Construction Noise and Vibration Management Plan

Westgate Estate - 253-267 Aldington Road, Kemps Creek NSW

Prepared for Icon Oceania Kemps Development Pty Ltd

November 2025

Construction Noise and Vibration Management Plan

Westgate Estate - 253-267 Aldington Road, Kemps Creek NSW

Icon Oceania Kemps Development Pty Ltd

E230916 RP2

November 2025

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Approved by

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1		
2		
3		
4		
5		

TABLE OF CONTENTS

Appendices

Tables

Figures

1 Introduction

1.1 Context

This Construction Noise and Vibration Management Sub Plan (CNVMP) forms part of the Construction Environmental Management Plan (CEMP) for the industrial estate development comprising four warehouse buildings, hardstand and carparking areas at 253–267 Aldington Road, Kemps Creek, NSW 2178 (SSD-23480429).

This CNVMP has been prepared to address the requirements of the Minister's Development Consent Conditions (SSD-23480429) dated 1 August 2025 and the mitigation and management measures listed in the EMM's previous NVIA report (reference: *Noise Impact Assessment – Westgate Estate, 253–267 Aldington Road, Kemps Creek NSW*, dated February 2025), and all applicable legislation.

1.2 Background and project description

The Project will comprise a state-of-the-art industrial warehouse and logistics estate. The key features of the project are summarised below:

- Site establishment:
  - Removal of farm dams.
  - Remediation as required.
  - Bulk earthworks (175,000m^3 of fill) and retaining walls.
- Staged construction and operation of an industrial estate within three buildings, including ancillary office spaces, hardstand areas and car parking, with a total gross floor area (GFA) of 34,245m^2, maximum floor space ratio of 0.34:1, maximum height of 19.7m (inclusive of rooftop plant), split over four warehouses contained within three buildings with ancillary hardstand and office spaces:
  - Stage 1
    i) Warehouse 1A: 7,189m^2 with 318m^2 office space (total GFA – 7,507m^2).
    ii) Warehouse 1B: 7,060m^2 with 307m^2 office space (total GFA – 7367m^2).
    iii) Warehouse 1C: 6,480m^2 office space (total GFA – 6,787m^2).
  - Stage 2
    i) Warehouse 2 (temperature controlled): 11,959m^2 with total 625m^2 office space (total GFA – 12,584m^2).
- Use of the buildings for warehouse and distribution purposes 24 hours per day 7 days per week.
- Ancillary development including:
  - Signage (a pylon estate sign and individual tenant identification and wayfinding signage).
  - Under croft car parking (149 vehicular spaces).
    ii) Warehouse 1A: 32 spaces.

iii) Warehouse 1B/1C: 61 spaces.

iv) Warehouse 2: 56 spaces.

- Landscaping.
- Utility infrastructure and services connection.
- Stormwater management including naturalised open channel drainage as well as below ground on-site detention of stormwater.
- Construction of two new industrial roads. This includes an east-west road (Road 1) and north-south road (Road 2). These roads are proposed to be delivered with an interim and ultimate access design:
  - Interim road design: half-road design for Road 1 and interim cul-de-sac at the northern end of Road 2.
  - Ultimate road design: full road design for Road 1 and connection to the lot to the north (removal of cul-de-sac) for Road 2. The ultimate road design will be delivered in co-ordination with the neighbouring landowners. The ultimate road design will be dedicated to Council once the Aldington Road Intersections have been completed.
- Subdivision of the site into two Torrens title allotments in addition to a road reserve lot for Road 1, Road 2 and area for the Aldington Road widening and intersection upgrade located on the site.
- Dedication of land required for the widening of Aldington Road and the part of the Aldington Road Intersection upgrade which is located on the site.

1.3 Environmental management system overview

The CEMP describes the overall system for environmental management of the project being delivered by Icon Oceania.

The CNVMP has been developed in response to the Development Consent conditions relating to construction noise and provides practical management measures and actions that will be implemented to avoid or minimise noise and vibration impacts during construction of the Project.

Where relevant, the CNVMP noise and vibration management and mitigation measures will be incorporated into location or activity specific construction planning and site procedures. These will be developed and approved by environment and management representatives prior to the commencement of associated works, and construction personnel will be required to undertake works in accordance with the identified requirements and mitigation measures.

Used together, the CEMP and CNVMP form management guides that clearly identify the required environmental management actions to be referenced by all personnel and contractors on the project.

This plan will be subject to the review and improvement processes described in the CEMP.

1.4 Glossary of acoustic terms

A number of technical acoustic descriptions are used in this report. A list of terms and a brief explanation are provided in Table 1.1.

Table 1.1 Glossary

Abbreviation or term	Definition
ABL	The assessment background level (ABL) is defined in the INP as a single figure background level for each assessment period (day, evening and night). It is the tenth percentile of the measured L_{A90} statistical noise levels.
Amenity noise criteria	The amenity noise criteria relate to the overall level of industrial noise. Where existing levels of industrial noise (excluding the subject development) approach the acceptable amenity noise criteria, then noise levels from new industries need to demonstrate that they will not be an additional contributor to existing industrial noise.
A-weighting	There are several different weightings utilised for describing noise, the most common being the 'A-weighting'. This attempts to closely approximate the frequency response of the human ear.
C-weighting	There are several different weightings utilised for describing noise, with the 'C-weighted' scale typically used to assess low frequency noise and is also utilised in the assessment of occupational noise.
Day period	Monday–Saturday: 7.00 am to 6.00 pm, on Sundays and public holidays: 8.00 am to 6.00 pm.
dB	Noise is measured in units called decibels (dB).
DPHI	Department of Planning, Housing and Infrastructure
EPA	The NSW Environment Protection Authority (formerly the Department of Environment, Climate Change and Water).
Evening period	Monday–Saturday: 6.00 pm to 10.00 pm, on Sundays and public holidays
Intrusive noise criteria	The intrusive noise criteria refers to noise that intrudes above the background level by more than 5 dB. The intrusiveness criterion is described in detail in Section 3.1.1.
L_{A1}	The A-weighted noise level exceeded for 1% of the time.
L_{A10}	The A-weighted noise level which is exceeded 10% of the time. It is roughly equivalent to the average of maximum noise level.
L_{A90}	The A-weighted noise level that is exceeded 90% of the time. Commonly referred to as the background noise level.
L_{Aeq}	The A-weighted energy average noise level. This is the equivalent continuous sound pressure level over a given period. The $L_{Aeq(15\text{-}minute)}$ descriptor refers to an L_{Aeq} noise level measured over a 15 minute period.
L_{Amax}	The maximum A-weighted sound pressure level received during a measurement interval.
Night period	Monday–Saturday: 10.00 pm to 7.00 am, on Sundays and public holidays: 10.00 pm to 8.00 am.
RBL	The rating background level (RBL) is an overall single value background level representing each assessment period over the whole monitoring period. The RBL is used to determine the intrusiveness criteria for noise assessment purposes and is the median of the average background levels.
Sound power level (L_w)	A measure of the total power radiated by a source. The sound power of a source is a fundamental property of the source and is independent of the surrounding environment.
Temperature inversion	A meteorological condition where the atmospheric temperature increases with altitude.

1.5 Common noise levels

It is useful to have an appreciation of decibels (dB), the unit of sound measurement when reading this assessment. Table 1.2 gives some practical indication of what an average person perceives about changes in noise levels.

Table 1.2 Perceived change in noise

Change in sound level (dB)	Perceived change in noise
3	Just perceptible
5	Noticeable difference
10	Twice (or half) as loud
15	Large change
20	Four times as loud (or quarter) as loud

Examples of common noise levels are provided in Figure 1.1.

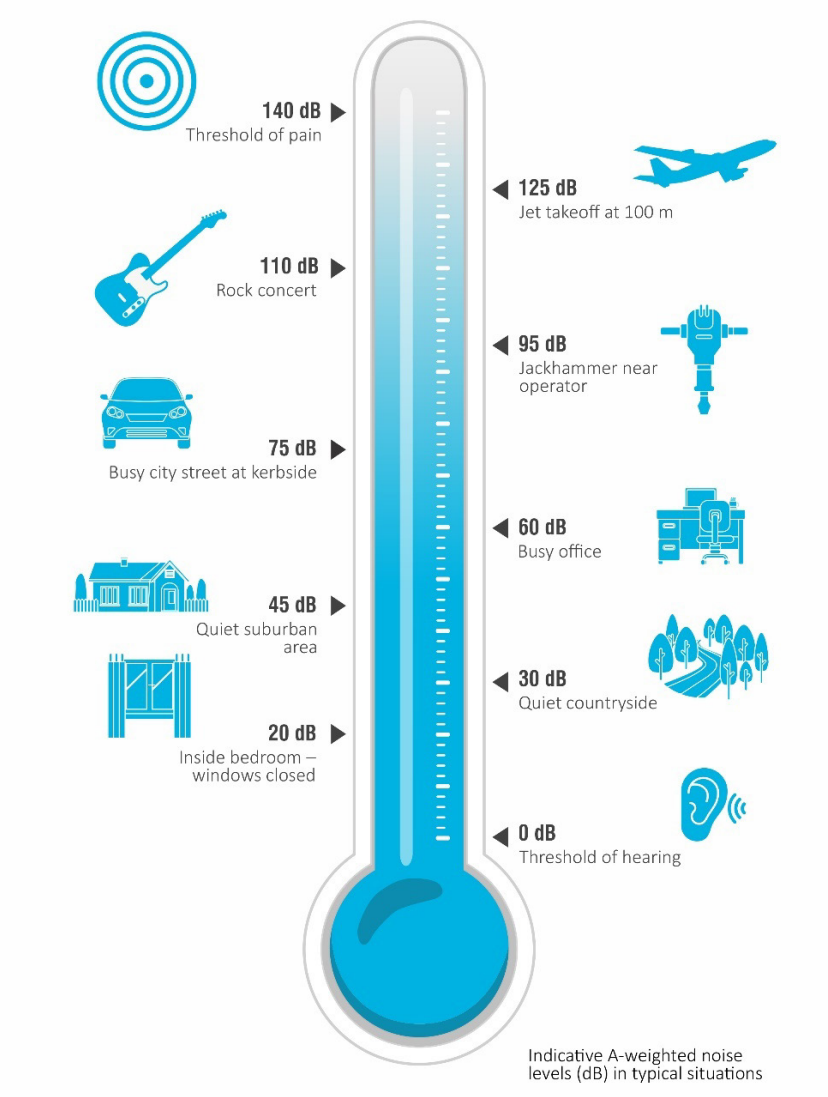


Figure 1.1 Common noise levels

2 Purpose and objectives

2.1 Purpose

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

2.2 Objectives

The key objective of the CNVMP is to ensure that impacts to the local community and the built environment from noise and vibration are minimised.

Specific objectives include:

- Identifying sensitive receivers and ensure appropriate environmental controls and procedures are implemented during construction activities.
- Minimising potential adverse noise and vibration impacts to the environment and community.
- Managing impacts if they occur through a systematic analysis of mitigation strategies.
- Ensure appropriate measures are implemented to comply with all relevant Development Consent conditions, legislation and other requirements as described in Section 3 of this CNVMP.

2.3 Targets

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

- To achieve full compliance with the relevant legislative requirements, Development Consent Conditions (SSD-23480429) dated 1 August 2025 and the mitigation and management measures listed in the EMM's previous NVIA report (reference: *Noise Impact Assessment – Westgate Estate, 253–267 Aldington Road, Kemps Creek NSW*, dated February 2025), and all applicable legislation.
- Implement feasible and reasonable noise mitigation measures with the aim of achieving the construction noise management levels detailed in the lnterim Construction Noise Guideline (DECC, 2009)
- Complaints from the community and stakeholders are minimised.

The potential for a corrective action or other consequence as a result of any failing to achieve one of the above targets will be specific to the target which has not been met and will be determined by the compliance processes described in the CEMP.

2.4 Competency

This CNVMP has been prepared by EMM's highly qualified and experienced team of technical noise specialists. The team has extensive experience in assessing noise and vibration impacts during both the construction and operational phases of developments.

EMM has been heavily involved to date in assessing noise and vibration impacts associated with the Westgate development.

The following individuals detailed in Table 2.1 were responsible for preparing this CNVMP:

Table 2.1 Project team competency

Name	Project Role	Qualifications	Years' experience
Carl Fokkema	Technical review	B.Sc (Env Sc), MAAS	24
Tristan Robertson	Project management and assessment, reporting	MDesSc (Audio and Acoustics), MAAS	17

3 Environmental requirements

3.1 Relevant legislation and guidelines

3.1.1 Legislation

Legislation relevant to noise and vibration management includes:

- Protection of the Environment Operations Act 1997 (POEO Act)
- Protection of the Environment Operations (Noise Control) Regulation 2008.

Relevant provisions of the above legislation are explained in the register of legal and other requirements included in the CEMP.

3.1.2 Guidelines

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

- NSW Interim Construction Noise Guideline (ICNG), Department of Environment and Climate Change 2009
- NSW Noise Policy for Industry (NPfI), Environment Protection Authority 2017
- NSW Assessing Vibration – a technical guideline (AVTG), Department of Environment and Conservation 2006
- Australian Standard AS/NZS 2107:2000 Acoustics - Recommended design sound levels and reverberation times for building interiors
- Australian Standard AS2436-2010 Guide to Noise Control on Construction, Maintenance and Demolition Sites
- British Standard BS 6472-2008, 'Evaluation of human exposure to vibration in buildings (1- 80Hz)
- British Standard BS 7385: Part 2-1993 'Evaluation and measurement of vibration in buildings'
- German Standard DIN4150-2016 Structural vibration Part 3: Effects of vibration on Structures

3.2 Ministers conditions of approval

The Development Consent Conditions relevant to this Plan are listed Table 3.1 below. A cross reference is also included to indicate where the condition is addressed in this Plan or other project management documents.

