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MOORBANK PRECINCT WEST STAGE 2 / STAGE 3

Construction Noise and Vibration Management Plan

17 December 2021

Qube Property Management Services Pty Ltd

TJ741-06F02 MPWS2 MPWS3 CNVMP (r16).docx

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1 Introduction

The Sydney Intermodal Terminal Alliance (SIMTA) received approval for the construction and operation of Stage 2 of the Moorebank Precinct West (MPW) Project (ref. SSD-7709) on the 11th November 2019, which comprises the second stage of development under the MPW Concept Approval (ref. SSD-5066).

The Sydney Intermodal Terminal Alliance (SIMTA) received approval for Stage 3 of the Moorebank Precinct West (MPW) Project (ref. SSD-10431) on the 11th May 2021, which comprises the third stage of development under the MPW Concept Approval (ref. SSD-5066).

This Construction Noise and Vibration Management Plan (CNVMP) has been developed to manage noise and vibration impacts during the construction phase of Stage 2 (MPWS2) and Stage 3 (MPWS3) of the MPW Project (together herein referred to as the Project).

Within this plan, a strategy has been established to demonstrate the contractor's approach to the management of construction noise and vibration impacts. This CNVMP addresses the relevant requirements of the project approvals, including the Environmental Impact Statements (EIS), response to submissions (RtS), the MPW Stage 2 SSD 7709 Conditions of Consent (MPWS2 CoC) and the MPW Stage 3 SSD 10431 Conditions of Consent (MPWS3 CoC), and all applicable guidelines and standards specific to the management of noise and vibration during the construction phase of the Project.

The work documented in this report was carried out in accordance with the Renzo Tonin & Associates Quality Assurance System, which is based on Australian Standard / NZS ISO 9001. Appendix A contains a glossary of acoustic terms used in this report.

2 Project Description

2.1 Background

The Moorebank Logistics Park (MLP) is located approximately 27 kilometres (km) south-west of the Sydney Central Business District (CBD) and approximately 26km west of Port Botany. The MLP is situated within the Liverpool Local Government Area (LGA) in Sydney's south west, approximately 2.5km from the Liverpool city centre.

The Project involves the construction and operation of a multi-purpose Intermodal Terminal (IMT) facility, rail link connection, warehousing, freight village, and upgrades to the Moorebank Avenue and Anzac Road intersection. Details on the key components of the Project include:

- IMT facility comprising:
  - Infrastructure to support a container freight throughput volume of 500,000 twenty-foot equivalent units (TEU) per annum
  - Installation of nine (9) rail sidings and associated locomotive shifter
  - Capacity to receive trains up to 1.8 km in length
  - Truck processing, holding and loading areas
  - Container storage area serviced by manual handling equipment
  - Container wash-down facilities and de-gassing area
  - Administration facility, engineer's workshop and associated car parking.
- Rail link connection including:
  - Construction of the rail link connection, which links the sidings within the IMT facility to the rail link, which will be constructed as part of the Moorebank Precinct East (MPE) Project SSD 6766
  - Operation of the rail link connection and the rail link from the rail link connection to the Southern Sydney Freight Line (SSFL).
- Warehousing area including:
  - Construction of approximately 215,000 m^2 gross floor area (GFA) of warehousing, plus ancillary offices, with warehouses ranging in size from 21,000 m^2 to 61,000 m^2 and with associated warehouse access roads.
- Freight village including:
  - Construction and operation of approximately 800 m^2 of retail premises, with access from the internal road.

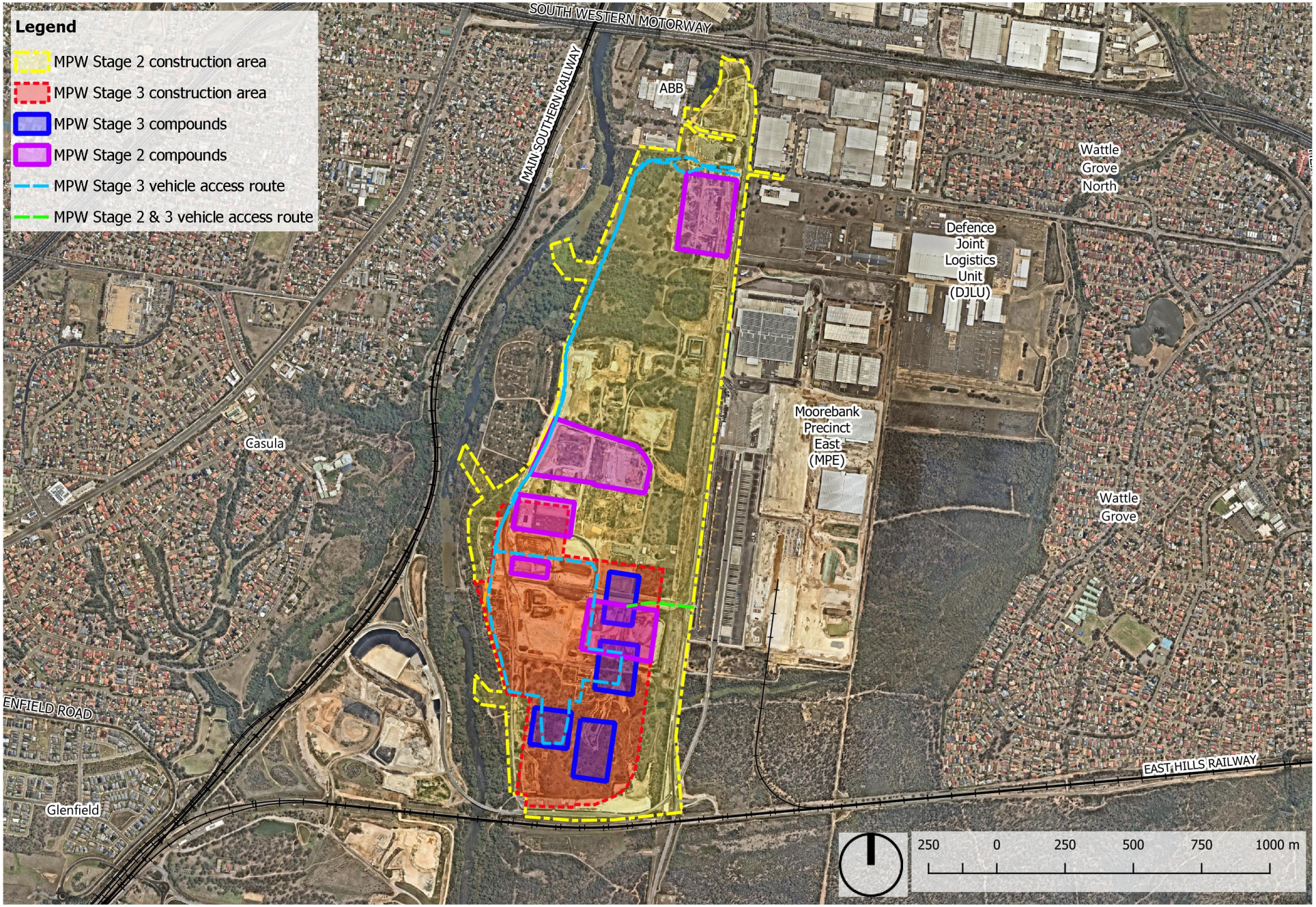
- Upgraded intersection on Moorebank Avenue, which will provide Project site access and egress, and construction of an internal road
- Ancillary works including:
  - Vegetation clearing
  - Earth works, including importation of 1,600,000 m^3 of fill
  - Utilities installation / connection
  - Signage
  - Landscaping.
- Progressive subdivision of the MPW site into nine allotments as part of MPW Stage 3 (SSD 10431), for the purposes of creating separate lots for the intermodal terminal facility (IMT) and rail link corridor, for warehousing and distribution facilities, biodiversity conservation.

The MPWS3 component of the Project involves the following construction works (the establishment and operations of these construction activities). The layout and works areas for Stage 3 are presented in Figure 1. MPWS3 component includes:

- Establishment of the MPW Stage 3 works compound
- Ancillary works to facilitate the MPWS3 progressive subdivision, including access roads, earthworks, utilities, stormwater and drainage, signage and landscaping
- Importation of fill to achieve the finished site surface level.

The location of the Project site is shown in Figure 1.

Figure 1 – Site location *(Imagery: Nearmap 2020)*



2.2 Development Consent

The MPW Stage 2 Project has been assessed by the Department of Planning, Industry and Environment (DPIE) under Part 4, Division 4.7 of the *Environmental Planning and Assessment Act* 1979 (EP&A Act) as a State significant development (SSD). The MPW Stage 2 application was approved by The Independent Planning Commission (IPC) on the 11th November 2019 (SSD 7709) and development conditions of consent conditions were issued (MPWS2 CoC). The component of the Project, including its potential impacts, consultation and proposed mitigation and management is documented in the following documents:

- Development Consent SSD 7099 (11th November 2019)
- Moorebank Precinct West – Stage 2 – Environment Impact Statement (Arcadis Australia Pacific Pty Limited, October 2016)
- Moorebank Precinct West – Stage 2 – Response to Submissions (Arcadis Australia Pacific Pty Limited, July 2017)
- *Environment Protection and Biodiversity Conservation Act* 1999 (EPBC Act) Approval (No. 2011/6086) granted on 27 September 2016.

The MPW Stage 3 Project has been assessed by the Department of Planning, Industry and Environment (DPIE) under Part 4, Division 4.7 of the *Environmental Planning and Assessment Act* 1979 (EP&A Act) as a State significant development (SSD). The MPW Stage 3 application was approved by The Independent Planning Commission (IPC) on the 11th May 2021 (SSD 10431) and development conditions of consent conditions were issued (MPWS3 CoC). The component of the Project, including its potential impacts, consultation and proposed mitigation and management is documented in the following documents:

- Development Consent SSD 10431 (11th May 2021)
- Moorebank Precinct West – Stage 3 – Environment Impact Statement (Aspect Environmental, April 2020)
- Moorebank Precinct West – Stage 3 – Response to Submissions (Aspect Environmental, August 2020)

2.3 Project Delivery Phases

The construction period of the Project is anticipated to be approximately 42 months. Construction works have been divided into delivery phases which are interrelated and may overlap.

The terminology for the Project delivery phases has been developed from the preparation of the EIS and RtS documentation in response to the requirements of the CoC and the need to stage the delivery of the environmental management documentation required by the CoC. The Project delivery phases, equivalent CoC and RtS phases, current terminology and the equivalent terminology from the CoC and RtS are included in Table 1.

Table 1 – Project Delivery Phase Terminology

Works Activity	Project Delivery Phase	MPW Stage 2 RtS & Stage 3 Works Period Equivalent
Pre-Construction	Site Preparation	Works period B – Site preparation activities
Construction	Benching	Works period C – Bulk earthworks, drainage and utilities
	Roads	Works period D – Moorebank Avenue intersection works and internal road network
	Terminal and Rail	Works period E – IMT facility and rail link connection construction
	Warehousing	Works period F – Construction and fit-out of warehousing and freight village
		Works period G – Miscellaneous structural construction and finishing works
	Support	Stage 3 temporary construction support compound and laydown/stockpile locations

2.3.1 Construction Program

Construction of the Project is proposed to take 42 months and with MPWS2 having commenced during quarter three of 2020. The completion of construction is expected to occur in quarter four of 2023. The final construction program will depend on the market demand for warehouses to be constructed on the project site and will be confirmed prior to construction works starting on site.

The indicative construction program is shown in Table 2.

Table 2 – Indicative construction program

Construction Phase[1]	2020				2021				2022				2023				2024			
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
SSD 7709 MPW Stage 2																				
Works period B – Pre-construction stockpiling																				
Works period B – Site preparation activities																				
Works period C – Bulk earthworks, drainage and utilities																				
Works period D – Moorebank Avenue/Anzac Road intersection works and internal road network																				
Works period E – IMT facility and rail link connection																				
Works period F & G – Construction and fit-out of warehousing																				
Works period F & G – Freight village																				

Construction Phase[1]	2020				2021				2022				2023				2024			
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
SSD 10431 MPW Stage 3																				
Fill importation																				
Internal roads, services and utilities																				
Construction compound																				

Notes: 1. Timings are indicative only and are subject to change. Construction phasing is subject to market conditions, commercial agreements and authority approvals.

2.3.2 Construction Hours

Construction hours are divided into two scenarios:

1. Standard construction hours
2. Out of Hours Works (OOHW)

The standard construction hours for the Project, subject to different hours being permitted or required under an Environment Protection Licence (EPL), are defined by MPWS2 CoC B125 and MPWS3 CoC C3 as follows:

- 7:00am to 6:00pm, Monday to Friday
- 8:00am to 1:00pm, Saturday

Works that are not captured within standard construction hours may be undertaken through the OOHW Protocol (Appendix A) developed in accordance with MPWS2 CoC B127, MPWS2 B135 and MPWS3 CoC C4. Table 3 presents a summary of the timeframes that constitute standard construction hours and OOHW.

Table 3 – Depiction of Construction Hours

Day/ Time	1am – 2am	2am – 3am	3am – 4am	4am – 5am	5am – 6am	6am – 7am	7am – 8am	8am – 9am	9am – 10am	10am – 11am	11am – 12pm	12pm – 1pm	1pm – 2pm	2pm – 3pm	3pm – 4pm	4pm – 5pm	5pm – 6pm	6pm – 7pm	7pm – 8pm	8pm – 9pm	9pm – 10pm	10pm – 11pm	11pm – 12am
Mon																							
Tue																							
Wed																							
Thurs																							
Fri																							
Sat																							
Sun / Pub. Holiday																							

Notes: 1. Green highlight = Standard Construction Hours
2. Red highlight = Out of Hours Work (OOHW)

The OOHW work construction period is divided further into the periods detailed in Table 4. The OOHW work construction periods shown in Table 4 are the typical OOHW periods required by the Project and no construction works are anticipated on Sundays or Public Holidays. Additional OOHW periods may be determined during the construction process; however, any works will be subject to the OOHW Protocol presented in Appendix A.

Table 4 – OOHW Periods

OOHW Period	Time	Days
OOH Period 1	6.00am – 7.00am	Monday to Friday
OOH Period 2	6.00pm – 10.00pm	Monday to Friday
OOH Period 3	6.00am – 7.00am	Saturday
OOH Period 4	7.00am – 8.00am	Saturday
OOH Period 5	1.00pm – 6.00pm	Saturday
OOH Period 6	6.00pm – 9.00pm	Saturday

2.4 Purpose and Application

This CNVMP has been developed to address the CoC, the Final Compilation of Mitigation Measures (FCMMs) for MPWS2, the Revised Compilation of Mitigation Measures (RCMMs) for MPWS3 and Revised Environmental Mitigation Measures (REMMs) and is based on the noise and vibration impact assessment presented in the MPWS2 EIS NVIA as prepared by Wilkinson Murray (WM Report No. 15324 Version D, dated October 2016) and the MPWS3 EIS NVIA as prepared Renzo Tonin & Associates (RTA Report TJ741-09F02 (r8) Moorebank Precinct West - Stage 3 EIS NVIA, 27 July 2020).

This CNVMP aims to demonstrate how impacts to noise and vibration will be managed during the construction phase of the Project and provides methods to measure and reduce the noise and vibration impacts by the contractor/s, including all sub-contractors and consultant partners, during construction.

The specific requirements of the CoC for compilation of this CNVMP, as identified in the CoC and FCMM/RCMM, are identified in Section 3.1.2 of this plan.

The most recent, approved version of the plan will be implemented to manage the Project's construction activities.

2.5 Objectives and Targets

Table 5 outlines the objectives and targets set out for the Project for the management of noise and vibration impacts during construction.

Table 5 – Objectives and Targets

Objective	Target	Timeframe	Accountability
Ensure construction noise and vibration impacts on community, commercial stakeholders and structures are minimised	100% compliance with approved hours of work. No exceedances of noise or vibration criteria. No structural or cosmetic damage to nearby buildings or structures due to vibration relating to works.	Duration of Early Works and Construction	Contractor's Construction Manager (CM)
Ensure compliance with relevant CoCs, applicable legislative and other requirements	No written warnings or infringement notices	Duration of Early Works and Construction	Contractor's Environmental Manager (EM)
Ensure that reasonable and feasible mitigation measures are implemented to manage impacts on surrounding residents and commercial stakeholders	No exceedances of noise or vibration criteria	Duration of Early Works and Construction	Contractor's EM
Ensure that affected residents and other stakeholders are kept informed of upcoming works, extended hours, out of hours works (if required) and mitigation measures	No validated complaints from the community regarding noise or vibration.	Duration of Early Works and Construction	Contractor's Community Liaison Manager (CLM)

3 Environmental Management

3.1 Environmental Obligations

Table 6 details the legislation, planning instruments and guidelines considered during development of this sub-plan.

Table 6 – Legislation, Planning Instruments and Guidelines

Legislation	Description	Relevance to this CNVMP
Environmental Planning and Assessment Act 1979	Establishes a system of environmental planning and assessment of development proposals for the State	The CoC for Consents listed in Section 2.2 and associated obligations are incorporated into this plan
Protection of the Environment Operations Act 1997	Aims to achieve the protection, restoration and enhancement of the quality of the NSW environment	All plant will be operated in a proper and efficient manner such that noise is minimised during construction.
Interim Construction Noise Guideline (ICNG), Department of Environment and Climate Change 2009	Current NSW guideline for the assessment and management of construction noise.	Noise management levels (NMLs) have been established in accordance with this guideline.
NSW Road Noise Policy (RNP), Department of Environment, Climate Change and Water 2011	Defines criteria to be used in assessing the impact of road traffic noise.	Assists the establishment of criteria for construction-related road traffic noise.
Assessing Vibration – a technical guideline (AVTG), Department of Environment and Conservation 2006	Based on BS6472–1992, Evaluation of human exposure to vibration in buildings. Presents preferred and maximum vibration values for use in assessing human responses to vibration and provides recommendations for measurement and evaluation techniques	Used for the assessment of vibration (disturbance to building occupants). MPWS2 CoC B135(d) and MPWS2 CoC C12 requires the vibration criteria for human exposure to be observed.
Australian Standard AS2436-1981 Guide to Noise Control on Construction, Maintenance and Demolition Sites	Provides guidance for noise control on construction, maintenance and demolition sites.	Supporting technical standard.
German Standard DIN4150-2016 Structural vibration Part 3: Effects of vibration on structures	Used for the assessment of vibration (structural damage to buried services)	Supporting technical standard. MPWS2 CoC B135(d) and MPWS2 CoC C12 requires the vibration limits for structural damage to be observed.

3.1.1 Interim Construction Noise Guideline

The aim of the ICNG is to provide guidance on managing construction works to minimise noise, with an emphasis on communication and cooperation with all involved in, or affected by, construction noise.

The ICNG states there is no single approach to minimise noise from all types of construction. The level of effort and sophistication needed to assess impacts and identify ways to minimise noise will be guided by factors such as the duration of works and the extent of the noise. Compliance with Noise

Management Levels (NMLs), short-term works or low noise level works will be typically easier to assess and manage.

Section 1.5 of the ICNG identifies the key steps for managing noise impacts from construction. These steps are outlined in Table 7 with references to where in this CNVMP the requirements have been addressed. This CNVMP has been prepared to be consistent with the guidelines contained in the ICNG.

Table 7 – ICNG Key Requirements

Requirement	Referenced in this CNVMP	How Addressed
Identify sensitive land uses that may be affected	Section 4.2	Residential and non-residential receivers most potentially affected by noise from the construction of the Project have been identified
Identify hours for the proposed construction works	Section 2.3.2	A number of periods have been identified where construction works are proposed for the Project.
Identify noise impacts at sensitive land uses	Section 4.14.1	Background noise levels established through noise monitoring at residential receivers for the development of NMLs
	Section 4.3.1	NMLs established for residential and non-residential land uses
	Section 4.4.4	Construction plant items and associated noise levels established for a number of scenarios. Noise levels at sensitive receivers predicted and compared to NMLs
Select and apply the best work practices to minimise noise impacts	Section 3.4	Management measures have been identified and developed in consideration of the ICNG, development consent and final compilation of mitigation measures from the RtS

3.1.2 Compliance Matrices

The Project is being delivered under Part 4, Division 4.7 of the EP&A Act. The CoC include requirements that need to be addressed in this plan and delivered during the Project.

The relevant consent conditions for both MPWS2 and MPWS3 and how they are addressed are provided within Table 8.

Table 8 – Conditions of Consent Requirements

CoC	Requirement	Referenced in this CNVMP	How Addressed
	MPWS2 (SSD 7709)		
A1	In addition to meeting the specific performance measures and criteria in this consent, all reasonable and feasible measures must be implemented to prevent, and if prevention is not reasonable and feasible, minimise, any material harm to the environment that may result from the construction and operation of the development, and any rehabilitation required under this consent.	Section 4.5 Section 4.6 APPENDIX A	Section 4.5 and Section 4.6 of this CNVMP identifies the management and mitigation measures to be implemented to prevent and minimise environmental harm. Additional management mitigation measures have been included within the Out of Hours protocol in APPENDIX A

<table>
<tr><th>CoC</th><th>Requirement</th><th>Referenced in this CNVMP</th><th>How Addressed</th></tr>
<tr><td>A2</td><td>The Applicant must ensure that all of its employees, contractors (and their sub-contractors) are made aware of, and are instructed to comply with, the conditions of this consent relevant to activities they carry out in respect of the development.</td><td>Section 3.3</td><td>All site personnel, contractors and sub-contractors shall undergo site specific induction training, which will include noise and vibration management training developed with an emphasis on understanding and managing noise impacts from the work activities being undertaken.</td></tr>
<tr><td>A3</td><td>The development may only be carried out:
(a) in compliance with the conditions of this consent;
(b) in accordance with all written directions of the Planning Secretary;
(c) in accordance with the EIS, Response to Submissions (RtS) and Consolidated assessment clarification responses; and
(d) in accordance with the management and mitigation measures in Appendix 2</td><td>This Plan</td><td>This CNVMP has been developed to comply with the CoC, written directions of the Secretary, amended development layout and management and mitigation measures outlined in Appendix B of the MPWS2 CoC.</td></tr>
<tr><td>B125</td><td>The Applicant must comply with the hours detailed in Table 2.
Table 2: Hours of Work<table><tr><th>Activity</th><th>Day</th><th>Time</th></tr><tr><td>Construction</td><td>Monday – Friday</td><td>7 am to 6 pm</td></tr><tr><td></td><td>Saturday</td><td>8 am to 1 pm</td></tr></table></td><td>Section 2.3.2
Section 4.5</td><td>Construction hours to be complied with unless works outside these hours are permitted by other conditions of consent</td></tr>
<tr><td>B126</td><td>Except as permitted by an EPL, activities resulting in highly noise intensive works (including impulsive or tonal noise emissions) must only be undertaken:
(a) between the hours of 8:00 am to 5:00 pm Monday to Friday;
(b) between the hours of 8:00 am to 1:00 pm Saturday; and
(c) in continuous blocks not exceeding three hours each with a minimum respite from those activities and works of not less than one hour between each block.
Note 1: For the purposes of this condition, 'continuous' includes any period during which there is less than a one-hour respite between ceasing and recommencing any of the work that is the subject of this condition.
Note 2: Section 4.42(1)(e) of the EP&A Act requires that an EPL be substantially consistent with this approval. Out-of-hours works considered under Condition B127 must be justified and include an assessment of mitigation measures.</td><td>Section 4.5</td><td>Addressed by NV14 in Table 37 of Section 4.5</td></tr>
</table>

CoC	Requirement	Referenced in this CNVMP	How Addressed
B127	Construction outside of the hours identified in Condition B125 may be undertaken in any of the following circumstances: (a) works that are inaudible at the nearest sensitive receivers; (b) where a negotiated agreement has been arranged with affected receivers; (c) for the delivery of materials required outside these hours by the NSW Police Force or other authorities for safety reasons; (d) where it is required in an emergency to avoid the loss of lives, property or to prevent environmental harm; or (e) works associated with: i. the Moorebank Avenue/Anzac Road upgrade, the delivery of the rail link connection, and works required to be undertaken during rail corridor possession where they are undertaken in accordance with an Out-Of-Hours Work Protocol under Condition B135; or ii. any other construction works on the site where they are undertaken Out-of-Hours must be in accordance with the approved Out-of-Hours Work Protocol (OOHWP) required under condition B135.	Section 4.4.1.2 APPENDIX A	Circumstances in which Out-Of-Hours works may be undertaken is explained in Section 4.4.1.2 and APPENDIX A
B128	Blasting is not permitted on the site.	Section 4.4.1.1	No blasting activities are proposed or permitted.
B134	Prior to commencement of construction, the Applicant must prepare a Construction Noise and Vibration Management Plan (CNVMP) and submit it to the Planning Secretary for approval. The CNVMP must be consistent with the guidelines contained in the ICNG (DECC, 2009).	This plan	Requirements of the ICNG are addressed in Section 2.1.1 and this CNVMP is assessed against the ICNG.
B135	The CNVMP must form part of the CEMP required by Condition C2 and, in addition to the general management plan requirements listed in Condition C1, the CNVMP must include:		
	(a) identification of the work areas, site compounds and internal access routes	Figure 3	Figure 3 shows site compounds, access points and work areas
	(b) identification of the type and number of plant and equipment expected on site at the same time;	Section 4.4.3; Table 28	Table 28 identifies the types and the number of construction plant and equipment that will be used during each phase of construction.
	(c) details of construction activities and a construction program, including the identification of key noise and/ or vibration generating construction activities (based on representative construction scenarios) that have the potential to generate noise and/ or vibration impacts on surrounding sensitive receivers, particularly residential areas;	Section 2.3.1	Section 2.3.1 details the construction program including identification of key noise and vibration generating construction activities.

