NATIONAL INTERMODAL

# Moorebank Avenue Realignment Works

## Construction Noise and Vibration Management Plan

SSI - 10053

22 January 2025

# EPBC EMP COVER PAGE

| Item | Description |
|---|---|
| EPBC Number | EPBC 2020/8839 |
| Project Name | Moorebank Avenue Realignment, Moorebank, NSW |
| Proponent / approval holder and CAN or ABN | National intermodal Corporation<br>ABN: 64 161 635 105 |
| The proposed/approved action | To realign a section of Moorebank Avenue, from south of Anzac Road to the East Hills Railway, in Moorebank, NSW. |
| Location of the action | Moorebank, NSW |
| Date of preparation of the environmental management plan | Construction Noise and Vibration Management Plan:<br>• 02/06/2023 (original version approved by DPHI / DCCEW information only)<br>• 22/01/2025 (updated version approved by the NSW ER / DCCEEW information only) – updated to reflect EPBC Variation (14/01/25) |
| Person accepting responsibility for the environmental management plan | NA – as per the Environmental Management Plans Guidelines (DCCEEW, 2024) the conditions of approval do not require approval of this management plan by DCCEEW and therefore a declaration of accuracy is not required. |

# NATIONAL INTERMODAL CORPORATION

# MOOREBANK AVENUE REALIGNMENT WORKS

## CONSTRUCTION NOISE AND VIBRATION MANAGEMENT PLAN

**Author** [redacted]

**Checker**

**Approver**

**Report No**

**Date** 22/01/2025

**Revision Text** H

## TECHNICAL SPECIALIST DETAILS

| Name | Qualification and Experience |
|---|---|
| [redacted] | [redacted] |

## REVISIONS

| Revision | Date | Description | Prepared By | Approved By |
|---|---|---|---|---|
| A | 15/12/2022 | Draft for Client review | [redacted] | |
| B | 25/01/2023 | Update in response to National Intermodal and technical specialist comments | | |
| C | 01/02/2023 | Update in response to National Intermodal | | |
| D | 24/02/2023 | Updated in response to ER and LOGOS comments | | |
| E | 17/03/2023 | Updated in response to ER comments | | |
| F | 24/04/2023 | Update following consultation | | |

| Revision | Date | Description | Prepared By | Approved By |
|---|---|---|---|---|
| G | 02/06/2023 | Update based on DPE comments | [redacted] | |
| H | 22/01/2025 | Update to reflect revised construction footprint and EPBC variation approval | | |

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# ACRONYMS AND DEFINITIONS

| Acronym | Definition |
|---|---|
| AVTG | *Assessing Vibration – a technical guideline* |
| BS | British Standard |
| CCS | Community Communication Strategy |
| CEMP | Construction Environmental Management Plan |
| CHMP | Construction Heritage Management Sub-plan |
| CNVMP | Construction Noise and Vibration Management Plan |
| CNVG | Construction Noise and Vibration Guideline (TfNSW) |
| CNVIS | Construction Noise and Vibration Impact Statement |
| CoA | Conditions of Approval |
| Construction | Includes all work required to construct the Project as described in the EIS and RtS (NSW CoA A1) including commissioning trials of equipment and temporary use of any part of the Project but excluding Low Impact Work which is carried out or completed before approval of the CEMP. |
| Continuous vibration | From uninterrupted sources, e.g., machinery, steady road traffic, continuous construction activity |
| DAWE | Department of Agriculture, Water and Environment |
| dB(A) | A-weighted decibel |
| DCCEEW | Department of Climate Change, Energy, Environment and Water (formerly DAWE) |
| DPIE | Department of Planning, Industry and Environment (now DPE) |
| EHC Act | *Environmentally Hazardous Chemicals Act 1985* (NSW) |
| EIS | Environmental Impact Statement |
| EMP | Environment Management Plans |
| EP&A Act | *Environmental Planning and Assessment Act 1979* |
| EPA | NSW Environment Protection Authority |
| EPBC Act | *Environmental Protection and Biodiversity Conservation Act 1999 (Commonwealth)* |
| EPL | Environment Protection Licence |
| ER | Environmental Representative |
| EWMS | Environmental Work Method Statements |
| Highly noise intensive works | Work which is defined as annoying under the Interim Construction Noise Guideline (DECC, 2009) including: (a) use of power saws, such as used for cutting timber, rail lines, masonry, road pavement or steel work; (b) grinding metal, concrete or masonry; (c) rock drilling; (d) line drilling; I vibratory rolling; (f) bitumen milling or profiling; (g) jackhammering, rock hammering or rock breaking; and (h) impact piling. |
| Highly noise affected level | Represents the point above which there may be strong community reaction to noise. The *Interim Construction Noise Guideline* specifies that the highly noise affected level is 75 dB(A) |

| Acronym | Definition |
|---|---|
| Human exposure | Disturbance to building occupants: Vibration in which the occupants or users of the building are inconvenienced or possibly disturbed |
| ICNG | *Interim Construction Noise Guideline* |
| Impulsive vibration | Up to three instances of sudden impact per monitoring period e.g., occasional dropping of heavy equipment, occasional loading and unloading |
| Infrastructure Approval | SSI 10053 or NSW CoA |
| Intermittent vibration | From drilling, compacting or activities that will result in continuous vibration if operated continuously |
| INP | Industry Noise Policy |
| LCC | Liverpool City Council |
| Low Impact Work | As defined in the Infrastructure Approval, and which Includes activities like survey work, investigative drilling, minor clearing, installation of mitigation measures etc. The low impact work described in this definition becomes construction when the Construction Environmental Management Plan is approved. This also applies to low impact work that has already commenced. |
| MARW | Moorebank Avenue Realignment Works |
| MIP | Moorebank Intermodal Precinct which includes Moorebank Precinct East (MPE) and Moorebank Precinct West (MPW) |
| Monitoring Program | Construction Noise and Vibration Monitoring Program |
| MPE | Moorebank Precinct East |
| MPE Site | Comprises the MPE Stage 1 Project as approved by SSD 14-6766 for the development of the intermodal terminal facility (IMT) at Moorebank and MPE Stage 2 as approved under SSD 7628 (as modified) and MPE Concept Approval (MP 10_0193) for the construction and operation of warehousing and distribution facilities and upgrades to approximately 2.1 kilometres of Moorebank Avenue. |
| MPW | Moorebank Precinct West |
| MPW Site | Comprises the MPW Stage 2 Project which is the second stage of development under the MPW Concept Approval (SSD 5066) and SSD 7709. The Project involves the construction and operation of a multi-purpose intermodal terminal facility, Rail link connection, warehousing and upgraded intersection on Moorebank Avenue. |
| National Intermodal | National Intermodal Corporation |
| NML | Noise Management Level |
| Noise affected level | Represents the point above which there may be some community reaction to noise. The noise affected level is calculated by adding 10 dB(A) to the RBL for standard ICNG hours. |
| NPfI | Noise Policy for Industry |
| NVIA | Noise and Vibration Impact Assessment |
| OEH | NSW Office of Environment and Heritage (now NSW EES, a part DPIE) |
| OOHW | Out-of-hours works |
| Planning Secretary | Secretary to the DPE |
| POEO Act | *Protection of the Environment Operations Act 1997 (NWS)* |
| POEO Regulations | *Protection of the Environment Operations (Waste) Regulation 2014* |

| Acronym | Definition |
|---|---|
| Project Site | Refers to the construction footprint area which is approximately 18.96 hectares and includes access for the construction of road embankments and cuttings, temporary and permanent fencing, temporary and permanent water quality control basins, ancillary facilities, access roads and construction side roads. It is generally bounded by the Defence Joint Logistics Unit (DJLU), MPE, Boot Land and the Sydney Trains owned land adjacent to the East Hills Railway. |
| RBL | Ratings Background Level |
| REMMs | Revised Environmental Management Measures |
| RMS | Roads and Maritime Services |
| RNP | NSW Road Noise Policy |
| RtS | Response to Submissions |
| SSI | State significant infrastructure |
| TPA | Tonnes per annum |
| TfNSW | Transport for NSW |
| The Project | Moorebank Avenue Realignment Works |
| VDVs | Vibration does values |

# 1 INTRODUCTION

## 1.1 Context

This Construction Noise and Vibration Management Plan (CNVMP) forms part of the Construction Environmental Management Plan (CEMP) for the Moorebank Avenue Realignment Works (MARW) (the Project).

This CNVMP has been prepared to address the requirements of the NSW Minister's Conditions of Approval (CoA), Commonwealth CoA, the Revised Environmental Management Measures (REMMs) detailed in the Response to Submissions (RtS) and the applicable legislation.

## 1.2 Background and Project Description

National Intermodal Corporation (National Intermodal) plans to realign and upgrade a section of Moorebank Avenue. The Project involves the realignment of an existing two-kilometre section of Moorebank Avenue, from a point approximately 130 meters south of the Anzac Road/Moorebank Avenue intersection to a point immediately north of the East Hills Railway. Moorebank Avenue currently divides the Moorebank Intermodal Precinct (MIP) into the Moorebank East Precinct (MPE site) and the Moorebank West Precinct (MPW site) (see Figure 1.1).

The Project is about three kilometres of additional road which ties in with the existing Moorebank Avenue at the northern and southern extremities. From its northernmost point, the realigned Moorebank Avenue follows the northern boundary of the MPE site, before continuing south along the MPE Site eastern boundary. This section of the realignment comprises four lanes (i.e. two lanes in each direction). At the south-western corner of the MPE Site, the new road section merges to become a dual lane road (i.e. one lane in each direction) before continuing in a south-west direction, crossing Anzac Creek, and re-joining the existing Moorebank Avenue alignment near the East Hills Railway (refer to Figure 1.1). At completion and commissioning of the realigned road section, the public through traffic using Moorebank Avenue will be redirected onto the upgraded alignment. The existing road alignment will be decommissioned and modified to function as a restricted access to the MIP.

The Project Site is approximately 18.96 hectares and includes access for the construction of road embankments and cuttings, temporary and permanent fencing, temporary and permanent water quality control basins, ancillary facilities, access roads and construction side roads. It is generally bounded by the Defence Joint Logistics Unit (DJLU), MPE, Boot land and the Sydney Trains owned land adjacent to the East Hills Railway (refer to Figure 1.1).

A detailed description of the Project is provided in Section 2 of the CEMP and is also shown on Figure 1.2.

The Project will not be staged but is anticipated to be undertaken in phases. Construction is expected to take approximately 16 months to complete.

An Environmental Impact Statement (EIS) for the Project was prepared in March 2021 to describe and assess the Project and recommend management measures to address impacts. The EIS was exhibited by the then NSW Department of Planning, Industry and Environment (DPIE) from 17 March 2021 to 13 April 2021 to give the community and stakeholders the opportunity to provide comment. A RtS was submitted in May 2021 to address the identified issues.

The Project was approved by the NSW Minister for Planning on 14 October 2021 as State Significant Infrastructure (SSI-10053) (Infrastructure Approval) under Division 5.2 of the *Environmental Planning and Assessment Act 1979* (EP&A Act). The Project is also a controlled action under Section 130(1) and 133(1) of

the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) and was approved by the Minister for the Environment on 7 December 2021 (EPBC Approval 2020-8839). On 14 January 2025 a variation to EPBC 2020-8839 was approved by the Minister for the Environment and Water.

The EIS assessed the noise and vibration impacts resulting from the construction of the Project. As part of EIS development, a detailed Noise and Vibration Impact Assessment Report (NVIA) was prepared in accordance with the legislation. The NVIA was prepared to address the Secretary's Environmental Assessment Requirements (SEARs) issued by the then DPIE and the Commonwealth EIS Guidelines issued by the then Commonwealth Department of Agriculture, Water and Environment (DAWE). The NVIA was included as Appendix E in the EIS.

Revised Environmental Management Measures (REMMs) were provided within the RtS. Where applicable, the REMMs from the RtS have been included in this CNVMP (Section 7.5.1 and Appendix C).

## 1.3 Scope of the Plan

This CNVMP is applicable to the construction stage of the Project and describes how the potential noise and vibration impacts will be managed during construction. Operational noise and vibration impacts do not fall within the scope of this CNVMP and therefore are not included within the processes contained within the CNVMP.

Low impact works as defined by the Infrastructure Approval, can be carried out prior to the CEMP and CVNMP being approved by the Planning Secretary. Once the CEMP and CNVMP are approved, low impact work is considered construction and is then governed by the CEMP and Sub-plans.

## 1.4 Environmental Management System Overview

The environmental management framework for the Project is described in Section 3 of the CEMP. This CNVMP forms part of the framework for the Project. The requirements of the NSW CoA's and the REMMs identified in this CNVMP will be complied with during construction.

Management measures identified in this CNVMP may also be incorporated into site or activity specific Environmental Work Method Statements (EWMS). EWMS incorporate appropriate mitigation measures and controls and identify key procedures to be used during construction activities. A template EWMS for use is provided in Appendix E of the CEMP.

## 1.5 CNVMP Endorsement and Approval

This CNVMP has been prepared to satisfy the NSW and Commonwealth CoA's in relation to noise and vibration management during construction of the Project.

This CNVMP will be reviewed by the Project Manager / Delivery Team and will be endorsed by the Environmental Representative (ER) (refer to Appendix B) and submitted to the Planning Secretary for approval, and the Department of Climate Change, Energy, Environment and Water (DCCEEW) for information, no later than one month prior to commencement of construction. It should be noted that the Out-of-Hours Work Protocol (Appendix D) and Noise and Vibration Monitoring Program (Appendix E) will be submitted with the CNVMP to the Planning Secretary for approval.

Construction of the Project will not commence prior to the approval of the CNVMP by the Planning Secretary. The final approved CNVMP will be available on the MIP and/or National Intermodal website within 20 business days of approval by the Planning Secretary in accordance with Commonwealth CoA 15.

The ER can approve minor amendments to this CNVMP if they do not increase impacts to nearby receivers, do not comprise updating, are administrative nature and are consistent with the conditions of the Infrastructure Approval. This does not include any modifications to the Infrastructure Approval.

### 1.5.1 Interactions with Other Management Plans

This CNVMP has the following interrelationships with other management plans and documents:

- Sensitive Area Plans (SAP) identify adjacent residential and other receivers (refer to Appendix D of the CEMP)
- Community Communication Strategy (CCS) details procedures and processes for community notification, consultation and complaints management
- Construction Traffic and Transport Management Plan (CTTMP) provides details of traffic movements to be carried out during construction including approved haulage routes.

## 1.6 Consultation

Liverpool City Council (LCC) will be consulted with during the development of this CNVMP.

A summary of the outcomes of this consultation is provided in Table 1.1. Supplementary information demonstrating the consultation undertaken is included in Appendix A.

*Table 1.1: Consultation Summary*

| Agency | Date | Person Contacted | Comment | Status |
|---|---|---|---|---|
| Liverpool City Council | 22/12/2022 | LCC Representative | Emailed LCC introducing the Project. | Closed |
| | 24/03/2022 | DPE portal | CNVMP submitted through DPE portal. Consultation to close Thursday 20 April 2023. | |
| | 20/04/2023 | LCC Representative | Response received via email. No comments were provided on the CNVMP. LCC reiterated the comments LCC provided during the Response to Submissions (RtS) should be considered for the development. These comments were addressed in the RtS report. | |
| | 20/04/2023 | N/A | Consultation closed. No comments were received on the CVNMP. Appendix A includes and addresses LCC's comments for the development. | |

### 1.6.1 Ongoing Consultation during Construction

Consultation with stakeholders, the community and relevant agencies regarding the management of noise and vibration impacts will be undertaken during the construction of the Project as required. The process for the consultation will be documented in the Community Communication Strategy (CCS).

During construction of the Project, it may be necessary to undertake work outside standard construction hours. On becoming aware of the need for out-of-hours works, the ER, the Planning Secretary and the EPA

will be notified of the reasons for such work. Prior to carrying out such works, best endeavours will be made to notify all affected sensitive receivers of the likely impact and duration of the emergency works.

Consultation will be carried out with the Community Consultative Committee with regards to selecting and implementing mitigation measures for residual out of hours impacts in accordance with the consultation requirements prescribed by NSW CoA E21(c).

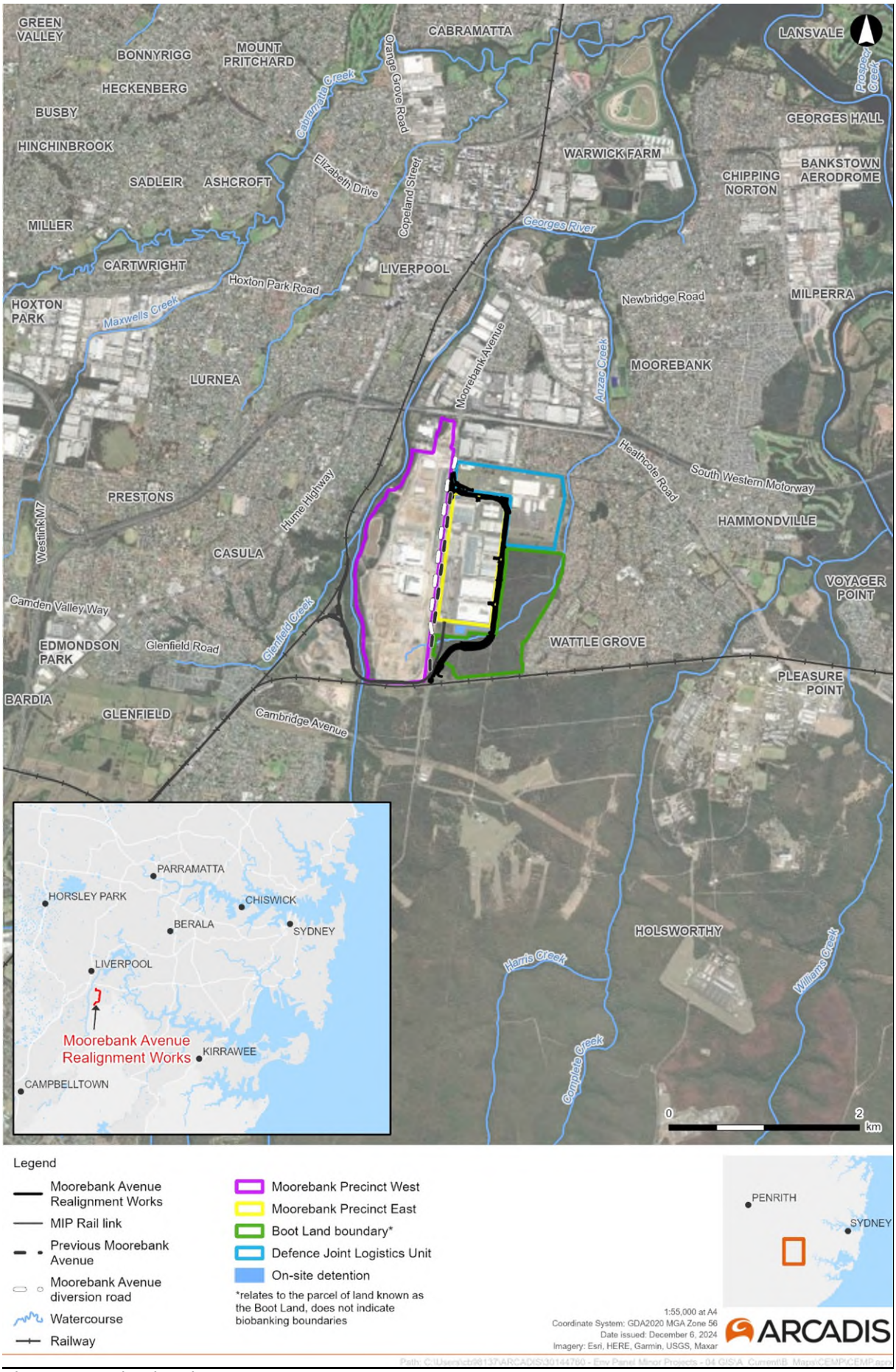


*Figure 1.1: Project location*


*Figure 1.2: Project layout*

# 2 PURPOSE AND OBJECTIVES

## 2.1 Purpose

The purpose of this CNVMP is to describe how noise and vibration impacts will be minimised and managed during the construction of the Project.

## 2.2 Objectives

The objective of the CNVMP is to ensure that noise and vibration impacts are managed appropriately throughout the construction of the Project and consider the mitigation and management measures referred to in:

- NSW Minister's Infrastructure Approval dated 14 October 2021 (SSI-10053)
- Federal Minister for the Environment Approval dated 7 December 2021 (EPBC 2020-8839), as varied on 14 January 2025
- *Moorebank Avenue Realignment Environmental Impact Statement Volume 1* and *Volume 2* prepared by EMM for Sydney Intermodal Terminal Alliance dated March 2021 (EIS)
- *Moorebank Avenue Realignment Noise and Vibration Impact Assessment* prepared by EMM dated February 2021 (NVIA)
- *Moorebank Avenue Realignment Response to Submissions* prepared for Sydney Intermodal Terminal Alliance dated May 2021 (RtS).

## 2.3 Targets

Table 2.1 details the following targets established for the management of noise and vibration impacts during construction of the Project.

*Table 2.1: Project environmental targets for noise and vibration*

| Objective | Target | Timeframe | Responsibility |
|---|---|---|---|
| Ensure compliance with relevant NSW CoA and applicable legislation | No written warnings or infringement notices<br>Zero non-compliance | Throughout construction | Construction Contractor |
| Avoid, minimise or manage potential adverse noise impacts within and adjacent to the Project Site | No exceedances of construction noise management levels detailed in the ICNG (DECC, 2009)<br>No complaints from adjacent land users (e.g. MPE warehouse operators) | Throughout construction | Construction Contractor |
| Avoid, minimise or manage potential adverse vibration impacts within and adjacent to the Project Site | No exceedance of the vibration criteria established using the *Assessing vibration: a technical guidelines* (DEC, 2006) (for human exposure) | Throughout construction | Construction Contractor |

| Objective | Target | Timeframe | Responsibility |
|---|---|---|---|
| Avoid, minimise or manage vibration impacts on structures to minimise structural damage (in particular on heritage buildings) | No exceedance of the vibration criteria established by the British Vibration Standard (BS 7385) and the German DIN Standard (DIN 4150-3). | Throughout construction | Construction Contractor |
| Minimise impacts to nearby sensitive receivers. | No complaints from nearby sensitive receivers. | Throughout construction | Construction Contractor |

# 3 ENVIRONMENTAL REQUIREMENTS

## 3.1 Relevant Legislation and Guidelines

### 3.1.1 Legislation

All legislation relevant to the Project is included in Appendix B of the CEMP. Legislation considered during the development of this CNVMP includes:

- *Environmental Planning and Assessment Act 1979* (EP&A Act)
- *Protection of the Environment Operations Act 1997 (POEO Act)*
- Protection of the Environment Operations (Noise Control) Regulation 2017.

### 3.1.2 Additional Approvals, Licences, Permits and Requirements

Refer to Section 4.3.2 and Appendix B of the CEMP.

### 3.1.3 Guidelines and Standards

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

**Construction noise**

- TfNSW QA Specification G36 – Environmental Protection (Management System)
- *Interim Construction Noise Guideline* (ICNG) (Department of Environment and Climate Change 2009)
- *Construction Noise and Vibration Guidelines* (TfNSW 2016)
- *Draft Construction Noise and Vibration Guidelines* (TfNSW 2019)
- *Road Noise Policy*, Department of Environment, Climate Change and Water 2011.

**Construction vibration**

- TfNSW QA Specification G36 – Environmental Protection (Management System)
- *Assessing Vibration – a technical guideline* (AVTG), Department of Environment and Conservation 2006
- *German Standard DIN4150-1999 Structural vibration Part 3: Effects of vibration on Structures* (Deutsches Institute fur Normung, 1999)
- British Standard 7385: Part 2‘1993 'Evaluation and measurement of vibration in buildings Part 2 (BSI, 1993)
- Australian Standard AS/NZS 2107:2000 Acou–tics - Recommended design sound levels and reverberation times for building interiors.

**Construction sleep disturbance guidance**

- *Road Noise Policy*, Department of Environment, Climate Change and Water 2011
- *Noise Policy for Industry* (NPfI), Environment Protection Authority 2017.

## 3.2 Commonwealth Approval

The Project is considered a controlled action under the EPBC Act and is therefore subject to Commonwealth CoA’s. There are no Commonwealth CoA related to noise and vibration management.

## 3.3 NSW Infrastructure Approval

The requirements of the Infrastructure Approval relevant to the development of this CNVMP are detailed in Table 3.1. These are defined as 'primary CoA' and specifically relate to the development of this CNVMP. Secondary CoA relevant to, but not specific to the development of this CNVMP, have been listed in Appendix C. A cross reference is also included to indicate where the CoA is addressed in this CNVMP or other Project plans.