Table 3.1 Conditions of approval relevant to the CNVMP

<table>
<tr><th>Development Consent Condition.</th><th>Condition requirements</th><th>Document reference</th></tr>
<tr><td>B31</td><td>Hours of work
The Applicant must comply with the hours detailed in Table 3.
Table 3 Hours of Work
<table>
<tr><th>Activity</th><th>Day</th><th>Time</th></tr>
<tr><td>Earthworks and construction</td><td>Monday – Friday
Saturday</td><td>7 am to 6 pm
8 am to 1 pm</td></tr>
</table></td><td>Section 5.2</td></tr>
<tr><td>B32</td><td>Works outside of the hours identified in condition B30 may be undertaken in the following circumstances: (a) works that are inaudible at the nearest sensitive receivers;
(b) works agreed to in writing by the Planning Secretary;
(c) for the delivery of materials required outside these hours by the NSW Police Force or other authorities for safety reasons; or
(d) where it is required in an emergency to avoid the loss of lives, property or to prevent environmental harm.</td><td>Section 5.2</td></tr>
<tr><td>B33</td><td>Construction Noise Limits
The development must be constructed to achieve the construction noise management levels detailed in the Interim Construction Noise Guideline (DECC, 2009) (as may be updated or replaced from time to time). 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 Construction Noise and Vibration Management Plan required under condition B33.</td><td>Section 7
Section 8
Section 9
Section 10</td></tr>
<tr><td>B34</td><td>Construction Noise Management Plan
The Applicant must prepare a Construction Noise Management Plan for the development to the satisfaction of the Planning Secretary. The Plan must form part of a CEMP in accordance with condition C2 and must
(a) be prepared by a suitably qualified and experienced noise expert;</td><td>Section 2.4</td></tr>
<tr><td></td><td>(b) describe procedures for achieving the noise management levels in EPA’s Interim Construction Noise Guideline (DECC, 2009) (as may be updated or replaced from time to time);</td><td>Section 10</td></tr>
<tr><td></td><td>(c) include noise management and mitigation measures, including any described in Appendix 2;</td><td>Section 10</td></tr>
<tr><td></td><td>(d) describe the measures to be implemented to manage high noise generating works such as piling, in close proximity to sensitive receivers;</td><td>Section 10</td></tr>
<tr><td></td><td>(e) include strategies that have been developed with the community for managing high noise generating works;</td><td>Section 11</td></tr>
<tr><td></td><td>(f) describe the community consultation undertaken to develop the strategies in condition B33 (e) and</td><td>Section 11</td></tr>
<tr><td></td><td>(g) include a complaints management system that would be implemented for the duration of the development.</td><td>Section 11</td></tr>
</table>

Development Consent Condition.	Condition requirements	Document reference
	(h) include a complaints management system that would be implemented for the duration of the development.	
B35	The Applicant must: (a) not commence construction of the development until the Construction Noise Management Plan required by condition B33 is approved by the Planning Secretary; and	See document control at the start of the ONVMP
	(b) implement the most recent version of the Construction Noise Management Plan approved by the Planning Secretary for the duration of construction.	See document control at the start of the ONVMP
C1	**Management plan requirements** Management plans required under this consent must be prepared in accordance with relevant guidelines, and include: (a) a condition compliance table for that plan;	Refer to this table
	(b) detailed baseline data;	Section 4.3
	(c) 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;	Section 3
	(d) a description of the measures to be implemented to comply with the relevant statutory requirements, limits, or performance measures and criteria;	Section 10
	(e) a program to monitor and report on the: (i) impacts and environmental performance of the development; and (ii) effectiveness of the management measures set out pursuant to paragraph (d) above;	Section 12 and Section 13
	(f) 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;	Section 11 and Section 13
	(g) a program to investigate and implement ways to improve the environmental performance of the development over time;	Section 14
	(h) 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; and	Section 13
	(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*	Section 14

4 Existing environment

4.1 Overview

The site is known as 253–267 Aldington Road, Kemps Creek NSW and is legally described as Lot 9 in Deposited Plan (DP) 253503. The site is rectangular in shape with an area of approximately 10 hectares (ha).

The site has a primary frontage along its eastern boundary to Aldington Road of 160 m and a depth of 630 m. The site is currently occupied by a dwelling house, sheds and agricultural land.

The site is undulating in parts but longitudinally falls slightly from Aldington Road at an RL 54.00 to the western boundary with an RL 44.00 which equates to an average grade of 1.5%. The site also falls across the site from north to south at an average grade of 4.3%.

The site is burdened by a 60.96 m wide Transgrid easement which runs north–south through the site. The easement is known as 'Dapto – Sydney West 330 kV Easement' and there is presently no high voltage transmission line infrastructure.

The site is approximately 5 kilometres (km) north-east of the Western Sydney International (Nancy-Bird Walton) Airport currently under construction, 14 km south-east of Penrith CBD and 38 km west of the Sydney CBD.

The site is located within the suburb of Kemps Creek, which falls within the Penrith Local Government Area (LGA). It is in the Mamre Road Precinct (MRP) within the broader Western Sydney Employment Area (WSEA) and is surrounded by rural residential land uses that are rapidly transitioning to commercial and industrial premises in accordance with the zoning and proposed land uses permitted within that zone. The MRP falls within the greater Western Sydney Aerotropolis Precinct. (WSAP).

Multiple state significant developments (SSDs) and local development applications (DAs) are currently being progressed for industrial and warehouse development within the MRP which will substantially change the nature of the surrounding area.

The surrounding land uses include:

- **north**: Pastoral/farmland extends towards the elevated Bakers Lane. Several properties have been purchased by developers for industrial development; these include Frasers and Fife Stockland with construction commencing. In addition, the BAPS Swaminarayan Hindu Temple located north of the site at 230-242 Aldington Road, Kemps Creek is currently under construction.
- **South**: Farm and pastoral lands with rural residential properties scattered within the landscape. The Mamre Road precinct extends further beyond Abbotts Road. A locally listed heritage item is located at 282 Aldington Road to the south-east.
- **East**: The site is bound to the east by Aldington Road. On the opposite side of Aldington Road several properties have been purchased in seeking approval for industrial development. Land rises to the east to the residential E4 Environmental Living zone beyond at Mount Vernon.
- **West**: Farm and pastoral lands to Mamre Road and beyond. Sites on Mamre Road have been purchased for industrial uses. Further to the west is Twin Lakes Estate at Luddenham providing for rural residential properties.

All land in the immediate surrounding context to the north, east and south is zoned for industrial uses and wholly contained within the MRP and WSAP.

4.2 Sensitive receivers

The sensitive receiver areas surrounding the project site have been selected and used for the purpose of assessing construction noise from the project to the residences outside of the MRP and WSAP that will remain following the development of these precincts. The assessment has also considered the BAPS Temple currently under construction and residual residences located within the MRP that will ultimately transition to commercial and industrial land uses. These are described and summarised in Table 4.1 and shown in Figure 4.1.

The assessment of construction noise impacts has considered the three key noise catchment areas (NCAs) surrounding the site, comprising:

- NCA1 – West / north-west - Residential
    - Twin Lakes Estate at Luddenham providing for rural residential properties specifically Medinah Avenue, Pennard Crescent, Woodhall Place and Ganton Way.
- NCA2 – north-east
    - BAPS Swaminarayan Hindu Temple site and built form as documented here .
        - Adopting the central Temple Building Terrace at FFL 74.5m (existing RL 60.0m)
        - Adopting Mandir western forecourt FFL 86.5m existing RL 82.0m)
- NCA3 – east / south-east – Residential
    - existing rural properties located at Mount Vernon specifically Mount Vernon Road and Kerrs Road.

Table 4.1 Assessment locations

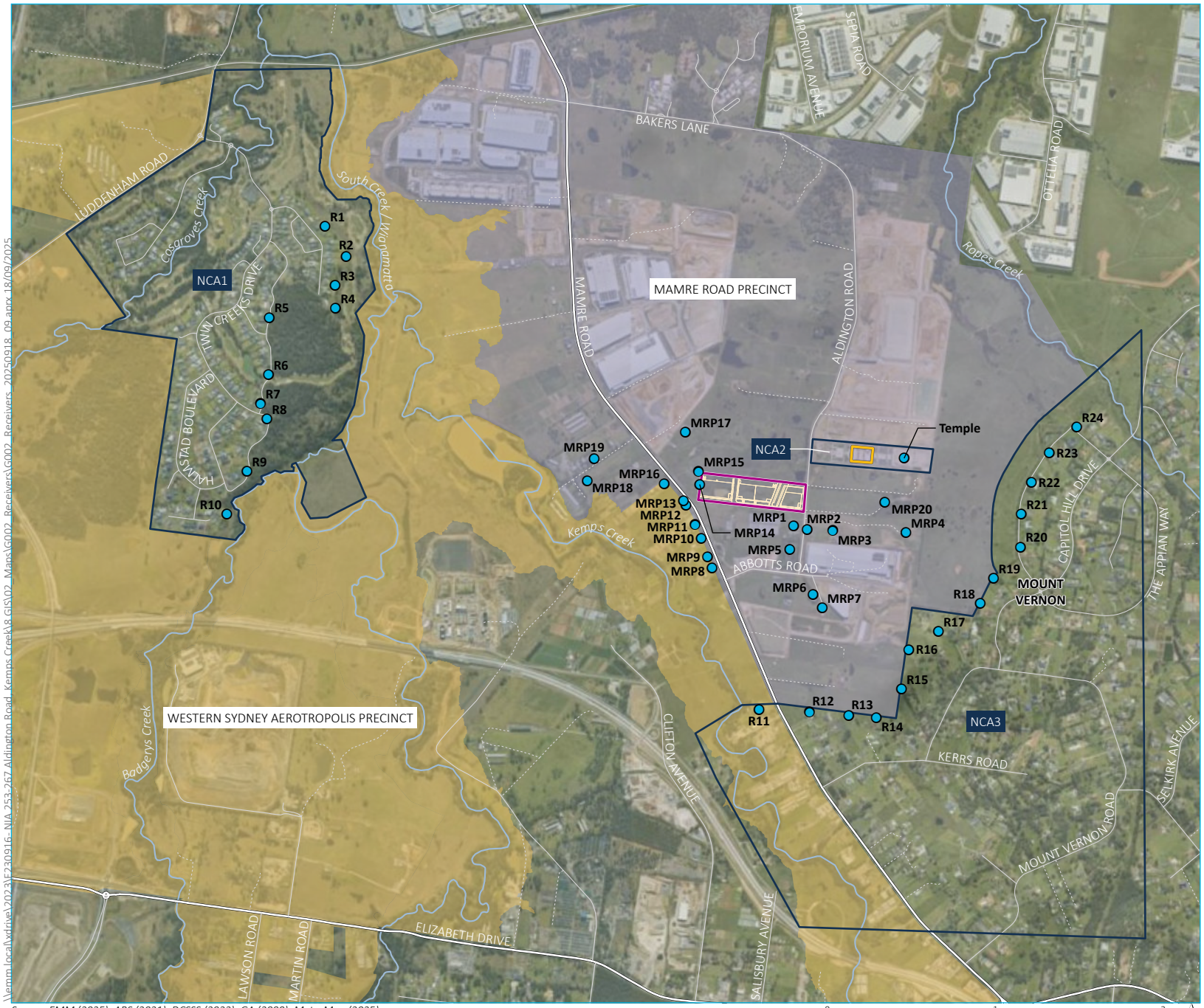
Assessment location	NCA	Zone	Coordinates		Distance to the construction boundary
			Eastings	Northings	
Receivers outside the MRP/WSAP from NVIA					
R1	NCA1 – west / north-west	MGA Grid 56	293211.4	6253579.5	2685
R2	NCA1 – west / north-west	MGA Grid 56	293337.6	6253398.0	2481
R3	NCA1 – west / north-west	MGA Grid 56	293271.2	6253227.5	2456
R4	NCA1 – west / north-west	MGA Grid 56	293273.5	6253090.2	2394
R5	NCA1 – west / north-west	MGA Grid 56	292879.5	6253034.6	2739
R6	NCA1 – west / north-west	MGA Grid 56	292874.9	6252692.7	2648
R7	NCA1 – west / north-west	MGA Grid 56	292827.6	6252520.9	2662
R8	NCA1 – west / north-west	MGA Grid 56	292865.3	6252429.4	2611
R9	NCA1 – west / north-west	MGA Grid 56	292746.9	6252119.8	2692
R10	NCA1 – west / north-west	MGA Grid 56	292626.7	6251863.3	2808
T1	NCA2 – north-east – BAPS Temple	MGA Grid 56	296410.5	6252216.6	380
T2	NCA2 – north-east – BAPS Mandir	MGA Grid 56	296661.0	6252197.0	607