CoC	Requirement	Referenced in this CNVMP	How Addressed
	(d) identification of sensitive receivers (including heritage structures if relevant) and relevant construction noise management levels (NMLs) using the ICNG, vibration criteria using the Assessing Vibration: a Technical Guide (DECC 2006) (for human exposure) and vibration limits set out in the German Standard DIN 4150-3: Structural Vibration effects of vibration on structures (for structural damage);	Section 4.2 Section 4.3.1 Section 4.3.2	Section 4.2 identifies sensitive receivers including heritage structures Section 4.3.1 establishes the NMLs using the ICNG Section 4.3.2 establishes the vibration criteria for both human exposure and structural damage
	(e) identification of any construction activities predicted to exceed NMLs; Note: The ICNG identifies 'particularly annoying' activities that require the addition of 5dB(A) to the predicted level before comparing to the construction NML.	Section 4.4.4 Table 31	Table 31 presents the predicted construction noise levels from construction activities at all identified receiver locations
	(f) identification of feasible and reasonable measures to be implemented to minimise and manage construction noise impacts, including, but not limited to, acoustic enclosures, erection of noise walls (hoardings), respite periods; and in accordance with the EIS, Response to Submissions (RtS) and Consolidated assessment clarification responses; and	Section 4.5; Table 37 Section 4.6, Table 38	Table 37 and Table 38 includes the requirements of the CoC, FCMM, REMM, ICNG and best practice management measures.
	(g) an **Out-of-hours Work Protocol** for the assessment, management and approval of works outside of the hours identified in **Condition B125**. The **Out-of-hours Work Protocol** must: (i) detail an assessment of out-of-hours works against the relevant NMLs and vibration criteria, (ii) provide detailed mitigation measures for any residual impacts (that is, additional to general mitigation measures), including extent of at-receiver treatments, and (iii) include proposed notification arrangements.	Section 4.4.1.2 APPENDIX A	The Out-of-Hours Work Protocol is included in Section 4.4.1.2 and APPENDIX A
B138	Prior to construction of the freight terminal, freight village and each warehouse, the Applicant must submit to the Secretary a Noise Assessment for Mechanical Plant and other noisy equipment to demonstrate that plant and equipment has been selected to meet the overall noise limits specified in Table 4.	Not referenced in this CNVMP as condition is applicable to operational noise	Noise assessment for mechanical plant and other noisy equipment will be submitted prior to construction of freight terminal, freight village and each warehouse.
B186	The CEMP required under Condition C2 must include mitigation, monitoring and management procedures specific to the crushing plant that would be implemented to minimise environmental and amenity impacts.	Section 4.5 Section 4.6 Table 30 Section 5.1.1	Crushing plant must adhere to management and mitigation measures presented in Section 4.5 and Section 4.6. Noise levels from crushing plant shall be verified in accordance with Section 5.1.1 and Table 30.

CoC	Requirement	Referenced in this CNVMP	How Addressed
B188	All plant and equipment used on site, or to monitor the performance of the development must be: (a) maintained in a proper and efficient condition; and (b) operated in a proper and efficient manner.	Section 4.5 Table 37 NV7 and NV8	All plant and equipment will be maintained and operated in a proper and efficient manner (NV7 and NV8).

CoC	Requirement	Referenced in this CNVMP	How Addressed
C1	Management plans required under this consent must be prepared in accordance with relevant guidelines, and (a) detailed baseline data; (b) details of: (i) the relevant statutory requirements (including any relevant approval, licence or lease conditions); (ii) any relevant limits or performance measures and criteria; and (iii) the specific performance indicators that are proposed to be used to judge the performance of, or guide the implementation of, the development or any management measures; (c) a description of the measures to be implemented to comply with the relevant statutory requirements, limits, or performance measures and criteria; (d) a program to monitor and report on the: (i) impacts and environmental performance of the development; (ii) effectiveness of the management measures set out pursuant to paragraph (c) above; (e) a contingency plan to manage any unpredicted impacts and their consequences and to ensure that ongoing impacts reduce to levels below relevant impact assessment criteria as quickly as possible; (f) a program to investigate and implement ways to improve the environmental performance of the development over time; (g) a protocol for managing and reporting any: (i) incident and any non-compliance (specifically including any exceedance of the impact assessment criteria and performance criteria); (ii) complaint; (iii) failure to comply with statutory requirements; (h) roles and responsibilities for implementing the plan; and (i) a protocol for periodic review of the plan. Note: The Planning Secretary may waive some of these requirements if they are unnecessary or unwarranted for particular management plans	(a) ection 4.1 (b) ection 3.1, Section 4.3 (c) ection 4.5 (d) ection 5.1, Section 5.3 (e) ection 5.2 (f) ection 5.1 Section 5.3 (g) ection 5.1.5, Section 5.2, Section 5.5 (h) ection 3.2 (i) ection 5.3	(a) Section 4.1 details existing background noise levels (b) Section 3.1 details legislative requirements, noise and vibration criteria are detailed in Section 4.3 (c) Section 4.5 details management measures (d) Section 5.1 details monitoring requirements, reporting is outlined in Section 5.1.4. Section 5.3 details the effectiveness of management measures (e) Section 5.2 details measures to be followed in the event of an exceedance or complaint (f) Section 5.1 details monitoring and reporting requirements. Section 5.3 details the mechanism to review and improve performance (g) Section 5.2 details incident and complaints management. This is further detailed within the CEMP and Section 5.1.5 and Section 5.5 detail the process for managing non-compliances (h) Section 3.2 details the roles and responsibilities for implementing this plan (i) Section 5.3 details periodic review.

CoC	Requirement	Referenced in this CNVMP	How Addressed
	MPW Stage 3 (SSD 10431)		
A1	In addition to meeting the specific performance measures and criteria in this consent, all reasonable and feasible measures must be implemented to prevent, and, if prevention is not reasonable and feasible, minimise any material harm to the environment that may result from the construction and operation of the development.	Section 4.5 Section 4.6 APPENDIX A	Section 4.5 and Section 4.6 of this CNVMP identifies the management and mitigation measures to be implemented to prevent and minimise environmental harm. Additional management mitigation measures have been included within the Out of Hours protocol in APPENDIX A
A2	The development may only be carried out: (a) in compliance with the conditions of this consent; (b) in accordance with all written directions of the Planning Secretary; (c) generally in accordance with the EIS and Response to Submissions; (d) generally in accordance with the management and mitigation measures in **Appendix 3** (e) in accordance with the approved subdivision plans in the table below *[see MPWS3 CoC for list]*	This Plan	This CNVMP has been developed to comply with the CoC, written directions of the Secretary, amended development layout and management and mitigation measures outlined in Appendix 3 of the MPWS3 CoC.
A13	Only one crushing plant is to operate at any one time across the MPW site (i.e. under either MPW Stage 2 consent or the conditions of this consent). Any crushing plant operated as part of MPW Stage 3 can only be operated once any existing crushing plant operated as part of MPW Stage 2 (SSD 7709) has been decommissioned.	Section 4.4.3 Section 4.5	Only one crushing plant is to operate at any one time across the MPW site (NV18). Addressed by NV18 in Table 37 of Section 4.5
A39	The Applicant must ensure that all of its employees, contractors (and their sub-contractors) are made aware of, and are instructed to comply with, the conditions of this consent relevant to activities they carry out in respect of the development.	Section 3.3	All site personnel, contractors and sub-contractors shall undergo site specific induction training, which will include noise and vibration management training developed with an emphasis on understanding and managing noise impacts from the work activities being undertaken.
B16	Management plans required under this consent must be prepared having regard to the relevant guidelines, including but not limited to the *Environmental Management Plan Guideline: Guideline for Infrastructure Project* (DPIE April 2020).	This Plan	The approved MPW Stage 2 CNVMP (Rev 8, dated 6 February 2021) has been reviewed against the guideline and revised to include the requirements of the MPW Stage 3 (SSD 10431) development consent. This revised CNVMP generally meet the requirements of the guideline.
B17	Prior to the commencement of construction, the Applicant must submit a Construction Environmental Management Plan (CEMP) to the Certifier and provide a copy to the Planning Secretary for approval. The CEMP must include, but not be limited to, the following: ... (j) Construction Noise and Vibration Management Sub-Plan (see condition B21);	This Plan	This Construction Noise and Vibration Management Sub-Plan has been prepared to address the requirements of MPWS3 CoC B21

CoC	Requirement	Referenced in this CNVMP	How Addressed
B21	The Construction Noise and Vibration Management Sub-Plan (CNVMSP) must address, but not be limited to, the following:		
	(a) be prepared by a suitably qualified and experienced noise expert;	Table 11	Authors of this documents are members of the Australian Acoustical Society
	(b) describe procedures for achieving the noise management levels in EPA's Interim Construction Noise Guideline (DECC, 2009);	Section 3.1 Section 4.3 Section 4.5 Section 4.6	Noise and vibration management levels are detailed in Section 4.3, derived in accordance with the EPA's Interim Construction Noise Guideline (DECC, 2009) as detailed in Section 3.1. Section 4.5 and 4.6 details the management and mitigation measures to address these.
	(c) describe the measures to be implemented to manage high noise generating works such as piling, in close proximity to sensitive receivers;	Section 4.3.1 Section 4.5 Section 4.6	High noise generating works are managed by NV14 to address MPWS2 CoC B126 and NV15 to address MPWS3 CoC C6, a highly noise affected noise management level is established in Section 4.3.1, and Section 4.5 and Section 4.6 describe mitigation and the management measures to minimise noise impacts.
	(d) include strategies that have been developed with the Community Consultative Committee (CCC) for managing high noise generating works;	Section 5.3	New strategies are to be developed with the CCC as per Section 5.3.1 for managing high noise generating works. These will be reviewed, considered and incorporated where feasible and reasonable as part of the continual review and improvement of this Plan as per Section 5.3.
	(e) identify work areas, site compounds and internal access routes;	Section 2.1 and Figure 4	Site layout is included in Section 2.1 and Figure 4.
	(f) identify the type and number of plant and equipment expected on site at the same time;	Section 4.4 Section 4.4.3 Table 28	Potential construction activities and potential impacts are addressed in Section 4.4 (plant and equipment are specifically addressed in Section 4.4.3 Table 28)
	(g) include a complaints management system that would be implemented for the duration of the construction;	Section 5.1.5 Section 5.2 Section 5.4 Section 5.5 Section 5.6	Section 5.2, Section 5.4 and Section 5.6 details incident and complaints management. This is further detailed within the CEMP and Section 5.1.5 and Section 5.5 detail the process for managing non-compliances.
	(h) include a program to monitor and report on the impacts and environmental performance of the development and the effectiveness of the implemented management measures in accordance with the requirements of condition B17;	Section 5.1, Section 5.3	Section 5.1 details monitoring requirements, reporting is outlined in Section 5.1.4. Section 5.3 details the effectiveness of management measures
	(i) an **Out-of-hours Work Protocol** for the assessment, management and approval of works associated with the importation and placement of fill, outside of the hours identified in condition C3. The Out-of-hours Work Protocol must:	Section 4.4.1.2 APPENDIX A	The Out-of-Hours Work Protocol is included in Section 4.4.1.2 and APPENDIX A

CoC	Requirement	Referenced in this CNVMP	How Addressed
B21 *(cont.)*	(i) provide evidence of how feedback from the CCC has been incorporated to develop the Out-of-hours Work Protocol;	Section 5.3.1 Section A.3.1 APPENDIX A	Details this process and responses to consultation and feedback from the Moorebank Logistics Park Community Consultative Committee (CCC)
	(ii) specify what works are proposed out-of-hours;	Section A.5.2	As per Section A.5.2, Step 1 of the OOHW protocol requires identification of specific work activities requiring OOHW and when the work will occur.
	(iii) provide details and clear justification for why the works must be done out-of-hours (reasons other than convenience must be provided);	Section A.5.2	As per Section A.5.2, Step 1 requires the full justification for why OOHW are needed; does the work proposed need to be completed outside the approved hours of construction or can it be rescheduled for standard working hours. Reasons other than convenience must be provided with clear justification documented.
	(iv) detail an assessment of out-of-hours works against the relevant NMLs and vibration criteria;	Section A.5.2	As per Section A.5.2, Step 3 of the OOHW Protocol requires a CNVIS to be assessed for noise and vibration impacts on the surrounding receptors and compare the predicted values to the noise and vibration management levels
	(v) provide detailed mitigation measures for any residual impacts (that is, additional to general mitigation measures), including extent of at-receiver treatments; and	Section A.5.2	As per Section A.5.2, Step 3 of the OOHW Protocol requires a CNVIS to then provide a list of necessary mitigation and management measures (including at-receiver treatments) that will be required to be implemented.
	(vi) include proposed notification arrangements.	Section A.5.2	As per Section A.5.2, Step 9 of the OOHW Protocol requires community notification where medium and high impacts are predicted.
B24	A Driver Code of Conduct must be prepared and communicated by the Applicant to heavy vehicle drivers and must address the following: (a) minimise the impacts of earthworks and construction on the local and regional road network; ... (c) minimise road traffic noise; and	Section 4.4.5	A Driver's Code of Conduct has been prepared as an Appendix to the Construction Traffic Access Management Plan (CTAMP) to assist in the management of potential traffic and traffic noise related impacts.
C2	**Operation of Plant and Equipment** All construction plant and equipment used on site must be maintained in a proper and efficient condition and operated in a proper and efficient manner.	Section 4.5 Table 37 NV7 and NV8	All plant and equipment will be maintained and operated in a proper and efficient manner (NV6, NV7 and NV8).

CoC	Requirement	Referenced in this CNVMP	How Addressed
C3	**Construction Hours** Construction, including the delivery of materials to and from the site, may only be carried out between the following hours: (a) between 7am and 6pm, Mondays to Fridays inclusive; and (b) between 8am and 1pm, Saturdays. No work may be carried out on Sundays or public holidays.	Section 2.3.2 Section 4.5	Construction hours to be complied with unless works outside these hours are permitted by other conditions of consent
C4	Construction activities may be undertaken outside of the hours in condition C3 if required: (a) by the Police or a public authority for the delivery of vehicles, plant or materials; or (b) in an emergency to avoid the loss of life, damage to property or to prevent environmental harm; or (c) where the works are inaudible at the nearest sensitive receivers; (d) where a variation is approved in advance in writing by the Planning Secretary or his nominee if appropriate justification is provided for the works; or (e) where they are undertaken in accordance with an **Out-of-Hours Work Protocol** under condition **B21(i).**	Section 4.4.1.2 APPENDIX A	Circumstances in which Out-Of-Hours works may be undertaken is explained in Section 4.4.1.2 and APPENDIX A
C5	Notification of such construction activities as referenced in condition C4 must be given to affected residents before undertaking the activities or as soon as is practical afterwards.	Section 4.4.1.2 Appendix A	The Out-of-Hours Work Protocol is included in Section 4.4.1.2 and Appendix A
C6	Rock breaking, rock hammering, sheet piling, pile driving and similar activities may only be carried out between the following hours: (a) 9am to 12pm, Monday to Friday; (b) 2pm to 5pm Monday to Friday; and (c) 9am to 12pm, Saturday.	Section 4.5	Addressed by NV15 in Table 37 of Section 4.5
C9	**Construction Noise Limits** The development must be constructed to achieve the construction noise management levels detailed in the Interim Construction Noise Guideline (DECC, 2009). All feasible and reasonable noise mitigation measures must be implemented and any activities that could exceed the construction noise management levels must be identified and managed in accordance with the management and mitigation measures identified in the approved Construction Noise and Vibration Management Sub-Plan.	Section 3.1 Section 4.3 Section 4.5 Section 4.6	Noise and vibration management levels are derived in accordance with the EPA's Interim Construction Noise Guideline (DECC, 2009) as per Section 3.1 and in Section 4.3. Section 4.5 and 4.6 details the management and mitigation measures to address these.
C10	The Applicant must ensure construction vehicles (including concrete agitator trucks) do not arrive at the site or surrounding residential precincts outside of the construction hours of work outlined under condition C3.	Section 2.3.2 Section 4.5	Addressed by NV16 in Table 37 of Section 4.5

CoC	Requirement	Referenced in this CNVMP	How Addressed
C11	The Applicant must implement, where practicable and without compromising the safety of construction staff or members of the public, the use of `quackers' to minimise noise impacts on surrounding noise sensitive receivers.	Section 4.5	Addressed by NV17 in Table 37 of Section 4.5
C12	**Vibration Criteria** Vibration caused by construction at any residence or structure outside the site must be limited to: (a) for structural damage, the latest version of DIN 4150-3 (1992-02) Structural vibration - Effects of vibration on structures (German Institute for Standardisation, 1999); and (b) for human exposure, the acceptable vibration values set out in the Environmental Noise Management Assessing Vibration: a technical guideline (DEC, 2006) (as may be updated or replaced from time to time).	Section 4.3.2	Section 4.3.2 establishes the vibration criteria for both human exposure and structural damage
C13	Vibratory compactors must not be used closer than 30 metres from residential buildings unless vibration monitoring confirms compliance with the vibration criteria specified in condition C12.	Section 4.4.6.1	Safe working distances for vibratory compactors/rollers is presented in Table 36 (Section 4.4.6.1) applicable for the vibration levels in accordance with the requirements of MPWS3 CoC C12. Also addressed in NV4 in Table 37 of Section 4.5
C14	The limits in conditions C12 and C13 apply unless otherwise outlined in a Construction Noise and Vibration Management Sub-Plan, approved as part of the CEMP required by condition B17 of this consent.	Section 4.3.2.4 Section 4.5 Section 5.1.3	As per NV7 in Table 37 of Section 4.5, construction works are to adhere to the safe working distances identified in the CNVMP for vibration intensive plant. Where use of vibration intensive plant needs to occur within the safe working distances identified in this CNVMP and/or the predicted vibration level is higher than the screening levels presented in Section 4.3.2.4 then monitoring is required as per Section 5.1.3 to ensure the vibration levels are achieved and/or impacts appropriately managed.

The Final Compilation of Mitigation Measures (FCMM) were prepared as part of the consolidated assessment clarification responses issued to DPIE on 10 November 2017 (MPWS2) and Appendix 2 – Applicants Revised Management and Mitigation Measures (RCMM) of the MPWS3 CoC. A list of the FCMM/RCMM as relevant to the Projects and how they have been complied with in this plan are provided in Table 9.

Table 9 – Final Compilation of Mitigation Measures (FCMM) / Revised Compilation of Mitigation Measures (RCMM)

RCMM	Requirement	Document Reference
	MPWS2 (SSD 7709) FCMM – Condition of Consent Appendix 2	
2A	A Construction Noise and Vibration Management Plan (CNVMP), or equivalent, would be prepared for the Proposal in accordance with the Interim Construction Noise Guideline (or equivalent), and would give consideration to Revised Environmental Mitigation Measures (REMMs) 5A – 5B (of the MPW Concept Approval (SSD 5066)).	This plan
2B	The ambient noise monitoring surveys undertaken within Casula, Wattle Grove and Glenfield would be continued throughout the construction and operation of the Proposal (with annual reporting of noise results up to two years beyond the completion of the Proposal).	Section 5
2C	In the event of any noise or vibration related complaint or adverse comment from the community, noise and ground vibration levels would be investigated. Remedial action would be implemented where feasible and reasonable.	Section 5.1
2D	Noise mitigation measures would be implemented to affected residential receivers at Casula which are subject to noise impacts above the established noise criteria. These mitigation measures could include (but are not limited to) attenuation at the receiver (i.e. treatment of dwellings) and/or attenuation at the source (i.e. installation of a noise wall on the Proposal site). The need for the selection of noise mitigation measures, and timing for implementation, would be subject to noise monitoring during operations and further modelling to be undertaken following the commencement of operations. Provision has been made for a noise wall in the event that it is deemed necessary during operations.	Section 4.5 Section 4.6
2F	Management of vibration impacts to Kitchener House. In the event that plant items to be used for construction identified in Table 12 of the Noise Technical Memorandum (refer to Appendix D of this RtS) are proposed to be operated within their respective "Cosmetic Damage" safe working distances from Kitchener House, then attended vibration monitoring would be conducted at Kitchener House to verify that the 'safe' vibration level is not exceeded. If exceedances are approached, the work should cease immediately, and alternative construction methods should be used.	Section 4.5
	MPW Stage 3 (SSD 10431) RCMM – Condition of Consent Appendix 3	
0B	The Construction Environmental Management Plan (CEMP) and sub-plans prepared for MPW Stage 2 (listed below) will be amended, where required, to accommodate MPW Stage 3 conditions: ... Construction Noise and Vibration Management Plan (CNVMP), prepared in accordance with the Interim Construction Noise Guideline ...	This plan
2A	A Construction Noise and Vibration Management Plan (CNVMP) prepared for MPW Stage 2 will be further amended, as required, to accommodate MPW Stage 3 conditions.	This plan
2B	The ambient noise monitoring surveys undertaken within Casula, Wattle Grove and Glenfield would be continued throughout the construction of the Proposal (with annual reporting of noise results up to two years beyond the completion of the Proposal).	Section 5
2C	In the event of any noise or vibration related complaint or adverse comment from the community, noise and ground vibration levels would be investigated. Remedial action would be implemented where feasible and reasonable.	Section 5.1

The MPW Concept Proposal and Stage 1 Early Works was originally approved on 3 June 2016. The conditions of consent for the Stage 1 approval relate primarily to the management of Stage 1 Early Works or the assessment of later stages of development and are therefore not included in this plan.

The Revised Environmental Management Measures (REMMs) relevant to Moorebank Precinct West (MPW) Stage 2 and this plan are identified in Table 10.

Table 10 – Revised Environmental Management Measures (REMMs)

REMMs	Requirement	Document Reference
5A	A construction noise and vibration management plan (CNVMP) (or equivalent) would be developed for construction activities.	This plan
5B	The appropriateness of the noise and vibration management and mitigation measures in 5C to 5T are to be further investigated as part of the future development applications. These measures, or their replacement measures, are to be implemented through the CNVMP (or equivalent) prior to and during all noise-generating construction works for each of the Project phases.	This plan
5C	Construction activities associated with the Development shall be undertaken during the following standard construction hours: • 7.00 am to 6.00 pm Mondays to Fridays, inclusive; and • 8.00 am to 1.00 pm Saturdays • at no time on Sundays or public holidays. Works may be undertaken outside of standard construction hours, subject to assessment within, and approval of, future development applications	Section 2.3.2
5D	Construction works outside of the standard construction hours identified in REMM 5C may be undertaken in the following circumstances: • construction works that generate noise that is: - no more than 5 dB(A) above rating background level at any residence in accordance with the Interim Construction Noise Guideline (Department of Environment and Climate Change, 2009); and - no more than the noise management levels specified in Table 3 of the Interim Construction Noise Guideline (Department of Environment and Climate Change, 2009) at other sensitive receivers; or • for the delivery of materials required outside these hours by the NSW Police Force or other authorities for safety reasons; or • where it is required in an emergency to avoid the loss of lives, property and/or to prevent environmental harm; • works approved through an EPL, or • works as approved through the out-of-hours work protocol outlined in the CEMP.	Section 2.3.2 Section 4.5
5E	During site inductions and toolbox talks, all site workers (including subcontractors and temporary workforce) are to be made aware of the hours of construction and how to apply practical, feasible and reasonable measures to minimise noise and vibration when undertaking construction activities.	Section 4.5
5F	Quieter and less vibration-emitting construction methods would be applied where feasible and reasonable. For example, when piling is required, bored piles rather than impact-driven piles would minimise noise and vibration impacts.	Section 4.5

REMMs	Requirement	Document Reference
5G	The construction site would be arranged to minimise noise impacts by locating potentially noisy activities away from the nearest receivers wherever possible.	Section 4.5
5H	Where possible, equipment that emit directional noise would be oriented away from sensitive receptors.	Section 4.5
5I	Reversing of vehicles and mobile equipment would be minimised so as to prevent nuisance caused by reversing alarms. This could be achieved through one-way traffic systems and the use of traffic lights which could also limit the use of vehicle horns.	Section 4.5
5J	Where work is proposed in the vicinity of residences, potentially affected residents would be advised, at least two weeks prior to the commencement of works, of the potential noise and vibration levels and the proposed management measures to control environmental impacts.	Section 4.5
5K	Whenever possible, loading and unloading areas would be located away from the nearest residences.	Section 4.5
5L	Broadband reversing alarms would be considered instead of tonal reversing alarms, in particular outside standard working hours (such as during night-time rail possession works).	Section 4.5
5M	Equipment that is used intermittently would be shut down when not in use for extended periods of time.	Section 4.5
5N	Where possible, all engine covers would be kept closed while equipment is operating.	Section 4.5
5O	Where possible, trucks associated with the work would not be left standing with their engines operating in streets adjacent to or within residential areas.	Section 4.5
5P	Traffic speeds would be signposted. All drivers would be expected to comply with speed limits and to implement responsible driving practices to minimise noise associated with unnecessary acceleration and braking. Traffic movements should be scheduled to minimise continuous traffic flows (convoys).	Section 4.5
5Q	The site manager (as appropriate) should provide a community liaison phone number and permanent site contact so that any noise and/or vibration related complaints can be received and addressed in a timely manner. Consultation and cooperation between the site and its neighbours would assist in limiting uncertainty, misconceptions and adverse reactions to noise and vibration.	Section 5.2
5R	Attended noise and ground vibration measurements would be undertaken at monthly intervals in areas within close proximity to sensitive receivers and upon receipt of adverse comment/complaints during the construction program, to confirm that noise and vibration levels at adjacent communities and receptors are consistent with the predictions in this assessment and any approval and/or licence conditions.	Section 5.1

REMMs	Requirement	Document Reference
5S	If noise generating construction works are undertaken outside the standard daytime construction hours and/or measured construction noise levels at nearest residences are greater than 75 dB(A) L_{Aeq}, the following additional noise mitigation measures would be considered: Localised acoustic screens, comprising a solid structure such as plywood fencing to surround noise generating construction plant or work locations. To be effective for ground level noise, the screens would be lined with acoustic absorptive material, at least 2 m in height and installed within 5 m of the noise source. Dominant noise-generating mechanical plant would be fitted with feasible noise mitigation controls such as exhaust mufflers and engine shrouds. Respite periods of one hour are recommended for every continuous three-hour period of work; alternatively, daytime works would be scheduled between 9.00 am and 12.00 pm, and between 2.00 pm and 5.00 pm Where practical, and when night works are being undertaken, noisy construction work would be undertaken during the less sensitive 6.00 pm to 10.00 pm evening period	Section 4.5
5T	Depending on the specific construction works undertaken, construction noise mitigation may need to be implemented: • where piling works (required for all rail access connection options) are undertaken within approximately 600 m of residences in Casula and within approximately 800 m of residences in Glenfield; • for rail access connection works where daytime construction works undertaken within 450 m of nearest receptors in Casula; and where rail construction is required up to 1400 m from residences outside the standard daytime hours, such as during track possession works.	Rail access connection works are subject to a separate CNVMP

The *Environmental Protection and Biodiversity Conservation Act* 1999 - Revised Environmental Management Measures (EPBC REMM) are presented in the Moorebank Intermodal Terminal (MIT) Final EIS prepared to satisfy the Commonwealth approval process (EPBC Final EIS, dated Dec 2015).