*Table 3.1: Primary NSW CoA relevant to the CNVMP*

| No. | Requirements | Document reference |
|---|---|---|
| A5 | Where the terms of this approval require a document or monitoring program to be prepared or a review to be undertaken in consultation with identified parties, evidence of the consultation undertaken must be submitted to the Planning Secretary with the document. The evidence must include: | Table 1.1<br>Appendix A |
| (a) | documentation of the engagement with the party identified in the condition of approval that has occurred before submitting the document for approval; | Appendix A |
| (b) | a log of the dates of engagement or attempted engagement with the identified party; | Table 1.1<br>Appendix A |
| (c) | documentation of the follow-up with the identified party where engagement has not occurred to confirm that they do not wish to engage or have not attempted to engage after repeated invitations; | Table 1.1<br>Appendix A |
| (d) | outline of the issues raised by the identified party and how they have been addressed; and | Table 1.1<br>Appendix A |
| (e) | a description of the outstanding issues raised by the identified party and the reasons why they have not been addressed. | Table 1.1<br>Appendix A |
| C6 | CEMP Sub-plans as identified in documents listed in Condition A1 must be prepared in consultation with relevant government agencies and stakeholders. Relevant government agencies and stakeholders must be nominated in the risk assessment matrix submitted to the Planning Secretary require in accordance with Condition A14 or A19. 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 as required by Condition A5. | This CNVMP<br>Section 1.6<br>Appendix A |
| C7 | The CEMP Sub-plans must state how: | |
| (a) | the environmental performance outcomes identified in the documents listed in Condition A1 will be achieved; | Table 8.1<br>Sections 2.2<br>Section 2.3 |
| (b) | the mitigation measures identified in the documents listed in Condition A1 will be implemented; | Table 8.1 |
| (c) | the relevant terms of this approval will be complied with; and | Table 3.1 and Table 3.2 |
| (d) | issues requiring management during construction (including cumulative impacts), as identified through ongoing environmental risk analysis, will be managed through SMART principles. | Section 7.5.1<br>Table 8.1, Table 8.2.<br>Section 10.1<br>Appendix C |

| No. | Requirements | Document reference |
|---|---|---|
| C12 | A Construction Noise and Vibration Monitoring Program must accompany the Noise and Vibration Management Sub-plan when it is lodged for endorsement or approval in accordance with Conditions C9 and C10. The Construction Noise and Vibration Monitoring Program must be prepared in consultation with the relevant council(s) to compare actual performance of construction of the SSI against the performance predicted in the documents listed in Condition A1 or in the relevant CEMP. | Appendix E<br>Section 1.6 |
| C13 | The Construction Noise and Vibration Monitoring Program must provide: | Appendix E |
| (a) | details of baseline data available; | Section 2 of Appendix E |
| (b) | details of baseline data to be obtained and when; | Section 2 of Appendix E |
| (c) | details of all monitoring of the project to be undertaken; | Section 4 of Appendix E |
| (d) | the parameters of the project to be monitored; | Section 5 Appendix E |
| (e) | the frequency of monitoring to be undertaken; | Section 4 of Appendix E |
| (f) | the location of monitoring; | Table 4.1 and Table 4.2<br>Section 4.1 and Section 6 of Appendix E |
| (g) | the reporting of monitoring results and analysis results against relevant criteria; | Section 6 of Appendix E |
| (h) | details of the methods that will be used to analyse the monitoring data; | Section 4 of Appendix E |
| (i) | procedures to identify and implement additional mitigation measures where the results of the monitoring indicate unacceptable project impacts; | Section 5 of Appendix E |
| (j) | a consideration of SMART principles; | Section 7.5.1<br>Section 10.1<br>Appendix B2 REMMs<br>Section 1.1 of Appendix E |
| (k) | any consultation to be undertaken in relation to the monitoring programs; | Section 1.6 |
| (l) | any specific requirements outlined in the terms of this approval; and | Table 3.1<br>Table 3.2 |
| (m) | Details of all information requested by an agency during consultation, including copies of all correspondence from those agencies as required by Condition A5. | Section 1.6<br>Appendix A |
| C14 | Unless expressly nominated by the Planning Secretary to be endorsed by the ER, the Construction Noise and Vibration Monitoring Program must be submitted to the Planning Secretary for approval. | Section 1.5 |
| C15 | Unless otherwise agreed with the Planning Secretary, construction must not commence until the Construction Noise and Vibration Monitoring Program has been approved by the Planning Secretary, and all relevant baseline data for the specific construction activity has been collected. | Section 1.5 |
| C16 | The Construction Noise and Vibration Monitoring Program, 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. | Appendix E |

## 3.4 Revised Environmental Management Measures

The REMMs relevant to the development of this CNVMP, defined as 'primary REMMs', are detailed in Table 3.2. A cross reference is also included to indicate where the REMM is addressed in this CNVMP or other Project management documents. Secondary REMMs relevant to, but not specific to the development of this CNVMP, have been listed in Appendix C.

*Table 3.2: Primary REMMs relevant to the development of this CNVMP*

| No. | Requirements | Timing | Document reference |
|---|---|---|---|
| NVI01 | A noise and vibration management plan (NVMP) will be developed for the Project post-approval and will be encompassed within the CEMP. | Pre-construction and construction | This CNVMP |
| | The NVMP will provide details for the ongoing management and maintenance of noise and vibration management and mitigation measures during the construction phase of the Project. | | Table 8.1 |
| | The NVMP will include training and procedures for promoting noise awareness by construction workers and personnel; a complaint lodgement procedure to ensure that members of the public and local residents are able to report noise issues; and an ongoing review process and plan for responding to noise complaints. | | Section 9.2<br>Community Communication Strategy |

# 4 EXISTING ENVIRONMENT

## 4.1 Key References

The sources of data and information used to develop this CNVMP are Section 7.5 and Appendix E of the Project EIS and Section 4.8 of the Project RtS.

The Project boundary and relevant noise and vibration impacts are shown on the Sensitive Area Plans included in Appendix D of the CEMP.

Key components of the NVIA methodology included:

- Unattended noise surveys and operator-attended aural observations to establish the existing ambient noise environment of the area. Assessment locations are outlined in Section 4.2.2
- Modelling of road traffic noise.

The following sections summarise existing noise environment within and adjacent to the Project Site.

## 4.2 Environmental Aspects

### 4.2.1 Sensitive Receivers

The Project is located within Liverpool Local Government Area, and primarily within an industrial area. The suburb of Wattle Grove is located to the east, and the suburbs of Casula and Glenfield are located to the west and south respectively. These suburbs generally comprise Low-Density Residential and Medium Density Residential.

According to the Interim Construction Noise Guideline (ICNG) (DECC, 2009), sensitive receivers have been categorised into the following noise-sensitive land uses:

- Residential
- Classrooms (educational institutes)
- Hospital wards
- Places of worship
- Active recreation areas
- Passive recreation areas
- Commercial premises
- Industrial premises.

The nearest representative noise sensitive locations to the Project Site were identified as being commercial, industrial and residential and were used for the purpose of assessing potential noise and vibration impacts for operation of the additional roadway and construction activities.

Locations were selected to represent the range and extent of noise impacts from the Project. Details are provided in Table 4.1 and their locations are shown in Figure 4.1.

*Table 4.1: Assessment locations*

| ID | Address | Classification | Easting | Northing |
|---|---|---|---|---|
| COM1 | Defence Building 1 | Commercial | 308640 | 6241780 |
| IN1 | Defence Building 2 | Industrial | 308764 | 6241755 |
| IN2 | Defence Building 3 | Industrial | 308764 | 6241623 |
| R1(NM2) | 26 Brickendon Court, Wattle Grove | Residential | 309349 | 6241227 |
| R2[1] (NM3) | 25 Exford Court, Wattle Grove | Residential | 309290 | 6240862 |
| R3 (NM4) | 25 Yallum Court, Wattle Grove | Residential | 308920 | 6240179 |

### 4.2.2 Ambient Noise

Noise monitoring was conducted at three locations in the vicinity of the assessment locations identified in Table 4.1 and considered to be representative of the range of noise levels likely to be experienced by residential receivers in the vicinity of the site. A summary of existing background and ambient noise levels is given in Table 4.2.

Existing traffic noise levels are based on the unattended noise monitoring conducted at NM1.

*Table 4.2: Summary of existing background and ambient noise*

| Monitoring location | Period[1] | Rating background level (RBL)[2], dB(A) | Measure $L_{Aeq, period}$ noise level[3], dB(A) |
|---|---|---|---|
| NM1 – Moorebank Avenue | Day | 54 | 65 |
| | Evening | 51 | 69 |
| | Night | 43 | 60 |
| NM2[2] – 26 Brickendon Court, Wattle Grove | Day | 36 | 52 |
| | Evening[4] | 34 (42) | 50 |
| | Night[4] | 31 (38) | 46 |
| NM3[34] – 23 Exford Court, Wattle Grove | Day | 35 | 54 |
| | Evening | 34 | 51 |
| | Night | 31 | 47 |

[1] R2 for RBL and ambient noise monitoring are in adjacent properties i.e., 25 Exford Street and 23 Exford Street respectively. For the purposes of this CNVMP, it has been assumed that they are the same property, monitoring will be undertaken at either location depending upon accessibility.

[2] NM2 is equivalent to R1 as shown in Figure 4.1
[3] NM3 is equivalent to R2 as shown in Figure 4.1
[4] NM3 for RBL and ambient noise monitoring are in adjacent properties i.e., 25 Exford Street and 23 Exford Street respectively. For the purposes of this CNVMP, it has been assumed that they are the same property, monitoring will be undertaken at either location depending upon accessibility.

| Monitoring location | Period[1] | Rating background level (RBL)[2], dB(A) | Measure $L_{Aeq, period}$ noise level[3], dB(A) |
|---|---|---|---|
| NM4[5] – 25 Yallum Court, Wattle Grove | Day | 36 | 52 |
| | Evening | 36 | 49 |
| | Night | 31 | 44 |

Notes:

1. Day: 7 am to 6 pm Monday to Saturday; 8 am to 6 pm Sundays and public holidays; Evening: 6 pm to 10 pm; Night: 10 pm to 7 am, Sunday to Friday and 10 pm to 8 am Saturday and public holidays.
2. The RBL is a Noise Policy for Industry 2017 (NPfI) term and is used to represent the background noise level. In accordance with the NPfI, minimum thresholds were adopted given measured values were lower. Measured noise levels are provided in brackets () where relevant.
3. The energy averaged noise level over the measurement period and representative of general ambient noise.
4. Evening noise level cannot be greater than day and night not greater than evening. Ambient levels appear affected by localised noise source accordingly levels for NM3 were adopted for assessment purposes. Measured levels in brackets ().

[5] NM4 is equilivent to R3 as shown in Figure 4.1.

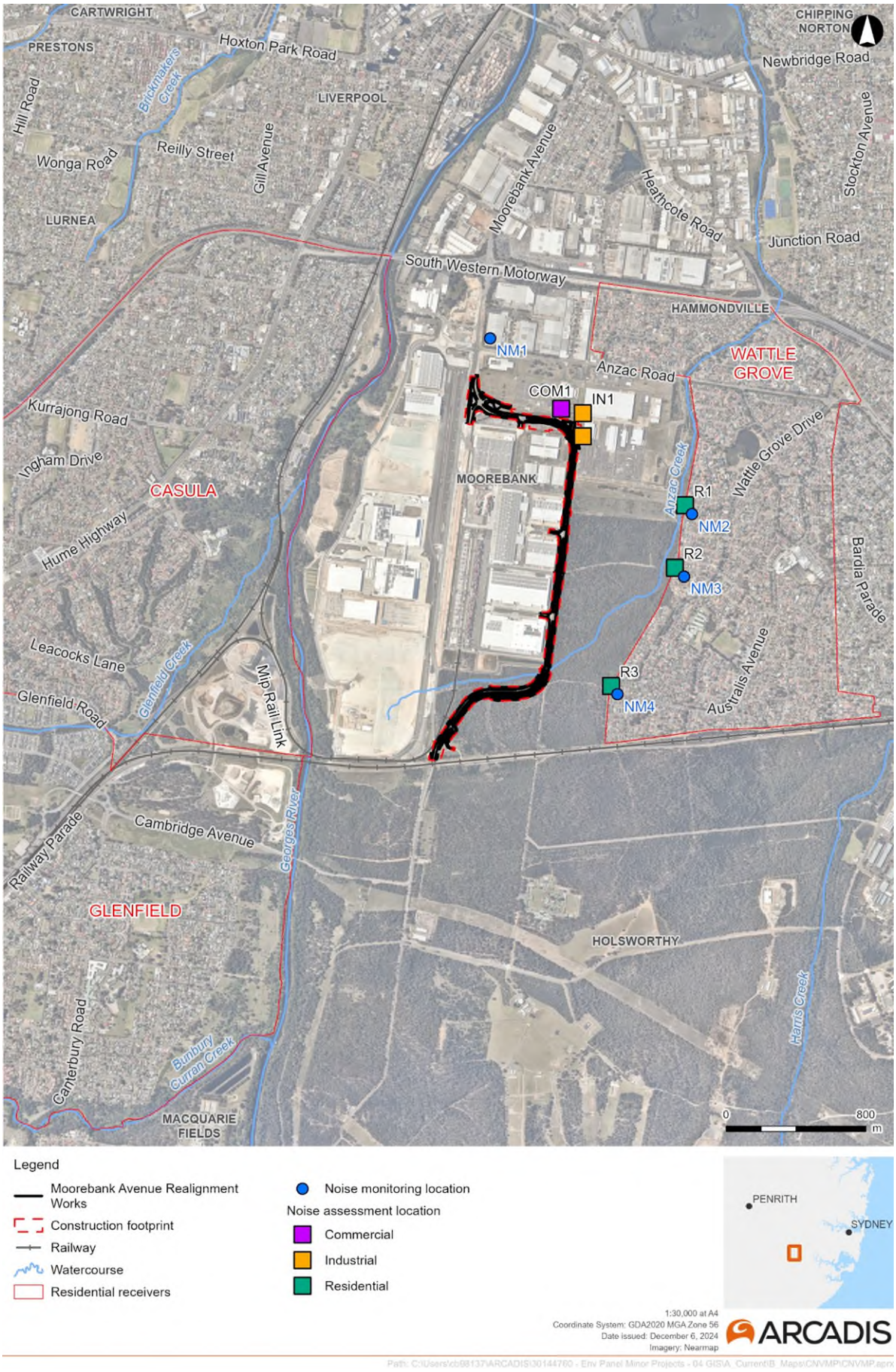


*Figure 4.1: Sensitive receivers and assessment and monitoring locations*

# 5 NOISE CRITERIA

## 5.1 Construction Noise Assessment Objectives

The ICNG 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.

## 5.2 Construction Noise Assessment Criteria

Construction noise assessment goals presented in the ICNG are referenced to noise management levels (NML) for residential, sensitive land uses and commercial/ industrial premises.

### 5.2.1 Residential Land Use

Table 5.1 (reproduced from Table 2 of the ICNG) sets out the NMLs for residences. The rating background level (RBL) is used as the basis for determining NMLs. The RBL is the overall single-figure background noise level measured in each relevant assessment period (during or outside the recommended standard hours). The term RBL is described in detail in the *Noise Policy for Industry* (EPA, 2017).

**For work during standard construction hours:**

- The 'noise affected level' represents the point above which there may be some community reaction to noise. The noise affected level is calculated by adding 10 dB(A) to the RBL
- The 'highly noise affected level' represents the point above which there may be strong community reaction to noise. The ICNG specifies that the highly noise affected level is 75 dB(A).

**For work outside of standard construction hours:**

Considering the possibility of work outside standard construction hours, additional Project construction NMLs for these times have also been determined. For these periods, the construction NML is calculated by adding 5 dB(A) to the RBL.

For assessing the potential for sleep disturbance, the *Noise Policy for Industry* (EPA, 2017) outlines night-time noise levels at a residential location should not exceed the prevailing RBL plus 15 dB(A) or 52 $dB_{LAmax}$, whichever is greater.

*Table 5.1: Residential construction NML guideline*

| Time | $L_{Aeq\ (15\ min)}$) |
|---|---|
| **Recommended standard construction hours**<br>• Monday to Friday: 7 am to 6 pm<br>• Saturdays: 8 am to 1 pm<br>• No work on Sundays or public holidays | Noise affected: RBL + 10 dB(A)<br>Highly noise affected: 75 dB(A) |
| **Outside standard construction hours** | Noise affected: RBL + 5 dB(A) |
| **Sleep disturbance**<br>• Monday to Saturday: 10 pm to 7 am<br>• Sundays and public holidays: 10 pm to 8 am | Noise affected: RBL + 15 dB(A) or 52 $dB_{LAmax}$, whichever is greater |

### 5.2.2 Non-Residential Land Use

Other sensitive land uses, such as schools and offices, typically find noise from construction to be disruptive when the properties are being used (such as during work and school times).

Consultation with non-residential land use occupants likely to be affected by noise from the Project will be undertaken to schedule construction activities and work hours to achieve a reasonable noise outcome.

## 5.3 Working Hours

### 5.3.1 Standard Construction Hours

In accordance with NSW CoA E18, work will be undertaken during the following standard construction hours:

- 7:00 am to 6:00 pm Monday to Friday
- 8:00 am to 1:00 pm Saturday
- At no time on Sunday or public holidays.

Any works to be undertaken outside of standard construction hours will be subject to an out of hours approval (refer to the OOHW Protocol provided in Appendix D).

Construction hours will be identified as part of the induction for contractors and subcontractors (refer to NV1 Table 8.1).

### 5.3.2 Highly Noise Intensive Works

As required by NSW CoA E19, except as permitted by an EPL, highly noise intensive works that result in an exceedance of the applicable noise management level (NML) at the same receiver must only be undertaken:

- Between 8:00 am to 6:00 pm Monday to Friday
- Between 8:00am to 1:00pm Saturday
- No work Sundays and public holidays.

Where highly noise intensive works will be carried out in continuous blocks this will not exceed three hours each, with a minimum respite of at least one hour between ceasing and recommencing each block of work. 'Continuous' includes any period during which there is less than a one-hour respite between ceasing and recommencing the work.

Highly noise intensive works are defined as annoying under the ICNG (DECC, 2009) and include:

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

All conditions relating to construction hours outlined in the Project EPL will be complied with.

### 5.3.3 Variation to Working Hours

Works outside of the standard construction hours identified in Section 5.3.1 may be undertaken in the following circumstances as permitted by NSW CoA E20. The process for seeking approval for out-of-hours construction works will be included in the induction for contractors and subcontractors, and is also detailed in Appendix D and Appendix E:

- **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.

  On becoming aware of the need for emergency work in accordance with the above, prior to work being undertaken the Construction Contractor Project Manager would liaise with the National Intermodal Principal's Representative who would notify National Intermodal, the ER, the Planning Secretary and the EPA of the reasons for such work. This would include notification to affected sensitive land user(s) of likely noise and vibration impacts and duration of those work.
- **Low impact:**
  - Construction that causes $LA_{eq(15\ min)}$ noise levels
    - No more than 5 dB(A) above the rating background level at any residence in accordance with the ICNG
    - No more than the 'Noise affected' NMLs specified in Table 3 of the ICNG at other sensitive land user(s)
  - Construction that causes:
    - Continuous or impulsive vibration values, measured at the most affected residence, and are no more than those for human exposure to vibration, specified for residences in Table 2.2 of Assessing Vibration: a technical guideline (DEC, 2006) and
    - Intermittent vibration values, measured at the most affected residence, and 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)

- **By approval:**
  - Where different construction hours are permitted or required under an EPL in force in respect of the SSI; or
  - Work which is **not** subject to an EPL that are approved under an Out-of-Hours Work Protocol as required by NSW CoA E21; or
  - Negotiated agreements with directly affected residents and sensitive land user(s).

### 5.3.4 Out Of Hours Work

The OOHW Protocol (Appendix D) outlines how assessment, approval and management of works outside of standard construction hours (refer to Section 5.3.1), and **not** the subject of an EPL, will occur.

The OOHW Protocol has been prepared to address the requirements of NSW CoA E21 and will include, but not be limited to:

- The process for obtaining approval for OOHW
- The details to be provided in any OOHW application, including information on the nature and need and justification for activities to be conducted during the varied construction hours
- Requirements for consultation with potentially affected receivers and local Councils.

The OOHW Protocol (Appendix D) will be submitted to the Planning Secretary for approval before commencement of the OOHW. Any minor amendments to the OOHW Protocol will be sent to the ER for consultation and approval.

### 5.3.5 Negotiated Agreements

Works outside of standard hours that do not meet the circumstances listed in NSW CoA E20(a), E20(b), E20(c)(i) or E20(c)(ii) may be undertaken if agreement between the Project and the directly affected noise sensitive receivers has been reached in accordance with NSW CoA E20(c)(iii). The community agreements between the Principal's Representative and the directly affected residents and sensitive land users will be:

- Prepared in writing and a copy of the agreement(s) kept on the premises for the duration of the OOHW
- Made available to DPE for the duration of the agreement (personal details of noise sensitive receivers will be omitted).

Where a community agreement has been attained by phone, the following may apply:

- Phone script used to describe the proposed agreement is to be provided to the Principal's Representative with the community agreement for approval
- Phone script to include a description of the proposed works, the likely impacts and benefits for the community and a clear question requesting receiver agreement to the proposal
- Detailed records are to be maintained for the duration of the community agreement
- Any noise sensitive receiver, who requests a copy of the phone agreement will be supplied with one.

It is noted that where negotiated agreements are used to undertake OOHW not subject to an EPL under E20(c)(iii), then agreements must be reached with 100% of the directly affected residents and sensitive land users.

In accordance with NSW CoA E23, noise generating work in the vicinity of potentially affected community, religious, educational institutions, noise and vibration-sensitive businesses, and critical working areas (such as theatres, laboratories and operating theatres), resulting in noise levels above the NMLs will not be scheduled within sensitive periods, unless the Principal's Representative (and National Intermodal) and the

potentially affected institution or business have made other arrangements. These arrangements will be implemented at no cost to the affected institution.

## 5.4 Adopted Construction NML

The construction NMLs have been derived based on the guidance outlined in the ICNG. The NMLs that are applicable are based on the land use for each identified sensitive receiver. The NML adopted are based on the principle that the characteristic activities for each of these land uses will not be unduly disturbed. The adopted Project construction NMLs for residential receivers are provided in

Table 5.2 and construction NMLs for non-residential receivers are provided in Table 5.3.

### 5.4.1 Residential NML

As required by the *Noise Policy for Industry* (NPfI) when setting project construction NMLs, the evening NML will be no greater than the daytime NML. Likewise, the night-time NML will be no greater than the day or evening NML.

Table 5.2 sets out the adopted Project construction NMLs for residential receivers.

*Table 5.2: Residential Construction NMLs* [6]

| Receiver type/ Monitoring Location | NML $L_{Aeq(15min)}$ – dB(A) | | | |
|---|---|---|---|---|
| | Standard construction hours dB(A) | Out-of-hours RBL + 5dB(A) | | |
| | Day | Day | Evening | Night |
| R1 (NM2) | 46 | 41 | 39 | 36 |
| R2 (NM3) | 45 | 40 | 39 | 36 |
| R3 (NM4) | 46 | 41 | 41 | 36 |

Note:

1. Day: 7 am to 6 pm Monday to Saturday; 8 am to 6 pm Sundays and public holidays;
2. Evening: 6 pm to 10 pm;
3. Night: All other periods.

### 5.4.2 Non-Residential NML

Construction NMLs for the non-residential receivers identified in the assessment are fixed target levels provided in the ICNG and summarised in Table 5.3. The construction NMLs for non-residential receivers apply when land is occupied and in use.

*Table 5.3: Non-residential sensitive land uses noise management levels*

| Land use[7] | Noise assessment location | NML ($L_{Aeq(15min)}$)[3] |
|---|---|---|
| Classrooms at schools and other educational institutions | Internal | 45 |
| Places of worship and hospitals | | |
| Passive recreation areas [1] | External | 60 |

[6] Sleep disturbance criteria will be assessed during preparation of a CNVIS where required.

| Land use[7] | Noise assessment location | NML ($L_{Aeq(15min)}$)[3] |
|---|---|---|
| Active recreation areas [2] | External | 65 |
| Industrial premises[4] | External | 75 |
| Office, retail outlets[5] | External | 70 |

Notes:

1. Passive recreation areas characterised by contemplative activities that generate little noise and where benefits are compromised by external noise intrusion.
2. Active recreation areas are characterised by sporting activities and activities which generate their own noise or focus for participants, making them less sensitive to external noise intrusion.
3. Applies only when properties are being used
4. Defence Buildings 2 and 3 are classified as industrial refer to Table 4.1
5. Defence Building 1 is classified as commercial refer to Table 4.1
6. AS/NZS 2107:2016 Acoustics – Recommended design sound levels and reverberation times for building interiors
7. No community centres within the vicinity of the Project Site

# 6 VIBRATION CRITERIA

## 6.1 Construction Vibration Assessment Objectives

The following construction vibration goals apply for the Project:

- For structural damage to heritage structures, the vibration limits are as set out in the German Standard *DIN 4150-3: Structural Vibration - effects of vibration on structures* (German DIN Standard)
- For damage to other buildings and/or structures, the vibration limits are as set out in the British Standard *BS 7385-1:1990 - Evaluation and measurement for vibration in buildings – Guide for measurement of vibration and evaluation of their effects on buildings* (British Vibration Standard)
- For human exposure, the acceptable vibration values are set out in *Assessing Vibration: A Technical Guideline* (DEC, 2006). (Vibration Guideline (DEC, 2006))

## 6.2 Vibration Assessment Criteria

Effects of ground vibration on buildings resulting from construction can be classified as follows:

- Human exposure – disturbance to building occupants: Vibration in which the occupants or users of the building are inconvenienced or possibly disturbed
- Effects on building contents: Vibration where the building contents may be affected
- Effects on building structures: Vibration in which the integrity of the building or structure itself may be prejudiced.