Assessment location	NCA	Zone	Coordinates		Distance to the construction boundary
			Eastings	Northings	
R11[1]	NCA3 – east / south-east	MGA Grid 56	295796.7	6250699.1	1201
R12	NCA3 – east / south-east	MGA Grid 56	296097.4	6250682.7	1195
R13	NCA3 – east / south-east	MGA Grid 56	296330.8	6250663.2	1244
R14	NCA3 – east / south-east	MGA Grid 56	296495.4	6250651.3	1301
R15	NCA3 – east / south-east	MGA Grid 56	296645.0	6250821.8	1206
R16	NCA3 – east / south-east	MGA Grid 56	296688.4	6251055.2	1034
R17	NCA3 – east / south-east	MGA Grid 56	296864.9	6251164.4	1074
R18	NCA3 – east / south-east	MGA Grid 56	297114.7	6251330.5	1186
R19	NCA3 – east / south-east	MGA Grid 56	297193.5	6251481.2	1199
R20	NCA3 – east / south-east	MGA Grid 56	297354.1	6251667.1	1309
R21	NCA3 – east / south-east	MGA Grid 56	297358.3	6251862.9	1293
R22	NCA3 – east / south-east	MGA Grid 56	297418.8	6252051.6	1344
R23	NCA3 – east / south-east	MGA Grid 56	297525.7	6252226.7	1463
R24	NCA3 – east / south-east	MGA Grid 56	297688.9	6252383.3	1651
Receivers within the MRP/WASP from NVIA					
R_MRP_1	269 Aldington Road, Kemps Creek	MGA Grid 56	296002	6251791	92
R_MRP_2	284-288 Aldington Road, Kemps Creek	MGA Grid 56	296083	6251770	109
R_MRP_3[2]	282 Aldington Road, Kemps Creek	MGA Grid 56	296235	6251763	207
R_MRP_4	272 Aldington Road, Kemps Creek	MGA Grid 56	296671	6251752	621
R_MRP_5	287 Aldington Road, Kemps Creek	MGA Grid 56	295979	6251650	235
R_MRP_6	1016-1028 Mamre Road, Kemps Creek	MGA Grid 56	296118	6251382	498
R_MRP_7	1016-1028 Mamre Road, Kemps Creek	MGA Grid 56	296173	6251303	585
R_MRP_8	1005-1023 Mamre Road, Kemps Creek	MGA Grid 56	295516	6251542	394
R_MRP_9	983 Mamre Road, Kemps Creek	MGA Grid 56	295489	6251606	333
R_MRP_10	983B Mamre Road, Kemps Creek	MGA Grid 56	295452	6251717	227
R_MRP_11	967-981 Mamre Road, Kemps Creek	MGA Grid 56	295415	6251798	151
R_MRP_12	967-981B Mamre Road, Kemps Creek	MGA Grid 56	295361	6251914	80
R_MRP_13	949-965 Mamre Road, Kemps Creek	MGA Grid 56	295346	6251940	88
R_MRP_14[3]	930B Mamre Road, Kemps Creek	MGA Grid 56	295443	6252037	3
R_MRP_15	930-966 Mamre Road, Kemps Creek	MGA Grid 56	295436	6252115	22
R_MRP_16	949-965B Mamre Road, Kemps Creek	MGA Grid 56	295231	6252041	214
R_MRP_17	930A Mamre Road, Kemps Creek	MGA Grid 56	295357	6252349	260

Assessment location	NCA	Zone	Coordinates		Distance to the construction boundary
			Eastings	Northings	
R_MRP_18	919-929 Mamre Road, Kemps Creek	MGA Grid 56	294773	6252059	669
R_MRP_19	901 Mamre Road, Kemps Creek	MGA Grid 56	294814	6252191	648
R_MRP_20	258-270 Aldington Road, Kemps Creek	MGA Grid 56	296545	6251931	477

Notes:

1. Receiver location within WSAP
2. R_MRP_14 Reported to be heritage listed
3. Assumed base on Streetview and aerial photography to be derelict



KEY

- Noise assessment location
- Site boundary
- Temple site
- Noise catchment area
- Proposed layout

Existing environment

- Major road
- Minor road
- Vehicular track
- Named watercourse
- Cadastral boundary

Precinct boundary

- Mamre Road
- Western Sydney Aerotropolis

INSET KEY

- Major road
- NPWS reserve
- State forest

Source: EMM (2025); ABS (2021); DCSSS (2023); GA (2009); MetroMap (2025)

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CNVMP- Site and assessment locations

Westgate Estate
253-267 Aldington Road, Kemps Creek NSW
CVNMP
Figure 4.1

EMM
creating opportunities

4.3 Existing acoustic background

The process of establishing noise criteria for construction activities typically requires the determination of background noise levels. However, it is important to note that area is and will continue to undergo a substantial period of development and that baseline ambient noise levels currently being enjoyed will also change, consistent with this project. The relevant methodology for this process, including siting of noise loggers, calculation of the rating background noise level (RBL) and filtering for meteorological conditions, is outlined in Fact Sheet B of the NPfI.

A preliminary noise assessment was prepared for Westgate in September 2021[1] and confirmed background L_{A90} noise levels in the order of 37-39 dB(A) during the day / evening and 34 dB(A) at night, whilst ambient L_{Aeq} levels were 50-53 dB(A) during the day / evening and 47 dB(A) at night.

Similar historic measurements have been conducted for Westlink Industrial development (SSD-9138102) which confirmed adopted background L_{A90} noise levels of 35 dB(A), 33 dB(A) and 33 dB(A) for day, evening and night respectively. Measurements contained within the WSA EIS for Mount Vernon confirmed similar background L_{A90} noise levels of 35 dB(A), 35 dB(A) and 33 dB(A) for day, evening and night respectively Ambient noise levels within the Twin Creeks, Luddenham areas would be expected to be historically quite low.

In terms of considering the construction noise goals, the NVIA and this CNVMP has considered the above noise levels and adopted background L_{A90} levels of 35 dB(A) day, 33 dB(A) evening and 33 dB(A) night.

[1] Pulse White Noise Acoustics – Westgate Industrial Estate, Kemps Creek – Noise and Vibration Impact Assessment. Report number: 210256

5 Construction details

5.1 Program and activities

The construction of the Project will involve a range of activities incorporating various heavy machinery, plant and equipment that will operate in a number of locations across the project. An indicative construction program is shown in Table 5.1.

Table 5.1 Indicative construction program

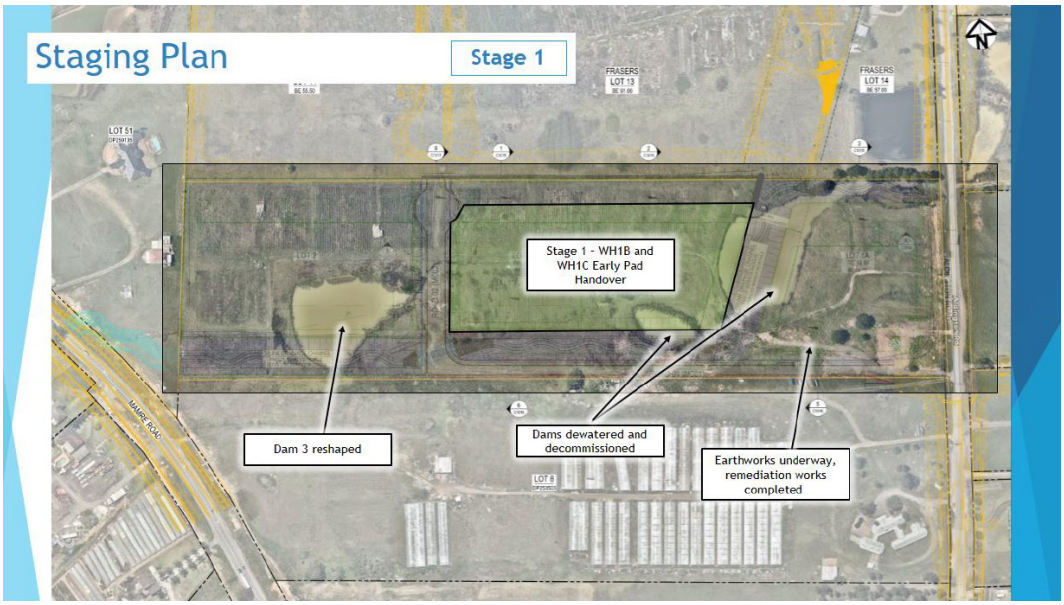
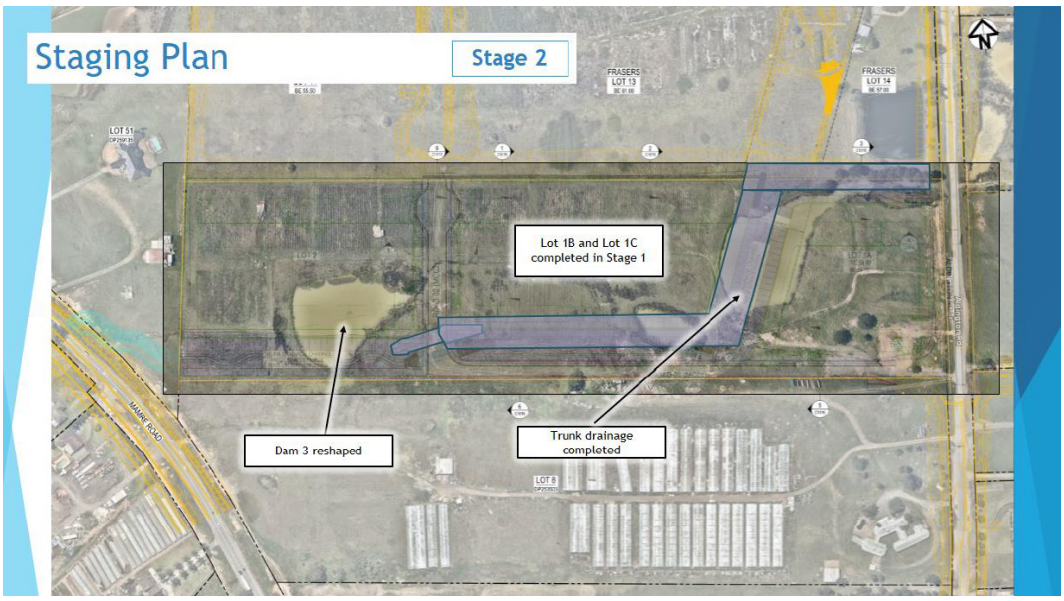
Construction activity/ anticipated start date	Year 2025					Year 2026							
	August	September	October	November	December	January	February	March	April	May	June	July	August
Site establishment 1/08/2025													
Early Works Pre-Subdivision Works Certificate (SWC) 8/08/2025													
SWC Works 29/09/2025													
Bulk Earthworks 25/11/2025													
Road works 9/12/2025													
Completion of works 7/8/2026													

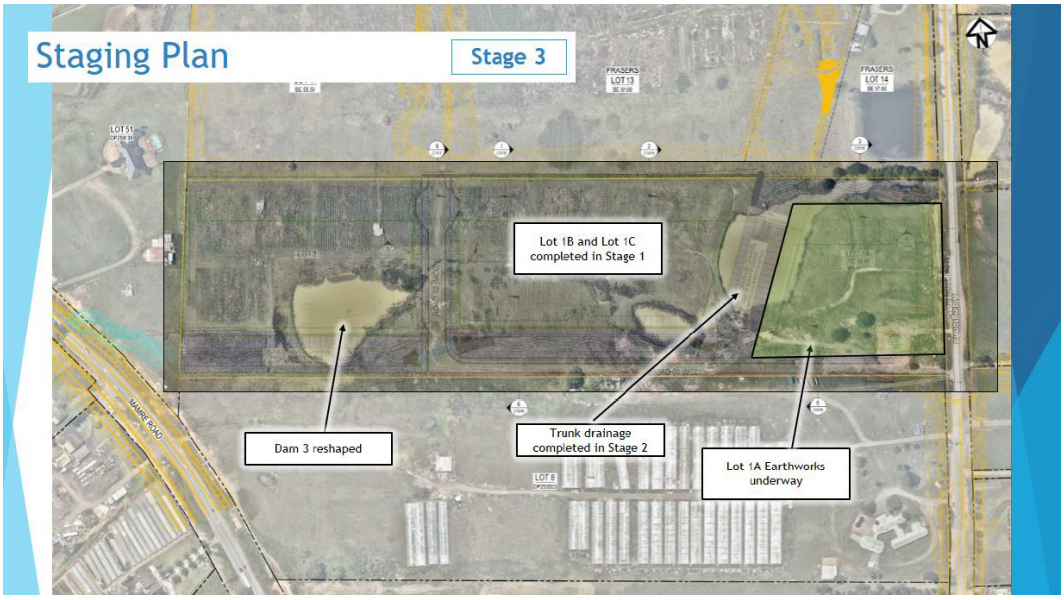
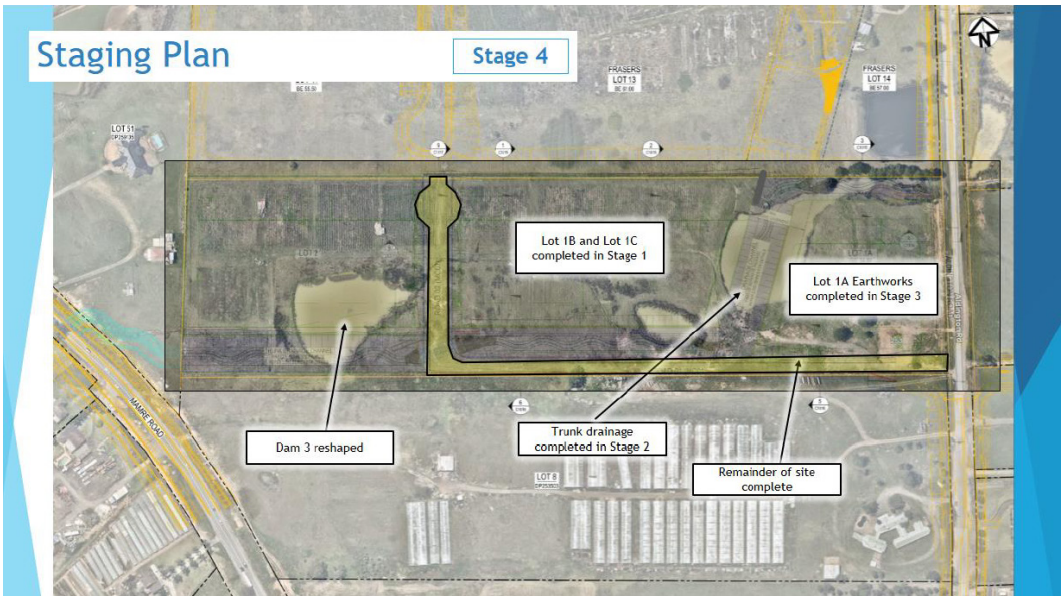
Expected typical construction method and staging is provided in Table 5.2 and Table 5.3 respectively.