The EPBC Act approval for the MPW Concept Proposal and Stage 1 Early Works was granted by DotEE in September 2016 (No. 2011/6086). This approval was provided for the impact of the MPW Project on listed threatened species and communities (Sections 18 and 18A of the EPBC Act) and Commonwealth action (Section 28 of the EPBC Act).

The construction and operation of the Project has been designed to be consistent with the EPBC Act approval conditions, where relevant. EPBC Act approval conditions for the Project include specific conditions and commitments that are required to be addressed in this plan. These conditions are identified within Table 11, along with where they have been addressed in this CNVMP.

Table 11 – EPBC Act Approval Conditions

EPBC Approval	Requirement	Referenced in this CNVMP
6	Sections of the CEMP and OEMP relating to noise and vibration must be prepared by a suitably qualified expert and must:	Authors of this documents are members of the Australian Acoustical Society
	(a) be consistent with the Noise and Vibration Provisional Environmental Management Framework (2 July 2014), provided at Appendix O to the finalised EIS	This plan

EPBC Approval	Requirement	Referenced in this CNVMP
	(b) Incorporate all measures 5A to 5T (CEMP only) and 5U to 5AJ (OEMP only) from Table 7.1 of the finalised EIS that are described as 'mandatory'	This plan The CEMP
	(c) Explain how all measures 5A to 5T (CEMP only) and 5U to 5AJ (OEMP only) from Table 7.1 of the finalised EIS that are described as 'subject to review' have been addressed	This plan The CEMP
	(d) Be approved by the Minister or a relevant New South Wales regulator	This plan

3.2 Roles and Responsibilities

Key roles and responsibilities associate with this CNVMP are presented in Table 12.

Table 12 – Roles and Responsibilities

Roles	Responsibilities
Contractor's Project Manager (Contractor's PM)	• Oversee the implementation and maintenance of the CEMP • Report to senior management and the Principal's Representative on the performance of the system and environmental breaches • Take action to resolve environmental non-conformances, non-compliances and incidents • Demonstrate that suppliers and sub-contractors are implementing Project environmental requirements • Report environmental incidents to the Principal's Representative • Authorise expenditure to implement environmental management requirements within limits of authority as defined in the Principal's Representatives Project requirements • Coordinate Incident Cause Analysis Method (ICAM) investigations • Review audit corrective actions and take action as necessary to ensure timely close out of issues • Direct works to be performed in a more environmentally responsible manner that reduces impacts or stop works if there is a risk of environmental harm • Employ apprentices in trade roles wherever possible.
Contractor's Construction Manager (Contractor's CM)	• Communicating with all personnel and sub-contractors regarding conformance with the CEMP and site specific environmental issues/EWMS • Identifying resources and competencies required for implementation of the CEMP • Organise and manage site plant, labour and temporary materials • Co-ordinating the implementation and maintenance of site environmental controls and provide support for the Contractor's EM • Report all environmental incidents in accordance with incident reporting protocol • Participate ICAM investigations • Take action to resolve non-conformances, non-compliances and incidents • Manage and direct works in an environmentally responsible manner that reduces environmental impacts or stop works if there is a risk of environmental harm • Managing and minimising water consumption, energy consumption, waste consumption and emission of greenhouse gases, wherever possible.

Roles	Responsibilities
Contractor's Environmental Manager (Contractor's EM)	• Assist and guide the respective workers to meet their environmental responsibilities and minimise the potential for environmental incidents • Undertake regular environmental inspections including against implementation of management measures and environmental controls • Report to the Contractor's CM on environmental issues • Implement appropriate action to address any environmental incidents • Investigate and report on identified non-conformances and non-compliances • Ongoing identification and mitigation of environmental risks and notify the Principals Representative of any required change • Develop environmental components of site induction and ensure a register of attendance is maintained • Present and participate in toolbox meetings • Manage environmental document control, reporting, inductions and training • Oversee site monitoring, inspections and internal audits • Monitor and report on the environmental capability and performance of subcontractors • Participate ICAM investigations • Report environmental non-conformances, incidents and potential incidents to the Contractor's PM • Cooperate and participate in audits and action results of any audit findings
Site Supervisors	• Effectively implement environmental controls on-site • Present and participate in toolbox talks and meetings • Report environmental non-conformances, incidents and potential incidents to the Contractor's EM and PM • Manage and direct works in a manner that minimises potential for environmental impacts or stop works if there is a risk of environmental harm
Contractor's Community Liaison Manager (Contractor's CLM)	• Implement the Community Communication Strategy CCS • Assist the Community Engagement Consultant (CEC) in the management of the relevant enquiries and complaints in accordance with the CCS • Communicate results of complaint, audit report findings and incident investigations to the community and relevant stakeholders
All Personnel	• Undertake work activities in a manner that minimises the potential for pollution of land, air, water, community amenity, and/or the generation of waste • Take all feasible and reasonable steps to comply with the requirements of this CEMP • Comply with lawful management directions to prevent environmental harm or enhance protection of site environmental values • Stop works if there is a potential risk of material harm • Promptly report to management on any non-conformances, perceived non-compliances, or environmental incidents • Undergo induction and training in environmental awareness
Noise and Vibration Monitoring Personnel (contractors)	• Undertake relevant training to implement the requirements of this CNVMP • Undertake all monitoring activities in accordance with this CNVMP • Ensure regular maintenance and calibration of monitoring equipment • Ensure all relevant monitoring quality control / assurance procedures are effectively implemented

3.3 Training

All site personnel, contractors and sub-contractors shall undergo site specific induction training, which will include noise and vibration management training developed with an emphasis on understanding and managing noise impacts from the work activities being undertaken.

This site-specific induction training will include:

- The location of potentially sensitive receptors
- Relevant noise and vibration mitigation measures, including noise screens and temporary barriers where feasible
- Site hours of operation i.e. the permissible hours of work, including deliveries
- A summary of relevant licence and approval conditions
- Any limitations on high noise generating activities
- Construction employee parking areas
- Designated loading / unloading areas and procedures
- Emphasis that there should be no swearing, shouting or loud stereos/radios on site
- Details of the complaints handling procedure
- Details of the environmental incident procedures
- The requirement to limit the clustering of noisy plant / processes
- Communication, including a notification process to inform residents of respite times
- Non-conformance, preventative and corrective action procedures
- An outline of the consequences of not complying with these measures
- An overview that Toolbox meetings will be undertaken as required covering specific environmental issues and will include noise and vibration control measures where required, including but not limited to:
- Ensuring work occurs within approved hours
- Locating noisy equipment away from sensitive receptors
- Ensuring plant and equipment is well maintained and not making excessive noise
- Operation of vehicles to minimise noise and vibration impacts, i.e. use of designated haulage routes, use of non-tonal reversing beepers where feasible, turning off plant, equipment and vehicles when not in use.

Toolbox training on noise and vibration management requirements and measures will be completed by the Contractor's EM (or nominated authority) during the Project.

Personnel directly involved in implementing noise and vibration control measures on site will be given specific training on the various measures to be implemented. Records of all training will be filed in the Project filing system.

4 Noise & Vibration Impact Assessment

4.1 Existing Noise Environment

The existing noise environment for sensitive areas in the vicinity of the Project is best described as 'urban', being areas with an acoustical environment that:

- Is dominated by 'urban hum' or industrial source noise, where 'urban hum' means the aggregate sound of many unidentifiable, mostly traffic-related sound sources
- Has through traffic with characteristically heavy and continuous traffic flows during peak periods (i.e. M5 South Western Motorway and Hume Highway)
- Is near commercial districts or industrial districts
- Has any combination of the above.

Background noise levels were established through previous long-term background noise monitoring conducted by Wilkinson Murray for the MPE Concept Plan and MPE Stage 2 project and was presented in the Wilkinson Murray report (ref. 12186-M2 Report Ver. D, dated February 2018) (MPE Stage 2 Monitoring Report). Based upon noise survey observations during the ongoing noise surveys as part of the Moorebank Precinct conditions of consent, a clear morning shoulder period was observed to be present as defined in Section A3 "Dealing with 'shoulder' periods" as per the MPWS3 EIS NVIA, this was as a result of road traffic noise from the M5 Motorway.

Consistent with the approach adopted in the MPWS3 EIS NVIA for the existing noise environment and noise management levels established, the baseline data for this CNVMP presented in the above MPE Stage 2 Monitoring Report was analysed in accordance with Section A3 "Dealing with 'shoulder' periods" of the NPfI for the 6:00am to 7:00am weekday morning shoulder period to determine the RBL for this period. This was undertaken for consistency with the established levels in the MPWS2 CNVMP.

The Rating Background Levels (RBLs) at sensitive receiver locations considered representative of each of the four potentially most affected residential receiver areas are presented in Table 13.

Table 13 – Measured Rating Background Levels, dB(A)

NCA	Daytime (7am to 6pm)	Evening (6pm to 10pm)	Night-time (10pm to 7am)	Morning shoulder (6am to 7am)
Wattle Grove	42	37	37	41
Wattle Grove North	36	36	36	36 (43)[1]
Casula	41	37	34	40
Glenfield	44	44	37	44 (47)[1]

Notes: 1. Where the above morning shoulder period RBL values are typically equal to or higher than the adopted daytime RBL values presented in Table 6, the daytime values have been adopted for this period so they are no higher than those adopted for the daytime, consistent with the requirements of the NPfI. Actual RBL values are included in brackets.

4.2 Sensitive Receivers

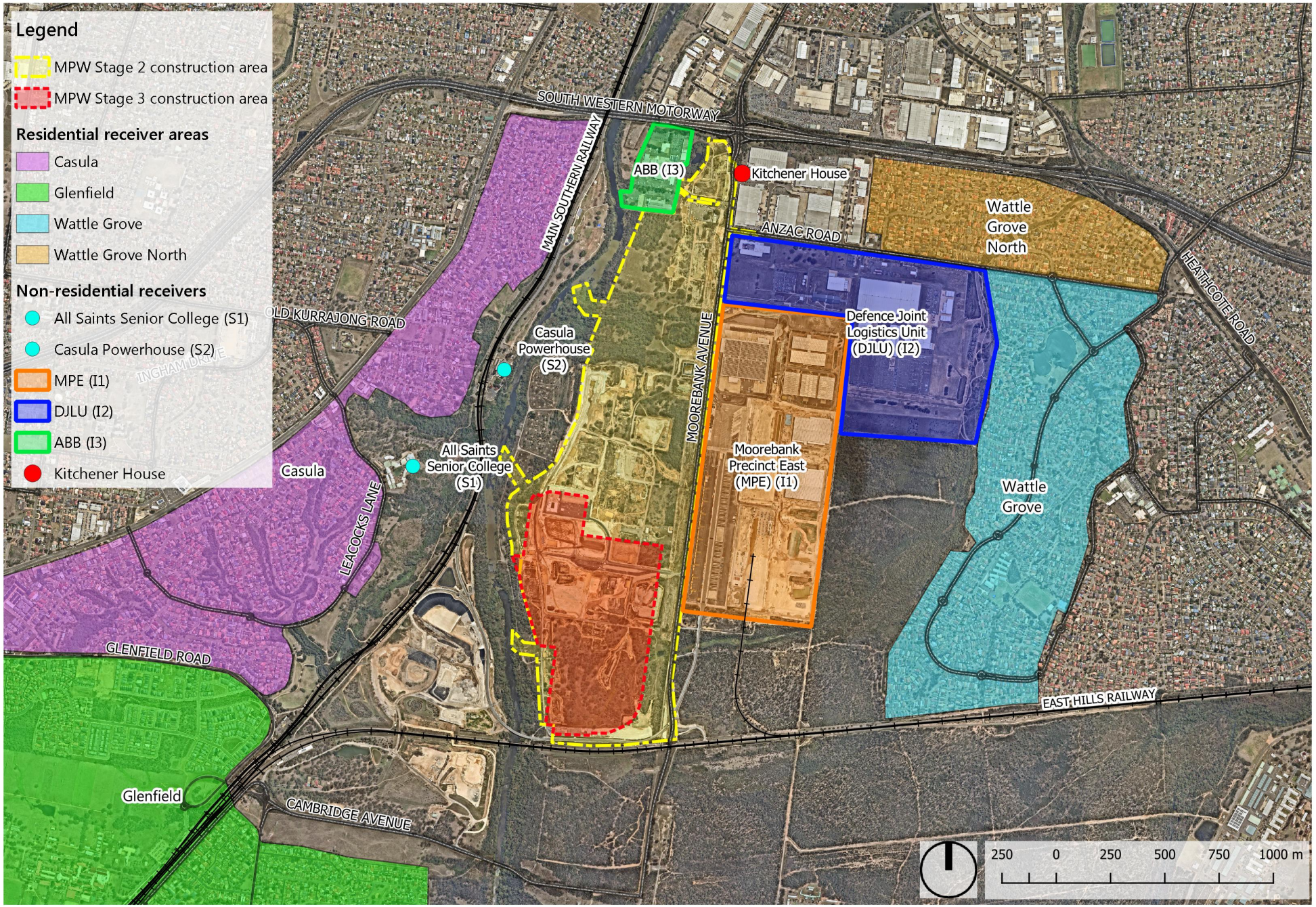
The potentially most affected residential receivers in the vicinity of the Project site are located in the suburbs of Casula, Glenfield and Wattle Grove. In addition to residential receivers, a number of potentially affected non-residential receivers have been identified near the Project site, including All Saints Senior College and the Casula Powerhouse, both of which are located to the west of the Project site and across the Georges River. The nearest industrial receivers consist of Moorebank Precinct East (MPE), ABB and the Defence Joint Logistics Unit (DJLU) as shown in Figure 2. Table 14 presents a summary of the potentially most affected receivers near the Project site, based on the approximate minimum distance from the Project to the potentially most affected receiver.

Table 14 – Sensitive Receivers

Receiver/Suburb	Category	Distance from Stage 2 Construction Area
Wattle Grove	Residential	640m
Casula		350m
Glenfield		1,800m
All Saints Senior College (S1)	Educational	630m
Casula Powerhouse (S2)		360m
MPE (I1)	Industrial	Share common boundary
DJLU (I2)		50m
ABB (I3)		Share common boundary

Kitchener House is located at 208 Moorebank Avenue, and is of heritage significance. Kitchener House is not occupied and is therefore, not considered as a noise sensitive receptor. However, it is to be considered as a sensitive receiver for potential construction vibration impacts which could cause damage to the heritage structure.

Figure 2 – Sensitive Receivers *(Imagery: Nearmap 2020)*



4.3 Noise and Vibration Management Levels

4.3.1 Noise Management Levels

The policies and standards outlined in Table 15 have been used to establish construction Noise Management Levels (NMLs) for the MPW Stage 2 construction works.

Table 15 – Applicable Construction Noise Policies and Standards

Environment impact	Relevant policy / standard used to establish noise and vibration management level
Sleep disturbance and maximum noise events	• Construction noise – INP Application Notes
Construction related road traffic noise	• No specific guidelines, but guidance taken from the NSW Interim Construction Noise Guideline (ICNG) and the NSW Road Noise Policy (RNP)
Airborne noise	• NSW Interim Construction Noise Guideline (ICNG) • Conditions of Consent

Table 16 (reproduced from Table 2 of the ICNG) sets out the NMLs and how they are applied to residential receivers.

Table 16 – ICNG Construction Noise Management Levels

Time of day	Management level $L_{Aeq,\ 15\ min}$ *	How to apply
Recommended standard hours: Monday to Friday 7 am to 6 pm Saturday 8 am to 1 pm No work on Sundays or public holidays	Noise affected RBL + 10dB	The noise affected level represents the point above which there may be some community reaction to noise. • Where the predicted or measured $L_{Aeq,15\ minute}$ is greater than the noise affected level, the proponent should apply all feasible and reasonable work practices to meet the noise affected level. • The proponent should also inform all potentially impacted residents of the nature of works to be carried out, the expected noise levels and duration, as well as contact details.
	Highly noise affected 75dB(A)	The highly noise affected level represents the point above which there may be strong community reaction to noise. • Where noise is above this level, the relevant authority (consent, determining or regulatory) may require respite periods by restricting the hours that the very noisy activities can occur, taking into account: • times identified by the community when they are less sensitive to noise (such as before and after school for works near schools, or mid-morning or mid-afternoon for works near residences • if the community is prepared to accept a longer period of construction in exchange for restrictions on construction times.

Time of day	Management level $L_{Aeq,\ 15\ min}$ *	How to apply
Outside recommended standard hours	Noise affected RBL + 5dB	• A strong justification would typically be required for works outside the recommended standard hours. • The proponent should apply all feasible and reasonable work practices to meet the noise affected level. • Where all feasible and reasonable practices have been applied and noise is more than 5dB(A) above the noise affected level, the proponent should negotiate with the community. • For guidance on negotiating agreements see section 7.2.2 *[of the ICNG.*

* Noise levels apply at the property boundary that is most exposed to construction noise, and at a height of 1.5 m above ground level. If the property boundary is more than 30 m from the residence, the location for measuring or predicting noise levels is at the most noise-affected point within 30 m of the residence. Noise levels may be higher at upper floors of the noise affected residence.

In addition to residential type receivers, the All Saints Senior College and the Casula Powerhouse have been identified as school and educational type receivers. Furthermore, the MPE, ABB and DJLU receivers have been categorised as industrial type receivers.

Therefore, the applicable NMLs for the other type of sensitive receivers as stipulated in the ICNG are presented in Table 17. It is noted that the receiver types for these other sensitive receivers were established in the EIS.

Table 17 – $L_{Aeq,15min}$ Noise Management Levels at Other Noise Sensitive Land Uses

Land Use	Noise Management Level	Where NML Applies
Classrooms at schools and other educational institutions	45dB(A)	Internal noise level
Industrial premises	75dB(A)	External noise level

For sensitive receivers S1 and S2, assuming that the building structures would typically provide a minimum of 10 dB(A) reduction from external noise levels to internal noise levels, the external NML for S1 and S2 are set to 10dBA above the internal NML.

Table 18 presents the summary of NMLs applicable for standard construction hours based on the measured RBL values shown in Table 13. The construction works are expected to typically occur during standard construction hours.

Table 18 – Summary of NMLs for Standard Construction Hours

Receivers	Applicable Noise Management Levels, dB(A)
Wattle Grove	52
Wattle Grove North	46
Casula	51
Glenfield	54
S1, S2	55
I1, I2, I3	75

Should construction works occur outside of standard hours, then construction noise impacts should be assessed against the NMLs presented in Table 19 for each of the OOHW periods identified in Table 4.

Table 19 – Construction Noise Management Levels by OOHW Period

Receiver	OOHW 1 6am – 7am (Mon – Fri)	OOHW 2 6pm – 10pm (Mon – Fri)	OOHW 3 6am – 7am (Saturday)	OOHW 4 7am – 8am (Saturday)	OOHW 5 1pm – 6pm (Saturday)	OOHW 6 6pm – 9pm (Saturday)
Wattle Grove	46	42	46	47	47	42
Wattle Grove North	41	41	41	41	41	41
Casula	45	42	45	46	46	42
Glenfield	49	49	49	49	49	49
S1, S2	55[2]	55[2]	55[2]	55[2]	55[2]	55[2]
I1, I2, I3	75[2]	75[2]	75[2]	75[2]	75[2]	75[2]

Notes:
1. The NMLs listed in this table are applicable for works undertaken in accordance with the OOHW Protocol (Appendix A) or as part of an assessment for MPWS2 CoC B127 (e) or MPWS3 CoC C4 (d) and excludes works allowed to occur outside of standard hours by MPWS2 CoC B127 (a)/(b)/(c)/(d)/(e) or MPWS3 CoC C4 (a) to (c).
2. Only applicable when in use

4.3.1.1 Sleep Disturbance

For residential receptors, it is also important to consider potential sleep disturbance impacts associated with OOHW conducted during the night time (10 pm to 7 am) period.

Initial screening levels for maximum noise levels during the night time period were established in accordance with the INP Application Notes (www.epa.nsw.gov.au/noise/applicnotesindustnoise.htm). Screening levels are based on the measured RBLs for the night period and are as follows:

- **Initial Screening level:** $L_{A1,1min}$ **(or** L_{Amax}**)** = $L_{A90(15min)}$ **+ 15dB(A)**

Based on the above and the measured night time RBLs for each residential receiver area, the applicable initial screening levels are presented in Table 20.

Table 20 – $L_{A1,1min}$ **(or** L_{Amax}**) Sleep Disturbance Screening Levels**

Residential noise catchment	Initial Screening Level, dB(A)	
	Night (10pm to 6am)	OOHW 1 & OOHW 3 (6am to 7am)
Wattle Grove	37 + 15= **52**	41 + 15 = **56**
Wattle Grove North	36 + 15 = **51**	36 + 15 = **51**
Casula	34 + 15 = **49**	40 + 15 = **55**
Glenfield	37 + 15 = **52**	44 + 15 = **59**

Where there are noise events found to exceed the initial screening level, further analysis is made to identify:

- The likely number of events that might occur during the night assessment period

- Whether events exceed an 'awakening reaction' level of 55 dB(A) L_{Amax} (internal), which equates to an external L_{Amax} NML of **65 dB(A)**, assuming open windows.

4.3.1.2 Construction Traffic Noise Criteria

The ICNG does not include any criteria to assess traffic noise on public roads (off-site) associated with construction of the Project.

Criteria for off-site road traffic noise applicable to existing residences affected by additional traffic on existing public roads generated by land use developments are specified in the NSW Road Noise Policy (RNP). Whilst these criteria do not specifically apply to construction traffic movements, they have been conservatively considered and are summarised in Table 21.

Table 21 – RNP Criteria for Road Traffic Noise, dB(A)

Road	Category	Day ($L_{Aeq, 15\ hour}$) (7am – 10pm)	Night ($L_{Aeq, 9\ hour}$) (10pm – 7am)
M5 Motorway	Freeway	60 (external)	55 (external)
Moorebank Avenue & Anzac Road	Arterial Road	60 (external)	55 (external)

Notes: 1. The identified criteria do not apply to vehicle movements within the Project Site. For the purpose of assessment, any noise generated by on-site vehicle movements is considered as construction noise and assessed holistically with on-site mobile plant in accordance with the ICNG.

Additionally, it is typically recognised that for existing residences and other sensitive land uses affected by additional traffic on existing roads, any increase in the total traffic noise level should be limited to no more than 2dB(A) above the existing road traffic noise levels. A 2dB(A) increase is typically considered not noticeable.

4.3.2 Vibration Management Levels

The policies and standards outlined in Table 22 have been used to establish vibration management levels for the Project.

Table 22 – Vibration Standards

Environment impact	Relevant policy/ standard used to establish noise and vibration management level
Vibration impact on humans	• Assessing Vibration: A Technical Guideline (DECC, 2006) • British Standard BS 6472-1992 and 2008 'Guide to evaluation of human exposure to vibration in buildings (1-80Hz)'
Vibration (structural damage to buildings and buried services)	• German Standard DIN 4150:2016 – Part 3 Structural vibration in buildings – Effects on structures

4.3.2.1 Disturbance to Building Occupants

Assessment of potential disturbance from construction vibration on human occupants of buildings is made in accordance with the EPA guideline 'Assessing vibration: A technical guideline' (DECC, 2006).

The guideline provides criteria which are based on the British Standard BS 6472-1992 'Guide to Evaluation of Human Exposure to Vibration in Buildings (1-80Hz)'.

BS 6472-1992 nominates guideline values for various categories of disturbance, the most stringent of which are the levels of building vibration associated with a "low probability of adverse comment" from occupants.

BS 6472-1992 was amended in 2008 to extend the use of the Vibration Dose Values (VDV) to all types of vibration (i.e. continuous, impulsive and intermittent). The VDV is dependent upon the level and duration of the short-term vibration event, as well as the number of events occurring during the daytime or night-time period.

The VDVs recommended in BS 6472-2008 for which various levels of adverse comment from occupants may be expected are presented in Table 23.

Table 23 – VDV Ranges Resulting in Adverse Comments Within Buildings

Place and Time	Low probability of adverse comment ($m/s^{1.75}$)	Adverse comment possible ($m/s^{1.75}$)	Adverse comment probable ($m/s^{1.75}$)
Critical areas (day or night)	0.1 to 0.2	0.2 to 0.4	0.4 to 0.8
Residential buildings 16 hr day	0.2 to 0.4	0.4 to 0.8	0.8 to 1.6
Residential buildings 8 hr night	0.1 to 0.2	0.2 to 0.4	0.4 to 0.8
Offices, schools, educational institutions and places of worship (day or night)	0.4 to 0.8	0.8 to 1.6	1.6 to 2.4
Workshops (day or night)	0.8 to 1.6	1.6 to 3.2	3.2 to 6.4

To assess the potential for vibration impact on human comfort, initial screening criteria based on EPA's 'Assessing vibration: a technical guideline' (DECC, 2006) have been adopted based on 'preferred' and maximum' vibration levels for human comfort. The criteria for intermittent vibration, which is caused by plant such as rock breakers, expressed as a VDV, are presented in Table 24.

Table 24 – Acceptable VDVs for intermittent vibration ($m/s^{1.75}$)

Location	Daytime[1]		Night-time[1]	
	Preferred value	Maximum value	Preferred value	Maximum value
Critical areas[2]	0.10	0.20	0.10	0.20
Residences	0.20	0.40	0.13	0.26
Offices, schools, educational institutions and places of worship	0.40	0.80	0.40	0.80
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. Examples include hospital operating theatres and precision laboratories where sensitive operations are occurring. These criteria are only indicative, and there may be a need to assess intermittent values against the continuous of impulsive criteria for critical areas.

Source: BS 6472-1992

4.3.2.2 Structural Damage to Buildings

Potential structural damage of buildings caused by vibration is typically managed by ensuring vibration induced into the structure does not exceed certain limits and standards.

For this project, German Standard DIN 4150-2016 'Structural vibration: Part 3: Effects of vibration on structures' (DIN 4150-3) is referenced by MPWS2 CoC B135 and MPWS3 CoC C12. DIN4150-3 suggests levels at which damage might occur. Damage is defined as any permanent effects of vibration that reduces the serviceability of a structure or one of its components.

