, 2014.

⁴ MacGillivray, Alexander, et al. "Modelling underwater shipping noise in the Great Barrier Reef Marine Park using AIS vessel track data." *Proceedings of the 43rd International Conference inter. noise*. 2014.

⁵ McKenna, Megan F., et al. "Underwater radiated noise from modern commercial ships." *The Journal of the Acoustical Society of America* 131.1 (2012): 92-103.

Table 7-4: Underwater noise prediction inputs

| Parameter | Value |
|--|--|
| Pile diameter | 0.76 m |
| Number of pile strikes per day | 1,200 |
| Water depth at pile | 5 m |
| Piling source level – Peak | 210 dB re 1µPa at 10 m |
| Piling source level - RMS | 190 dB re 1µPa at 10 m |
| Piling source level – SEL (single strike) | 177 dB re 1µPa ² -s at 10 m |
| Construction vessel source level – SEL (single vessel) | 199 dB re 1µPa ² -s at 1 m |

7.5.1 Piling noise impacts

Predicted noise levels have been compared to the criteria outlined in Section 5.4 to determine onset radii (distances) where Temporary (TTS) and Permanent (PTS) threshold shifts or other physical injury may occur. Onset radii for piling noise impacts are shown in Table 7-5 (cumulative SEL) and Table 7-6 (peak). We note that the predicted piling noise impacts are the same for both Kurnell and La Perouse.

Table 7-5: Piling noise impacts – cumulative SEL

| Functional Hearing Group | Permanent Threshold Shift | | Temporary Threshold Shift | | Injury | |
|--|-------------------------------|--------------|-------------------------------|--------------|--------------------------|--------------|
| | Criteria | Onset Radius | Criteria | Onset Radius | Criteria | Onset Radius |
| Low-Frequency Cetaceans | SEL ₂₄ 183 dB(LF) | 80 m | SEL ₂₄ 168 dB(LF) | 550 m | - | - |
| High-Frequency Cetaceans | SEL ₂₄ 185 dB(HF) | 1 m | SEL ₂₄ 178 dB(HF) | 4 m | - | - |
| Very High-Frequency Cetaceans | SEL ₂₄ 155 dB(VHF) | 95 m | SEL ₂₄ 140 dB(VHF) | 600 m | - | - |
| Otariid Pinnipeds | SEL ₂₄ 203 dB(OCW) | 1 m | SEL ₂₄ 188 dB(OCW) | 25 m | - | - |
| Sirenians | SEL ₂₄ 206 dB(SI) | 1 m | SEL ₂₄ 186 dB(SI) | 25 m | - | - |
| Marine Turtle | - | - | - | - | SEL ₂₄ 219 dB | 1 m |
| Fish (No Swim Bladder, including Sharks) | SEL ₂₄ 216 dB | 1 m | SEL ₂₄ 186 dB | 45 m | SEL ₂₄ 207 dB | 1 m |
| Fish (With Swim Bladder) | SEL ₂₄ 203 dB | 1 m | SEL ₂₄ 186 dB | 45 m | SEL ₂₄ 210 dB | 1 m |

Table 7-6: Piling noise impacts – peak

| Functional Hearing Group | Permanent Threshold Shift | | Temporary Threshold Shift | | Injury | |
|--|---------------------------|--------------|---------------------------|--------------|-------------|--------------|
| | Criteria | Onset Radius | Criteria | Onset Radius | Criteria | Onset Radius |
| Low-Frequency Cetaceans | PEAK 219 dB | 45 m | PEAK 213 dB | 130 m | - | - |
| High-Frequency Cetaceans | PEAK 230 dB | 4 m | PEAK 224 dB | 15 m | - | - |
| Very High-Frequency Cetaceans | PEAK 202 dB | 510 m | PEAK 196 dB | 800 m | - | - |
| Otariid Pinnipeds | PEAK 232 dB | 3 m | PEAK 226 dB | 10 m | - | - |
| Sirenians | PEAK 226 dB | 10 m | PEAK 220 dB | 50 m | - | - |
| Marine Turtle | - | - | - | - | PEAK 207 dB | 300 m |
| Fish (No Swim Bladder, including Sharks) | PEAK 213 dB | 130 m | - | - | PEAK 213 dB | 130 m |
| Fish (With Swim Bladder) | PEAK 207 dB | 300 m | - | - | PEAK 207 dB | 300 m |

7.5.2 Construction vessel noise impacts

Based on Table E3 and Table E4 of the Underwater Noise Assessment (Appendix P of the EIS), physical or auditory injury (TTS or PTS) are not expected at distances of more than 1 m due to noise from construction vessel operation.

7.5.3 People

In terms of people within about 300 metres of the works, there is the potential for physical injury to anyone in the water if no mitigation was introduced. Humans are considered likely to hear the piling if they are in the water or diving in the Bay and no mitigation was introduced. The noise levels will become increasingly uncomfortable for distances closer to the piling to the point where divers and swimmers are unlikely to wish to remain in the water. Even at levels below the tolerance limit, there is the potential that noise levels may result in indirect safety impacts for divers (particularly for inexperienced divers) if sudden noise levels result in a startle or panic reaction. This highlights the importance of effective community notification of piling and the need for a “soft start” regime so that noise levels do not suddenly increase.

7.5.4 Safety and potential effects zones

The stop work, restrict work and observation zones in the REMM / EIS are based on the 2012 South Australian Underwater Piling Noise Guidelines. These guidelines are under revision, with an updated framework for the mitigation and management of underwater noise impact works adapted from the *Environment Protection and Biodiversity Conservation Act 1999* Policy Statement 2.1 in context with recent scientific research.

Mitigation measures include safety zones for marine mammals, potential effects zones for fishes and marine turtles, and standard operational procedures for piling. These are to be implemented as follows.

- *Safety zones* – Safety zones applicable for marine mammals and sized based on the predicted noise levels produced by piling activity. The safety zones are a requirement for standard operational procedures. Safety zones are not applicable to fishes and marine turtles.
- *Potential effects zones* – These zones are applicable to the risk assessment of fishes and marine turtles from underwater noise.
- *Standard operational procedures* – These procedures are to be used for all piling works irrespective of location and time of year. Marine fauna observers are required.

Safety and potential effects zones are determined as follows:

- Shut-down zone for marine mammals is based on potential onset of hearing injury (TTS) from cumulative SEL or peak noise levels, whichever is higher.
- Observation zone for marine mammals to be sized based on the shut-down zone plus an additional 250 m range as a minimum. Larger observation zones may be adopted where practical.
- Potential effects zones for fishes and marine turtles to be sized based on both the ranges relating to risk to fatality and hearing injury (TTS).

Table 7-7 shows the adopted safety zones for the project. We note that it is very unlikely that very high-frequency cetaceans (porpoises and river dolphins) would occur in Botany Bay however this hearing group is included for completeness.

Table 7-7: Safety zones

| Functional Hearing Group | Safety Zones (Marine Mammals) | | Potential Effects Zones (Fish & Marine Turtles) | |
|-------------------------------|-------------------------------|------------------|---|--------------------------------------|
| | Shut-Down Zone | Observation Zone | Increased Risk of Fatality | Potential Hearing Injury (Fish Only) |
| Low-Frequency Cetaceans | 550 m | 800 m | - | - |
| High-Frequency Cetaceans | 15 m | 265 m | - | - |
| Very High-Frequency Cetaceans | 800 m | 1050 m | - | - |
| Otariid Pinnipeds | 25 m | 275 m | - | - |
| Sirenians | 50 m | 300 m | | |
| Marine Turtle | - | - | 300 m | - |
| Fish (No Swim Bladder) | - | - | 130 m | 45 m |
| Fish (With Swim Bladder) | - | - | 300 m | 45 m |

It is only practical to include observation zones for marine megafauna as these can be easily spotted as they need to come up for air every so often. It would not be feasible to observe other species, something recognised in the guidelines.

7.5.5 Standard operating procedures for piling works

Standard operational procedures to be adopted during piling activities include pre-start, soft start, normal operation, stand-by operation, and shut-down procedures.

- *Pre-start procedure* – The presence of marine mammals (and other relevant marine fauna where able to be observed) shall be visually monitored by a person suitably experienced in identifying marine fauna for at least 30 minutes before the commencement of the soft start procedure. Particular focus shall be put on the shut-down zone but the observation zone shall be inspected as well, for the full extent where visibility allows. Observations will be made from a high vantage point, ideally >6 m above sea level, if where practicable.
- *Soft start procedure* – If marine mammals have not been sighted within or are likely to enter the shut-down zone during the pre-start procedure, the soft start procedure may commence in which the piling impact energy is gradually increased over a 10-minute period. The soft start procedure shall also be used after long breaks of more than 30 minutes in piling activity. Visual observations of marine mammals within the safety zones shall be maintained by the marine mammal observer (MMO) throughout soft starts. The soft start procedure is an added precaution and may alert marine fauna to the presence of the piling rig and enable animals to move away to distances where injury is unlikely.
- *Normal operation procedure* – If marine mammals have not been sighted within or are not likely to enter the shut-down or observation zone during the soft start procedure, piling may start at full impact energy. The MMO shall continuously undertake visual observations during piling activities. After long breaks in piling activity or when visual observations ceased or were hampered by poor visibility, the pre-start procedure shall be re-initiated. Piling activities at night-time or during low visibility operations may proceed, provided that there were no target marine mammal sightings during the preceding 24 hour period.
- *Stand-by operations procedure* – If a marine mammal is sighted within the observation zone during the soft start or normal operation procedures, the operator of the piling rig shall be placed on stand-by to shut-down the piling rig (should the mammal enter the shut-down zone). The MMO shall continuously monitor the marine mammal in sight.
- *Shut-down procedure* – If a marine mammal is sighted within or about to enter the shut-down zone, the piling activity shall be stopped immediately. If a shut-down procedure occurred and marine mammals have been observed to move outside the shut-down zone, or 30 minutes have lapsed since the last marine mammal sighting, then piling activities shall recommence using the soft start procedure. If marine mammals are detected in the shut-down zone during poor visibility, operations shall stop until visibility improves.

The implementation and management of these observation zones is outlined in the CEMP Appendix B2 Biodiversity Management Plan (Attachment G).

7.6 Construction vibration impacts

7.6.1 Buildings and people

There is specific guidance for vibration generating equipment which determines minimum safe working distances. The minimum working distances are indicative and vary depending on the local ground conditions.

Given the distances between the receivers and the piling works at the wharves, cosmetic damage or disruption to human comfort is not expected for any receivers at La Perouse or any sensitive receivers at Kurnell.

The only receiver that is close enough to the works to be potentially impacted by vibration from piling is COM1, The Boathouse at La Perouse. The piling activities would be intermittent, with the risk of impact reducing as the wharf is constructed further into the Bay.

For other activities such as (but not limited to) landside civil works and utilities relocation, McConnell Dowell will select and use equipment to limit vibration impacts on this receiver, this includes using smaller excavators with a smaller hammer attachment for rock breaking work or smaller rollers when compacting material.

These mitigation measures will also apply to the following heritage structures:

- the La Perouse Monument
- the Coursed Stone Sea Wall
- the Captain Cook Monument
- ferry shelter shed at Kurnell (during landscape works)

Where minimum safe working distances cannot be achieved, vibration monitoring will be undertaken to determine real-time vibration during vibration intensive construction activities.

The control measures in Section 8 outline where a building condition inspection is required where vibration intensive works occur within close proximity to potentially affected public utilities, buildings or structures.

Vibration monitoring and verification is outlined in Attachment E-4.

7.6.2 Heritage items

There are heritage structures such as monuments, plaques and buildings within both Project areas. BS 7385-2 notes that '*a building of historical value should not (unless it is structurally unsound) be assumed to be more sensitive*'.

There are identified rock engravings (AHIMS listed sites) and heritage plaques within the recommended minimum safe working distances, as well as potentially buried archaeology. Where these items are within the standard safe working distances from vibration intensive equipment, they could experience cosmetic damage. Vibration monitoring in consultation with a qualified heritage person will be carried out to determine safe working distances and safe equipment to use near these sensitive features.

Vibration monitoring and verification is outlined in Attachment E-4.

8 Environmental control measures

Specific measures and requirements to address contract specifications, MCoA, EPBC-CoA and REMMs in relation to impacts from noise and vibration are outlined in Table 8 1.

Table 8-1 Noise and vibration management and mitigation measures

| ID | Measure / Requirement | Responsibility | When to implement | Timing/frequency | Reference | Evidence |
|----------------|--|--|----------------------------------|-----------------------|---|----------------------------|
| General | | | | | | |
| NV_1 | A Construction Noise and Vibration Management Plan (NVMP) will be prepared and implemented as part of the CEMP. The plan will follow the approach of the Interim Construction Noise Guideline (NSW DECC, 2009) and provide details of construction management measures and procedures. | McConnell Dowell Environment & Sustainability Lead | Pre-construction Construction | Prior to construction | MCoA E45 (a) REMM SN1 Interim Construction Noise Guideline (NSW DECC, 2009) | This CNVMP |
| NV_2 | The standard hours of construction for the Project are: <ul style="list-style-type: none"> Monday to Friday 7 am to 6 pm; and Saturday 8 am to 1 pm. There would be no construction work on Sundays or public holidays. | McConnell Dowell Environment & Sustainability Lead Construction Manager Site Supervisor | Construction | During construction | MCoA E43 MCoA E45 (a), (b), (c) and (d) REMM SN1 | Attachment A OOHW Protocol |
| NV_3 | Out of hours are anytime outside of standard hours. Out of hours works must be undertaken in accordance with MCoA E44 and the Out of Hours Works Protocol | McConnell Dowell Environment & Sustainability Lead | Pre-construction Construction | Prior to construction | MCoA E44 MCoA E45 (a), (b), (c) and (d) | Attachment A OOHW Protocol |

| ID | Measure / Requirement | Responsibility | When to implement | Timing/frequency | Reference | Evidence |
|------|---|---|-------------------|---------------------|---|------------------------|
| | and provision to cover working outside of the standard hours set by the Construction Noise and Vibration Guidelines (RMS, 2016)) | | | | REMM SN1 Construction Noise and Vibration Guidelines (RMS, 2016) | |
| NV_4 | All highly noise intensive works that result in an exceedance of the applicable NML at the same receiver must only be undertaken: a) between the hours of 8:00 am to 6:00 pm Monday to Friday; b) between the hours of 8:00 am to 1:00 pm Saturday; and c) if continuously, then not exceeding three hours, with a minimum cessation of highly noise intensive work of not less than one hour. | McConnell Dowell Environment & Sustainability Lead Site Supervisors | Construction | During construction | MCoA E43 MCoA E45 (a) | Site inspection report |
| NV_5 | Industry best practice construction methods must be implemented where reasonably practicable to ensure that noise levels are minimised. Practices must include, but are not limited to: | McConnell Dowell Environment & Sustainability Lead Site Supervisors | Construction | During construction | REMM SN1 MCoA E45 (a) MCoA E47 Best Practice | Site inspection report |

| ID | Measure / Requirement | Responsibility | When to implement | Timing/frequency | Reference | Evidence |
|------|--|---|-------------------|---------------------|--------------------------|------------------------|
| | <ul style="list-style-type: none"> a. use of regularly serviced low sound power equipment; and / or b. temporary noise barriers (including the arrangement of plant and equipment) around noisy equipment and activities such as rockhammering and concrete cutting; and / or c. use of alternative construction and demolition techniques. | | | | | |
| NV_6 | Very noisy activities will be scheduled for normal working hours. If the work cannot be undertaken during the day, the loudest works (deemed to produce noise or vibration above set criteria) will be undertaken earlier in the evening (prior to 11pm) and accordance with MCoA E44 and the OOHW Approval. | McConnell Dowell Environment & Sustainability Lead | Construction | During construction | MCoA E45 (a) REMM SN1 | Site inspection report |
| NV_7 | All employees, contractors and subcontractors are to receive an | McConnell Dowell | Construction | During construction | REMM SN1 | Site inspection report |

| ID | Measure / Requirement | Responsibility | When to implement | Timing/frequency | Reference | Evidence |
|------|---|-------------------------------------|-------------------|---------------------|-----------------------------|------------------------|
| | <p>environmental induction. The induction must at least include:</p> <ul style="list-style-type: none"> • all project specific and relevant standard noise and vibration mitigation measures • relevant licence and approval conditions • permissible hours of work • any limitations on high noise generating activities • location of nearest sensitive receivers • construction employee parking areas • designated loading/unloading areas and procedures • site opening/closing times (including deliveries) • environmental incident procedures. | Environment & Sustainability Lead | | | MCoA E45 (a), (b), (c), (d) | Induction records |
| NV_8 | No swearing or unnecessary shouting or loud stereos/radios on site. | McConnell Dowell Site Supervisor | Construction | During construction | REMM SN1 MCoA E45 (a) | Site inspection report |

| ID | Measure / Requirement | Responsibility | When to implement | Timing/frequency | Reference | Evidence |
|--------------------------------------|--|--|-------------------|---------------------|--------------------------|------------------------|
| NV_9 | No dropping of materials from height, throwing of metal items and slamming of doors. | McConnell Dowell Site Supervisor | Construction | During construction | MCoA E45 (a) REMM SN1 | Site inspection report |
| NV_10 | No blasting will be undertaken. | McConnell Dowell Construction Manager | Construction | During construction | MCoA E45 (a) REMM SN1 | Site inspection report |
| Vehicles, plant and equipment | | | | | | |
| NV_11 | The offset distance between noisy plant and adjacent sensitive receivers is to be maximised. | McConnell Dowell Site Supervisor | Construction | During construction | MCoA E45 (a) REMM SN1 | Site inspection report |
| NV_12 | Noise-emitting plant to be directed away from sensitive receivers. | McConnell Dowell Site Supervisor | Construction | During construction | MCoA E45 (a) REMM SN1 | Site inspection report |
| NV_13 | Non-tonal reversing beepers (or an equivalent mechanism) must be fitted and used on all construction vehicles and mobile plant regularly used on site and for any out of hours work. | McConnell Dowell Site Supervisor | Construction | During construction | MCoA E45 (a) REMM SN1 | Site inspection report |
| NV_14 | Limit the use of engine compression brakes at night and in residential areas | McConnell Dowell Site Supervisor | Construction | During construction | MCoA E45 (a) REMM SN1 | Site inspection report |

| ID | Measure / Requirement | Responsibility | When to implement | Timing/frequency | Reference | Evidence |
|-------|--|-------------------------------------|-------------------|---------------------|---|---|
| NV_15 | Deliveries to Site will be made during standard construction hours. Out of hours deliveries will only be made where it is required to maintain the safe and efficient operation of the road network. | McConnell Dowell Site Supervisor | Construction | During construction | MCoA E45 (a) REMM SN1 | Traffic Management Plan |
| NV_16 | Vehicles will avoid queuing or idling outside residential properties. | McConnell Dowell Site Supervisor | Construction | During construction | MCoA E45 (a) REMM SN1 | Traffic Management Plan |
| NV_17 | Plan traffic flow, parking and loading or unloading areas to minimise reversing movements within the Site. | McConnell Dowell Site Supervisor | Construction | During construction | MCoA E45 (a) REMM SN1 | Site inspection report Traffic Management Plan Traffic Control Plan |
| NV_18 | Reduce throttle setting and turn off equipment when not being used | McConnell Dowell Site Supervisor | Construction | During construction | MCoA E45 (a) REMM SN1 | Site inspection report |
| NV_19 | Consider using electric , hydraulic equipment or equipment with low sound power levels where reasonably practicable | McConnell Dowell Site Supervisor | Construction | During construction | REMM SN1 MCoA E45 (a) MCoA E47 Best Practice | Site inspection report |

| ID | Measure / Requirement | Responsibility | When to implement | Timing/frequency | Reference | Evidence |
|------------------------------------|--|---|-------------------|-----------------------|--|--|
| NV_20 | All plant and equipment used on Site must be maintained in a proper and efficient condition. | McConnell Dowell Site Supervisor | Construction | During construction | REMM SN1 | Site inspection report Plant checklist |
| NV_21 | If rental equipment are to be used, the noise levels of plant and equipment items are to be considered in rental decisions with a priority placed on plant and equipment with low sound power levels. | McConnell Dowell Site Supervisor | Construction | During construction | REMM SN1 MCoA E45 (a) MCoA E47 Best Practice | Site inspection report |
| Monitoring and verification | | | | | | |
| NV_22 | Noise and vibration verification including complaints procedures, monitoring and reporting will be undertaken as outlined in the Construction Monitoring Program for Noise & Vibration to assess performance against relevant noise and vibration criteria | McConnell Dowell Environment & Sustainability Lead | Construction | During construction | REMM SN1 MCoA E9 MCoA E45 (a), (b), (c), and (d) ICNG | Attachment E - Construction Monitoring Program – Noise & Vibration |
| Building condition surveys | | | | | | |
| NV_23 | The Contractor must carry out a Building Condition Inspection for each public utility, structure and building within the distance from the appropriate activity listed below; however, where the risk of | McConnell Dowell Construction Manager | Construction | Prior to construction | MCoA E45 (b), (c), and (d) Best Practice | Building condition surveys |