### 6.2.1 Human Comfort

Assessment of potential disturbance from tactile vibration on human occupants of buildings is made in accordance with the Vibration Guideline (DEC, 2006). The guideline provides criteria which are based on the British Vibration Standard.  Sources of vibration are defined as either ‘continuous’, ‘impulsive’ or ‘intermittent’:

- Continuous vibration – from uninterrupted sources, e.g., machinery, steady road traffic, continuous construction activity
- Impulsive vibration – up to three instances of sudden impact per monitoring period e.g., occasional dropping of heavy equipment, occasional loading and unloading
- Intermittent vibration – such as from drilling, compacting or activities that will result in continuous vibration if operated continuously.

Maximum and preferred values for continuous and impulsive vibration are defined in Table 6.1. Application of the continuous and impulsive vibration criteria considers the level, duration of exposure, time of day, and varies for land uses.

*Table 6.1: Continuous and impulsive vibration acceleration ($m/s^2$) 1-80 Hz*

| Location | Assessment period[1] | Preferred values | | Maximum values | |
|---|---|---|---|---|---|
| | | z-axis | x- and y-axis | z-axis | x- and y-axis |
| **Continuous vibration** | | | | | |
| Critical areas[2] | Day or night-time | 0.0050 | 0.0036 | 0.010 | 0.0072 |
| Residences | Daytime | 0.010 | 0.0071 | 0.020 | 0.014 |
| | Night-time | 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 |
| Workshops | Day or night- time | 0.04 | 0.029 | 0.080 | 0.058 |
| **Impulsive vibration** | | | | | |
| Critical areas[2] | Day or night-time | 0.0050 | 0.0036 | 0.010 | 0.0072 |
| Residences | Daytime | 0.30 | 0.21 | 0.60 | 0.42 |
| | Night-time | 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 |
| Workshops | Day or night- time | 0.64 | 0.46 | 1.28 | 0.92 |

Notes:

1. Daytime is 7.00am to 10.00pm and night-time is 10.00pm to 7.00am
2. Such as hospital operating theatres or precision laboratories.

Intermittent vibration impact is assessed using vibration dose values (VDVs). The VDV method is more sensitive to peaks in the acceleration waveform and makes corrections to the criteria based on the exposure duration. The acceptable VDVs for intermittent vibration are defined in Table 6.2.

*Table 6.2: Acceptable vibration dose values ($m/s^{1.75}$) for intermittent vibration*

| Location | Daytime[1] | | Night-time[1] | |
|---|---|---|---|---|
| | Preferred values | Maximum values | Preferred values | Maximum values |
| Critical areas[2] | 0.10 | 0.20 | 0.10 | 0.02 |
| 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 |
| Workshops | 0.80 | 1.60 | 0.80 | 1.60 |

Notes:

1. Daytime is 7.00am to 10.00pm and night-time is 10.00pm to 7.00am
2. Includes operating theatres, precision laboratories and other areas where vibration sensitive activities may occur.

### 6.2.2 Structural damage

The standards by which building damage from construction-induced vibration is assessed are British Vibration Standard and the German DIN Standard.

#### British Vibration Standard

BS 7385 is used as a guide to assess the likelihood of building damage from ground vibration. BS 7385 suggests levels at which 'cosmetic', 'minor' and 'major' categories of damage might occur, where the categories of structural damage are defined as:

- Cosmetic: The formation of hairline cracks on drywall surfaces, or the growth of existing cracks in plaster or drywall surfaces; in addition, the formation of hairline cracks in mortar joints of brick/ concrete block construction
- Minor: The formation of large cracks or loosening of plaster or drywall surfaces, or cracks through bricks/concrete blocks
- Major: Damage to structural elements of the building, cracks in supporting columns, loosening of joints, splaying of masonry cracks, etc.

The levels for structural damage outlined in the standard refer to non-continuous vibration sources and are considered 'safe limits' up to which no damage due to vibration effects are expected to occur for the various building types. Where vibration is continuous these levels may be reduced by up to 50% and additional assessment against the standard will be necessary.

BS 7385 is based on peak particle velocity and specifies damage criteria for frequencies within the range 4 Hz to 250 Hz, being the range usually encountered in buildings. Table 6.3 sets out the BS 7385 criteria for cosmetic, minor and major damage.

*Table 6.3: BS 7385 structural damage criteria*

| Group | Type of structure | Damage level | Peak component particle velocity[1] (mm/s) | | |
|---|---|---|---|---|---|
| | | | 4 – 15 Hz | 15 – 40Hz | ≥40Hz |
| 1 | Reinforced or framed structures Industrial and heavy commercial buildings | Cosmetic | 50 | 50 | 50 |
| | | Minor[2] | 100 | 100 | 100 |
| | | Major[2] | 200 | 200 | 200 |
| 2 | Un-reinforced or light framed structures Residential or light commercial type buildings | Cosmetic | 15 - 20 | 20 - 50 | 50 |
| | | Minor[2] | 30 - 40 | 40 - 100 | 100 |
| | | Major[2] | 60 - 80 | 80 - 200 | 200 |

Notes:

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 BS 7385 Part 2 (1993) Section 7.4.2

#### German DIN Standard

DIN 4150-3 provides recommended maximum levels of vibration that reduce the likelihood of building damage caused by vibration and are generally recognised to be a more stringent criteria set than that of BS 7385. DIN 4150-3 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.

Where heritage structures are impacted, DIN 4150-3 vibration criteria will be applied. The criteria applicable to heritage buildings are identified in

Table 6.4. Based on DIN 4150-3, a measured value exceeding those listed in

Table 6.4 will not necessarily lead to damage if it is significantly exceeded, however, further investigations may be necessary.

*Table 6.4: DIN 4150-3 vibration guidelines for heritage buildings*

| Type of structure | Guideline values for vibration velocity (mm/s) | | | |
|---|---|---|---|---|
| | Vibration at the foundation at a frequency of | | | Vibration at the horizontal plane of the highest floor at all frequencies |
| | 1 - 10 Hz | 10 - 50 Hz | 50 - 100 Hz[1] | |
| Heritage buildings | 3 | 3 - 8 | 8 - 10 | 8 |

Notes:

1. P1PAt frequencies above 100 Hz the values given in this column may be used as minimum values.

### 6.2.3 Safe Working Distances

Where vibration intensive plant such as rock breakers and vibratory rollers are used, vibration must be managed to minimise disturbance to building occupants and to avoid damage to buildings and other structures. Table 6.5 indicates the safe working distances recommended by the CNVG for typical items of vibration intensive plant that will be adopted.

*Table 6.5: Safe working distances for vibration intensive plant (TfNSW 2019)*

| Plant item | Rating/description | Safe working distance | | |
|---|---|---|---|---|
| | | Cosmetic damage (British Std 7385) – Light framed structures | Cosmetic damage (DIN 4150) Heritage and other sensitive structures | Human response (EPA's vibration guideline) |
| Vibratory roller | <50 kN (typically 1-2 t)<br><100 kN (typically 2-4 t)<br><200 kN (typically 4-6 t)<br><300 kN (typically 7-13 t)<br>>300 kN (typically 13-18 t)<br>>300 kN (> 18 t) | 5 m<br>6 m<br>12 m<br>15 m<br>20 m<br>25 m | 14 m<br>16 m<br>33 m<br>41 m<br>54 m<br>68 m | 15 m to 20 m<br>20 m<br>40 m<br>100 m<br>100 m<br>100 m |
| Small hydraulic hammer | 300 kg – 5 to 12 t excavator | 2 m | 5 m | 7 m |
| Medium hydraulic hammer | 900 kg – 12 to 18t excavator | 7 m | 19 m | 23 m |
| Large hydraulic hammer | 1600 kg – 18 to 34 t excavator | 22 m | 60 m | 73 m |
| Vibratory pile driver | Sheet piles | 20 m | 50 m | 100 m |
| Pile boring | ≤800 mm | 2 m (nominal) | 5 m | 7 m |
| Jackhammer | Handheld | 1 m (nominal) | 2 m | 3 m |

The safe working distances presented in Table 6.5 are indicative and will vary depending on the item of plant (particularly its power rating) and local geotechnical conditions. The cosmetic damage thresholds apply to typical buildings under typical geotechnical conditions and vibration monitoring is recommended at specific sites. Where structures are more sensitive such as heritage items, more stringent conditions may be applicable.

In relation to human response, the safe working distances relate to continuous vibration. For most construction activities, vibration emissions are intermittent and higher vibration levels over shorter periods are acceptable. Additional assessment will be undertaken where the human response criteria are exceeded.

# 7 ENVIRONMENTAL IMPACTS

## 7.1 Construction Activities

Section 2.3 of the CEMP provides an overview of the construction activities that have the potential for environmental impact. The potential risks have been identified based on the outcomes of the risk assessment provided in Appendix C of the CEMP.

Appendix D (OOHW Protocol) outlined work activities that may require scheduled OOHW.

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 Site. 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 include:

- Site establishment and decommissioning
- Construction compounds (carparks, office buildings, laydown areas)
- Clearing and grubbing
- Demolition
- Utilities and drainage
- Earthworks
- Material haulage
- Road works
- Piling
- Paving and concrete saw cutting
- Finishing works (road furnishing and landscaping).

The potential for noise and vibration impacts on sensitive receivers or structures will depend on several factors including:

- Type of equipment in use
- Number of equipment simultaneously in use
- Ground conditions
- Topography and other physical barriers
- Proximity to sensitive receivers
- Condition of sensitive receivers
- Hours/duration of construction works
- Proximity of heavy traffic areas.

Scheduling of construction activities will be undertaken by the Construction Contractor Construction Manager and potential noise and vibration impacts will be considered as part of this process. Requirements for noise and vibration management, including consultation with the local community, will form part of the regular Project Construction Meetings. Outcomes of the planning will be communicated to the wider construction force through training and daily pre-start meetings (refer to Section 9.2).

## 7.2 Construction Noise Impacts

### 7.2.1 Residential Construction Noise Impacts

The NVIA modelled a worst-case construction scenario (road construction) considering operation of 50% of all plant and equipment including vehicles operating continuously over a 15-minute period.

The result of the modelling for road construction indicates that the highly noise affected levels will be satisfied, but that NMLs will be exceeded at the residential reference locations, (Table 7.1). It is noted that these exceedances are limited to road construction and have been modelled for daytime only. In accordance with NSW CoA E26, a Construction Noise and Vibration Impact Statement (CNVIS) must be prepared for any work that may exceed the noise management levels or vibration criteria specified in NSW CoA E22 at any residence outside construction hours identified in NSW CoA E18, or where receivers will be highly noise affected.

It is noted that during the preparation of the NVIA although construction noise levels are predicted to be greater than the NML, in some circumstances, they are less than or equal to the ambient noise level. Exceedance of NMLs during standard hours is typical of such construction projects where residences are in proximity. Notwithstanding, implementation of the management measures detailed in Section 7.5.1 and REMMs will minimise noise impacts during construction.

*Table 7.1: Predicted Worst Case Scenario Noise Levels (Road Construction)*

| Location | NML $L_{Aeq,15min}$, dB(A) | Highly noise affected level | Predicted level | Exceedance |
|---|---|---|---|---|
| R1 (NM2) | 46 | 75 | 51 | +5 |
| R2 (NM3) | 45 | 75 | 52 | +7 |
| R3 (NM4) | 46 | 75 | 55 | +9 |

Noise contours were identified in the NVIA to evaluate the potential impacts to sensitive receivers to the north-east of the Project Site. Construction noise levels in the order of $L_{Aeq,15min}$ 45-48 dB(A), and therefore up to 2 dB(A) above NMLs were identified (Figure 7.1).

### 7.2.2 Non-Residential Construction Noise Impacts

The result of the modelling for a non-residential scenario during worst case scenario (road construction) identifies that construction noise levels satisfy the ICNG noise management levels at the reference commercial and industrial assessment locations (Table 7.2).

*Table 7.2: Predicted Worst Case Scenario Noise Levels (Road Construction)*

| Location | NML $L_{Aeq,15min}$, dB(A) | Highly noise affected level | Predicted level | Exceedance |
|---|---|---|---|---|
| COM | 70 | - | 66 | 0 |
| IN1 | 75 | - | 62 | 0 |
| IN2 | 75 | 75 | 66 | 0 |

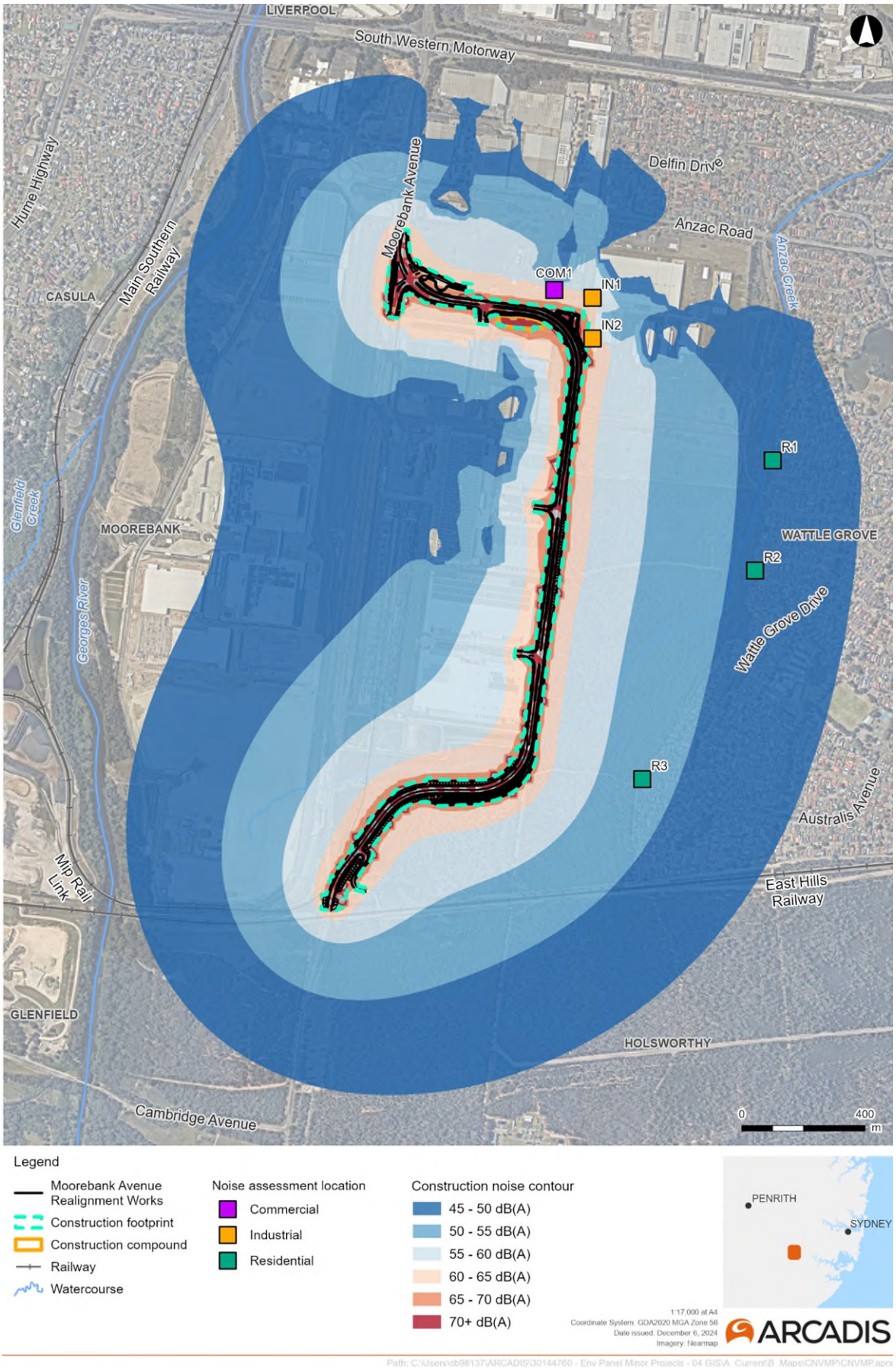


Figure 7.1: Modelled Construction Noise Contours (NVIA)

### 7.2.3 Construction Traffic Noise Impacts

Construction will generate heavy vehicle movements associated with transporting construction machinery, equipment, and materials to the Project Site. Light vehicle movements will be related to site personnel, visitors and smaller deliveries.

## 7.3 Construction Vibration Impacts

### 7.3.1 Construction Vibration Assessment

Potential vibration impacts to residents and buildings will be managed during construction of the Project. The main sources of construction vibration include:

- Vibratory rollers
- Rock breaking
- Hydraulic hammers
- Vibratory pile drivers
- Pile boring
- Jackhammers.

The main sources of vibration during construction of the Project will be associated with the use of vibratory rollers and rock breakers. A large vibratory roller produces noticeable vibration and is likely to be used throughout the construction of the Project. It is expected that vibration impacts will be able to be controlled to avoid cosmetic and structural damage to all structures. Where works are within the minimum working distances of structures, a detailed review of the required construction methods will be completed and attended vibration measurements will be required at the start of the works to determine the risk of exceeding the vibration objectives.

The distance between the construction works and the nearest sensitive receivers is generally sufficient for most buildings not to suffer cosmetic damage. Distance to the nearest structures is as follows:

- Residential: approximately 350 metres from the construction footprint
- Industrial (existing): approximately 20 metres from the construction footprint
- Industrial (i.e. MPE site): adjacent to the construction footprint
- Infrastructure (East Hills Bridge): adjacent to the construction footprint.

Where works are within the minimum working distances and considered likely to exceed the cosmetic damage objectives, construction works will not proceed unless:

- A different construction method with lower source vibration levels is used, where feasible
- Attended vibration measurements are carried out at the start of the works to determine the risk of exceeding of the vibration objectives.

Vibration impacts (structural damage and human comfort) are not anticipated during construction as all identified residential and industrial structures and heritage items are located beyond minimum safe working distances for vibration intensive activities and no further construction vibration mitigation measures are proposed. However, some receivers may be able to perceive vibration impacts at times when vibration generating equipment is in use. Where impacts will be perceptible, they will likely only be apparent for relatively short durations when equipment such as rock-breakers or vibratory rollers are in use nearby.

Vibration impacts on adjacent infrastructure (East Hills Bridge) has the potential to occur for tie-in works into the existing road. Implementation of the management measures detailed in Section 7.5.1 will minimise vibration impacts during construction.

### 7.3.2 Construction Ground-Borne Noise

Construction works can cause ground-borne noise impacts in nearby buildings when vibration generating equipment is in use. The majority of receivers are sufficiently distant from the works for ground-borne noise impacts on be minimal. Where residential receivers are located near construction works, airborne noise levels will typically be dominant over the ground-borne component.

## 7.4 Construction Noise and Vibration Impact Statements

In accordance with NSW CoA E26, and as detailed in Section 7.2 and Section 7.2.3, a CNVIS will be prepared for any work that may exceed the noise management levels (Section 5.4) or vibration criteria (Section 6.2) at any residence outside construction hours (Section 5.3) or where receivers will be highly noise affected.

The CNVIS will to be prepared by the Construction Contractor Environmental Advisor and/or a qualified acoustic consultant (Section 9.1 of the CNVMP) depending on the scale of the construction activities being undertaken. The CNVIS will include, but not limited to:

- An overview of the proposed construction works, including a list of equipment likely to be used and duration of the works
- Noise and/or vibration assessment methodology to determine the potential noise impacts
- Predicted construction noise and/or vibration results from the modelling
- Identification of the affected sensitive receivers during the construction activities
- Identification of reasonable and feasible mitigation measures to reduce noise and/or vibration levels, including those identified through consultation with affected sensitive land user(s). The identified mitigation measures must be implemented for the duration of the work.

A copy of the CNVIS will be issued to the ER at least two weeks prior to proposed works commencing and and may be provided to the Planning Secretary for information.

## 7.5 Cumulative Impacts

Cumulative noise and vibration impacts may arise from the interplay between construction activities associated with the Project, and other approved or proposed projects that are likely to occur within the area. When considered in isolation, specific impacts may be considered minor. These minor impacts may be more substantial however, when the impact of multiple projects on the same receivers is considered.

As outlined in the EIS, a number of other projects in the area that may coincide with construction works and may lead to construction and consultation fatigue for the local community, include:

- MPE Stage 2 (SSD 7628)
- MPW Stage 2 (SSD 7709) and Stage 3 (SSD 10431)
- M5 Motorway Westbound Traffic Upgrade (REF)
- Glenfield Waste Services Resource Recovery Facility (SSD 6249).

Communication between the Construction Contractor and developers for these projects will be undertaken with the aim of combining messages when possible, to coordinate disruptive activities and manage and

minimise cumulative impacts to the local community as per the CCS. In accordance with NSW CoA E27, works will be scheduled with the aim of minimising concurrent works near sensitive receivers. This will include:

- Coordination between project teams and other projects that are being constructed nearby
- Rescheduling of work to provide respite to impacted noise sensitive land user(s) so that respite is achieved during OOHW
- Consideration to the provision of alternative respite or mitigation to impacted noise sensitive land users.

The ER will be informed of decisions made in relation to respite or mitigation for OOHW and will also be provided with the documentary evidence that supports the decision. The implementation of respite and OOHW management measures have been detailed in Section 7 and will be managed in accordance with the Out of Hours Work Protocol (Appendix D).

Construction fatigue will be managed in accordance with the CCS, which includes a Construction Fatigue Protocol to minimise impacts associated with construction fatigue.

### 7.5.1 Respite and Sensitive Periods

The ICNG provides guidelines around the provision of Respite Periods during construction, specifically when nearby residents are subjected to lengthy periods of noise or vibration. This respite period or mitigation required will determined on a case-by-case basis.

However, typical respite periods and as detailed in the ICNG include the following:

- Where night work near residences cannot be feasibly or reasonably avoided, restrict the number of nights per week and/or the number of nights per calendar month that the works are undertaken, in consultation with residents who will be most affected. For example no more than three consecutive evenings and no more than two consecutive nights in the same location in any one week.
- Noise with special audible characteristics and vibration generating activities (including jack and rock hammering, sheet and pile driving, rock breaking and vibratory rolling) may only be carried out in continuous blocks, not exceeding three hours each, with a minimum respite period of one hour between each block. 'Continuous' includes any period during which there is less than a one-hour respite between ceasing and recommencing the work.
- Consult with affected schools to ensure that noise-generating construction works in the vicinity of affected school buildings are not scheduled to occur during examination periods, unless other arrangements (such as relocation to an alternative location) acceptable to the affected schools can be made.
- Relocating noise-affected occupants for short periods of time, such as when high noise levels from construction occur at night and there are no feasible and reasonable ways of reducing noise levels.

Typical sensitive periods include, but are not limited to:

- Avoid scheduling construction activities Sundays or public holidays to minimise impacts on religious services
- Avoiding evening and Saturday afternoon, where noise from construction can impact leisure activities
- Not scheduling works if an educational institution or school are undertaking examinations.

# 8 ENVIRONMENTAL MITIGATION AND MANAGEMENT MEASURES

The ICNG provide guidelines on applying all *feasible and reasonable* work practices or measures to minimise to protect the majority of sensitive receivers from noise generated during construction. *Feasible and reasonable* work practices can be summarised as:

- Feasible measures are capable of being put into practice, being engineered and are practical given project constraints. Examples include the use of low noise power tools or hydraulic or electrically controlled equipment instead of petrol or pneumatic equipment and controlling noise at the source.
- Selecting reasonable measures from those that are feasible involves making a judgment to determine whether the overall noise benefits outweigh the overall adverse social, economic and environmental effects.

Management actions and *feasible and reasonable* mitigations measures to avoid and minimise impacts of noise and vibration are summarised in Table 8.1.

The development of management measures has been based on SMART principles i.e. measures that are specific, measurable, achievable, relevant, and time-bound:

- **S**pecific – Mitigation and management measures identified in Table 8.1 specifically to manage noise and vibration impacts during construction
- **M**easurable – Inspection and monitoring requirements detailed in Section 9.3 include specific measures or indicators for which inspection and monitoring requirements will be triggered
- **A**chievable – Ongoing compliance with the Infrastructure Approval (Table 3.1 and Table 3.2) and Commonwealth CoAs, is achievable throughout the delivery of construction and represents the minimum requirements to be implemented by the Construction Contractor
- **R**elevant - The management measures outlined in Table 8.1 represent the approach to monitoring and tracking against the objectives, targets and environmental performance outcomes (identified in Section 2.3 of the CNVMP)
- **T**ime-bound – The management measures set out within Table 8.1 are required to be implemented for the duration of construction, setting a clear and defined time frame and includes reference to other timeframes, including during detailed design, pre-construction, post-construction and/or operation.

