

## **M4-M5 Link Mainline Tunnels**

# **Construction Noise and Vibration Impact Statement | Northcote Tunnel Site - Demobilisation**

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Prepared for ASBJV

October 2022

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ASBJV

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October 2022

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# Executive Summary

EMM has completed a construction noise and vibration impact statement (CNVIS) to review potential noise and vibration impacts from the demobilisation of the Northcote ancillary facility at Haberfield.

The Site will be extensively mitigated and managed to reduce noise emissions. The mitigation and management applied at site satisfies the feasible and reasonable approach as outlined in the ICNG (EPA 2009) and the requirements of the conditions of approval (CoA).

This CNVIS assesses noise levels from the following stages:

- Stage 1: Remove electrical store;
- Stage 2: Tunnel backfill;
- Stage 3: Demobilisation of office;
- Stage 4: Demobilisation at decline capping beam, retaining wall and stockpile wall;
- Stage 5: Demobilisation of acoustic shed;
- Stage 6: Level site and chip seal; and
- Stage 7: Reinstate Northcote St as cul-de-sac.

All proposed works are for standard daytime construction hours only, with no out-of-hours works proposed.

No exceedances of NML are predicted for Stages 1 to 6. Stage 7 predicted noise levels indicate exceedances of NML by up to 10 dB at 16 locations (six in NCA02, 10 in NCA01), with three of the assessment locations in NCA02 exceeding the highly noise affected level of 75 dB (5, 6 and 8 Northcote Street, Haberfield). This is due to the proximity of the works in relation to residences on Northcote Street and that a portion of the boundary hoarding will and must be removed in order to perform these works.

When comparing the EIS impacts to this CNVIS, all stages except for Stage 7 of this CNVIS are predicted to exceed NMLs at less receivers than the EIS. Stage 7 is predicted to exceed NMLs at two more receiver locations, however this scenario is not directly comparable due to the activities assessed. Nevertheless, works are proposed to be completed during standard daytime hours only and will be for a limited period of time to reinstate the cul-de-sac at Northcote Street.

The works will not occur during the night-time period (10pm to 7am). Therefore, the assessment of potential sleep disturbance at residences is not required.

An assessment of construction vibration was conducted, with a number of premises inside safe working distances noted. Construction management and mitigation measures are recommended.

Additional mitigation measures in line with the CNVG have been recommended for each stage assessed.

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# 1 Introduction

## 1.1 Context

This Construction Noise and Vibration Impact Statement (CNVIS) has been prepared to identify the noise and vibration impacts from a portion of Stage 1 of the WestConnex 3A – M4-M5 Link Mainline tunnels project (the Project). In addition, this CNVIS also responds to (as required) the various noise and vibration requirements detailed within the Minister’s Conditions of Approval (CoA), the WestConnex M4-M5 Link Environmental Impact Statement (EIS), the revised environmental management measures (REMM) listed in the Submissions and Preferred Infrastructure Report (SPIR) and all applicable legislation.

## 1.2 Background and project description

An EIS (AECOM 2017) assessed the potential impacts of construction and operation of the project on noise and vibration, within Section 10.

The EIS identified the potential noise and vibration impacts during construction typically associated with noise intensive construction works. It concluded any potential impacts could be managed by standard mitigation and management measures.

The WestConnex M4-M5 Link project is being constructed in two stages (refer to Figure 1.1):