| ID | Measure / Requirement | Responsibility | When to implement | Timing/frequency | Reference | Evidence | | | | | | | | | | | | |
|--------------------------------------|---|---|-----------------------------------|----------------------------------|--|--|-----------|--------------------------------------|-----------|--------------------------------------|-----------|--------------------------|-----------|--|--|--|--|--|
| | <p>damage to an item is assessed to be very low, the requirement for a Building Condition Inspection may be waived with the Principal's agreement.</p> <table border="1" data-bbox="237 456 680 1034"> <thead> <tr> <th data-bbox="237 456 510 507">Activity</th> <th data-bbox="510 456 680 507">Distance</th> </tr> </thead> <tbody> <tr> <td data-bbox="237 507 510 592">Pile Driving</td> <td data-bbox="510 507 680 592">150 metres</td> </tr> <tr> <td data-bbox="237 592 510 711">Excavation by hammering or ripping</td> <td data-bbox="510 592 680 711">75 metres</td> </tr> <tr> <td data-bbox="237 711 510 831">Vibrating Compaction > 7 tonne plant</td> <td data-bbox="510 711 680 831">50 metres</td> </tr> <tr> <td data-bbox="237 831 510 951">Vibrating Compaction < 7 tonne plant</td> <td data-bbox="510 831 680 951">25 metres</td> </tr> <tr> <td data-bbox="237 951 510 1034">Demolition of Structures</td> <td data-bbox="510 951 680 1034">50 metres</td> </tr> </tbody> </table> | Activity | Distance | Pile Driving | 150 metres | Excavation by hammering or ripping | 75 metres | Vibrating Compaction > 7 tonne plant | 50 metres | Vibrating Compaction < 7 tonne plant | 25 metres | Demolition of Structures | 50 metres | | | | | |
| Activity | Distance | | | | | | | | | | | | | | | | | |
| Pile Driving | 150 metres | | | | | | | | | | | | | | | | | |
| Excavation by hammering or ripping | 75 metres | | | | | | | | | | | | | | | | | |
| Vibrating Compaction > 7 tonne plant | 50 metres | | | | | | | | | | | | | | | | | |
| Vibrating Compaction < 7 tonne plant | 25 metres | | | | | | | | | | | | | | | | | |
| Demolition of Structures | 50 metres | | | | | | | | | | | | | | | | | |
| NV_24 | A pre-construction building condition assessment of Aboriginal and non-Aboriginal heritage items within 70 metres of the construction boundary (refer to the Heritage Management Sub Plan) will be carried out by a | McConnell Dowell Environment & Sustainability Lead | Pre-construction and construction | Prior to and during construction | REMM SN2 MCoA E45 (b), (c), and (d) Heritage Management Sub Plan | Building condition surveys Attachment E | | | | | | | | | | | | |

| ID | Measure / Requirement | Responsibility | When to implement | Timing/frequency | Reference | Evidence |
|----|--|----------------|-------------------|------------------|-----------|----------|
| | <p>suitably qualified person prior to construction.</p> <p>During construction, inspections of the construction activities and work areas will be undertaken to monitor and review the construction methodology and confirm the integrity of the nearby significant structural elements.</p> <p>For heritage items identified at risk during the pre-construction condition assessment, minimum safe working distances will be established and vibration monitoring be carried out prior to the commencement of construction and monitored throughout construction to identify any construction-related impacts.</p> <p>If impacts are detected, work in the area will stop, notification to required parties would be made and appropriate environmental management measures will be implemented such as using alternative construction techniques or installing protection structures in collaboration with a heritage consultant.</p> | | | | | |

| ID | Measure / Requirement | Responsibility | When to implement | Timing/frequency | Reference | Evidence |
|---------------------|--|--|-------------------------|------------------------------|--|--|
| Notification | | | | | | |
| NV_25 | <p>Any noise or vibration affected sensitive receivers will be notified at least five days before starting work. The notification will include details of:</p> <ul style="list-style-type: none"> a) Construction periods and working hours b) Contact information for project management staff c) Complaint and incident reporting d) How to obtain further information. <p>This excludes emergency works which will be covered under the Community Communication Strategy (CCS).</p> | <p>McConnell Dowell Environment & Sustainability Lead</p> | <p>Pre-construction</p> | <p>Prior to construction</p> | <p>MCoA E51 MCoA E45 (a), (b), (c), and (d) REMM SN3</p> | <p>Notification letters CCS</p> |
| NV_26 | <p>Owners and occupiers of properties at risk of exceeding the screening criteria for cosmetic damage must be notified before work that generates vibration commences in the vicinity of those properties.</p> <p>If the potential exceedance is to occur more than once or extend over a period of 24 hours, owners</p> | | | | | |

| ID | Measure / Requirement | Responsibility | When to implement | Timing/frequency | Reference | Evidence |
|-------------------------|---|---|---|-----------------------|-----------|-------------|
| | and occupiers are to be provided a schedule of potential exceedances on a monthly basis for the duration of the potential exceedances, unless otherwise agreed by the owner and occupier. | | | | | |
| NV_27 | Public communication, including website updates and notices at the Project areas, will be carried out before any piling starts. This will be included as part of the CCS. | McConnell Dowell Community Manager | Construction | During construction | REMM UN2 | CCS |
| NV_28 | Notify the recreational user groups in the area and post notices at the key beaches. Notification is to provide warning of the ongoing piling works and expected underwater noise. | McConnell Dowell Community Manager | Construction | During construction | REMM UN1 | CCS |
| Underwater noise | | | | | | |
| NV_29 | Investigate the use bubble curtains to reduce the severity of the energy of the sounds caused by the driving of the piles. | McConnell Dowell Environment & Sustainability Lead | Prior to underwater noise generating activities | Prior to construction | REMM UN1 | Section 9.3 |

| ID | Measure / Requirement | Responsibility | When to implement | Timing/frequency | Reference | Evidence |
|-------|---|--|--|-----------------------|-----------|---|
| NV_30 | Prepare and maintain a compliance and siting report while piling takes place. | McConnell Dowell Construction Manager | Construction | During construction | REMM UN1 | Piling compliance report |
| NV_31 | Aim to avoid piling on weekends and during public holidays. | McConnell Dowell Construction Manager | Construction | During construction | REMM UN1 | Piling compliance report |
| NV_32 | Trained marine mammal observers (MMO), with demonstrated experience in the identification and management of marine mammals are to undertake the observation of marine mammals during piling and re-strike testing | McConnell Dowell Environment & Sustainability Lead Marine Mammal Observers | Prior to and during underwater noise generating activities | Prior to construction | REMM UN3 | Section 7.5.5 CEMP Appendix B2 Biodiversity Management Plan (Attachment G) |
| NV_33 | Piling Operation Procedures a) Pre-start Observation b) Soft-Start Procedure c) Stand by procedure d) Normal Piling Procedure | McConnell Dowell Construction Manager] | Prior to and during underwater noise generating activities | During construction | REMM UN3 | Section 7.5.5 CEMP Appendix B2 Biodiversity Management Plan (Attachment G) |

| ID | Measure / Requirement | Responsibility | When to implement | Timing/frequency | Reference | Evidence |
|-------|---|---|---|----------------------------|-----------------|---|
| NV_34 | <p>Re-strike testing</p> <p>a) Before the commencement of re-strike testing, marine mammal observers must visually monitor the observation zone for marine mammals for a minimum of 30 minutes. Re-strike testing may only commence if no marine mammals are sighted in the observation zone or shut-down zone during this time.</p> <p>b) A maximum of 20 full impact strikes are to be applied to each test pile.</p> | <p>McConnell Dowell</p> <p>Construction Manager</p> | <p>Prior to and during underwater noise generating activities</p> | <p>During construction</p> | <p>REMM UN3</p> | <p>Section 7.5.5 CEMP Appendix B2 Biodiversity Management Plan (Attachment G)</p> |
| NV_35 | <p>Shut-Down requirements</p> <p>a) If visibility is poor and marine mammal observers are unable to clearly identify objects to the full observation zone distance, a vessel or aircraft search must be conducted or the piling and re-strike testing postponed until visibility has improved.</p> <p>b) If any marine mammals are spotted within the shut-down zone, piling and re-strike testing must cease immediately or as soon as safe to do so until the</p> | <p>McConnell Dowell</p> <p>Construction Manager</p> | <p>Prior to and during underwater noise generating activities</p> | <p>During construction</p> | <p>REMM UN3</p> | <p>Section 7.5.5 CEMP Appendix B2 Biodiversity Management Plan (Attachment G)</p> |

| ID | Measure / Requirement | Responsibility | When to implement | Timing/frequency | Reference | Evidence |
|-------|---|--|-----------------------|---------------------|-----------|------------------------------|
| | <p>marine mammals move outside of the shutdown zone.</p> <p>c) All piling and re-strike testing must cease for a minimum of 1 hour after the last sighting of marine mammals within the shut-down zone. Piling and re-strike testing must recommence at the pre-start observation after the 1 hour shut-down has elapsed, with the clearance from the marine mammal observer.</p> | | | | | |
| NV_36 | All vessels associated with construction must observe low speed operations (4 knots or less) when operating within the construction boundary at La Perouse and Kurnell. | <p>McConnell Dowell</p> <p>Construction Manager</p> | Construction | During construction | | Marine Works Management Plan |
| NV_37 | Underwater noise predictions are conservative; therefore, noise monitoring is not required. However, if desired, underwater noise monitoring may be carried out before the main construction works starts to determine or confirm the size of the zones outlined in Section 7.3 and in accordance with Section 5.2 of the Underwater Piling Noise | <p>McConnell Dowell</p> <p>Construction Manager</p> <p>Environment & Sustainability Lead</p> | Prior to construction | Pre-construction | REMM UN3 | Attachment E-3 |

| ID | Measure / Requirement | Responsibility | When to implement | Timing/frequency | Reference | Evidence |
|----------|---|---|-----------------------|------------------|---|--------------------------------|
| | Guidelines (Government of South Australia, 2012). | | | | | |
| Land Use | | | | | | |
| NV_38 | A detailed land use survey will be undertaken to confirm sensitive land user(s) potentially exposed to construction noise and vibration, construction ground-borne noise and operational noise. | McConnell Dowell Environment & Sustainability Lead | Prior to construction | Pre-construction | MCoA E41 MCoA E45 (a), (b), (c), and (d) | Attachment D – Land Use Survey |

9 Additional noise and vibration mitigation measures

The implementation of the standard management measures, compliance with maximum sound power levels for plant and equipment, construction hour management and standard community consultation measures in this CNVMP will significantly reduce the noise and vibration impacts on nearby sensitive receivers.

Nevertheless, due to the highly variable nature of construction activities and the likelihood of work outside the standard construction hours, some exceedances of the construction noise and vibration management levels are likely to be unavoidable.

Where there is a potential exceedance of the construction noise and vibration management levels, a number of additional measures to mitigate such exceedances – primarily aimed at pro-active engagement with affected sensitive receivers – would be explored and have been included in this CNVMP. The additional mitigation measures to be applied are outlined in Table 9-1.

Table 9-1 Additional management measures

| Measure | Description | Abbreviation |
|---|--|--------------|
| Notification (letterbox drop or equivalent) | Advanced warning of works and potential disruptions can assist in reducing the impact on the community. The notification may consist of a letterbox drop (or equivalent) detailing work activities, time periods over which these will occur, impacts and mitigation measures. Notification will be a minimum of 5 working days prior to the start of works. The approval conditions for projects may also specify requirements for notification to the community about works that may impact on them. | N |
| Specific notifications | Specific notifications are letterbox dropped (or equivalent) to identified stakeholders no later than seven calendar days ahead of construction activities that are likely to exceed the noise objectives. The specific notification provides additional information when relevant and informative to more highly affected receivers than covered in general letterbox drops. The exact conditions under which specific notifications would proceed are defined in the relevant Additional Mitigation Measures (Table 9-2 to Table 9-4). This form of communication is used to support periodic notifications, or to advertise unscheduled works. | SN |
| Phone calls | Phone calls detailing relevant information made to identified/affected stakeholders within seven calendar days of proposed work. Phone calls provide affected stakeholders with personalised contact and tailored advice, with the opportunity to provide comments on the proposed work and specific needs. Where the resident cannot be telephoned then an alternative form of engagement will be used. | PC |

| Measure | Description | Abbreviation |
|----------------------|--|--------------|
| Individual briefings | Individual briefings are used to inform stakeholders about the impacts of high noise activities and mitigation measures that will be implemented. Project representatives would visit identified stakeholders at least 48 hours ahead of potentially disturbing construction activities. Individual briefings provide affected stakeholders with personalised contact and tailored advice, with the opportunity to comment on the project. Where the resident cannot be met with individually then an alternative form of engagement will be used. | IB |
| Respite Offers | Respite Offers will be considered made where there are high noise and vibration generating activities near receivers. As a guide work will be carried out in continuous blocks that do not exceed 3 hours each, with a minimum respite period of one hour between each block. The actual duration of each block of work and respite will be flexible to accommodate the usage of and amenity at nearby receivers. | RO |
| Respite Period 1 | Out of hours construction noise in out of hours period 1 shall be limited to no more than three consecutive evenings per week except where there is a Duration Respite. For night work these periods of work will be separated by not less than one week and no more than 6 evenings per month. | R1 |
| Respite Period 2 | Night time construction noise in out of hours period 2 shall be limited to two consecutive nights except for where there is a Duration Respite. For night work these periods of work will be separated by not less than one week and 6 nights per month. Where practicable, high noise generating works shall be completed before 11pm. | R2 |
| Duration Respite | Respite offers and respite periods 1 and 2 may be counterproductive in reducing the impact on the community for longer duration projects. In this instance and where it can be strongly justified it may be beneficial to increase the work duration, number of evenings or nights worked through Duration Respite so that the project can be completed more quickly. The project team will engage directly with affected residents and sensitive land user(s) (i.e. where noise levels are expected to exceed the NML) to negotiate agreements for Duration Respite. | DR |

| Measure | Description | Abbreviation |
|---------------------------|--|--------------|
| Alternative Accommodation | Alternative accommodation options may be offered to residents living in close proximity to construction works that are likely to experience highly intrusive noise levels (Tables C1-C3). Additional aspects for consideration shall include whether the highly intrusive activities occur throughout the night or before midnight. | AA |
| Verification | Routine checks of noise levels or following reasonable complaints. This verification will include measurement of the background noise level and construction noise. | V |

9.1 Applying Additional Mitigation Measures

The following steps need to be carried out to determine the Additional Mitigation Measures (AMM) to be implemented:

- Determine the duration (time period) when the work is to be undertaken.
- Determine the level of exceedance above the NML
- From the AMM table, identify the additional mitigation measures to be implemented (abbreviation codes are explained in Table 9-1).

Table 9-2 Additional mitigation measures – airborne construction noise

| Perception | dB(A) above RBL | dB(A) above NML | Additional mitigation measure type | Mitigation Levels |
|--|-----------------|-----------------|------------------------------------|-------------------|
| All periods >75 dB(A) | | | N, V, PC, RO | > 75 dB(A) |
| Standard: Mon-Fri (7am – 6pm), Sat (8am – 1pm) Sun/Public Holiday (Nil) | | | | |
| Noticeable | 5 to 10 | 0 | - | NML |
| Clearly Audible | 10 to 20 | <10 | - | NML |
| Moderately Intrusive | 20 to 30 | 10 to 20 | N, V | NML+10 |
| Highly Intrusive | >30 | >20 | N, V | NML+20 |
| OOHW Period 1: Mon-Fri (6pm – 10pm), Sat (7am – 8am & 1pm – 10pm), Sun/Public Holiday (8am – 6pm) | | | | |
| Noticeable | 5 to 10 | < 5 | - | NML |
| Clearly Audible | 10 to 20 | 5 to 15 | N, R1, DR | NML+5 |
| Moderately Intrusive | 20 to 30 | 15 to 25 | V, N, R1, DR | NML+15 |

| Perception | dB(A) above RBL | dB(A) above NML | Additional mitigation measure type | Mitigation Levels |
|---|-----------------|-----------------|------------------------------------|-------------------|
| Highly Intrusive | > 30 | > 25 | V, IB, N, R1, DR, PC, SN | NML+25 |
| OOHW Period 2: Mon-Fri (10pm – 7am) Sat (10 pm – 8am) Sun/Public Holiday (6pm – 7am) | | | | |
| Noticeable | 5 to 10 | < 5 | N | NML |
| Clearly Audible | 10 to 20 | 5 to 15 | V, N, R2, DR | NML+5 |
| Moderately Intrusive | 20 to 30 | 15 to 25 | V, IB, N, PC, SN, R2, DR | NML+15 |
| Highly Intrusive | > 30 | > 25 | AA, V, IB, N, PC, SN, R2, DR | NML+25 |

Table 9-3 – Additional mitigation measures – ground-borne construction noise

| Perception | dB(A) above GB NML | Additional mitigation measure type | Apply to |
|--|---|------------------------------------|----------|
| Standard: Mon-Fri (7am – 6pm), Sat (8am – 1pm) Sun/Public Holiday (Nil) | | | |
| N/A | Vibration only applicable during standard hours | | |
| OOHW Period 1: Mon-Fri (6pm – 10pm), Sat (7am – 8am & 1pm – 10pm), Sun/Public Holiday (8am – 6pm) | | | |
| Clearly Audible | < 10 | N | All |
| Moderately Intrusive | 10 to 20 | V, N, R1, DR, SN | All |
| Highly Intrusive | > 20 | V, IB, N, R1, DR, PC, SN | All |
| OOHW Period 2: Mon-Fri (10pm – 7am) Sat (10 pm – 8am) Sun/Public Holiday (6pm – 7am) | | | |
| Clearly Audible | < 10 | V, N, SN | All |
| Moderately Intrusive | 10 to 20 | AA, V, IB, N, PC, RP, SN, R2, DR | All |
| Highly Intrusive | > 20 | AA, V, IB, N, PC, RP, SN, R2, DR | All |

Table 9-4 – Additional mitigation measures – construction vibration

| Construction hours | Additional mitigation measure type | Apply to: |
|--|------------------------------------|-----------|
| Standard: Mon-Fri (7am – 6pm), Sat (8am – 1pm) Sun/Public Holiday (Nil) | | |
| Predicted vibration levels exceeds maximum levels | V, N, RO | All |
| OOHW Period 1: Mon-Fri (6pm – 10pm), Sat (7am – 8am & 1pm – 10pm), Sun/Public Holiday (8am – 6pm) | | |
| Predicted vibration levels exceeds maximum levels | V, IB, N, RO, PC, R1, SN | All |
| OOHW Period 2: Mon-Fri (10pm – 7am) Sat (10 pm – 8am) Sun/Public Holiday (6pm – 7am) | | |
| Predicted vibration levels exceeds maximum levels | AA, V, IB, N, PC, R2, SN | All |

9.2 Recommended AMM

Based on the predicted construction noise exceedances in Section 7.2 the following AMM will be implemented at the nearby receivers.