*Table 8.1: Noise and Vibration Management and Mitigation Measures*

| ID | Measure / requirement | Timing | Responsibility | Reference | Evidence |
|---|---|---|---|---|---|
| **Training** | | | | | |
| NV1 | All employees, contractors and subcontractors are to receive a Project induction prior to commencing work on site. The induction will include:<br>• Existence and requirements of this NVMP<br>• Relevant legislation and guidelines<br>• Standard construction hours and exemptions<br>• The process for seeking approval for out-of-hours works and highly noise intensive works, including consultation<br>• Location of noise sensitive areas<br>• Complaints reporting and recording<br>• How to implement noise and vibration management measures<br>• Specific responsibilities to minimise impacts on the community and built environment from noise and vibration associated with the works. | Construction | Construction Contractor Environmental Advisor | Standard industry practice | Induction records |
| NV2 | The need to minimise noise and vibration impacts will be communicated through the provision of targeted training and toolbox talks to relevant Project personnel, including relevant subcontractors. | Prior to Construction<br>Construction | Construction Contractor Environmental Advisor | REMM NVI02 | Training records<br>Toolbox talk sign on sheets |
| **Scheduling of construction activities** | | | | | |
| NV3 | Schedule noisy work activities adjacent community, religious, educational institutions, noise and vibration-sensitive businesses and critical working areas (such as theatres, laboratories and operating theatres) outside sensitive time periods, unless other reasonable arrangements with the affected institutions, businesses or facilities are made at no cost to the affected institution. | Construction | Construction Contractor Project Manager<br>Construction Contractor Site Supervisor | NSW CoA E23 | Compliance monitoring |

| ID | Measure / requirement | Timing | Responsibility | Reference | Evidence |
|---|---|---|---|---|---|
| NV4 | Schedule works such that the noise exposure, for any employee working at or near the construction site, does not exceed LAeq,8h of 85 dB(A). | Construction | Construction Contractor Project Manager<br>Construction Contractor Site Supervisor | NSW CoA E24 | Compliance monitoring |
| NV5 | Coordinate construction works with third parties such as MPE and MPW to provide respite. | Construction | Construction Contractor Project Manager<br>Construction Contractor Site Supervisor | NSW CoA E27<br>REMM NVI13 | Consultation records |
| NV6 | All work in the delivery of the Project including by subcontractors, will be coordinated to provide respite including:<br>Rescheduling of work to provide respite to impacted noise sensitive land user(s)<br>Consideration of the provision of alternative respite or mitigation to impacted noise sensitive land user(s) | Construction | Construction Contractor Project Manager<br>Construction Contractor Site Supervisor | NSW CoA E27 | Consultation records |
| NV7 | Avoid simultaneous operation of noisy plant within discernible range of a sensitive receiver. | Construction | Construction Contractor Project Manager<br>Construction Contractor Site Supervisor | REMM NVI12 | Construction documentation |
| NV8 | Noisiest works will be scheduled to be undertaken during standard construction hours | Construction | Construction Contractor Project Manager<br>Construction Contractor Site Supervisor | NSW CoA E25 | Construction documentation |
| NV9 | Noise and vibration generating work in the vicinity of potentially-affected community, religious, educational institutions, noise and vibration-sensitive businesses and critical working areas resulting in noise levels above the NMLs will not be timetabled within sensitive periods, unless offers of other reasonable arrangements have been made to the affected institutions. | Construction | Construction Contractor Project Manager<br>Construction Contractor Site Supervisor | NSW CoA E23 | Compliance monitoring |

| ID | Measure / requirement | Timing | Responsibility | Reference | Evidence |
|---|---|---|---|---|---|
| **On-site management - noise** | | | | | |
| NV10 | No swearing or unnecessary shouting or loud stereos / radios, public address systems or other forms of communication that may impact upon nearby residents. | Construction | Construction Contractor Site Supervisor | REMM NVI04 | Site inspection records<br>Toolbox talks |
| NV11 | Dropping of materials from height, throwing of metal items and slamming of doors will be avoided | Construction | Construction Contractor Site Supervisor | REMM NVI04 | Site inspection records<br>Toolbox talks |
| NV12 | The arrangement of plant and equipment will be considered to reduce noise impacts including:<br>• Directing noise-emitting plant away from sensitive receivers<br>• Maximise the offset distance between noisy plant and adjacent sensitive receivers.<br>• Minimising idling | Pre-construction | Construction Contractor Site Supervisor | NSW CoA E25 | Site inspection records |
| NV13 | Pre-start inspections, and regular maintenance of plant and equipment will be undertaken in accordance with manufacturers guidelines | Construction | Construction Contractor Site Supervisor | NSW CoA E25<br>REMM NVI10 | Compliance monitoring<br>Site inspection records |
| NV14 | All construction plant and equipment used on the site will be operated in a quiet and efficient manner such as throttling down or shutting down when not in use. | Construction | Construction Contractor Site Supervisor | REMM NVI09 | Site inspection records |
| NV15 | Non-tonal (white noise) movement alarms will be used in place of tonal reversing alarms for Contractor owned plant and subcontract plant used at night or during the day. | Construction | Construction Contractor Site Supervisor | REMM NVI09<br>REMM NVI11 | Site inspection records<br>Toolbox talks |
| NV16 | Stationary noise sources will be enclosed or shielded where feasible and reasonable. This will apply to plant and equipment such as generators, stationary concrete cutters, stationary asphalt corers, stationary vacuum trucks, and stationary jack hammers | Construction | Construction Contractor Site Supervisor | NSW CoA E25 | Site inspection records |

| ID | Measure / requirement | Timing | Responsibility | Reference | Evidence |
|---|---|---|---|---|---|
| NV17 | Additional temporary screening or enclosures, or alternative construction and demolition techniques will be considered for stationary and mobile plant and equipment where additional measures are required to meet relevant NMLs, or where plant and equipment is known to exceed the NMLs | Pre-construction | Construction Contractor Project Manager<br>Construction Contractor Site Supervisor | NSW CoA E25<br>REMM NVI03 | Compliance monitoring |
| NV18 | The use of equipment that generates impulsive noise (sudden bursts of noise) will be avoided. | Construction | Construction Contractor Project Manager<br>Construction Contractor Site Supervisor | REMM NVI06 | Site inspection records<br>Compliance monitoring |
| NV19 | Quieter plant and equipment will be selected based on the optimal power and size to perform the required tasks most efficiently | Pre-construction and construction | Construction Contractor Project Manager<br>Construction Contractor Site Supervisor | NSW CoA E25<br>REMM NVI08 | Manufacturer's specifications |
| **On-site management – vibration** | | | | | |
| NV20 | Appropriate safe working distances will be implemented to avoid impacts on structures and sensitive receivers during activities that generate vibration. | Construction | Construction Contractor Project Manager<br>Construction Contractor Environmental Advisor | n/a | Site inspection records |
| NV21 | The use of alternatives to vibration generating equipment will be considered where vibration impacts are predicted. | Construction | Construction Contractor Project Manager<br>Construction Contractor Environmental Advisor | n/a | Construction documentation |
| NV22 | Where works are within the minimum working distances and considered likely to exceed the cosmetic damage objectives, construction works will not proceed unless:<br>A different construction method with lower source vibration levels is used, where feasible<br>Attended vibration measurements are carried out at the start of the works to determine the risk of exceeding the vibration objectives. | Construction | Construction Contractor Project Manager<br>Construction Contractor Environmental Advisor | n/a | Construction documentation |

| ID | Measure / requirement | Timing | Responsibility | Reference | Evidence |
|---|---|---|---|---|---|
| **Consultation** | | | | | |
| NV23 | Notify residents at least seven days prior to the commencement of highly noise intensive works. | Construction | Construction Contractor Project Manager<br>Construction Contractor Site Supervisor | REMM NVI07 | Correspondence |
| **Out of hours works** | | | | | |
| NV24 | The Out of Hours Works Protocol must be followed for any works outside standard construction hours, and that are not subject to an EPL | Construction | Construction Contractor Project Manager | NSW CoA E21 | Construction documentation |
| NV25 | Construction Noise and Vibration Impact Statements (CNVIS) must be prepared for any work that may exceed the noise management levels or vibration criteria specified in NSW CoA E22 at any residence outside construction hours identified in NSW CoA E18, or where receivers will be highly noise affected. | Pre-construction and construction | Construction Contractor Environmental Advisor<br>Acoustic Consultant | NSW CoA E26 | CNVIS |
| NV26 | Respite periods must be negotiated with the CCC; the identified respite periods and the scheduling of the likely OOHW will be provided to the ER for information within one week of undertaking the community consultation. | Construction | Construction Contractor Environmental Advisor | NSW CoA B1 | CCC Minutes |
| **Construction vehicles** | | | | | |
| NV27 | All personnel will use nominated on site car parking facilities | Construction | Construction Contractor Project Manager | REMM NVI05 | Site layout plans |
| NV28 | Heavy vehicles will use nominated haulage routes only | Construction | Construction Contractor Project Manager | REMM NVI05 | Site layout plans |
| NV29 | Vehicles operating to, from and within the Project Site shall do so in a manner, which does not create unreasonable or unnecessary noise or vibration including:<br>Switching off engines during waiting periods<br>Avoiding compression braking unless safety requires such application | Construction | Construction Contractor Project Manager | Standard Practice | Compliance monitoring |

| ID | Measure / requirement | Timing | Responsibility | Reference | Evidence |
|---|---|---|---|---|---|
| **Monitoring** | | | | | |
| NV30 | Noise and vibration monitoring is to be undertaken in accordance with the Noise and Vibration Monitoring Program | Construction | Construction Contractor Environmental Advisor | NSW CoA C12 | Compliance monitoring<br>Site inspection records |
| NV31 | Monitoring will be carried out at the start of highly noise intensive works (such as piling, rock-breaking, vibratory rolling and power sawing) to confirm that actual noise and vibration levels are consistent with the noise and vibration impact predictions. | Construction | Construction Contractor Environmental Advisor | NSW CoA C12 | Compliance monitoring<br>Site inspection records |
| NV32 | Where monitoring identifies higher levels of noise and vibration compared to predicted levels, or where mitigation is shown to be ineffective against measured noise and vibration levels, additional mitigation measures will be identified and implemented to appropriately manage impacts where feasible and reasonable. | Construction | Construction Contractor Environmental Advisor | NSW CoA C12 | Compliance monitoring<br>Site inspection records |
| NV33 | In-situ monitoring will be carried out to confirm vibration levels and assess the impact of vibration. Where the monitoring identifies exceedances in the relevant criteria, or where impacts are identified, additional mitigation measures will be identified and implemented to appropriately manage impacts. | Construction | Construction Contractor Environmental Advisor | NSW CoA C12 | Compliance monitoring<br>Site inspection records |
| NV34 | Where works are within the minimum working distances of structures, a detailed review of the required construction methods will be completed and attended vibration measurements will be required at the start of the works to determine the risk of exceeding the vibration objectives | Construction | Construction Contractor Environmental Advisor | NSW CoA C12 | Vibration monitoring<br>Site inspection records |

## 8.1 Trigger for Additional Management Measures

The TfNSW Construction Noise and Vibration Guideline (CNVG) has been used, as a guide only, to determine the type of additional management measures that will be implemented based on exceedance above the RBL or NML for this Project. Additional management measures are based on the level of predicted risk and will be undertaken in accordance with the Communication Consultation Strategy (CCS) as detailed in Table 8.2.

*Table 8.2: Additional noise management measures for residential land uses*

| Risk | Perception | Predicted airborne $L_{Aeq(15min)}$ noise level receiver | | dB(A) above NML | Additional mitigation measures type |
|---|---|---|---|---|---|
| | | dB(A) above RBL | dB(A) above NML | | |
| **All hours** | | | | | |
| High Risk | 75 dB(A) or greater | - | - | Highly noise affected. CNVIS required (residential only) | Community Consultation (refer to CCS) |
| **Standard Hours: Mon – Fri (7am – 6pm), Sat (8am – 1pm), Sun/Public Holiday (Nil)** | | | | | |
| Low Risk | Noticeable | 5 to 10 | 0 | NML | - |
| Low Risk | Clearly audible | 10 to 20 | < 10 | NML | - |
| High Risk | Moderately intrusive | 20 to 30 | 10 to 20 | NML+10 | Community Consultation (refer to CCS) |
| High Risk | Highly intrusive | > 30 | > 20 | NML+25 | |
| **Out of Hours Works** | | | | | |
| Low Risk | Noticeable | 5 to 10 | < 5 | NML | - |
| High Risk | Clearly audible | 10 to 20 | 5 to 15 | NML+5 | Community Consultation (refer to CCS) |
| High Risk | Moderately intrusive | 20 to 30 | 15 to 25 | NML+15 | |
| High Risk | Highly intrusive | > 30 | > 25 | NML+25 | |

The following will be undertaken in the event of high-risk activities being undertaken in order to inform nearby residential receivers of the activities:

- Construction Contractor to identify types and durations of works which may generate high-impact noise during works scheduling and notify Construction Contractor's Community Liaison Officer prior to quarterly Community Consultative Committee (CCC) meetings

- Works scheduling to be discussed at CCC meetings, with members given the opportunity to raise concerns around timing of works, for example due to school holidays or local events etc.
- Construction Contractor's to review schedule and amend where possible and provide Construction Contractor's Community Liaison Officer details or works being undertaken
- Construction Contractor's Community Liaison Officer to develop content to be included within community notification and submit content to National Intermodal's CEC a minimum of 5 days prior to works commencing for review and approval
- National Intermodal's CEC to review and approve notification and distribute to the impacted nearby sensitive receivers a minimum of 7 days prior to the works commencing. National Intermodal's CEC will also update the Project website with the relevant information.

Respite consultation will be undertaken in accordance with Section 4.1 of the OOHW Protocol in Appendix D.

# 9 COMPLIANCE MANAGEMENT

## 9.1 Roles and Responsibilities

The Project organisational structure and overall roles and environmental responsibilities are outlined in Section 5.1 of the CEMP. Specific responsibilities for the implementation of noise and vibration management are detailed in Section 7.5.1 of this CNVMP.

A suitably qualified acoustic consultant will be engaged by the Construction Contractor as required to advise on noise and vibration and assist with the preparation of the CNVIS, described in Section 7.4 of the CNVMP.

## 9.2 Training

All site personnel (including sub-Construction Contractors) will undergo site induction training relating to noise and vibration management issues prior to construction commencing. The induction training will address elements related to noise and vibration management, including:

- Existence and requirements of this CNVMP
- Relevant legislation, regulations and Environment Protection Licence (EPL) conditions
- Incident response, management and reporting
- Environmentally sensitive locations and exclusion zones
- Standard construction hours and exemptions
- The process for seeking approval for out-of-hours works, including consultation
- Location of noise sensitive areas
- Complaints reporting and recording
- How to implement noise and vibration management measures
- All requirements of Appendices contained within this CNVMP.

Targeted training in the form of toolbox talks or specific training will also be provided to personnel with a key role in noise and vibration management or those undertaking an activity with a high risk of environmental impact. Site personnel will undergo refresher training at not less than six monthly intervals.

Daily pre-start meetings conducted by the Site Supervisor will inform the site workforce of any environmental issues relevant to noise and vibration, including the location of institutions (religious and educational) that have “sensitive periods” that need to be avoided, that could potentially be impacted by, or impact on, the day’s activities.

Further details regarding staff induction and training are provided in Section 5.2 of the CEMP.

## 9.3 Monitoring and Inspections

Inspections of sensitive areas and activities with the potential to impact noise and vibration will occur for the duration of the construction of the Project. Construction noise and vibration monitoring for the Project will be carried out in accordance with the Construction Noise and Vibration Monitoring Program (refer to Appendix E).

Requirements and responsibilities in relation to monitoring and inspections are documented in Section 7.1 of the CEMP and will include noise and vibration specific requirements including checking for excessive noise or vibration, exhaust noise, reversing non-tonal alarms,

## 9.4 Auditing

Audits (both internal and external) will be undertaken to assess the effectiveness of environmental controls, compliance with this sub plan, State and Commonwealth CoA and other relevant approvals, licenses and guidelines.

Audit requirements are detailed in Section 7.3 of the CEMP.

## 9.5 Reporting and Identified Records

Reporting requirements and responsibilities are documented in Section 7.4 of the CEMP.

Specific reporting requirements associated with the CNVMP are outlined in Table 9.1.

*Table 9.1: Reporting requirements relevant to noise and vibration management*

| Report | Frequency | Responsibility |
|---|---|---|
| Coordination of Respite or Mitigation | As required by NSW CoA E27(c) | Construction Contractor Environmental Advisor |
| Construction Noise and Vibration Impact Statements | As required by NSW CoA E26 | Construction Contractor Environmental Advisor |

The Construction Contractor will be required to maintain accurate records substantiating all construction activities associated with the Project or relevant to the State and Commonwealth CoA, including measures taken to implement this CNVMP. Records will be made available to the DPE and DCCEEW upon request, within the timeframe nominated in the request.

## 9.6 Incidents

It is the responsibility of all personnel to report any incidents in accordance with the incident management procedures detailed to Section 6.1 of the CEMP.

## 9.7 Complaints

Complaints will be managed as soon as possible in accordance with the requirements of the CCS and Complaints Management System developed in accordance with NSW CoA B7 and B8 respectively.

Complaints will be managed in accordance with Section 5.4.3 of the CEMP and CCS.

## 9.8 Non-Compliances and Corrective Actions

Non-compliance may be identified via internal and external audits, site monitoring, inspections and observations, environmental incidents and emergencies, complaints and management reviews.

Non-compliance and resulting corrective actions will be managed in accordance with Section 7.2 of the CEMP.

# 10 REVIEW AND IMPROVEMENT

## 10.1 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 and through SMART principles. 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-compliances and deficiencies
- Develop and implement a plan of corrective and preventative action to address any non- compliances 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.

Project environmental risks will be identified and included in the risk register and appropriate mitigation measures implemented throughout the construction of the Project as part of the continuous improvement process.

The process for ongoing risk identification and management during construction is outlined in Section 4.2 and Appendix C of the CEMP.

## 10.2 CNVMP Update and Amendment

The processes described in Section 7.5 of the CEMP may result in the need to update or revise this CNVMP including the OOHW Protocol and Noise and Vibration Monitoring Program. This will occur as needed.

Any revisions to the CNVMP will be endorsed and / or approved in accordance with the process outlined in Section 1.5 of the CEMP.

A copy of the updated the CNVMP and changes will be distributed to all relevant stakeholders in accordance with the approved document control procedure.

# APPENDIX A Consultation

Response to Liverpool City Council Letter of 20 April 2023

| Comment | Response and where the comment has been addressed |
|---|---|
| 1. It is recommended that the CNVMP be reviewed and determined satisfactory by the consent authority. This may include an independent review of the CNVMP by an external consultant. | The CNVMP has been prepared and reviewed by suitably qualified consultants (Arcadis and EMM). In accordance with NSW CoA C2, DPE must also review and approve this CNVMP. |
| 2. Notwithstanding this, Council has previously endorsed a submission dated 30 April 2021 for the Moorebank Avenue Realignment Environmental Impact Statement (EIS). This submission advised that a CNVMP must be prepared by a suitably qualified acoustic consultant, and should incorporate actions that minimise noise arising from construction, including the following: | All relevant information from the EIS and RtS has been incorporated into the CNVMP. An Acoustic Consultant (EMM) has undertaken a technical review of the CNVMP. |
| 3. Methods for promoting noise awareness by contractors and training procedures | As detailed in Section 9.2, all site personal will undergo site induction training relating to noise and vibration management issues prior to construction commencing. Additionally, toolbox talks and specific training will also be provided no less than six monthly intervals. |
| 4. A complaints lodgement procedure to ensure that the public and local residents are able to report any noise issues<br>An ongoing review process and a plan for responding to noise complaints | As detailed in Section 9.7, complaints will be managed in accordance with the requirements of the Community Communication Strategy and the Complaint Management System in accordance with NSW CoA B7 and B8.<br>Section 5.4.3 of the CEMP also details how complaints will be managed during construction of the Project. |
| 5. Details of the site personnel who would manage noise and the steps that would be used to manage any potential noise impacts. | Section 7.5.1 of this CNVMP details specific responsibilities for the implementation of noise and vibration management including respite and sensitive periods. The Project organisational structure and overall roles and environmental responsibilities are outlined in Section 5.1 of the CEMP.<br>Section 8 details noise and vibration management measures and related responsibilities. |
| 6. The Council submission raised concerns that the residents in the western portion of Wattle Grove would be exposed to increased traffic noise, where acoustic walls are not proposed. It was also outlined that the EIS did not identify whether the road traffic noise assessment considered the expected additional traffic volumes from the proposed Cambridge Avenue upgrade. | Based on the outcomes of the noise impact assessment (Appendix E of the EIS), a noise wall is not required.<br>Potential road traffic noise associated with increased operational traffic volumes on Cambridge Avenue are not relevant to this CNVMP as it relates to construction noise and vibration impacts only. |

# APPENDIX B Environmental Representative Endorsement

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26 April 2023 Our Ref: 2205 L5

National Intermodal Corporation
Senior Manager – Planning and Environment
Attention: Westley Owers

Dear Westley

**SSI 10053 - Moorebank Avenue Realignment Works (MARW)**
**Environmental Representative (ER) - Endorsement of the Construction Noise and Vibration Management Plan and Out of Hours Work Protocol**

Pursuant to SSI10053 Conditions of Approval (CoA) A31(d), C8, C12, C14 and E21, I confirm that I have reviewed the following documentation to be submitted to the Planning Secretary for approval:

- National Intermodal Corporation, Moorebank Avenue Realignment Works, Construction Noise and Vibration Management Plan, Version F, dated 24 April 2023 (CNVMP).
- Out of Hours Work Protocol (CoA E21) appended as Appendix D to the CNVMP.
- Noise and Vibration Monitoring Program (CoA C12) appended as Appendix E to the CNVMP.

In accordance with CoA A6, and as agreed by a nominee of the Planning Secretary (Department of Planning and Environment letter dated 22 November 2022, Reference: SSI-10053-PA-4), the CNVMP includes:

- Construction Noise and Vibration Management Plan (REMM NVI01)
- Construction Noise and Vibration Monitoring Program (CoA C12)

In my opinion the documents are consistent with the requirements included in or required under the terms of the SSI10053 Conditions of Approval.

Yours sincerely,

Maurice Pignatelli
*Environmental Representative – MARW Project*
*OptimE Pty Ltd*

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12 February 2025 Our Ref: 2205.L13.2

National Intermodal Corporation
Senior Manager – Planning and Environment
Attention: Westley Owers

Dear Westley

**SSI 10053 - Moorebank Avenue Realignment Works (MARW)**
**Environmental Representative (ER) – Approved amendments to the Construction Environmental Management Plan (CEMP) and associated sub-plans and monitoring programs**

National Intermodal Corporation (NIC) has updated the CEMP and associated sub-plans and monitoring programs approved by the Secretary to reflect the following documents:

- Moorebank Avenue Realignment Works (MARW) Division 5.2 Consistency Assessment – Proposed Design and Boundary Changes, Revision E, 16 July 2024
- Artefact Moorebank Avenue Realignment Works Surface Collection Completion Memo, 30 August 2024
- Moorebank Avenue Realignment Project Remediation Action Plan (Rev C), 5 July 2024
- Variation to EPBC 2020-8839 approved by the Minister for the Environment and Water on 14 January 2025.
- Approval of variation to the conditions attached to the Environment Protection and Biodiversity Conservation (EPBC) Act 1999 approval 2020/8839, dated 14 January 2025.

A summary of the amendments, prepared by Arcadis, is provided as Attachment A to this letter.

The ER was requested by NIC to review the updated CEMP and associated sub-plans and monitoring programs and if the updates were considered by the ER to be consistent with SSI10053 Conditions of Approval (CoA) A31(i), to approve the amendments.

Pursuant to SSI10053 CoA A31(i), I confirm that I have reviewed the following MARW documentation:

- Construction Environmental Management Plan, Version F, dated 22 January 2025
- Construction Air Quality Management Plan, Version F, dated 22 January 2025

- Construction Bushfire Management Plan, Version F, dated 22 January 2025
- Construction Biodiversity Management Plan, Version H, dated 22 January 2025
- Construction Contamination Management Plan, Version E, dated 22 January 2025
- Construction Heritage Management Plan, Version I, dated 22 January 2025
- Construction Noise and Vibration Management Plan, Version H, dated 22 January 2025 and associated Construction Noise and Vibration Monitoring Program, Version H, dated 22 January 2025
- Construction Soil and Water Management Plan, Version E, dated 22 January 2025 and associated Construction Surface Water Monitoring Program, Version E, dated 22 January 2025
- Construction Traffic and Transport Management Plan, Version H, dated 22 January 2025
- Construction Waste and Resource Management Plan, Version H, dated 22 January 2025.

In my opinion, the amendments to the approved CEMP and associated subplans and monitoring programs do not increase impacts to nearby receivers, are of an administrative nature, and are consistent with the terms of SSI10053. On this basis, I approve the amendments.

Yours sincerely,

Maurice Pignatelli
*Environmental Representative – MARW Project*
*OptimE Pty Ltd*

*Attachment A - MARW CEMP and Sub-plan minor updates, Q4 2024*

| | |
|---|---|
| **Date** | 12 February 2025 |
| **To** | Maurice Pignatelli |
| **From** | Jamie Crawford |
| **Copy to** | Gail Hall, Wes Owers, Ben Bracken |
| **Subject** | MARW CEMP and Sub-plan minor updates, Q4 2024 |

## CEMP AND SUB-PLAN MINOR ADMENDMENTS

The MARW CEMP and Sub-plans have been updated to reflect the following:

- Moorebank Avenue Realignment Works (MARW) Division 5.2 Consistency Assessment – Proposed Design and Boundary Changes, Revision E, 16 July 2024
- Artefact Moorebank Avenue Realignment Works Surface Collection Completion Memo, 30 August 024
- Moorebank Avenue Realignment Project Remediation Action Plan (Rev C)
- Approval of variation to the conditions attached to the Environment Protection and Biodiversity Conservation (EPBC) Act 1999 approval 2020/8839, dated 14 January 2025.