Table 25 sets out the recommended limits from DIN4150 for short-term vibration to ensure minimal risk of damage.

Table 25 – DIN 4150-3:2016 Structural Damage Criteria (Peak Particle Velocity – PPV)

Group	Type of structure	Vibration velocity, mm/s				
		At foundation in all directions at frequency of			Plane of floor uppermost storey in horizontal direction	Floor slabs, vertical direction
		1Hz to 10Hz	10Hz to 50Hz	50Hz to 100Hz[1]	All frequencies	All frequencies
1	Buildings used for commercial purposes, industrial buildings and buildings of similar design	20	20 to 40	40 to 50	40	20
2	Residential buildings and buildings of similar design and/or occupancy[2]	5	5 to 15	15 to 20	15	20
3	Structures that because of their particular sensitivity to vibration, cannot be classified under Groups 1 and 2 and are of great intrinsic value (e.g. listed buildings)[3]	3	3 to 8	8 to 10	8	20

Notes:
1. At frequencies above 100Hz, the values given in this column may be used as minimum values
2. Type of structure considered to be representative of a residential building
3. Type of structure considered to be representative of a heritage building

For this project, the guideline values taken at the foundation have been used as the buildings are typically low level.

Furthermore, DIN 4150-3 states that exceeding these values does not necessarily result in structural damage. If the criteria are significantly exceeded, further investigation would be required.

4.3.2.3 Structural Buried Pipework and Infrastructure

Table 26 provides guideline values for evaluating the effects of vibration on buried pipework and infrastructure. It is assumed that the pipes have been manufactured and laid using current technology; if this is not the case, special considerations will have to be made.

Table 26 – Guideline values for evaluating effects of short-term vibration on buried pipework

Line	Pipe Material	Guideline values for vibration velocity measured at the pipe, mm/s
1	Steel, welded	100
2	Vitrified clay, concrete, reinforced concrete, prestressed concrete, metal (with or without flange)	80
3	Masonry, plastics	50

Note: 1. For gas and water supply pipes within 2 m of buildings, the levels given in Table 28 should be applied. Consideration must also be given to pipe junctions with the building structure as potential significant changes in mechanical loads on the pipe must be considered.

4.3.2.4 General Vibration Screening Criterion

DIN4150-3 states that the guide values in Table 25 relate predominantly to short-term vibration, which does not give rise to fatigue in structures.

For most construction activities involving short term vibration sources such as rock breakers, piling rigs, vibratory rollers, excavators and the like, the predominant vibration energy occurs at frequencies greater than 10 Hz (and usually in the 20 Hz to 100 Hz range). On this basis, a conservative vibration damage screening level per receiver type is given below:

- Buildings used for commercial purposes, industrial buildings and buildings of similar design: **20 mm/s**
- Dwellings and buildings of similar design and/or occupancy: **5 mm/s**
- Pipework and infrastructure: **50 mm/s**
- Heritage buildings: **3 mm/s**

At locations where the predicted and/or measured vibration levels are greater than those shown above (peak component particle velocity), a more detailed analysis of the building structure, vibration source, dominant frequencies and dynamic characteristics of the structure would be required to determine the applicable safe vibration level.

4.3.2.5 Heritage

A building of historical value should not (unless it is structurally unsound) be assumed to be more sensitive.

If required, the advice of a heritage specialist on methods and locations for installing equipment used for vibration, movement and noise monitoring of heritage-listed structures will be sought.

Unless otherwise advised, heritage buildings and structures would be assessed as per the screening criteria presented in the section above as they should not be assumed to be more sensitive to vibration unless they are found to be structurally unsound. If a heritage building or structure is found to be structurally unsound (following inspection) a more conservative cosmetic damage objective of 3mm/s peak component particle velocity (Line 3 from Table 25 as per DIN 4150-3) would be considered.

The approach to manage potential vibration impact shall be to:

1. Identify heritage items where the 3mm/s peak component particle velocity objective may be exceeded during specific construction activities
2. Structural engineering report to be undertaken on any identified heritage items where exceedances of 3mm/s peak component particle velocity are expected, to confirm structural integrity of the building and confirm if item is 'structurally sound'
3. If item confirmed as 'structurally sound', adopt the heritage screening criteria, or
4. If item confirmed as 'structurally unsound' or no structural engineering report conducted, adopt the more conservative cosmetic damage objectives of 3mm/s peak component particle velocity.

4.4 Environmental Impacts

4.4.1 Construction Activities

4.4.1.1 Standard Construction Hours

A summary of the indicative construction works and associated activities proposed to be undertaken during standard construction hours at each of these delivery phases and works periods is provided in Table 27. No blasting activities are permitted or proposed for the construction of the Project.

Table 27 – Construction Activities to be Undertaken

Delivery Phase	Construction Works Periods	Activity
Pre-Construction	Site preparation activities	• Establishment of construction compound fencing and hoardings • Installation of temporary sediment and erosion control measures • Vegetation clearance • Installation of temporary site offices and amenities • Construction of hardstands for staff parking and laydown areas • Establishment of temporary batch plant sites and installation of batch plant • Construction of access roads, site entry and exit points and security (N.B. preference is to use existing access where practicable) • Set up of construction monitoring equipment

Delivery Phase	Construction Works Periods	Activity
Benching	Bulk earthworks, drainage and utilities	• Establishment of temporary stockpiling pads and associated temporary access roads • Establishment of temporary batch plant sites and installation of batch plant if required • Importation, stockpiling and placement of clean fill (bulk earthworks) and raising of the Project site to final level • Importation, placement and compaction of engineered fill, which is comprised of Virgin Excavated Natural Material, Excavated Natural Material or other material approved in writing by the EPA • Importation of construction materials • Installation of erosion and sediment controls • Installation of on-site detention (OSD) basins • Drainage and utilities installation
		SSD 10431 MPW Stage 3 **Standard hours construction works** • Offices, staff amenities, meeting and training rooms, staff kitchen and canteen facilities. • Car parking hardstand area in the eastern portion of the site. • Preparation of stockpile sites for materials, temporary spoil storage and mulch • Materials crushing plant and processing.
		Out of hours construction works consistent with the provisions of CoC B21 (i) • Fill delivery • Fill delivery & placement
Roads	Moorebank Avenue intersection works and internal road network	• Relocation, adjustment and/or protection of all affected utilities, services and signage, as required • Establishment of traffic management devices • Installation of erosion and sediment controls • Stripping and stockpiling of topsoil by excavators and trucks • Drainage works • Progressive stabilisation of exposed areas • Compaction of widening areas • Preparation of new lane surfaces • Forming of new kerbs, gutters, medians and other structures • Construction of asphalt and concrete pavement • Landscaping of exposed earthworks areas • New line marking, lighting and sign posting • Removal of construction traffic management and progressive opening of new works to traffic

Delivery Phase	Construction Works Periods	Activity
Terminal and Rail	IMT facility and rail link connection construction	• Importation, placement and compaction of engineering fill • Compaction of engineering fill • Importation and placement of ballast material • Establish formwork and reinforcement for sidings and bridge infrastructure • Placement of concrete, curing and sealing • Installation of permanent ways and rail systems • Installation of permanent access gates, security gatehouse and permanent fencing • Installation of the connection between the rail link and the IMT facility sidings • Erection of IMT facility administration building – excavation foundation and floor slab construction, structural wall and roof framework, and roofing • Internal fit-out of building with control room, office, workshops, loco-shifter and staff amenities
Warehousing	Construction and fit-out of warehousing	• Establishment of construction compound, temporary fencing/ hoardings and temporary sediment and erosion control • Installation of temporary site offices and amenities • Excavation, foundation and floor slab installation • Erection of framework and structural walls • Installation of roof • Internal fit out • Landscaping and surrounds • Preparation of warehouse access road subgrade • Forming of new kerbs, gutters, medians and other structures • Construction of asphalt and concrete pavement • New line marking, lighting and sign posting • Removal of construction traffic management and progressive opening of the internal road and warehouse access roads to traffic
	Miscellaneous structural construction and finishing works	• Decommissioning/demobilisation of construction sites • Commissioning of operational facilities • Landscaping • Rehabilitation of affected areas • Post-construction condition surveys • Removal of construction environmental controls • Removal of construction ancillary facility related traffic signage

4.4.1.2 Out of Hours Work

Works outside of standard hours can occur under MPWS2 CoC B127 and B135 or MPWS3 CoC B21 and C4 under the following circumstances:

- works that are inaudible at the nearest sensitive receivers [MPWS2 CoC B127 (a)and MPWS3 CoC C4 (c)];
- where a negotiated agreement has been arranged with affected receivers [MPWS2 CoC B127 (b)];

- for the delivery of materials required outside these hours by the NSW Police Force or other authorities for safety reasons [MPWS2 CoC B127 (c) and MPWS3 CoC C4(a)];
- where it is required in an emergency to avoid the loss of lives, property or to prevent environmental harm [MPWS2 CoC B127 (d) and MPWS3 CoC C4(b)]; or
- Works associated with the Moorebank Avenue/Anzac Road upgrade, the delivery of the rail connection, and works required to be undertaken during rail corridor possession, and any other construction works on the site where they are undertaken Out-of-Hours, where they are undertaken in accordance with the approved OOHW Protocol (APPENDIX A) detailing the assessment, management and monitoring of noise [MPWS2 CoC B127 (e) and MPWS3 CoC C4 (e)].

For MPWS2, the activities to be undertaken during OOH (and not including extended hours detailed above) have not yet been determined; however, once identified the OOHW Protocol (APPENDIX A) will be implemented should it fall outside of the classification of MPWS2 CoC B127 (a) to (e) or MPWS3 CoC C4 (a) to (d) and strong justification exists to undertake the activities outside of standard construction hours.

For MPWS3, the importation and placement of fill to the MPW site during the bulk earthworks is proposed to take place during OOH periods under the provisions of CoC B21 (i). This is proposed for the during the following hours:

- Fill delivery is proposed during the 6:00am to 7:00am weekday morning shoulder period
- Fill delivery & placement is still proposed during:
  - 6:00pm to 10:00pm weekdays
  - 7:00am to 8:00am Saturdays
  - 1:00pm to 6:00pm Saturdays

The OOHW Protocol (APPENDIX A) prepared , as detailed in Section A.3.1, will be implemented for these works.

4.4.2 Construction compounds

Temporary construction compounds are required to support construction of the Project. The locations of these compounds are presented in Figure 3 (MPWS2) and Figure 4 (MPWS3). The locations of the MPWS3 compounds are subject to confirmation by the construction contractor in accordance with MPWS3 CoC B35. The ancillary facilities include the following:

- Main compound
- Satellite compounds
- Northern and southern stockpile locations

- MPWS3 temporary laydown and materials stockpiles
- MPWS3 temporary construction, operation, and maintenance compound

Up to six (6) satellite compounds will be located throughout the Project and used throughout the development of the Project. Up to four (4) stockpile locations will be utilised for the importation of fill. Two (2) for MPWS2, including one in the north (northern stockpile) and the other centrally located (southern stockpile), with up to two (2) for MPWS3 as shown in Figure 4. The main construction compound for MPWS2 (Main Compound) will be located south of the southern stockpile, the Main Compound includes the construction contractor's site office, staff amenities, car park, and storage and laydown areas. The main construction compound for MPW3 (temporary construction, operation, and maintenance compound) and materials storage and parking compound will be located in the southern most area of MPW.

Figure 3 – Project Construction Compounds, Stockpiles and Construction Area (MPWS2)

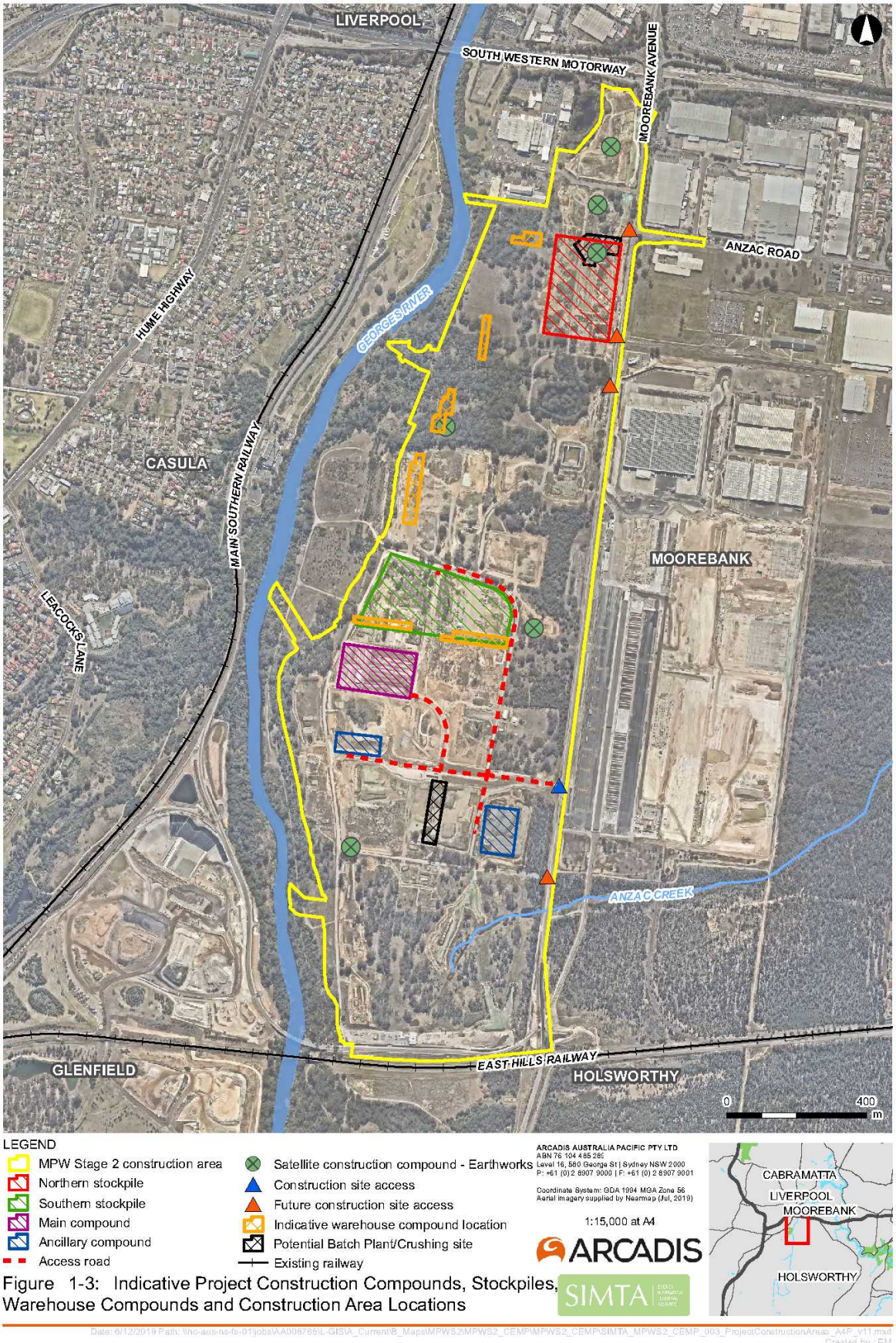
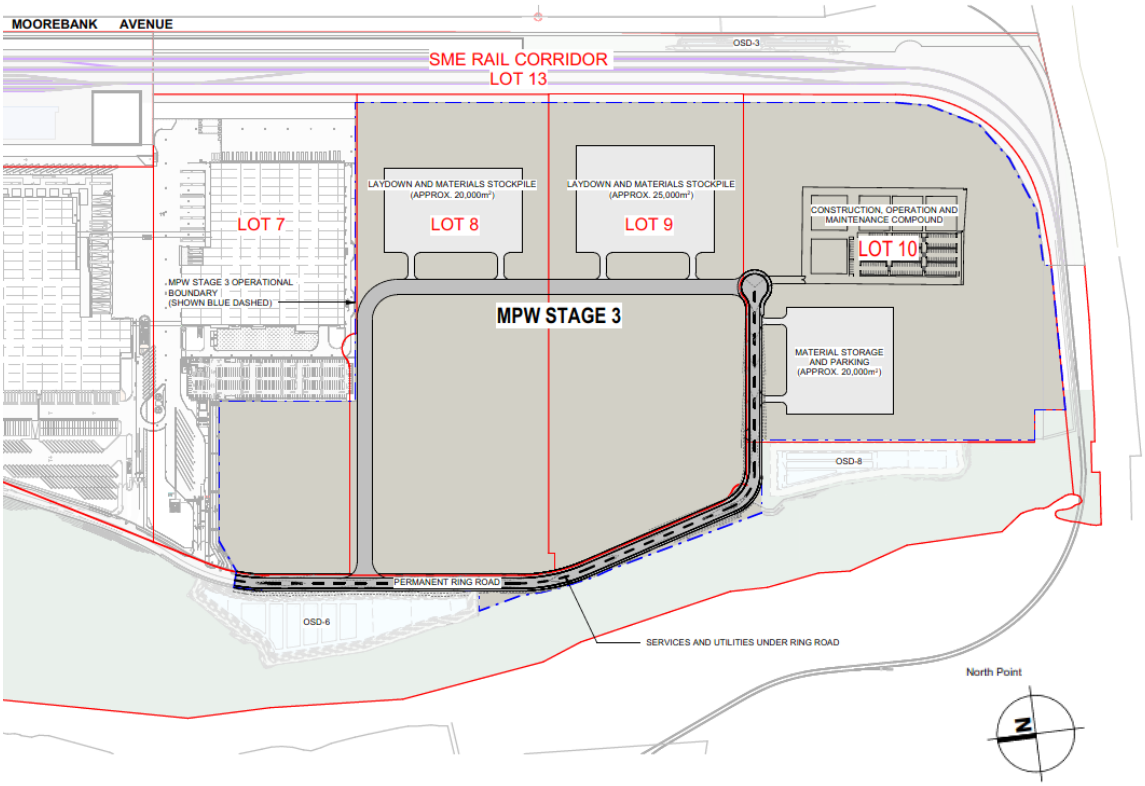


Figure 1-3: Indicative Project Construction Compounds, Stockpiles, Warehouse Compounds and Construction Area Locations

Figure 4 – Project Construction Compounds, Stockpiles and Construction Area (MPWS3) ***(refer to Figure 1 for context map)***



4.4.3 Plant and Equipment

A range of plant and equipment will be required for the construction of the Project. A summary of the amount of plant and equipment predicted to be utilised during standard construction hours is provided in Table 28. These numbers are assumed in consideration of the following:

- Values presented in 'MIC Concept Plan Modification Design risk workshop – Imported Fill Option Memo'
- Values presented in MPE Stage 2 CNVMP
- Values presented in MPW Stage 3 EIS NVIA.

Table 28 – Indicative Number of Construction Plant and Equipment for Construction (MPWS2)

Equipment	Site Preparation	Bulk earthworks, drainage and utilities	Moorebank Avenue and internal roads	IMT facility and rail link connection	Warehouse construction and fit out	Buildings and finishing works
Truck and Dog	4	12	-	-	-	-
Loaders	-	2	-	4	4	2
Static and vibratory rollers, and high energy impact compaction	2	4	3	4	3	-
Mobile cranes	2	5	-	4	8	-
Excavators	3	5	4	4	4	-
Excavators with hammers	-	2	-	-	-	-
Backhoes	-	4	-	2	6	4
Crushing plant[1]	-	1	-	-	-	-
Concrete Batch plant	-	1	-	-	1	-
Concrete agitators (or similar)	-	5	-	6	10	3
Concrete pumps	-	4	-	2	10	3
Concrete saws	-	2	-	6	6	2
Air compressors	-	4	-	4	20	4
Jackhammers	-	-	-	4	6	3
Dozers	-	2	2	-	-	-
Mulchers	3	-	-	-	-	-
20-40 tonne articulated tipper trucks	4	10	-	4	-	-

Equipment	Site Preparation	Bulk earthworks, drainage and utilities	Moorebank Avenue and internal roads	IMT facility and rail link connection	Warehouse construction and fit out	Buildings and finishing works
Scrapers	-	6	-	-	-	-
Graders	4	3	4	2	2	-
Water trucks	1	5	2	2	2	2
Piling rigs	-	3	-	2	2	-
Forklifts	-	3	-	2	20	3
Small earthmoving equipment	3	20	-	20	20	6
Welder	10	10	-	-	20	5
Rail tamper	-	-	-	1	-	-
Road profiler	-	-	1	-	-	-
Rubber roller	-	-	1	-	-	-
Lighting tower	-	12	-	-	-	-
Road sweeper	-	1	-	-	-	-
Wheel wash	-	2	-	-	-	-
Generators	-	2	-	-	-	-
Helicopter	-	-	-	-	1	-

Notes: 1. In accordance with MPWS3 CoC A13, only one crushing plant is to operate at any one time across the MPW site, and any crushing plant to operate as part of MPW Stage 3 can only be operated once any existing crushing plant operated as part of MPW Stage 2 has been decommissioned.

For MPWS3, additional construction plant and equipment associated with the temporary works compound would operate. As per the MPWS3 EIS NVIA, these have been assumed to operate concurrently with the MPW Stage 2 construction works. The potential plant and equipment that would be associated with the MPWS3 temporary works compound and associated construction activities and vehicles for Stage 3 is provided in Table 28.

Table 29 – Indicative construction plant and equipment (MPWS3)

Equipment	Indicative number of construction plant and equipment assumed operating concurrently	Assumed indicative working area
Material deliveries		
Truck and Dog (per hour)[1]	67	Access road via the western boundary and the temporary loop road to the compound and laydown area (see Figure 1).
Works compound		
Water trucks	2	Operating within the temporary compound (Figure 4).
Forklifts	2	
Generators	2	
Truck and Dog	2	
Crushing & materials processing[2]		
Crushing plant[2,3]	1	Operating within the laydown and material stockpile areas (Figure 4).
Truck and Dog	2	
Stockpiling areas		
Loader	1	Operating within the laydown and material stockpile areas (Figure 4).

Notes:
1. Based upon an even distribution of daily movements, as presented in the MPW Stage 2 traffic assessment. It was then assumed that these movements were evenly distributed over the hour and 15-minute periods.
2. Crushing plant and material processing sites, which have already been approved under MPW Stage 2, could be required, and the crushing plant, being the loudest out of these has been modelled operating.
3. In accordance with MPWS3 CoC A13, only one crushing plant is to operate at any one time across the MPW site, and any crushing plant to operated as part of MPW Stage 3 can only be operated once any existing crushing plant operated as part of MPW Stage 2 has been decommissioned.

Sound Power Levels (SWLs) associated with typical construction plant to be used throughout the construction of the Project are identified in Table 30. These SWLs are based on those presented in the EIS for the same type of plant and equipment. Table 30 gives both SWL and Sound Pressure Levels (SPL) at 7m, 10m and 16m for the equipment, which may vary subject to the size and dimensions of the plant/equipment and should be measured at a suitable distance (see Section 5.1.1). It is noted that SWL is independent of measurement distance.

Table 30 – Typical Construction Plant Sound Levels, dB(A)

Plant	Sound Power Level (SWL), dB(A) re. 1pW	Sound Pressure Level (SPL)		
		7 metres	10 metres	16 metres
Loaders[4]	112	87	84	80
Static and vibratory rollers and high energy impact compaction[1,2]	110	85	82	78
Mobile cranes	110	85	82	78
Excavators	110	85	82	78
Excavators with hammers*[1]	122	97	94	90
Backhoes	105	80	77	73
Crushing plant*[4]	118	93	90	86

Plant	Sound Power Level (SWL), dB(A) re. 1pW	Sound Pressure Level (SPL)		
		7 metres	10 metres	16 metres
Concrete batch plant	113	88	85	81
Concrete agitators (or similar)	105	80	77	73
Concrete pumps	103	78	75	71
Concrete saws	112	87	84	80
Air compressors	100	75	72	68
Jackhammers[1]	113	88	85	81
Dozers*	118	93	90	86
Mulchers	118	93	90	86
20-40 tonne articulated tipper trucks	110	85	82	78
Scrapers	110	85	82	78
Graders	109	84	81	77
Water trucks[4]	105	80	77	73
Piling rigs*	121	96	93	89
Forklifts[4]	106	81	78	74
Small earthmoving equipment	95	70	67	63
Rail tamper*	118	93	90	86
Welder	90	65	62	58
Road profiler*	116	91	88	84
Rubber roller	108	83	80	76
Lighting towers	85	60	57	53
Road sweeper	105	80	77	73
Generators[4]	85 - 94[4]	60 - 69	57 - 66	53 - 62
Truck and Dog[4,5]	106	81	78	74
Helicopter[3]	141	113	110	106

Notes:
1. 5 dB(A) modification factors applied for annoying noise characteristics
2. Data obtained from the EIS NVIA
3. Sound Power Level for Helicopter hovering, taken to be the worst case during a typical lift
4. Associated with the MPWS3 construction activities
5. Source from past projects Renzo Tonin & Associates (RT&A) library files from noise measurements and references
6. Significant equipment for the purposes of Section 5.1.1.1 and Section 5.1.1.1.2 are indicated with *

A number of activities have proven to be particularly annoying to nearby residents:

- Use of 'beeper' style reversing or movement alarms
- Grinding metal
- Concrete or masonry rock drilling
- Vibratory rolling
- Bitumen milling or profiling

- Jackhammering
- Rock hammering or rock breaking
- Impact piling.

These activities have had a 5 dB(A) modification factor added to the source levels.

4.4.4 Assessment of Construction Noise

4.4.4.1 Standard Construction Hours

Consistent with the requirements of the ICNG, construction noise impacts are considered based on a worst-case assessment corresponding to plant and equipment operating on part of the site nearest to sensitive receivers.

The ICNG recommends that realistic worst case or conservative noise levels should be predicted for assessment locations representing the most noise exposed residential or other sensitive land uses. For the construction site, residential or other sensitive land uses have been grouped into receiver areas or "catchments" which comprise those receivers which would experience a similar level of construction noise. For each receiver area, the noise levels are predicted at the most noise exposed location. For most construction activities, it is expected that the actual construction noise levels will be lower than predicted at the most exposed receiver, as the noise levels presented in this document are based on a realistic worst-case assessment.

The worst-case scenarios are based on the top three noisiest plant within each works period operating concurrently. The noise level ranges represent the noise sources being located at the furthest to the closest proximity to each receiver location. The worst case predicted $L_{Aeq,15minute}$ construction noise levels at sensitive receivers during standard hours for each identified works periods is presented in Table 31.