Table 9-5 Recommended AMM at La Perouse

| ID | Period | | NML | Recommended AMM at each construction stage | | | | | | | | | | | | | | | | |
|------|----------------|-------|-----|--|-------------------------------------|--------------------------------|-------------------------------|-----------------------------------|------------------------------|----------------------------|------------------------------|------------------------|-------------------------|----------------|-------------------------|--|-----------------------------------|-----------------------|------------------|--------------------------|
| | | | | 1A – Compound Setup | 2A – Service Install – Sydney Water | 2B – Service Install - Ausgrid | 2C – Relocation – Fibre Optic | 3A – Construction – Rock Platform | 3B – Removal – Rock Platform | 4A – Piling Works - Marine | 4B – Piling Works - Landside | 4C – Pre-cast Delivery | 4D – Plank Installation | 4E – Deck Pour | 4F – Fit Out & Services | 5A – Abutment Construction / Hardscaping | 5C – Service Installation - Wharf | 5D – Southern Carpark | 5E - Landscaping | 6A – Removal of Compound |
| RES1 | Standard Hours | Day | 53 | - | N, V | N, V | - | - | - | N, V | N, V | - | - | - | - | N, V | - | - | - | - |
| | OOHW | Night | 43 | - | AA, V, IB, N, PC, SN, R2, DR | V, IB, N, PC, SN, R2, DR | V, N, R2, DR | - | - | - | AA, V, IB, N, PC, SN, R2, DR | - | N | - | - | - | - | - | - | - |
| RES2 | Standard Hours | Day | 53 | - | N, V, PC, RO | N, V | - | - | - | N, V | N, V | - | - | - | - | N, V | - | N, V | - | - |

| ID | Period | | NML | Recommended AMM at each construction stage | | | | | | | | | | | | | | | | |
|------|----------------|-------|-----|--|-------------------------------------|--------------------------------|-------------------------------|-----------------------------------|------------------------------|------------------------------|------------------------------|------------------------|-------------------------|----------------|-------------------------|--|-----------------------------------|-----------------------|------------------|--------------------------|
| | | | | 1A – Compound Setup | 2A – Service Install – Sydney Water | 2B – Service Install - Ausgrid | 2C – Relocation – Fibre Optic | 3A – Construction – Rock Platform | 3B – Removal – Rock Platform | 4A – Piling Works - Marine | 4B – Piling Works - Landside | 4C – Pre-cast Delivery | 4D – Plank Installation | 4E – Deck Pour | 4F – Fit Out & Services | 5A – Abutment Construction / Hardscaping | 5C – Service Installation - Wharf | 5D – Southern Carpark | 5E - Landscaping | 6A – Removal of Compound |
| | OOHW | Night | 43 | - | AA, V, IB, N, PC, SN, R2, DR | AA, V, IB, N, PC, SN, R2, DR | V, N, R2, DR | - | - | AA, V, IB, N, PC, SN, R2, DR | - | N | - | - | - | - | - | - | - | - |
| RES3 | Standard Hours | Day | 53 | - | N, V | N, V | - | - | - | N, V | - | - | - | - | - | N, V | - | N, V | - | - |
| | OOHW | Night | 43 | - | AA, V, IB, N, PC, SN, R2, DR | V, IB, N, PC, SN, R2, DR | V, IB, N, PC, SN, R2, DR | - | - | AA, V, IB, N, PC, SN, R2, DR | - | N | - | - | - | - | - | - | - | - |
| RES4 | Standard Hours | Day | 53 | - | - | - | - | - | - | N, V | - | - | - | - | - | - | - | - | - | - |

| ID | Period | | NML | Recommended AMM at each construction stage | | | | | | | | | | | | | | | | | |
|------|----------------|-------|-----------------|--|-------------------------------------|--------------------------------|-------------------------------|-----------------------------------|------------------------------|------------------------------|------------------------------|------------------------|-------------------------|----------------|-------------------------|--|-----------------------------------|-----------------------|------------------|--------------------------|--|
| | | | | 1A – Compound Setup | 2A – Service Install – Sydney Water | 2B – Service Install - Ausgrid | 2C – Relocation – Fibre Optic | 3A – Construction – Rock Platform | 3B – Removal – Rock Platform | 4A – Piling Works - Marine | 4B – Piling Works - Landside | 4C – Pre-cast Delivery | 4D – Plank Installation | 4E – Deck Pour | 4F – Fit Out & Services | 5A – Abutment Construction / Hardscaping | 5C – Service Installation - Wharf | 5D – Southern Carpark | 5E - Landscaping | 6A – Removal of Compound | |
| | OOHW | Night | 43 | - | V, IB, N, PC, SN, R2, DR | V, IB, N, PC, SN, R2, DR | V, N, R2, DR | - | - | AA, V, IB, N, PC, SN, R2, DR | - | - | - | - | - | - | - | - | - | - | |
| ARC1 | Standard hours | Day | 65 | - | N, V, PC, RO | N, V, PC, RO | - | - | - | - | N, V | - | - | - | - | - | - | - | - | - | |
| ARC2 | Standard hours | Day | 65 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | |
| PRC1 | Standard hours | Day | 60 | - | - | - | - | - | - | N, V | N, V | - | - | - | - | - | - | - | - | - | |
| CHC1 | Standard hours | Day | 45 ¹ | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | |

| ID | Period | | NML | Recommended AMM at each construction stage | | | | | | | | | | | | | | | | | |
|-----------------------------|----------------|-----|-----------------|--|-------------------------------------|--------------------------------|-------------------------------|-----------------------------------|------------------------------|----------------------------|------------------------------|------------------------|-------------------------|----------------|-------------------------|--|-----------------------------------|-----------------------|------------------|--------------------------|--|
| | | | | 1A – Compound Setup | 2A – Service Install – Sydney Water | 2B – Service Install - Ausgrid | 2C – Relocation – Fibre Optic | 3A – Construction – Rock Platform | 3B – Removal – Rock Platform | 4A – Piling Works - Marine | 4B – Piling Works - Landside | 4C – Pre-cast Delivery | 4D – Plank Installation | 4E – Deck Pour | 4F – Fit Out & Services | 5A – Abutment Construction / Hardscaping | 5C – Service Installation - Wharf | 5D – Southern Carpark | 5E - Landscaping | 6A – Removal of Compound | |
| COM1 | Standard hours | Day | 70 | - | - | N, V, PC, RO | - | - | - | - | - | - | - | - | - | - | - | - | - | - | |
| CUL1 | Standard hours | Day | 45 ¹ | - | N, V | N, V | - | - | - | N, V | N, V | - | - | - | - | N, V | - | N, V | - | - | |
| CUL2 | Standard hours | Day | 45 ¹ | - | - | - | - | - | - | N, V | N, V | - | - | - | - | - | - | N, V | - | - | |
| CMU1 | Standard hours | Day | 45 ¹ | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | |
| Note 1: Internal NML | | | | | | | | | | | | | | | | | | | | | |

Table 9-6 Recommended AMM at Kurnell

| ID | Period | | NML | Recommended AMM at each construction stage | | | | | | | | | | | | | | | | | | |
|------|-------------------|-------|-----|--|---------------------|------------------------------|-------------------------------------|--------------------------------|-----------------------------------|------------------------------|---------------------------------|----------------------------|------------------------------|------------------------------|------------------------|-------------------------|----------------|-------------------------|--|-----------------------------------|------------------|--------------------------|
| | | | | 0A – Demolition of Old Jetty | 1A – Compound Setup | 1B – Tree Trimming / Removal | 2A – Service Install – Sydney Water | 2B – Service Install - Ausgrid | 3A – Construction – Rock Platform | 3B – Removal – Rock Platform | 3C – Construction – Steel Jetty | 3D – Removal – Steel Jetty | 4A – Piling Works - Marine | 4B – Piling Works - Landside | 4C – Pre-cast Delivery | 4D – Plank Installation | 4E – Deck Pour | 4F – Fit Out & Services | 5B – Abutment Construction / Hardscaping | 5C – Service Installation - Wharf | 5E - Landscaping | 6A – Removal of Compound |
| RES1 | Standard Hours | Day | 53 | - | N, V | N, V | N, V, PC, RO | N, V, PC, RO | - | - | N, V | - | N, V | N, V | - | - | - | - | - | - | N, V | N, V, PC, RO |
| | OOHW ¹ | Night | 43 | - | - | - | AA, V, IB, N, PC, SN, R2, DR | AA, V, IB, N, PC, SN, R2, DR | - | - | - | - | AA, V, IB, N, PC, SN, R2, DR | - | V, N, R2, DR | - | - | - | - | - | - | - |
| RES2 | Standard Hours | Day | 53 | - | - | - | - | - | - | N, V | - | N, V | N, V | - | - | - | - | - | - | - | - | - |

| ID | Period | | NML | Recommended AMM at each construction stage | | | | | | | | | | | | | | | | | | |
|------|-------------------|-------|-----|--|---------------------|------------------------------|-------------------------------------|--------------------------------|-----------------------------------|------------------------------|---------------------------------|----------------------------|------------------------------|------------------------------|------------------------|-------------------------|----------------|-------------------------|--|-----------------------------------|------------------|--------------------------|
| | | | | 0A – Demolition of Old Jetty | 1A – Compound Setup | 1B – Tree Trimming / Removal | 2A – Service Install – Sydney Water | 2B – Service Install - Ausgrid | 3A – Construction – Rock Platform | 3B – Removal – Rock Platform | 3C – Construction – Steel Jetty | 3D – Removal – Steel Jetty | 4A – Piling Works - Marine | 4B – Piling Works - Landside | 4C – Pre-cast Delivery | 4D – Plank Installation | 4E – Deck Pour | 4F – Fit Out & Services | 5B – Abutment Construction / Hardscaping | 5C – Service Installation - Wharf | 5E - Landscaping | 6A – Removal of Compound |
| | OOHW ¹ | Night | 43 | - | - | - | V, IB, N, PC, SN, R2, DR | V, IB, N, PC, SN, R2, DR | - | - | - | - | AA, V, IB, N, PC, SN, R2, DR | - | - | - | - | - | - | - | - | - |
| RES3 | Standard Hours | Day | 53 | - | - | - | N, V | N, V | - | - | N, V | - | N, V | - | - | - | - | - | - | - | - | N, V |
| | OOHW ¹ | Night | 43 | - | - | - | AA, V, IB, N, PC, SN, R2, DR | AA, V, IB, N, PC, SN, R2, DR | - | - | - | - | AA, V, IB, N, PC, SN, R2, DR | - | V, N, R2, DR | - | - | - | - | - | - | - |
| RES4 | Standard Hours | Day | 53 | - | - | N, V | - | - | - | - | N, V | - | N, V | - | - | - | - | - | - | - | - | N, V |

| ID | Period | | NML | Recommended AMM at each construction stage | | | | | | | | | | | | | | | | | | |
|------|-------------------|-------|-----------------|--|---------------------|------------------------------|-------------------------------------|--------------------------------|-----------------------------------|------------------------------|---------------------------------|----------------------------|----------------------------|------------------------------|------------------------|-------------------------|----------------|-------------------------|--|-----------------------------------|------------------|--------------------------|
| | | | | 0A – Demolition of Old Jetty | 1A – Compound Setup | 1B – Tree Trimming / Removal | 2A – Service Install – Sydney Water | 2B – Service Install - Ausgrid | 3A – Construction – Rock Platform | 3B – Removal – Rock Platform | 3C – Construction – Steel Jetty | 3D – Removal – Steel Jetty | 4A – Piling Works - Marine | 4B – Piling Works - Landside | 4C – Pre-cast Delivery | 4D – Plank Installation | 4E – Deck Pour | 4F – Fit Out & Services | 5B – Abutment Construction / Hardscaping | 5C – Service Installation - Wharf | 5E - Landscaping | 6A – Removal of Compound |
| | OOHW ¹ | Night | 43 | - | - | - | V, IB, N, PC, SN, R2, DR | V, IB, N, PC, SN, R2, DR | - | - | - | - | V, IB, N, PC, SN, R2, DR | - | V, N, R2, DR | - | - | - | - | - | - | - |
| EDU1 | Standard Hours | Day | 45 ¹ | - | - | - | - | - | - | - | N, V | - | N, V | N, V | - | - | - | - | - | - | - | - |
| PoW1 | Standard Hours | Day | 45 ¹ | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| ARC1 | Standard Hours | Day | 65 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| ARC2 | Standard Hours | Day | 65 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| PRC1 | Standard Hours | Day | 60 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |

| ID | Period | | NML | Recommended AMM at each construction stage | | | | | | | | | | | | | | | | | | |
|----------------------|----------------|-----|-----------------|--|---------------------|------------------------------|-------------------------------------|--------------------------------|-----------------------------------|------------------------------|---------------------------------|----------------------------|----------------------------|------------------------------|------------------------|-------------------------|----------------|-------------------------|--|-----------------------------------|------------------|--------------------------|
| | | | | 0A – Demolition of Old Jetty | 1A – Compound Setup | 1B – Tree Trimming / Removal | 2A – Service Install – Sydney Water | 2B – Service Install - Ausgrid | 3A – Construction – Rock Platform | 3B – Removal – Rock Platform | 3C – Construction – Steel Jetty | 3D – Removal – Steel Jetty | 4A – Piling Works - Marine | 4B – Piling Works - Landside | 4C – Pre-cast Delivery | 4D – Plank Installation | 4E – Deck Pour | 4F – Fit Out & Services | 5B – Abutment Construction / Hardscaping | 5C – Service Installation - Wharf | 5E - Landscaping | 6A – Removal of Compound |
| CHC1 | Standard Hours | Day | 45 ¹ | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| COM1 | Standard Hours | Day | 70 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | N, V, PC, RO |
| IND1 | Standard Hours | Day | 75 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| Note 1: Internal NML | | | | | | | | | | | | | | | | | | | | | | |

9.3 Bubble curtains

As outlined in the Revisited Environmental Management Measures (REMM – UN1), McConnell Dowell has investigated the use of bubble curtains to reduce the severity of the energy of the sounds caused by the driving of the piles.

Based on our investigation, the installation of bubble curtains may not be required because:

- the assessed shut-down and observation zones are not excessive.
- bubble curtains are not likely to be effective in shallow water environment such as the project sites.

However, the use of bubble curtains has been further investigated by McConnell Dowell's Biodiversity consultant Stantec under MCoA E10 as a potential suitable method to protect Black Rock Cod in accordance with the provisions of the MBOS, Black Rockcod Recovery Plan 2012 and DPI Fisheries' Priorities Action Statement — Actions for Black Rockcod.

It was concluded that if the presence of Black Rock Cod is confirmed during the ecologist dive inspection (MCoA E9), additional underwater noise mitigation measures such as bubble curtains and underwater noise monitoring may be required.

The technical memo from Stantec has been included in Attachment C.

As such, McConnell Dowell's proposed approach is as follows:

- Conduct an inspection by an appropriately qualified and experienced ecologist (and diver) at known potential habitat for Black Rockcod (*Epinephelus daemeli*) (rocky reefs, caves, ledges, gutters and artificial structures such as wharves, piers and rock emplacements) with and adjacent to the project boundary.
- If the presence of Black Rock Cod is confirmed, underwater noise monitoring will be conducted to verify underwater noise levels during piling;
 - If underwater noise monitoring demonstrates an increased risk of fatality, additional underwater noise measures such as bubble curtains will be implemented.

10 Roles and responsibilities

The McConnell Dowell Project Team's organisational structure and overall roles and responsibilities are outlined in Section 4.5 of the CEMP. Specific responsibilities for the implementation of environmental controls are detailed in Section 8 of this CNVMP.

11 Training

11.1 Inductions

All employees, contractors and utility staff working on site will undergo site induction training that includes construction noise and vibration management issues. The induction training will address elements related to noise and vibration management including:

- Existence and requirements of this CNVMP
- Relevant legislation
- Roles and responsibilities for noise and vibration management
- Normal construction hours
- The process for seeking approval for out of hours works, including consultation
- Location of noise sensitive areas
- Complaints reporting
- General noise and vibration management measures
- Specific responsibilities to minimise impacts on the community and built environment from noise and vibration associated with the works.

Further details regarding staff induction and training are outlined in Section 7.2 of the CEMP.

11.2 Noise and Vibration Monitoring Qualifications

Those undertaking noise and vibration monitoring (Attachment E) shall be appropriately qualified and experienced in acoustics to a standard sufficient to enable that person to accurately interpret and apply the advice set out in acoustics standards, guidelines and policies. (NSW EPA – *Approved methods for the measurement and analysis of environmental noise in NSW*)

12 Environmental inspection, monitoring, auditing and reporting

12.1 Out of hours work protocol

The Out-of-Hours Work Protocol (OOHW Protocol) is shown in Attachment A.

12.2 Respite

Appropriate respite periods for out-of-hours work will be identified in consultation with the community at each affected location on a regular basis. This addresses part of the CoA E51(d) requirement.

12.3 Inspection and monitoring

Routine inspections by the Environment & Sustainability Lead, TfNSW, ERG representatives and ER will occur throughout construction. Detail on the nature and frequency of these inspections are documented in Section 8.1 of the CEMP.

Noise and vibration monitoring will also occur routinely for the duration of the Project. Monitoring will be undertaken by a suitably trained and experienced person.

Reporting of noise and/or vibration exceedances of the set criteria will be provided to TfNSW in accordance with the reporting requirements outlined in Section 12.6 of this CNVMP.

12.4 Complaints

Complaints will be recorded and managed in accordance with MCoA B7 and the project Community Communication Strategy. Transport for NSW will prepare and implement a Complaints Management System for the commencement of any Work in accordance with the requirements of MCoA B7.

All community inquiries and complaints related to the construction activities will be referred to the 24-hour community information line (1800 718 556). A postal address, website ([Kamay ferry wharves | Transport for NSW](#)) and email address (kamaywharves@mcdgroup.com) has been provided for receipt of complaints and enquiries.

12.5 Auditing

Audits (both internal and external) will be undertaken to assess the effectiveness of environmental controls, compliance with this CNVMP, MCoA and other relevant approvals, licenses and guidelines.

Audit requirements are detailed in Section 8.3 of the CEMP.

12.6 Reporting

Reporting requirements and responsibilities are documented in Section 8.2 of the CEMP.

Specific reports prepared in response to noise and vibration monitoring will capture detail including, but not limited, to:

- a) The locations and description of monitoring undertaken
- b) A tabulation of results (eg for noise including L_{MAX} , L_{10} , L_{90} and L_{Aeq} noise levels) together with notes identifying the principal sources and operations

- c) Summary of any measurements exceeding the nominated criteria, and descriptions of the plant or operations causing these exceedances
- d) Detail of any corrective actions and confirmation of their successful implementation.

13 Review and improvement

13.1 Continuous improvement

Continuous improvement of this CNVMP will be achieved by the ongoing evaluation of environmental management performance against environmental policies, objectives and targets for the purpose of identifying opportunities for improvement.

The continuous improvement process will be designed to:

- Identify areas of opportunity for improvement of environmental management and performance
- Determine the cause or causes of non-conformances and deficiencies
- Develop and implement a plan of corrective and preventative action to address any non-conformances and deficiencies
- Verify the effectiveness of the corrective and preventative actions
- Document any changes in procedures resulting from process improvement
- Make comparisons with objectives and targets.

All complaints are to be managed in accordance with the requirements of the Project's MCoA and Community Communication Strategy, by the Community Manager and Environment & Sustainability Lead.

13.2 CNVMP update and amendment

The processes described in 3.1.1 of the CEMP may result in the need to update or revise this CNVMP. This will occur as needed.

McConnell Dowell will review and update the CNVMP where required prior to significant changes in construction methodology that alter the risk rating identified in the Aspect and Impacts Register or after significant environmental incidents.

If the works are anticipated to extend beyond 18 months, the CNVMP would be reviewed and updated where required within 12 months of approval.

Only the Environment & Sustainability Lead, or delegate, has the authority to change any of the environmental management documentation. The revised document will then be issued to the Environmental Representative to approve minor changes to the CNVMP in accordance with MCoA A32(i). Minor changes include those that are consistent with the terms of the approval and the CEMP, CEMP sub-plans and monitoring programs.

Where the Environmental Representative deems it necessary, the amended CEMP will be forwarded to the Planning Secretary for approval.

Attachment A - Out of hours work protocol

A-1 Purpose and scope

The Project may require construction activities to occur outside of standard construction hours due to safety, weather and traffic restrictions. In the marine environment, weather and sea conditions are typically calmer during night time periods, and some activities may have to be carried out during this time for safety reasons.

This protocol has been developed to assist compliance with environmental legislation and project obligations, and to effectively manage potential environmental impacts associated with noise during construction of the project.

It has been prepared in accordance with the Minister's Conditions of Approval (MCoA), ICNG, REMMs and the TfNSW Construction Noise and Vibration Strategy (ST-157/4.1). The protocol is to be applied where Out-of-Hours Work (OOHW) is proposed for the project.

This protocol outlines the project requirements for construction working hours and documents a process to be implemented when work outside of standard hours is required. The key objective of the protocol is to ensure that impacts to the local community are avoided.

Specific objectives include:

- Minimise potential adverse noise impacts to the community
- Identify sensitive receivers and ensure appropriate noise control measures are implemented during construction activities
- Ensure appropriate measures are implemented to comply with all relevant legislation and other requirements as described in the CNVMP.
- Ensure appropriate measures are implemented to meet the MCoA and ICNG.

OOHW is defined as all construction works undertaken outside the standard construction hours. The standard working hours are:

- Monday to Friday 7 am to 6 pm; and
- Saturday 8 am to 1 pm.