The following table summarises the updates made to the CEMP and Sub-plans in order to reflect the above documentation.

| Reason for update | Plan, version and section subject to minor update |
|---|---|
| Construction Environmental Management Plan | |
| Consistency Assessment – Proposed Design and Boundary Changes | Construction Environmental Management Plan (Version E), updated to Version F:<br>• Figure 1.1 Project regional and local context, updated to reflect revised construction footprint.<br>• Figure 2.1 Project Overview, updated to reflect revised construction footprint.<br>• Figure 2.2a Project Overview, updated to reflect revised construction footprint and renamed Figure 2.2<br>• Figure 2.3b Project Overview, updated to reflect revised construction footprint and renamed Figure 2.3<br>• Figure 2.4c Project Overview, updated to reflect revised construction footprint and renamed Figure 2.4<br>• Figure 2.5d Project Overview, updated to reflect revised construction footprint and renamed Figure 2.5<br>• Appendix E Sensitive Area Plans:<br>  ○ App E Main Figure<br>  ○ App E Fig a<br>  ○ App E Fig b<br>  ○ App E Fig d |
| Moorebank Avenue Realignment Works Surface Collection Completion Memo | Construction Environmental Management Plan (Version E), updated to Version F:<br>• Section 3.2.5. Bullet list summary of information included on Sensitive Area Plans updated to remove reference to Aboriginal heritage sites |

| Reason for update | Plan, version and section subject to minor update |
|---|---|
| | • Appendix E Sensitive Area Plans:<br>  ○ App E Main Figure. 'Recorded AHIMS' removed<br>  ○ App E Fig a. 'Recorded AHIMS' removed<br>  ○ App E Fig c. 'Recorded AHIMS' removed<br>  ○ App E Fig d. 'Recorded AHIMS' removed |
| EPBC Act 2020/8839 variation, dated 14 January 2025. | Construction Environmental Management Plan (Version E), updated to Version F:<br>• Section 1.1 Overview updated to reflect approval of the variation to EPBC 2020/8839 dated 14 January 2025<br>• Section 1.2 Purpose of the CEMP updated to reflect that EPBC 2020/8839 was varied on 14 January 2025<br>• Table 4.2 Approvals permits and licences required for the Project updated to include Commonwealth EPBC Approval (EPBC 2020-8839) variation dated 14 January 2025<br>• Appendix C1 Legislation Register updated to reflect that EPBC 2020/8839 was varied on 14 January 2025. |
| Other minor updates | Construction Environmental Management Plan (Version E), updated to Version F:<br>• Section 5.4.2 updated to reflect current Project website. |
| Construction Biodiversity Management Plan | |
| Consistency Assessment – Proposed Design and Boundary Changes | Construction Biodiversity Management Plan (Version G), updated to Version H:<br>• Figure 1.1: Project location. Figure updated to reflect revised construction footprint.<br>• Figure 1.2: Project overview. Figure updated to reflect revised construction footprint.<br>• Figure 6.1: Project exclusion zones. Figure updated to reflect revised construction footprint.<br>• Figure D-1 Native Plant Community Types and threatened flora and fauna. Figure updated to reflect revised construction footprint. |
| EPBC Act 2020/8839 variation, dated 14 January 2025. | Construction Biodiversity Management Plan (Version G), updated to Version H:<br>• Section 1.1 Background and Project Description updated to reflect approval of the variation to EPBC 2020/8839 dated 14 January 2025<br>• Section 2.2 Objectives updated to reflect that EPBC 2020/8839 was varied on 14 January 2025. |
| Construction Traffic and Transport Management Plan | |
| Consistency Assessment – Proposed Design and Boundary Changes | Construction Traffic and Transport Management Plan (Version G), updated to Version H:<br>• Figure 1.1: Project location. Figure updated to reflect revised construction footprint. |

| Reason for update | Plan, version and section subject to minor update |
|---|---|
| | • Figure 1.2: Project layout. Figure updated to reflect revised construction footprint.<br>• Figure 4.1: Key intersections. Figure updated to reflect revised construction footprint. |
| EPBC Act 2020/8839 variation, dated 14 January 2025. | Construction Traffic and Transport Management Plan (Version G), updated to Version H:<br>• Section 1.1 Background and Project Description updated to reflect approval of the variation to EPBC 2020/8839 dated 14 January 2025<br>• Section 2.2 Objectives updated to reflect that EPBC 2020/8839 was varied on 14 January 2025. |
| Construction Noise and Vibration Management Plan | |
| Consistency Assessment – Proposed Design and Boundary Changes | Construction Noise and Vibration Management Plan (Version G), updated to Version H:<br>• Figure 1.1: Project location. Figure updated to reflect revised construction footprint.<br>• Figure 1.2: Project layout. Figure updated to reflect revised construction footprint.<br>• Figure 4.1: Sensitive receivers and assessment and monitoring locations. Figure updated to reflect revised construction footprint.<br>• Figure 7.1: Modelled Construction Noise Contours (NVIA). Figure updated to reflect revised construction footprint.<br>Construction Noise and Vibration Monitoring Program (Version G)<br>• Figure 2.1: Location of noise and vibration assessment and monitoring locations. Figure updated to reflect revised construction footprint. |
| EPBC Act 2020/8839 variation, dated 14 January 2025. | Construction Noise and Vibration Management Plan (Version G), updated to Version H:<br>• Section 1.1 Background and Project Description updated to reflect approval of the variation to EPBC 2020/8839 dated 14 January 2025<br>• Section 2.2 Objectives updated to reflect that EPBC 2020/8839 was varied on 14 January 2025. |
| Construction Heritage Management Plan | |
| Consistency Assessment – Proposed Design and Boundary Changes | Construction Heritage Management Plan (Version H), updated to Version I:<br>• Figure 1.1: Project location. Figure updated to reflect revised construction footprint.<br>• Figure 1.2: Project layout. Figure updated to reflect revised construction footprint.<br>• Figure 4.1 (previously Figure 4.2): Location of Non-Aboriginal heritage sites and items. Figure renamed as Figure 4.1 and updated to reflect revised construction footprint. |

| Reason for update | Plan, version and section subject to minor update |
|---|---|
| Moorebank Avenue Realignment Works Surface Collection Completion Memo | Construction Heritage Management Plan (Version H), updated to Version I<br><br>The following updates have been made in response to completion of surface collection activities on 19 August 2024 in accordance with Section 6.1.1 of the CHMP, Appendix A of Infrastructure Approval SSI-10053 and REMM ABH01, during which no Aboriginal objects were identified and an Aboriginal Site Impact Recording Form (ASIRF) was submitted to AHIMS to note the revised status of these sites.<br><br>• Section 4.1 – Update to include reference to Artefact Moorebank Avenue Realignment Works Surface Collection Completion Memo (30 August 2024)<br>• Section 4.2.1.2 Known Aboriginal Cultural Heritage Values – Project Site updated to reflect that there are now no known Aboriginal sites within the Project Site (previous desktop and field investigations identified six remaining sites).<br>• Section 4.2 – Removal of Figure 4.1: Location of Aboriginal sites and isolated finds across the Project<br>• Section 5.2.1 Aboriginal Heritage Impacts revised to reflect that no known Aboriginal sites are identified within the construction boundary and therefore no impacts to Aboriginal heritage associated with Project construction are anticipated.<br>• Section 5.3 Cumulative impacts revised to reword paragraph three and remove reference to "…the Aboriginal items identified within the Project Site…"<br>• Section 6.1 Management of Aboriginal Cultural Heritage Risks updated to remove inference that there are known Aboriginal heritage objects on the Project Site<br>• Section 6.1.1 Salvage of Aboriginal Objects updated to reflect that surface collection activities are now complete and no Aboriginal objects were identified.<br>• Section 6.1.2 Care of Salvaged Aboriginal Objects updated to reflect that surface collection activities are now complete and, as no objects were identified, no temporary storage locations were required for the storage of collected objects.<br>• Section 7.5, Table 7.1 reference to Heritage Salvage Report retained, but reference to six Aboriginal sites removed |
| EPBC Act 2020/8839 variation, dated 14 January 2025. | Construction Heritage Management Plan (Version H), updated to Version I<br><br>• Section 1.1 Background and Project Description updated to reflect approval of the variation to EPBC 2020/8839 dated 14 January 2025<br>• Section 2.2 Objectives updated to reflect that EPBC 2020/8839 was varied on 14 January 2025. |
| Construction Soil and Water Management Plan | |
| Consistency Assessment – Proposed Design and Boundary Changes | Construction Soil and Water Management Plan (Version D), updated to Version E:<br><br>• Figure 1.1: Project location. Figure updated to reflect revised construction footprint. |

| Reason for update | Plan, version and section subject to minor update |
|---|---|
| | • Figure 1.2: Project Layout. Figure updated to reflect revised construction footprint.<br>• Figure 4.1: Nearby Waterways. Figure updated to reflect revised construction footprint.<br>• Figure 4.2: Groundwater dependent ecosystems. Figure updated to reflect revised construction footprint.<br><br>Construction Surface Water Monitoring Program (Version D), updated to Version E:<br><br>• Figure 3.1: Proposed Monitoring Locations. Figure updated to reflect revised construction footprint.<br><br>NOTE: Appendix F Preliminary Erosion and Sediment Control Plan is not proposed for update as this effort is unwarranted given Progressive Erosion and Sediment Control Plans will be developed reflecting the revised construction footprint. |
| EPBC Act 2020/8839 variation, dated 14 January 2025. | Construction Soil and Water Management Plan (Version D), updated to Version E:<br><br>• Section 1.1 Background and Project Description updated to reflect approval of the variation to EPBC 2020/8839 dated 14 January 2025<br>• Section 2.2 Objectives updated to reflect that EPBC 2020/8839 was varied on 14 January 2025. |
| Contamination Management Sub-Plan | |
| Consistency Assessment – Proposed Design and Boundary Changes | Contamination Management Sub-Plan (Version D), updated to Version E:<br><br>• Figure 1.1: Project location. Figure updated to reflect revised construction footprint.<br>• Figure 1.2: Project Layout. Figure updated to reflect revised construction footprint.<br>• Figure 4.1: Sources of potential contamination. Figure updated to reflect revised construction footprint. |
| Moorebank Avenue Realignment Remediation Action Plan (Rev C) | Contamination Management Sub-Plan (Version D), updated to Version E:<br><br>The following updates have been made as a result of preparation of the Interim Audit Advice and the Remediation Action Plan (RAP).<br><br>• Section 1.5.1 Interactions with Other Management Plans and Documents updated to confirm that a RAP has been prepared<br>• Section 6.1 Targeted Site Investigations updated to reflect completion of the Interim Audit Advice verifying the appropriateness of the SAQP (Condition E33), and completion of the targeted investigations required and subsequent reporting of findings (Condition E34). A summary of the key remediation recommendations has been included.<br><br>Section 6.2 Remediation Action Plan updated to reflect preparation of a RAP in accordance with NSW Condition E35, E36, E37 and E38. |

| Reason for update | Plan, version and section subject to minor update |
|---|---|
| EPBC Act 2020/8839 variation, dated 14 January 2025. | Contamination Management Sub-Plan (Version D), updated to Version E:<br>• Section 1.1 Background and Project Description updated to reflect approval of the variation to EPBC 2020/8839 dated 14 January 2025<br>• Section 2.2 Objectives updated to reflect that EPBC 2020/8839 was varied on 14 January 2025. |
| Construction Bushfire Management Plan | |
| Consistency Assessment – Proposed Design and Boundary Changes | Construction Bushfire Management Plan (Version E), updated to Version F:<br>• Figure 1.1: Project location. Figure updated to reflect revised construction footprint.<br>• Figure 1.2: Project layout. Figure updated to reflect revised construction footprint.<br>• Figure 4.2: Project Bushfire Prone Land Map. Figure updated to reflect revised construction footprint.<br>• Figure 6.1: Assembly Points and Evacuation Route. Figure updated to reflect revised construction footprint. |
| EPBC Act 2020/8839 variation, dated 14 January 2025. | Construction Bushfire Management Plan (Version E), updated to Version F:<br>• Section 1.1 Background and Project Description updated to reflect approval of the variation to EPBC 2020/8839 dated 14 January 2025<br>• Section 2.2 Objectives updated to reflect that EPBC 2020/8839 was varied on 14 January 2025. |
| Construction Air Quality Management Plan | |
| Consistency Assessment – Proposed Design and Boundary Changes | Construction Air Quality Management Plan (Version E), updated to Version F:<br>• Figure 1.1: Project location. Figure updated to reflect revised construction footprint.<br>• Figure 1.2: Project layout. Figure updated to reflect revised construction footprint.<br>• Figure 4.1: Receptors for construction impacts. Figure updated to reflect revised construction footprint. |
| EPBC Act 2020/8839 variation, dated 14 January 2025. | Construction Air Quality Management Plan (Version E), updated to Version F<br>• Section 1.1 Background and Project Description updated to reflect approval of the variation to EPBC 2020/8839 dated 14 January 2025<br>• Section 2.2 Objectives updated to reflect that EPBC 2020/8839 was varied on 14 January 2025. |
| Construction Waste and Resource Management Sub-Plan | |
| Consistency Assessment – Proposed Design and Boundary Changes | Construction Waste and Resource Management Sub-Plan (Version D), updated to Version E:<br>• Figure 1.1: Project location. Figure updated to reflect revised construction footprint. |

| Reason for update | Plan, version and section subject to minor update |
|---|---|
| | • Figure 1.2: Project layout. Figure updated to reflect revised construction footprint. |
| EPBC Act 2020/8839 variation, dated 14 January 2025. | Construction Waste and Resource Management Sub-Plan (Version D), updated to Version E:<br>• Section 1.1 Background and Project Description updated to reflect approval of the variation to EPBC 2020/8839 dated 14 January 2025<br>• Section 2.2 Objectives updated to reflect that EPBC 2020/8839 was varied on 14 January 2025. |

# APPENDIX C Secondary CoA and REMMs

## C1: Secondary NSW CoA relevant to the CNVMP

| No. | Requirements | Document reference |
|---|---|---|
| C8 | With the exception of any CEMP Sub-plans expressly nominated by the Planning Secretary to be endorsed by the ER, all CEMP sub-plans must be submitted to the Planning Secretary for approval.<br>*Note: The Planning Secretary will consider the assessment of the predicted level of environmental risk and potential level of community concern required under Condition ©(e) when deciding whether any CEMP Sub-plans may be endorsed by the ER.* | Section 1.5 |
| C9 | The CEMP Sub-plans not requiring the Planning Secretary's approval must obtain the endorsement of the ER as being in accordance with the conditions of approval and all relevant undertakings made in the documents listed in Condition A1. Any of these CEMP Sub-plans must be submitted to the ER with, or subsequent to, the submission of the CEMP but in any event, no later than one (1) month before construction or where construction is staged no later than one (1) month before the commencement of that stage | Section 1.5 |
| C10 | Any of the CEMP Sub-plans to be approved by the Planning Secretary must be submitted to the Planning Secretary with, or subsequent to, the submission of the CEMP but in any event, no later than one (1) month before construction or where construction is staged no later than one (1) month before the commencement of that stage. | Section 1.5 |
| C11 | Construction must not commence until the CEMP and all CEMP Sub-plans have been approved by the Planning Secretary or endorsed by the ER (whichever is applicable), unless otherwise agreed by the Planning Secretary. The CEMP and CEMP Sub-plans, as approved by the Planning Secretary or endorsed by the ER (whichever is applicable), including any minor amendments approved by the ER, must be implemented for the duration of construction. | Section 1.5 |
| C17 | The results of construction noise and vibration monitoring must be included in a Construction Noise Monitoring Report. The report must also include a summary of the monitoring results against the relevant noise criteria identified in the Construction Noise and Vibration Monitoring Program and be published on the Proponent's website in accordance with the reporting frequency specified in the monitoring program. | Appendix E |
| E18 | Work must only be undertaken during the following hours: | Table 8.1 NV1<br>Section 5.3.1 |
| | (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. | |
| E19 | Except as permitted by an EPL, highly noise intensive works that result in an exceedance of the applicable NML at the same receiver must only be undertaken: | Table 8.1 NV1<br>Section 5.3.2 |
| | (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. | |

| No. | Requirements | Document reference |
|---|---|---|
| | 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. | |
| E20 | Notwithstanding Conditions E18 and E19 work may be undertaken outside the hours specified in any of the following circumstances: | Table 8.1 NV1 |
| | (a) Safety and Emergencies, including: | Section 5.3.3 |
| | (i) for the delivery of materials required by the NSW Police Force or other authority for safety reasons; or | Section 5.3.3 |
| | (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. | Section 5.3.3 |
| | On becoming aware of the need for emergency work in accordance with Condition E20(a)(ii), 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 sensitive land user(s) of the likely impact and duration of those work or | Section 5.3.3 |
| | (b) Low impact, including: | Section 5.3.3 |
| | (i) construction that causes LAeq(15 minute) noise levels:<br>• no more than 5 dB(A) above the rating background level at any residence in accordance with the ICNG, and<br>• no more than the 'Noise affected' NMLs specified in Table 3 of the ICNG at other sensitive land user(s); and | Section 5.3.3 |
| | (ii) construction that causes:<br>• 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), and<br>• 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 5.3.3 |
| | (c) By Approval, including: | |
| | (i) where different construction hours are permitted or required under an EPL in force in respect of the SSI; or | Section 5.3.3 |
| | (ii) work which is not subject to an EPL that are approved under an Out-of-Hours Work Protocol as required by Condition E21; or | Section 5.3.3 |
| | (iii) negotiated agreements with directly affected residents and sensitive land user(s). | Section 5.3.3<br>Section 5.3.5 |
| E21 | An Out-of-Hours Work Protocol must be prepared to identify a process for the consideration, management and approval of work which is outside the hours defined in Conditions E18, and that are not subject to an EPL. The Protocol must be approved by the Planning Secretary before commencement of Out-of-Hours Work. The Protocol must be prepared in consultation with the ER . The Protocol must provide: | Appendix D |
| | (a) identification of low and high-risk activities and an approval process that considers the risk of activities, proposed mitigation, management, and coordination, including where: | Appendix D |

| No. | Requirements | Document reference |
|---|---|---|
| | (i) the ER reviews all proposed out-of-hours activities and confirm their risk levels, | Appendix D |
| | (ii) low risk activities can be approved by the ER, and | Appendix D |
| | (iii) high risk activities are approved by the Planning Secretary; | Appendix D |
| | (b) a process for the consideration of and justification for out-of-hours work against the relevant NML and vibration criteria; | Appendix D |
| | (c) a process for selecting and implementing mitigation measures for residual impacts in consultation with the Community Consultative Committee, established by Condition B1, at each affected location, including respite periods. The measures must take into account the predicted noise levels and the likely frequency and duration of the out-of-hours work that sensitive land user(s) would be exposed to, including the number of noise awakening events; | Appendix D |
| | (d) procedures to facilitate the coordination of out-of-hours work including those approved by an EPL or undertaken by a third party, to ensure appropriate respite is provided; and | Appendix D |
| | (e) notification arrangements for affected receivers for all approved out-of-hours work and notification to the Planning Secretary of approved low risk out-of-hours work. | Appendix D |
| E22 | Mitigation measures must be implemented with the aim of achieving the following construction noise management levels and vibration objectives: | Table 8.1 |
| | (a) construction 'Noise affected' NMLs established using the Interim Construction Noise Guideline (DECC, 2009); | Section 3.1<br>Table 8.1 NV3, NV4 and NV9 |
| | (b) vibration criteria established using the Assessing vibration: a technical guideline (DEC, 2006) (for human exposure); | Section 6.1<br>Table 8.1 NV20, NV21 and NV22 |
| | (c) Australian Standard AS 2187.2 - 20–6 "Explosives - Storage and Use - Use of Explosives"; | Not applicable explosives are not expected to be used |
| | (d) BS 7385 Part 2-1993 "Evaluation and measurement for vibration in buildings Part 2" as they are "applicable to Australian conditions"; and | Section 6.1<br>Table 8.1 NV20, NV21 and NV22 |
| | (e) the vibration limits set out in the German Standard DIN 4150-3: Structural Vibration- effects of vibration on structures (for structural damage).<br>Work that exceeds the noise management levels and/or vibration criteria must be managed in accordance with the commitments made in the documents listed in Condition A1.<br>*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.* | Section 6.1<br>Table 8.1 NV20, NV21 and NV22 |
| E23 | Work resulting in noise levels above the relevant NMLs at community, religious, educational institutions, noise and vibration-sensitive businesses and critical working areas (such as theatres, laboratories and operating theatres) must not be timetabled during sensitive periods, unless other reasonable arrangements with the affected institutions, businesses or facilities are made at no cost to the affected institution. | Section 7.5<br>Table 8.1 NV3 and NV9 |

| No. | Requirements | Document reference |
|---|---|---|
| E24 | At no time can noise generated by construction exceed the National Standard for exposure to noise in the occupational environment of an eight-hour (8 hr) equivalent continuous A-weighted sound pressure level of LAeq,8h of 85 dB(A) for any employee working at a location near the SSI. | Table 8.1 NV2 and NV4 |
| E25 | Industry best practice construction methods must be implemented where reasonably practicable to minimise noise levels. Practices must include, but are not limited to: | |
| | (a) use of regularly serviced low sound power equipment; | Table 8.1 NV13 |
| | (b) scheduling of noisiest works during standard construction hours; | Table 8.1 NV8 |
| | © temporary noise barriers (including the arrangement of plant and equipment) around noisy equipment and activities such as rock hammering and concrete cutting; and | Table 8.1 NV16 and NV17 |
| | (d) use of alternative construction and demolition techniques. | Table 8.1 NV19 |
| E26 | Construction Noise and Vibration Impact Statements (CNVIS) must be prepared for any work that may exceed the noise management levels or vibration criteria specified in Condition E22 at any residence outside construction hours identified in Condition E18, or where receivers will be highly noise affected. The CNVIS must include specific mitigation measures identified through consultation with affected sensitive land user(s) and the mitigation measures must be implemented for the duration of the work. A copy of the CNVIS must be provided to the ER before the commencement of the associated work. The Planning Secretary may request a copy/ies of CNVIS. | Section 7.4<br>Table 8.1 NV25 |
| E27 | Work undertaken for the delivery of the SSI, including those undertaken by third parties (such as utility relocations), must be coordinated to provide respite. The Proponent must: | Section 5.3.2<br>Section 7.4<br>Table 8.1 NV5 |
| | (a) reschedule work to provide respite to impacted noise sensitive land user(s); or | Table 8.1 NV6 |
| | (b) consider the provision of alternative respite or mitigation to impacted noise sensitive land user(s); and | Table 8.1 NV6 |
| | (c) provide documentary evidence to the ER in support of any decision made by the Proponent in relation to respite or mitigation.<br>The consideration of respite must also include other CSSI, SSI and SSD projects which may cause cumulative and/or consecutive impacts at receivers affected by the delivery of the SSI. | Section 7.5 |

## C2: Secondary REMMs relevant to the CNVMP

| No. | Requirements | Timing |
|---|---|---|
| NVI02 | The Project will regularly reinforce (such as at toolbox talks) the need to minimise noise and vibration. | Table 8.1 NV2 |
| NVI03 | The Project will review and implement feasible and reasonable mitigation measures that reduce construction noise levels. | Section 7.1<br>Table 8.1 |
| NVI04 | Avoidance of portable radio use, public address systems or other methods of site communication that may unnecessarily impact upon nearby residents. | Table 8.1 NV10 and NV11 |
| NVI05 | Routes for the delivery of materials and parking of vehicles to minimise noise will be used, where feasible. | Table 8.1 NV27 and NV28 |

| No. | Requirements | Timing |
|---|---|---|
| NVI06 | Where possible, the Project will avoid the use of equipment that generates impulsive noise. | Table 8.1 NV18 |
| NVI07 | Residents will be notified prior to the commencement of intensive works. | Table 8.1 NV23<br>Section 6.2.4 of the CCS |
| NVI08 | Where possible, quieter plant and equipment will be used based on the optimal power and size to most efficiently perform the required tasks. | Table 8.1 NV19 |
| NVI09 | Plant and equipment will be operated in the quietest and most efficient manner. | Table 8.1 NV14 and NV15 |
| NVI10 | Regular inspection and maintenance of plant and equipment will be undertaken to minimise noise and vibration level increases, to ensure that all noise and vibration reduction devices are operating effectively. | Table 8.1 NV13 |
| NVI11 | Where possible, use broadband audible reverse alarms, as opposed to beepers on plant and equipment. | Table 8.1 NV15 |
| NVI12 | When not in use, plant and equipment will be turned-off. Where possible, works are to be scheduled to minimise plant and equipment occurring concurrently. | Table 8.1 NV12 and NV14 |
| NVI13 | Coordinate with MPW and MPE projects to minimise cumulative construction impacts where practical. | Table 8.1 NV5<br>CEMP Section 5.4.5 |