Table 31 – Predicted Construction Noise Levels during Standard Hours

Receiver Areas	Site preparation	Bulk earthworks, drainage and utilities				Moorebank Avenue and internal roads	IMT facility and Rail link connection	Warehouse construction and fit out		Buildings and finishing works	NML
		MPWS2 (minimum)	MPWS2 (minimum) + MPWS3[2]	MPWS2 (maximum)	MPWS2 (maximum) + MPWS3[2]			Without helicopter	With helicopter[1]		
Wattle Grove	19-42	23	38	46	47	24-42	25-44	22-36	51-63	16-29	**52**
Wattle Grove North	20-**50**	23	31	**54**	**54**	25-40	29-**50**	28-40	53-68	22-33	**46**
Casula	14-**57**	17	45	**60**	**60**	11-46	16-**52**	14-**53**	47-75	8-47	**51**
Glenfield	21-42	25	35	45	46	23-37	25-42	24-37	43-60	17-31	**54**
S1 – All Saints Senior College	33-53	37	43	**56**	**57**	31-46	36-43	37-49	62-70	31-42	**55**
S2 – Casula Powerhouse	29-55	33	44	**58**	**59**	31-45	31-45	39-55	67-74	33-49	**55**
I1 – MPE	27-**79**	31	53	**83**	**83**	32-**82**	31-**81**	32-61	59-79	25-54	**75**
I2 – DJLU	28-**76**	32	47	**80**	**80**	30-56	31-**76**	34-59	54-78	27-52	**75**
I3 – ABB	24-**80**	28	55	**84**	**84**	28-47	30-**76**	33-73	60-85	26-67	**75**

Notes 1. **Bold** indicates above the NML

2. Contribution from the MPW Stage 3 works have been added to the bulk earthworks, drainage and utilities presented in the previous MPWS2 CNVMP assessment, as per the approach presented in the MPW Stage 3 EIS NVIA. This has only been added to the overall "Works period C – Bulk earthworks, drainage and utilities" Stage 2 predicted construction noise levels this is the associated works stage of MPWS2 that MPWS3 is supporting, as per MPW Stage 3 EIS NVIA.

Based on the predicted construction noise levels presented in Table 31, the NMLs may be exceeded when construction works excluding the use of helicopter are conducted at the closest proximity to the residential receivers in Wattle Grove North and Casula. NMLs may be exceed when construction works are conducted for residential receivers in Wattle Grove, Wattle Grove North, Casula and Glenfield.

It is noted that construction noise levels at all residential receivers are predicted to not exceed the highly noise affected level of 75 dB(A).

The NMLs may be exceeded when construction works are conducted at the closest proximity to Receivers S1, S2, I1, I2 and I3.

In light of the predicted noise levels above, it is recommended that a feasible and reasonable approach towards noise management measures be applied to reduce noise levels as much as possible to manage the impact from construction noise. Further details on construction noise management and mitigation measures are provided in Section 4.5 and Section 4.6.

4.4.4.2 Outside standard construction hours

As per Section 4.4.1.2, construction activities associated with the importation and placement of fill are proposed to take place outside of standard construction hours.

- During OOH Period 1, which is the 6:00am to 7:00am weekday morning shoulder period, the only construction activity proposed is material delivery.
- During OOH Period 2 (6:00pm to 10:00pm weekday evening period), OOH Period 3 (7:00am to 8:00am Saturdays) and OOH Period 4 (1:00pm to 6:00pm Saturday period), the only construction activities proposed are fill delivery & placement activities.

These activities have been assessed in the proposed most conservative MPWS3 locations as other MPWS2 construction works are not proposed to occur concurrently.

The overall most conservative predicted $L_{Aeq,15minute}$ fill delivery & placement noise levels at the sensitive receivers during the OOH periods are presented in Table 32.

The predictions have been presented against the NMLs presented in Section 4.3.1. The predicted levels are based upon those presented in the MPWS3 EIS NVIA.

Table 32 – Predicted fill delivery & placement noise levels during OOH periods, $L_{Aeq\ 15\ minute}$ dB(A)

Receiver	NML	Predicted construction noise level, $L_{Aeq\ 15\ minute}$	NML			Predicted construction noise level, $L_{Aeq\ 15\ minute}$	
	OOHW Period 1	MPWS3 Fill deliveries[2]	OOHW Period 2	OOHW Period 3	OOHW Period 4	MPWS3 Filll deliveries[2] + placement (35 trucks per hour / 70 in/out movements)	MPWS3 Fill deliveries[2] + placement (67 trucks per hour / 134 in/out movements)
Casula	45	44	42	45	46	42	**44**
Glenfield	49	31	49	49	49	31	32
Wattle Grove	46	32	42	46	47	34	34
Wattle Grove North	41	30	41	41	41	30	30
S1	*55*[4]	40	*55*[4]	*55*[4]	*55*[4]	40	40
S2	*55*[4]	44	*55*[4]	*55*[4]	*55*[4]	43	44
I1 – MPE	*75*[4]	48	*75*[4]	*75*[4]	*75*[4]	50	50
I2 – DJLU	*75*[4]	47	*75*[4]	*75*[4]	*75*[4]	46	47
I3 – ABB	*75*[4]	55	*75*[4]	*75*[4]	*75*[4]	53	55

Notes: 1. OOHW 1= 6:00am – 7:00am Mon – Fri, OOHW 2= 6:00pm – 10:00pm Mon – Fri, OOHW 3= 7:00am – 8:00am Saturday, OOHW 4= 1:00pm – 6:00pm Saturday

2. Maximum potential heavy vehicle deliveries of 67 per hour have been assumed along the western MPW site boundary road

3. **Bold** indicates exceedance of the NML.

4. Only applicable when in use

As fill delivery and placement works are proposed during OOH Period 1 (6:00am to 7:00am weekdays), which forms part of the night period (10:00pm to 7:00am), a sleep disturbance assessment has been undertaken assessing the worst case predicted L_{Amax} construction noise levels. Source L_{Amax} levels have been based on noise from metal-on-metal bangs [ie. bangs or loose chains, with a SWL of 120 dB(A)] as the trucks move along the internal haul road. The sleep disturbance assessment results are presented in Table 33.

Table 33 – Predicted L_{Amax} construction noise levels during OOH Period 1 – MPW Stage 3 activities

Receiver	Screening level	Awakening reaction	Predicted noise level, L_{Amax} dB(A)
	OOHW 1 & OOHW 3 (6am to 7am)		
Casula	*55*	*65*	**58**
Glenfield	*59*	*65*	43
Wattle Grove	*56*	*65*	43
Wattle Grove North	*51*	*65*	50

Notes 1. **Bold** indicates exceedance of the screening level

As review of the predicted construction noise levels presented in Table 32 and Table 33 concludes that:

1. During the most conservative scenario where truck fill delivery movements are occurring during the proposed OOH periods, the predicted noise levels achieve the NML during all periods at all locations, except in the where the number of fill delivery trucks operating via the western ring road is above 35 trucks per hour (70 in/out movements from compound) only for receivers in Casula, and only during the OOHW 2 evening (6:00pm – 10:00pm) period.

2. Where the number of fill delivery trucks operating via the western ring road is below 35 trucks per hour (70 truck movements in/out from compound) the predicted noise levels achieve the NML at all locations during all proposed periods.

3. The sleep disturbance screening level is achieved at all residential receivers, except for potentially some in Casula. However, all predicted noise levels remain below the awakening reaction level at all nearby residential receivers.

The assessment demonstrates that the Proposal can be managed in order to exceed the NML at nearby sensitive receivers during OOH periods, however there is the potential for high noise events to exceed the sleep disturbance screening level. Management of these sources high noise events (ie. tailgate bangs or loose chains) from delivery vehicles will help to minimise the potential for sleep disturbance impacts on nearby receivers. As such, it is recommended that a feasible and reasonable approach towards noise management measures outside of standard construction hours be applied to manage the potential impacts from construction noise. Further details on construction noise management and mitigation measures are provided in Section 4.5.

As per the OOHW Protocol (Section A.5) all proposed OOHW would be subject to a CNVIS process. The CNVIS would detail the monitoring required to verify the construction noise levels in the adjacent community, to ensure they remain consistent with the predicted levels in the CNVIS. Similarly, noise monitoring would be undertaken in response to noise complaints following further investigation as required by Section 5.2 and also to address concerns raised by the CCC as detailed in Section A.3.1.

As per Section 5.1.5, in the event of an exceedance of noise and vibration management levels, works will cease or reduce immediately at the direction of the Contractor's CM/EM or Site Supervisor. Remedial measures will be implemented prior to recommencing work, and monitoring undertaken to verify noise or vibration levels.

Additionally, as per MPWS3 CoC B21 (i), where additional feedback from the CCC is received in relation to OOHW, where feasible and reasonable it will be incorporated into the specific OOHW CNVIS to ensure OOHW are managed with current information.

4.4.5 Potential Construction Traffic Noise Impacts

4.4.5.1 Construction Traffic Generation

During construction of the Project all heavy vehicles, and the majority of light vehicles, will travel to and from the site via the M5 Motorway and Moorebank Avenue. Additionally, a small number of light vehicles will travel along Anzac Road, east of Moorebank Avenue, and along Moorebank Avenue, north of the M5 Motorway. No heavy vehicles associated with the construction of the Project will travel along Anzac Road or along Moorebank Avenue, north of the M5 Motorway.

The existing and projected daily traffic volumes along the identified roads for the construction of the Project are presented in Table 34. The percentage of heavy vehicles is also shown in Table 34. It is not yet known whether heavy construction vehicles will travel to the site along the M5 Motorway from the east or the west. This will depend upon factors considered and determined by the construction contractor, such as the source(s) of fill. Therefore, the projected construction traffic volumes along the M5 Motorway, presented in Table 34, are based on all heavy construction vehicles travelling along the M5 Motorway both east and west of Moorebank Avenue. Such a scenario will not eventuate in practice, and therefore, the assessment of construction traffic noise along the M5 Motorway is conservative.

A Driver's Code of Conduct has been prepared as an Appendix to the Construction Traffic Access Management Plan (CTAMP) to assist in the management of potential traffic and traffic noise related impacts.

Table 34 – Construction Traffic Volume and % Heavy Vehicles

Location	Time Period	Existing (no Development)		Future (with Development)	
		Volume	%Heavy	Volume	%Heavy
M5 Motorway – East of Moorebank Avenue	Day	106,140	10%	106,590	10%
	Night	20,850	11%	20,980	11%
M5 Motorway – West of Moorebank Avenue	Day	124,950	11%	126,680	11%
	Night	24,460	11%	24,880	12%
Moorebank Avenue – North of M5 Motorway	Day	27,290	11%	27,970	12%
	Night	6,290	10%	6,440	11%
Anzac Road – East of Moorebank Avenue	Day	9,000	4%	9,150	4%
	Night	2,130	4%	2,180	4%

4.4.5.2 Predicted Increases in Road Traffic Noise Levels

Using the data presented in Table 34, the increases in road traffic noise levels along the M5 Motorway, Moorebank Avenue and Anzac Road during construction of the Project have been calculated. The calculations have been conducted using the Calculation of Road Traffic Noise (CORTN) algorithm, and are based upon the following assumptions:

- Vehicle speeds are 100 km/h along the M5 Motorway and 60 km/h along Moorebank Avenue and Anzac Road.
- Typical receiver setbacks are approximately 25 metres along the M5 Motorway and approximately 12 metres along Moorebank Avenue and Anzac Road. It is important to note that receiver setbacks are important when calculating absolute road traffic noise levels; however, setbacks are not important when calculating increases in road traffic noise levels due to changes in traffic volume and mix.

The predicted increases in road traffic noise levels, due to the construction of the Project, are shown in Table 35.

Table 35 – Increases in Road Traffic Noise Levels During Construction

Location	Predicted Increase (dBA)	
	Day[1]	Night[2]
M5 Motorway – East of Moorebank Avenue	0.1	0.1
M5 Motorway – West of Moorebank Avenue	0.0	0.2
Moorebank Avenue – North of M5 Motorway	0.2	0.3
Anzac Road – East of Moorebank Avenue	0.1	0.1

Notes: 1. Day – 7.00am to 10.00pm,
2. Night – 10.00pm to 7.00am

Table 35 shows that increases in road traffic noise levels along the M5 Motorway, Moorebank Avenue, and Anzac Road are considerably less than 2dB(A). Therefore, no mitigation of road traffic noise levels on public road due to the construction of the Project is required.

4.4.6 Potential Construction Vibration Impacts

Vibration-intensive plant that will be used during construction will include:

- Vibratory compactor/rollers
- High-energy impact compaction equipment
- Jackhammers

4.4.6.1 Vibration Safe Working Distances

Table 36 presents the typical safe working distances for vibration intensive activities. These safe working distances are applicable for structural damage (DIN 4150-3) and human comfort (the NSW EPA Assessing Vibration: A Technical Guideline).

Table 36 – Safe Working Distances

Plant Item	Rating/Description	Safe Working Distance (m)			
		Pipework and Infrastructure (DIN 4150-3)	Buildings used for commercial purposes, industrial buildings, and buildings of similar design (DIN 4150-3)	Dwellings and buildings of similar design and/or occupancy (DIN 4150-3)	Human Comfort (Assessing Vibration guideline)
Vibratory compactor/ roller	< 50 kN (Typically 1-2 tonnes)	1 m	2 m	6 m	15 m to 20 m
	< 100 kN (Typically 2-4 tonnes)	1 m	2 m	8 m	20 m
	< 200 kN (Typically 4-6 tonnes)	1 m	3 m	15 m	40 m
	< 300 kN (Typically 7-13 tonnes)	1 m	4 m	19 m	100 m
	> 300 kN (Typically 13-18 tonnes)	1 m	4 m	25 m	100 m
	> 300 kN (> 18 tonnes)	1 m	1 m	31 m	100 m
High Energy Impact Compaction[1]	100 kW Tractor (Towing Equipment)	2 m	3 m	10 m	50 m
Small Hydraulic Hammer	(300 kg - 5 to 12t excavator)	1 m	1 m	3 m	7 m
Medium Hydraulic Hammer	(900 kg – 12 to 18t excavator)	1 m	2 m	9 m	23 m
Large Hydraulic Hammer	(1600 kg – 18 to 34t excavator)	1 m	4 m	24 m	73 m
Vibratory Pile Driver	Sheet piles	1 m	1 m to 4m	2 m to 20 m	20 m
Pile Boring	≤ 800 mm	1 m	1 m	2 m	n/a
Jackhammer	Handheld	1 m	1 m	1 m	Avoid contact with structure

Notes: 1. Data presented in Appendix N of the MPWS2 EIS NVIA

The nearest residential receiver is located approximately 350m from the Project site, which is well beyond the safe working distances presented in the table above. Therefore, it is not expected that the cosmetic damage and human comfort criteria will be exceeded at the nearest affected residential receivers.

Sensitive receivers S1 and S2 are located in excess of 350m away, which is well beyond the safe working distances presented in the table above. Therefore, it is not expected that the cosmetic damage and human comfort criteria will be exceeded at the nearest affected educational receivers.

Sensitive receiver I3 (ABB) may potentially operate vibration sensitive equipment susceptible to impacts from construction vibration. If works are within 100m of any ABB building, the following approach to manage potential vibration impacts shall be conducted prior to the commencement of those works:

1. Engage with ABB and determine whether vibration sensitive equipment is housed within relevant building
2. If vibration sensitive equipment exists, then determine the manufacturer's vibration limits for the vibration sensitive equipment
3. Engage a vibration expert to determine appropriate safe working distances
4. Conduct continuous vibration monitoring for the period where construction works occur within 100m of the relevant ABB building.

4.4.6.2 Heritage Listed Structures

Kitchener House is located at 208 Moorebank Avenue and is of heritage significance. Vibration generating works on the project site will potentially occur within 100m of Kitchener House.

If works are within 100m of Kitchener House, the following approach to manage potential vibration impacts shall be conducted prior to the commencement of those works:

1. Undertake pre-construction dilapidation surveys of Kitchener House
2. Obtain a structural engineering report to confirm structural integrity of the building and confirm if item is 'structurally sound' (or alternatively adopt the more stringent criteria specified in Item 5 below)
3. Seek advice of a heritage specialist on methods and locations for installing equipment used for vibration and movement of heritage-listed structures
4. If Kitchener House is 'structurally sound', the screening criteria will apply
5. If Kitchener House is 'structurally unsound' or if a structural engineering report is not conducted, the conservative cosmetic damage objectives of 3mm/s peak component particle velocity will be adopted
6. Conduct continuous vibration monitoring for the period where construction works occur within 100m of Kitchener House.

4.5 Noise and Vibration Management Measures

This section describes the overall approach to managing and mitigating noise and vibration impacts as a result of the Project based on the predicted impacts as summarised in this CNVMP.

The management measures discussed in this section are based on the applicable EIS, RtS, NVIA, CoC, ICNG as well as the requirements and standards of SIMTA and its contractors.

The noise predictions in this CNVMP were undertaken to address the assessment requirements documented in the ICNG (Section 3.1.1). It also identifies the thresholds by which impacts can be qualified and the level of mitigation and management that is required for each stage of works.

The mitigation and management measures are consistent with the intent and recommendations of the ICNG for best-practice techniques to be developed for managing construction noise and vibration and implementing feasible and reasonable mitigation measures.

Table 9 includes the FCMM/RCMM related to noise and vibration that were established as part of the MPW Stage 2 RtS. These mitigation measures have been included in Table 37 and references to where the RCMMs are addressed have also been included. These mitigation measures would be adopted during the Project and implemented for the works to manage and potentially reduce construction noise and vibration impacts.

Table 37 – Noise and Vibration Management Measures

ID	Management Measure	Timing	Responsibility	Reference
NV1	The approved hours of work, the name of the site/project manager, the responsible managing company, its address and 24-hour contact phone number for any inquiries, including construction/noise complaints will be displayed at the site, typically near site entrance points.	Pre-construction and during construction	Contractor's CLM	Best practice
NV2	Notification of potentially affected people and the relevant council about construction commencement, out-of-hours works, and high noise works will occur in accordance with the Construction Community Communication Strategy and will detail the following at least 14 days prior to commencement of relevant works: • Nature of the construction stages • Hours of work • Duration of noisier activities • Measures to minimise noise impacts The Project website, information and response lines, email distribution list and any applicable community-based forums will also be utilised for this purpose.	Pre-construction and during construction	Contractor's CLM	MPWS2 CoC B127 MPWS2 CoC B135 MPWS3 CoC B21 MPWS3 CoC C4

ID	Management Measure	Timing	Responsibility	Reference
NV3	In the event of any noise or vibration related complaint or adverse comment from the community, noise and ground vibration levels (as relevant) will be investigated. Remedial action will be implemented where feasible and reasonable. The procedures for managing complaints will be provided within the Construction Community Communication Strategy.	Construction	Contractor's CLM	MPWS2 CoC A31 MPWS2 CoC C1 MPWS2 FCMM 2C MPWS3 RCMM 2C
NV4	In the event that plant items are proposed to be operated within their respective "Cosmetic Damage" safe working distances from Kitchener House or other vibration sensitive structure (or a vibratory compactors is proposed to be used closer than 30 metres from residential building), then attended vibration monitoring will be conducted at Kitchener House or the respective sensitive structure to verify that the 'safe' vibration level is not exceeded. If exceedances are approached, the work should cease immediately, and alternative construction methods will be used to ensure the vibration levels are achieved and/or impacts appropriately managed.	Construction	Contractor's CM	MPWS2 FCMM 2F MPWS3 CoC C12 MPWS3 CoC C13 MPWS3 CoC C14
NV5	Ambient noise monitoring will be undertaken during construction, operation and up to two years beyond completion of the Project. Annual reports of noise monitoring results will be prepared.	Construction	Contractor's EM	MPWS2 FCMM 2B MPWS3 RCMM 2B
NV6	Where feasible and reasonable, plant and equipment will be selected, operated and maintained to be minimise noise and vibration, including: • Select plant and equipment based on least noise and vibration emission levels • Use of low vibration generating equipment/vibration dampeners or alternative construction methodology where necessary • Use of noise source controls, such as the use of residential class mufflers, to reduce noise from all plant and equipment including excavators and trucks • Maintenance, repair or replacement of plant and equipment if it becomes noisy • Use of quietest suitable and available construction equipment • Use of silenced generators and compressors • Ensuring road plates are properly installed and maintained. • Use of non-tonal movement alarms in place of reversing beepers, or alternatives such as reversing cameras and proximity alarms, unless tonal alarms are mandated by legislation. All plant and equipment used at the site or to monitor the performance of the development will be: • maintained in a proper and efficient condition • operated with all engine covers and hatches closed as intruded by the manufacturer; and • operated in a proper and efficient manner.	During construction	Contractor's EM Site Supervisor	MPWS2 CoC B135 MPWS2 CoC B188 MPWS2 REMM 5F,5L,5N MPWS3 CoC C2 MPWS3 CoC C9

NV7	Where feasible and reasonable, the following work practices will be adopted to minimise noise and vibration: • Where practical, undertake the noisiest works during standard hours. • Avoid simultaneous operation of noisy plant. • Maximise the offset distance between noisy plant and adjacent sensitive receptors • Throttle down or switch off plant when not in use • Examine, and implement where feasible and reasonable, alternative work practices that generate less noise. • All drivers and operators will adhere to speed limits and other signposted instructions • Noise-emitting plant to be directed away from sensitive receivers, or behind barriers. • "Clustering" of noisy plant or processes will be limited. • Adhere to the safe working distances identified in the CNVMP for vibration intensive plant • Select materials which require fewer vibration intensive activities to occur (such as materials requiring less compaction). • Arrange the work site to minimise the use of movement alarms on vehicles and mobile plant. • Where there are no overriding project constraints, program works so as to not affect any sensitive receiver for more than a total of six nights in any four-week period. • Avoid dropping materials from a height, dropping or dragging road plates. • Talk to workers about noise from the works and how it can be reduced. • Use radios and stereos indoors rather than outdoors. • Contact potentially noise affected receivers at the earliest possible time before any site work begins. • Inform potentially noise affected receivers about the nature of the construction stages and the duration of noisier activities – for example, excavation and rock-breaking. • Describe to potentially affected receivers any noise controls, such as temporary noise walls or use of silenced equipment. • Keep potentially noise affected receivers up to date on progress. • Provide contact details on a site board at the front of the site and maintain a complaints register suited to the scale of works. • Ask about any concerns that potentially affected receivers may have and discuss possible solutions.	Pre-construction	Contractor's EM	MPWS2 CoC B135 MPWS2 REMM 5H, 5I, 5M, 5P MPWS3 CoC C2 MPWS3 CoC C9

ID	Management Measure	Timing	Responsibility	Reference
	• Provide potentially affected receivers with access to the latest copy of the CNVMP. • Keep staff who receive complaints informed regarding current and upcoming works and the relevant contacts for these works. • Handle complaints in a prompt and responsive manner. • Where there are complaints about noise from an identified work activity, review and implement, where feasible and reasonable, actions additional to those described above to minimise noise output.			
NV8	Construction vehicles will be operated so as to minimise any construction noise impacts from the construction site. To achieve this the following will occur: • Toolbox talks for drivers and operators • No use of compression brakes on the site or on nearby roads • Loading and unloading of materials/deliveries will occur as far as possible from receptors. • Selection of site access points and roads which are as far as possible away from noise sensitive receptors. • Shielding of dedicated loading/unloading areas to be shielded if close to noise sensitive receptors (such that exceedance of NMLs is expected) • Fitting of delivery vehicles with straps rather than chains for unloading, wherever feasible and reasonable. • Make delivery personnel and truck drivers aware of approved haulage routes and access in and out of the construction site. • Prevent vehicles and plant queuing and idling outside the site prior to the morning start time. • Issue pre-determined delivery times to suppliers and use radio communication to confirm status of the delivery. • Contracts will include provisions to deal with any unsatisfactory noise performance for specific vehicles and/or operators and require the use of non-tonal reversing alarms. • The Truck Drivers Protocol presented in the CTAMP must be adhered to.	During construction	Contractor's EM Site Supervisor	MPWS2 CoC B188 MPWS2 FCMM 2E MPWS2 REMM 5E, 5K, 5O MPWS3 CoC A39 MPWS3 CoC B24 MPWS3 CoC C2 MPWS3 CoC C9
NV9	If noise management levels are likely to be exceeded, stationary noise sources will be enclosed or shielded whilst ensuring that the work health and safety of workers is maintained.	During construction	Contractor's EM	CoC B135
NV10	If noise management levels are likely to be exceeded, structures will be used to shield residential receptors from noise. This may include site shed placement; earth bunds; fencing; erection of operational stage noise barriers (where practicable) and consideration of site topography when situating plant.	Pre-construction and during construction	Contractor's EM	MPWS2 CoC B135 MPWS2 FCMM 2B MPWS2 REMM 5G

ID	Management Measure	Timing	Responsibility	Reference
NV11	If works are within 50 m of Kitchener House, the following approach to manage potential vibration impacts shall be conducted prior to the commencement of those works: (a) Undertake pre-construction dilapidation surveys of Kitchener House; (b) Obtain a structural engineering report to confirm structural integrity of the building and confirm if item is 'structurally sound' (or alternatively adopt the more stringent criteria specified in (5) below). (c) Seek advice of a heritage specialist on methods and locations for installing equipment used for vibration and movement of heritage-listed structures. (d) If Kitchener House is 'structurally sound', the screening criteria will apply, or (e) If Kitchener House is 'structurally unsound' or if a structural engineering report is not conducted, the conservative cosmetic damage objectives of 3 mm/s peak component particle velocity will be adopted. (f) Conduct continuous vibration monitoring for the period where construction works occur within 100 m. (g) Undertake post-construction dilapidation surveys In the event an exceedance of established vibration criteria does occur, surveys will be undertaken immediately.	Construction	Contractor's EM	This plan MPWS2 FCMM 2F
NV12	If noise generating construction works are undertaken outside the standard construction hours and/or measured construction noise levels at nearest residences are greater than 75 dB(A) L_{Aeq}, the following additional noise mitigation measures will be considered: (a) Localised acoustic screens (to be appropriately designed by an acoustic consultant). An example screen is described in FCMM 5S, (b) Dominant noise-generating mechanical plant will be fitted with feasible noise mitigation controls such as exhaust mufflers and engine shrouds. (c) Respite periods of one hour are recommended for every continuous three-hour period of work; alternatively, daytime works will be scheduled between 9.00 am and 12.00 pm, and between 2.00 pm and 5.00 pm (d) Where practical, and when night works are being undertaken, consider whether noisy construction work could be undertaken during the less sensitive 6.00 pm to 10.00 pm evening period	During construction	Contractor's EM Site Supervisor	MPWS2 REMM 5S MPWS3 CoC 21 (c)

ID	Management Measure	Timing	Responsibility	Reference
NV13	All general construction works and activity will be scheduled to occur during the following periods, unless authorised as out-of-hours works or as otherwise specified in an environment protection licence: • 7:00am to 6:00pm Mondays to Fridays, inclusive; • 7:00am to 1:00pm Saturdays; and • at no time on Sundays or public holidays.	During construction	Contractor's EM Site Supervisor	MPWS2 CoC B125 MPWS2 REMM 5C MPWS3 CoC C3
NV14	Construction works and activity with the potential to generate high noise impact (including impulsive or tonal noise emissions) will be scheduled to occur during the following periods: • between the hours of 8:00 am to 5:00 pm Monday to Friday; • between the hours of 8:00 am to 1:00 pm Saturday; and • in continuous blocks not exceeding three hours each with a minimum respite from those activities and works of not less than one hour between each block. Blasting is not permitted at any time.	During construction	Contractor's EM Site Supervisor	MPWS2 CoC B126
N15	Rock breaking, rock hammering, sheet piling, pile driving and similar activities may only be carried out between the following hours: (a) 9:00am to 12:00pm, Monday to Friday; (b) 2:00pm to 5:00pm Monday to Friday; and (c) 9:00am to 12:00pm, Saturday.	During construction	Contractor's EM Site Supervisor	MPWS3 CoC C6
NV16	Construction vehicles (including concrete agitator trucks) are not to arrive at the site or surrounding residential precincts outside of the construction hours of work outlined under condition MPWS3 CoC C3, except where works are being undertaken in accordance with MPWS3 CoC C4.	During construction	Contractor's EM Site Supervisor	MPWS3 CoC C3 MPWS3 CoC C4 MPWS3 CoC C10
NV17	Where feasible and reasonable, non-tonal movement alarms will be used in place of tonal reversing alarms site plant and equipment required for MPWS3 construction activities.	During construction	Contractor's EM Site Supervisor	MPWS3 CoC C11
NV18	Only one crushing plant is to operate at any one time across the MPW site (i.e. under either MPWS2 or MPWS3). Any crushing plant operated as part of MPWS3 can only be operated once any existing crushing plant operated as part of MPWS2 has been decommissioned.	During construction	Contractor's EM Site Supervisor	MPWS3 CoC A13

4.6 Noise and Vibration Mitigation Measures

The following noise and vibration mitigation measures in addition to the general management measures detailed in Section 4.5 above would be considered, where reasonable and feasible.