As OOHW have the potential to impact on the amenity of adjacent sensitive receivers, these works require assessment and approval prior to commencement. This Out of Hours Works Procedure (this Procedure) defines the process for that assessment and approval for all OOHW associated with the Project.

This Procedure has been developed as part of the CNVMP for the Project to define this assessment process and should be read in conjunction with the CNVMP. Notwithstanding, all OOHW associated with the Project will be undertaken in accordance with this Procedure.

A-2 Justification for OOHW

Construction work associated with the Project will be undertaken during standard construction hours as outlined in MCoA E42.

However, where it is not possible to conduct work within standard construction hours, out of hours work may be required if it can be strongly justified, meets the requirement of out of hours work under MCoA E44 and approved by the ER.

Examples of Out of Hours Work may include (but not limited to):

- Delivery of oversized plant or materials that require a Road Occupancy License (ROL) and are not permitted to travel during the day (MCoA E44 (a)).
- Maintenance of plant & equipment, project controls or any other work that meets the definition of low impact under MCoA E44 (b).
- Where weather conditions such as tides or storms that prevent the completion of work during standard construction hours (as long as the work meets the requirement of MCoA E44).
- Any work that can be conducted under a negotiated agreements with directly affected residents.

Justification for OOHW will be provided in an Out of Hours Work Approval (OOHWA) which will be provided to TfNSW and the ER for review. Following the review the OOHWA must be approved by the ER prior to any out of hours work being conducted.

Working outside of standard construction hours (Out of Hours Work) is permitted under MCoA E44 for the following:

- a) Safety and Emergencies, including:
 - for the delivery of materials required by the NSW Police Force or other authority for safety reasons; or
 - i. where it is required in an emergency to avoid injury or the loss of life, to avoid damage or loss of property or to prevent environmental harm.

Note – On becoming aware of the need for emergency work in accordance with this condition, the Proponent must notify the ER, the Planning Secretary and the EPA of the reasons for such work. The Proponent must use best endeavours to notify all noise and/or vibration affected residents and owners/occupiers of properties identified sensitive land user(s) of the likely impact and duration of those work.
- b) Low impact, including:
 - i. construction that causes L-Aeq(15 minute) noise levels:
 - no more than 5 dB(A) above the rating background level at any residence; or
 - no more than the 'Noise affected' NMLs; or
 - ii. construction that causes LAFmax(15 minute) noise levels no more than 15 dB(A) above the rating background level at any residence; or
 - iii. construction that causes:
 - continuous, impulsive or intermittent vibration values, measured at the most affected residence are no more than the preferred values for human exposure to vibration
- c) By Approval, including:
 - i. where different construction hours are permitted or required under an EPL
 - ii. negotiated agreements with directly affected residents and sensitive land user(s).
- d) By Prescribed Activity, including:
 - i. Piling between 10:00pm and 7:00am Monday-Friday inclusive and if endorsed by the ER;
 - ii. delivery of material that is required to occur outside of standard construction hours in Condition E42 to directly support Piling.

For works conducted under MCoA E44 (d), justification will be provided to the ER in accordance with MCoA E51 and will include:

- reasons for the OOH Work; a description of location and duration of the OOH Work;
- the noise characteristics and likely noise levels of the OOH Work;
- likely mitigation and management measures which aim to achieve the relevant noise management levels and vibration criteria under Condition E44 (including the circumstances of when respite or relocation offers will be available and details about how the affected community can access these offers); and
- proposed community notifications which must be provided to impacted sensitive receivers in the community at least 10 days prior to the proposed OOH Work.

A-3 Out of hours noise and vibration assessment

A-3.1 Noise

For all OOHW, assessment is required to determine the extent of noise impact the construction activities will have upon the community/residential receivers.

Assessments are to identify the exceedances of construction scenarios against the noise management levels identified for each sensitive receiver.

A-3.2 Vibration

Assessment will be required for out of hours vibration intensive works within the safe working distances for human comfort (British Standard 6472) for the nominated plant and equipment required. Prior to undertaking an assessment, all other feasible and reasonable options to utilise less vibration intensive equipment are to be exhausted.

A-3.3 High noise impact equipment

Equipment that can generate high noise impacts include jackhammering, rock breaking or hammering, pile driving, concrete cutting, vibratory rolling and impact piling occurring on the surface and generating noise with impulsive, intermittent, tonal or low frequency characteristics. High noise impact equipment will only be used:

- Between 8am-6pm, Monday to Friday;
- Between 8am-1pm Saturdays; and
- In continuance blocks of no more than 3 hours with at least a one hour respite between each block of work generating high noise impact, where the location of the work is likely to impact the same receivers.

Piling activities may occur between 1pm-6pm on Saturdays. However, there will be no piling works evening (6pm-10pm) and night-time (10pm-7am) periods.

Pile drilling or hammering would take place intermittently during the above periods. On average, a pile would be drilled or hammered for about 10 minutes followed by a relatively quiet period for the next 30 minutes or more before the next stage is progressed.

A-4 Management measures for out of hours works

Where OOHW are proposed, McConnell Dowell will prepare an assessment of the likely impacts on sensitive receivers. An OOHW assessment must be completed and must include the following information as a minimum:

- Date and time of works commencement and completion
- Description of the works including all proposed equipment

- Location of the works
- Technical justification for the works
- Any proposed noise mitigation measures to be implemented

The environmental team will assess the OOHW using a noise impact assessment tool (Resonate Consultant's SoundSite <https://soundsite.io/>) to allow the environment team to assess the level of noise likely to be experienced at each potentially affected receiver.

The tool provides predictions of noise levels at all identified sensitive receiver locations based on the number and type of all equipment operating in an area and their estimated noise emission levels, and considers topographical and structural barriers, air and ground absorption and any mitigation that might already be in place.

The tool determines an overall noise level, identifies any exceedance of the NML, sleep disturbance screening criteria, and the impact class for each receiver, which can be used to determine additional management measures applicable to the activity.

Based on the outputs of the tool, the environment team will provide reasonable and feasible mitigation measures which are to be implemented by the construction team. Noise mitigation measures to be implemented will vary for reasons such as safety and space constraints, these are to be identified and the calculations adjusted accordingly.

A-5 Approval of out of hours work

When OOHWs are required, the Environment & Sustainability Lead prepare and submit an OOHW Approval (OOHWA) justifying the need to carry out the works in accordance with MCoA E44 and MCoA E51 to TfNSW and the ER for review and approval.

Note OOHW that meets the requirement of Low Impact Work (MCoA E44(b)) does not require ER approval, however a copy of the completed OOHWA Permit will be provided to the ER for information, including any supporting noise modelling.

Any justification will be provided in writing and include the following information:

- reasons for the OOH Work;
- a description of location and duration of the OOH Work;
- the noise characteristics and likely noise levels of the OOH Work;
- likely mitigation and management measures which aim to achieve the relevant noise management levels and vibration criteria under Condition E44 (including the circumstances of when respite or relocation offers will be available and details about how the affected community can access these offers); and
- proposed community notifications which must be provided to impacted sensitive receivers in the community at least 10 days prior to the proposed OOH Work.

On receipt of the approval for the OOHW, any specific conditions that relate to the OOHW will be:

- Implemented prior to works (such as any 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 Environment Team.

Refer to Figure 14-1.

A-5.1 Planning out of hours works

Planning OOHW is an administrative task that involves collaboration with Project construction personnel. Planning OOHW is generally undertaken via the following steps:

1. OOHW are first discussed during a scheduled OOHW Planning Meeting held early each week.
2. The information gathered from this meeting is used by the Environment & Sustainability Lead to produce an OOHW Schedule. The OOHW Schedule is a management system tool used to demonstrate compliance with the Project MCoA.
3. OOHW application form must be submitted for upcoming works discussed in the OOHW Planning Meeting and include details of noise mitigation measures to be implemented for night construction works.
4. Prior to OOHW occurring, The OOHW Schedule is checked by Environment & Sustainability Lead to ensure no works will be undertaken without approval..
5. OOHW Schedule is disseminated to the Project Team including the TfNSW and ER.

A-5.2 Notification

Notifications for OOHW will be in accordance with the Project's Community Communication Strategy (CCS) and MCoA E51.

Any additional management measures identified for the works that require community notification are to be undertaken, and may include;

- phone calls
- individual briefings
- the offering of alternative accommodation or other measures for respite.

On becoming aware of the need for emergency work in accordance with MCoA E44(a) (Safety and Emergency), the ER, the Planning Secretary and the EPA will be notified of the reasons for such work. Best endeavours will be undertaken to notify all noise and/or vibration affected residents and owners/occupiers of properties identified sensitive land user(s) of the likely impact and duration of those work.

A-5.3 Out of hours enquires and complaints management

All complaints are to be managed in accordance with the requirements of the Project's MCoA and CCS, by the Community Manager and Environment & Sustainability Lead.

Each complainant will be advised of the results of the investigation into their complaint and any proposed remedial action. Complaint records will be kept for at least 4 years following the complaint and will contain:

- a) The date and time of the complaint
- b) The method by which the complaint was made
- c) Any personal details of the complainant which were provided by the complainant or, if no such details were provided, a note to that effect
- d) The nature of the complaint
- e) The action taken by the Project in relation to the complaint, including any follow-up contact with the complainant
- f) If no action was taken by the Project, the reasons why no action was taken.

The details of any complaints received will be forwarded as a report to TfNSW by 2pm each business day. This report will include the complaints received between 12.00pm on that day and 12.00pm on the previous business day.

A-6 Out of hours noise monitoring

Attended noise monitoring is to be undertaken in accordance with the relevant Australian Standards and guidelines, and where required by, and in accordance with, the Project's MCoA.

The Project's MCoA and/or any OOHW approval issued by the Environmental Manager, will determine the requirements for any monitoring to be undertaken.

A-6.1 Noise monitoring and vibration monitoring

Noise and vibration monitoring will be undertaken in accordance with Attachment E.

A-7 Auditing, compliance evaluation and reporting

The overall environmental audit and compliance requirements for construction are detailed in the CEMP.

Audits for compliance with construction noise and vibration objectives for both plant and equipment and predicted noise levels within assessments along with the monitoring requirements is to be undertaken.

Noise and vibration monitoring and compliance to requirements is to be reported as required by the Project MCoA and Project compliance program.

A-7.1 Exceedances/non-conformances

Where noise monitoring identifies any exceedances from those predicted in the OOHW assessments, an immediate review of OOHW activities is to be undertaken in accordance with the requirements of the Project's MCoA to determine where noise levels can be further reduced.

Where monitored noise levels are found to be above predictions or vibration goals are exceeded, the following actions will be undertaken:

- Confirm that monitored levels are not being impacted by other noise or vibration sources
- Implement other feasible and reasonable measures which may include reducing plant size, modify time of works, changing operational settings (such as turning off the vibratory function of the machine), and utilising alternate construction methodology or a combination of these
- Review work practices to ensure compliance with the ICNG
- Confirm if the exceedance is due to an uncharacteristically loud piece of equipment
- Identify if equipment can be swapped out for another piece of equipment or alternative equipment or plant
- Confirm if the exceedance is due to an uncharacteristically vibratory piece of equipment
- Confirm that the modelling reflects the actual activity being undertaken
- Ensure that learning's from the above are fed back into the noise modelling assessment process.

A-7.2 Corrective action

A Non Conformance Report (NCR) may be raised by the Environmental Manager, which is to include the corrective action taken (as detailed in the CEMP), in the following instances (not limited to):

- If the results of noise monitored from the works indicate levels which are more than 5dB(A) above those noise levels predicted in the assessment
- A breach of any CoA or other requirement

- Failure to implement required management and mitigation in accordance with the Project's EMS.

A-8 Out of Hours Work Approval (OOHWA) development process

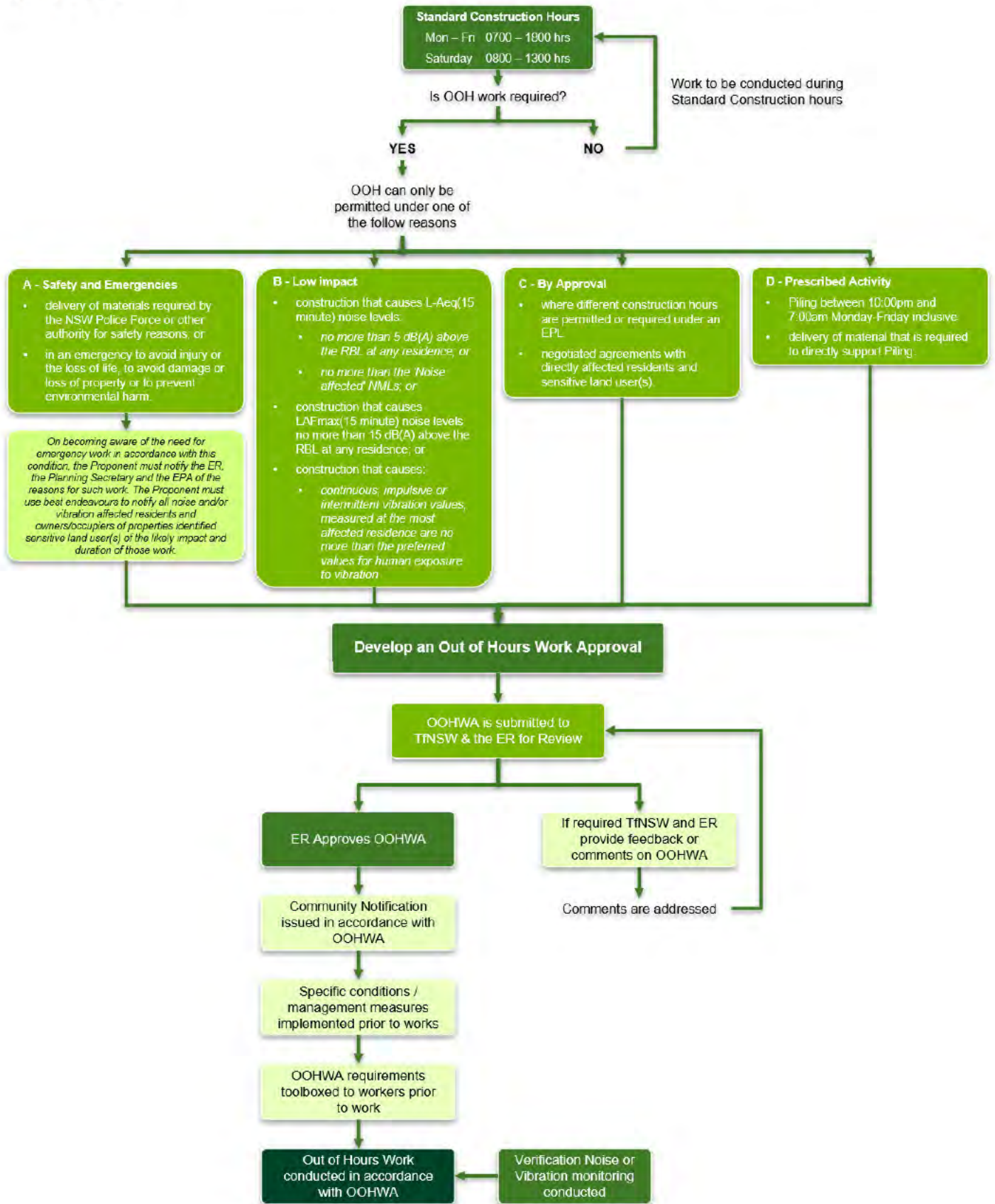


Figure 13-1 Out of Hours Work Approval (OOHWA) development process

Attachment B – Environmental requirements

Relevant legislation and guidelines

Legislation

All legislation relevant to this CNVMP is included in Appendix C of the CEMP.

Guidelines and standards

The main guidelines, specifications and policy documents relevant to this Plan include:

- Roads and Maritime Construction Noise and Vibration Guidelines (Roads and Maritime 2015)
- NSW Interim Construction Noise Guideline (ICNG), Department of Environment and Climate Change 2009
- NSW Road Noise Policy, Dept. of Environment, Climate Change and Water 2011
- NSW Industrial Noise Policy, Environment Protection Authority 2000
- NSW Assessing Vibration – a technical guideline (AVTG), Department of Environment and Conservation 2006
- Australian Standard AS2436-1981 Guide to Noise Control on Construction, Maintenance and Demolition Sites
- British Standard BS 6472-2008, 'Evaluation of human exposure to vibration in buildings (1-80Hz)
- British Standard 7385: Part 2-1993 'Evaluation and measurement of vibration in buildings'
- German Standard DIN4150-1999 Structural vibration Part 3: Effects of vibration on Structures
- Construction Noise Strategy 7TP-ST-157/2.0 (CNS), Transport for NSW 2012
- Underwater Piling Noise Guidelines, Government of South Australia, 2012.
- Approved methods for the measurement and analysis of environmental noise in NSW, NSW EPA, 2022.

Minister's Conditions of Approval

The MCoA relevant to this Plan are listed Table B1 below. A cross reference is also included to indicate where the condition is addressed in this CNVMP or other project management documents.

Table B-1 Minister's Conditions of Approval

| MCoA No. | Condition Requirements | Document Reference | | | | | | |
|----------|--|---|--------------|---|-----|---------------------|------------------------------|-----------|
| C6 | <p>Except as provided by Condition A15, the following CEMP Sub-plans must be prepared in consultation with the relevant government agencies identified for each CEMP Sub-plan. Details of all information requested by an agency during consultation must be provided to the Planning Secretary as part of any submission of the relevant CEMP Sub-plan, including copies of all correspondence from those agencies by Condition A14.</p> <table border="1" data-bbox="398 671 1718 810"> <thead> <tr> <th data-bbox="398 671 490 759"></th> <th data-bbox="490 671 1016 759">Required CMP</th> <th data-bbox="1016 671 1718 759">Relevant government agencies to be consulted for each CEMP Sub-plan</th> </tr> </thead> <tbody> <tr> <td data-bbox="398 759 490 810">(b)</td> <td data-bbox="490 759 1016 810">Noise and Vibration</td> <td data-bbox="1016 759 1718 810">Relevant council(s) and NPWS</td> </tr> </tbody> </table> <p><i>Note: CEMP Sub-plan(s) may reflect the construction of the project through geographical activities, temporal activities or activity-based staging.</i></p> | | Required CMP | Relevant government agencies to be consulted for each CEMP Sub-plan | (b) | Noise and Vibration | Relevant council(s) and NPWS | Section 3 |
| | Required CMP | Relevant government agencies to be consulted for each CEMP Sub-plan | | | | | | |
| (b) | Noise and Vibration | Relevant council(s) and NPWS | | | | | | |
| C7 | <p>The CEMP Sub-plan(s) must state how:</p> <p>(a) The environmental performance outcomes identified in the documents listed in Condition A1 will be achieved;</p> <p>(b) The mitigation measures identified in the documents listed in Condition A1 will be implemented;</p> <p>(c) The relevant terms of this approval will be complied with; and</p> | <p>Section 8 & Section 9</p> <p>Section 8</p> <p>Attachment B</p> | | | | | | |

| MCoA No. | Condition Requirements | Document Reference | | | | | | |
|----------|---|------------------------------|--------------|------------------------------|-----|---------------------|-----|--------------|
| | (d) issues requiring management during construction (including cumulative impacts), as identified through ongoing environmental risk analysis, will be managed through SMART principles. | Attachment E | | | | | | |
| C9 | <p>The Noise and Vibration CEMP Sub-plan must include measures to minimise vibration impacts on Aboriginal and historical heritage, including:</p> <p>(a) Monitoring of vibration impacts in the immediate area of AHIMS Site # 45-6-0653 (Site 6 – La Perouse), including procedures to be followed should any impact or damage occur;</p> | Attachment E | | | | | | |
| | <p>(b) Identification of smaller equipment or hand tools for use in the following locations:</p> <ul style="list-style-type: none"> (i) The La Perouse Monument inside the Anzac Parade Loop, which is near the construction boundary and may be impacted if large vibration generating equipment is used; (ii) The Coursed Stone Sea Wall, which is located at Kurnell and will be within 5-10 metres of Piling; (iii) The Captain Cook Monument, which is set on sandstone bedrock and is within the construction boundary and adjacent to Monument Track, where a utilities trench will be installed; and <p>Landscape works close to the ferry shelter shed, where there is potential for indirect vibration impacts to the structure.</p> | | | | | | | |
| C14 | <p>Except as provided by Condition A15, the following CMP must be prepared in consultation with the relevant government agencies identified for each to compare actual performance of construction of the SSI against the performance predicted in the documents listed in Condition A1 or in the CEMP:</p> <table border="1" data-bbox="398 1070 1718 1174"> <thead> <tr> <th data-bbox="398 1070 490 1121"></th> <th data-bbox="490 1070 1016 1121">Required CMP</th> <th data-bbox="1016 1070 1718 1121">Relevant government agencies</th> </tr> </thead> <tbody> <tr> <td data-bbox="398 1121 490 1174">(a)</td> <td data-bbox="490 1121 1016 1174">Noise and Vibration</td> <td data-bbox="1016 1121 1718 1174">EPA</td> </tr> </tbody> </table> | | Required CMP | Relevant government agencies | (a) | Noise and Vibration | EPA | Attachment E |
| | Required CMP | Relevant government agencies | | | | | | |
| (a) | Noise and Vibration | EPA | | | | | | |