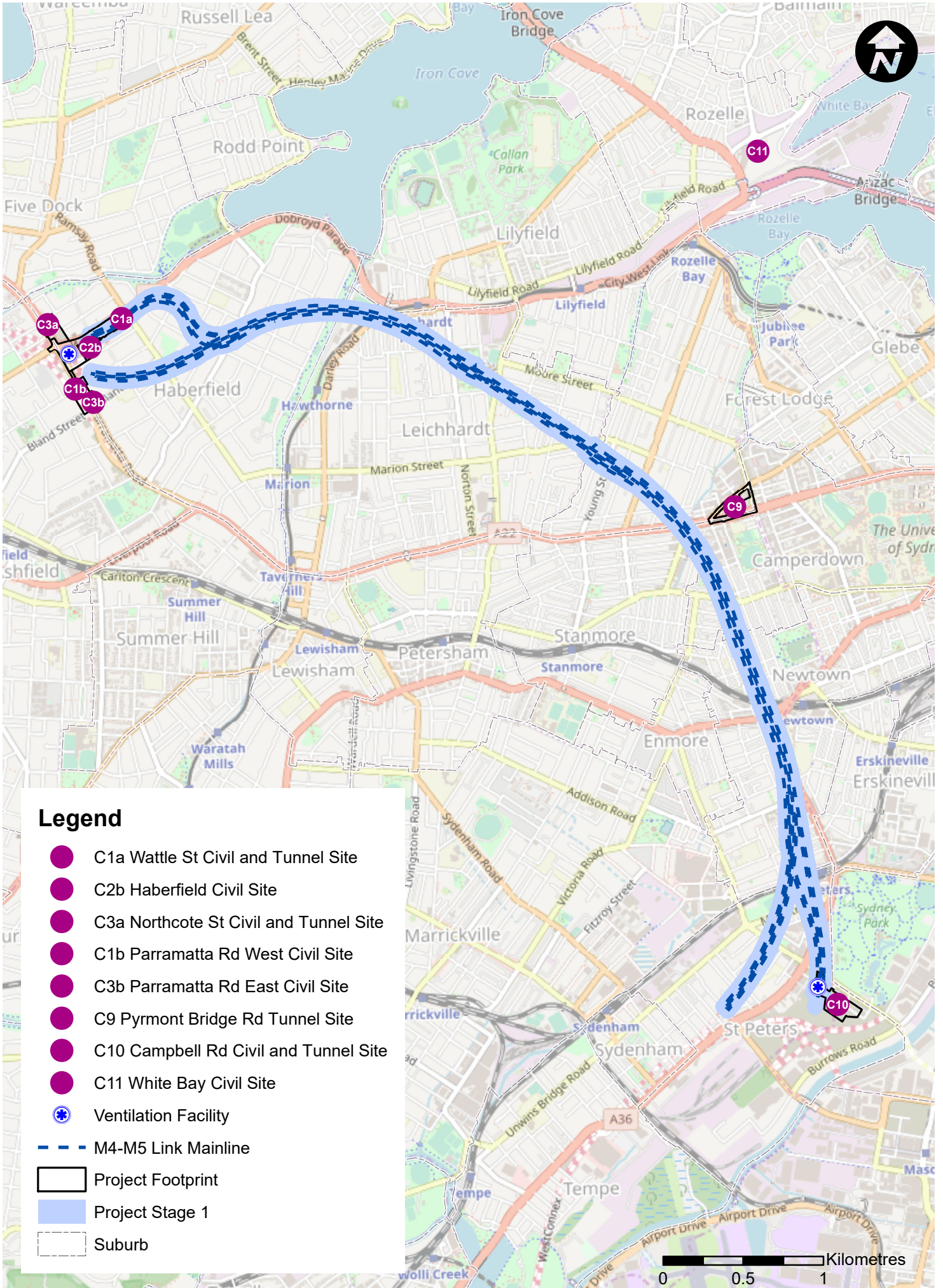
- Stage 1: (the Project and subject of this document): M4-M5 Link Mainline tunnels.
- Stage 2: Rozelle interchange.

Sydney Motorway Corporation (SMC) has engaged Lendlease Samsung Bouygues Joint Venture (LSBJV) to design and construct Stage 1 of the project (refer Figure 1.1). The key features of the Mainline tunnels project include:

- Twin mainline motorway tunnels between the M4 East at Haberfield and the New M5 at St Peters. Each tunnel would be around 7.5 kilometres long and would generally accommodate up to four lanes of traffic in each direction;
- connections of the mainline tunnels to the M4 East project, comprising:
  - a tunnel-to-tunnel connection to the M4 East mainline stub tunnels east of Parramatta Road near Alt Street at Haberfield;
  - entry and exit ramp connections between the mainline tunnels and the Wattle Street interchange at Haberfield (which is currently being constructed as part of the M4 East project); and
  - minor physical integration works with the surface road network at the Wattle Street interchange including road pavement and line marking;
- connections of the mainline tunnels to the New M5 project, comprising:
  - a tunnel-to-tunnel connection to the New M5 mainline stub tunnels north of the Princes Highway near the intersection of Mary Street and Bakers Lane at St Peters;
  - entry and exit ramp connections between the mainline tunnels and the St Peters interchange at St Peters (which is currently being constructed as part of the New M5 project); and
  - minor physical integration works with the surface road network at the St Peters interchange including road pavement and line marking;

- construction of tunnel stubs to provide for future underground connection of the mainline tunnels to the Rozelle interchange and Iron Cove Link;
- a motorway operations complex at St Peters (Campbell Road) (MOC5). The types of facilities that would be contained within the motorway operations complexes would include substations, water treatment plants, ventilation facilities and outlets (the Campbell Road ventilation facility), offices, on-site storage and parking for employees;
- tunnel ventilation systems, including ventilation supply and exhaust facilities, ventilation fans, ventilation outlets and ventilation tunnels;
- fitout (mechanical and electrical) of part of the Parramatta Road ventilation facility at Haberfield (which is currently being constructed as part of M4 East project) for use by the M4-M5 Link project;
- drainage infrastructure to collect surface and groundwater for treatment at dedicated facilities;
- water treatment would occur at the operational water treatment facility at the Campbell Road motorway operations complex (subject to future Modification);
- ancillary infrastructure and operational facilities for electronic tolling and traffic control and signage (including electronic signage);
- emergency access and evacuation facilities, including pedestrian and vehicular cross and long passages and fire and life safety systems;
- utility works, including protection and/or adjustment of existing utilities, removal of redundant utilities and installation of new utilities; and
- temporary construction ancillary facilities to facilitate construction of the project at the following locations:
  - Northcote Street civil and tunnel site (C3a), Haberfield;
  - Haberfield civil site (C2b), Haberfield;
  - Parramatta Road East civil site (C3b), Haberfield;
  - Parramatta Road West civil site (C1b), Ashfield;
  - Wattle Street civil and tunnel site (C1a), Haberfield;
  - Pyrmont Bridge Road tunnel site (C9), Camperdown/Annandale;
  - Campbell Road civil and tunnel site (C10), St Peters; and
  - White Bay civil site (C11), Rozelle.