Table 5.2 Proposed construction method

Phases	Typical activity
Civil work - site preparation and bulk earthworks	• Early works (farm infrastructure removal) • Sediment and erosion controls • Contamination remediation • Dam dewatering • Bulk earthworks (cut/fill) • Roadworks • Stormwater and trunk drainage installation • Services installation and landscaping. • Machinery floats in / out of site • Import of materials

Table 5.3 Proposed construction staging

Stage	Staging Plan
SP1 – Early works pad handover – WH1B and WH1C	
SP2 – Trunk drainage channel works	

Stage	Staging Plan
SP3A – Pad handover WH1A	
SP3B - Balance of civil works (including roads, landscaping)	

As a conservative assessment due to the varied nature of construction activities, activities listed above may occur in isolation or simultaneously at any time during each phase of work. Accordingly, this CNVMP considered a worst case assessment of the civil works across the entire site footprint in order to assess noise and vibration impacts and identify appropriate mitigation measures.

5.2 Standard construction hours

In accordance with Development Consent conditions B31 and B32, work must only be undertaken during the following standard construction hours:

- 7:00 am – 6:00 pm, Monday to Friday;
- 8:00 am – 1:00 pm, Saturday; and
- No works to be undertaken on Sundays or public holidays.

Works outside of the hours identified in condition B31 may be undertaken in the following circumstances:

- works that are inaudible at the nearest sensitive receivers;
- works agreed to in writing by the Planning Secretary;
- 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 or to prevent environmental harm.

6 Construction noise guidelines

6.1 Interim construction noise guidelines

The *Interim Construction Noise Guideline* (ICNG) (DECC 2009) has been jointly developed by NSW Government agencies, including the NSW Environment Protection Authority (EPA) and Department of Planning (DoP) (now DPHI). The objectives of the guideline relevant to the planning process are to promote a clear understanding of ways to identify and minimise noise from construction and to identify 'feasible' and 'reasonable' work practices. The guideline recommends standard construction hours where noise from construction activities is audible at residential premises (i.e. assessment locations), as follows:

- Monday to Friday 7.00 am to 6.00 pm
- Saturday 8.00 am to 1.00 pm
- no construction work is to take place on Sundays or public holidays.

The ICNG acknowledges that works outside standard hours may be necessary, however, justification should be provided to the relevant authorities.

The ICNG provides two methodologies to assess construction noise emissions. The first is a quantitative approach, which is suited to major construction projects with typical durations of more than three weeks. This method requires noise emission predictions from construction activities at the nearest assessment locations and assessment against ICNG recommended noise levels.

The second is a qualitative approach, which is a simplified assessment process that relies more on noise management strategies. This method is suited to short-term infrastructure and maintenance projects of less than three weeks.

This assessment has adopted a quantitative approach. The qualitative aspects of the assessment include identification of assessment locations, description of works involved including predicted noise levels and proposed management measures that include a complaints handling procedure.

6.1.1 Construction noise management levels - residents

Table 6.1 provides ICNG noise management levels (NML) which apply to residential assessment locations.

Table 6.1 ICNG construction noise management levels for residences

Time of day	NML $L_{Aeq,15min}$	Application
Recommended standard hours: Monday to Friday 7.00 am to 6.00 pm, Saturday 8.00 am to 1.00 pm, no work on Sundays or public holidays	Noise-affected RBL + 10 dB	The noise-affected level represents the point above which there may be some community reaction to noise. • Where the predicted or measured $L_{Aeq,15min}$ 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.

Time of day	NML $L_{Aeq,15min}$	Application
	Highly noise affected 75 dBA	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: 1. 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) 2. if the community is prepared to accept a longer period of construction in exchange for restrictions on construction times.
Outside recommended standard hours	Noise-affected RBL + 5 dB	• 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 5 dBA 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.

Source: ICNG (EPA 2009).

6.1.2 Construction noise management levels – other noise sensitive land uses

Table 6.2 summarises the ICNG recommendations and provides NML for other land uses.

Table 6.2 ICNG noise levels at other land uses

Land use	Management level, $L_{Aeq,15min}$ dB
Industrial premises	External noise level 75 dB (when in use)
Offices, retail outlets	External noise level 70 dB (when in use)
Hotels[1]	External noise level 65 dB (7 am to 10 pm) 60 dB (10 pm to 7 am)
Classrooms at schools and other educational institutions	Internal noise level 45 dB (when in use)
Hospital wards and operating theatres	Internal noise level 45 dB (when in use)
Places of worship	Internal noise level 45 dB (when in use)
Active recreation areas	External noise level 65 dB (when in use)
Passive recreation areas	External noise level 60 dB (when in use)

Source: ICNG (DECC 2009).

1. NML based on AS2017 recommend maximum internal noise level and the premise that windows and doors for such development would typically remain closed, providing 20 dB of outdoor to indoor construction noise level reduction.

6.1.3 Project specific construction noise management levels

The project construction NMLs for recommended standard and out of hour periods are presented in Table 6.3 for all assessment locations based conservatively on historic background noise levels referenced in Section 4.3. Construction activities associated with the project have been assessed based on standard construction hours, however a full range of out-of-hours work (OOHW) has been provided for completeness and potential construction activity flexibility.

Table 6.3 Construction noise management levels – all assessment locations

Assessment location	Period	Adopted RBL[1]	NML $L_{Aeq,15min}$ dB	
			Noise affected	Highly noise affected
R1 to R24 (outside MRP / WASP)	Day (standard ICNG hours)	35	45	75
	Day (OOHW)	35	40	N/A
	Evening (OOHW)	33	38	N/A
	Night (OOHW)	33	38	N/A
R_MRP_1 to R_MRP_20 (within MRP / WSAP)	Day (standard ICNG hours)	35	45	75
	Day (OOHW)	35	40	N/A
	Evening (OOHW)	33	38	N/A
	Night (OOHW)	33	38	N/A
T1 - Temple	When in use (internal)	n/a	65 (45 internal) [2]	N/A

Notes:

1. Assuming minimum background noise levels in accordance with NPfI
2. Assuming windows closed during use and minimum 20dB noise reduction and noting still under construction
3. Recommended standard hours of 7.00 am and 6.00 pm Monday to Friday, and 8.00 am to 1.00 pm Saturdays. No construction work on Sundays or Public Holidays.
4. Evening 6.00 pm to 10.00 pm and Night 10.00 pm to 7.00 am.

7 Construction vibration guidelines

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

- Assessing Vibration – a technical guideline (AVTG), Department of Environment and Conservation 2006

Impacts of ground borne vibration may be defined into the following two categories:

- Human comfort – vibration in which the occupants or users of the building are inconvenienced or possibly disturbed.
- Effects on building structures (structural damage) – where vibration can compromise the integrity of the building or structure itself.

7.1 Human comfort vibration objectives

7.1.1 Types of vibration

AVTG is based on BS 6472 – 2008, Evaluation of human exposure to vibration in buildings (1–80 Hz). The guideline outlines three types of vibration and provides guidance on how to assess and evaluate the relevant criteria. Examples of these three vibration types are presented in Table 2.1 of the guideline and are reproduced in Table 7.1.

Construction activities vibration associated with project are considered intermittent vibration.

Table 7.1 Examples of types of vibration

Continuous vibration	Impulsive vibration	Intermittent vibration
Machinery, steady road traffic, continuous construction activity (such as tunnel boring machinery).	Infrequent: Activities that create up to three distinct vibration events in an assessment period, e.g. occasional dropping of heavy equipment, occasional loading and unloading. Blasting is assessed using ANZEC (1990).	Trains, intermittent nearby construction activity, passing heavy vehicles, forging machines, impact pile driving, jack hammers. Where the number of vibration events in an assessment period is three or fewer these would be assessed against impulsive vibration criteria.

7.1.2 Continuous and impulsive vibration

Table 2.2 of the AVTG outlines acceptable criteria for human exposure to continuous and impulsive vibration for the frequency range 1 to 80 Hz. The criteria are dependent on both the time of activity (usually day or night) and the occupied place or location being assessed. Preferred and maximum criteria relating to measured root mean square (RMS) acceleration are summarised in Table 7.2.

Table 7.2 Criteria for exposure to continuous or impulsive vibration

Place or location	Period	RMS acceleration (m/s^2) for frequency range 1-80 Hz							
		Continuous				Impulsive			
		Preferred		Maximum		Preferred		Maximum	
		z-axis	x- and y-axes	z-axis	x- and y-axes	z-axis	x- and y-axes	z-axis	x- and y-axes
Critical areas[1]	Day/night	0.0050	0.0036	0.010	0.0072	0.005	0.0036	0.010	0.0072
Residences	Day	0.010	0.0071	0.020	0.014	0.300	0.210	0.600	0.420
	Night	0.007	0.005	0.014	0.010	0.100	0.071	0.200	0.140
Offices, schools, educational institutions and places of worship	Day/night	0.020	0.014	0.040	0.028	0.640	0.460	1.280	0.920
Workshops	Day/night	0.040	0.029	0.080	0.058	0.640	0.460	1.280	0.920

Notes: 1. Places such as hospital operating theatres and precision laboratories where sensitive operations are occurring.

2. Day: 7 am to 10 pm. Night: 10 pm to 7 am.

7.1.3 Intermittent vibration

The guideline outlines both preferred and maximum vibration values for assessing human responses to vibration, along with recommendations for appropriate measurement and evaluation techniques. Vibration levels below the preferred values are associated with a low likelihood of adverse comment or disturbance to building occupants. If vibration levels exceed the maximum values despite the application of all feasible and reasonable mitigation measures, it is recommended that the operator engage directly with the affected community.

Intermittent vibration as defined in Section 2.1 of the guideline is assessed using the vibration dose value (VDV) concept, which accounts for both the magnitude of vibration and the duration of exposure. This type of vibration typically results from heavy vehicle pass-bys and construction activities such as impact hammering, rolling, or general excavation.

Section 2.4 of the guideline provides acceptable values for intermittent vibration in terms of VDV, which requires measurement of the overall weighted root mean square (rms) acceleration over the frequency range of 1 Hz to 80 Hz. These acceptable VDV limits for intermittent vibration are reproduced in Table 7.3.

There is a low probability of adverse comment or disturbance to building occupants at vibration values below the preferred values. Adverse comment or complaints may be expected if vibration values approach the maximum values. The guideline recommends that activities should be designed to meet the preferred values where an area is not already exposed to vibration.

Table 7.3 Acceptable vibration dose values for intermittent vibration

Location	Daytime		Night time	
	Preferred value, $m/s^{1.75}$	Maximum value, $m/s^{1.75}$	Preferred value, $m/s^{1.75}$	Maximum value, $m/s^{1.75}$
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

Location	Daytime		Night time	
	Preferred value, $m/s^{1.75}$	Maximum value, $m/s^{1.75}$	Preferred value, $m/s^{1.75}$	Maximum value, $m/s^{1.75}$
Workshops	0.80	1.60	0.80	1.60

Note Daytime is 7.00 am to 10.00 pm and night time is 10.00 pm to 7.00 am.

These criteria are indicative only, and there may be a need to assess intermittent values against continuous or impulsive criteria for critical areas.

7.1.4 Human perception of vibration

While the assessment of response to vibration in BS 6472-1:1992 is based on VDV and weighted acceleration, for construction-related vibration, it is considered more appropriate to provide guidance in terms of Peak Particle Velocity (PPV), since this parameter is more likely to be routinely measured based on the more usual concern over potential building damage.

Humans can detect vibration levels which are well below those causing any risk of damage to a building or its contents.

The actual perception of motion or vibration may not in itself be disturbing or annoying. An individual's response to that perception, and whether the vibration is "normal" or "abnormal", depends very strongly on previous experience and expectations, and on other connotations associated with the perceived source of the vibration. For example, the vibration that a person responds to as "normal" in a car, bus or train is considerably higher than what is perceived as "normal" in a shop, office, or dwelling.

Human tactile perception of random motion, as distinct from human comfort considerations, was investigated by Diekmann and subsequently updated in German Standard DIN 4150 Part 2 1999. On this basis, the resulting degrees of perception for humans are suggested by the vibration level categories given in Table 7.4.

Table 7.4 suggests that people will just be able to feel floor vibration at levels of approximately 0.15 (mm/s) and that the motion becomes "noticeable" at a level of approximately 1 mm/s.

Table 7.4 Peak vibration levels and human perception of motion

Approximate vibration level	Degree of perception
0.10 mm/s	Not felt
0.15 mm/s	Threshold of perception
0.35 mm/s	Barely noticeable
1 mm/s	Noticeable
2.2 mm/s	Easily noticeable
6 mm/s	Strongly noticeable
14 mm/s	Very strongly noticeable

Note: These approximate vibration levels (in floors of building) are for vibration having a frequency content in the range of 8 Hertz (Hz) to 80 Hz.

In addition, the degrees of perception for humans are suggested by the vibration level categories given in British Standard *BS 5228-2:2009 Code of practice for noise and vibration on construction and open sites – Part 2: Vibration* as listed in Table 7.5.

Table 7.5 Guidance on the effects of vibration levels

Approximate vibration level	Degree of perception
0.14 mm/s	Vibration might be just perceptible in the most sensitive situations for most vibration frequencies associated with construction. At lower frequencies, people are less sensitive to vibration.
0.30 mm/s	Vibration might be just perceptible in residential environments.
1.00 mm/s	It is likely that vibration of this level in residential environments will cause complaint but can be tolerated if prior warning and explanation has been given to residents.
10.00 mm/s	Vibration is likely to be intolerable for any more than a very brief exposure to this level.