- Ensuring the heavy vehicles are not required to stop and use air brakes along the access road or when close to nearby residential receivers

- Loose items or items with the potential to generate high noise events (ie. tailgate bangs or loose chains) on delivery vehicles are substituted or prevented from moving (ie. straps or plastic covered chains)
- All plant to be well maintained and fitted with noise mufflers, engine hoods, etc
- Timetabling noisiest activities to occur at the least sensitive times
- Using spotters, closed circuit television monitors, "smart" reversing alarms, or "squawker" type reversing alarms in place of traditional reversing alarms
- Mitigation of specific noise sources using portable temporary screens or enclosures, where practicable and safe
- Turning off plant and equipment when not in use
- Carrying out loading and unloading away from sensitive receivers, where practicable
- Avoid dropping materials from a height
- Timetabling OOHW at locations with the furthest distance from sensitive receivers
- Substituting noisy / vibration intensive equipment with less intrusive types
- Maximising the offset distance between noisy plant items and sensitive receivers
- Avoiding using noisy plant simultaneously and / or close together, adjacent to sensitive receivers, where practicable
- Orienting equipment away from sensitive receivers, where practicable
- Using noise source controls, such as the use of residential class mufflers, to reduce noise from all plant and equipment including cranes, graders, excavators and trucks
- Selecting plant and equipment based on noise emission levels
- Temporary acoustic shielding
- Offer of respite to residents.

The potential noise reduction that can be achieved by noise mitigation measures are shown in Table 36.

Table 38 – Noise Mitigation Measures and Potential Noise Reductions

Management Measure	Anticipated Noise Reduction, dB(A)
Administrative Controls	
Operate during approved hours	-
Undertake regular noise monitoring to determine the impact of operating plant on sensitive receivers	-
Appropriate training of onsite staff	-
Undertake community consultation and respond to complaints in accordance with established project procedures	-
Turning off machinery when not in use	0-5
Respite periods for pile drivers and rock breakers	-
Engineering Controls	
Portable temporary screens	5-10
Screen or enclosure for stationary equipment	10-15
Maximising the offset distance between noisy plant items and sensitive receivers	3-6
Avoiding using noisy plant simultaneously and / or close together, adjacent to sensitive receivers	2-3
Orienting equipment away from sensitive receivers	3-5
Carrying out loading and unloading away from sensitive receivers	3-5
Using dampened tips on rock breakers	3-6
Using noise source controls, such as the use of residential class mufflers, to reduce noise from all plant and equipment including bulldozers, cranes, graders, excavators and trucks	5-10
Selecting site access points and roads as far as reasonably practicable away from sensitive receivers	3-6
Using spotters, closed circuit television monitors, "smart" reversing alarms, or "quacker" broadband type reversing alarms in place of traditional tonal reversing alarms	2-5
Employ non noise-generating structures such as site offices, storage sheds, stockpiles and tanks as noise barriers	5-10

5 Monitoring and Reporting

5.1 Monitoring

Noise and vibration monitoring will be conducted as per the requirements of this CNVMP. Noise measurements shall be undertaken consistent with the procedures documented in AS1055.1-2018 '*Acoustics - Description and Measurement of Environmental Noise – General Procedures*' or the most recent version of this standard in force at the time. 'Vibration measurements shall be undertaken in accordance with the procedures documented in the EPA's *'Assessing vibration - a technical guideline*' (2006), DIN4150 '*Structural Vibration – Part 3 Effects of Vibration on Structures*' and BS7385 Part 2 '*Evaluation and measurement for vibration in buildings*'.

5.1.1 Noise Emission Levels for Plant and Equipment

Attended noise measurements will be undertaken within a period of 28 days of significant (significant plant items are indicated in Table 30 or includes key high noise equipment proposed to be used during OOHW) and other high noise intensive equipment arriving on site.

Significant plant items should be measured in accordance with Section 5.1.1.1 to establish the actual noise levels and to confirm that the operating noise levels comply with the values presented in Table 30 of this CNVMP.

For other high noise intensive equipment, noise measurements should follow the methodology presented in Section 5.1.1.2, and to confirm that the operating noise levels comply with the values presented in Table 30 of this CNVMP.

In each case, if operating noise levels are significantly louder than the values presented in Table 30, then a review of the plant and equipment will be undertaken and reselection of plant and equipment should be considered, if required.

The testing procedures are presented in the following sub-sections and make reference to the following standards:

- IEC 61672-1 2013 '*Electroacoustics - Sound Level Meters*'
- ISO 3744:2010 '*Acoustics - Determination of sound power levels and sound energy levels of noise sources using sound pressure - Engineering methods for an essentially free field over a reflecting plane*'
- ISO 3746:2010 '*Acoustics - Determination of sound power levels and sound energy levels of noise sources using sound pressure - Survey method using an enveloping measurement surface over a reflecting plane*'
- AS ISO 6393:2019 '*Earth-moving machinery - Determination of sound power level - Stationary test conditions*'

- ISO 6395:2008 '*Earth-moving machinery - Determination of sound power level - Dynamic test conditions*'
- ISO 9614-1:1993 '*Acoustics - Determination of sound power levels of noise sources using sound intensity – Part 1: Measurement at discrete points*'

The testing procedures are to be followed by personnel suitably qualified and experienced in undertaking acoustic measurements.

With the exception of measurement parameters, which are to reflect the individual requirements of each sub-section, the test report for each piece of plant/equipment should include at minimum the reporting information required as detailed in Section 5.1.1.2.

5.1.1.1 Significant equipment noise emission level testing procedures

The testing procedures for determination of sound power levels for key noise intensive construction plant identified in in Table 30 including earthmoving equipment and other ancillary plant and equipment used during construction are presented in the following sub-sections.

The following procedures are to be followed by personnel suitably qualified and experienced in undertaking acoustic measurements.

Each significant earthmoving machinery plant item shall be tested in terms of both the 'stationary' and the 'dynamic' testing procedures detailed below, as required.

5.1.1.1.1 Earthmoving machinery - Stationary testing

Stationary measurements shall be performed on all earthmoving plant according to the method of AS ISO 6393:2019.

In addition to measuring overall A-weighted noise levels, octave band frequency $L_{Aeq,T}$ noise levels shall also be measured at each measurement location from 63Hz to 8kHz inclusive. Background noise shall also be recorded in the same octave band frequency range, and corrections to measured octave band noise levels shall be applied as described in AS ISO 6393:2019.

Each plant item should be tested in isolation, without any other noisy plant on site operating. Where this cannot be done for practical reasons, then the noise of the plant being tested shall be at least 6dB greater than the background noise from other nearby plant, both in terms of the overall A-weighted level and in all octave band frequencies.

Measured octave band $L_{Aeq,T}$ noise levels shall also be processed as described in Section 8 of AS ISO 6393:2019 to establish octave band sound power levels.

The overall A-weighted sound power levels shall be determined for $L_{Aeq,T}$ and $L_{A1,T}$ noise metrics. The measurement sample time shall be selected so that it is representative of the operating cycle/s of the plant being tested.

Where the plant tested or noise measurements are taken within 3.5 metres of large walls or cliffs, then a reflection correction of up to -2.5dB(A) shall be applied to remove the effect of increased noise due to sound reflections from such structures.

All measured noise level data and determined sound power levels shall be included in the test reports and compared against the corresponding item in Table 30.

5.1.1.1.2 Earthmoving machinery - Dynamic testing

Details of equipment operation during testing will vary depending on the equipment type. Dynamic measurements shall be performed on all earthmoving plant according to the method in ISO 6395.

In addition to measuring overall A-weighted noise levels, octave band frequency $L_{Aeq,T}$ noise levels shall also be measured at each measurement location from 63Hz to 8kHz inclusive. Background noise shall also be recorded in the same octave band frequency range, and corrections to measured octave band noise levels shall be applied as described in ISO 6395.

Each plant item should be tested in isolation, without any other noisy plant on site operating. Where this cannot be done for practical reasons, then the noise of the plant being tested shall be at least 6dB greater than the background noise from other nearby plant, both in terms of the overall A-weighted level and in all octave band frequencies.

Measured octave band $L_{Aeq,T}$ noise levels shall also be processed to establish octave band sound power levels.

Where the plant tested or noise measurements are taken within 3.5 metres of large walls or cliffs, then a reflection correction of up to -2.5dB(A) shall be applied to remove the effect of increased noise due to sound reflections from such structures.

The overall A-weighted sound power levels shall be determined for $L_{Aeq,T}$ and $L_{A1,T}$ noise metrics. The measurement sample time shall be selected so that it is representative of the operating cycle/s of the plant being tested.

All measured noise level data and determined sound power levels shall be included in the test reports and compared against the corresponding item in Table 30.

5.1.1.1.3 Testing procedures – other non-earthmoving construction plant

Noise measurements shall be performed on all significant non-earthmoving construction plant according to the methods of either ISO 3744 or ISO 3746, whichever is applicable to the items of plant. being tested.

Machinery shall be operated at high idle speed. In the case of drilling, boring and rock-breaking machines, the testing location shall allow for these machines to be operated in rock of characteristics that are typical for the project site.

In addition to measuring overall A-weighted noise levels, octave band frequency $L_{Aeq,T}$ noise levels shall also be measured at each measurement location from 63Hz to 8kHz inclusive. Background noise shall also be recorded in the same octave band frequency range, and corrections to measured octave band noise levels shall be applied as described in ISO 3744.

Each plant item should be tested in isolation, without any other noisy plant on site operating. Where this cannot be done for practical reasons, then the noise of the plant being tested shall be at least 6dB greater than the background noise from other nearby plant, both in terms of the overall A-weighted level and in all octave band frequencies.

Measured octave band $L_{Aeq,T}$ noise levels shall also be processed as described in Section 8 of ISO 3744 to establish octave band sound power levels.

The overall A-weighted sound power levels to be determined shall be in terms of both the $L_{Aeq,T}$ and $L_{A1,T}$ noise metrics. The measurement sample time shall be selected so that it is representative of the operating cycle/s of the plant being tested.

Where the plant tested or noise measurements are taken within 3.5 metres of large walls or cliffs, then a reflection correction of up to -2.5dB(A) shall be applied to remove the effect of increased noise due to sound reflections from such structures.

All measured noise level data and determined sound power levels shall be included in the test reports and compared against the corresponding item in Table 30.

5.1.1.2 Other high noise intensive equipment noise emission level testing procedures

Other high noise intensive equipment that are not covered under Section 5.1.1.1, should also have the noise emission levels checked prior to undertaking works using the following testing procedures.

The high noise equipment that are required to be monitored is subject to their intended use and if they are to be used during OOHW. This would typically cover equipment that may be 105 L_W or louder for use during standard construction hours and all proposed equipment that would be used OOHW, however, the potential for the plant/equipment to impact nearby receivers should be considered when determining if monitoring is required. Examples of the other high noise intensive equipment are as follows, but are not limited to these:

- Excavators
- Mobile cranes
- Mulchers
- Graders

The following procedures are to be followed by personnel suitably experienced in undertaking acoustic measurements. Plant and equipment noise monitoring will ensure the $L_{Aeq,T}$, and $L_{A90,T}$ parameters are

recorded as a minimum, with $L_{Aeq,15min}$ values inferred by extrapolation or calculation as necessary. The L_{Amax}, and $L_{A1,\ 1min}$ parameter should also be recorded for each measurement. The time and location of the monitoring will also be noted.

Each plant item should be tested in isolation, without any other noisy plant on site operating. Where this cannot be done for practical reasons, then the noise of the plant being tested shall be at least 10 dB(A) greater than the background noise ($L_{A90,T}$) in terms of the overall A-weighted level.

The plant and equipment measurement sample height will be 1.5 m above ground level, unless an alternate height is specified by the operator that more accurately captures emissions data for the item being considered. All measurements will be completed with the sound level meter mounted to a tripod (if possible, hand held measurements are acceptable if the assessment height or position cannot be achieved using a tripod) and with a windscreen fitted.

All sound level meters used must be Class 2 instruments as described in IEC 61672-1 2013 '*Electroacoustics - Sound Level Meters*' and calibrated to standards that are traceable to Australian Physical Standards held by the National Measurement Laboratory (CSIRO Division of Applied Physics). The calibration of the meters shall be checked in the field before and after the noise measurement period. All outdoor noise measurements shall be undertaken with a windscreen over the microphone. Windscreens reduce wind noise at the microphones. Measurements of noise should be disregarded when it is raining and/or the wind speed is greater than 5 m/s (18 km/h).

Measurements are to be undertaken at a distance of at least twice the characteristics source dimension (source centroid to further point on the plant/equipment [refer to ISO 3744:2010 and/or AS ISO 6393:2019 for further information]) from the noise source under investigation. This can be typically undertaken at 7m, subject to the size of the plant/equipment being measured. As per AS ISO 6393:2019, this should be 10m when the basic length of the equipment is 1.5m < length < 4m, and 16m when the basic length of the equipment is 4m < length < 8m. The test site measurements ground surface should consist of a hard reflecting surface (ie. concrete, non-porous asphalt, hard sand). Care should be taken that the measurement distance does not result in the measured noise level being sufficiently above the background noise level. Multiple measurement locations are recommended, ensuring to measure in the loudest direction from the source.

All noise measurements are to be undertaken at least 3.5 metres from any nearby reflective surfaces (other than the ground) (ie. building, silent plant/equipment items, etc.).

Plant/equipment shall be operated in a typical noise generating condition (loudest operation). The duration of each plant and equipment measurement sample will be selected by the operator to ensure the noise emission form the item being considered is adequately recorded and representative of the typical noise emissions from that plant/equipment item. To avoid misunderstanding, a shorter duration less than 15 minutes may be adopted for plant and equipment noise level tests where the period of representative noise emissions is less than less than 15 minutes.

The test report for each piece of plant/equipment should include at minimum the following information:

Measurement details and instrumentation

1. Date and time of measurements.
2. Type, manufacturer and model number of sound measurement instrumentation.
3. Results of field calibration checks before and after measurements and field calibrator details.
4. Description of the time aspects of each measurement (ie sample times, measurement time intervals and time of day).

Acoustic environment

5. Description of the test site, test-site ground surface.
6. Sketch map of measured area and test setup including:
    a. Distance of all measurement locations to operating plant/equipment (including various distances in the case where the plant/equipment moves as part of operation).
    b. Distances to nearby reflective surfaces.
7. Weather conditions during measurements, including wind velocity, wind direction, temperature and relative humidity.
8. Any adjustment made for presence or absence of nearby reflecting surfaces.

Noise source under test

9. Details of the noise source under test:
    a. a description of the noise source under test (including the manufacturer, type, technical data, dimensions, serial number and year of manufacture).
    b. type/description of tested operation/activity and load conditions of the noise sources under investigation (for each measurement).
10. Details of any noise due to other sources that influenced the measurement (eg traffic, aircraft, trains, dogs barking, insects, other construction equipment etc).

Acoustic data

11. Measurement location details and number of measurements at each location.
12. The following measurement parameters are to be recorded at a minimum for each measurement location:
    a. L_{Amax}, $L_{A1,T}$, $L_{Aeq,T}$, $L_{A90,T}$ (for duration of typical activity noise emission).
    b. Background noise level (L_{A90}) in absence of noise source under test.
    c. $L_{Aeq,15min}$ & $L_{A1,1min}$ values inferred by extrapolation or calculation as necessary.

d. Sound Pressure Level $L_{Aeq,15min}$ @ 7m, 10m, 16m or Sound Power Level calculated compared against the corresponding item in Table 30 (only one value required for comparison).

13. Recommendation for further review if measured levels were above the corresponding value in Table 30.

5.1.2 Attended Community Noise Monitoring

5.1.2.1 Triggers for Attended Community Noise Monitoring

Attended noise monitoring would be undertaken within close proximity to sensitive receivers:

- In response to complaints during the construction program, to confirm that noise and vibration levels at adjacent communities and receptors are consistent with the predictions in this CNVMP and any approval and/or licence conditions (determined on a case-by-case basis).
- During OOHW, as described in the relevant CNVIS, to verify that noise levels in the adjacent community remain consistent with the predicted levels in the CNVIS.

5.1.2.2 Attended Noise Monitoring Locations

The attended measurements will typically be conducted at the potentially most affected receivers in each residential receiver area for the specific construction works being assessed. This will typically be as follows, however will be subject to review of the specific construction works being assessed:

- Wattle Grove North: 15 Larra Court, Wattle Grove
- Wattle Grove: 6 Namoi Court, Wattle Grove
- Casula: 2 Rushton Place, Casula
- Glenfield: 14 Goodenough Street, Glenfield.

5.1.2.3 Attended Noise Monitoring Methodology

Community noise monitoring will ensure the $L_{Aeq,\ 15\ minute}$ and $L_{A90,\ 15\ minute}$ parameters are recorded as a minimum. The site noise level contribution ($L_{Aeq,\ 15\ minute}$) shall be determined in the absence of any influential source not associated with the Project works for direct comparison to the relevant criteria. The L_{Amax}, L_{Amin}, L_{A1} and L_{A10} parameters will be recorded for each measurement with the $L_{A1,\ 1\ minute}$ parameter measured directly or calculated where possible and if applicable.

The community noise measurement sample height will be 1.5m above ground level. The duration of each community noise measurement sample will be 15 minutes. All measurements will be completed with the sound level meter mounted to a tripod and with a windscreen fitted. The microphone will be focused on the noise emission centre of the noise source being tested. No noise monitoring will be completed during periods where wind speeds exceed 5 m/s or during any rain events.

If community noise monitoring identifies that predicted noise levels are being exceeded, the construction contractor will revisit construction practices / sequencing in order to reduce noise levels, minimise impacts and to enable provision of information on noise levels to surrounding and potentially affected residents should this be required (i.e. on request or following a complaint).

Where OOHW is authorised / approved and monitoring is determined to be required, attended noise measurements will be conducted at the most affected receptors following the general and community monitoring requirements specified above. Further guidance is provided in the OOHW Protocol included in this CNVMP (Appendix A).

5.1.3 Vibration Monitoring

Additional vibration monitoring of plant or equipment or in the community may be required. Circumstances where this may be required include:

- In response to a vibration complaint
- Works occurring near or adjacent to retained heritage structures
- Use of vibration intensive plant needs to occur within the safe working distances identified in this CNVMP.

Vibration monitoring will be conducted as per the requirements of this CNVMP and with due regard to EPA's 'Assessing vibration - a technical guideline' (2006), DIN4150 'Structural Vibration – Part 3 Effects of Vibration on Structures' and BS7385 Part 2 'Evaluation and measurement for vibration in buildings'.

Specific monitoring requirements and measures for heritage and other sensitive structures and residential receivers are described below.

- Should activities with the potential to generate significant vibration events in close proximity to heritage structures and other sensitive structures be identified, vibration testing will be undertaken for the activity at a location away from sensitive buildings or structures
- The safe working distances for human comfort specified in Table 36 will be used to trigger the requirement for vibration monitoring
- The vibration testing methodology will be established by a suitably experienced person and/or in consultation with a qualified technical specialist
- The outcomes of the vibration testing may require continuous unattended vibration monitoring to occur for select activities. The methodology for any ongoing vibration monitoring will be established by a suitably experienced person and/or in consultation with a qualified technical specialist
- Pre and post construction dilapidation surveys of sensitive structures where vibration is likely to result in damage to buildings and structures (including surveys being undertaken immediately following a monitored exceedance of the criteria).

A vibration a monitoring report will be developed following the monitoring and include the following information:

- Relevant guideline or policy that has been applied
- Background vibration measurements that have been undertaken
- Instrumentation and methodology used for measurements (including reasons for settings, descriptors used and calibration details)
- A site map showing location of vibration sources, measurement locations and receivers (where appropriate)
- Vibration criteria applied
- Vibration measurement results
- A comparison of measured vibration levels against vibration criteria
- A discussion of proposed mitigation measures, the vibration reduction likely, the feasibility and reasonableness of these measures and how compliance can be practically determined.

5.1.4 Monitoring Reports

The Contractor's EM will compile a report for the construction noise and vibration compliance monitoring (attended monitoring) every month detailing the community noise monitoring results as well as any other noise and vibration monitoring that was conducted during the reporting period. The report will include information about any exceedances detected and how non-compliances were addressed. This report will be sent to the Principal's Representative.

5.1.5 Exceedance of Noise and Vibration Management Levels

In the event of an exceedance of noise and vibration management levels, works will cease or reduce immediately at the direction of the Contractor's CM/EM or Site Supervisor. Remedial measures will be implemented prior to recommencing work, and monitoring undertaken to verify noise or vibration levels.

If high noise generating works are shown to exceed the required noise criteria, or if noise complaints are received related to the high noise work, additional mitigation will be implemented for these activities, to ensure compliance with the required noise limits to the satisfaction of the ER, such as:

- Acoustic screening
- Alternate work methodologies
- Alternative plant with lower noise
- Plant and machinery will be checked and verified for noise levels and appropriate exhaust / fittings / noise attenuators will be considered.

Where vibration is found to be excessive, management measures should be implemented to ensure vibration compliance is achieved. Management measures may include modification of construction methods such as using smaller equipment, establishment of safe working distances and if necessary, time restrictions for the most excessive vibration activities. Time restrictions are to be negotiated with affected receivers.

5.2 Community Enquiry, Complaints and Incident Management

Community consultation will be undertaken in accordance with the CEMP and of the Community Communication Strategy (CCS). Prior to the commencement of high noise activities, notification will be issued to the agreed distribution area identified in CCS; this will occur seven (7) days prior to works which may impact on the community or stakeholders.

The objective of the CCS is to ensure that the community is notified regarding works being undertaken for potentially affected neighbouring property owners and businesses before undertaking major activity or milestones. These works may include:

- Commencement and completion of works
- Noisy works
- Out of hours works
- Changes to traffic, parking or access.

Community notifications include all community updates, out-of-hours notices, project information flyers and other communications material. The notifications will proactively notify the community and key stakeholders of current and forthcoming activities including those that have the potential to impact on the community. All notifications will include the Project contact numbers, details of the Project website and an email address to refer any enquiries or complaints.

In the event of a noise or vibration incident or complaint, the response management process summarised in Table 39 will be implemented.

Complaints arising from the Project will be treated sensitively and in a manner that recognises the potential for noise and vibration to cause environmental impacts. Special consideration will be given to complaints related to noise and vibration during highly intrusive works, particularly those activities when increased impacts are predicted, so that additional mitigation can be implemented in a timely manner.

Various lines of communication will be made available for enquiries and complaints during the construction of the Project. This will include a 24-hour telephone number for enquiries and complaints. Any complaints received during the works will be dealt with in accordance with the Project complaints management protocols outlined in the Construction Community Communication Strategy.