An overview of the project footprint and ancillary facilities is presented in the Construction Environmental Management Plan (CEMP) and Site Environmental Management Plan (SEMP). Further detail of the project description is presented in Section 1.3 of the CEMP.



**Legend**

- C1a Wattle St Civil and Tunnel Site
- C2b Haberfield Civil Site
- C3a Northcote St Civil and Tunnel Site
- C1b Parramatta Rd West Civil Site
- C3b Parramatta Rd East Civil Site
- C9 Pymont Bridge Rd Tunnel Site
- C10 Campbell Rd Civil and Tunnel Site
- C11 White Bay Civil Site
- ★ Ventilation Facility
- M4-M5 Link Mainline
- ▭ Project Footprint
- ▭ Project Stage 1
- Suburb

Figure 1-1 Overview of Stage 1 - M4-M5 Link Mainline Tunnels (the Project)



### 1.3 Scope of this CNVIS

The scope of this CNVIS is to assess potential noise impacts from site demobilisation activities at the Northcote ancillary facility at Haberfield. The proposed activities at this site assessed in this CNVIS include:

- demobilisation of acoustic shed and equipment; and
- reinstating Northcote Street cul-de-sac.

The purpose of the CNVIS is to identify potential noise and vibration impacts and to develop feasible and reasonable noise management and mitigation measures where potential impacts are identified.

### 1.4 Environmental management systems overview

The environmental management system overview is described in Section 1.5 of the CEMP. Noise and vibration impacts are managed through the implementation of the Noise and Vibration Management Plan (NVMP) as required by CoA C4 b).

## 2 Purpose and objectives

The key objective of the CNVIS is to ensure all CoA, REMM and licence/permit requirements relevant to noise and vibration are described, scheduled and assigned responsibility as outlined in:

- the EIS prepared for WestConnex M4-M5 Link;
- the submissions report prepared for WestConnex M4-M5 Link;
- Conditions of Approval granted to the project on 17 April 2018;
- Roads and Maritime specifications G36;
- the Project's Environmental Protection Licence (EPL); and
- all relevant legislation and other requirements described in Section 3 of this Plan.

## 3 Environmental requirements

### 3.1 Legislation

This CNVIS has been prepared in accordance with:

- *Environmental Planning and Assessment Act 1979*; and
- *Protection of the Environment Operations Act 1997* (POEO Act).

### 3.2 Guidelines

The following guidelines apply to project related construction noise and vibration:

- NSW Industrial Noise Policy (INP) 2000, Environmental Protection Authority<sup>1</sup>;
- NSW Interim Construction Noise Guideline (ICNG) 2009, Department of Environment and Climate Change;
- NSW Road Noise Policy, Department of Environment 2011, Climate Change and Water;
- NSW Assessing Vibration – a technical guideline (AVTG) 2006, Department of Environment and Conservation;
- NSW Noise Criteria Guideline (NCG) 2015, Roads and Maritime Services;
- NSW Noise Mitigation Guideline (NMG) 2015, Roads and Maritime Services;
- Construction noise and vibration guideline (CNVG) 2016, Roads and Maritime Services;
- Australian Standard AS/NZS 2107:2000 'Acoustics - Recommended design sound levels and reverberation times for building interiors';
- Australian Standard 2834-1995 Computer Accommodation, Chapter 2.9 Vibration;
- Australian Standard AS 2187.2 'Explosives - Storage and use - Part 2 Use of explosives';
- Australian Standard AS2436-1981 'Guide to Noise Control on Construction, Maintenance and Demolition Sites';
- British Standard BS 6472-2008, 'Evaluation of human exposure to vibration in buildings (1-80Hz)';
- British Standard 7385: Part 2-1993 'Evaluation and measurement of vibration in buildings';
- German Standard DIN4150-1999 'Structural vibration Part 3: Effects of vibration on Structures';
- Construction Noise Strategy 7TP-ST-157/2.0 (CNS) 2012, Transport for NSW; and
- Environmental Noise Management Manual (ENMM) 2001, Roads and Traffic Authority.

<sup>1</sup> This document has since been superseded by the NSW Noise Policy for Industry (NPfi) 2017. However, the INP remains the relevant policy in accordance with the project's Instrument of Approval and NPfi transitional requirements.

### 3.3 Conditions of approval

The CoA relevant to this CNVIS are listed in Table 3.1.