# APPENDIX D Out-of-Hours Work Protocol

**SSI-10053**

# MOOREBANK AVENUE REALIGNMENT WORKS

# APPENDIX D

Out-Of-Hours Work Protocol

02 JUNE 2023

# NATIONAL INTERMODAL CORPORATION

# MOOREBANK AVENUE REALIGNMENT WORKS

## OUT-OF-HOURS WORK PROTOCOL

| | |
|---|---|
| **Author** | Samantha Oyston/Ketan Patel |
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| **Approver** | Ketan Patel |
| **Report No** | |
| **Date** | 2/06/2023 |
| **Revision Text** | G |

## TECHNICAL SPECIALIST DETAILS

| Name | Qualification and Experience |
|---|---|
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## REVISIONS

| Revision | Date | Description | Prepared By | Approved By |
|---|---|---|---|---|
| A | 15/12/2022 | Draft for Client review | KP | HT |
| B | 25/01/2023 | Update in response to National Intermodal and technical specialist comments | SO | KP |
| C | 01/02/2023 | Revised for consistency with main document but no changes from Rev B | - | - |
| E | 17/03/2023 | Revised for consistency with main document but no changes from Rev C | - | - |

| Revision | Date | Description | Prepared By | Approved By |
|---|---|---|---|---|
| F | 21/04/2023 | Revised for consistency with main document but no changes from Rev C | - | - |
| G | 02/06/2023 | Update based on DPE comments | KB | KP |

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# ACRONYMS AND DEFINITIONS

| Acronym | Definition |
|---|---|
| CCC | Community Consultative Committee |
| CCS | Community Communication Strategy |
| CEC | Community Engagement Consultant |
| CEMP | Construction Environmental Management Plan |
| CNVMP | Construction Noise and Vibration Management Plan |
| CNVG | Construction Noise and Vibration Guideline (TfNSW) |
| CNVIS | Construction Noise and Vibration Impact Statement |
| CoA | Conditions of Approval |
| Construction | Includes all work required to construct the Project as described in the EIS and RtS (NSW CoA A1) including commissioning trials of equipment and temporary use of any part of the Project but excluding Low Impact Work which is carried out or completed before approval of the CEMP. |
| Continuous vibration | From uninterrupted sources, e.g., machinery, steady road traffic, continuous construction activity |
| CSSI | Critical State significant infrastructure |
| dB(A) | A-weighted decibel |
| EIS | Environmental Impact Statement |
| EPA | NSW Environment Protection Authority |
| EPL | Environment Protection Licence |
| ER | Environmental Representative |
| Highly noise intensive works | Work which is defined as annoying under the Interim Construction Noise Guideline (DECC, 2009) including: (a) use of power saws, such as used for cutting timber, rail lines, masonry, road pavement or steel work; (b) grinding metal, concrete or masonry; (c) rock drilling; (d) line drilling; (e) vibratory rolling; (f) bitumen milling or profiling; (g) jackhammering, rock hammering or rock breaking; and (h) impact piling. |
| Highly noise affected level | Represents the point above which there may be strong community reaction to noise. The *Interim Construction Noise Guideline* specifies that the highly noise affected level is 75 dB(A). |
| Human exposure | Disturbance to building occupants: Vibration in which the occupants or users of the building are inconvenienced or possibly disturbed |
| ICNG | Interim Construction Noise Guideline |
| Impulsive vibration | Up to three instances of sudden impact per monitoring period e.g., occasional dropping of heavy equipment, occasional loading and unloading |
| Infrastructure Approval | SSI 10053 or NSW CoA |
| Intermittent vibration | From drilling, compacting or activities that will result in continuous vibration if operated continuously |
| Low Impact Work | As defined in the Infrastructure Approval, and which Includes activities like survey work, investigative drilling, minor clearing, installation of mitigation measures etc. The low impact work described in this definition becomes construction when the Construction |

| Acronym | Definition |
|---|---|
| | Environmental Management Plan is approved. This also applies to low impact work that has already commenced. |
| MARW | Moorebank Avenue Realignment Works |
| MIP | Moorebank Intermodal Precinct, which includes MPE and MPW |
| | |
| MPE | Moorebank Precinct East |
| MPE Site | Comprises the MPE Stage 1 Project as approved by SSD 14-6766 for the development of the intermodal terminal facility (IMT) at Moorebank and MPE Stage 2 as approved under SSD 7628 (as modified) and MPE Concept Approval (MP 10_0193) for the construction and operation of warehousing and distribution facilities and upgrades to approximately 2.1 kilometres of Moorebank Avenue. |
| MPW | Moorebank Precinct West |
| MPW Site | Comprises the MPW Stage 2 Project which is the second stage of development under the MPW Concept Approval (SSD 5066) and SSD 7709. The Project involves the construction and operation of a multi-purpose intermodal terminal facility, Rail link connection, warehousing and upgraded intersection on Moorebank Avenue. |
| National Intermodal | National Intermodal Corporation |
| NML | Noise management level |
| Noise affected level | Represents the point above which there may be some community reaction to noise. The noise affected level is calculated by adding 10 dB(A) to the RBL |
| OOHW | Out-of-hours works |
| Planning Secretary | Secretary to the DPE |
| Project Site | Refers to the construction footprint area which is approximately 18.96 hectares and includes access for the construction of road embankments and cuttings, temporary and permanent fencing, temporary and permanent water quality control basins, ancillary facilities, access roads and construction side roads. It is generally bounded by the Defence Joint Logistics Unit (DJLU), MPE, Boot Land and the Sydney Trains owned land adjacent to the East Hills Railway. |
| RBL | Ratings Background Level |
| RtS | Response to Submissions |
| SSD | State significant development |
| SSI | State significant infrastructure |
| The Project | Moorebank Avenue Realignment Works |

# 1 INTRODUCTION

## 1.1 Context

This Out-Of-Hours Work (OOHW) Protocol (the/this OOHW Protocol) has been developed in accordance with NSW Condition of Approval (CoA) E21 to assist with any work associated with Moorebank Avenue Realignment Works (MARW) (the Project) that will be undertaken outside the standard hours of work, as defined with the NSW CoA E18 and that are not subject to an Environment Protection Licence (EPL). This OOHW Protocol also satisfies NSW CoA E20 (c)(ii), where works can be approved outside the standard hours through an approval of an OOHW Protocol.

This OOHW Protocol forms part of the environmental documentation prepared for the Project including the Construction Environmental Management Plan (CEMP) and is an appendix to the Construction Noise and Vibration Management Plan (CNVMP). This OOHW Protocol has been prepared in consultation with the Environmental Representative (ER) (Appendix A of the CNVMP) in accordance with NSW COA E21. This OOHW Protocol will be implemented by the Construction Contractor.

Works outside of standard construction hours and not subject to an EPL are expected to be minimal.

## 1.2 NSW Conditions of Approval

The primary NSW CoA relevant to this OOHW Protocol are listed Table 1.1. A cross reference is also included to indicate where the condition is addressed in this document.

*Table 1.1: Primary NSW CoA*

| CoA No. | Condition Requirements | Document Reference |
|---|---|---|
| E21 | An Out-of-Hours Work Protocol must be prepared to identify a process for the consideration, management and approval of work which is outside the hours defined in Conditions E18, and that are not subject to an EPL. The Protocol must be approved by the Planning Secretary before commencement of Out-of-Hours Work. The Protocol must be prepared in consultation with the ER. The Protocol must provide: | This OOHW Protocol<br>Section 1.4<br>Appendix A of the CNVMP |
| | (a) identification of low and high-risk activities and an approval process that considers the risk of activities, proposed mitigation, management, and coordination, including where:<br>(i) the ER reviews all proposed out-of-hours activities and confirm their risk levels,<br>(ii) low risk activities can be approved by the ER, and<br>(iii) high risk activities that are approved by the Planning Secretary; | Section 2.1<br>Appendix A |
| | (b) a process for the consideration of out-of-hours work against the relevant NML and vibration criteria; | Section 2 |
| | (c) a process for selecting and implementing mitigation measures for residual impacts in consultation with the Community Consultative Committee, established by Condition B1, at each affected location, including respite periods. The measures must take into account the predicted noise levels and the likely frequency and duration of the out-of-hours work that sensitive land user(s) would be exposed to, including the number of noise awakening events; | Section 3<br>Section 5 |

| CoA No. | Condition Requirements | Document Reference |
|---|---|---|
| | (d) procedures to facilitate the coordination of out-of-hours work including those approved by an EPL or undertaken by a third party, to ensure appropriate respite is provided; and | Section 2.4 |
| | (e) notification arrangements for affected receivers for all approved out-of-hours work and notification to the Planning Secretary of approved low risk out-of-hours work. | Section 4<br>Section 5 |

## 1.3 Justification for OOHW

As per Section 5.3 of the CNVMP, in accordance with NSW CoA E18, work will be undertaken during the following standard construction hours:

- 7:00 am to 6:00 pm Monday to Friday
- 8:00 am to 1:00 pm Saturday
- At no time on Sunday or public holidays.

Any works to be undertaken outside of standard construction hours will be subject to an out of hours approval.

In accordance with NSW CoA E19, except as permitted by an EPL, highly noise intensive works that result in the exceedance of an applicable Noise Management Level (NML) at the same receiver must only be undertaken:

- Monday to Friday: 8:00 am to 6:00 pm
- Saturday: 8:00 am to 1:00 pm
- Sunday and public holidays not permitted
- Where highly noise intensive works will be carried out in continuous blocks this will not exceed three hours, with a minimum respite of work of not less than one hour at least one hour between ceasing and recommencing each block of work.

Continuously includes any period during which there is less than one hour between ceasing and recommencing any of the work.

Should certain activities need to be carried out outside of standard hours where requirements of the CoA are satisfied and considered necessary. The Construction Contractor Environmental Advisor will provide justification for the need to undertake OOHW in accordance with the Interim Construction Noise Guideline (ICNG) or where OOHW is required:

- For technical considerations (such as the need to meet particular quality specifications)
- To maintain the safety of road users or site personnel
- Where a road occupancy licence will not be provided during standard times
- Where a utility service operator has advised that the works undertaken during standard hours will result in a high risk to the operation or integrity of the network.

Work activities that may require scheduled OOHW include, but are not limited to:

- Traffic management for work required close to live traffic including vegetation clearing and setting up safety barriers

- Road-tie in work
- Utility outages / cutovers
- Utility and service relocations
- Ancillary facility operation.

Work activities that may be required or proposed to be undertaken outside of standard working hours will be assessed in accordance with the process outlined in this OOHW Protocol.

The frequency and duration of OOHW will be specified in the OOHW Approval Form and approved by the ER (low impact) or the Planning Secretary (high impact).

## 1.4 Exclusions

As per Section 5.3.3 of the CNVMP, works outside of the standard construction hours identified in Section 1.3 may be undertaken in the following circumstances as permitted by NSW CoA E20:

- **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.

  On becoming aware of the need for emergency work in accordance with the above, the Project Manager would liaise with the National Intermodal Principal's Representative who would notify National Intermodal, the ER, the Planning Secretary and the EPA of the reasons for such work. This would include notification to affected sensitive land user(s) of likely noise and vibration impacts and duration of those work.
- **Low impact,** including:
  - Construction that causes $LA_{eq(15\ min)}$ noise levels
    - No more than 5 dB(A) above the rating background level at any residence in accordance with the ICNG
    - No more than the 'Noise affected' NMLs specified in Table 3 of the ICNG at other sensitive land user(s)
  - Construction that causes:
    - Continuous or impulsive vibration values, measured at the most affected residence, and are no more than those for human exposure to vibration, specified for residences in Table 2.2 of *Assessing Vibration: a technical guideline* (DEC, 2006) and
    - Intermittent vibration values, measured at the most affected residence, and 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)
- **By approval:**
  - Where different construction hours are permitted or required under an EPL in force in respect of the SSI; or
  - Work which is **not** subject to an EPL that are approved under an Out-of-Hours Work Protocol as required by NSW CoA E21; or

- Negotiated agreements with directly affected residents and sensitive land user(s).

On becoming aware of the need for emergency works, National Intermodal, the ER, the Planning Secretary and the EPA will be notified of the need for the emergency works. Best endeavours will be made to notify all affected sensitive receivers of the likely impact and duration of the emergency works.

Emergency work is defined as work that is required to:

- Avoid injury or the loss of life
- To avoid damage or loss of property
- To prevent environmental harm.

Work carried out outside standard construction hours without prior approval or where the definition of emergency work isn't met is considered an environmental incident and non-compliance and will be managed in accordance with processes set out in the CEMP.

OOHW that is approved but not carried out in accordance with the approval or required management measures is also considered a non-conformance with the OOHW Approval and managed in accordance with processes outlined in the CEMP.

## 1.5 Review, Approval and Modification of this OOHW Protocol

In accordance with NSW CoA E21, this OOHW Protocol has been prepared in consultation with the ER and must be approved by the Planning Secretary prior to the commencement of the OOHW.

Minor amendments to this OOHW Protocol will be sent to the ER for approval in accordance with NSW CoA A31(i).

# 2 OOHW NOISE AND VIBRATION ASSESSMENT

Prior to undertaking any OOHW, a noise and (if applicable) vibration assessment will be undertaken by the Construction Contractor Environmental Advisor to assess the noise and vibration impacts for any low and high-risk activities proposed outside standard hours. The assessment will include details of the work to be undertaken, plant and equipment required, scheduling and duration of the work, predicted impacts on sensitive receivers, their location and proposed mitigation measures.

The inputs into the noise and vibration assessment are to be as accurate as possible and checked by relevant construction personnel. Where uncertainty exists about specific details, a worst-case scenario must be assessed.

Where changes to the scope of the OOHW occur following approval of the OOHW Approval Request Form, the change management process outlined in Section 5.5 will be followed.

## 2.1 Risk Categorisation

In accordance with NSW CoA E21(a), OOHW activities will be categorised as low or high risk. Table 2.1 details the risk categories.

*Table 2.1: Risk Categorisation*

| Risk | Description | Approval |
|---|---|---|
| Low Risk | • Works that result in noise levels less than 5dB(A) above NML; and/or<br>• Vibration works that are no more than the construction vibration criteria. | ER Approval<br>DPE Notification |
| High Risk | • Works that result in noise levels greater than 5dB(A) above NML; and or<br>• Vibration works that exceed the construction vibration criteria. | ER Endorsement<br>Planning Secretary Approval |

## 2.2 Noise

A quantitative noise assessment will be prepared to determine the extent of noise impact the works activities will have on sensitive receivers. The assessment will identify the exceedances of activity scenarios against the NMLs adopted at each residential, commercial and industrial reference point (Table 2.2).

*Table 2.2: Assessment locations*

| ID | Address | Classification | Easting | Northing |
|---|---|---|---|---|
| COM1 | Defence Building 1 | Commercial | 308640 | 6241780 |
| IN1 | Defence Building 2 | Industrial | 308764 | 6241755 |
| IN2 | Defence Building 3 | Industrial | 308764 | 6241623 |
| R1 (NM2) | 26 Brickendon Court, Wattle Grove | Residential | 309349 | 6241227 |
| R2[1] (NM3) | 25 Exford Court, Wattle Grove | Residential | 309290 | 6240862 |
| R3 (NM4) | 25 Yallum Court, Wattle Grove | Residential | 308920 | 6240179 |

[1] R2 for RBL and ambient noise monitoring are in adjacent properties i.e., 25 Exford Street and 23 Exford Street respectively. For the purposes of this CNVMP, it has been assumed that they are the same property, monitoring will be undertaken at either location depending upon accessibility.

The noise assessment will document predicted noise levels, frequency and duration of OOHW, awakening events/sleep disturbance and determine the appropriate standard and additional mitigation measures. The noise assessment will also consider if feasible and reasonable work practices have been identified to minimise the noise.

A Construction Noise and Vibration Impact Statements (CNVIS) will be prepared by the Construction Contractor for any work that may exceed the NMLs and vibration criteria specified in NSW CoA E26 at any residence outside the standard work hours identified in NSW CoA E18, or where receivers will be highly noise affected. The CNVIS must include specific mitigation measures identified through consultation with affected sensitive receivers and the mitigation measures must be implemented for the duration of the construction phase. Feedback on mitigation measures will be sought from affected sensitive receivers through notifications or via phone calls. A copy of the CNVIS must be provided to the ER prior to the commencement of the associated work. The Planning Secretary may request copies of the CNVIS for their information (approval is not required under the NSW CoA).

CNVIS will not be required for those circumstances outlined in NSW CoA E20(a), which relate to safety and emergency situations, however all noise and/or vibration affected sensitive receivers will be notified of the likely impact and duration of the works.

## 2.3 Vibration

An CNVIS will be required for vibration intensive OOHW within the safe working distances for human comfort for the nominated plant and equipment. Prior to undertaking an assessment, all other feasible and reasonable options to use less vibration intensive equipment will be investigated and exhausted.

## 2.4 Co-ordination of OOHW with Third Parties

All OOHW, including works undertaken by a third party, will be co-ordinated with other projects that are being constructed nearby, to implement the appropriate management measures and respite periods as specified in NSW CoA E27.

Works will be scheduled with the aim of minimising concurrent works near sensitive receivers in consultation with managers of other nearby projects that are likely to result in a cumulative impact. This will include:

- Coordination between project teams
- Rescheduling of work to provide respite to impacted noise sensitive land user(s) so that respite is achieved during OOHW
- Consideration to the provision of alternative respite or mitigation for impacted noise sensitive land users where OOHW respite occurs.

Consultation will be undertaken in accordance with the Community Communication Strategy (CCS) to ensure works can be coordinated with third parties.

# 3 OOHW MANAGEMENT

## 3.1 OOHW Process

For proposed OOHW, the following process will be followed:

1. The OOHW approval request form (Appendix A) will be prepared and include information on the proposed:
    a. Activities
    b. Required plant and equipment
    c. Location
    d. Duration (dates)
    e. Timing
    f. Respite periods
    g. Justification for the work
    h. Details of the completed quantitative noise assessment (in accordance with Section 2.2) including predicted impacts and appropriate management measures as per Section 3.2 and Appendix B of this OOHW protocol
    i. Details of consultation with the community regarding respite periods and scheduling as outlined in Section 5 of this OOHW protocol
2. The OOHW request to the Principal's Representative for review who will determine if the justification for the OOHW is satisfactory
3. Undertake a OOHW planning meeting with the Construction Contractor Project Manager and Environmental Advisor, Principal's Representative and acoustic advisor (or equivalent personnel) to consider feasible and reasonable measures to reduce noise and vibration for proposed OOHW.
4. The Principal's Representative will provide the OOHW request to the ER for review and confirmation of the risk level
5. The identification of the OOHW as a low or high-risk activity will determine who can then approve the OOHW:
    a. **Low Risk Activities**: approved by the ER. The ER will consider the risk criteria as well as ongoing and cumulative impacts, construction fatigue and complaints in reviewing the determined risk level. If required, the ER may consult with DPE Representatives at times to discuss the assessed risk level. The ER will have 10 days to review the OOHW approval request. The Planning Secretary will also be notified of all approved low risk OOHW.
    b. **High risk activities**: must be approved by the Planning Secretary. The Planning Secretary will have one month to review the OOHW approval request.
6. Following approval of each OOHW request, community consultation will be undertaken as per the CCS.
7. Noise monitoring and reporting will be carried out in accordance with Section 5 of this Protocol.

## 3.2 Management Measures

Standard mitigation measures include the environmental management measures as described in the Section 7 of the CNVMP and cover measures such as:

- Behavioural practices on site
- Equipment selection / maintaining and monitoring plant
- Use and siting of plant and hoardings
- Site inductions
- Use of non-tonal reversing alarms
- Planning noisier work to be carried out during less sensitive times in the OOHW period.

The standard mitigation measures are considered appropriate for Low Risk OOHW activities. However, additional management measures in the form of community consultation will be required for works deemed High Risk, this will be undertaken in accordance with CCS.

## 3.3 Roles and Responsibilities

The Construction Contractor Environmental Advisor will complete the OOHW approvals request form (refer to Appendix A).

The Contractor's Community Liaison will provide detail to the Community Engagement Consultant (CEC) who will ensure that notification and consultation occurs with community stakeholders, in accordance with the CCS, on the likely impacts of OOHW activities.

The Construction Contractor Environmental Advisor (or delegate) will implement and oversee the noise monitoring program for OOHW to assess compliance with the CoA and the OOHW Protocol. They will also be responsible for notifying the ER and Planning Secretary of any noise or vibration exceedances or complaints during OOHW.

Prior to the start of OOHW, the Site Supervisor will be responsible for completing a pre-start check to ensure compliance with the OOHW Approval Request Form.

## 3.4 Induction / Training

All site personnel (including sub-contractors) will be inducted on the control measures to be implemented to minimise impacts of OOHW on the community and environment and this OOHW Protocol. Training will include inductions, toolbox talks, pre-starts and targeted training as required.

# 4 COMMUNICATION AND NOTIFICATION

## 4.1 Respite Consultation

Prior to undertaking approved OOHW, appropriate respite periods will be identified in consultation with the Community Consultative Committee (CCC) established in accordance with NSW CoA B1.

The outcomes of the community consultation, the identified respite periods and the scheduling of the likely OOHW will be provided to the ER for information within one week of undertaking the community consultation.

The consultation must include (but not be limited to) providing the community with:

- Progressive schedule for likely OOHW
- Description of the potential work, location and duration of the OOHW
- Noise characteristics and likely noise levels of the work
- Mitigation and management measures which aim to achieve the relevant NML and vibration criteria as per the CNVMP.

## 4.2 Negotiated Agreements

Works outside of standard hours that do not meet the circumstances listed in NSW CoA E20(a), E20(b), E20(c)(i) or E20(c)(ii) may be undertaken if agreement between the Project and the directly affected noise sensitive receivers has been reached in accordance with NSW CoA E20(c)(iii). The community agreements between the Principal's Representative and the directly affected residents and sensitive land users is addressed in Section 5.3.5 of the CNVMP.

# 5 MONITORING AND REPORTING

## 5.1 Monitoring for OOHW

The following noise and vibration monitoring will be undertaken for all OOHW:

- Attended noise monitoring at representative sensitive receivers
- Unattended vibration monitoring at representative sensitive receivers
- Additional noise and vibration monitoring and review if complaints about the activity are received.

All OOHW monitoring will be carried out by an appropriately trained person in the measurement and assessment of construction noise and vibration.

Validation monitoring will be undertaken for any works that are the subject of a community agreement and will be performed by a suitably qualified and experienced person on at least the first two nights where OOHW will be undertaken. If validation monitoring shows that noise levels are higher than those predicted by any noise modelling undertaken as part of the community agreement, work practices will be modified so that measured noise levels do not exceed predicted levels.

## 5.2 Complaints Management

Complaints will be managed in accordance with the CCS.

## 5.3 Reporting Exceedances

Where monitoring identifies any exceedances of the levels predicted in the OOHW assessments, a review of OOHW activities will be carried out to determine where noise or vibration levels can be further reduced. Where monitored noise or vibration levels are found to exceed the relevant criteria, the exceedance will be managed in accordance with the procedures outlined in the CEMP.

Where the processes and systems outlined in this OOHW Protocol are not followed or where work is not in accordance with the approved OOHW Approval Request Form, this will be deemed a non-conformance with this OOHW Protocol. The non-conformance will be managed in accordance with the procedures outlined in the CEMP.

## 5.4 Records

Accurate records of all OOHW applications and noise and vibration monitoring will be maintained for the duration of the construction phase of the Project.

## 5.5 Change Management

Where changes to the scope of the OOHW (including to plant and equipment) occur following approval of the OOHW request, the Construction Contractor Environmental Advisor must complete a consistency review of the noise and vibration assessment to assess the impacts of the changes (see Appendix C).