| MCoA No. | Condition Requirements | Document Reference |
|----------|---|--------------------|
| C15 | <p>Each CMP must provide:</p> <ul style="list-style-type: none"> (a) Details of baseline data available; (b) Details of baseline data to be obtained and when; (c) Details of all monitoring of the project to be undertaken; (d) The parameters of the project to be monitored; (e) The frequency of monitoring to be undertaken; (f) The location of monitoring; (g) the reporting of monitoring results and analysis results against relevant criteria; (h) details of the methods that will be used to analyse the monitoring data; (i) procedures to identify and implement additional mitigation measures where the results of the monitoring indicated unacceptable project impacts; and (j) any consultation to be undertaken in relation to the monitoring programs. | Attachment E |
| C16 | CMP(s) must be submitted to the Planning Secretary for approval except those permitted to be endorsed by others pursuant to a CEMF approved by the Planning Secretary under Condition A15. | Attachment E |
| C17 | Where a CMP requires Planning Secretary's approval, the CMP must be endorsed by the ER and then submitted to the Planning Secretary for approval no later than one month before the commencement of construction, or where construction is staged, no later than one month before the commencement of each stage. | Attachment E |
| C19 | Construction must not commence until the relevant CMP(s) have been approved by the Planning Secretary or endorsed by the ER, (as applicable and as identified in the CEMF approved under Condition A15, and all relevant baseline data for the specific construction activity has been collected. | Attachment E |

| MCoA No. | Condition Requirements | Document Reference |
|----------|---|--------------------|
| C20 | The CMPs, as approved or endorsed (as relevant) including any minor amendments approved by the ER must be implemented for the duration of construction and for any longer period set out in the monitoring program or specified by the Planning Secretary, whichever is the greater. | Attachment E |
| C21 | <p>The results of the CMP(s) must be submitted to the Planning Secretary and relevant regulatory agencies, for information in the form of a Construction Monitoring Report at the frequency identified in the relevant CMP.</p> <p>Note: Where a relevant CEMP Sub-plan exists, the relevant Construction Monitoring Program may be incorporated into that CEMP Sub-plan.</p> | Attachment E |
| E30 | During construction works, monitoring of vibration impacts in the immediate area of AHISM Site # 45-6-0653 (Site 6 – La Perouse) must be undertaken. If vibration monitors are affixed to sandstone, non-invasive adhesive methods (such as beeswax) must be used. If it is identified that levels of vibration would result in damage to AHISM Site # 45-6-0653 (Site 6 – La Perouse), all works must cease and the construction methodology revised to mitigate further impacts. This must be undertaken in consultation with Heritage NSW, RAPs and LALCs. | Attachment E |
| E41 | <p>Land Use Survey</p> <p>A detailed land use survey must be undertaken to confirm sensitive land user(s) potentially exposed to construction noise and vibration, construction ground-borne noise and operational noise. The survey may be undertaken on a progressive basis but must be undertaken in any one area before the commencement of work which generates construction or operational noise, vibration or ground-borne noise in that area. The results of the survey must be included in the Noise and Vibration CEMP Sub-plan required by Condition C6.</p> | Section 4.1 |

| MCoA No. | Condition Requirements | Document Reference |
|----------|---|--------------------|
| E42 | <p>Work Hours</p> <p>Work must only be undertaken during the following hours:</p> <ul style="list-style-type: none"> (a) 7:00am to 6:00pm Mondays to Fridays, inclusive; (b) 8:00am to 1:00pm Saturdays; and (c) At no time on Sundays or public holidays. | Section 5.1 |
| E43 | <p>Highly Noise Intensive Work</p> <p>Except as permitted by an EPL, highly noise intensive work that result in an exceedance of the applicable NML at the same receiver must only be undertaken:</p> <ul style="list-style-type: none"> (a) between the hours of 8:00 am to 6:00 pm Monday to Friday; (b) between the hours of 8:00 am to 1:00 pm Saturday; and (c) if continuously, then not exceeding three hours, with a minimum cessation of work of not less than one hour. <p>For the purposes of this condition, 'continuously' includes any period during which there is less than one hour between ceasing and recommencing any of the work.</p> | Section 5.1 |

| MCoA No. | Condition Requirements | Document Reference |
|----------|---|--------------------|
| E44 | <p>Variation to Work Hours</p> <p>Notwithstanding Conditions E42 and E43 work may be undertaken outside the hours specified in the following circumstances:</p> <p>(a) Safety and Emergencies, including:</p> <ul style="list-style-type: none"> (i) for the delivery of materials required by the NSW Police Force or other authority for safety reasons; or (ii) where it is required in an emergency to avoid injury or the loss of life, to avoid damage or loss of property or to prevent environmental harm; or <p>(b) Low impact, including:</p> <ul style="list-style-type: none"> (i) construction that causes $L_{Aeq(15\text{ minute})}$ noise levels: <ul style="list-style-type: none"> • no more than 5 dB(A) above the rating background level at any residence in accordance with the ICNG, and • no more than the 'Noise affected' NMLs specified in Table 3 of the ICNG at other sensitive land user(s); and (ii) construction that causes $L_{Amax(15\text{ minute})}$ noise levels no more than 15 dB(A) above the rating background level at any residence; or (iii) construction that causes: <ul style="list-style-type: none"> • continuous or impulsive vibration values, measured at the most affected residence are no more than the preferred values for human exposure to vibration, specified in Table 2.2 of Assessing Vibration: a technical guideline (DEC, 2006), or • intermittent vibration values measured at the most affected residence are no more than the preferred values for human exposure to vibration, specified in Table 2.4 of Assessing Vibration: a technical guideline (DEC, 2006); or | Section 5.1 |

| MCoA No. | Condition Requirements | Document Reference |
|----------|---|----------------------------|
| | <p>(c) By Approval, including:</p> <ul style="list-style-type: none"> (i) where different construction hours are permitted or required under an EPL in force in respect of the SSI; or (9) negotiated agreements with directly affected residents and sensitive land user(s). or <p>(d) By Prescribed Activity, including:</p> <ul style="list-style-type: none"> (9) Piling between 10:00pm and 7:00am Monday-Friday inclusive and if endorsed by the ER; or (iii) delivery of material that is required to be delivered outside of standard construction hours in Condition E42 to directly support Piling. | |
| E45 | <p>Mitigation measures must be implemented with the objective of achieving the following construction noise management levels and vibration objectives:</p> <ul style="list-style-type: none"> (a) construction 'Noise affected' noise management levels established using the Interim Construction Noise Guideline (DECC, 2009); (b) vibration criteria established using the Assessing vibration: a technical guideline (DEC, 2006) (for human exposure); (c) BS 7385 Part 2-1993 "Evaluation and measurement for vibration in buildings Part 2" as they are "applicable to Australian conditions"; and (d) the vibration limits set out in the German Standard DIN 4150-3: Structural Vibration- effects of vibration on structures (for structural damage). <p>Any work identified as exceeding the noise management levels and / or vibration criteria must be managed in accordance with the Noise and Vibration CEMP Sub-plan.</p> <p>Note: The ICNG identifies 'particularly annoying' activities that require the addition of 5 dB(A) to the predicted level before comparing to the construction NML.</p> | Attachment E and Section 8 |

| MCoA No. | Condition Requirements | Document Reference |
|----------|---|--------------------|
| E46 | <p>Mitigation measures must be applied when the following residential ground-borne noise levels are exceeded:</p> <p>(a) evening (6:00 pm to 10:00 pm) – internal $L_{Aeq(15\text{minute})}$: 40 dB(A); and</p> <p>(b) night (10:00 pm to 7:00 am) – internal $L_{Aeq(15\text{minute})}$: 35 dB(A).</p> <p>The mitigation measures must be outlined in the Noise and Vibration CEMP Sub-plan.</p> | Section 7.3 |
| E47 | <p>Industry best practice construction methods must be implemented where reasonably practicable to ensure that noise and vibration levels are minimised around sensitive land use(s). Practices may include, but are not limited to:</p> <p>(a) use of regularly serviced low sound power equipment; and/or</p> <p>(b) temporary noise barriers (including the arrangement of plant and equipment) around noisy equipment and activities such as rock hammering and concrete cutting; and/or</p> <p>© use of alternative construction and demolition techniques.</p> | Section 8 |
| E48 | <p>Owners and occupiers of properties at risk of exceeding the screening criteria for cosmetic damage must be notified before works that generate vibration commences in the vicinity of those properties. If the potential exceedance is to occur more than once or extend over a period of 24 hours, owners and occupiers are to be provided a schedule of potential exceedances on a monthly basis for the duration of the potential exceedances, unless otherwise agreed by the owner and occupier. These properties must be identified and considered in the Noise and Vibration CEMP Sub-plan required by Condition C6 and the Community Communication Strategy required by Condition B1.</p> | Section 7.6 |
| E49 | <p>The Proponent must conduct vibration testing before and during vibration generating activities that have the potential to impact on heritage items to identify minimum working distances to prevent cosmetic damage. In the event that the vibration testing and attended monitoring shows that the preferred values for vibration are likely to be exceeded, the Proponent must review the construction methodology and, if necessary, implement additional mitigation measures.</p> | Attachment E-4 |

| MCoA No. | Condition Requirements | Document Reference |
|----------|--|-----------------------------|
| E50 | Advice from a heritage specialist must be sought on methods and locations for installing equipment used for vibration and movement monitoring at heritage-listed structures. | Attachment E |
| E51 | <p>In order to undertake out-of-hours work as prescribed under Condition E42(d) (piling), the Proponent must justify to the ER the reasons why these works cannot be undertaken during standard working hours. These works must be endorsed by the ER prior to the commencement of such work.</p> <p>Any justification must be in writing and include the following information:</p> <ul style="list-style-type: none"> (a) reasons for the OOH Works; (b) a description of location and duration of the OOH Work; (c) the noise characteristics and likely noise levels of the OOH Work; (d) likely mitigation and management measures which aim to achieve the relevant noise management levels and vibration criteria under Condition E44 (including the circumstances of when respite or relocation offers will be available and details about how the affected community can access these offers); and (e) proposed community notifications which must be provided to impacted sensitive receivers in the community at least 10 days prior to the proposed OOH Work. | Section 5.1 Attachment A |

EPBC Conditions of Approval

EPBC Conditions relevant to construction are listed Table B2 below. This includes the responsible owner of the condition and relevant compliance evidence.

Table B-2 EPBC Compliance table

| Ref | Description | Owner | Evidence |
|---|--|-------|--|
| 1) | The approval holder must not clear outside of the project area. | All | CEMP Appendix B2 – Biodiversity Management Sub Plan |
| National Heritage Places | | | |
| 2) | The approval holder must comply with NSW Approval conditions E21 – E37 and E49 to minimise impacts on the Indigenous, Non-Indigenous, and Natural heritage values of Kurnell Peninsula Headland. | All | CEMP Appendix B1 – Heritage Management Sub Plan |
| Listed Threatened Species and Ecological Communities | | | |
| 3) | Within the project area, the approval holder must not clear more than: <ul style="list-style-type: none"> a) 0.0683 hectares of seagrass meadows b) 0.0683 hectares of White’s Seahorse habitat. | All | CEMP Appendix B2 – Biodiversity Management Sub Plan |
| 4) | The approval holder must comply with NSW Approval conditions E6 – E8 and E11 related to preconstruction surveying and protection measures. | All | CEMP Appendix B2 – Biodiversity Management Sub Plan |
| 5) | The approval holder must comply with NSW Approval conditions E62 – E65, E67 – E68, and E70 related to the prevention and management of contamination on protected matters. | All | CEMP Appendix B6 – Soil, Water & Contamination Management Sub Plan |

| Ref | Description | Owner | Evidence |
|--|--|-------|--|
| Construction Environmental Management Plan | | | |
| 6) | The approval holder must comply with NSW Approval conditions C1 – C13 related to the preparation and implementation of a Construction Environmental Management Plan (CEMP) to avoid, mitigate and manage impacts on protected matters during construction. | All | Construction Environmental Management Plan (this plan) |
| 7) | The CEMP required by the NSW Approval must include environmental management measures to manage impacts to protected matters and be informed by the contamination documentation. | MCD | CEMP Appendix B6 – Soil, Water & Contamination Management Sub Plan |
| Marine Biodiversity Offset Strategy | | | |
| 10) | The approval holder must comply with NSW Approval conditions E12 – E20 related to the requirements of the Marine Biodiversity Offset Strategy (MBOS) to compensate for the clearing of 0.0683 hectares of seagrass meadows and White’s Seahorse habitat. | TfNSW | TfNSW |

| Ref | Description | Owner | Evidence |
|-----|--|-------|----------|
| 11) | <p>To monitor the outcomes of the MBOS for seagrass meadows and White’s Seahorse habitat, the approval holder must include a Marine Biodiversity Offset Report as part of the compliance report until at least the 10th anniversary of the commencement of the action, unless otherwise agreed to in writing by the Minister. Each Marine Biodiversity Offset Report must include:</p> <ul style="list-style-type: none"> a. a progress report on the implementation of the MBOS; b. a list of success metrics; c. details of the monitoring methodology(ies) implemented and the locations of reference sites; d. monitoring results including a comparison against reference sites; e. a summary of any adaptive management steps taken to improve implementation and/or monitoring methodology(ies); and f. a conclusion as to whether the outcomes, as measured against the success metrics, have been achieved, are likely to be met or are unlikely to be met, as determined by a suitably qualified person. | TfNSW | TfNSW |

| Ref | Description | Owner | Evidence |
|--|---|-------|----------|
| 12) | <p>To assess the ongoing success of the MBOS, the approval holder must submit a Rehabilitation Monitoring Review to the department within 6 years of the date of this approval and every 5 years thereafter, unless otherwise agreed to in writing by the Minister. Each Rehabilitation Monitoring Review must include:</p> <ul style="list-style-type: none"> a. a review of the monitoring methodology by a suitably qualified person; b. a conclusion based on the success metrics as to whether the environmental offsets for seagrass meadows and White's Seahorse habitat have been achieved, are likely to be met or are unlikely to be met, as determined by a suitably qualified person; and c. if environmental offsets for seagrass meadows and White's Seahorse habitat have not been achieved based on the success metrics: <ul style="list-style-type: none"> i. a list measurable and time-bound remediation measures which will be undertaken to ensure the success metrics are achieved; and ii. justification for how the remediation measures will provide full compensation for the impacts to seagrass meadows and White's Seahorse habitat. | TfNSW | TfNSW |
| Submission and Publication of Plans | | | |
| 13) | The approval holder must submit all plans required by these conditions electronically to the department. | TfNSW | TfNSW |
| 14) | If the approval holder submits a revised version of a plan for the Planning Secretary's approval, the approval holder must provide the revised plan to the department within 5 business days and an explanation of the differences between the approved plan and the revised plan. | TfNSW | TfNSW |
| 15) | If a revised version of a plan is approved by the Planning Secretary, the approval holder must provide the revised plan to the department within 10 business days of the Planning Secretary's approval. | TfNSW | TfNSW |

| Ref | Description | Owner | Evidence |
|---|--|-------|------------------|
| 16) | Unless otherwise agreed to in writing by the Minister, the approval holder must publish each plan on the website within 15 business days of the date: <ul style="list-style-type: none"> a. the plan is approved by the Planning Secretary; or b. a revised version of the plan is approved by the Planning Secretary. | TfNSW | TfNSW |
| 17) | The approval holder must keep all published plans required by these conditions on the website until the expiry date of this approval. | TfNSW | TfNSW |
| 18) | The approval holder must exclude or redact sensitive ecological data from plans published on the website or otherwise provided to a member of the public. | TfNSW | TfNSW |
| 19) | If sensitive ecological data is excluded or redacted from a plan, the approval holder must notify the department in writing what exclusions and redactions have been made in the version published on the website | TfNSW | TfNSW |
| Notification of Date of Commencement of the Action | | | |
| 20) | The approval holder must notify the department electronically of the date of commencement of the action, within 5 business days of the commencement of the action. | TfNSW | TfNSW |
| 21) | If the commencement of the action does not occur within 5 years from the date of this approval, then the approval holder must not commence the action without the prior written agreement of the Minister. | TfNSW | TfNSW |
| Compliance Records | | | |
| 22) | The approval holder must maintain accurate and complete compliance records. | All | CEMP Section 8.4 |
| 23) | If the department makes a request in writing, the approval holder must provide electronic copies of compliance records to the department within the timeframe specified in the request. | | |

| Ref | Description | Owner | Evidence |
|------------------------------------|---|-------|--------------------|
| 24) | Note: Compliance records may be subject to audit by the department, or by an independent auditor in accordance with section 458 of the EPBC Act, and/or be used to verify compliance with the conditions. Summaries of the results of an audit may be published on the department's website or through the general media. | TfNSW | TfNSW |
| 25) | The approval holder must ensure that any monitoring data (including sensitive ecological data), surveys, maps and other spatial and metadata required under the conditions of this approval are prepared in accordance with the Guidelines for biological survey and mapped data (Commonwealth of Australia 2018), or as otherwise specified by the Minister in writing. | All | CEMP Section 8.1.2 |
| 26) | The approval holder must ensure that any monitoring data (including sensitive ecological data), surveys, maps and other spatial and metadata required under the conditions of this approval are prepared in accordance with the Guide to providing maps and boundary data for EPBC Act projects (Commonwealth of Australia 2021), or as otherwise specified by the Minister in writing. | All | CEMP Section 8.1.2 |
| Annual Compliance Reporting | | | |
| 27) | The approval holder must prepare a compliance report for each 12-month period following the date of this approval, or as otherwise agreed to in writing by the Minister. | TfNSW | TfNSW |
| 28) | Each compliance report must be consistent with the Annual Compliance Report Guidelines (Commonwealth of Australia 2014). | TfNSW | TfNSW |
| 29) | Each compliance report must include: <ul style="list-style-type: none"> a. Accurate and complete details of compliance and any non-compliance with the conditions and the plans, and any incidents. b. One or more shapefile showing all clearing of any protected matters, and/or their habitat, undertaken within the 12-month period at the end of which that compliance report is prepared. c. A schedule of all plans in existence in relation to these conditions and accurate and complete details of how each plan is being implemented. | TfNSW | TfNSW |

| Ref | Description | Owner | Evidence |
|---------------------------------|---|-------|----------|
| 30) | <p>The approval holder must:</p> <ul style="list-style-type: none"> a) Publish each compliance report on the website within 60 business days following the end of the 12-month period for which that compliance report is required. b) Notify the department electronically, within 5 business days of the date of publication, that a compliance report has been published on the website. c) Provide the weblink for the compliance report in the notification to the department. d) Keep all published compliance reports required by these conditions on the website until the expiry date of this approval. e) Exclude or redact sensitive ecological data from compliance reports published on the website or otherwise provided to a member of the public. f) If sensitive ecological data is excluded or redacted from the published version, submit the full compliance report to the department within 5 business days of its publication on the website and notify the department in writing what exclusions and redactions have been made in the version published on the website. <p>Note: Compliance reports may be published on the department's website</p> | TfNSW | TfNSW |
| Reporting Non-Compliance | | | |
| 31) | The approval holder must notify the department electronically, within 2 business days of becoming aware of any incident and/or potential non-compliance and/or actual non-compliance with these conditions or commitments made in a plan. | TfNSW | TfNSW |

| Ref | Description | Owner | Evidence |
|--------------------------|---|-------|----------|
| 32) | <p>The approval holder must specify in the notification:</p> <ul style="list-style-type: none"> a) Any condition or commitment made in a plan which has been or may have been breached. b) A short description of the incident and/or potential non-compliance and/or actual non-compliance. c) The location (including co-ordinates), date, and time of the incident and/or potential non-compliance and/or actual non-compliance. <p>Note: If the exact information cannot be provided, the approval holder must provide the best information available.</p> | TfNSW | TfNSW |
| 33) | <p>The approval holder must provide to the department in writing, within 12 business days of becoming aware of any incident and/or potential non-compliance and/or actual non-compliance, the details of that incident and/or potential non-compliance and/or actual non-compliance with these conditions or commitments made in a plan. The approval holder must specify:</p> <ul style="list-style-type: none"> a) Any corrective action or investigation which the approval holder has already taken. b) The potential impacts of the incident and/or non-compliance and/or non-compliance. c) The method and timing of any corrective action that will be undertaken by the approval holder. | TfNSW | TfNSW |
| Independent Audit | | | |
| 34) | <p>The approval holder must ensure that an independent audit of compliance with these conditions is conducted for every five-year period following the commencement of the action until this approval expires, unless otherwise specified in writing by the Minister.</p> | TfNSW | TfNSW |

| Ref | Description | Owner | Evidence |
|------------------------------------|---|-------|----------|
| 35) | <p>For each independent audit, the approval holder must:</p> <ul style="list-style-type: none"> a) Provide the name and qualifications of the nominated independent auditor, the draft audit criteria, and proposed timeframe for submitting the audit report to the department prior to commencing the independent audit. b) Only commence the independent audit once the nominated independent auditor, audit criteria and timeframe for submitting the audit report have been approved in writing by the department. c) Submit the audit report to the department for approval within the timeframe specified and approved in writing by the department. d) Publish each audit report on the website within 15 business days of the date of the department's approval of the audit report. e) Keep every audit report published on the website until this approval expires. | TfNSW | TfNSW |
| 36) | Each audit report must report for the five-year period preceding that audit report. | TfNSW | TfNSW |
| 37) | Each audit report must be completed to the satisfaction of the Minister and be consistent with the Environment Protection and Biodiversity Conservation Act 1999 Independent Audit and Audit Report Guidelines (Commonwealth of Australia 2019). | TfNSW | TfNSW |
| Completion of the Action | | | |
| 38) | The approval holder must notify the department electronically 60 business days prior to the expiry date of this approval, that the approval is due to expire. | TfNSW | TfNSW |
| 39) | Within 20 business days after the completion of the action, and, in any event, before this approval expires, the approval holder must notify the department electronically of the date of completion of the action and provide completion data. | TfNSW | TfNSW |
| Changes to State Conditions | | | |

| Ref | Description | Owner | Evidence |
|-----|--|-------|----------|
| 40) | The approval holder must inform the department in writing within 2 business days of requesting any change to the NSW Approval conditions that may relate to protected matters. | TfNSW | TfNSW |
| 41) | The approval holder must inform the department in writing within 5 business days of any approved changes made to the NSW Approval conditions that may relate to protected matters. | TfNSW | TfNSW |

Revised Environmental Management Measures

Relevant REMM are listed Table B3 below. This includes reference to required outcomes, the timing of when the commitment applies, relevant documents or sections of the environmental assessment influencing the outcome and implementation.