**Table 3.1 Conditions of Approval for construction noise and vibration**

Condition	Key requirement
<b>Land Use Survey</b>	
E66	A detailed land use survey must be undertaken to confirm sensitive receivers (including critical working areas such as operating theatres and precision laboratories) potentially exposed to construction noise and vibration, construction ground-borne noise and operational noise. The survey may be undertaken on a progressive basis but must be undertaken in any one area prior to the commencement of works which generate construction or operational noise, vibration or ground-borne noise in that area. The results of the survey must be included in the Construction Noise and Vibration Management Sub-plan.
<b>Noise Assessments</b>	
E67	All noise and vibration assessment, management and mitigation required by this approval must consider the cumulative noise impacts of approved CSSI and SSI projects. This includes using ambient and background levels which do not include other WestConnex M4 East and New M5 (SSI 6307 and SSI 6788) projects. This condition applies to all works and operation.
<b>Works Hours</b>	
E68	Works must be undertaken during the following hours: (a) 7:00 am to 6:00 pm Mondays to Fridays, inclusive; (b) 8:00 am to 1:00 pm Saturdays; and (c) at no time on Sundays or public holidays..
E69	Notwithstanding <b>Condition E68</b> , works may be undertaken between 1:00 pm to 6:00 pm on Saturday.
E70	Notwithstanding <b>Conditions E68</b> and <b>E69</b> the following works are permitted to be undertaken 24 hours a day, seven days a week: (a) tunnelling activities excluding cut and cover tunnelling; (b) haulage of spoil and delivery of material; (c) works within an acoustic shed; and (d) tunnel fit out works. Other surface works associated with tunnelling must only be undertaken in accordance with the requirements of <b>Condition E73</b> .
<b>Variation to Work Hours</b>	
E73	Notwithstanding Conditions E68 to E72 works may be undertaken outside the hours specified under those conditions in the following circumstances: (a) for the delivery of materials required by the NSW Police Force or other authority for safety reasons; or (b) where it is required in an emergency to avoid injury or the loss of life, to avoid damage or loss of property or to prevent environmental harm; or (c) where different construction hours are permitted or required under an EPL in force in respect of the CSSI; or (d) works approved under an Out-of-Hours Work Protocol for works not subject to an EPL as required by Condition E77; or (e) construction that causes $L_{Aeq(15\text{ minute})}$ noise levels: (i) no more than 5 dB(A) above the rating background level at any residence in accordance with the Interim Construction Noise Guideline (DECC, 2009), and (ii) no more than the 'Noise affected' noise management levels specified in Table 3 of the Interim Construction Noise Guideline (DECC, 2009) at other sensitive land uses, and

**Table 3.1 Conditions of Approval for construction noise and vibration**

Condition	Key requirement
	<p>(iii) continuous or impulsive vibration values, measured at the most affected residence are no more than the maximum values for human exposure to vibration, specified in Table 2.2 of <i>Assessing Vibration: a technical guideline</i> (DEC, 2006), and</p> <p>(iv) intermittent vibration values measured at the most affected residence are no more than the maximum values for human exposure to vibration, specified in Table 2.4 of <i>Assessing Vibration: a technical guideline</i> (DEC, 2006).</p>
<b>Construction Noise and Vibration – General</b>	
E79	<p>Construction Noise and Vibration Impact Statements must be prepared for construction ancillary facility(s) before any works that result in noise and vibration impacts commence, and include specific mitigation measures identified through consultation with affected sensitive receivers. The Statements must supplement the Construction Noise and Vibration Management Sub-plan or Site Establishment Management Plan(s) and are to be implemented for the duration of the works. The Construction Noise and Vibration Impact Statement for the White Bay Civil Site (C11) must be prepared in consultation with the Port Authority of NSW and NSW Heritage Council.</p>
E80	<p>Noise generating works in the vicinity of potentially-affected community, religious, educational institutions and noise and vibration-sensitive businesses and critical working areas (such as theatres, laboratories and operating theatres) resulting in noise levels above the NMLs must not be timetabled within sensitive periods, unless other reasonable arrangements with the affected institutions are made at no cost to the affected institution.</p>
E81	<p>Mitigation measures must be implemented with the aim of achieving the following construction noise management levels and vibration criteria:</p> <ul style="list-style-type: none"> <li>(a) construction ‘Noise affected’ noise management levels established using the <i>Interim Construction Noise Guideline</i> (DECC, 2009);</li> <li>(b) vibration criteria established using the <i>Assessing vibration: a technical guideline</i> (DEC, 2006) (for human exposure);</li> <li>(c) Australian Standard AS 2187.2 - 2006 “<i>Explosives - Storage and Use - Use of Explosives</i>”;</li> <li>(d) BS 7385 Part 2-1993 “<i>Evaluation and measurement for vibration in buildings Part 2</i>” as they are “applicable to Australian conditions”; and</li> <li>(e) the vibration limits set out in the <i>German Standard DIN 4150-3: Structural Vibration- effects of vibration on structures</i> (for structural damage).</li> </ul> <p>Any works identified as exceeding the noise management levels and/or vibration criteria must be managed in accordance with the <b>Construction Noise and Vibration Management Sub-plan</b>.</p> <p><i>Note: The Interim Construction Noise Guideline identifies ‘particularly annoying’ activities that require the addition of 5 dB(A) to the predicted level before comparing to the construction Noise Management Level.</i></p>
<b>Construction Noise Mitigation – Acoustic Sheds</b>	
E86	<p>All acoustic sheds must be erected as soon as site establishment works at the facilities are completed and before undertaking any works which are required to be conducted within the sheds.</p>