# APPENDIX A OOHW Approval Request Form

| Out of hours work approval request form | | | |
|---|---|---|---|
| **No:** | **Notification date:** | **Approval date:** | **Project:** |
| | | | |
| **A. Contact details** | **Name** | **Mobile number** | **Email** |
| ER | | | |
| Project Manager | | | |
| Site Supervisor | | | |
| Project Engineer | | | |

| | | |
|---|---|---|
| **B. Details of work:** Include a map showing location of work extent and nearest sensitive receivers | Location (Chainage): | |
| | Description of activities to be carried out: | |
| | Plant and equipment to be used | |
| | Traffic control measures required: | |
| | Lighting required: | |
| | Proposed mitigation measures: | |
| | Proposed dates: | |
| | Proposed timings: | |
| | Proposed respite periods: | |
| | Justification (Why does work need to occur outside of standard construction hours?): | |
| **C. Risk factor category (low, high) and evidence of risk confirmation from the ER:** | Low (requires approval from ER)<br><br>High (requires approval from Planning Secretary)<br><br>Comments | |
| **D. Details of noise or vibration assessment completed:** | Provide details of quantitative assessments for all proposed works, including predicted noise levels, potential noise exceedances against relevant NMLs, potentially affected sensitive receivers and proposed management measures in accordance with ICNG and CNVG. Where alternative accommodation or other agreed mitigation is triggered, include details of and offers made to qualifying residents. | |
| **E. Review/ Endorsements** | | |
| **National Intermodal Project Manager (or delegate) notified** | National Intermodal notified? Yes / No | |
| | Comments: | |
| | ER notified? Yes / No | |

| | | | |
|---|---|---|---|
| **Environmental Representative** | | | |
| | Comments: | | |
| | Community notified? Yes / No | | Date: |
| | Provide details of consultation with affected receivers, in accordance with Overarching Communication Strategy | | |
| **Community Relations Manager** | Have the works been reviewed and endorsed? | | Yes / No |
| | Name: | Signature: | Date: |
| | | | |
| | Comments: | | |
| **F. Approvals (if required)** | **Low Risk Activities** | | |
| | ER approval required | | Yes / No |
| | ER approval letter attached?<br>**Or** signature obtained: | | Yes / No<br>Yes / No |
| | **High Risk Activities** | | |
| | Has the Planning Secretary approved the high-risk activity? | | Yes / No |
| | Planning Secretary approval letter attached? | | Yes / No |
| | Are the works approved? | | Yes / No |
| **Project Manager (or delegate)** | Name: | Signature: | Date: |
| | | | |
| | Comments: | | |

# APPENDIX B Application of OOHW Mitigation Measures

| Predicted Airborne LAeq (15mins) Noise Level at Receiver | | | | Mitigation Measures | | |
|---|---|---|---|---|---|---|
| **OOHW Period** | **Perception** and risk | **dB(A) above RBL** | **dB(A) above NML** | **Standard Mitigation Measures** | **Additional Mitigation Measures**[2] | |
| | | | | | **Type** | **Mitigation Level** |
| Monday–Friday:<br>6 pm – 7am<br><br>Saturday:<br>1 pm – 8 am<br><br>Sunday and Public Holidays:<br>24 hours | Noticeable (low risk) | 5-10 | <5 | • Behavioural practices on site<br>• Equipment selection / Maintaining and monitoring plant<br>• Use and siting of plant and hoardings<br>• Site inductions<br>• Use of non-tonal reversing alarms<br>• Managing cumulative impacts and planning noisier work to be carried out earlier in the period | N/A | NML |
| | Clearly Audible (high risk) | 10-20 | 5-15 | • Standard measures as above | • Community consultaion as per CCS and agreements with CCC<br>• Planning Secretary approval | NML + 5 |
| | Moderately intrusive (high risk) | 20-30 | 15-25 | • Standard measures as above | | NML + 15 |
| | Highly intrusive (high risk) | >30 | >25 | • Standard measures as above | | NML + 25 |

[2] The TfNSW Construction Noise and Vibration Guideline (CNVG) has been used, as a guide only, to determine the type of additional management measures that will be implemented based on exceedance above the RBL or NML for this Project.

# APPENDIX C Noise Assessment Consistency Review

*Guidance (delete from final version): This consistency review is only to be used where the OOHW approval requires a scope change (including change or substitution in plant or equipment).*

| Questions | Yes / No |
|---|---|
| Has the noise assessment been updated to include new or substituted plant and equipment? | Yes / No |
| Detail changes made to the noise assessment including the changes to plant / equipment and relevant assumptions. | |
| Is the impact less than or equal to the impact assessed in the approved OOHW Approval Request Form? | Yes / No |
| *Guidance (delete from final version): if you have answered yes to the above questions, the work is considered to be consistent and can be carried out without further approval under this OOHW Protocol.*<br>*If you have answered no to the above questions, the work is not considered consistent and additional assessment and OOHW approval under this OOHW Protocol is required.*<br>*Strikethrough text below that is not relevant:*<br>**The work is considered to be consistent with the approved OOHW Approval Request Form**. OR<br>**The work is not consistent with the approved OOHW Approval Request Form and further assessment and approval is required** | |
| Reviewer: | |
| Signature: | |
| Date: | |

# APPENDIX E Noise and Vibration Monitoring Program

**SSI-10053**

# MOOREBANK AVENUE REALIGNMENT WORKS

# APPENDIX E

## Construction Noise and Vibration Monitoring Program

22 JANUARY 2025

# NATIONAL INTERMODAL CORPORATION

# MOOREBANK AVENUE REALIGNMENT WORKS

## CONSTRUCTION NOISE AND VIBRATION MONITORING PROGRAM

**Author** [redacted]

**Checker**

**Approver**

**Report No**

**Date** 22/01/2025

**Revision Text** H

## TECHNICAL SPECIALIST DETAILS

| Name | Qualification and Experience |
|---|---|
| [redacted] | [redacted] |

## REVISIONS

| Revision | Date | Description | Prepared By | Approved By |
|---|---|---|---|---|
| A | 15/12/2022 | First draft for client review | [redacted] | |
| B | 25/01/2023 | Update in response to National Intermodal comments and technical specialist review | | |
| C | 01/02/2023 | Update in response to National Intermodal comments | | |
| D | 24/02/2023 | Update in response to Environmental Representative comments | | |
| E | 17/03/2023 | Update based on ER comments | | |
| F | 24/04/2023 | Update following consultation | | |

| Revision | Date | Description | Prepared By | Approved By |
|---|---|---|---|---|
| G | 02/06/2023 | Update based on DPE comments | [redacted] | |
| H | 22/01/2025 | Update to reflect revised construction footprint | | |

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# ACRONYMS AND DEFINITIONS

| Acronym | Definition |
|---|---|
| BS | British Standard |
| CNVMP | Construction Noise and Vibration Management Sub-plan |
| CNVG | Construction Noise and Vibration Guideline (TfNSW) |
| CNVIS | Construction Noise and Vibration Impact Statement |
| CoA | Conditions of Approval |
| Construction | Includes all work required to construct the Project as described in the EIS and RtS (NSW CoA A1) including commissioning trials of equipment and temporary use of any part of the Project but excluding Low Impact Work which is carried out or completed before approval of the CEMP. |
| Continuous vibration | From uninterrupted sources, e.g., machinery, steady road traffic, continuous construction activity |
| dB(A) | A-weighted decibel |
| EIS | Environmental Impact Statement |
| EPA | NSW Environment Protection Authority |
| EPL | Environment Protection Licence |
| ER | Environmental Representative |
| Highly noise intensive works | Work which is defined as annoying under the Interim Construction Noise Guideline (DECC, 2009) including: (a) use of power saws, such as used for cutting timber, rail lines, masonry, road pavement or steel work; (b) grinding metal, concrete or masonry; (c) rock drilling; (d) line drilling; (e) vibratory rolling; (f) bitumen milling or profiling; (g) jackhammering, rock hammering or rock breaking; and (h) impact piling. |
| Highly noise affected level | Represents the point above which there may be strong community reaction to noise. The *Interim Construction Noise Guideline* specifies that the highly noise affected level is 75 dB(A). |
| Human exposure | Disturbance to building occupants: Vibration in which the occupants or users of the building are inconvenienced or possibly disturbed |
| ICNG | Interim Construction Noise Guideline |
| Impulsive vibration | Up to three instances of sudden impact per monitoring period e.g., occasional dropping of heavy equipment, occasional loading and unloading |
| Infrastructure Approval | SSI 10053 or NSW CoA |
| Intermittent vibration | From drilling, compacting or activities that will result in continuous vibration if operated continuously |
| Low Impact Work | As defined in the Infrastructure Approval, and which Includes activities like survey work, investigative drilling, minor clearing, installation of mitigation measures etc. The low impact work described in this definition becomes construction when the Construction Environmental Management Plan is approved. This also applies to low impact work that has already commenced. |
| MARW | Moorebank Avenue Realignment Works |
| MIP | Moorebank Intermodal Precinct, which includes MPE and MPW |
| MPE | Moorebank Precinct East |

| Acronym | Definition |
|---|---|
| MPE Site | Comprises the MPE Stage 1 Project as approved by SSD 14-6766 for the development of the intermodal terminal facility (IMT) at Moorebank and MPE Stage 2 as approved under SSD 7628 (as modified) and MPE Concept Approval (MP 10_0193) for the construction and operation of warehousing and distribution facilities and upgrades to approximately 2.1 kilometres of Moorebank Avenue. |
| MPW | Moorebank Precinct West |
| MPW Site | Comprises the MPW Stage 2 Project which is the second stage of development under the MPW Concept Approval (SSD 5066) and SSD 7709. The Project involves the construction and operation of a multi-purpose intermodal terminal facility, Rail link connection, warehousing and upgraded intersection on Moorebank Avenue. |
| National Intermodal | National Intermodal Corporation |
| NML | Noise management level |
| Noise affected level | Represents the point above which there may be some community reaction to noise. The noise affected level is calculated by adding 10 dB(A) to the RBL |
| NVIA | Noise and Vibration Impact Assessment |
| OOHW | Out-of-hours works |
| Planning Secretary | Secretary to the DPE |
| PPV | Peak Particle Velocity |
| Project Site | Refers to the construction footprint area which is approximately 18.96 hectares and includes access for the construction of road embankments and cuttings, temporary and permanent fencing, temporary and permanent water quality control basins, ancillary facilities, access roads and construction side roads. It is generally bounded by the Defence Joint Logistics Unit (DJLU), MPE, Boot Land and the Sydney Trains owned land adjacent to the East Hills Railway. |
| RBL | Ratings Background Level |
| REMM | Revised Environmental Management Measures |
| RtS | Response to Submissions |
| SSI | State significant infrastructure |
| TfNSW | Transport for NSW |
| The Project | Moorebank Avenue Realignment Works |
| The Proponent | National Intermodal Corporation |

# 1 INTRODUCTION

## 1.1 Context

This Construction Noise and Vibration Monitoring Program ('Monitoring Program') has been developed in accordance with NSW Condition of Approval (CoA) C12. It describes the environmental noise and vibration monitoring activities to be undertaken during construction of the Moorebank Avenue Realignment Works (the Project). The purpose of this Monitoring Program is to:

- Provide a procedure to monitor noise and vibration impacts during construction of the Project
- Meet the requirements of the CoA for the Project
- Meet any relevant legal and other requirements for the Project.

SMART (Specific, Measurable, Achievable, Realistic and Timely) principles have been considered in the preparation of this Monitoring Program. Refer to Section 8 of the Construction Noise and Vibration Management Plan (CNVMP) for more information.

This Monitoring Program is to be read in conjunction with the CNVMP. Where details within both plans overlap, these have been retained in the CNVMP only and reference to sections within the CNVMP have been made for ease of reference within this Monitoring Program.

## 1.2 Background and Project Description

National Intermodal Corporation (National Intermodal) plans to realign and upgrade a section of Moorebank Avenue. The Project involves the realignment of an existing two-kilometre section of Moorebank Avenue, from a point approximately 130 meters south of the Anzac Road/Moorebank Avenue intersection to a point immediately north of the East Hills Railway. Moorebank Avenue currently divides the Moorebank Intermodal Precinct (MIP) into the Moorebank East Precinct (MPE site) and the Moorebank West Precinct (MPE site).

## 1.3 Responsibilities

Site personnel or sub-contractors with suitable experience and qualifications will undertake the monitoring outlined in this Monitoring Program.

The Construction Contractors' Construction Manager is responsible for ensuring that all legal and other requirements described in this Monitoring Program are met.

## 1.4 Approval, Review and Modification

In accordance with NSW CoA C14, this Monitoring Program will be endorsed by the Environmental Representative (ER) and submitted to the Planning Secretary for approval at least one month before commencement of construction. Construction will not commence until the Planning Secretary has approved this Monitoring Program.

This Monitoring Program, as approved by the Planning Secretary, including any minor amendments approved by the ER, will be implemented for the duration of construction and for any longer period set out in this Monitoring Program or specified by the Planning Secretary, whichever is the greater.

This Monitoring Program will be reviewed every six months. In accordance with NSW CoA C16, minor amendments to this Monitoring Program may be approved by the ER.

Any amendments will be documented in subsequent revisions of this Monitoring Program. A copy of the updated Monitoring Program and changes will be distributed to all relevant stakeholders in accordance with the approved document control procedure outlined in the CEMP. Site personnel with responsibilities relevant to noise and vibration monitoring will be informed of any amendments to the Monitoring Program and training provided where required.

## 1.5 Consultation

Liverpool City Council (LCC) was consulted during the preparation of this Monitoring Program, in accordance with NSW CoA C12. No comments were provided from LCC regarding the Monitoring Program.

In accordance with NSW CoA C13(m), details of all information requested during consultation must be provided to the Planning Secretary as part of any submission of the Monitoring Program.

Refer to Appendix A of the CVNMP for a record of the consultation carried out during the development of this Monitoring Program, and Section 1.6 of the CNVMP for a summary of the consultation undertaken.

## 1.6 Guidelines, Policies and Specification

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

**Guidelines**

- TfNSW Construction Noise and Vibration Guidelines (Roads and Maritime 2016)
- NSW Interim Construction Noise Guideline (ICNG) (Department of Environment and Climate Change (DECC), 2009)
- NSW Assessing Vibration – a technical guideline (AVTG) (DEC, 2006)

**Policies**

- NSW Road Noise Policy (Department of Environment, Climate Change and Water, 2011)
- NSW Noise Policy for Industry (Environment Protection Authority, 2017)

**Standards**

- Australian Standard 2659.1 – 1998 Guide to the use of sound measuring equipment – portable sound level meters
- Australian Standard IEC 61672.1 Electroacoustic – Sound Level Meters – Specifications
- Australian Standard 2775 Mechanical Mounting of Accelerometers
- Australian Standard AS/NZS 2107:2000 Acoustics - Recommended design sound levels and reverberation times for building interiors
- Australian Standard 2834-1995 Computer Accommodation, Chapter 2.9 Vibration
- Australian Standard AS 2187.2 Explosives - Storage and use - Part 2 Use of explosives
- Australian Standard 1055 Acoustics – Description and Measurement of Environmental Noise
- 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 (180Hz) (British Vibration Standard)
- 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 (German DIN Standard).

## 1.7 Conditions of Approval

The requirements of the Infrastructure Approval conditions relevant to the development of this Monitoring Program are listed in Table 1.1. A document reference is also included to indicate where the condition is addressed in this Monitoring Program or other project management documents.

*Table 1.1: NSW CoA relevant to the Monitoring Program*

| No. | Requirements | Document reference |
|---|---|---|
| C12 | A Construction Noise and Vibration Monitoring Program must accompany the Noise and Vibration Management Sub-plan when it is lodged for endorsement or approval in accordance with Conditions C9 and C10. The Construction Noise and Vibration Monitoring Program must be prepared in consultation with the relevant council(s) to compare actual performance of construction of the SSI against the performance predicted in the documents listed in Condition A1 or in the relevant CEMP. | The Monitoring Program<br><br>Section 1.5 |
| C13 | The Construction Noise and Vibration Monitoring Program must provide: | |
| (a) | details of baseline data available; | Section 2 |
| (b) | details of baseline data to be obtained and when; | Section 2 |
| (c) | details of all monitoring of the project to be undertaken; | Section 4 |
| (d) | the parameters of the project to be monitored; | Section 4 |
| (e) | the frequency of monitoring to be undertaken; | Section 4 |
| (f) | the location of monitoring; | Section 5 |
| (g) | the reporting of monitoring results and analysis results against relevant criteria; | Section 6 |
| (h) | details of the methods that will be used to analyse the monitoring data; | Section 4 |
| (i) | procedures to identify and implement additional mitigation measures where the results of the monitoring indicate unacceptable project impacts; | Section 5.2 |
| (j) | a consideration of SMART principles; | Section 1.1<br>Section 4<br>Section 8 of the CNVMP |
| (k) | any consultation to be undertaken in relation to the monitoring programs; | Section 1.5<br>Appendix A of the CNVMP |
| (l) | any specific requirements outlined in the terms of this approval; and | Section 1.7 |
| (m) | Details of all information requested by an agency during consultation, including copies of all correspondence from those agencies as required by Condition A5. | Section 1.5<br>Appendix A of the CNVMP |
| C14 | Unless expressly nominated by the Planning Secretary to be endorsed by the ER, the Construction Noise and Vibration Monitoring Program must be submitted to the Planning Secretary for approval. | Section 1.4 |

| No. | Requirements | Document reference |
|---|---|---|
| C15 | Unless otherwise agreed with the Planning Secretary, construction must not commence until the Construction Noise and Vibration Monitoring Program has been approved by the Planning Secretary, and all relevant baseline data for the specific construction activity has been collected. | Section 1.4 |
| C16 | The Construction Noise and Vibration Monitoring Program, 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. | Section 1.4 |
| C17 | The results of construction noise and vibration monitoring must be included in a Construction Noise Monitoring Report. The report must also include a summary of the monitoring results against the relevant noise criteria identified in the Construction Noise and Vibration Monitoring Program and be published on the Proponent's website in accordance with the reporting frequency specified in the monitoring program. | Section 6 |

# 2 BASELINE DATA

## 2.1 Introduction

The Noise and Vibration Impact Assessment (NVIA) in the Environmental Impact Assessment (EIS) (EMM, 2021) stated that the assessment of operational road traffic noise for 2024 and 2034 years confirmed that the baseline goals for new roads of the NSW, the NSW Road Noise Policy (DECCW, 2011) was satisfied for all assessment locations for day and night, and no additional mitigation was required. Based on this, no additional baseline noise monitoring, other than what was measured, is required. The following section detail the noise baseline conditions for the Project.

## 2.2 Noise and Vibration Sensitive Receivers

The NVIA identified and considered potential construction noise and vibration impacts from the Project on the surrounding land uses and sensitive receivers. The nearest representative noise sensitive locations to the Project were identified as being commercial, industrial and residential receivers.

Locations were selected to represent the range and extent of noise impacts from the Project. Details are provided in Table 2.1 and their locations are shown in Figure 2.1.

*Table 2.1: Assessment locations*

| ID | Address | Classification | Easting | Northing |
|---|---|---|---|---|
| COM1 | Defence Building 1 | Commercial | 308640 | 6241780 |
| IN1 | Defence Building 2 | Industrial | 308764 | 6241755 |
| IN2 | Defence Building 3 | Industrial | 308764 | 6241623 |
| R1 (NM2) | 26 Brickendon Court, Wattle Grove | Residential | 309349 | 6241227 |
| R2[1] (NM3) | 25 Exford Court, Wattle Grove | Residential | 309290 | 6240862 |
| R3 (NM4) | 25 Yallum Court, Wattle Grove | Residential | 308920 | 6240179 |

## 2.3 Existing Noise Environment

Table 2.2 summarises the existing background and ambient noise that was measured during the NVIA noise monitoring. Further detail regarding the existing environment is within Section 4 of the CNVMP.

*Table 2.2: Summary of existing background and ambient noise*

| Monitoring location | Period[a] | Rating background level (RBL)[b], dB(A) | Measure $L_{Aeq, period}$ noise level[c], dB(A) |
|---|---|---|---|
| NM1 – Moorebank Avenue | Day | 54 | 65 |
| | Evening | 51 | 69 |
| | Night | 43 | 60 |

[1] NM3 for RBL and ambient noise monitoring are in adjacent properties i.e., 25 Exford Street and 23 Exford Street respectively. For the purposes of this CNVMP, it has been assumed that they are the same property, monitoring will be undertaken at either location depending upon accessibility.

| Monitoring location | Period[a] | Rating background level (RBL)[b], dB(A) | Measure $L_{Aeq, period}$ noise level[c], dB(A) |
|---|---|---|---|
| NM2[2] – 26 Brickendon Court, Wattle Grove | Day | 36 | 52 |
| | Evening[d] | 34 (42) | 50 |
| | Night[d] | 31 (38) | 46 |
| NM3 [3,4] – 23 Exford Court, Wattle Grove | Day | 35 | 54 |
| | Evening | 34 | 51 |
| | Night | 31 | 47 |
| NM4[5] – 25 Yallum Court, Wattle Grove | Day | 36 | 52 |
| | Evening | 36 | 49 |
| | Night | 31 | 44 |

Notes:

a) Day: 7 am to 6 pm Monday to Saturday; 8 am to 6 pm Sundays and public holidays; Evening: 6 pm to 10 pm; Night: all other periods.

b) The RBL is a Noise Policy for Industry 2017 (NPfI) term and is used to represent the background noise level. In accordance with the NPfI, minimum thresholds were adopted given measured values were lower. Measured noise levels are provided in brackets () where relevant.

c) The energy averaged noise level over the measurement period and representative of general ambient noise.

d) Evening noise level cannot be greater than day and night not greater than evening. Ambient levels appear affected by localised noise source accordingly levels for NM3 were adopted for assessment purposes. Measured levels in brackets ().

[2] NM2 is equivalent to R1 as shown in Figure 2.1.
[3] NM3 is equivalent to R2 as shown in Figure 2.1.
[4] NM3 for RBL and ambient noise monitoring are in adjacent properties i.e., 25 Exford Street and 23 Exford Street respectively. For the purposes of this CNVMP, it has been assumed that they are the same property, monitoring will be undertaken at either location depending upon accessibility.
[5] NM4 is equivalent to R3 as shown in Figure 2.1.

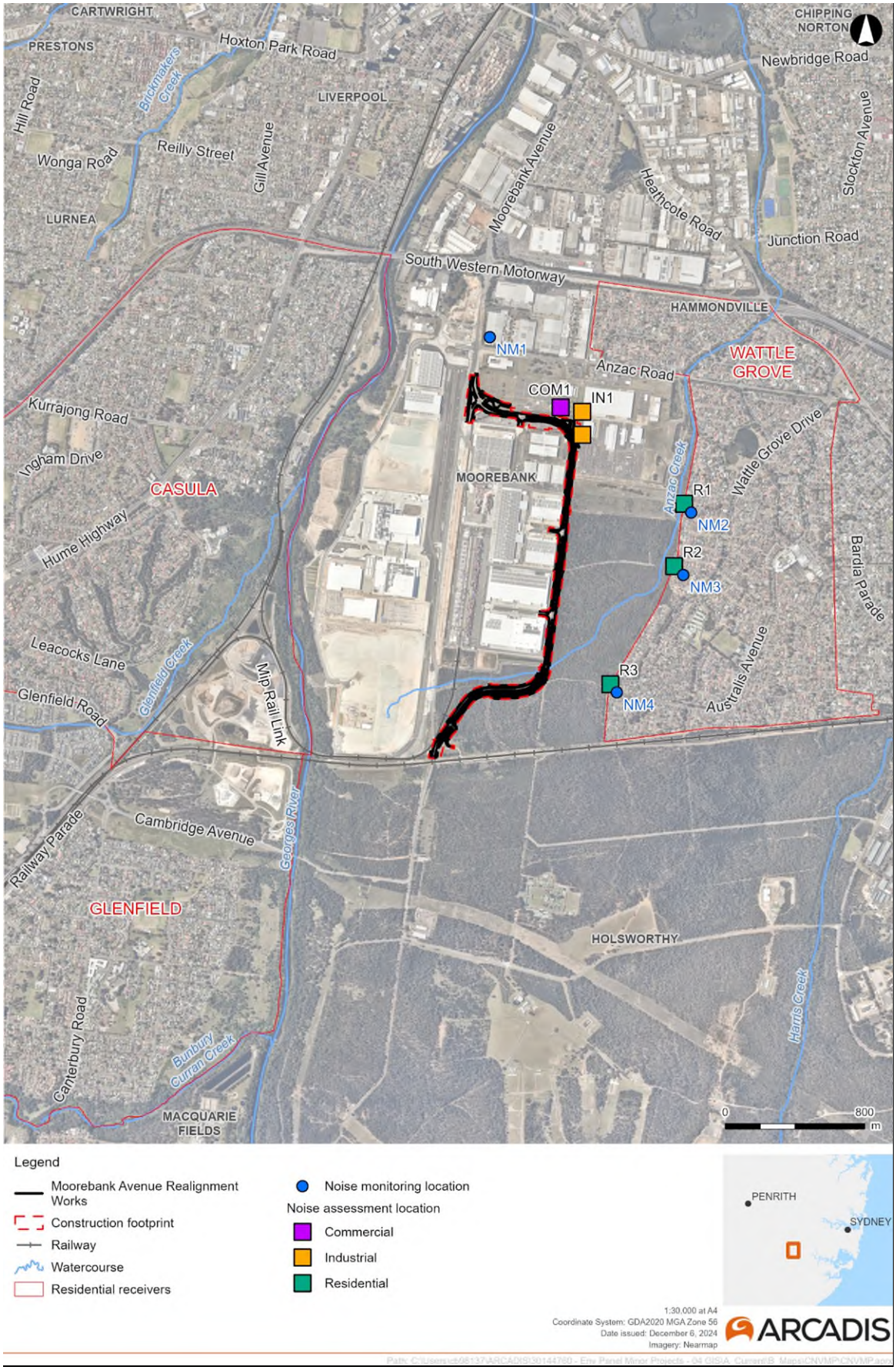


Figure 2.1: Location of noise and vibration assessment and monitoring locations

# 3 NOISE AND VIBRATION CRITERIA

## 3.1 Construction Activities

Section 7 of the CVNMP provides an overview of the construction activities that have the potential for triggering noise and vibration impacts and which will need to be appropriately managed to ensure the construction noise and vibration criteria, detailed below, are achieved.

## 3.2 Construction Noise Criteria

The noise management levels (NMLs) adopted for the Project are set out in Table 3.1 and Table 3.2 for residential and non-residential sensitive receivers respectively.