Table B3: Revised environmental management measures relevant to this CNVMP

| Outcome | REMM Ref # | Commitment | Responsibility | Timing | CNVMP Reference |
|---------------------|------------|--|----------------|---|-----------------|
| Noise and vibration | SN1 | <p>A Construction Noise and Vibration Management Plan (NVMP) will be prepared and implemented as part of the CEMP. The plan will generally follow the approach of the Interim Construction Noise Guideline (NSW DECC, 2009) and provide details of construction management measures and procedures. The plan will include:</p> <ul style="list-style-type: none"> a) An Out of Hours Works Protocol and provision to cover working outside of the standard hours set by the Construction Noise and Vibration Strategy (ST-157/4.1, Transport for NSW, 2020j) b) Identify all potential significant noise and vibration generating activities c) Noise and vibration management measures such as restrictions on working hours, staging, placement and operation of work compounds, parking and storage areas, temporary noise barriers, haul road maintenance, equipment selection and controlling the location and use of vibration generating equipment d) A monitoring and reporting program to assess performance against relevant noise and vibration criteria e) Consultation arrangements with affected neighbours and sensitive receivers, including notification and complaint handling procedures | Contractor | <p>Pre-construction</p> <p>Construction</p> | This Plan |

| Outcome | REMM Ref # | Commitment | Responsibility | Timing | CNVMP Reference |
|---|------------|--|----------------|-----------------------------------|-----------------|
| | | f) Consultation with NSW EPA, Randwick City Council, Sutherland Shire Council and National Parks and Wildlife Service for preparation of the NVMP <ul style="list-style-type: none"> Contingency measures in the event of non-compliance with noise and vibration criteria. | | | |
| Heritage vibration impacts | SN2 | A pre-construction building condition assessment of Aboriginal and non-Aboriginal heritage items within 70 metres of the construction boundary will be carried out by a suitably qualified person prior to construction. During construction, inspections of the construction activities and work areas will be undertaken to monitor and review the construction methodology and confirm the integrity of the nearby significant structural elements. For heritage items identified at risk during the pre-construction condition assessment, minimum safe working distances will be established and vibration monitoring be carried out prior to the commencement of construction and monitored throughout construction to identify any construction-related impacts. If impacts are detected, work in the area will stop and appropriate environmental management measures will be implemented such as using alternative construction techniques or installing protection structures in collaboration with a heritage consultant. | Contractor | Pre-construction and construction | Section 9.3 |
| Unavoidable noise and vibration impacts | SN3 | Any noise or vibration affected sensitive receivers will be notified at least five days before starting work. The notification will include details of: <ol style="list-style-type: none"> Construction periods and working hours | Contractor | Construction | Section 8 |

| Outcome | REMM Ref # | Commitment | Responsibility | Timing | CNVMP Reference |
|--------------------------|------------|---|----------------|-----------------------------------|-----------------|
| | | b) Contact information for project management staff c) Complaint and incident reporting d) How to obtain further information. This excludes emergency works which will be covered under the CLIP. | | | |
| Underwater noise impacts | UN1 | Underwater noise management measures will be included as part of a Construction Noise and Vibration Management Plan (CNVMP). The CNVMP will include: a) Identification of potential significant underwater noise and vibration generating activities b) Management measures that will be guided by Section 5 of the SA Underwater Piling Noise Guidelines (Government of South Australia, 2012). This will include: <ul style="list-style-type: none"> • Investigating the use bubble curtains to reduce the severity of the energy of the sounds caused by the driving of the piles. • Carrying out observations for 30 minutes before starting work in all zones. • A slow-start process for the piling works that would last for 10 minutes. • Implement a stand-by and shut down process. • Prepare and maintain a compliance and siting report while piling takes place. • Notify the recreational user groups in the area and post notices at the key beaches warning people of the ongoing piling works so that can expect potential underwater noise. | Contractor | Pre-construction and construction | Section 8 |

| Outcome | REMM Ref # | Commitment | Responsibility | Timing | CNVMP Reference |
|--|------------|---|----------------|--------------------------------|-----------------|
| | | <ul style="list-style-type: none"> Aim to avoid piling on weekends and during public holidays. | | | |
| Underwater noise impacts on humans | UN2 | Public communication, including website updates and notices at the project areas, will be carried out before any piling starts. This will be included as part of the CLIP. | Contractor | Pre-construction/ construction | Section 8 |
| Underwater noise impacts on marine fauna | UN3 | <p>Underwater noise monitoring may be carried out before the main construction works starts. This will be used to define three zones in accordance with Section 5.2 of the Underwater Piling Noise Guidelines (Government of South Australia, 2012):</p> <ol style="list-style-type: none"> Zone 1: stop work Zone 2: introduce work restrictions Zone 3: use marine spotters. <p>A specialist marine spotter will be responsible for observing and implementing the three zones during piling activities.</p> | Contractor | Construction | Attachment E |

Attachment C – Technical Advice – Protecting Black Rockcod (Epinephelus daemeli) During Construction of the Kamay Ferry Wharves

Under MCoA E10, McConnell Dowell's Biodiversity Consultant Stantec has undertaken the below investigation into potential protection measures for Black Rock Cod, including the use of bubble curtains and underwater noise modelling (Section 5.3).

Technical Advice – Protecting Black Rockcod (*Epinephelus daemeli*) During Construction of the Kamay Ferry Wharves

1 Project Background

Transport for New South Wales (TfNSW) is constructing new ferry wharves at La Perouse (**Figure 1-1**) and Kurnell (**Figure 1-2**) in Botany Bay (the Project). This would allow for an alternative connection between northern and southern Botany Bay other than by road. The primary purpose of this infrastructure would be to return the public ferry service that operated between La Perouse and Kurnell for 75 years until the wharves were damaged in 1974 by a storm. It would also provide supplementary temporary mooring for non-ferry commercial vessels (such as whale watching vessels) and recreational boating.

Key features of the project include:

- Demolition of the existing viewing platform at Kurnell
- Construction of temporary ancillary works including access roads, compound areas, stockpiles, fencing and temporary building platforms (including a temporary causeway at Kurnell and temporary crane platform at La Perouse)
- Relocation of swing moorings at La Perouse
- Construction of two wharves on piles, one at La Perouse and one at Kurnell that would include:
 - A berth for passenger ferries (to cater for ferries between 15 m to 40 m in length)
 - A multi-user berth for commercial and recreational vessels (to cater for vessels between 2 m and 20 m long)
 - Sheltered waiting areas and associated furniture located on the wharves
 - Signage and lighting
 - Landside paving and landscaping at the entrance to the wharves

An Environmental Impact Statement (EIS) was prepared for the Project with Chapter 10 assessing impacts of construction and operation of the Project on marine biodiversity.

The Project was approved as State Significant Infrastructure (SSI) under the *Environmental Planning and Assessment Act 1979* on 21/7/2022 (SSI 10049).



Figure 1-1 La Perouse project overview



Figure 1-2 Kurnell project overview



Figure 1-1 La Perouse project overview



Figure 1-2 Kurnell project overview

2 Purpose

SSI 10049 contains several conditions relevant to biodiversity management including those related to the vulnerable Black Rockcod (*Epinephelus daemeli*) (Table 2-1). This paper of technical advice provides for the requirements of SSI Condition E10, identifying suitable methods to protect Black Rockcod and its habitat in accordance with the Project's Marine Biodiversity Offset Strategy, the NSW Black Rockcod Recovery Plan (2012) and NSW Department of Primary Industries (DPI) Fisheries' Priorities Action Statement — Actions for Black Rockcod.

Table 2-1 SSI 10049 conditions relating to Black Rockcod

| Condition no. | Condition |
|---------------|--|
| E9 | An inspection must be undertaken by an appropriately qualified and experienced ecologist (and diver) when any construction methods have the potential to impact potential habitat for Black Rockcod (<i>Epinephelus daemeli</i>) (rocky reefs, caves, ledges, gutters and artificial structures such as wharves, piers and rock emplacements). |
| E10 | Suitable methods must be used to protect Black Rockcod habitat and individuals in the construction footprint at La Perouse and Kurnell sites in accordance with the provisions of the MBOS, Black Rockcod Recovery Plan 2012 and DPI Fisheries' Priorities Action Statement — Actions for Black Rockcod. |

3 Background – Black rockcod

The Black Rockcod is a large grouper, listed as vulnerable under the NSW *Fisheries Management Act 1994* (FM Act) and the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act). This species is known to occur in warm temperate to subtropical waters of the south-western Pacific Ocean (Aquaculture, Conservation and Marine Parks Unit, Port Stephens Fisheries Institute, 2012). It has been recorded along the east coast of Australia from southern Queensland to Kangaroo Island off South Australia and around Lord Howe and Norfolk Islands.

Black Rockcod distribution is centred around the NSW coast and adults are usually found in caves, gutters and beneath bommies on rocky reefs up to 50 metres (m) in depth. Juveniles of this species prefer coastal rock pools while larger juveniles prefer rocky reefs in estuaries. This species has high site fidelity and is territorial. Significant habitat for the species has been identified, of which the intertidal rocky shore within the coastal depth zone between 0 and 20 m of the Hawkesbury Shelf is considered as significant.

Black Rockcod was considered in the EIS to be likely to occur in the marine study area, which extended 100-200 m outside the construction boundary. Targeted surveys undertaken as part of the EIS did not identify Black Rockcod in the study area, but the species are known in the region and there is habitat outside of the construction boundary but within the study area (Figure 3-1, Figure 3-2), which is in good condition that could support these species. There is no high-quality Black Rockcod habitat within the construction boundary and it is highly unlikely that Black Rockcod would utilise this area.



Figure 3-1 Black Rockcod habitat at La Perouse



Figure 3-2 Black Rockcod habitat at Kurnell

3.1 Black Rockcod Recovery Plan

NSW DPI Fisheries develop and implement recovery and threat abatement plans to assist in the recovery of threatened species, populations, ecological communities, and mitigate key threatening process listed under the FM Act. Recovery plans summarise the current state of knowledge of the species, community etc and use a risk assessment framework to identify and rank threats. The plans also identify and prioritise recovery actions.

The Black Rockcod Recovery Plan (2012) identified and prioritised nine risks to Black Rockcod (Table 3-1). Six of those nine risks, including the only high risk, are related to fishing or collecting and hence would not be influenced by the Project. Climate change would also not be influenced by the Project. The only identified risks to Black Rockcod that have the potential to be influenced by the Project are water pollution and the introduction of non-indigenous fish and marine vegetation. These are addressed in detail in Section 4.

Table 3-1 Black Rockcod Recovery Plan – Identified risks and priority

| Threat | Risk/Priority |
|--|---------------|
| Hook and line fishing (bottom-set baited) – setlining, trotlining, handlining | High |
| Hook and line fishing (soft plastic lures and droplining) | Moderate |
| Climate change | Moderate |
| Water pollution | Moderate |
| Spearfishing | Low |
| Mesh netting (estuarine) and fish trapping | Low |
| Hook and line fishing (non-baited, surface-set baited) – lure, fly, jig, poling, driftlining, trolling | Low |
| Aquarium collecting | Low |
| Introduction of non-indigenous fish and marine vegetation | Low |

3.2 Priorities Action Statement – Actions for Black Rockcod

NSW DPI Fisheries Priorities Action Statements are non-regulatory documents that provide a list of strategies and recovery actions that will assist in down-grading risks to each threatened species, population, ecological community, and from key threatening process listed under the FM Act.

Recovery actions for the Black Rockcod relevant to the Project are limited. This is due to the Project not influencing many of the key identified Black Rockcod risks (eg fishing, climate change). Recovery actions for the Black Rockcod relevant to the Project include:

- Ensure that councils, government agencies and other relevant organisations are aware of the location of important areas for Black Rockcod, for example, by providing maps of known and potential habitat and the location of significant populations
- Implement the NSW Diffuse Source Water Pollution Strategy to coordinate efforts to reduce diffuse source water pollution impacting on Black Rockcod habitat

4 Project Risks to Black Rockcod

The EIS considered that the Project poses several risks to Black Rockcod and its habitat and these are further addressed below. Water pollution and the introduction of non-indigenous fish and marine vegetation were identified as key risk in the Black Rockcod Recovery Plan (2012).

4.1 Water Pollution

Activities at Kurnell and La Perouse including piling have the potential to impact water quality, particularly turbidity within the construction boundaries of each site. Turbidity and sediment deposition have the potential to impact on the quality of adjoining Black Rockcod habitats, both through smothering as well as reducing the absorption of light for photosynthesis of marine vegetation. Mobilisation of finer debris could also result in the resuspension of sediments of an unknown quality. This could reduce forage material or the quality of shelter. This may, however, only be a temporary disturbance to habitat depending on the volume and the size of fine debris, along with the potential for wave, tide and current to disperse suspended or settled sediment.

Fish, including Black Rockcod could experience behavioural changes, given species may avoid affected areas of impact. Fish can also experience physiological changes from increased turbidity. While the precise impacts of water pollution on Black Rockcod are unknown, it is likely to have a negative impact on the species long-term viability in local areas.

Given the location of the study area at the mouth of the Georges River, periodic changes in turbidity and suspended sediments are normal with high levels of local natural variability. The project EIS indicates that water quality impacts from piling are low and restricted to within proximity to the piling activities. Sediment generated from piling is predicted to mainly suspend and disperse near the seafloor over 80 m from piling at Kurnell and 40 m from piling at La Perouse. On the surface sediment is expected to disperse more rapidly, being fully dispersed more than 20 m from any piling activities.

Most mobile marine fauna (including fish) would also temporarily seek out alternative unaffected habitat within the estuary. Less mobile fauna or those with strong site fidelity, such as the Black Rockcod could be temporarily affected by local changes in water quality however given the known variability in turbidity at the location of the study area it is more likely that local populations are adapted to such conditions.

Given the Project would not be expected to cause additional turbidity that would affect the fauna in Botany Bay and that local fauna is expected to be adapted to, and can tolerate, occasional high turbidities that occur naturally due to rainfall and river flow events, and other activities, Black Rockcod are not expected to be at risk. Notwithstanding, monitoring measures to ensure that turbidity remains with a target range are included in Section 5.1.

4.2 Introduction of Non-indigenous Fish and Marine Vegetation

The Black Rockcod Recovery Plan indicated that the introduction of non-indigenous fish and marine vegetation to the coastal waters of NSW is unlikely to directly affect Black Rockcod as none of the known introduced species are reported to interact with Black Rockcod. However, it was acknowledged that there may be some unknown indirect impacts on the prey resources and/or habitat of Black Rockcod. For example, the invasive alga *Caulerpa taxifolia* has been reported to support fewer species, higher abundances of gobies, and few or no seahorses and leatherjacket species than adjacent, native seagrass beds

Maritime construction projects and maintenance works have the potential to introduce and promote the spread of non-indigenous fish and marine vegetation, particularly *Caulerpa* which occurs throughout Botany Bay. No *Caulerpa* was found within the study area and the over water activities of the proposal are highly unlikely to introduce marine pests if the appropriate protection and mitigation measures are implemented as per Section **Error! Reference source not found.**

4.3 Habitat Loss

The EIS indicated that there is no habitat for Black Rockcod within the construction boundary that would be directly impacted or lost due to Project activities. This risk has not been considered further or had protection and mitigation measures recommended.

4.4 Underwater Noise

Underwater noise can impact marine mammals (whales, dolphins, porpoise, seals, and dugong), fish, sharks, rays, sea turtles, other marine reptiles, birds, invertebrates, squid, and crustaceans, causing permanent or temporary hearing loss and injury. It can also affect divers and other recreational users. Tolerance to changes in noise, vibration and water quality may vary among species, but the response is generally similar to these types of activities in a busy harbour (ie movement away from unfavourable conditions).

There would be two underwater noise sources associated with the construction of the Project. During construction there is the need to pile the wharf foundations. This would generate impulsive noise for approximately eight months at Kurnell and La Perouse. The other noise source occurs from construction vessels operating in the area (approximately 13 months).

The Project Construction Noise and Vibration Sub-Plan indicates that the potential effects zone with increased risk of fatality for fish with swim bladders (Black Rockcod) is 300 m from piling. Construction vessel operation is not expected to cause injury at distances of more than 1 m and does not require any mitigation actions.

The 300 m potential effects zone for piling include parts of Watts Reef at Kurnell and a section of rocky reef habitat to the south of the construction boundary at La Perouse. Measures to protect Black Rockcod from underwater noise impacts are recommended in Sections 5.3 and 5.4.

4.5 Vessel Strike

A temporary increase in vessel and barge activity during Project construction will increase the risk of vessel strikes. This risk is largely relevant to turtles, marine mammals, and other species that regular access the surface, rather than Black Rockcod given its preference for bottom habitat such as caves, or gutters within rocky reef. This risk is further limited by there being no Black Rockcod habitat within the construction boundary at La Perouse or Kurnell. Vessel activity during travel to and from the construction site would be far less regular than at the Construction site. As such, the Project would not pose additional risk to Black Rockcod via vessel strike.

Vessel strike mitigation measures are being implemented for marine mammals as per Section 5.3. These would also provide protection for Black Rockcod.

5 Protection and Mitigation Measures

Several protection and mitigation measures are recommended to reduce risks to Black Rockcod from Project activities.

5.1 Turbidity Monitoring Program

A turbidity monitoring program and associated Trigger Action Response Plan (TARP) were developed for the Project in accordance with conditions of SSI 10049 and the Revised Environment Management Measures (REMMs) identified by the EIS.