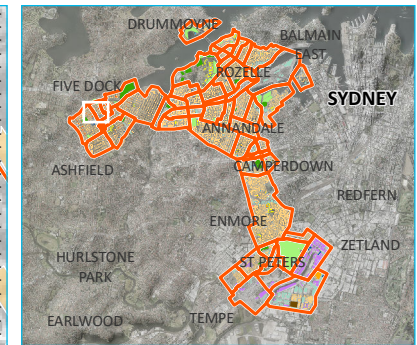
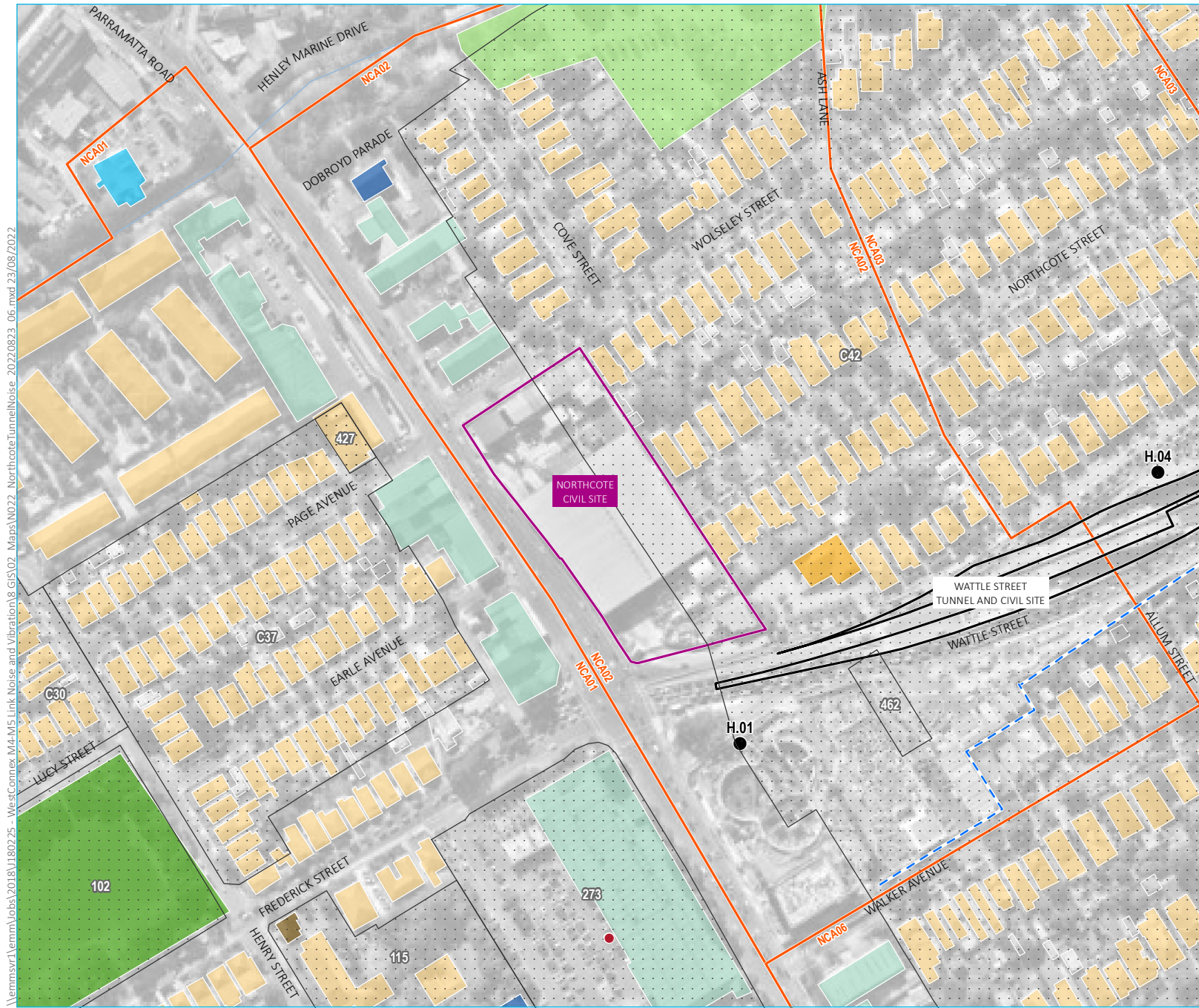
## 4 Existing environment

### 4.1 Noise and vibration sensitive receivers

A detailed land use survey has been undertaken to address E66 of the CoA. The outcomes of the land use survey have been incorporated into this CNVIS. A visual representation of the survey is provided in the NVMP. For the purpose of this assessment, receivers potentially sensitive to noise have been categorised as:

- residential dwellings;
- commercial, retail and industrial properties; and
- other, including:
  - education institutions;
  - childcare centres;
  - medical (hospital wards or other uses including medical centres);
  - places of worship;
  - outdoor open areas (passive and active recreation);
  - aged care;
  - hotel;
  - theatre/auditorium;
  - public building; and
  - recording studio.