7.2 Structural damage vibration objectives

Most commonly specified "safe" structural vibration limits are designed to minimise the risk of threshold or cosmetic surface cracks, and are set well below the levels that have potential to cause damage to the main structure.

In terms of the most recent relevant vibration damage criteria, Australian Standard AS 2187.2 - 2006 "*Explosives - Storage and Use - Use of Explosives*" recommends the frequency dependent guideline values and assessment methods given in BS 7385 Part 2-1993 *"Evaluation and measurement for vibration in buildings Part 2*" be used as they are "applicable to Australian conditions".

The standard sets guide values for building vibration based on the lowest vibration levels above which damage has been credibly demonstrated. These levels are judged to give a minimum risk of vibration induced damage, where minimal risk for a named effect is usually taken as a 95% probability of no effect.

Sources of vibration that are considered in the standard include demolition, blasting (carried out during mineral extraction or construction excavation), piling, ground treatments (eg compaction), construction equipment, tunnelling, road and rail traffic and industrial machinery.

The recommended limits (guide values) for transient vibration to ensure minimal risk of cosmetic damage to residential and industrial/commercial buildings are presented numerically in Table 7.6 and graphically in Figure 7.1.

Table 7.6 Transient vibration guide values - minimal risk of cosmetic damage

Line	Type of Building	Peak Component Particle Velocity in Frequency Range of Predominant Pulse	
		4 Hz to 15 Hz	15 Hz and Above
1	Reinforced or framed structures Industrial and heavy commercial buildings	50 mm/s at 4 Hz and above	
2	Unreinforced or light framed structures Residential or light commercial type buildings	15 mm/s at 4 Hz increasing to 20 mm/s at 15 Hz	20 mm/s at 15 Hz increasing to 50 mm/s at 40 Hz and above

Notes:

1. Source: BS 7385 Part 2-1993

The standard states that the guide values in Table 7.6 relate predominantly to transient vibration which does not give rise to resonant responses in structures and low-rise buildings.

Where the dynamic loading caused by continuous vibration is such as to give rise to dynamic magnification due to resonance, especially at the lower frequencies where lower guide values apply, then the guide values in Table 7.6 may need to be reduced by up to 50%.

Sheet piling activities (for example) are considered to have the potential to cause dynamic loading in some structures (eg residences) and it may therefore be appropriate to reduce the transient values by 50%.

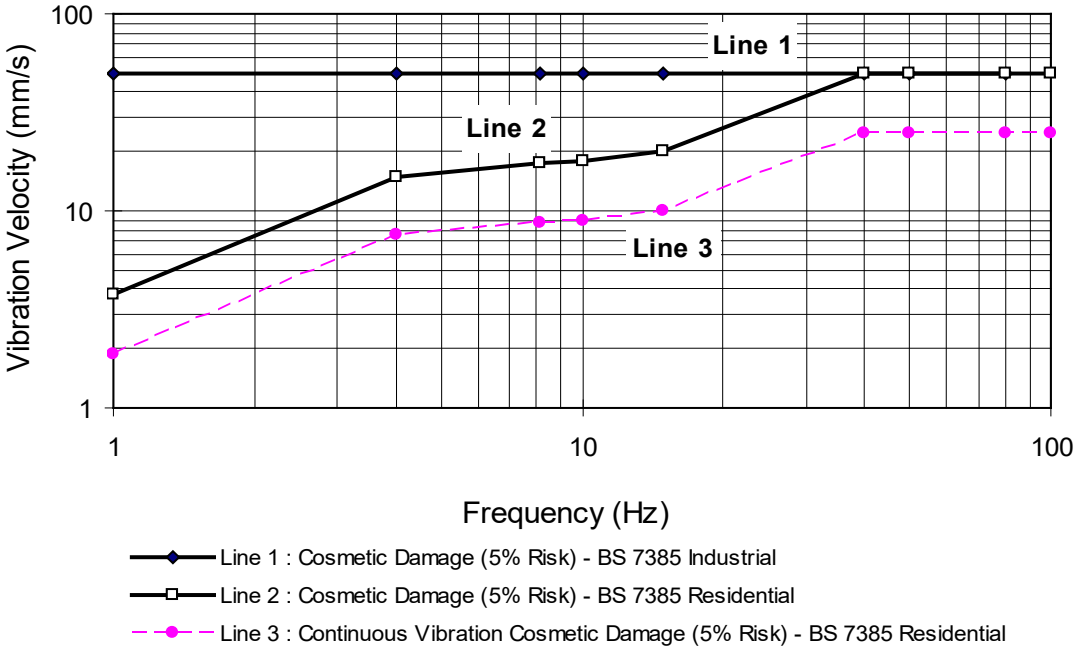


Figure 7.1 Graph of transient vibration guide values for cosmetic damage

In the lower frequency region where strains associated with a given vibration velocity magnitude are higher, the guide values for building types corresponding to Line 2 are reduced. Below a frequency of 4 Hz where a high displacement is associated with the relatively low peak component particle velocity value, a maximum displacement of 0.6 mm (zero to peak) is recommended. This displacement is equivalent to a vibration velocity of 3.7 mm/s at 1 Hz.

The standard goes on to state that minor damage is possible at vibration magnitudes which are greater than twice those given in Table 7.6, and major damage to a building structure may occur at values greater than four (4) times the tabulated values.

Fatigue considerations are also addressed in the standard and it is concluded that unless calculation indicates that the magnitude and number of load reversals is significant (in respect of the fatigue life of building materials) then the guide values in Table 7.6 should not be reduced for fatigue considerations.

In order to assess the likelihood of cosmetic damage due to vibration, AS2187 specifies that vibration measurements should be undertaken at the base of the building and the highest of the orthogonal vibration components (transverse, longitudinal and vertical directions) should be compared with the criteria curves presented in Table 7.6.

It is noteworthy that extra to the guide values nominated in Table 7.6, the standard states that:

> *Some data suggests that the probability of damage tends towards zero at 12.5 mm/s peak component particle velocity. This is not inconsistent with an extensive review of the case history information available in the UK.*

Also that:

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

A vibration screening criterion of 15 mm/s is recommended for structures surrounding the site for vibration inducing construction. This should be reduced to 7.5mm/s (by 50%) if the vibration activity is continuous and has the potential to cause resonance effects in surrounding structures (eg sheet piling).

In addition, the German Standard DIN 4150-3:2016 Structural Vibration – Part 3: Effects of Vibration on Structures, which is used for the assessment of damage to structures of intrinsic value, provides guideline values for both short-term and long-term vibration (including vibrations that may cause resonance in the structure being evaluated). The DIN 4150-3 criteria are presented in Table 7.7 and Table 7.8 below.

Table 7.7 Guideline values for short term vibration on structures – DIN 4150-3

Line	Type of structure	Guideline values for velocity, vi(t)[1] [mm/s] – foundation all directions		
		1 Hz to 10 Hz	10 Hz to 50 Hz	50 Hz to 100 Hz
1	Buildings used for commercial purposes, industrial buildings, and buildings of similar design	20	20-40	40-50
2	Residential buildings and buildings of similar design and/or occupancy	5	5-15	15-20
3	Structures that, because of their particular sensitivity to vibration, cannot be classified under lines 1 and 2 and are of great intrinsic value (for example listed buildings under preservation order)	3	3-8	8-10

Notes:

1. The term vi refers to vibration levels in any of the x, y or z axes
2. At frequencies above 100 Hz the values given in this column may be used as minimum values

Table 7.8 Guideline values for long-term vibration on structures

Line	Type of structure	Guideline values for velocity, vi in mm/s	
		Topmost floor. Horizontal direction, all frequencies	Floor slab, Vertical direction, all frequencies
1	Buildings used for commercial purposes, industrial buildings, and buildings of similar design.	10	10
2	Dwellings and buildings of similar design and/or occupancy.	5	10
3	Structures that, because of their particular sensitivity to vibration, cannot be classified under lines 1 and 2 and are of great intrinsic value (such as heritage listed buildings under preservation order).	2.5	10[2]

Notes:

1. Even if the reference values according to line 1, column 2 are observed, slight damage cannot be ruled out.
2. Significant reduction in this reference value may be necessary to prevent minor damage.

For this assessment, the DIN conservative short-term 5 mm/s at the foundation in all directions has been adopted for structural damage to all buildings and the conservative long-term 2.5 mm/s (horizontal direction, all frequencies) DIN criteria has been adopted for structural damage to heritage buildings (R_MRP_3 - 282 Aldington Road, Kemps Creek).

7.2.1 Transport for NSW Safe working distances

Transport for NSW Construction Noise and Vibration Guideline (December 2024) also provides safe working distances for typical items of vibration intensive plant are listed in Table 7.9. The safe working distances are quoted for both "Cosmetic Damage" (refer British Standard BS 7385) and "Human Response" Assessing Vibration – a technical guideline.

Table 7.9 Recommended minimum working distances for vibration intensive plant from sensitive receivers

Plant item	Rating/description	Safe working distance	
		Cosmetic damage (BS 7385)	Human Response (AV-atg)
Vibratory Rollers	1–2 tonne	5 m	15 to 20 m
	2–4 tonne	6 m	20 m
	4–6 tonne	12 m	40 m
	7-13 tonne	15 m	100 m
	13-18 tonne	20 m	100 m
	>18 tonne	25 m	100 m
Small Hydraulic Hammer	(300 kg - 5 to 12t excavator	2 m	7 m
Medium Hydraulic Hammer	(900 kg –12 to 18t excavator)	7 m	23 m
Large Hydraulic Hammer	(1600 kg –18 to 34t excavator)	22 m	73 m
Vibratory Pile Driver	Sheet piles	2 m to 20 m	20 m
Pile Boring	≤ 800 mm	2 m (nominal)	4 m
Jackhammer	Hand held	1 m (nominal)	2 m
Small Hydraulic Hammer	(300 kg - 5 to 12t excavator)	2 m	7 m
Medium Hydraulic Hammer	(900 kg –12 to 18t excavator)	7 m	23 m

Source: Transport for NSW – Construction Noise and vibration guideline (December 2024).

Safe work distances relate to continuous vibration. For most construction activity, vibration emissions are intermittent in nature. The safe working distances are therefore conservative.

More stringent screening criteria may be applicable to heritage or other sensitive structures.

The minimum working distances presented in Table 7.9 are indicative and will vary depending on the item of plant and local geotechnical conditions. They apply to cosmetic damage of typical buildings under typical geotechnical conditions.

7.2.2 Buried services

DIN 4150-3:2016-12 sets out guideline values for vibration effects on buried pipework and are reproduced in Table 7.10. Consultation will be undertaken with buried asset owners to confirm acceptable vibration limits, with consideration given to the existing condition of the asset as well as duration and nature of the vibration-generating activities.

Table 7.10 Guideline values for short-term vibration impacts on buried pipework – DIN 4150-3

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

Notes:

1. For gas and water supply pipes within 2m of buildings, the levels given in Table 7.10 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.

In addition, British Standard BS 5228-2:2009 *Code of Practice for noise and vibration control on construction and open sites* provide information on the vulnerability of ground-related services and structures to vibration.

Table 7.11 Vibration guide values for underground services – BS 5228

Type of Utility	Guideline maximum values for velocity measured on the pipe (mm/s)	
	Intermittent or transient vibrations	Continuous vibrations
Underground services	30	15

For this assessment, the BS criteria (the more conservative criteria) has been adopted for damage to underground services due to vibration and can be summarised as 30 mm/s for intermittent or transient vibrations (such as excavators, pile driving, trucks etc.) and 15 mm/s for continuous vibrations (compactors and rollers).

8 Construction noise impact assessment

8.1 Construction noise prediction methodology

The construction noise model inputs and assumptions for this assessment are provided in Table 8.1.

Table 8.1 Construction noise modelling parameter

Modelling component	Assumption
Noise model	iNoise
Prediction algorithm	ISO 9613-2 (1996)
Terrain	1 m digital elevation model – Elvis Elevation Geoscience Australia (Lidar 201906)
Modelling period	Typical worst case 15 minute period of operation where each item of equipment is running at full power
Ground absorption coefficient	G = 0.7 for construction zone and at receiver locations
Atmospheric absorption	As detailed in Section 8.3
Receiver heights	1.5 m above building ground level (ground floor)
Source height	An area source 2 m above ground level. Total sound power evenly distributed over the construction area.

8.2 Equipment sound power levels

Equipment sound power levels have been taken from Transport for NSW *Construction Noise and Vibration Guideline* (TfNSW 2023) and *Update of Noise Database for Prediction of Noise on Construction and Open Sites* (DEFRA 2005), where unavailable.

As a conservative assessment due to the varied nature of construction activities, activities may occur in isolation or simultaneously at any time during each phase of work. Accordingly, this CNVMP considered a worst-case assessment of the civil works across the entire site footprint in order to assess noise and vibration impacts and identify appropriate mitigation measures. Acoustically significant construction plant and equipment were considered in the model for the site with 100% utilisation and represent a key range of activities likely to be undertaken during the main construction works. A summary of the number of plant and cumulative sound power levels (Lw) for the main civil works are presented in Table 8.2. The model considered the cumulative plant and equipment sound power level as an area source across the project.

Table 8.2 Construction scenario and equipment sound power levels

Equipment/activity	Number of items (per 15 minutes)	SWL per item, L_{Aeq}	Total SWL, L_{Aeq}	Cumulative SWL per phase, L_{Aeq}
Initial site preparation works/bulk earthworks				
Dozer D9	1	116	116	121
Scraper	1	110	110	
Excavator	1	110	110	
Dump truck	1	110	110	

Equipment/activity	Number of items (per 15 minutes)	SWL per item, L_{Aeq}	Total SWL, L_{Aeq}	Cumulative SWL per phase, L_{Aeq}
Smooth Drum Roller	1	107	107	
Padfoot Roller	1	109	109	
Compactor	2	106	109	
Grader	2	113	116	
Watercart	2	107	110	

8.2.1 Modifying factor corrections

The ICNG (DEC 2009) recommends a 5 dB penalty to be applied to the noise source sound power level (SWL) for plant items that have special audible characteristics. Plant items and activities that have proven to be particularly annoying to nearby residents include:

- Use of 'beeper' style reversing or movement alarms, particularly at night-time
- Use of power saws, such as used for cutting timber, rail lines, masonry, road pavement or steel work
- Grinding metal, concrete or masonry
- Rock drilling
- Line drilling
- Vibratory rolling
- Rail tamping and regulating
- Bitumen milling or profiling
- Jackhammering, rock hammering or rock breaking
- Impact piling.