The program includes a turbidity threshold of 2.2 NTU. The level was set with consideration for Botany Bay's classification as a high conservation value system under ANZECC guidelines, ecological values and community preferences. This threshold is consistent with the Sydney Metropolitan Catchment Management Authority water quality objectives under the Botany Bay and Catchment Water Quality Improvement Plan (2011).

If the threshold is exceeded, fortnightly turbidity readings are to be compared between control and impact sites. Where an exceedance is confirmed to have resulted from construction and not from a natural event any work with the potential to impact water quality will be stopped until further sampling confirms reading have dropped below the threshold. Increased monitoring frequency is recommended in the period immediately following any exceedance.

The turbidity monitoring program was developed in accordance with ANZECC guidelines and the NSW Diffuse Source Water Pollution Strategy.

5.2 Introduction of Non-indigenous Fish and Marine Vegetation

Mitigation actions to reduce the risk of Project activities introducing non-indigenous fish and marine vegetation are listed in the Kamay Ferry Wharves Biodiversity Management Plan and include:

- All Contractors must undertake a Vessel Risk Assessment (VRA), which includes using the online Vessel-Check application and complete a Biofouling Record Book Form for each vessel prior to mobilisation of the vessel to Site. The history of the vessel is also to be provided including location of last port and previous antifouling applications.
- All vessels assessed in the VRA as uncertain or high risk for introduction of invasive marine species must undertake an Invasive Marine Species Inspection (IMS) Any construction vessels mobilised from outside of Australia shall also be considered high risk and an IMS inspection must be carried out.
- The IMS inspection must be undertaken by an appropriately qualified practitioner with experience in biosecurity of marine vessels. The Contractor(s) is responsible for arranging the IMS inspection and attendance of DPI-Fisheries.
- The Contractor(s) must provide the completed IMS report to the Principal at least seven days prior to the vessel leaving the departure port.
- Where IMS inspections identify significant amounts of sediment and/or the presence of an invasive marine species (as deemed by the IMS inspector) the vessel must be dry docked and cleaned prior to entering the site. The Contractor(s) must then resubmit the VRA and if the vessel is classified as low risk, it shall be permitted to sail to site and begin operations.
- All work vessels must be cleaned before and after leaving site.
- Anchoring locations should be established with consideration for *Caulerpa*. Currently no *Caulerpa* has been identified onsite however it is known to occur in the locality.
- Ballast water management procedures would also apply to vessels operating on site in accordance with the Australian Ballast Water Management Requirements (Department of Agriculture, Water and the Environment 2020).
- Ensure moveable structures (semi-permanent or temporary infrastructure) are inspected to assess the level of biofouling present before being moved between locations, and clean if necessary:
 - if there is a high level of fouling/macrofouling (more than just an algal film/microfouling), the structure should be cleaned before it is moved, as this can present similar biofouling risks to vessel movements
 - cleaning should be done on land or in a location with suitable facilities to prevent waste from returning to the water
 - infrastructure that can be removed from the water, such as mooring buoys, should be pressure cleaned or scraped, scrubbed and air-dried for at least 48 hours, ideally exposed to sunshine, before being redeployed
 - if the infrastructure cannot be cleaned on land, it should be cleaned according to the *Anti-fouling and in-water cleaning guidelines*.

5.3 Targeted Surveys

Black Rockcod habitat has not been identified within the construction boundary of either site (La Perouse or Kurnell). Black Rockcod have been identified to potentially occur at the rocky reef south of the La Perouse construction boundary (Figure 3-1), and at locations to the north (Watts Reef) and west of Kurnell (Figure 3-2). Some of this habitat is within the 300 m potential effects zone for piling underwater noise.

A targeted survey for Black Rockcod will be conducted at La Perouse and Kurnell in the leadup to any pile driving work (24 hours prior). A single survey is required at each site. Likely habitat would be inspected using a combination of divers and / or ROV deployed from a survey vessel, depending on which is most appropriate for the specific habitats and conditions surveyed at the time. Surveys would utilise the roving count methodology as per Harasti (2013) focusing on habitat within the 300 m potential effects zone. This meets the requirements of SSI 10049 Condition E9.

Any sighted Black Rockcod would be photographed, have their size recorded and their location identified in relation to the proposed works. Sighting would be immediately reported to the client via phone and followed up by email.

If Black Rockcod are observed within the 300 m potential effects zone, then due to their high site fidelity additional underwater noise mitigation measures such as bubble curtains and underwater noise monitoring may be required. Further Black Rockcod monitoring may also be required to support these additional measures. It is recommended that the DPI Fisheries Threatened Species Unit is consulted in this circumstance.

5.4 Piling Procedures

All pile driving is to use a soft start procedure which would alert Black Rockcod of the upcoming activity, allowing them the opportunity to move away. An example of a soft start procedure is the gradual increases of the hammer energy from 10% to 100% of the final energy level of piling over 30 minutes.

5.5 Vessel Management

To reduce the risk of vessel strike due to increased vessel traffic during Project construction low speed operations (>4 knots) will be observed within the construction boundary at La Perouse and Kurnell. Safe distances and approaches as identified in Section 2.3 and 2.5 of the *Biodiversity Conservation Regulation 2017* will also be followed.

Vessel operators and crew will be trained and made aware of vessel strike risk through a project induction.

6 Summary

The Black Rockcod is a large grouper, listed as vulnerable under the FM Act and EPBC Act. Its distribution is centred around the NSW coast with adults usually found in caves, gutters and beneath bommies on rocky reefs. This species has high site fidelity and is territorial.

The EIS considered the species to be likely to occur in the marine study area although targeted surveys did not identify any Black Rockcod individuals. There are sections of high-quality Black Rockcod habitat in proximity to the construction boundary at La Perouse and Kurnell but no likely habitat within the construction boundaries.

SSI 10049 Condition E10 requires the identification of suitable methods to protect Black Rockcod and its habitat in accordance with the Project's Marine Biodiversity Offset Strategy, the Black Rockcod Recovery Plan (2012) and DPI Fisheries' Priorities Action Statement — Actions for Black Rockcod. The Project poses several risks to Black Rockcod, although all have been assessed as minimal and easily managed with standard mitigation measures.

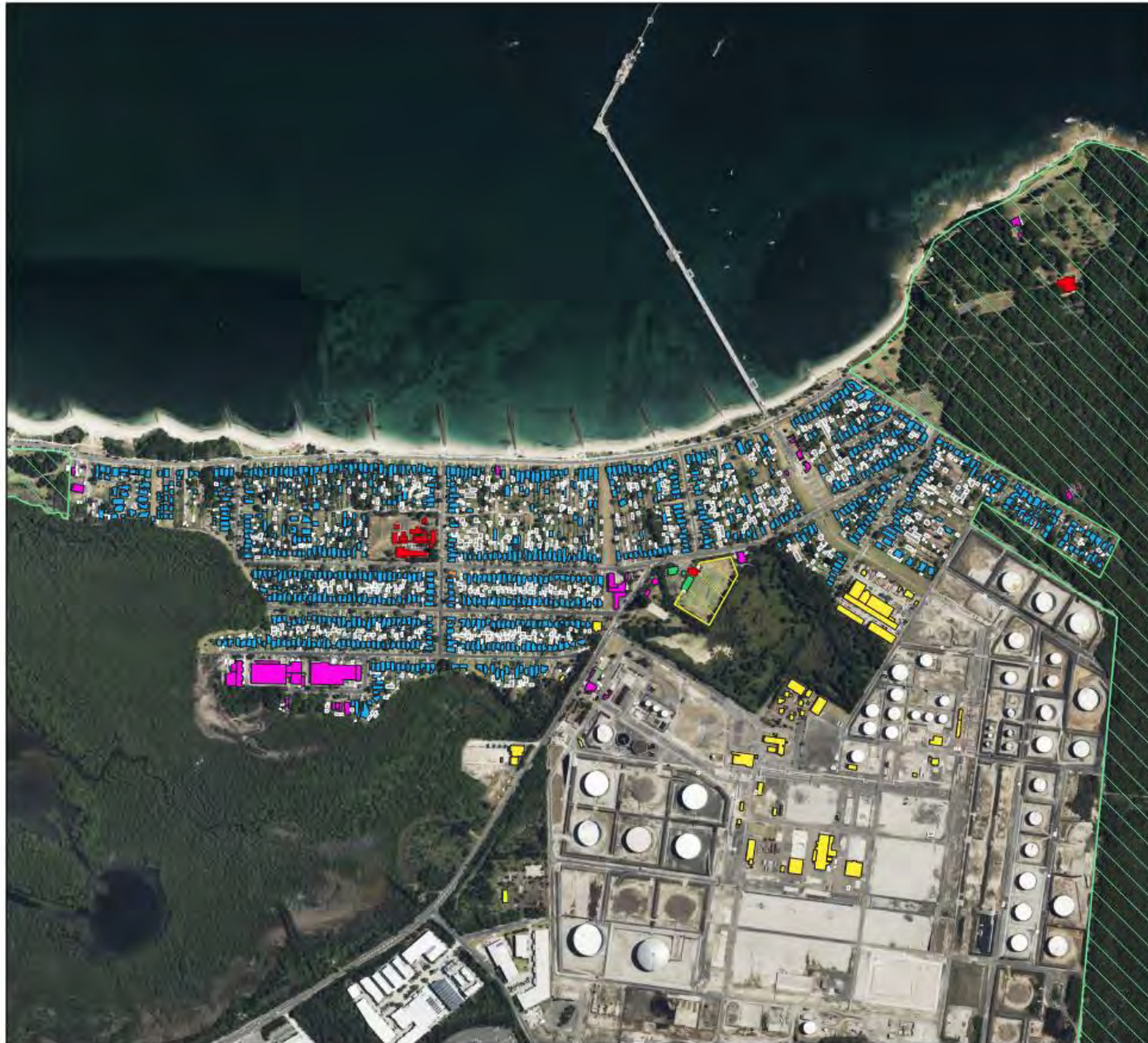
Water pollution risks were low with the EIS identifying that the Project would not cause additional turbidity that would affect marine fauna. A turbidity monitoring program with associated trigger values and a TARP are being implemented to monitor, confirm and manage (if required) this outcome. The Project was found to be highly unlikely to introduce non-indigenous fish and marine vegetation with a standard suite of vessel biofouling and ballast management procedures recommended.

The key risk the Project poses to Black Rockcod is from underwater noise generated from pile driving. The potential effects zone with increased risk of fatality for Black Rockcod is 300 m from any piling driving activity. This includes parts of likely Black Rockcod habitat at Watts Reef at Kurnell and a section of rocky reef habitat to the south of the construction boundary at La Perouse. Soft start piling procedures will be used to alert Black Rockcod of the upcoming activity and this would be expected to allow them the opportunity to move away. Targeted surveys would confirm the presence/absence of Black Rockcod at these locations before piling commences and whether additional mitigation measures need to be explored.

Will the implementation of the recommended protection and mitigation measures Black Rockcod will be suitably protected from Project impacts in accordance with SSI 10049 Condition E10.

Attachment D – Land Use Survey

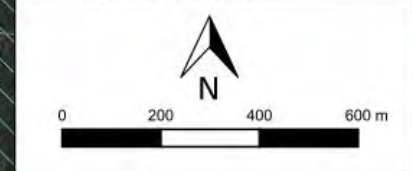
A detailed land use survey has been undertaken prior to construction to confirm sensitive land user(s) potentially exposed to construction noise and vibration, construction ground-borne noise and operational noise. The results of the land use survey are outlined below.



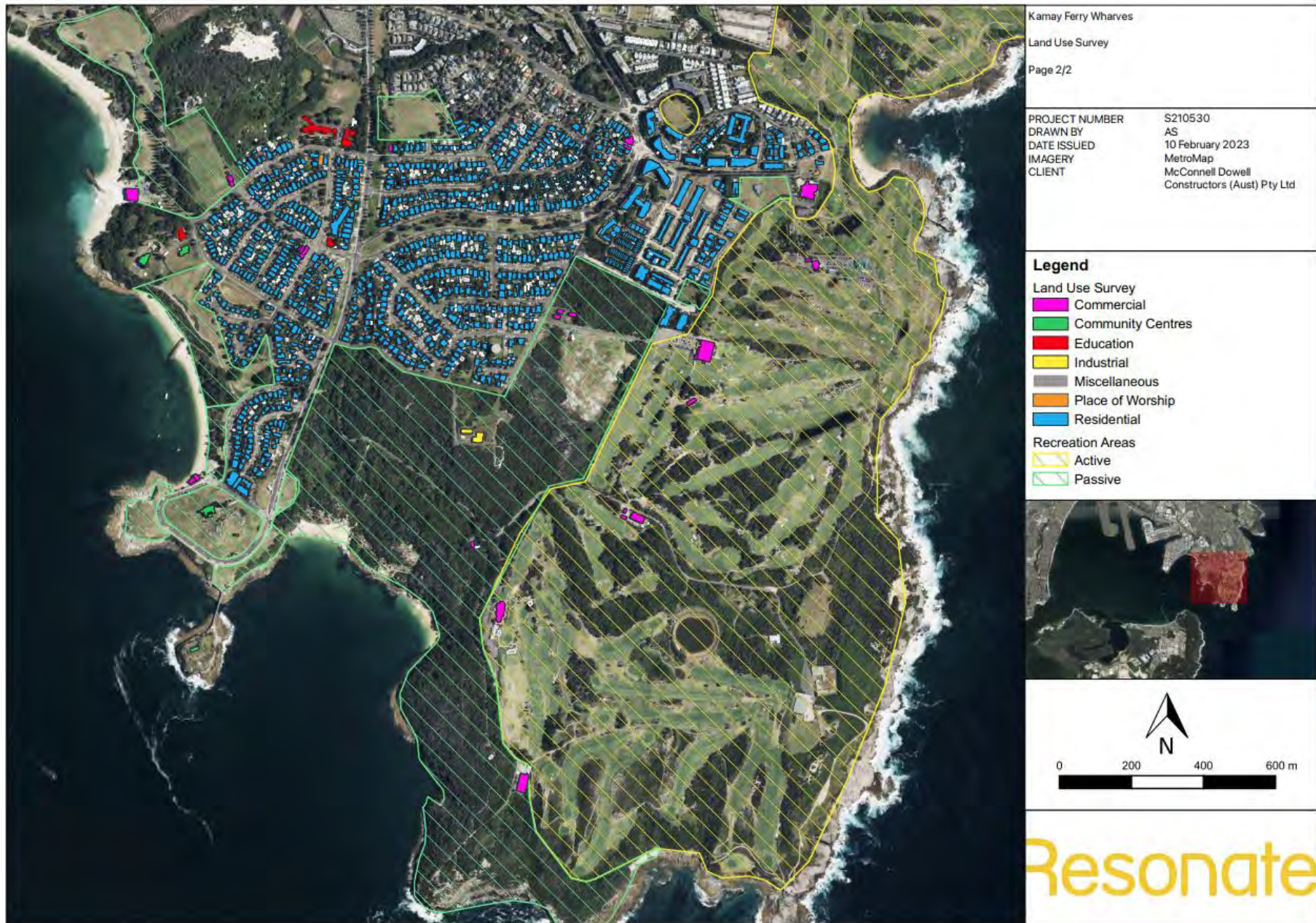
Kamay Ferry Wharves
 Land Use Survey
 Page 1/2

| | |
|----------------|--|
| PROJECT NUMBER | S210530 |
| DRAWN BY | AS |
| DATE ISSUED | 10 February 2023 |
| IMAGERY | MetroMap |
| CLIENT | McConnell Dowell Constructors (Aust) Pty Ltd |

- Legend**
- Land Use Survey
- Commercial
 - Community Centres
 - Education
 - Industrial
 - Miscellaneous
 - Place of Worship
 - Residential
- Recreation Areas
- ▭ Active
 - ▭ Passive



Resonate



Attachment E – Construction Monitoring Program – Noise & Vibration

This section contains the Construction Monitoring Program – Noise and Vibration (CMPNV) that has been prepared in accordance with MCoA C7, MCoA C9 and MCoA C14 to MCoA 21, in consultation with NSW EPA and to address MCoA E45.

In accordance with MCoA C19, construction will not commence until the CNVMP (which includes this CMPNV) has been approved by the Secretary and endorsed by the ER.

The approved CMPNV (including any minor amendments approved by the ER) will be implemented for the duration of construction and for any longer period set out in the monitoring program or specified by the Planning Secretary, whichever is the greater.

Noise and vibration will be monitored to ensure construction impacts (including cumulative impacts) are in accordance with regulatory requirements and guidelines, and to identify environmental risks or potential non-compliances before they occur. Ongoing analysis of environmental risks and non-compliance will be undertaken through monitoring as specified in this CMP.

The CMP has been developed considering the SMART principles, being specific with measurable outcomes. The outcomes are defined by the criteria and the measured construction noise and vibration, allowing to adjust the work methodology in case of exceedances of the criteria. The requirements for monitoring are achievable and realistic. Monitoring is only proposed for works with risk of high noise or vibration impacts and the frequency of noise monitoring is proposed.

E-1 Baseline noise data

Surface Noise monitoring has been undertaken for the EIS from 27 March up until 2 April 2020 at two locations for the purpose of obtaining noise data at the La Perouse and Kurnell receivers. The methodology and sampling locations are provided in Section 2.3 of the EIS.

As outlined in Chapter 15 of the EIS, baseline noise monitoring was carried out during lockdown restrictions due to Covid-19. Which may have affected noise monitoring results given the reduction in road and air traffic during monitoring. However, when compared to previous noise monitoring in the area, the results are representative of the typical noise environment, therefore it is not anticipated that additional baseline measurement data would be required.

Note that the two locations used in the EIS are still the closest sensitive receivers to the construction sites and the data collected for the EIS is still relevant.

E-2 Surface Noise monitoring

Where it has been predicted that noise levels may be in excess of the nominated construction noise goals at a noise sensitive receiver, verification noise monitoring would be conducted at:

- the affected receiver; or
- if more than one affected receiver has been identified, at the nearest affected receiver; or
- where the nearest affected receiver refuses noise monitoring on their property, at the near point to that receiver within the site boundary; or
- if it can be demonstrated that direct measurement of noise from the construction site is impractical, alternative means of determining construction noise levels will be adopted in accordance with Chapter 7 of the NSW EPA's *Noise Policy for Industry*.

All noise monitoring results would be compiled into a report to be forwarded to the construction contractor and project manager. Reporting would be submitted to the construction contractor and project manager within one week of being undertaken or at weekly intervals for continuous monitoring.

E-2.1 Surface Noise Monitoring Procedure

Surface Noise monitoring is to be conducted in accordance with the *Approved Methods for the Measurement and Analysis of Environmental Noise (EPA, 2022)* and includes the following:

- Verification noise monitoring are to be conducted at the start of each construction activity to verify if noise levels are within or below PNL for that activity;
- Where valid complaints are received, additional noise monitoring may be undertaken at sensitive receivers to determine if the actual construction noise generated exceeds the predicted 'worst case' construction noise levels identified in Section 7.2 of this CNVMP;
- Noise monitoring may be carried out for the purpose of refining construction methods or techniques to minimise noise; and
- Ongoing spot checks of noise intensive plant and equipment will be undertaken throughout construction to ensure compliance with manufacturer's specifications.
- OOHW noise monitoring to confirm compliance with the noise model will be confirmed for each OOHW activity onsite;

It should be noted that recommended feasible and reasonable mitigation measures have been developed based on the PNL.

The measured noise levels of standard hours works and approved out-of-hours works will be compared against the PNL to determine if the recommended feasible and reasonable measures that are implemented are sufficient. Where the measured noise levels are found to exceed the PNL, a review of the AMM applied will be conducted to determine if extra measures would be required to either reduce noise emissions or reduce the impacts on receivers.

In the case of low impact works outside of standard hours, the measured noise levels will be compared against the NML (i.e. no more than 5 dB(A) above the RBL) and sleep disturbance criteria (i.e. $L_{AFmax(15\text{ minute})}$ no more than 15 dB(A) above the RBL) as per the MCoA Condition E44 part (b) (i) and part (b) (ii) requirements respectively .

Details of site activity and equipment usage will be noted during construction noise monitoring.

Acoustic instrumentation employed in the noise monitoring surveys will comply with the requirements of AS1259.2-1990 Acoustics – Sound Level Meters, Part 2: Integrating – Averaging and carry appropriate NATA (or manufacturer) calibration certificates.

E-2.2 Surface Noise Monitoring Locations

The nominated monthly attended noise monitoring locations relevant for construction noise monitoring are listed in Table E-1 and Figure E-1 and E-2.

The monitoring locations are selected to cover the most impacted residential receivers at each site. These locations will be reviewed during construction and amended, if necessary, based on proximity to key construction zones and most potentially affected sensitive receivers.