The sensitive receivers in proximity to the site is shown in Figure 4.1. Heritage items of importance where vibration emission needs to be considered are also shown.



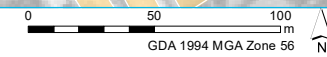
- KEY**
- Noise logger location
  - Heritage item identified in EIS
  - Watercourse/drainage line
  - - - M4 East noise wall (existing)
  - ▭ Noise catchment boundary
  - ▭ Heritage item (local environmental plan)
- Noise receiver**
- Commercial
  - Residential
  - Other - café/bar
  - Other - childcare
  - Other - medical
  - Other - outdoor active
  - Other - outdoor passive
  - Other - place of worship

Site locality, noise catchment areas and baseline monitoring locations

M4-M5 Link Mainline Tunnels  
Construction noise and vibration impact statement, Northcote Tunnel Site  
Figure 4.1

\\lemmsvr1\emmm\jobs\2018\180225 - WestConnex M4-M5 Link Noise and Vibration\8 GIS\02 Maps\NO22 NorthcoteTunnelNoise\_20220823\_06.mxd 23/08/2022

Source: EMM (2022); LendLease (2018); DFSI (2017); DPE (2017)



## 4.2 Noise catchment areas

The areas surrounding the Project have been divided into Noise Catchment Areas (NCAs). NCAs group individual sensitive receivers by common traits such as existing noise environment and location in relation to the works. The NCAs have been based on those established in M4-M5 Link EIS.

The noise catchment areas of relevance to this CNVIS are shown in and are explained in Table 4.1.

**Table 4.1 Nearest residential noise and vibration sensitive receivers**

NCA	Description
NCA01	South west of Parramatta Road between Iron Cove Creek and Bland Street. Land use comprises a mix of residential receivers, special use facilities, active and passive recreation areas and commercial receivers fronting Parramatta Road.
NCA02	North east of Parramatta Road between Henley Marine Drive and Walker Avenue. Land use comprises a mix of residential and commercial receivers, a place of worship and a childcare centre.
NCA06	North east of Parramatta Road, south of Walker Avenue. Land use comprises a mix of residential and commercial receivers.

## 4.3 Background noise levels

This CNVIS has adopted background noise levels documented in the EIS which are presented in Table 4.2 for each relevant NCA. Representative monitoring locations are shown in Table 4.1.

The majority of the NCAs surrounding the project are influenced by road traffic noise levels from major roads. In accordance with prescribed methods in the NSW Industrial Noise Policy (Section 3.3) and the NSW Road Noise Policy (Section 2.5.5), the background noise logging data for the Project was reviewed in greater detail to identify potential shoulder periods. Shoulder periods are defined as periods between the standard INP day, evening and night periods where there may be a steady rise or fall in background noise levels and therefore a justification to define an RBL specific to that time period.

It is proposed to adopt shoulder period Noise Management Levels (NMLs) during 5am to 7am (morning shoulder) and 10pm to midnight (evening shoulder) in order to manage noise according to the noise characteristics of the catchments.

It is noted that the Interim Construction Noise Guideline (ICNG) relies on methodologies contained within the NSW Industrial Noise Policy for the establishment of RBLs. Hence, this approach is deemed consistent with the guidance provided by the ICNG.



**Table 4.2 Rating background levels**

NCA	Rating background levels (RBLs)				
	Morning shoulder (5 am to 7 am) <sup>2</sup>	Day	Evening	Evening shoulder (10 pm to 12 am) <sup>3</sup>	Night
NCA01	42	46	46	42	38
NCA02	55	58	58	55	52
NCA06	45	46	46	45	43

- Notes:
1. ICNG defines daytime period as 7:00am to 6:00pm Monday to Saturday, 8:00am to 6:00 pm Sunday; Evening as 6:00pm to 10:00pm; Night as 10:00pm to 7:00am Monday to Saturday, 10:00pm to 8:00am Sunday.
  2. There is a steady rise in background noise levels between 5am and 7am. Hence a shoulder period has been applied in accordance with the INP by taking the mid-point of day and night RBLs.
  3. There is a steady fall in background noise levels between 10pm and 12am. Hence a shoulder period has been applied in accordance with the INP by taking the mid-point of evening and night RBLs.