Since the proposed construction works do not include any of the previously mentioned annoying activities, no specific plant items have had penalty applied to the sound power levels presented in Table 8.2.

8.3 Noise enhancing meteorology

The construction noise modelling undertaken considered meteorological conditions as per the methodology of the ISO 9613-2 (1996) standard, with a temperature of 20°C and 60% humidity, and the following wind conditions as per the adverse meteorological assumptions of ISO 9613:

Downwind propagation conditions for the method specified in this part of ISO 9613 are as specified in 5.4.3.3 of ISO 1996-2:1987, namely

- *Wind direction within an angle of + 45^0 of the direction connecting the centre of the dominant sound source and the centre of the specified receiver region, with the wind blowing from source to receiver, and*
- *Wind speed between approximately 1m/s and 5m/s, measured at a height of 3m to 11m above the ground.*

- *These formulae also hold, equivalently, for average propagation under a well-developed moderate ground-based temperature inversion, such as commonly occurs on clear, calm nights.*

As such, given the above adverse meteorological assumptions, it is considered that the noise modelling represents the resultant noise levels of the proposed development during noise propagation enhancing meteorological conditions.

8.4 Predicted construction noise levels

The predicted construction noise levels are provided in Table 8.3 for standard construction hours under noise enhancing conditions. The level presented for each assessment location represents the energy-average noise level over a 15-minute period and assumes all plant operating concurrently. The assessment against the ICNG noise affected NML at each assessment location is also provided. Construction noise contour maps are provided in Appendix A.

Table 8.3 Predicted construction noise levels – Day (outside MRP / Aerotropolis)

Assessment location	Period[1]	NML, dB		Predicted construction noise level, dB $L_{Aeq,15min}$	Complies with NML[2]	
		Noise affected	Highly noise affected		Noise affected	Highly noise affected
Civil work - site preparation and bulk earthworks						
R1	Standard	45	75	28	Yes	Yes
R2	Standard	45	75	29	Yes	Yes
R3	Standard	45	75	29	Yes	Yes
R4	Standard	45	75	30	Yes	Yes
R5	Standard	45	75	30	Yes	Yes
R6	Standard	45	75	28	Yes	Yes
R7	Standard	45	75	31	Yes	Yes
R8	Standard	45	75	31	Yes	Yes
R9	Standard	45	75	30	Yes	Yes
R10	Standard	45	75	30	Yes	Yes
R11[3]	Standard	45	75	40	Yes	Yes
R12	Standard	45	75	39	Yes	Yes
R13	Standard	45	75	36	Yes	Yes
R14	Standard	45	75	35	Yes	Yes
R15	Standard	45	75	35	Yes	Yes
R16	Standard	45	75	39	Yes	Yes
R17	Standard	45	75	40	Yes	Yes
R18	Standard	45	75	37	Yes	Yes
R19	Standard	45	75	37	Yes	Yes

Assessment location	Period[1]	NML, dB		Predicted construction noise level, dB $L_{Aeq,15min}$	Complies with NML[2]	
		Noise affected	Highly noise affected		Noise affected	Highly noise affected
R20	Standard	45	75	36	Yes	Yes
R21	Standard	45	75	36	Yes	Yes
R22	Standard	45	75	36	Yes	Yes
R23	Standard	45	75	35	Yes	Yes
R24	Standard	45	75	34	Yes	Yes
T1	When is use	65 (45 internal) [4]	N/A	48	Yes	N/A
T2	When is use	65 (45 internal) [4]	N/A	47	Yes	N/A
R_MRP_1	Standard	45	75	61	No	Yes
R_MRP_2	Standard	45	75	59	No	Yes
R_MRP_3	Standard	45	75	55	No	Yes
R_MRP_4	Standard	45	75	47	No	Yes
R_MRP_5	Standard	45	75	54	No	Yes
R_MRP_6	Standard	45	75	47	No	Yes
R_MRP_7	Standard	45	75	46	No	Yes
R_MRP_8	Standard	45	75	52	No	Yes
R_MRP_9	Standard	45	75	54	No	Yes
R_MRP_10	Standard	45	75	56	No	Yes
R_MRP_11	Standard	45	75	58	No	Yes
R_MRP_12	Standard	45	75	60	No	Yes
R_MRP_13	Standard	45	75	59	No	Yes
R_MRP_14[4]	Standard	45	75	70	No	Yes
R_MRP_15	Standard	45	75	64	No	Yes
R_MRP_16	Standard	45	75	55	No	Yes
R_MRP_17	Standard	45	75	53	No	Yes
R_MRP_18	Standard	45	75	46	No	Yes
R_MRP_19	Standard	45	75	46	No	Yes
R_MRP_20	Standard	45	75	49	No	Yes

Notes:

1. Standard hours (7.00 am to 6.00 pm Monday to Friday, 8.00 am to 1.00 pm Saturday and no work on Sunday or public holidays.
2. Level above NML for standard hours only.
3. R11 within WSAP
4. Assuming windows closed during use and minimum 20dB noise reduction
5. R_MRP_14 is assumed to be derelict based of a review of aerial photography and StreetView

A review of the predicted levels in Table 8.3 indicate:

- Construction predicted noise levels are compliant with the NML at all assessment locations outside MRP/WSAP.
- Construction predicted noise levels exceed the NML at all assessment locations within MRP / WSAP.
- Temple is still under construction but has been included for completeness.
- No assessment locations have been identified as highly noise affected.
- Reasonable and feasible mitigation strategies to minimise construction noise impacts are presented in Section 10

9 Construction vibration assessment

9.1 Construction vibration predictions

Energy generated by construction equipment is transmitted into the ground, where it is converted into vibration. This vibration attenuates with distance, and both its magnitude and rate of attenuation depend on several factors, including:

- The efficiency of the energy transfer mechanism (e.g. impulsive, reciprocating, rolling, or rotating equipment)
- The frequency content of the vibration
- The stiffness of the impact medium
- The type of wave (surface or body)
- Ground conditions and site topography

The construction vibration assessment presented in this report is based on the following guidance documents:

- Environmental Noise Management Manual (Roads and Traffic Authority, 2001)
- BS 5228-2:2009 Code of Practice for Noise and Vibration Control on Construction and Open Sites – Part 2: Vibration
- BS 6472:1992 Evaluation of Human Exposure to Vibration in Buildings (1–80 Hz)
- Construction Noise and Vibration Strategy (Transport for NSW, ST-157/4.1, 2019)
- Assessing Vibration: A Technical Guideline (DEC, 2006)

Vibration from intermittent construction sources is assessed in accordance with *Assessing Vibration: A Technical Guideline*, which adopts the BS 6472:1992 approach to evaluate vibration dose values (VDV). The VDV accounts for both the magnitude and duration of the vibration and is calculated as:

$eVDV = 0.07 \times V_{rms} \times t^{0.25}$ $(m/s^{1.75})$

Where:

- *Vrms* = root-mean-square vibration velocity
- *t* = duration of vibration event (in seconds)

This assessment estimates the eVDV based on assumptions detailed in this section. Notably, *Assessing Vibration: A Technical Guideline* specifies:

“Over the frequency range of 8 to 80 Hz, z-axis velocity requires no frequency weighting to assess annoyance or disturbance (no weighting required for x- and y-axis vibration over 2–80 Hz). Below 8 Hz, unweighted velocity is more conservative than BS 6472 requirements.”

To estimate *Vrms* from peak particle velocity (PPV) values, a sinusoidal waveform is assumed. These assumptions lead to conservative eVDV estimates for assessing human comfort impacts.

Vibration generating activities associated with the construction methodology are not currently known. In the absence of specific information for this project, the following vibration generating equipment has been considered in this assessment:

- Roller 13-18t.
- Dozer D9.
- Compactor >18t.

Vibration levels at any given location are expected to be intermittent due to equipment movement within the site. Therefore, a cumulative equipment operating time of one hour within the 15-hour day period (7:00 am to 10:00 pm) has been assumed.

As noted in *Assessing Vibration: A Technical Guideline*, vibration velocity (e.g. PPV) can be used as a screening tool. Velocity data are more widely available for construction equipment and are typically used to assess the potential for building damage. As such, both PPV and eVDV are presented in this assessment to evaluate potential human comfort impacts, with reference to the human perception vibration criteria provided in *BS 5228-2:2009*.

9.2 Potential vibration impacts of individual equipment

Typical vibration levels associated with the assumed vibration intensive construction equipment are presented in Table 9.1. The vibration predictions have been calculated using typical vibration levels sourced from the *Environmental Noise Management Manual* (RTA, 2001), *BS 5228-2:2009 Code of Practice for Noise and Vibration Control on Construction and Open Sites – Part 2: Vibration*, and the *Construction Noise and Vibration Strategy* (Transport for NSW, ST-157/4.1, 2019).

The rate of vibration attenuation can be calculated from the following regression analysis formula:

$$PPV = \left(\frac{K}{d}\right) e^{-ad}$$

Where:

PPV = Peak Particle Velocity

d = Distance in metres from source

a = Alpha site specific ground condition.

k = Velocity (PPV) at d=1 unit of distance

However, field measurements indicate that this relationship typically varies alpha (a) rather than a fixed alpha dependency. Unless otherwise specified, the vibration levels in Table 9.1 are based on a conservative assumption of 0.02 for Alpha (stiff ground conditions). Table 9.1 provides estimated vibration levels at various distances to assess the potential impact of construction activities.

Table 9.1 Predicted construction vibration levels

Vibration source	Distance to Source PPV (mm/s)			
	10 m	20 m	50 m	100 m
Roller 13t to 18t	18.3	7.5	1.6	0.3
Dozer D9	4.0	1.6	0.4	0.1
Compactor >18t	25.3	10.4	2.3	0.4

9.3 Potential for human comfort and perception

Predicted safe working buffer distances to address human comfort and perception of vibration have been calculated using typical vibration levels, sourced from the *Environmental Noise Management Manual* (RTA, 2001), *BS 5228-2:2009 Code of Practice for Noise and Vibration Control on Construction and Open Sites – Part 2: Vibration*, and the *Construction Noise and Vibration Strategy* (Transport for NSW, ST-157/4.1, 2019). These distances are provided in Table 9.2 for residential receivers and Table 9.3 for non-residential receivers. The buffer distances are based on guidance from *BS 5228-2:2009 Code of Practice for Noise and Vibration Control on Construction and Open Sites – Part 2: Vibration* and *Assessing Vibration: A Technical Guideline* (DEC, 2006).

The vibration criteria have been interpreted as follows:

- *The BS 5228-2:2009 criterion reflects a level at which:*
  "It is likely that vibration of this level in residential environments will cause complaint but can be tolerated if prior warning and explanation has been given to residents."

- *The preferred values from Assessing Vibration: A Technical Guideline represent a threshold below which there is a low likelihood of adverse comment or disturbance from building occupants.*

- *The maximum values from the same guideline apply in situations where:*
  "All feasible and reasonable measures have been applied… values up to the maximum may be used if they can be justified. For values beyond the maximum, the operator should negotiate directly with the affected community."

Although vibration typically attenuates as it travels through multi-level buildings, it can, in some cases, be amplified on upper floors due to structural resonances and other factors. As the specific locations of multi-storey buildings are not yet confirmed, potential impacts should be assessed on a case-by-case basis when such buildings are identified.

As a general guide, application of the *preferred value* buffer distances outlined in Table 9.2 and Table 9.3 is expected to sufficiently protect multi-level receivers from exceeding acceptable human comfort vibration levels.

Table 9.2 Vibration buffer distances (metres) – human comfort and perception, residential receivers

Equipment	Human comfort criteria based on BS 5228-2.2009 (1.0 mm/s)	Human comfort based on AVTG vibration dose value (m/s1.75)	
		Day preferred value 0.2 m/s1.75	Day maximum value 0.4 m/s1.75
Roller 13t to 18t	63 m	82 m	62 m
Dozer D9	28 m	41 m	27 m
Compactor >18t	73 m	93 m	71 m

Table 9.3 Vibration buffer distances (metres) – human comfort and perception, non-residential receivers

Equipment	Human comfort criteria based on BS 5228-2.2009 (1.0 mm/s)	Human comfort based on AVTG vibration dose value (m/s1.75)	
		Day preferred value 0.4 m/s1.75	Day maximum value 0.8 m/s1.75
Roller 13t to 18t	63 m	62	44 m
Dozer D9	28 m	27 m	17 m
Compactor >18t	73 m	71 m	52 m

A review of the predicted human comfort and perception vibration levels in Table 9.2 and Table 9.3 and the receiver distances to the construction boundary (refer to Section 4.2) indicate:

- Vibration levels are compliant with the Day Preferred values for human comfort and perception levels at all residential assessment locations outside MRP / WSAP.
- Vibration levels are compliant with the Day Preferred values human comfort and perception levels at T1 and T2 non-residential (places of worship) assessment locations. It is noted this temple is currently under construction.
- Vibration levels potentially exceed the Day Preferred values for human comfort and perception levels at the following residential assessment locations within MRP / WSAP:
  - R_MRP_1
  - R_MRP_12
  - R_MRP_13
  - R_MRP_14
  - R_MRP_15
- Vibration levels potentially exceed the Day maximum values for human comfort and perception levels at the following residential assessment locations within MRP / WSAP:
  - R_MRP_14
  - R_MRP_15
- Reasonable and feasible mitigation strategies to minimise construction vibration impacts are presented in Section 10.