*Table 3.1: Residential construction NMLs*

| Receiver type/ Monitoring location | NML $L_{Aeq(15min)}$ – dB(A) | | | |
|---|---|---|---|---|
| | Standard construction hours dB(A) | Out-of-hours RBL + 5dB(A) | | |
| | Day | Day | Evening | Night [4] |
| R1 (NM2) | 46 | 41 | 39 | 36 |
| R2 (NM3) | 45 | 40 | 39 | 36 |
| R3 (NM4) | 46 | 41 | 41 | 36 |

Note:

1. Day: 7 am to 6 pm Monday to Saturday; 8 am to 6 pm Sundays and public holidays;
2. Evening: 6 pm to 10 pm;
3. Night: all other periods and public holidays.
4. Sleep disturbance criteria will be assessed during preparation of a Construction Noise and Vibration Impact Statement (CNVIS) where required, generally for any work that may exceed the NMLs or vibration criteria specified.

*Table 3.2: Non-residential sensitive land uses noise management levels*

| Land use | Noise assessment location | NML ($L_{Aeq(15min)}$)[3] |
|---|---|---|
| Classrooms at schools and other educational institutions | Internal | 45 |
| Places of worship and hospitals | | |
| Passive recreation areas [1] | External | 60 |
| Active recreation areas [2] | External | 65 |
| Industrial premises[4] | External | 75 |
| Office, retail outlets[5] | External | 70 |

| Land use | Noise assessment location | NML ($L_{Aeq(15min)}$)[3] |
|---|---|---|
| Community centres | Internal | Depends on the intended use of the centre. Refer to the recommended 'maximum' internal levels in AS/NZS 2107:2016[6] for specific uses. |

Notes:

1. Passive recreation areas characterised by contemplative activities that generate little noise and where benefits are compromised by external noise intrusion.
2. Active recreation areas are characterised by sporting activities and activities which generate their own noise or focus for participants, making them less sensitive to external noise intrusion.
3. Applies only when properties are being used.
4. Defence Buildings 2 and 3 are classified as industrial refer to Table 2.1.
5. Defence Building 1 is classified as commercial refer to Table 2.1.
6. S/NZS 2107:2016 Acoustics – Recommended design sound levels and reverberation times for building interiors

## 3.3 Construction Vibration Criteria

### 3.3.1 Human Comfort

Maximum and preferred values for continuous and impulsive vibration for the Project are defined in Table 3.3.

*Table 3.3: Continuous and impulsive vibration acceleration ($m/s^2$) 1-80 Hz*

| Location | Assessment period[1] | Preferred values | | Maximum values | |
|---|---|---|---|---|---|
| | | z-axis | x- and y-axis | z-axis | x- and y-axis |
| **Continuous vibration** | | | | | |
| Critical areas[2] | Day or night-time | 0.0050 | 0.0036 | 0.010 | 0.0072 |
| Residences | Daytime | 0.010 | 0.0071 | 0.020 | 0.014 |
| | Night-time | 0.007 | 0.005 | 0.014 | 0.010 |
| Offices, schools, educational institutions and places of worship[3] | Day or night-time | 0.020 | 0.014 | 0.040 | 0.028 |
| Workshops[4] | Day or night- time | 0.04 | 0.029 | 0.080 | 0.058 |
| **Impulsive vibration** | | | | | |
| Critical areas[2] | Day or night-time | 0.0050 | 0.0036 | 0.010 | 0.0072 |
| Residences | Daytime | 0.30 | 0.21 | 0.60 | 0.42 |
| | Night-time | 0.10 | 0.071 | 0.20 | 0.14 |

| Location | Assessment period[1] | Preferred values | | Maximum values | |
|---|---|---|---|---|---|
| | | z-axis | x- and y-axis | z-axis | x- and y-axis |
| Offices, schools, educational institutions and places of worship[3] | Day or night-time | 0.64 | 0.46 | 1.28 | 0.92 |
| Workshops[4] | Day or night- time | 0.64 | 0.46 | 1.28 | 0.92 |

Notes:

1. Daytime is 7.00am to 10.00pm and night-time is 10.00pm to 7.00am
2. Such as hospital operating theatres or precision laboratories
3. Defence Building 1 is classified as commercial refer to Table 2.1.
4. Defence Buildings 2 and 3 are classified as industrial refer to Table 2.1.

Intermittent vibration impact is assessed using vibration dose values (VDVs). The VDV method is more sensitive to peaks in the acceleration waveform and makes corrections to the criteria based on the exposure duration. The acceptable VDVs for intermittent vibration are defined in Table 3.4.

*Table 3.4: Acceptable vibration dose values ($m/s^{1.75}$) for intermittent vibration*

| Location | Daytime[1] | | Night-time[1] | |
|---|---|---|---|---|
| | Preferred values | Maximum values | Preferred values | Maximum values |
| Critical areas[2] | 0.10 | 0.20 | 0.10 | 0.02 |
| 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 |
| Workshops | 0.80 | 1.60 | 0.80 | 1.60 |

Notes:

1. Daytime is 7.00am to 10.00pm and night-time is 10.00pm to 7.00am
2. Includes operating theatres, precision laboratories and other areas where vibration sensitive activities may occur.

### 3.3.2 Structural Damage

The standards by which building damage from construction-induced vibration is assessed are the British Vibration Standard (BS 7385) and the German DIN Standard (DIN 4150-3).

BS 7385 is used as a guide to assess the likelihood of building damage from ground vibration. BS 7385 suggests levels at which ‘cosmetic’, ‘minor’ and ‘major’ categories of damage. BS 7385 is based on peak particle velocity and specifies damage criteria for frequencies within the range 4 Hz to 250 Hz, being the range usually encountered in buildings.

Table 3.5 sets out the BS 7385 criteria for cosmetic, minor and major damage. Where heritage structures are impacted, DIN 4150-3 vibration criteria will be applied. The criteria applicable to heritage buildings are identified in Table 3.6.

*Table 3.5: BS 7385 structural damage criteria*

| Group | Type of structure | Damage level | Peak component particle velocity[1] (mm/s) | | |
|---|---|---|---|---|---|
| | | | 4 – 15 Hz | 15 – 40Hz | ≥40Hz |
| 1 | Reinforced or framed structures Industrial and heavy commercial buildings | Cosmetic | 50 | 50 | 50 |
| | | Minor[2] | 100 | 100 | 100 |
| | | Major[2] | 200 | 200 | 200 |
| 2 | Un-reinforced or light framed structures Residential or light commercial type buildings | Cosmetic | 15 - 20 | 20 - 50 | 50 |
| | | Minor[2] | 30 - 40 | 40 - 100 | 100 |
| | | Major[2] | 60 - 80 | 80 - 200 | 200 |

Notes:

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 BS 7385 Part 2 (1993) Section 7.4.2

*Table 3.6: DIN 4150-3 vibration guidelines for heritage buildings*

| Type of structure | Guideline values for vibration velocity (mm/s) | | | |
|---|---|---|---|---|
| | Vibration at the foundation at a frequency of | | | Vibration at the horizontal plane of the highest floor at all frequencies |
| | 1 - 10 Hz | 10 - 50 Hz | 50 - 100 Hz[1] | |
| Heritage buildings | 3 | 3 - 8 | 8 - 10 | 8 |

Notes:

1. P1PAt frequencies above 100 Hz the values given in this column may be used as minimum values.

### 3.3.3 Safe working distances

Where vibration intensive plant such as rock breakers and vibratory rollers are used, vibration must be managed to minimise disturbance to building occupants and to avoid damage to buildings and other structures. Table 3.7 indicates the safe working distances recommended by the CNVG for typical items of vibration intensive plant that must be complied with.

*Table 3.7: Safe working distances for vibration intensive plant (TfNSW 2019)*

| Plant item | Rating/description | Safe working distance | | |
|---|---|---|---|---|
| | | Cosmetic damage (British Std 7385) – Light framed structures | Cosmetic damage (DIN 4150) Heritage and other sensitive structures | Human response (EPA's vibration guideline) |
| Vibratory roller | <50 kN (typically 1-2 t) | 5 m | 14 m | 15 m to 20 m |
| | <100 kN (typically 2-4 t) | 6 m | 16 m | 20 m |
| | <200 kN (typically 4-6 t) | 12 m | 33 m | 40 m |
| | <300 kN (typically 7-13 t) | 15 m | 41 m | 100 m |
| | >300 kN (typically 13-18 t) | 20 m | 54 m | 100 m |
| | >300 kN (> 18 t) | 25 m | 68 m | 100 m |

| Plant item | Rating/description | Safe working distance | | |
|---|---|---|---|---|
| | | Cosmetic damage (British Std 7385) – Light framed structures | Cosmetic damage (DIN 4150) Heritage and other sensitive structures | Human response (EPA's vibration guideline) |
| Small hydraulic hammer | 300 kg – 5 to 12 t excavator | 2 m | 5 m | 7 m |
| Medium hydraulic hammer | 900 kg – 12 to 18t excavator | 7 m | 19 m | 23 m |
| Large hydraulic hammer | 1600 kg – 18 to 34 t excavator | 22 m | 60 m | 73 m |
| Vibratory pile driver | Sheet piles | 20 m | 50 m | 100 m |
| Pile boring | ≤800 mm | 2 m (nominal) | 5 m | 7 m |
| Jackhammer | Handheld | 1 m (nominal) | 2 m | 3 m |

The safe working distances presented in Table 3.7 are indicative and will vary depending on the item of plant (particularly its power rating) and local geotechnical conditions. The cosmetic damage thresholds apply to typical buildings under typical geotechnical conditions and vibration monitoring is recommended at specific sites.

Where structures are more sensitive such as heritage items, more stringent conditions may be applicable. Potential vibration impacts to Non-Aboriginal heritage are not expected; there are no known areas of archaeological significance for Non-Aboriginal heritage located in or adjacent to the Project Site. The nearest state significant heritage item (Glenfield Farm State Heritage Register item 00025; Liverpool LEP 14) is located about 1.8 kilometres from the Project Site boundary and will not be subject to potential vibration impacts. Refer to Section 4 of the CHMP for more information. In relation to human response, the safe working distances relate to continuous vibration. For most construction activities, vibration emissions are intermittent and higher vibration levels over shorter periods are acceptable. Additional assessment will be undertaken where the human response criteria are exceeded.

# 4 MONITORING PROCEDURES

As required by NSW CoA C13(j), SMART principles (refer to Section 8 of the CNVMP) have been considered in the preparation of this Monitoring Program and the procedure detailed below.

## 4.1 Noise Monitoring

The noise monitoring procedure to be adopted for the Project is provided in Table 4.1. Noise monitoring will be undertaken by the Construction Contractor or noise consultant who will be appropriately trained in the measurement and assessment of construction noise and vibration and has working knowledge of the requirements of AS 2659.1.

All noise monitoring will be undertaken in accordance with Australian Standard AS 2659.1 – 1998: Guide to the use of sound measuring equipment – portable sound level meters, or any revisions of that standard which may be made by Standards Australia, and the compliance monitoring guidance provided in the NSW Noise Policy for Industry (EPA, 2017).

A Construction Noise and Vibration Impact Statement (CNVIS) will be prepared by the Construction Contractor for any work that may exceed the NMLs and vibration criteria specified in NSW CoA E26 at any residence outside the standard work hours identified in NSW CoA E18, or where receivers will be highly noise affected. The CNVIS must include specific mitigation measures identified through consultation with affected sensitive receivers and the mitigation measures must be implemented for the duration of the construction phase. Feedback on mitigation measures will be sought from affected sensitive receivers through notifications or via phone calls. A copy of the CNVIS must be provided to the ER at least two weeks prior to the commencement of the associated work. The Planning Secretary may request copies of the CNVIS for their information.

Subject to property owner approval, noise monitoring will be conducted at representative residential and other locations (including at the worst- affected residences) to confirm construction noise levels. The ICGN (DECC, 2009) states that noise levels apply at the property boundary that is most exposed to construction noise, and at a height of 1.5 metres above ground level. If the property boundary is more than 30 metres from the residence, the location for measuring or predicting noise levels is at the most noise-affected point within 30 metres of the residence.

*Table 4.1: Noise monitoring procedure*

| Monitoring details | Frequency | Test procedure |
|---|---|---|
| Attended noise monitoring will be carried out to verify noise environment | Prior to the commencement of construction | • Monitoring will be carried out at the locations identified in Figure 2.1, or as near as practiable<br>• Monitoring equipment will be located at receivers which would have line-of-sight to the Project or to existing major roads |
| Attended monitoring will be carried out at the commencement of activities for which a NVIS has been prepared to confirm actual noise | On the first occasion of activities for which a NVIS has been prepared | The testing method includes:<br>• Sound level meter configured for “Fast” time weighting and “A” frequency weighting<br>• Sound level meter height set at around 1.2-1.5 metre above ground level<br>• The test environment will be free from reflecting objects where possible. Where the noise monitoring is conducted within 3.5 metres of large |
| Attended OOHW noise monitoring at sensitive receivers during evening, night and OOH (weekends/public holidays) | As required during OOHW | |

| Monitoring details | Frequency | Test procedure |
|---|---|---|
| Attended monitoring where a complaint is received and monitoring is considered an appropriate response to determine if noise levels exceed predicted 'worst case' Construction noise levels documented (Section 7.2 of the CNVMP) | Related to noise complaint | walls or a building facade, then a reflection correction of up to -2.5 dB(A) will be applied to remove the effect of increased noise due to sound reflections from such structures<br>• Tests will not be carried out during rain or when the wind speed at the test site exceeds 5 m/s at the microphone<br>• Conditions such as wind velocity, wind direction, temperature, relative humidity and cloud cover will be recorded. These may be obtained from the nearest Bureau of Meteorology monitoring station or on-site weather station/observations<br>• The monitoring period should be sufficient such that the measured noise levels are representative of the noise over a 15-minute period<br>• Selected monitoring periods should vary to cover the range of activities being undertaken, including the worst-case construction scenario<br>• At a minimum $L_{eq}$, $L_{max}$, $L_{10}$ and $L_{90}$ levels will be measured and reported<br>• If any specific noise characteristics as the NPfI are identified, they should be factored into the quantitative assessment by adding penalties to the predicted levels as per the NPfI.<br>The attended noise monitoring data will be compared to the NMLs presented in Section 3 and predicted noise levels.<br>Observations will also be reported including audibility of construction noise, other noise in the environment and any discernible construction activities contributing to the noise at the receiver. |
| Attended monitoring to confirm noise levels are no more than 5 dB(A) above RBL levels using the $L_{Aeq,\ 15min}$ descriptor for works undertaken in accordance with NSW CoA E20 (b)(i) | On each occasion works undertaken in accordance with NSW CoA E20(b)(i) on each occasion it is used | |
| Noise monitoring at non-sensitive receivers predicted to be impacted by moderate exceedances of the NML from work in standard hours | As required | |
| Spot checks of noise intensive plant where it is required to check the noise emission from the plant against manufacturer's specifications | When a noise intensive piece of equipment commences works on site | The test procedure for construction plant will be guided by the stationary test procedures according to Australian Standard AS 2012.1.<br>• Sound level meter configured for "Fast" time weighting and "A" frequency weighting<br>• The test environment will be free from reflecting objects<br>• Tests will not be carried out during rain or when the wind speed at the test site exceeds 5 m/s at the microphone |
| Where required for the purposes of refining construction methods or techniques to reduce noise levels | As required | |
| Real time (unattended) monitoring | As required | Can provide useful indications of noise exceedances, particularly during highly intensive noise activities. Real-time noise monitoring may be used as a backup for attended noise monitoring and will not be used alone. Noise monitoring equipment will continuously measure existing noise levels in 15-minute periods during the daytime, evening and night-time periods for the survey period. All equipment must carry current |

| Monitoring details | Frequency | Test procedure |
|---|---|---|
| | | National Association of Testing Authorities (NATA) or manufacturer calibration certificates |
| Validation monitoring | At least the first two nights of OOHW | For any works that are the subject of a community agreement under the Environmental Protection Licence (EPL) on at least the first two nights where OOHW will be undertaken in accordance with the community agreement. If validation monitoring shows that noise levels are higher than those predicted by any noise modelling undertaken as part of the community agreement, work practices will be modified so that measured noise levels do not exceed predicted levels. |

Where actual noise levels exceed the predicted worst-case levels, the source of excessive noise generations will be identified, and any additional feasible and reasonable measures available will be implemented to either reduce noise emissions or reduce the impacts on receivers.

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

### 4.1.1 Noise Monitoring Equipment

Noise monitoring equipment used will be at least Type 2 (for unattended surveys) and Type 1 (for attended surveys) instruments as required by Australian Standard AS 1259.1-1990 Acoustics – Sound Level Meters and calibrated in accordance with manufacturer specifications or relevant Australian Standards. The calibration of the monitoring equipment will be checked in the field before and following the noise measurement period.

Advice from a heritage specialist will be sought on methods and locations for installing equipment used for noise monitoring at heritage-listed structures.

Acoustic instrumentation employed in the noise monitoring surveys will carry current manufacturer conformance certificates and comply with the guidelines identified in Section 1.6.

## 4.2 Vibration Monitoring

The overarching vibration monitoring procedure to be adopted for the Project is provided in Table 4.2. Monitoring will be undertaken by the Construction Contractor or noise consultant, trained to undertake vibration monitoring for the duration of construction. Dilapidation surveys will be the responsibility of the Construction Contractor.

All vibration monitoring will be undertaken in accordance with the technical guidance provided in the Environmental Noise Management - Assessing Vibration: a technical guideline (DEC, 2006). Vibration monitoring results may be assessed and reported against the acceptable values of human exposure to vibration set out in Tables 2.2 and Table 2.4 of the guideline.

Subject to property owner approval, vibration monitoring will be conducted at representative residential and other locations (including at the worst- affected residences) to confirm construction vibration levels.

*Table 4.2: Vibration monitoring procedure*

| Monitoring details | Frequency | Test procedure |
|---|---|---|
| At the commencement of vibratory compaction work within 50 metres of residential buildings | As required | Attended vibration monitoring will be undertaken when checking the safe working distances from construction plant or in response to a complaint.<br>The testing method includes:<br>• Transducer to be affixed to ground or building in general accordance with AS 2775- 2004<br>• Monitoring to be conducted for at least three distances from the plant, including a representative distance for the nearest sensitive structures and/or receivers<br>• 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<br>• 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” setting<br>• Peak Particle Velocity (PPV) with sufficient temporal resolution to determine vibration impacts 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 a metric which is appropriate for calculating vibration does values |
| Where a complaint is received in relation to human exposure to vibration levels and monitoring is considered an appropriate response | As required | |
| Where a complaint is received in relation to suspected property damage due to vibration impacts and monitoring is considered an appropriate response | As required | |
| Where an activity may occur within safe working distances for cosmetic damage for no more than one day continuously | As required | |
| Where required for the purposes of refining Construction methods to reduce vibration levels | As required | |
| Where an activity may occur within safe working distances for cosmetic damage for a period of more than one day continuously | As required | Continuous vibration monitoring will be undertaken in situations where there is a risk that vibration from a particular construction activity may exceed the cosmetic damage criteria at a sensitive structure. This will be where activities may occur within the safe working distances for cosmetic damage identified in Section 3.3.3 of this Monitoring Program.<br>The testing method includes:<br>• Transducer to be affixed to ground or building in general accordance with AS 2775- 2004<br>• Vibration logger to continuously measure vibration levels while the relevant works are occurring within the safe working distance for cosmetic damage<br>• Measurement to be conducted as close as possible to the sensitive structure.<br>• A warning system will be implemented with the monitoring system including one or both of the following:<br>– Audible and/or visual warning alarm<br>– SMS and/or email alerts to site personnel<br>• PPV with sufficient temporal resolution to determine vibration impacts and the dominant frequency of the vibration will be recorded for assessment against the structural and cosmetic damage criteria. In situations in |

| Monitoring details | Frequency | Test procedure |
|---|---|---|
| | | which human comfort is also of concern then a metric which is appropriate for calculating vibration does values |
| Vibration testing for vibration generating activities that have the potential to impact on heritage items | As required | • Identify minimum working distances to prevent cosmetic damage<br>• When conducting at-property treatment at any heritage item, the advice of a suitably qualified and experienced built heritage specialist will be obtained and implemented to ensure such work does not have an adverse impact on the heritage significance of the item |
| Dilapidation surveys of buildings and structures where construction works occurs within the safe working distance for cosmetic damage | Prior to that work being undertaken and post-construction | At a minimum, dilapidation surveys and reports will comprise:<br>• 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<br>• Full written building Condition Survey Report outlining the condition of the internal and external components of each property<br>• A series of photographs of each identified defect/crack<br>• A sketched floor plan showing the exact location of each defect and measurements of crack width/defect size<br>• Identification of any condition changes relative to pre-construction and the likely cause of the change (post-construction only). |

Where vibration is found to exceed safe levels, impacts will be reduced by changing work methods and / or equipment, or through the provision of building protection measures where possible. In the event that a complaint relating to property damage is received, an inspection of the property will be undertaken and an interim building condition survey prepared.

Attended vibration monitoring will be undertaken to determine site-specific minimum working distances for structural damage and human response. Site-specific minimum working distances will be determined whenever significant vibration generating plant will be working close to or within the recommended minimum working distances listed in Table 3.7. Details of site activity and equipment usage will be noted during monitoring.

### 4.2.1 Vibration monitoring equipment

Vibration monitoring equipment will be used and calibrated in alignment with manufacturers guidelines. Monitoring methods and instrumentation employed in the vibration monitoring surveys will comply with AS2775.2004 Mechanical vibration and shock—Mechanical mounting of accelerometers and AS2670.1 Evaluation of human exposure to whole body vibration.

As heritage items are located outside of safe working distances impacts are unlikely and no monitoring of heritage items is required.

# 5 COMPLIANCE REQUIREMENT

## 5.1 Noise and Vibration Monitoring Locations

The locations of noise and vibration sensitive receivers are shown in Figure 2.1. Noise monitoring locations will include representative sensitive receivers relevant to the Project stage.

- Noise monitoring will also be undertaken for non-sensitive receivers predicted to be impacted by moderate exceedances of the NML (refer to Table 8.2 of the CNVMP) from work in standard hours.
- Vibration monitoring will be undertaken at vibration sensitive locations within the 'minimum working distances' established for each item of plant during the commencement of use of each plant on site.
- Attended noise and vibration monitoring locations will include locations onsite where the commencement of operation for each new plant or activity has the potential to generate significant noise or vibration levels (refer to sound power levels in Table 5.1 of the Environmental Impact Statement). This may also include specific attended noise and/or vibration monitoring of significant plant items, such as earthmoving plant.

## 5.2 Adaptive Management

This section outlines the procedures to identify and implement additional mitigation measures where monitoring indicates noise and/or vibration levels in excess noise and vibration criteria.

Should noise and vibration monitoring results directly attributable to the Project exceeding the criteria set out in Section 3 of this Monitoring Program, the following steps will be undertaken:

- Analysis of the results by the Construction Contractor and noise consultant in consultation with the ER in more detail with a view of determining possible causes for the exceedance
- Site inspection by the ER
- Advising relevant personnel of the problem
- Identifying and agreeing on actions and/or additional mitigation measures to resolve or mitigate the exceedance
- Implementing actions to rectify or mitigate the exceedance, including stop work arrangements where necessary or if directed by the ER
- Identifying and implementing additional mitigation measures.

Where actual noise levels are found to exceed the predicted worst case levels (refer to Table 6.1 and Table 6.2 of the CNVMP), the source of excessive noise generations will be identified, and any additional feasible and reasonable measures available will be implemented to either reduce noise emissions or reduce the impacts on receivers. Where necessary, monitoring will be implemented to follow-up on any noise and vibration issues that arise during construction.

Where vibration is found to exceed safe levels, impacts will be reduced by changing work methods and / or equipment, or through the provision of building protection measures where possible. In the event a complaint relating to property damage is received, an inspection of the property will be undertaken and an interim building condition survey prepared.

Mitigation measures and preventative / corrective actions will be developed in accordance with procedures for dealing with non-compliance with environmental management measures outlined in Section 7.2 of the CEMP. Verification and documentation of the effectiveness of any management measures or preventative / corrective actions implemented to avoid further exceedances will be required.

# 6 REPORTING

## 6.1 Construction Noise and Vibration Monitoring Report

The Construction Noise and Vibration Monitoring Reports will detail the results of the monitoring undertaken for the Project, in accordance with this Monitoring Program. The Noise and Vibration Monitoring Reports will be undertaken as soon as the first noise and vibration monitoring event takes place during construction.

The results of the monitoring will be collected in the form of a Construction Noise and Vibration Monitoring Report as per NSW CoA C17. The Monitoring Reports will be prepared and submitted to the Planning Secretary every six months and to relevant regulatory agencies for information in accordance with NSW CoA C16 and published on the National Intermodal website.

Reports will include, but not be limited to, the following information:

- The date(s) and time at which the monitoring was undertaken
- The locations and description of monitoring undertaken
- The name of the person who undertook the monitoring
- Tabulations of monitoring data
- Compliance monitoring results with the criteria identified in Section 3 of this Monitoring Program
- Identification of exceedances of the nominated criteria and descriptions of the causes of these exceedances
- Details of any alteration to the Monitoring Program
- Summary of any complaints received regarding noise and vibration

The Construction Contractor will maintain accurate records of all noise and vibration monitoring activities.