## 5 Construction noise criteria

### 5.1 Interim Construction Noise Guideline

The ICNG provides guidelines for the assessment and management of noise from construction works.

Table 5.1 is an extract from the ICNG and provides construction NMLs for residential receivers for both recommended standard construction hours and outside of these periods.

It is noted that the CoA allows extended standard hours of construction during 1pm to 6pm on Saturdays which deviates slightly from ICNG recommended standard hours.

**Table 5.1 ICNG residential noise management levels**

Time of day	Management level $L_{Aeq,15\text{ minute}}$	How to apply
Recommended standard hours: Monday to Friday 7:00 am to 6:00 pm Saturday 8:00 am to 6:00 pm No work on Sundays or public holidays	Noise affected RBL + 10 dB	<p>The noise affected level represents the point above which there may be some community reaction to noise.</p> <ul style="list-style-type: none"> <li>Where the predicted or measured <math>L_{Aeq,15\text{ minute}}</math> is greater than the noise affected level, the proponent should apply all feasible and reasonable work practices to meet the noise affected level.</li> <li>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.</li> </ul>
	Highly noise affected 75 dB	<p>The highly noise affected level represents the point above which there may be strong community reaction to noise.</p> <ul style="list-style-type: none"> <li>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: <ul style="list-style-type: none"> <li>– 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; and</li> <li>– if the community is prepared to accept a longer period of construction in exchange for restrictions on construction times.</li> </ul> </li> </ul>
Outside recommended standard hours	Noise affected RBL + 5 dB	<ul style="list-style-type: none"> <li>A strong justification would typically be required for works outside the recommended standard hours.</li> <li>The proponent should apply all feasible and reasonable work practices to meet the noise affected level.</li> <li>Where all feasible and reasonable practices have been applied and noise is more than 5 dB(A) above the noise affected level, the proponent should negotiate with the community.</li> </ul>

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

Table 5.2 summarises noise management levels for non-residential land uses as defined in the ICNG.

**Table 5.2 ICNG noise management levels at other land uses**

Land use	Management level, $L_{Aeq,15 \text{ minute}}$
Industrial premises	External noise level 75 dB (when in use)
Offices, retail outlets	External noise level 70 dB (when in use)
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)

The ICNG provides further guidance for construction noise levels at commercial and industrial premises as follows:

Due to the broad range of sensitivities that commercial or industrial land can have to noise from construction, the process of defining management levels is separated into three categories. The external noise levels should be assessed at the most-affected occupied point of the premises:

Industrial premises: external  $L_{Aeq (15 \text{ min})}$  75 dB(A)

offices, retail outlets: external  $L_{Aeq (15 \text{ min})}$  70 dB(A)

other businesses that may be very sensitive to noise, where the noise level is project specific as discussed below.

Examples of other noise-sensitive businesses are theatres and child care centres. The proponent should undertake a special investigation to determine suitable noise levels on a project-by-project basis; the recommended 'maximum' internal noise levels in AS 2107 Acoustics – Recommended design sound levels and reverberation times for building interiors may assist in determining relevant noise levels (Standards Australia 2000).

The proponent should assess construction noise levels for the project, and consult with occupants of commercial and industrial premises prior to lodging an application where required.

During construction, the proponent should regularly update the occupants of the commercial and industrial premises regarding noise levels and hours of work.

## 5.2 Project specific NMLs – residential

In accordance with the ICNG and based on the RBLs presented in Table 4.2, Table 5.3 presents the project specific construction noise affected NMLs applicable to residential premises during the proposed work hours. As per the ICNG, these apply to ground floor locations. The highly noise affected NML also applies to all residential receivers during standard hours.

**Table 5.3 Project-specific NMLs at residential locations**

NCA	Residential NML					
	L <sub>Aeq,15mins</sub>					
	Morning shoulder	Day (S)	Day (O)	Evening	Evening shoulder	Night
NCA01	47	56	51	51	47	43
NCA02	60	68	63	63	60	57
NCA06	50	56	51	51	50	48

Notes: Day (S) = Recommended standard hours, Day (O) = Daytime out of hours.

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

### 5.3 Project specific NMLS – non residential

Table 5.4 presents the project specific construction NMLs applicable to non-residential land uses as defined in the NSW ICNG or AS2107.

**Table 5.4 Project specific NMLs at non-residential land uses**

Land use	Noise management level (when in use), L <sub>Aeq,15 minute</sub>
Industrial premises	External noise level 75 dB
Offices, retail outlets	External noise level 70 dB
Classrooms at schools and other educational institutions	Internal noise level 45 dB
Hospital wards and operating theatres	Internal noise level 45 dB
Places of worship	Internal noise level 45 dB
Active recreation areas	External noise level 65 dB
Passive recreation areas	External noise level 60 dB
Child care centres <sup>1</sup>	External noise level 65 dB
Aged care <sup>1</sup>	External noise level 65 dB (7am to 10pm) 60 dB (10pm to 7am)
Hotels <sup>1</sup>	External noise level 65 dB (7am to 10pm) 60 dB (10pm to 7am)
Theatre/auditorium <sup>1</sup>	External noise level 45 dB
Recording studio <sup>1</sup>	External noise level 45 dB
Public building <sup>1</sup>	Determined on site specific basis

Notes:

- 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.
- Notwithstanding NMLs in this table, Condition E80 states “Noise generating works in the vicinity of potentially-affected community, religious, educational institutions and noise and vibration-sensitive businesses and critical working areas (such as theatres, laboratories and operating theatres) resulting in noise levels above the NMLs must not be timetabled within sensitive periods, unless other reasonable arrangements with the affected institutions are made at no cost to the affected institution.