9.4 Potential for structural damage

Predicted safe working buffer distances to avoid cosmetic and structural damage, both for standard dwellings and heritage buildings (R_MRP_3), have been calculated using typical vibration levels and are presented in Table 9.4. These distances are based on guidance from *BS 7385-2:1993 Evaluation and Measurement for Vibration in Buildings*.

Although vibration can be amplified through building structures to upper floors, the buffer distances in Table 9.4 are based on *DIN 4150-3:2016 Structural Vibration – Part 3: Effects on Structures*. The Standard states, if vibration levels at a building's foundation remain within specified limits, damage that compromises structural serviceability will not occur. DIN 4150-3 also allows for higher vibration levels at upper floors, typically three to four times the foundation limits used in this assessment, making the calculated buffer distances appropriate for multi-storey buildings of typical construction.

A review of the predicted structural vibration levels in Table 9.4 and the receiver distances to the construction boundary (refer to Section 4.2) indicate:

- Vibration levels are compliant with the structural damage level at all residential and heritage assessment locations outside MRP/Aerotropolis.
- Vibration levels are compliant with the structural damage level at T1 and T2 for non-residential (places of worship) assessment locations. It is noted that Temple is currently under construction.
- Vibration levels exceed the structural damage threshold at residential assessment locations R_MRP_14 (possibly derelict) and R_MRP_15 within MRP / WSAP.
    - It should be noted that this assumes the vibration equipment is located directly on the construction boundary of the site.
    - The actual location of vibration-intensive equipment would be anticipated to be outside the structural damage buffer zone.
    - However, if vibration-intensive equipment is proposed within the structural damage buffer zone, monitoring should be conducted to confirm actual levels.
- Reasonable and feasible mitigation strategies to minimise construction vibration impacts are presented in Section 10.

Table 9.4 Vibration buffer distances (metres) – structural damage

Activity	Structural damage		
	Heritage building/structure DIN 4150-3 criteria (2.5 mm/s) long term vibration[1]	Heritage building/structure DIN 4150-3 criteria (3.0 mm/s) – short term vibration	Standard dwellings DIN 4150-3 criteria (5.0 mm/s) – short term vibration
Roller 13t to 18t	40 m	36 m	26 m
Dozer D9	15 m	13 m	8 m
Compactor >18t	48 m	43 m	32 m

Notes:

1. The vibration criteria is based on an amplification factor of 1 to convert from the "Topmost floor" to foundation vibration criteria.

9.5 Potential vibration damage to utilities

Safe working buffer distances to comply with vibration criteria for underground assets are presented in Table 9.5. Buffers are based on the identified vibration intensive construction equipment.

The location of underground utilities will be identified during detail design and construction phase. A Before You Dig (BYD) survey should be done prior to construction work commencing on site to locate all utilities. Once the location of utilities is known, due care should be taken to avoid the use of vibration intensive equipment within the buffer areas. Less vibration intensive equipment should also be sourced prior to commencing work.

Table 9.5 Vibration buffer distances (metres) – underground assets

Equipment	Peak particle velocity, mm/s
Vibration limit	**15[1]**
Roller 13t to 18t	12 m
Dozer D9	3 m
Compactor >18t	15 m

Notes:

1. British Standard BS 5228 continuous vibration criterion for underground services.

10 Environmental mitigation and management measures

The following sections outline the environmental noise and vibration mitigation and management measures proposed to minimise potential construction impacts associated with the project. These measures have been developed in accordance with relevant guidelines and standards to protect the amenity of nearby sensitive receivers and ensure compliance with regulatory requirements. They focus on the identification, implementation, and monitoring of feasible and reasonable strategies to reduce noise and vibration levels during construction activities and to manage community impacts effectively throughout the project's delivery.

Section 10.1 provides site-specific noise and vibration mitigation and management measures that will be implemented at the site and the subsequent sections provide further good practice recommendations in this regard.

10.1 Site-specific mitigation and management

The following measures will be implemented at the site with the aim of reducing construction noise and vibration levels nearer to or below NMLs:

- Residents will be notified prior to works commencing of construction.
- As detailed in the previous Noise Impact Assessment (EMM Consulting 2025), construction noise monitoring during the initial stage of earthworks construction will be undertaken to confirm actual construction noise levels at receivers outside of MRP / WSAP. If NMLs are exceeded, Contractor will identify feasible and reasonable mitigation measures that reduce construction noise levels where practical.
- Minimise the number of plant items operating concurrently, particularly when in close proximity to surrounding receivers.
- Minimise the need for vehicle reversing for example, by arranging for one-way site traffic routes.
- All onsite mobile plant to be fitted we broadband reversing alarms (without comprising safety).
- Vibration monitoring is conducted at nearby structures if vibrations generating activity occurs within safe working distances as listed in Section 9.
- Noise and vibration monitoring will be adopted as a management strategy if complaints are received during the construction period.

10.2 Adoption of general noise & vibration management practices

AS 2436-2010 *"Guide to Noise and Vibration Control on Construction, Demolition and Maintenance Sites"* sets out numerous practical recommendations to assist in mitigating construction noise emissions. Examples of strategies that could be implemented on the subject project are listed below.

10.2.1 Work practices

These include:

- regular reinforcement (such as at toolbox talks) of the need to minimise noise and vibration
- regular identification of noisy activities and adoption of improvement techniques

- avoiding the use of portable radios, public address systems or other methods of site communication that may unnecessarily impact upon nearby residents
- developing routes for the delivery of materials and parking of vehicles to minimise noise
- where possible, avoiding the use of equipment that generates impulsive noise
- minimising the movement of materials and plant and unnecessary metal-on-metal contact
- minimising truck movements
- scheduling respite periods for intensive works as determined through consultation with potentially affected neighbours (eg a daily respite period for a minimum of one hour at midday).

10.2.2 Plant and equipment

Additional measures for plant and equipment include:

- choosing quieter plant and equipment based on the optimal power and size to most efficiently perform the required tasks
- using temporary noise barriers (in the form of plywood hoarding, Echo barrier, Flexfield or similar) to shield intensive construction noise activities from residences where practical
- operating plant and equipment in the quietest and most efficient manner
- regularly inspecting and maintaining plant and equipment to minimise noise and vibration level increases, to ensure that all noise and vibration reduction devices are operating effectively.

10.2.3 Work scheduling

These include:

- scheduling activities to minimise impacts by undertaking all possible work during hours that will least adversely affect sensitive receivers and by avoiding conflicts with other scheduled events;
- scheduling work to coincide with non-sensitive periods
- scheduling noisy activities to coincide with high levels of neighbourhood noise so that noise from the activities is partially masked and not as intrusive
- planning deliveries and access to the site to occur quietly and efficiently and organising parking only within designated areas located away from the sensitive receivers
- optimising the number of deliveries to the site by amalgamating loads where possible and scheduling arrivals within designated hours
- designating, designing and maintaining access routes to the site to minimise impacts
- high vibration generating activities should only be carried out in continuous blocks, with appropriate respite periods as determined through consultation with potentially affected neighbours.

10.2.4 Quantifying noise reductions

Approximate noise reductions provided by some of these measures are provided in Table 10.1.

Table 10.1 Relative effectiveness of various forms of noise control

Noise control	Nominal noise reduction possible, in total A-weighted sound pressure level, dB
Increase source to receiver distance[1]	approximately 6 dB for each doubling of distance
Reduce equipment operating times or turn off idling machinery[2]	approximately 3 dB per halving of operating time
Operating training on quiet operation[2]	up to 3 to 5 dB
Screening (e.g. noise barrier)[1]	normally 5 dB to 10 dB, maximum 15 dB
Enclosure (e.g. shed/building)[1]	normally 15 dB to 25 dB, maximum 50 dB
Silencing (e.g. exhaust mufflers) [1]	normally 5 dB to 10 dB, maximum 20 dB

Notes

1. Sourced from AS2436-2010
2. Based on EMM's measurement experience at construction and mining sites

10.2.5 Construction traffic noise

Management of construction related traffic or traffic reroutes should consider the following:

- Scheduling and routing of vehicle movements
- Speed of vehicles
- Driver behaviour and avoidance of the use of engine compression brakes
- Ensuring vehicles are adequately silenced before allowing them to access the site

11 Community consultant and complaints handling

A programme to engage in active community consultation and maintain positive relations with local residents will be implemented in order to minimise complaints by addressing their concerns as proactively as possible in accordance with Conditions of Approval A.51 and C3.(g). It is important that advice and detail be given to the community regarding any works outside the standard construction hours.

With regard to potentially offensive noise events associated with construction activities, AS 2436 – 1981 provides the following:

If noisy operations must be carried out, then a responsible person should maintain liaison between the neighbouring community and the contractor. This person should inform the public at what time to expect noisy operations and also inform the contractor of any special needs of the public.

Consultation and cooperation between the contractor and his neighbours and the removal of uncertainty and rumour can help to reduce the adverse reaction to noise.

The same approach can be taken for potential events likely to cause high levels of vibration at a nearby sensitive receiver.

In order to effectively manage any requests for information or respond to any public concerns in relation to the proposed construction activities and site operation, the following systems shall be maintained:

- The proponent will supply the relevant governing authorities with the names and appropriate contact numbers for the site construction manager during the construction period and one other senior staff member.
- An emergency after hours contact phone number will be put in place to allow contact with the proponent in relation to any environmental matter including those concerned with noise and vibration issues. This phone number will be clearly displayed on the fence surrounding the construction site as well as on the proponent's website as relevant.
- The proponent will use a complaint handling system to monitor environmental noise and vibration complaints. All information relating to such complaints will be kept in a register. The register will include but not be restricted to the following information:
    - Date and time of complaint
    - Complainant details (ie full name, address and contact details)
    - Nature and source of complaint
    - Action taken
    - Follow-up with complainant.
- The complaint register will be made available to any relevant regulatory authority upon request.
- The proponent will endeavour to respond to any complaint within one working day of its receipt.

Response measures, which would be adopted following complaints regarding noise and/or vibration, would include:

- Identify the source that has caused the complaint. This would be done by consultation with the complainant and by conducting a noise and/or vibration survey to quantify the level of disturbance (Refer to Section 12).

- Reassess the mitigation and management techniques employed at the site to reduce the impact of the source in question. Particular attention should be given to the scheduling of activities and the siting of equipment used on site.

Following the adoption of additional or alternative mitigation, a further noise and/or vibration survey would be conducted at the complainant's location to demonstrate the effectiveness of the mitigation strategy.

11.1 Consultation strategy to manage high noise generating works

Prior to the commencement of works, consultation is required to be undertaken with surrounding noise-sensitive receivers to develop a suitable strategy for managing high noise generating activities such as piling as referenced in Condition B34 (d). In accordance with NSW, EPA ICNG, highly noise affected applies where a residence is exposed to noise levels of $L_{Aeq,15min}$ 75 dB or greater.

The predicted construction noise levels presented in Table 8.3 indicate that no assessment locations have been identified as highly noise affected.

In the event of high noise generating works, the strategy for managing high noise generating works, developed in consultation with surrounding receivers, comprises the following measures:

- Prior notification of the commencement of works to affected receivers.

- Provision of site contact details to enable receivers to raise any concerns regarding noise or vibration from site activities.

- Opportunity for receivers to provide feedback on any specific concerns regarding the nature, timing, or duration of high noise generating works.

- Adjustment of timing and/or duration of high noise generating works (where feasible and reasonable) in consultation with affected receivers, following notification and identification of concerns.

A summary of the consultation undertake to date is provided in Table 11.1.

Table 11.1 Summary consultation undertaken to date

Date	Timing	Time	Location	Developer (initials)	Name	Details	Outcome	Condition B33 Noise	Action	Resolution
31/10/2025	Prior to commencement of construction		272 Aldington Road 282 Aldington Road 284 Aldington Road 287 Aldington Road BAPS Swaminarayan Sanstha 930 Mamre Road 930B Mamre Road 930A Mamre Road	BP	Residents	Civil Contractor letterbox drop to surrounding neighbours advising of upcoming civil works and outlining proposed noise and vibration mitigation measures.	Residents were aware of the proposed works. No issues raised or unresolved. Will notify if issues arise during construction.	✓	n/a	Will notify if issues arise during construction.
6/11/2025	Prior to commencement of construction	3:30pm	269 Aldington Road 280 Aldington Road BAPS Swaminarayan Sanstha 284-288 Aldington Road"	BP	Residents	Icon email issued to surrounding neighbours and developers advising of upcoming high noise works and outlining proposed noise and vibration mitigation measures.	Residents were aware of the proposed works. No issues raised or unresolved. Will notify if issues arise during construction.	✓	n/a	Will notify if issues arise during construction.
6/11/2025	Prior to commencement of construction	4pm	284-288 Aldington Road	BP	Toni Olivera	Phone call to advise of upcoming works and discuss proposed environmental mitigation strategies, including noise management.	Residents were aware of the proposed works. No issues raised or unresolved. Will notify if issues arise during construction.	✓	n/a	Will notify if issues arise during construction.
6/11/2025	Prior to commencement of construction	4pm	282 Aldington Road	BP	Jacqueline Seraglio	Phone call to advise of upcoming works and discuss proposed environmental mitigation strategies, including noise management.	Residents were aware of the proposed works. No issues raised or unresolved. Will notify if issues arise during construction.	✓	n/a	Will notify if issues arise during construction.