These locations have also been selected to coincide with the locations where previous baseline monitoring occurred during the EIS. For these locations, the EIS baseline noise monitoring data will be used as the baseline data for the construction noise monitoring

Table E-1 Noise monitoring locations

| Address | Receiver Type | Site |
|--|---------------|-------------------|
| 51-52 Endeavour Avenue | Residential | La Perouse |
| 27 Goorawahl Ave | Residential | La Perouse |
| 3/1 Captain Cook Drive | Residential | Kurnell |
| Alpha House (Rangers House) | Commercial | Kurnell |
| <i>Alternative* – 1605 Anzac Parade</i> | Residential | <i>La Perouse</i> |
| <i>Alternative* – 10 Prince Charles Parade</i> | Residential | <i>Kurnell</i> |

** Alternative noise monitoring locations will be selected when noise monitoring locations is/may be affected by extraneous noise sources.*



Figure E-1 Noise Monitoring Locations - Kurnell



Figure E-2 Noise Monitoring Locations - La Perouse

E-3 Underwater Noise Monitoring

Underwater noise may be carried out prior to and during construction in accordance with REMM UN3. Underwater noise monitoring of piling shall be undertaken by a suitably qualified and experienced person in accordance with ISO 18406 Underwater acoustics – Measurement of radiated underwater sound from percussive pile driving (2017).

E-3.1 Underwater Noise Monitoring Procedure

During underwater noise monitoring, measurement shall be undertaken at locations sufficient to quantify the piling source level(s). Measurements will be undertaken for at least one full pile driving event.

Details of piling to be recorded (for each pile measured) shall include:

- Piling rig make and model
- Pile number / location
- Piling start and stop times
- Number of pile strikes
- Water depth at the pile
- Average energy per strike (where available)
- Details of the seabed and substrate type at the pile location.

Measurement data shall include:

- Measurement location and distance from the pile
- Water depth at the measurement location, and measurement depth
- RMS Sound Pressure Levels (125 ms)
- Peak levels
- Average SEL (single strike)
- Cumulative SEL
- Third octave band spectra

A monitoring report shall be prepared and include the above piling details, details of the measurement methodology and presentation of results.

The report shall include comparison of the piling source levels derived from measurement data, and the indicative source levels in Table 7-4 of the CNVMP. If required (i.e. in the event that there is a significant difference between the measured and indicative source levels), noise levels and safety zone distances should be re-predicted based on the measured source levels, and the CNVMP updated to reflect the revised distances.

E-4 Vibration monitoring

Where it is anticipated that an item of plant will exceed the cosmetic damage criteria given in Section 5.3, vibration monitoring would be required at the nearest affected receiver. Where it is anticipated that an item of plant will exceed the human response / ground borne noise criteria and concerns have been raised regarding vibration following a valid community complaint, vibration monitoring would also be required at the receiver(s) under question.

All vibration monitoring results would be assessed against the nominated vibration goals and compiled into a report to be forwarded to the McConnell Dowell and project manager. Reporting would be submitted to McConnell Dowell and project manager within one week of being undertaken or at weekly intervals for continuous monitoring.

E-4.1 Vibration Monitoring Procedure

The following attended vibration monitoring will be undertaken:

- a) In the immediate area of AHIMS Site # 45-6-0653 (Site 6 - La Perouse). If vibration monitors are affixed to sandstone, non-invasive adhesive methods (such as beeswax) must be used in consultation with a heritage consultant.
 - o If it is identified that levels of vibration would result in damage to AHIMS Site # 45-6-0653 (Site 6 - La Perouse), all works must cease and the construction methodology revised to mitigate further impacts. This must be undertaken in consultation with Heritage NSW, RAPs and LALCs.
- b) For the protection of buildings, monitoring will be carried out at the commencement of vibratory compaction work and any rock-breaking within 50 metres of buildings to ensure that safe vibration working distances specified in Table E-2 are not exceeded and to confirm safe working distances.

Table E-2 Recommended minimum working distances for vibration intensive plant

| Plant item | Rating / description | Minimum working distance – cosmetic damage (BS7385) | Minimum working distance – human response (DECC 2006) |
|------------------------|-----------------------------------|---|---|
| Vibratory roller | < 50 kN (Typically 1-2 tonnes) | 5 m | 15 m to 20 m |
| | < 100 kN (Typically 2-4 tonnes) | 6 m | 20 m |
| | < 200 kN (Typically 4-6 tonnes) | 12 m | 40 m |
| | < 300 kN (Typically 7-13 tonnes) | 15 m | 100 m |
| | > 300 kN (Typically 13-18 tonnes) | 20 m | 100 m |
| | > 300 kN (> 18 tonnes) | 25 m | 100 m |
| Small Hydraulic Hammer | (300 kg - 5 to 12t excavator) | 2 m | 7 m |

| Plant item | Rating / description | Minimum working distance – cosmetic damage (BS7385) | Minimum working distance – human response (DECC 2006) |
|-------------------------|---------------------------------|---|---|
| Medium Hydraulic Hammer | (900 kg – 12 to 18t excavator) | 7 m | 23 m |
| Large Hydraulic Hammer | (1600 kg – 18 to 34t excavator) | 22 m | 73 m |
| Vibratory Pile Driver | Sheet piles | 2 m to 20 m | 20 m |
| Pile Boring | ≤ 800 mm | 2 m (nominal) | 4 m |
| Jackhammer | Handheld | 1 m (nominal) | 2 m |

- c) When vibration intensive activities are required, vibration monitoring will be carried out within the established buffer zones, or where there is considered to be a risk that levels may exceed the relevant structural damage goals
- d) Vibration monitoring may be carried out in response to complaints, exceedances, or for the purpose of refining construction methods or techniques to minimise vibrations
- e) Vibration monitoring will continue throughout construction, where appropriate, at nominated sensitive receiver locations to determine the effectiveness of mitigation strategies.
- f) Where vibration is found to exceed safe levels, impacts will be avoided by changing work methods and/or equipment, or through the provision of building protection measures where practical. In the event a complaint relating to property damage is received, an inspection of the property would be undertaken and an interim building condition survey prepared.
- g) Other Heritage items identified as “At Risk” during the Pre-Construction Condition Assessment Advice from a heritage specialist must be sought on methods and locations for installing equipment used for vibration and movement monitoring at heritage-listed structures.

Longer-term unattended monitoring may be conducted in situations where there is a requirement to work within safe working distances and attended monitoring has demonstrated that there is a reasonable risk of exceeding the established vibration criteria at sensitive receivers or structures. These monitors would have the capability to send automated alerts or include audible or visual alarms.

Vibration monitoring will be carried out in accordance with:

- For structural damage vibration – German Standard DIN 4150 and BS 7385: Part 2 – 1993
- For human exposure to vibration – the evaluation criteria presented in the Environmental Noise Management Assessing Vibration: A Technical Guideline (DECC 2006).

E-4.2 Vibration Monitoring Locations

Potential vibration monitoring locations are outlined below in Table E-3, Figure E-3 and Figure E-4, these locations have been selected due to the proximity of works to sensitive heritage structures, commercial buildings and residential buildings. Additional vibration monitoring locations may be identified during construction or in response to complaints.

Table E-3 Vibration Monitoring Locations

| Address | Receiver Type | Site |
|--------------------------------|---------------|------------|
| 2-4 Prince Charles Parade | Residential | Kurnell |
| Captain Cook Monument | Heritage | Kurnell |
| 1609 Anzac Parade | Commercial | La Perouse |
| La Perouse Monument | Heritage | La Perouse |
| AHIMS Site #45-6-0653 (Site 6) | Heritage | La Perouse |



Figure E-3 Potential Vibration Monitoring Locations - Kurnell



Figure E-4 Vibration Monitoring Locations - La Perouse

E-5 Noise and Vibration Monitoring Summary

Table E-3 Noise and Vibration Monitoring Summary

| Monitoring details | Record | Frequency | Responsibility | Test procedures/ Methods |
|--|---|-------------|-----------------------------------|---|
| Inspections | | | | |
| Inspection of works to ensure that noise and vibration mitigation measures are being implemented on site. | Environment & Sustainability Inspection Checklist | Weekly | Environment & Sustainability Lead | Nil |
| Attended noise monitoring | | | | |
| Attended noise monitoring at monitoring locations identified at locations listed. | Noise Monitoring Record | Fortnightly | Environment & Sustainability Lead | <p>If monitoring cannot be undertaken at the nearest relevant sensitive receiver, a suitable representative location will be selected. The testing method includes:</p> <ul style="list-style-type: none"> ▪ SLM set to “Fast” time weighting and “A” frequency weighting. ▪ Test environment free from reflecting objects where practicable. Where noise monitoring is conducted within 3.5metres of large walls or a building facade, then a reflection correction of up to -2.5 dB(A) will be applied to remove of increased noise due to sound reflections. ▪ Tests will not be carried out during rain or when wind speed > 5m/s. ▪ Conditions such as wind velocity and direction, temperature, relative humidity and cloud cover will be recorded from the nearest Bureau of Meteorology station or on-site weather station/observations. |
| Where Verification is required in accordance with mitigation measures in Section 8. | Noise Monitoring Record | As required | Environment & Sustainability Lead | |
| Where complaint is received and monitoring is considered an appropriate response to determine if noise levels exceed predicted construction noise levels | Noise Monitoring Record | As required | Environment & Sustainability Lead | |

| Monitoring details | Record | Frequency | Responsibility | Test procedures/ Methods |
|--|-------------------------|--|-----------------------------------|---|
| documented in this CNVMP. | | | | <ul style="list-style-type: none"> The monitoring period should be sufficient such that measured noise levels are representative of noise over a 15-minute period. At a minimum L_{eq}, L_{max}, L_{10} and L_{90} levels will be reported. Monitoring to include an assessment of the feasible and reasonable noise mitigation measures deployed <p>The observations of the person undertaking the measurements will be reported including audibility of construction noise, other noise in the environment and any discernible construction activities contributing to the noise at the receiver.</p> <p>Noise Monitoring to be undertaken by a suitably competent person.</p> |
| Spot checks of noise intensive plant where it is required to check noise emission against manufacturer's specifications. | Noise Monitoring Record | Monthly for construction activities with $PNL > 60$ dB $L_{Aeq(15min)}$ | Environment & Sustainability Lead | <p>Stationary test procedures according to AS 2012.1 Acoustics – Measurement of airborne noise emitted by earth-moving machinery and agricultural tractors – Stationary test condition (superseded by AS ISO 6393:2019 Earth-moving machinery- Determination of sound power level- Stationary test conditions). The testing method includes:</p> <ul style="list-style-type: none"> Sound level meter configured for “Fast” time weighting and “A” frequency weighting. The test environment will be free from reflecting objects. Tests will not be carried out during rain or when wind speed exceeds 5 m/s. <p>In accordance with AS 2012.1 / AS ISO 6393:2019, a minimum of three (3) measurement points will be defined at locations on the hemispherical surface around the plant with the radius determined by the basic length of the machine.</p> |
| Spot checks for worst-case noise impact scenarios or when new predicted high noise impact activities commence | Noise Monitoring Record | As required | Environment & Sustainability Lead | <ul style="list-style-type: none"> Sound level meter configured for “Fast” time weighting and “A” frequency weighting. The test environment will be free from reflecting objects. Tests will not be carried out during rain or when wind speed exceeds 5 m/s. <p>In accordance with AS 2012.1 / AS ISO 6393:2019, a minimum of three (3) measurement points will be defined at locations on the hemispherical surface around the plant with the radius determined by the basic length of the machine.</p> |
| Where required for the purposes of refining construction methods or | Noise Monitoring Record | As required | Environment & Sustainability Lead | <ul style="list-style-type: none"> Sound level meter configured for “Fast” time weighting and “A” frequency weighting. The test environment will be free from reflecting objects. Tests will not be carried out during rain or when wind speed exceeds 5 m/s. <p>In accordance with AS 2012.1 / AS ISO 6393:2019, a minimum of three (3) measurement points will be defined at locations on the hemispherical surface around the plant with the radius determined by the basic length of the machine.</p> |

| Monitoring details | Record | Frequency | Responsibility | Test procedures/ Methods |
|--|-----------------------------|-------------|-----------------------------------|--|
| techniques to reduce noise levels. | | | | <ul style="list-style-type: none"> The A-weighted Leq background noise at the measurement locations will be at least 6 dB and preferably 10 dB below the level with the plant operating. Both L_{eq} and L₁₀ levels will be measured and reported. |
| Attended and unattended vibration monitoring | | | | |
| At start of vibratory compaction work or rock-breaking within 50m of residential buildings. | Vibration Monitoring Record | As required | Environment & Sustainability Lead | <p>Attended vibration monitoring will be undertaken when checking the safe working distances from construction plant (e.g. compaction plant) or in response to a complaint.</p> <p>The testing method includes:</p> <ul style="list-style-type: none"> Monitoring to be conducted for at least three distances from the plant, including a representative distance for the nearest sensitive structures and/or receivers. The testing will be conducted at each location to obtain a suitable representation of the range of vibration levels that would occur from the tested plant. the plant will be tested in the settings in which it is expected to operate. For vibratory rollers this may include both “High” and “Low” settings. <p>Peak (PPV) vibration levels and the dominant frequency of the vibration will be recorded for assessment against the structural and cosmetic damage criteria. In situations in which human comfort is also of concern then the rms vibration level should also be recorded.</p> |
| Where Verification is required in accordance with mitigation measures in Section 8. | | | | |
| Where a complaint is received and monitoring is considered an appropriate response. | | | | |
| Where an activity may occur within safe working distances for cosmetic damage for no more than one day continuously. | | | | |

| Monitoring details | Record | Frequency | Responsibility | Test procedures/ Methods |
|---|------------------------------|-----------------------|-----------------------------------|---|
| During construction to confirm minimum safe working distances and refine construction methods if vibration levels exceed guideline values. | | | | |
| Where an activity may occur within safe working distances for cosmetic damage for a period of more than one day continuously. | Vibration Monitoring Record | As required | Environment & Sustainability Lead | <p>Continuous vibration monitoring will be undertaken where vibration from a construction activity may exceed cosmetic damage criteria at a sensitive structure, where activities may occur within safe working distances for cosmetic damage. The testing method includes:</p> <ul style="list-style-type: none"> ▪ Vibration logger to continuously measure vibration while relevant works are occurring within the safe working distance for cosmetic damage. ▪ Measurement to be conducted as close as practicable to the sensitive structure. ▪ A warning system will be implemented including one or both of an audible and/or visual warning alarm, and/or SMS and/or email alerts to site staff. |
| Dilapidation surveys of buildings and structures where construction works occurs within the safe working distance for cosmetic damage. At a minimum, this will include all buildings where buffer distances | Building Dilapidation Survey | Prior to Construction | Construction Manager | <p>At a minimum, dilapidation surveys and reports will comprise:</p> <ul style="list-style-type: none"> ▪ Inspector's qualifications and expertise ▪ A visual inspection of the structure, including all internal and external walls, ground level floors and external pavements, all connections of other structures above ground level and their connection at ground level and any exposed foundations. |

| Monitoring details | Record | Frequency | Responsibility | Test procedures/ Methods |
|--|--------|-----------|----------------|---|
| will be less than those identified in Section 5.3.4 in areas where vibratory compaction and/or rock-breaking will occur. | | | | <ul style="list-style-type: none"> ▪ Full written report outlining condition of internal and external components of each property. ▪ A series of photographs of each identified defect/crack. ▪ A sketched floor plan showing exact locations of defect and measurements of crack width/defect size. ▪ Identification of any condition changes relative to pre-construction and the likely cause of the change (post-construction only) |

E-6 Reporting

Results of the CMPNV, in the form of a Construction Monitoring Report, will be submitted to the Planning Secretary and relevant regulatory agencies on a six-monthly basis from the commencement of construction in accordance with MCoA C21.

The results of the monitoring must be readily available to the construction team, the Proponent and ER. The Planning Secretary and EPA must be provided with access to the results on request.

E-6.1 Exceedances/non-conformances

Where noise and vibration monitoring identify any exceedances from those predicted in the assessments, an immediate review of activities is to be undertaken in accordance with the requirements of the Project's MCoA to determine where noise and vibration levels can be further reduced. Where monitored noise and vibration levels are found to be above predictions or vibration goals are exceeded, the following actions will be undertaken:

- Confirm that monitored levels are not being impacted by other noise or vibration sources
- Implement other feasible and reasonable measures which may include reducing plant size, modify time of works, changing operational settings (such as turning off the vibratory function of the machine), and utilising alternate construction methodology or a combination of these
- Review work practices to ensure compliance with the ICNG
- Confirm if the exceedance is due to an uncharacteristically loud piece of equipment
- Identify if equipment can be swapped out for another piece of equipment or alternative equipment or plant
- Confirm if the exceedance is due to an uncharacteristically vibratory piece of equipment
- Confirm that the modelling reflects the actual activity being undertaken
- Ensure that learning's from the above are fed back into the noise modelling assessment process.

Where verified exceedances result in a non-conformance, corrective and preventative actions shall be raised in accordance with Section 9.1 of the CEMP. Notification of the non-conformance will be provided to DPE within 7 days as required by MCoA A44.

E-7 Corrective action

A Non Conformance Report (NCR) may be raised by the Environment & Sustainability Lead, which is to include the corrective action taken (as detailed in the CEMP), if there is a breach of any MCoA or other requirement. Failure to implement required management and mitigation in accordance with the Contractors EMS (CEMS).

E-8 Consultation

The below table provides a summary consultation undertaken on the Construction Monitoring Program – Noise & Vibration in accordance with MCoA C14 and how the comments were addressed.

Table E-4 – Consultation comments and Responses

| Agency | Comment | Response |
|------------|--|--|
| NSW EPA | <p>Section 13.2.1 (now section E-2.1) of the monitoring program has elected to compare monitored noise levels against predicted worst-case levels to determine requirements for additional noise monitoring, out-of-hours work, and additional mitigation measures. The EPA notes that predicted worst case levels (especially where exceedances are defined as >3 dB over predicted levels as proposed on page 84 of the extract) are not a surrogate for acceptable / benchmark performance levels when assessing the proper and efficient operation of a construction site. The monitoring program should benchmark performance against noise levels determined to be best achievable after deploying all feasible and reasonable noise mitigation measures.</p> | <p>Section 13.2.1 (Now E 2.1) has been updated. It should be noted that recommended feasible and reasonable mitigation measures have been developed based on the PNL.</p> <p>The measured noise levels of standard hours works and approved out-of-hours works will be compared against the PNL to determine if the recommended feasible and reasonable measures that are implemented are sufficient. Where the measured noise levels are found to exceed the PNL, a review of the AMM applied will be conducted to determine if extra measures would be required to either reduce noise emissions or reduce the impacts on receivers.</p> <p>In the case of low impact works outside of standard hours, the measured noise levels will be compared against the NML (i.ee no more than 5 dB(A) above the RBL) and sleep disturbance criteria (i.e. LAFmax(15 minute) no more than 15 dB(A) above the RBL) as per the MCoA Condition E44 part (b) requirements.</p> |
| NSW EPA | <p>In addition to the weekly inspections proposed in Table 13-3 (<i>now table E-3</i>), an assessment of the feasible and reasonable noise mitigation measures deployed should be undertaken by a competent person as part of noise monitoring sessions.</p> | <p>Additional information added to 'Attended Noise Monitoring' section to include assessment of noise mitigation measures and noting a suitably competent person to undertake noise monitoring.</p> |

| Agency | Comment | Response |
|------------|--|--|
| NSW EPA | <p>Section 13.2.2 (<i>now section E-2.2</i>) has selected noise monitoring locations to coincide with locations where background noise monitoring was undertaken as part of the EIS (Surface Noise and Vibration Impact Assessment Report, prepared by ARUP, dated 10 June 2021). The EPA notes that previous noise measurements undertaken at 51-53 Endeavour Avenue were contaminated with localised mechanical plant noise (Table 3-4, point 2, of the Response to Submissions Report, prepared by TfNSW, dated October 2021). The EPA recommends that an alternate location is selected where monitoring will not be affected by extraneous noise sources. It is also noted that the monitoring procedure would benefit from referencing Approved Methods for the Measurement and Analysis of Environmental Noise (EPA, 2022).</p> | <p>"Additional alternative noise monitoring locations have been added to Table E-1 and Figure E-1 / Figure E-2. These alternative noise monitoring locations may be selected when noise monitoring locations is/may be affected by extraneous noise sources.</p> |