Table 39 – Noise and Vibration Incident / Complaint Resource Management

Incident Type	Response	Responsibility
Noise levels from construction activities exceed noise goals and criteria	Noisy activities will be paused or reduced under direction of the Contractor's EM/CM or Site Supervisor. Remedial measures will be implemented prior to recommencing work, and monitoring undertaken to verify noise levels. All plant and machinery will be checked and verified for noise levels and appropriate exhaust/fittings/noise attenuators. Works methodologies will be reviewed and amended if required.	Contractor's EM Site Supervisor
Community complaint relating to noise or vibration	Any noise or vibration complaints received from the community or adjacent stakeholders will be recorded and responded to within two hours in accordance with the complaints management system for the Project. Attended noise or vibration monitoring will be offered if the complaint is not immediately resolved. Noise or vibration intensive activities will cease or reduce under direction of the Contractor's EM or Site Supervisor. Remedial measures will be implemented prior to recommencing work, and monitoring undertaken to verify noise levels. All plant and machinery will be checked and verified for noise levels and appropriate exhaust/fittings/noise attenuators. Works methodologies will be reviewed and amended if required.	Contractor's EM Contractor's CLM
Negotiations with specific Receptors	Additional noise and vibration mitigation measures may be negotiated with sensitive receptors if requested or as required to address complaints (if received).	Contractor's CLM
Vibration causing structural damage	Activities causing significant vibration at off-site buildings (however unlikely) will cease under direction of the Contractor's EM or Site Supervisor. Any occupants of buildings may be evacuated with due consideration to safety, and the area secured to prevent unauthorised access. A structural assessment will be undertaken, and the results compared with any previous condition survey; and if any damage is associated with construction, rectification work will be implemented, or compensation agreed.	Contractor's EM Site Supervisor

5.3 Review and Improvement

Any amendments to the CNVMP and associated documentation will be undertaken in accordance with Section 1.2.6 of the CEMP.

Management reviews will be undertaken as part of the continual improvement process. The reviews will be initiated by the Contractor's EM and includes relevant project team members and stakeholders and will be undertaken in accordance with Section 4.5 of the CEMP.

The review of the CNVMP will include:

- Consideration of the general progress of work, significant changes in construction activities and the level of overall environmental risk
- Consideration of monitoring, inspection and audit results
- Consideration of recent and relevant incidents and any lessons learnt
- Consideration of any new regulatory obligations
- Consideration of any recorded noise complaints
- A review of the effectiveness of environmental controls
- Consideration of changes in operational needs such as resourcing
- Any feasible and reasonable noise management strategies that have been developed with the CCC for managing high noise generating works and OOH fill importation and placement works.
- Feedback from relevant stakeholders.

The outcomes of the environmental reviews may trigger amendments to this CNVMP and related documentation, revision to the Project's environmental management system, review of risk assessments, re-evaluation of the Project objectives and targets as well as input into other project documents.

Where amendments require changes to the Truck Driver Protocol, the relevant sections of the CTAMP must also be updated.

5.3.1 Moorebank Logistics Park Community Consultative Committee (CCC)

The process for the consideration of CCC input into management strategies for high noise generating activities and OOHWs, in accordance with the requirements of CoC B21 (d) and (i), is detailed below.

For short-term reactive or unforeseeable OOHW, the CCC will be notified of the proposed works via the CCC Chairperson. The notification will include an overview of the nature and duration of the proposed works and a specified turnaround time for provision of feedback (based on timing requirements for the works). Any notifications for short-term reactive or unforeseeable works will be issued on an as required basis outside of the regular CCC meeting cycle.

For mid- or long-term planned OOHW, the CCC will be notified of the proposed works via the CCC Chairperson. The notification will include an overview of the nature and duration of the proposed works. Following provision of the notification to the CCC, a presentation may be made available to the CCC membership either via the regular meeting (held quarterly) or in an irregular meeting where required with input from the relevant technical specialist

Management strategies for high noise generating works that are raised at the via the CCC regular meeting (held quarterly) will be reviewed and considered, and where feasible and reasonable will be incorporated as part of the continual review and improvement of this Plan.

Any feedback received from the CCC in relation to OOHW as part of the MPW Stage 3 development under this process, will be incorporated into the specific OOHW CNVIS to ensure OOHW are managed with current information, where feasible and reasonable. This process will be integrated with the existing community notification and neighbourhood agreement process, as necessary.

Best practice management and mitigation measures already exist in the approved MPW Stage 2 CNVMP (see Section 4.5 and Section 4.6) that have been demonstrably effective in responding to and managing off-site impacts during noise-generating activities at the MPW site and will continue to be implemented on site during MPWS3 construction activities. Notwithstanding, engagement with the MLP CCC on this matter will take place, and incorporation of CCC feedback in this CNVMP, where reasonable and feasible, will occur prior to the commencement of the importation of fill as part of MPWS3, noting that the importation of fill under MPWS3 cannot commence until the completion of import activities under the MPWS2 development.

The requirements of CoC B21 (d) and (i) were raised in the Moorebank Logistics Park (MLP) CCC meeting on 2 November 2021, and the approved MPW Stage 2 and Stage 3 CNVMP (rev 15) was provided to the CCC members via email on 5 November 2021 with a request for review and feedback. Feedback was received on 15 November 2021. The feedback did not respond directly to the requirements of the condition and generally related to matters already covered under the existing requirements and approved management measures, such as noise monitoring, non-tonal reversing alarms, and respite periods during periods of high activity.

The feedback received from the CCC and SIMTA's response is provided in Appendix D. Given the nature of the feedback there is no updates to management strategies required at this time. SIMTA will continue to engage with the CCC on noise and vibration matters, and review, consider and incorporate new strategies for managing high noise generating works where feasible and reasonable as part of the continual review and improvement of this Plan.

5.4 Incidents

In the event of a safety / environmental incident or unpredicted impacts relating to noise and / or vibration, it is the responsibility of all personnel to report to the Site Supervisor. All environmental incidents will be managed and reported in accordance with Section 2.8 of the CEMP.

5.5 Non-Compliance and Non-Conformance

It is the responsibility of all personnel to report non-compliances and non-conformances to the Site Supervisor and / or the Contractor's EM. Non-compliances and non-conformances will be managed in accordance with Section 4.4 of the CEMP.

5.6 Complaints

Complaints may be received directly from stakeholders to members of the Project team, or indirectly via the 24-hour Project information line, email address or postal address. Complaints will be managed in

accordance with the CEMP and the CCS. The CCS indicates who the 24-hour contact of the Project is, provides details on the complaints register and how disputes will be resolved.

APPENDIX A Out of Hours Work Protocol

A.1 Preamble

This Out of Hours Works (OOHW) Protocol has been developed to assist with conformance and compliance with environmental legislation, project obligations and to effectively manage potential environmental impacts associated with noise during in the course of construction of the Project. It has been prepared in accordance with MPWS2 CoC B127, MPWS2 CoC B135 (g), MPWS3 CoC B21 (i) and MPWS3 CoC C4 (e).

A.2 Objectives

This Protocol outlines the Project requirements for construction working hours and documents a process to be implemented when work outside of standard hours is required.

The key objective of the Protocol is to ensure that impacts to the local community are avoided and minimised and the requirements of MPWS2 CoC B127, MPWS2 CoC B135 (g), MPWS3 CoC B21 (i) and MPWS3 CoC C4 (e) are met. Specific objectives include:

- Minimising potential adverse noise impacts to the community
- Identify sensitive receivers and ensure appropriate noise control measures are implemented during out of hours construction activities
- Ensure appropriate measures are implemented to comply with all relevant legislation and other requirements.

A.3 Review and improvement

A.3.1 Moorebank Logistics Park Community Consultative Committee (CCC)

The process for the consideration of CCC input into management strategies for OOHWs, in accordance with the requirements of CoC B21 (i), is detailed below.

For short-term reactive or unforeseeable OOHW, the CCC will be notified of the proposed works via the CCC Chairperson. The notification will include an overview of the nature and duration of the proposed works and a specified turnaround time for provision of feedback (based on timing requirements for the works). Any notifications for short-term reactive or unforeseeable works will be issued on an as required basis outside of the regular CCC meeting cycle.

For mid- or long-term planned OOHW, the CCC will be notified of the proposed works via the CCC Chairperson. The notification will include an overview of the nature and duration of the proposed works. Following provision of the notification to the CCC, a presentation may be made available to the CCC membership either via the regular meeting (held quarterly) or in an irregular meeting where required with input from the relevant technical specialist

Where relevant, feedback from the Moorebank Logistics Park Community Consultative Committee (MLP CCC) has been incorporated into this OOHW Protocol, as required by MPWS3 CoC Condition B21(i)(i). In response to a matter raised in the CCC meeting on 9 November 2020 in regard to noise levels from fill importation OOH works and following the further notification of noise complaints relating to out of hours work being undertaken as part of MPW Stage 1 works, SIMTA engaged Renzo Tonin & Associates to review the continuous monitoring data for the period and conduct community attended noise monitoring for the same OOHW subject to complaint. The results from the attended noise monitoring found construction noise levels to be above the noise management levels (NMLs) for the MPW Stage 1 development at the nearest sensitive receiver. In accordance with the attended noise monitoring report, additional mitigation and management measures were put in place for the out of hours works, including the following:

- use of existing and new stockpiles/mounds as acoustic barriers during unloading at ground level
- additional site planning and revised site layout to minimise line of sight to receivers at Casula from noise-generating activities
- management of onsite truck numbers and increased focus on noise-generating activities during tool box talks and driver training.

Subsequently, follow up attended noise monitoring was carried out for same out of hours works. The results of this round of noise monitoring were found to be below NMLs at the nearest sensitive receiver. The measures implemented onsite in response to these OOHW exceedances would continue to be considered during construction planning and would be implemented as required during MPWS2 and MPWS3 OOHW activities to minimise noise impacts on nearby residences. An update was provided following the close-out of the matter in the meeting on 15 February 2020.

A.4 Compliance Matrix

Table A-1 shows the requirements for the OOHW in MPWS2 CoC B127, MPWS2 CoC B135 (g), MPWS3 CoC B21 (i) and MPWS3 CoC C4 (e), and where the condition has been responded to in this Protocol.

Table A-1 – Compliance Matrix OOHW Protocol

CoC	Condition	Document Reference	How Addressed
MPWS2 B127	Construction outside of the hours identified in MPWS2 CoC B125 may be undertaken in any of the following circumstances:		
	(a) works that are inaudible at the nearest sensitive receivers;	Table A-2, Number 4	Table A-2, Number 4
	(b) where a negotiated agreement has been arranged with affected receivers;	Table A-2, Numbers 6 and 7	Table A-2, Numbers 6 and 7
	(c) for the delivery of materials required outside these hours by the NSW Police Force or other authorities for safety reasons;	Appendix A.5	Appendix A.5

CoC	Condition	Document Reference	How Addressed
	(d) where it is required in an emergency to avoid the loss of lives, property or to prevent environmental harm; or	Appendix A.5	Appendix A.5
	(e) works associated with: (i) the Moorebank Avenue/Anzac Road upgrade, the delivery of the rail ink connection, and works required to be undertaken during rail corridor possession where they are undertaken in accordance with an **Out-Of-Hours Work Protocol** under **Condition B135; or** (ii) any other construction works on the site where they are undertaken Out-of-Hours must be in accordance with the approved Out-of-Hours Work Protocol (OOHWP) required under condition B135.	Table A-2, Number 8	Table A-2, Number 8
MPWS2 B135	(g) an **Out-of-hours Work Protocol** for the assessment, management and approval of works outside of the hours identified in **Condition B125**. The **Out-of-hours Work Protocol** must:	Appendix A	The Out-of-Hours Work Protocol is included in Appendix A and addresses the requirements of MPWS2 CoC B135(g).
	(i) detail an assessment of out-of-hours works against the relevant NMLs and vibration criteria,	Table A-2	Table A-2
	(ii) provide detailed mitigation measures for any residual impacts (that is, additional to general mitigation measures), including extent of at-receiver treatments, and	Table A-2 and Section A.6	Table A-2 and Section A.6
	(iii) include proposed notification arrangements.	Table A-2, Number 9	Table A-2, Number 9
MPWS3 B21	The Construction Noise and Vibration Management Sub-Plan (CNVMSP) must address, but not be limited to, the following:		
	(i) an **Out-of-hours Work Protocol** for the assessment, management and approval of works associated with the importation and placement of fill, outside of the hours identified in condition C3. The Out-of-hours Work Protocol must:	Appendix A	This Out-of-Hours Work Protocol addresses the requirements of MPWS3 CoC B21(i) including updates from CCC feedback, see Section A.3.1 for the feedback process.
	(i) provide evidence of how feedback from the CCC has been incorporated to develop the Out-of-hours Work Protocol;	Section A.3.1	Section A.3.1
	(ii) specify what works are proposed out-of-hours;	Table A-2, Number 1	Table A-2, Number 1
	(iii) provide details and clear justification for why the works must be done out-of-hours (reasons other than convenience must be provided);	Table A-2, Number 1	Table A-2, Number 1
	(iv) detail an assessment of out-of-hours works against the relevant NMLs and vibration criteria;	Table A-2, Number 3	Table A-2, Number 3
	(v) provide detailed mitigation measures for any residual impacts (that is, additional to general mitigation measures), including extent of at-receiver treatments; and	Table A-2, Number 3	Table A-2, Number 3
	(vi) include proposed notification arrangements.	Table A-2, Number 9	Table A-2, Number 9

CoC	Condition	Document Reference	How Addressed
MPWS3 C4	Construction activities may be undertaken outside of the hours in condition C3 if required:		
	a) by the Police or a public authority for the delivery of vehicles, plant or materials; or	Appendix A.4	Appendix A.4
	(b) in an emergency to avoid the loss of life, damage to property or to prevent environmental harm; or	Appendix A.4	Appendix A.4
	(c) where the works are inaudible at the nearest sensitive receivers;	Table A-2, Number 4	Table A-2, Number 4
	(d) where a variation is approved in advance in writing by the Planning Secretary or his nominee if appropriate justification is provided for the works; or	Appendix A.4	Appendix A.4
	(e) where they are undertaken in accordance with an **Out-of-Hours Work Protocol** under condition **B21(i)**.	Table A-2, Number 8	Table A-2, Number 8

A.5 Out of Hours Work Protocol

A.5.1 Exclusions to this Protocol

Exclusions to this Protocol: with due regard to MPWS2 CoC B127 and MPWS3 CoC C4 OOHW will be undertaken without further assessment in the following circumstances:

- works that are inaudible at the nearest sensitive receivers [MPWS2 CoC B127 (a) and MPWS3 CoC C4 (c)];
- where a negotiated agreement has been arranged with affected receivers [MPWS2 CoC B127 (b)];
- for the delivery of materials required outside these hours by the NSW Police Force or other authorities for safety reasons [MPWS2 CoC B127 (c) and MPWS3 CoC C4 (a)];
- where it is required in an emergency to avoid the loss of lives, property or to prevent environmental harm [MPWS2 CoC B127 (d) and MPWS3 CoC C4 (b)]; or

A.5.2 Permitted OOHW

Where proposed OOHW can be undertaken in accordance with MPWS2 CoC B135 or MPWS3 CoC B21, the OOHW Protocol process detailed in Table A-2 is applicable, with each step of the process processed to be addressed as applicable.

The Contractor's EM must submit an OOHW request to the Principal's Representative at least two weeks prior to works being undertaken (except in emergency circumstances) for endorsement. The Principal's Representative must submit the OOH request to the ER for information. OOHW periods are detailed in Table 4 of the CNVMP.

Where possible, OOHW will be avoided and scheduled to occur during the approved hours for construction. Where OOHW are needed for the safe and efficient implementation of the Project and there is a clear justification for why the works must be done out-of-hours (other than convenience) or

due to exceptional circumstances, the potential level of noise and/or vibration impacts of OOHW will be considered.

A Construction Noise and Vibration Impact Statement (CNVIS) will be utilised to identify risk of the proposed OOHW activity and whether the application is required to be reviewed and/or approved by the Contractor's EM, the Environmental Representative (ER), or referred to DPIE.

Table A-2 – OOHW Protocol

No.	Step	Detail
1	Work Identification	• Identify work activities requiring OOHW and when the work will occur. • Identify the full justification for why OOHW are needed; does the work proposed need to be completed outside the approved hours of construction or can it be rescheduled for standard working hours. • If the OOHW are essential to the Project, or are required due to exceptional circumstances, prepare and document a justification for the works. Reasons other than convenience must be provided with clear justification documented.
2	Assess Alternatives	Assess alternate options that may allow construction to be undertaken within approved hours such as: • Using alternate equipment • Different construction methods, or • Postponing scheduled works. If no other options are considered practical, consult the Contractor's EM and document, using an Out of Hours form (developed by the Construction Contractor) to provide a description of the works, the expected duration, proposed OOH timing, a list of all noise generating plant, equipment and machinery in use, activities to be undertaken, and all potential mitigation and management measures considered.
3	Undertake CNVIS	If no alternate options are available / viable, the activity is to be assessed for noise and vibration impacts on the surrounding receptors via a Construction Noise and Vibration Impact Statement (CNVIS) prepared by suitably qualified personnel, taking into account all proposed noise and vibration mitigation measures. The CNVIS will: • Identify the closest and/or potentially most affected receptors situated within the potential area of influence of the works; • Consider cumulative impact from other out of hours works within the Moorebank intermodal precinct proposed to be conducted simultaneously; • Predict noise and vibration levels based on the NVIA scenarios or via modelling (or spreadsheet calculation) for new scenarios; • Compare the predicted values to the noise and vibration management levels; • Provide a list of necessary detailed mitigation and management measures (including at-receiver treatments) that will be required to be implemented. Including, where feasible and reasonable, any updated mitigation or management approaches based upon CCC feedback. Predictions will account for particularly annoying (tonal, low frequency content or impulsive) work activities by applying a 5 dB(A) penalty to the values for particularly annoying activities. Predictions will account for all potential noise and vibration mitigation and management measures by applying a deduction to the values assessed above for the noise reducing measures that will be implemented. Where works are proposed during the night period, predictions will be provided to assess potential sleep disturbance impacts, if anticipated. General activities which are inaudible at receptors, including (but not limited to), security operations, monitoring, survey, refuelling, low noise plant maintenance, general site maintenance will not require a CNVIS.

No.	Step	Detail
4	Low Impact Works	If the CNVIS shows that construction works outside standard hours will not generate $L_{Aeq,\ 15\ minute}$ noise levels more than 10 dB below the rating background level at sensitive receivers, the activity will be considered inaudible. Where works are inaudible at the nearest sensitive receivers and vibration levels will not exceed those stipulated by Table 2.2 and Table 2.4 of *Assessing Vibration: A Technical Guide* (DECC 2006), the works will be considered to have low impact. The Contractor's EM will be provided with the OOHW review for information.
5	Medium Impact Works	If the CNVIS shows that construction works out of standard hours will generate $L_{Aeq,\ 15\ minute}$ noise levels not more than 5 dB above the rating background level at sensitive receivers and will comply with the NML and Vibration Management Level (VML), the activity will be considered medium impact and referred to the Contractor's EM for review and approval. In referring the approval to the Contractor's EM, the Construction Contractor will: • Demonstrate the requirement for activities to be conducted outside the approved standard construction hours • Summarise the findings of the CNVIS assessment, and • Detail the mitigation measures to be implemented for the specific OOHW. Where the nature of the activity, the likely impacts and the proposed management measures are considered acceptable by the Contractor's EM, works may proceed. The ER will be provided the assessment and review for information..
6	High Impact Works Negotiated agreements achieved with the community	If the CNVIS shows that construction works will exceed NML and/or VML, the activity will be considered high impact and, if negotiated agreements **have** been reached with affected receivers, referred to the Contractor's EM for review and approval. In referring the approval to the Contractor's EM, the contractor will: • Demonstrate the requirement for activities to be conducted outside the approved standard construction hours; • Summarise the findings of the CNVIS assessment; • Detail the mitigation measures to be implemented for the specific OOHW; and • Detail the negotiated agreements agreed with the community. Where the nature of the activity, the likely impacts and the proposed management measures are considered acceptable by the Contractor's EM, works may proceed when the Principal's Representative approval is received. The ER will be provided the assessment and review for information.
7	High Impact Works Negotiated agreements <u>not</u> achieved with the community	If the CNVIS shows that construction works will exceed NML and/or VML, the activity will be considered high impact and, if negotiated agreements have not been reached with affected receivers, an updated CNVIS will be developed and referred to DPIE, for review and approval. In referring the approval to DPIE, the contractor will: • Demonstrate the requirement for activities to be conducted outside the approved standard construction hours • Summarise the findings of the CNVIS assessment; • Detail the mitigation measures to be implemented for the specific OOHW; and • Detail why the negotiated agreements were not agreed with the community. When referring the application to DPIE the Principal's Representative will provide a summary of the issues and provide a recommendation to be considered by DPIE. The application will be provided to the ER for information. Up to 4 weeks (20 business days) will be allowed for DPIE to review the updated CNVIS.
8	OOHW Approval	OOHW will not commence until approval is granted in accordance with items 5, 6 or 7 (whichever is applicable)

No.	Step	Detail
9	Community Notification	Community notification will be undertaken in accordance with the Community Communication Strategy. OOHW which are low impact will not require notification to be distributed to receptors potentially affected by the works except for specific circumstances outlined in Section 3.3.2 of the CCS. Where appropriate, and to be determined on a case by case basis, the use of alternative communication methods (i.e. Variable Message Signage) may be employed. OOHW which are medium and high impact will require notification to be distributed to receptors potentially affected by the works. A notification boundary will be established on a case by case basis in consultation with the Principal's Representative. Notification will be made to the agreed area at least 14 days prior to the commencement of works which may impact the community or stakeholders. The Project website will be updated with relevant information to further notify the community and stakeholders.
10	Mitigation and Monitoring	Reasonable and feasible mitigation measures will be implemented during OOHW for the duration of the Project. Attended noise monitoring will be undertaken during OOHW and in accordance with other project or environment protection licence requirements. Monitoring will provide comparison the applicable CNVIS to verify that noise levels in the adjacent community remain consistent with those predicted in the CNVIS. Where noise (or vibration) levels are observed to continually exceed those outlined in the activity specific CNVIS, works shall stop and alternate methods and mitigation measures investigated and implemented. Noise and vibration monitoring will be undertaken by suitably qualified personnel, including professionally trained and experienced environmental staff and noise consultants where deemed necessary.

A.6 Noise Mitigation to be Considered for OOHW

Noise and vibration mitigation measures for OOHW in addition to the general management measures detailed in Section 4.5 of the CNVMP will be considered. These will be considered on a case by case basis and nominated where reasonable and feasible, dependent upon the outcomes of the CNVIS:

- All plant to be well maintained and fitted with noise mufflers, engine hoods or similar
- Timetabling noisiest activities to occur at the least sensitive times i.e. in the evening as opposed to night, or mid-morning as opposed to first thing in the morning
- Using spotters, closed circuit television monitors, "smart" reversing alarms, or "squawker" broadband type reversing alarms in place of traditional tonal reversing alarms
- Mitigation of specific noise sources using portable temporary screens or enclosures, where practicable and safe
- Turning off plant and equipment when not in use
- Carrying out loading and unloading away from sensitive receivers, where practicable
- Avoid dropping materials from a height
- Timetabling OOHW at locations with the furthest distance from sensitive receivers
- Substituting noisy/vibration intensive equipment with less intrusive types
- Maximising the offset distance between noisy plant items and sensitive receivers

- Avoiding using noisy plant simultaneously and / or close together, adjacent to sensitive receivers, where practicable
- Orienting equipment away from sensitive receivers, where practicable
- Using noise source controls, such as the use of residential class mufflers, to reduce noise from all plant and equipment including cranes, graders, excavators and trucks
- Selecting plant and equipment based on noise emission levels.

In extreme circumstances where the CNVIS deems the works to be of high impact, and they cannot be planned to occur during standard construction hours, at-receiver treatments may be required. They may include but not be limited to:

- Temporary acoustic shielding
- Offer of respite to residents.

Following the application of all feasible and reasonable mitigation measures, if proposed OOHW are anticipated to result in residual impacts, defined as an exceedance of NML or VML, due consideration should be given to conducting these works during standard construction hours instead of OOH.

The potential noise reduction that can be achieved by noise mitigation measures are shown in Table A-3.

Table A-3 – Noise Mitigation Measures

Management Measure	Anticipated Noise Reduction, dB(A)
Administrative Controls	
Operate during approved hours	-
Undertake regular noise monitoring to determine the impact of operating plant on sensitive receivers	-
Appropriate training of onsite staff	-
Undertake community consultation and respond to complaints in accordance with established project procedures	-
Turning off machinery when not in use	0-5
Respite periods for pile drivers and rock breakers	-
Engineering Controls	
Portable temporary screens	5-10
Screen or enclosure for stationary equipment	10-15
Maximising the offset distance between noisy plant items and sensitive receivers	3-6
Avoiding using noisy plant simultaneously and / or close together, adjacent to sensitive receivers	2-3
Orienting equipment away from sensitive receivers	3-5
Carrying out loading and unloading away from sensitive receivers	3-5
Using dampened tips on rock breakers	3-6

Management Measure	Anticipated Noise Reduction, dB(A)
Using noise source controls, such as the use of residential class mufflers, to reduce noise from all plant and equipment including bulldozers, cranes, graders, excavators and trucks	5-10
Selecting site access points and roads as far as reasonably practicable away from sensitive receivers	3-6
Using spotters, closed circuit television monitors, "smart" reversing alarms, or "quacker" broadband type reversing alarms in place of traditional tonal reversing alarms	2-5
Employ non noise-generating structures such as site offices, storage sheds, stockpiles and tanks as noise barriers	5-10

APPENDIX B Glossary of Terminology

The following is a brief description of the technical terms used to describe noise to assist in understanding the technical issues presented.