12 Noise and vibration reporting and response procedures

The recommended construction noise and vibration monitoring and reporting system to be adopted for the Project, in the event of a noise or vibration complaint and during the initial stage of earthworks construction to confirm actual construction noise and vibration levels, is as follows:

12.1 Construction noise and vibration monitoring

12.1.1 Standards and guidelines

All noise monitoring and analysis will be conducted in accordance with:

- Development Consent - SSD-23480429
- EPA NSW Noise Policy for Industry (2017)
- EPA NSW Interim Construction Noise Guideline (2009).
- EPA Approved Methods for the Measurement and Analysis of Environmental Noise in NSW (2022)
- AS 1055:2018 Acoustics: description and measurement of environmental noise
- AS IEC 61672.1-2019 – Electroacoustics – Sound level meters
- IEC 60942:2017 Electroacoustics: sound calibrators.
- German Standard DIN4150-3:2016-12 “Structural Vibration Part3: Effects on Structures”
- DECCW’s interim guideline “Assessing Vibration: A Technical Guideline” (2006)

12.1.2 Regulatory requirements

The relevant noise limits in relation to construction are found in Condition B33 of the Development Consent.

12.1.3 Quality assurance

All monitoring and reporting will be undertaken by suitably qualified and experienced acoustic consultants.

A competent person will satisfy one or more of the following:

- have qualifications and/or experience sufficient to fulfil the requirements of ‘member’ grade of the Australian Acoustical Society
- undertake the duties of an acoustic consultant on behalf of a consultancy firm that is a member of the Association of Australasian Acoustical Consultants
- have a recognised tertiary qualification in a discipline pertinent to acoustics

12.1.4 Monitoring location

In the event of a noise and vibration complaint, monitoring will be conducted at the affected receiver location.

All noise measurements will be taken outdoors in free-field conditions at least 3.5 metres from reflective structures (excluding the ground) and 1.2–1.5 metres above the ground or floor level, unless a different position is acoustically justified and properly documented.

If reflective surfaces affect noise measurements, both façade and corrected free-field levels will be reported, with evidence supporting any correction factors used.

In some instances, it may be difficult to measure continuous vibration levels in the presence of other ambient sources (ie traffic vibration). In such instances continuous vibration may be measured in radial alignment from source to receiver and calculated back to the receiver.

12.1.5 Instrumentation

i Sound level meters

All noise measurements for the purposes of determining compliance with the consent will be based on the use of a Class 1 sound level meter as specified in AS/NZS IEC 61672.1:2019 Electroacoustics: sound level meter specifications. All instruments will be capable of audio sampling and 1/3 octave logging as described later.

If measuring noise with sound level meters manufactured before 2019, we will report this, together with the standard(s) met by that instrument (for example, Australian Standard IEC 61672.1:2013 or IEC 61672.1:2004).

All recording instrumentation will be calibrated over its full frequency and dynamic ranges by a technical facility or laboratory accredited by NATA. This is done at least once every two years.

a Measurement parameters

The following details the minimum measurement parameters for all operator attended and unattended noise monitoring surveys:

- $L_{Aeq,15min}$
- $L_{A90,15min}$
- L_{AFmax}
- L_{Zeq} and L_{Z90} Linear dB 1/3 octave bands (10Hz to 20KHz)
- Audio recording (.wav)
- 1 second data logging
- L_{Aeq} measurements the meter should be set to linear averaging
- where frequency analysis is required, the meter should be set to Z frequency weighting for the recorded spectrum data.
- Statistical descriptors or maximum noise levels are measured (for example, L_{Amax}, L_{A90}), the meter should be set to fast time weighting and exponential averaging.

ii Calibrators

The sound calibrator will comply with the requirements set out in IEC 60942:2017 Electroacoustics: sound calibrators. The sound calibrator will also be of the same class as the sound level meter.

If a sound calibrator is designed or manufactured before 2017 to calibrate a sound level meter, it will be reported, together with the standard(s) met by that sound calibrator (for example, IEC 60942:2003 Electroacoustics: sound calibrators).

Any calibration instrumentation will be calibrated over its full frequency and dynamic ranges by a technical facility or laboratory accredited by NATA. This is done at least once every year.

a Calibration field checks

Field calibration checks of all instrumentation will be carried out before and after sets of measurements are made.

The sound level meter will be calibrated by the following:

- a sound calibrator producing the same nominal sound pressure level and frequency as a model specified in the instruction manual.
- Calibration checks of measurement instrumentation will be undertaken and any necessary adjustments will be undertaken:
    - immediately before using the sound level meter to make measurements (pre-measurement calibration).
    - immediately after making those measurements (post-measurement check).

If the noise level recorded during the post-measurement check differs by more than 1.0 dB from the noise level recorded during the pre-measurement calibration, all measurements made in the intervening period will be disregarded.

iii Meteorological equipment

The meteorological conditions during the noise monitoring survey will be determined from meteorological data obtained from the nearest Bureau of Meteorology (BOM) AWS meteorological weather station.

In addition, a handheld anemometer will also be used at all sites during the operator attended noise monitoring compliance survey to supplement the BOM data.

Instrumentation used to measure meteorological conditions at the measurement location will meet the specifications set out in Section 6.3.4 of Australian Standard AS 1055:2018 Acoustics: description and measurement of environmental noise. Instrumentation used to measure meteorological conditions at other locations that are representative of the meteorological conditions of the area at the time of measurement will meet the specifications set out in Australian Standard AS 3580.14:2014 Methods for sampling and analysis of ambient air, Part 14: Meteorological monitoring for ambient air quality monitoring applications.

iv Vibration Instrumentation and measurement parameters

Vibration monitoring instrumentation will be employed to meet the following primary specifications presented in Table 12.1. The instrumentation will be installed, operated and maintained by suitably qualified or trained personnel. The instruments will carry current NATA or manufacturer calibration certificates.

The compliance measurements will be conducted over a 15 minute period, under normal operating conditions, at the construction site.

Table 12.1 Vibration monitoring specifications

Specification	Seismic
Sample rate	Minimum 1024 samples per second per channel
Frequency response	2 Hz to 250 Hz (3 dB points)
Resolution	0.016 mm/s
Range	0.1 mm/s to254 mm/s
Accuracy	3% at 15 Hz
Recording mode	Full Waveform and Histogram recording with archiving

12.1.6 Meteorological conditions

All measurements will be conducted under meteorological conditions suitable for compliance noise monitoring.

12.1.7 Source Identification

In order to estimate the source contributions from construction during the compliance noise monitoring surveys, Table 12.2 provides the source identification method summary that will be utilised during the monitoring survey. The subsequent sections below provide more details of the different monitoring methods that will be utilised to assess compliance.

Table 12.2 Source identification method summary

Method	Description	When to use	Key tools/techniques
1. Direct Measurement at Receiver	On-site, operator-attended measurement at designated receiver location	Preferred method; when source noise dominates	Pausing during extraneous noise, filtering, L_{A90}, on/off tests, directional microphones
2. Intermediate Location Measurement	Measurement at locations between source and receiver	When direct access is blocked or noise is masked	Needs modelled or measured relationship with receiver location
3. Unattended Monitoring	Remote, continuous noise logging with audio	For management, not sole compliance check	Audio recording, correlation with receiver location
4. Modelling	Simulated noise assessment using sound power levels and environmental data	When direct measurement is not viable	Noise software, source measurements, terrain/weather data, model validation

i Method 1 - Direct measurement at a receiver location

- Preferred method, using operator-attended sound level measurements at a designated compliance point.
- Effective when noise from the development dominates the location.
- Challenges arise when multiple noise sources exist.
- Techniques to isolate source noise include:
    - Pausing measurements during unrelated noise events (e.g. dogs, traffic).

- Frequency filtering (e.g. removing insect noise).
- Using alternative descriptors like L_{A90} for continuous sources.
- Temporarily switching source on/off or choosing quiet background periods.
- Temporarily or completely switching glass recycling facility off to reduce its influence.

ii Method 2 - Direct measurement at alternative or intermediate locations

- Used when receiver location access is denied or ambient noise is too high.
- Measurements taken at intermediate points with better signal-to-noise ratios.
- Requires a demonstrated acoustic relationship between the intermediate and compliance locations.
- May involve noise modelling to establish correlation.
- Techniques from Method 1 are also applicable here.

iii Method 3 - Unattended monitoring

- Not recommended for residential locations as a sole compliance method due to difficulty isolating target noise.
- Can be useful when combined with audio recordings and post-analysis.

iv Method 4 - Modelling

- Used when direct measurement is not feasible, especially in complex environments (e.g. industrial estates with multiple noise sources).
- Involves:
  - Measuring sound power levels of source equipment.
  - Using models to estimate noise at sensitive receivers.
- Can range from simple calculations to complex 3D simulations considering terrain, weather, and other attenuation factors.
- Model validation is crucial, ideally using intermediate location data.

12.1.8 Data analysis and adjustments

All noise data will be analysed in line with the Approved Methods:

- Adjustments for tonality, impulsiveness, and low-frequency noise will be applied where applicable.
- Meteorological data will be used to filter out non-compliant conditions where required.
- Measurements will be compared against noise limits.

12.1.9 Reporting

A noise and vibration compliance report will be development and will include (but not limited to):

- Site and receiver location descriptions (with maps)
- Monitoring dates, times, and meteorological conditions
- Instrumentation details and calibration certificates
- Measured noise and vibration levels and any adjustments made
- Assessment of compliance with noise and vibration limits
- Commentary on dominant noise and vibration sources
- Appendices including raw data, photos, and audio logs (if applicable)
- Reports will be submitted to relevant stakeholders including the DPHI and NSW EPA, where required, and retained as part of environmental records

13 Contingency management and compliance

Noise and vibration monitoring will be used to assess compliance with this CNVMP (refer to Section 12).

The contingency management framework outlined in Table 13.1 will be implemented to manage any noise or vibration impacts that are higher than expected. Any incident or non-compliance will be managed and reported in accordance with the CEMP.

The following events constitute an incident in relation to noise and vibration:

- A Condition Red trigger for noise or vibration impacts during the standard construction hours detailed in Section 5.2.
- Any works occurring outside standard construction hours that do not meet the allowable circumstances, including those not agreed in writing by the Planning Secretary.

Table 13.1 Contingency management plan

Key Element	Trigger / Response	Condition green	Condition amber	Condition red
Noise impacts at sensitive receiver locations	Trigger	Noise levels do not exceed applicable NMLs (refer to Table 6.3)	Noise levels exceed applicable NMLs (refer to Table 6.3)	Noise levels exceed Highly Noise Affected criteria (75 dBA)
	Response	Continue best-practice management measures to minimise noise emissions.	Implement all feasible and reasonable mitigation measures to minimise noise impacts and achieve compliance with NMLs.	Manage works in accordance with the high-noise work strategies developed through community consultation (refer to Section 11)
Vibration impacts at sensitive receiver locations	Trigger	Vibration-intensive works undertaken outside the minimum working distance for the specific equipment in use.	Vibration-intensive works undertaken within the minimum working distance for the specific equipment in use.	Vibration levels exceed applicable vibration limits.
	Response	Continue best-practice management measures to minimise vibration emissions	Undertake vibration monitoring for the duration of the works to confirm vibration levels.	**Cosmetic** Stop work immediately if cosmetic vibration limits are exceeded. Implement all feasible and reasonable mitigation measures to reduce vibration levels below applicable limits. If compliance cannot be achieved, alternative construction methods or equipment must be used. **Human comfort** If human comfort vibration limits are exceeded, communicate with the impacted residents by clearly explaining the duration of the vibration intensive works, and inform of any respite periods. Example: 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.

14 Review and improvement

14.1 Continuous improvement

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

The continuous improvement process will:

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

Updates to this plan may also be undertaken:

- To address exceedances or non-compliances if investigations determine changes are required to prevent reoccurrences
- To take into account changes to the environment or generally accepted environmental management practices, new risks to the environment, any hazardous substances, contamination or changes in law;
- Where requested or required by the NSW Department of Planning, Housing and Infrastructure or any other Authority
- In response to internal or external audits.

14.2 CNVMP update and amendment

The processes described in the CEMP may result in the need to update or revise this Plan. This will occur as needed and any revisions to the CNVMP will be in accordance with the process outlined in these sections of the CEMP.

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

References

Australian Standard AS 1055-2018 - *Acoustics - Description and Measurement of Environmental Noise*.

Australian Standard AS 2187.2-2006 *Explosives* - Storage *and Use - Use of Explosives*.

BS 5228-2:2009 *Code of Practice for Noise and Vibration Control on Construction and Open Sites – Part 2: Vibration*

BS 7385 Part 2-1993 *Evaluation and measurement for vibration in buildings Part 2*.

BS 6472 – 2008 *Evaluation of human exposure to vibration in buildings (1-80Hz).*

Department of Environment, Food and Rural Affairs (DEFRA) 2005, *Update of Noise Database for Prediction of Noise on Construction and Open Sites*.

EMM Consulting Noise Impact Assessment – Westgate Estate, 253–267 Aldington Road, Kemps Creek NSW, dated February 2025

German Standard DIN 4150 Part 2 1975.

Nettleton Tribe – Proposed Warehouse & Distribution Centre Buildings. 253-267 Aldington Road, Kemps Creek – 12253-ARCH. COMBINED_250124

NSW Environment Protection Authority (EPA) 2017, *Noise Policy for Industry.*

NSW Department of Environment and Conservation 2006, *Assessing Vibration: a technical guideline.*

NSW Department of Environment Climate Change (DECC) 2009, *Interim Construction Noise Guideline* (ICNG).

Pulse White Noise Acoustics – Westgate Industrial Estate, Kemps Creek – Noise and Vibration Impact Assessment. Report number: 210256

Transport for NSW *Construction Noise and Vibration Guideline, September 2023*

Appendix A
Construction noise contour maps

EMM
creating opportunities

Source: EMM (2025); ABS (2021); DCSSS (2023); GA (2009); MetroMap (2025)

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Construction noise contour map

Westgate Estate
253-267 Aldington Road, Kemps Creek NSW
CVNMP
Appendix A

EMM
creating opportunities

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