Absorption Coefficient α	The absorption coefficient of a material, usually measured for each octave or third-octave band and ranging between zero and one. For example, a value of 0.85 for an octave band means that 85% of the sound energy within that octave band is absorbed on coming into contact with the material. Conversely, a low value below about 0.1 means the material is acoustically reflective.
Adverse weather	Weather effects that enhance noise (particularly wind and temperature inversions) occurring at a site for a significant period of time. In the NSW INP this occurs when wind occurs for more than 30% of the time in any assessment period in any season and/or temperature inversions occurring more than 30% of nights in winter.
Air-borne noise	Noise which is fundamentally transmitted by way of the air and can be attenuated by the use of barriers and walls placed physically between the noise source and receiver.
Ambient noise	The all-encompassing noise associated within a given environment at a given time, usually composed of sound from all sources near and far.
Amenity	A desirable or useful feature or facility of a building or place.
AS	Australian Standard
Assessment period	The time period in which an assessment is made. e.g. Day 7am-10pm & Night 10pm-7am.
Assessment Point	A location at which a noise or vibration measurement is taken or estimated.
Attenuation	The reduction in the level of sound or vibration.
Audible Range	The limits of frequency which are audible or heard as sound. The normal hearing in young adults detects ranges from 20 Hz to 20 kHz, although some people can detect sound with frequencies outside these limits.
A-weighting	A filter applied to the sound recording made by a microphone to approximate the response of the human ear.
Background noise	Background noise is the term used to describe the underlying level of noise present in the ambient noise, measured in the absence of the noise under investigation. It is described as the average of the minimum noise levels measured on a sound level meter and is measured statistically as the A-weighted noise level exceeded for ninety percent of a sample period. This is represented as the LA90 noise level if measured as an overall level or an L90 noise level when measured in octave or third-octave bands.
Barrier (Noise)	A natural or constructed physical barrier which impedes the propagation of sound and includes fences, walls, earth mounds or berms and buildings.
Berm	Earth or overburden mound.
Buffer	An area of land between a source and a noise-sensitive receiver and may be an open space or a noise-tolerant land use.
Bund	A bund is an embankment or wall of brick, stone, concrete or other impervious material, which may form part or all of the perimeter of a compound.
BS	British Standard
CoRTN	United Kingdom Department of Environment entitled "Calculation of Road Traffic Noise (1988)"

Decibel [dB]	The units of sound measurement. The following are examples of the decibel readings of everyday sounds: 0dB The faintest sound we can hear, defined as 20 micro Pascal 30dB A quiet library or in a quiet location in the country 45dB Typical office space. Ambience in the city at night 60dB CBD mall at lunch time 70dB The sound of a car passing on the street 80dB Loud music played at home 90dB The sound of a truck passing on the street 100dB The sound of a rock band 110dB Operating a chainsaw or jackhammer 120dB Deafening
dB(A)	A-weighted decibel. The A- weighting noise filter simulates the response of the human ear at relatively low levels, where the ear is not as effective in hearing low frequency sounds as it is in hearing high frequency sounds. That is, low frequency sounds of the same dB level are not heard as loud as high frequency sounds. The sound level meter replicates the human response of the ear by using an electronic filter which is called the "A" filter. A sound level measured with this filter is denoted as dB(A). Practically all noise is measured using the A filter.
dB(C)	C-weighted decibels. The C-weighting noise filter simulates the response of the human ear at relatively high levels, where the human ear is nearly equally effective at hearing from mid-low frequency (63Hz) to mid-high frequency (4kHz), but is less effective outside these frequencies. The dB(C) level is not widely used but has some applications.
Diffraction	The distortion of sound waves caused when passing tangentially around solid objects.
DIN	German Standard
ECRTN	Environmental Criteria for Road Traffic Noise, NSW, 1999
EPA	Environment Protection Authority
Field Test	A test of the sound insulation performance in-situ. See also 'Laboratory Test' The sound insulation performance between building spaces can be measured by conducting a field test, for example, early during the construction stage or on completion. A field test is conducted in a non-ideal acoustic environment. It is generally not possible to measure the performance of an individual building element accurately as the results can be affected by numerous field conditions.
Fluctuating Noise	Noise that varies continuously to an appreciable extent over the period of observation.
Free-field	An environment in which there are no acoustic reflective surfaces. Free field noise measurements are carried out outdoors at least 3.5m from any acoustic reflecting structures other than the ground.
Frequency	Frequency is synonymous to pitch. Sounds have a pitch which is peculiar to the nature of the sound generator. For example, the sound of a tiny bell has a high pitch and the sound of a bass drum has a low pitch. Frequency or pitch can be measured on a scale in units of Hertz or Hz.
Ground-borne noise	Vibration propagated through the ground and then radiated as noise by vibrating building elements such as wall and floor surfaces. This noise is more noticeable in rooms that are well insulated from other airborne noise. An example would be vibration transmitted from an underground rail line radiating as sound in a bedroom of a building located above.
Habitable Area	Includes a bedroom, living room, lounge room, music room, television room, kitchen, dining room, sewing room, study, playroom, family room, home theatre and sunroom. Excludes a bathroom, laundry, water closet, pantry, walk-in wardrobe, corridor, hallway, lobby, photographic darkroom, clothes drying room, and other spaces of a specialised nature occupied neither frequently nor for extended periods.
Heavy Vehicle	A truck, transporter or other vehicle with a gross weight above a specified level (for example: over 8 tonnes).
IGANRIP	Interim Guideline for the Assessment of Noise from Rail Infrastructure Projects, NSW DEC 2007

Impulsive noise	Having a high peak of short duration or a sequence of such peaks. A sequence of impulses in rapid succession is termed repetitive impulsive noise.
INP	NSW Industrial Noise Policy, EPA 1999
Intermittent noise	The level suddenly drops to that of the background noise several times during the period of observation. The time during which the noise remains at levels different from that of the ambient is one second or more.
Intrusive noise	Refers to noise that intrudes above the background level by more than 5 dB(A).
ISEPP	State Environmental Planning Policy (Infrastructure), NSW, 2007
ISEPP Guideline	Development Near Rail Corridors and Busy Roads - Interim Guideline, NSW Department of Planning, December 2008
L1	The sound pressure level that is exceeded for 1% of the time for which the given sound is measured.
L10	The sound pressure level that is exceeded for 10% of the time for which the given sound is measured.
L10(1hr)	The L10 level measured over a 1 hour period.
L10(18hr)	The arithmetic average of the L10(1hr) levels for the 18 hour period between 6am and 12 midnight on a normal working day.
L90	The level of noise exceeded for 90% of the time. The bottom 10% of the sample is the L90 noise level expressed in units of dB(A).
LAeq or Leq	The "equivalent noise level" is the summation of noise events and integrated over a selected period of time, which would produce the same energy as a fluctuating sound level. When A-weighted, this is written as the LAeq.
LAeq(1hr)	The LAeq noise level for a one-hour period. In the context of the NSW EPA's Road Noise Policy it represents the highest tenth percentile hourly A-weighted Leq during the period 7am to 10pm, or 10pm to 7am (whichever is relevant).
LAeq(8hr)	The LAeq noise level for the period 10pm to 6am.
LAeq(9hr)	The LAeq noise level for the period 10pm to 7am.
LAeq(15hr)	The LAeq noise level for the period 7am to 10pm.
LAeq (24hr)	The LAeq noise level during a 24 hour period, usually from midnight to midnight.
Lmax	The maximum sound pressure level measured over a given period. When A-weighted, this is usually written as the LAmax.
Lmin	The minimum sound pressure level measured over a given period. When A-weighted, this is usually written as the LAmin.
Loudness	A rise of 10 dB in sound level corresponds approximately to a doubling of subjective loudness. That is, a sound of 85 dB is twice as loud as a sound of 75 dB which is twice as loud as a sound of 65 dB and so on. That is, the sound of 85 dB is four times or 400% the loudness of a sound of 65 dB.
Microphone	An electro-acoustic transducer which receives an acoustic signal and delivers a corresponding electric signal.
NCA	Noise Catchment Area. An area of study within which the noise environment is substantially constant.
Noise	Unwanted sound
Pre-construction	Work in respect of the proposed project that includes design, survey, acquisitions, fencing, investigative drilling or excavation, building/road dilapidation surveys, minor clearing (except where threatened species, populations or ecological communities would be affected), establishing ancillary facilities such as site compounds, or other relevant activities determined to have minimal environmental impact (e.g. minor access roads).
Reflection	Sound wave reflected from a solid object obscuring its path.
RING	Rail Infrastructure Noise Guideline, NSW, May 2013

RMS	Root Mean Square value representing the average value of a signal.
Rw	Weighted Sound Reduction Index A measure of the sound insulation performance of a building element. It is measured in very controlled conditions in a laboratory. The term supersedes the value STC which was used in older versions of the Building Code of Australia. Rw is measured and calculated using the procedure in ISO 717-1. The related field measurement is the DnT,w. The higher the value the better the acoustic performance of the building element.
R'w	Weighted Apparent Sound Reduction Index. As for Rw but measured in-situ and therefore subject to the inherent accuracies involved in such a measurement. The higher the value the better the acoustic performance of the building element.
RNP	Road Noise Policy, NSW, March 2011
Sabine	A measure of the total acoustic absorption provided by a material. It is the product of the Absorption Coefficient (alpha) and the surface area of the material (m2). For example, a material with alpha = 0.65 and a surface area of 8.2m2 would have 0.65 x 8.2 = 5.33 Sabine. Sabine is usually calculated for each individual octave band (or third-octave).
SEL	Sound Exposure Level (SEL) is the constant sound level which, if maintained for a period of 1 second would have the same acoustic energy as the measured noise event. SEL noise measurements are useful as they can be converted to obtain Leq sound levels over any period of time and can be used for predicting noise at various locations.
Sound	A fluctuation of air pressure which is propagated as a wave through air.
Sound absorption	The ability of a material to absorb sound energy by conversion to thermal energy.
Sound Insulation	Sound insulation refers to the ability of a construction or building element to limit noise transmission through the building element. The sound insulation of a material can be described by the Rw and the sound insulation between two rooms can be described by the DnT,w.
Sound level meter	An instrument consisting of a microphone, amplifier and indicating device, having a declared performance and designed to measure sound pressure levels.
Sound power level (SWL)	Ten times the logarithm to the base 10 of the ratio of the sound power of the source to the reference sound power of 1 pico watt.
Sound pressure level (SPL)	The level of noise, usually expressed in decibels, as measured by a standard sound level meter with a microphone referenced to 20 mico Pascal.
Spoil	Soil or materials arising from excavation activities.
STC	Sound Transmission Class A measure of the sound insulation performance of a building element. It is measured in controlled conditions in a laboratory. The term has been superseded by Rw.
Structure-borne Noise	Audible noise generated by vibration induced in the ground and/or a structure. Vibration can be generated by impact or by solid contact with a vibrating machine. Structure-borne noise cannot be attenuated by barriers or walls but requires the isolation of the vibration source itself. This can be achieved using a resilient element placed between the vibration source and its support such as rubber, neoprene or springs or by physical separation (using an air gap for example). Examples of structure-borne noise include the noise of trains in underground tunnels heard to a listener above the ground, the sound of footsteps on the floor above a listener and the sound of a lift car passing in a shaft. See also 'Impact Noise'.
Tonal Noise	Sound containing a prominent frequency and characterised by a definite pitch.

Transmission Loss	The sound level difference between one room or area and another, usually of sound transmitted through an intervening partition or wall. Also, the vibration level difference between one point and another. For example, if the sound level on one side of a wall is 100dB and 65dB on the other side, it is said that the transmission loss of the wall is 35dB. If the transmission loss is normalised or standardised, it then becomes the Rw or R'w or DnT,w.

APPENDIX C Conditions of Consent Requirements

Table C.1 – Conditions of Consent Requirements

<table>
<tr><th>CoC</th><th>Requirement</th></tr>
<tr><td></td><td>MPWS2 (SSD 7709)</td></tr>
<tr><td>A1</td><td>In addition to meeting the specific performance measures and criteria in this consent, all reasonable and feasible measures must be implemented to prevent, and if prevention is not reasonable and feasible, minimise, any material harm to the environment that may result from the construction and operation of the development, and any rehabilitation required under this consent.</td></tr>
<tr><td>A2</td><td>The Applicant must ensure that all of its employees, contractors (and their sub-contractors) are made aware of, and are instructed to comply with, the conditions of this consent relevant to activities they carry out in respect of the development.</td></tr>
<tr><td>A3</td><td>The development may only be carried out:
(a) in compliance with the conditions of this consent;
(b) in accordance with all written directions of the Planning Secretary;
(c) in accordance with the EIS, Response to Submissions (RtS) and Consolidated assessment clarification responses; and
in accordance with the management and mitigation measures in Appendix 2</td></tr>
<tr><td>B125</td><td>The Applicant must comply with the hours detailed in Table 2.
Table 2: Hours of Work
<table>
<tr><th>Activity</th><th>Day</th><th>Time</th></tr>
<tr><td>Construction</td><td>Monday – Friday
Saturday</td><td>7 am to 6 pm
8 am to 1 pm</td></tr>
</table></td></tr>
<tr><td>B126</td><td>Except as permitted by an EPL, activities resulting in highly noise intensive works (including impulsive or tonal noise emissions) must only be undertaken:
(a) between the hours of 8:00 am to 5:00 pm Monday to Friday;
(b) between the hours of 8:00 am to 1:00 pm Saturday; and
(c) in continuous blocks not exceeding three hours each with a minimum respite from those activities and works of not less than one hour between each block.
Note 1: For the purposes of this condition, 'continuous' includes any period during which there is less than a one hour respite between ceasing and recommencing any of the work that is the subject of this condition.
Note 2: Section 4.42(1)(e) of the EP&A Act requires that an EPL be substantially consistent with this approval. Out-of-hours works considered under Condition B127 must be justified and include an assessment of mitigation measures.</td></tr>
<tr><td>B127</td><td>Construction outside of the hours identified in Condition B125 may be undertaken in any of the following circumstances:
(a) works that are inaudible at the nearest sensitive receivers;
(b) where a negotiated agreement has been arranged with affected receivers;
(c) for the delivery of materials required outside these hours by the NSW Police Force or other authorities for safety reasons;
(d) where it is required in an emergency to avoid the loss of lives, property or to prevent environmental harm; or
(e) works associated with:
i. the Moorebank Avenue/Anzac Road upgrade, the delivery of the rail ink connection, and works required to be undertaken during rail corridor possession where they are undertaken in accordance with an Out-Of-Hours Work Protocol under Condition B135; or
ii. any other construction works on the site where they are undertaken Out-of-Hours must be in accordance with the approved Out-of-Hours Work Protocol (OOHWP) required under condition B135.</td></tr>
<tr><td>B128</td><td>Blasting is not permitted on the site.</td></tr>
</table>

CoC	Requirement
B134	Prior to commencement of construction, the Applicant must prepare a Construction Noise and Vibration Management Plan (CNVMP) and submit it to the Planning Secretary for approval. The CNVMP must be consistent with the guidelines contained in the ICNG (DECC, 2009).
B135	The CNVMP must form part of the CEMP required by Condition C2 and, in addition to the general management plan requirements listed in Condition C1, the CNVMP must include: (a) identification of the work areas, site compounds and internal access routes (b) identification of the type and number of plant and equipment expected on site at the same time; (c) details of construction activities and a construction program, including the identification of key noise and/ or vibration generating construction activities (based on representative construction scenarios) that have the potential to generate noise and/ or vibration impacts on surrounding sensitive receivers, particularly residential areas; (d) identification of sensitive receivers (including heritage structures if relevant) and relevant construction noise management levels (NMLs) using the ICNG, vibration criteria using the Assessing Vibration: a Technical Guide (DECC 2006) (for human exposure) and vibration limits set out in the German Standard DIN 4150-3: Structural Vibration effects of vibration on structures (for structural damage); (e) identification of any construction activities predicted to exceed NMLs; Note: The ICNG identifies 'particularly annoying' activities that require the addition of 5dB(A) to the predicted level before comparing to the construction NML. (f) identification of feasible and reasonable measures to be implemented to minimise and manage construction noise impacts, including, but not limited to, acoustic enclosures, erection of noise walls (hoardings), respite periods; and in accordance with the EIS, Response to Submissions (RtS) and Consolidated assessment clarification responses; and (g) an **Out-of-hours Work Protocol** for the assessment, management and approval of works, outside of the hours identified in **Condition B125**. The **Out-of-hours Work Protocol** must: (i) detail an assessment of out-of-hours works against the relevant NMLs and vibration criteria, (ii) provide detailed mitigation measures for any residual impacts (that is, additional to general mitigation measures), including extent of at-receiver treatments, and (iii) include proposed notification arrangements.
B188	All plant and equipment used on site, or to monitor the performance of the development must be: (a) maintained in a proper and efficient condition; and operated in a proper and efficient manner.

CoC	Requirement
C1	Management plans required under this consent must be prepared in accordance with relevant guidelines, and (a) detailed baseline data; (b) details of: (i) the relevant statutory requirements (including any relevant approval, licence or lease conditions); (ii) any relevant limits or performance measures and criteria; and (iii) the specific performance indicators that are proposed to be used to judge the performance of, or guide the implementation of, the development or any management measures; (c) a description of the measures to be implemented to comply with the relevant statutory requirements, limits, or performance measures and criteria; (d) a program to monitor and report on the: (i) impacts and environmental performance of the development; (ii) effectiveness of the management measures set out pursuant to paragraph (c) above; (e) a contingency plan to manage any unpredicted impacts and their consequences and to ensure that ongoing impacts reduce to levels below relevant impact assessment criteria as quickly as possible; (f) a program to investigate and implement ways to improve the environmental performance of the development over time; (g) a protocol for managing and reporting any: (i) incident and any non-compliance (specifically including any exceedance of the impact assessment criteria and performance criteria); (ii) complaint; (iii) failure to comply with statutory requirements; (h) roles and responsibilities for implementing the plan; and (i) a protocol for periodic review of the plan. Note: The Planning Secretary may waive some of these requirements if they are unnecessary or unwarranted for particular management plans
	MPW Stage 3 (SSD 10431)
A1	In addition to meeting the specific performance measures and criteria in this consent, all reasonable and feasible measures must be implemented to prevent, and, if prevention is not reasonable and feasible, minimise any material harm to the environment that may result from the construction and operation of the development.
A2	The development may only be carried out: (f) in compliance with the conditions of this consent; (g) in accordance with all written directions of the Planning Secretary; (h) generally in accordance with the EIS and Response to Submissions; (i) (generally in accordance with the management and mitigation measures in **Appendix 3** in accordance with the approved subdivision plans in the table below *[see MPWS3 CoC for list]*
A13	Only one crushing plant is to operate at any one time across the MPW site (i.e. under either MPW Stage 2 consent or the conditions of this consent). Any crushing plant operated as part of MPW Stage 3 can only be operated once any existing crushing plant operated as part of MPW Stage 2 (SSD 7709) has been decommissioned.
A39	The Applicant must ensure that all of its employees, contractors (and their sub-contractors) are made aware of, and are instructed to comply with, the conditions of this consent relevant to activities they carry out in respect of the development.
B16	Management plans required under this consent must be prepared having regard to the relevant guidelines, including but not limited to the *Environmental Management Plan Guideline: Guideline for Infrastructure Project* (DPIE April 2020).
B17	Prior to the commencement of construction, the Applicant must submit a Construction Environmental Management Plan (CEMP) to the Certifier and provide a copy to the Planning Secretary for approval. The CEMP must include, but not be limited to, the following: … (j) Construction Noise and Vibration Management Sub-Plan (see condition B21);

CoC	Requirement
B21	The Construction Noise and Vibration Management Sub-Plan (CNVMSP) must address, but not be limited to, the following: (a) be prepared by a suitably qualified and experienced noise expert; (b) describe procedures for achieving the noise management levels in EPA's Interim Construction Noise Guideline (DECC, 2009); (c) describe the measures to be implemented to manage high noise generating works such as piling, in close proximity to sensitive receivers; (d) include strategies that have been developed with the Community Consultative Committee (CCC) for managing high noise generating works; (e) identify work areas, site compounds and internal access routes; (f) identify the type and number of plant and equipment expected on site at the same time; (g) include a complaints management system that would be implemented for the duration of the construction; (h) include a program to monitor and report on the impacts and environmental performance of the development and the effectiveness of the implemented management measures in accordance with the requirements of condition B17; (i) an Out-of-hours Work Protocol for the assessment, management and approval of works associated with the importation and placement of fill, outside of the hours identified in condition C3. The Out-of-hours Work Protocol must: (i) provide evidence of how feedback from the CCC has been incorporated to develop the Out-of-hours Work Protocol; (ii) specify what works are proposed out-of-hours; (iii) provide details and clear justification for why the works must be done out-of-hours (reasons other than convenience must be provided); (iv) detail an assessment of out-of-hours works against the relevant NMLs and vibration criteria; (v) provide detailed mitigation measures for any residual impacts (that is, additional to general mitigation measures), including extent of at-receiver treatments; and (vi) include proposed notification arrangements.
B24	A Driver Code of Conduct must be prepared and communicated by the Applicant to heavy vehicle drivers and must address the following: (a) minimise the impacts of earthworks and construction on the local and regional road network; … (c) minimise road traffic noise; and
C2	**Operation of Plant and Equipment** All construction plant and equipment used on site must be maintained in a proper and efficient condition and operated in a proper and efficient manner.
C3	**Construction Hours** Construction, including the delivery of materials to and from the site, may only be carried out between the following hours: (a) between 7am and 6pm, Mondays to Fridays inclusive; and (b) between 8am and 1pm, Saturdays. No work may be carried out on Sundays or public holidays.
C4	Construction activities may be undertaken outside of the hours in condition C3 if required: (a) by the Police or a public authority for the delivery of vehicles, plant or materials; or (b) in an emergency to avoid the loss of life, damage to property or to prevent environmental harm; or (c) where the works are inaudible at the nearest sensitive receivers; (d) where a variation is approved in advance in writing by the Planning Secretary or his nominee if appropriate justification is provided for the works; or (e) where they are undertaken in accordance with an **Out-of-Hours Work Protocol** under condition **B21(i).**
C5	Notification of such construction activities as referenced in condition C4 must be given to affected residents before undertaking the activities or as soon as is practical afterwards.

CoC	Requirement
C6	Rock breaking, rock hammering, sheet piling, pile driving and similar activities may only be carried out between the following hours: (a) 9am to 12pm, Monday to Friday; (b) 2pm to 5pm Monday to Friday; and (c) 9am to 12pm, Saturday.
C9	**Construction Noise Limits** The development must be constructed to achieve the construction noise management levels detailed in the Interim Construction Noise Guideline (DECC, 2009). All feasible and reasonable noise mitigation measures must be implemented and any activities that could exceed the construction noise management levels must be identified and managed in accordance with the management and mitigation measures identified in the approved Construction Noise and Vibration Management Sub-Plan.
C10	The Applicant must ensure construction vehicles (including concrete agitator trucks) do not arrive at the site or surrounding residential precincts outside of the construction hours of work outlined under condition C3.
C11	The Applicant must implement, where practicable and without compromising the safety of construction staff or members of the public, the use of `quackers' to minimise noise impacts on surrounding noise sensitive receivers.
C12	**Vibration Criteria** Vibration caused by construction at any residence or structure outside the site must be limited to: (c) for structural damage, the latest version of DIN 4150-3 (1992-02) Structural vibration - Effects of vibration on structures (German Institute for Standardisation, 1999); and for human exposure, the acceptable vibration values set out in the Environmental Noise Management Assessing Vibration: a technical guideline (DEC, 2006) (as may be updated or replaced from time to time).
C13	Vibratory compactors must not be used closer than 30 metres from residential buildings unless vibration monitoring confirms compliance with the vibration criteria specified in condition C12.
C14	The limits in conditions C12 and C13 apply unless otherwise outlined in a Construction Noise and Vibration Management Sub-Plan, approved as part of the CEMP required by condition B17 of this consent.

APPENDIX D SSD 10431 MPW Stage 3 CoC B21 (d) and (i) consultation

Stakeholder	Feedback received	SIMTA comment
CCC member	**P73- Community Noise Monitoring** - "no noise monitoring will be completed during periods where wind speed exceeds 5 metres per second". I query why monitoring is limited to 5 metre per second. If my google calculation is correct, this converts to 18km per hour. Wind speeds in the Wattle Grove area are more often well above 20km per hour in the afternoons. I think this matters because living near the M5, when wind speeds are high and blowing from a north westerly or westerly direction the increase in traffic noise is substantial. Likewise, the noise impact on Casula residents will differ significantly according to the wind direction. What is the rationale for a comparatively low wind speed limit?	At wind speeds above 5 m/second there is a decreased ability to differentiate/discriminate point sources of noise generation from diffuse/regional sources – such as from the M5 and Hume Highway or Holsworthy Barracks. Data collected from monitoring becomes meaningless in terms of tracking or assessing performance of the development due to increased background noise detection and/or wind shear/secondary flow over recording devices. Jeff has answered his own question in his supporting discussion. The CNVMP has been prepared with reference to the Interim Construction Noise Guideline (DECC 2009) (ICNG) as per condition of consent B135. Noise generated from public roads and construction traffic on public roads or from industrial sources is not covered by the ICNG.
CCC member	**P75- Monitoring reports** - "will be sent to Principal's representative.". For transparency, can CCC be provided with copy during construction phase?	Monitoring reports prepared by individual contractors on site are not required to be made publicly available under the consent. Compliance with construction requirements is reported through compliance reports which are published on the SIMTA website and are publicly available.
CCC member	It would be advisable to make the installation of the Noise Abatement Walls ASAP. This should be an important first step procedure to limit the construction noise to the receivers most prone to noise.	The noise wall identified in the MPW Stage 2 consent is an operational noise wall. It should be noted that in late 2019 SIMTA proposed the installation of an acoustic bund along the western perimeter of the MPW site. The proposal with categorically opposed and rejected by the Department and it's Environmental Representative.
CCC member	It would be very helpful to the residents if under the new construction contracts that BEEPERS be banned from the site and only Quackers are used on all machinery, considering the number of complaints raised by my neighbours. Noise from Beepers and dust being the two biggest complaints followed by light spill from Daymakers making the third.	It is not practicable to ban beepers from the works site. The preferential use of non-tonal reversing alarms, such as quackers, is already included as part of the site-specific induction training, outlined in Section 3.3 of the approved CNVMP. Nothing in the consent constrains or prohibits the use of beepers.
CCC member	It should be noted that previous Noise and Vibration Reports commented on there being an 8dba reduction of noise to sensitive receivers due to windows and doors which made the noise limits acceptable in meeting the guidelines. This is true during winter and inclement weather, however on the hot humid days of spring/summer the sensitive receivers will have their doors and windows open to take advantage of the fresh breezes and therefore any subsequent noise recordings should be lowered to ensure excessive noise is not received by SIMTA neighbours, this goes double for OOH work.	This is the only CNVMP prepared for MPW2. It is assumed that the previous reports are the assessments in the EIS. The CNVMP identifies measures to be implemented to manage noise generation and mitigate impact in accordance with the approved consent and the respective conditions of consent.

Stakeholder	Feedback received	SIMTA comment
CCC member	Because of the standard 11hour workday ALL Excessive Noise should have periods of respite for the neighbours. There is nothing more annoying than 11 hours of constant banging and beeping from not one but several pieces of heavy machinery.	Due to the breadth of works cross the MPW site it is probably neither feasible or practicable to impose a uniform respite period All works on site should be compliant with the conditions of consent in respect of noise generation and would therefore not be considered excessive, albeit they may be perceived as such by proximate receivers. Regardless, respite for residents, where reasonable and feasible, is already included as additional management measures in Section 4.6 of the approved CNVMP.