# 6 Construction vibration criteria

## 6.1 Overview

Vibration criteria adopted for the works are consistent with those established in the EIS and in accordance with the Instrument of Approval (SSI 7485). Condition E81 of SSI 7485 states that mitigation measures must be implemented with the aim of achieving the following vibration criteria:

- vibration criteria established using the Assessing vibration: a technical guideline (DEC 2006) (for human exposure);
- Australian Standard AS 2187.2 - 2006 “Explosives - Storage and Use - Use of Explosives”;
- BS 7385 Part 2-1993 “Evaluation and measurement for vibration in buildings Part 2” as they are “applicable to Australian conditions”; and
- the vibration limits set out in the German Standard DIN 4150-3: Structural Vibration- effects of vibration on structures (for structural damage).

It is noted that blasting is not part of the scope for works relevant to this CNVIS.

## 6.2 Human comfort – Assessing vibration: a technical guideline (DEC)

Environmental Noise Management – Assessing Vibration: a technical guideline (DEC 2006) is based on guidelines contained in BS 6472 – 2008, Evaluation of human exposure to vibration in buildings (1 to 80Hz).

The guideline presents preferred and maximum vibration values for use in assessing human responses to vibration and provides recommendations for measurement and evaluation techniques. At vibration values below the preferred values, there is a low probability of adverse comment or disturbance to building occupants. Where all feasible and reasonable mitigation measures have been applied and vibration values are still beyond the maximum value, it is recommended the operator negotiate directly with the affected community.

The guideline defines three vibration types and provides direction for assessing and evaluating the applicable criteria. Table 2.1 of the guideline provides examples of the three vibration types and has been reproduced in Table 6.1.

**Table 6.1 Examples of types of vibration (from Table 2.1 of the guideline)**

Continuous Vibration	Impulsive Vibration	Intermittent Vibration
Machinery, steady road traffic, continuous construction activity (such as tunnel boring machinery).	Infrequent: Activities that create up to 3 distinct vibration events in an assessment period, eg occasional dropping of heavy equipment, occasional loading and unloading. Blasting is assessed using ANZECC (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.

Intermittent vibration is representative of activities such as impact hammering, vibratory rolling or general excavation work (such as an excavator tracking) and, as such, is most relevant to this assessment.

Intermittent vibration (as defined in Section 2.1 of the guideline) is assessed using the vibration dose concept which relates to vibration magnitude and exposure time.

Section 2.4 of the Guideline provides acceptable values for intermittent vibration in terms of vibration dose values (VDV) which requires the measurement of the overall weighted RMS (root mean square) acceleration levels over the frequency range 1 Hz to 80 Hz. To calculate VDV the following formula (refer section 2.4.1 of the guideline) was used:

$$VDV = \left[ \int_0^T a^4(t) dt \right]^{0.25}$$

Where VDV is the vibration dose value in  $m/s^{1.75}$ ,  $a(t)$  is the frequency-weighted rms of acceleration in  $m/s^2$  and  $T$  is the total period of the day (in seconds) during which vibration may occur.

The Acceptable Vibration Dose Values (VDV) for intermittent vibration are reproduced in Table 6.2.

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

Location	Daytime		Night-time	
	Preferred value, $m/s^{1.75}$	Maximum value, $m/s^{1.75}$	Preferred value, $m/s^{1.75}$	Maximum value, $m/s^{1.75}$
Critical Areas	0.10	0.20	0.10	0.20
Residences	0.20	0.40	0.13	0.26
Offices, schools, educational institutions and places of worship	0.40	0.80	0.40	0.80
Workshops	0.80	1.60	0.80	1.60

Notes:

1. Daytime is 7 am to 10 pm and night-time is 10 pm to 7 am.
2. These criteria are indicative only, and there may be a need to assess intermittent values against continuous or impulsive criteria for critical areas.

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 states that activities should be designed to meet the preferred values where an area is not already exposed to vibration.

## 6.3 Structural vibration criteria

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.

### 6.3.1 Australian Standard AS 2187.2 - 2006

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 buildings are presented numerically in Table 6.3 and graphically in Figure 6.1.

**Table 6.3 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: Source: BS 7385 Part 2-1993

The standard states that the guide values in Table 6.3 relate predominantly to transient vibration which does not give rise to resonant responses in structures and low-rise buildings.

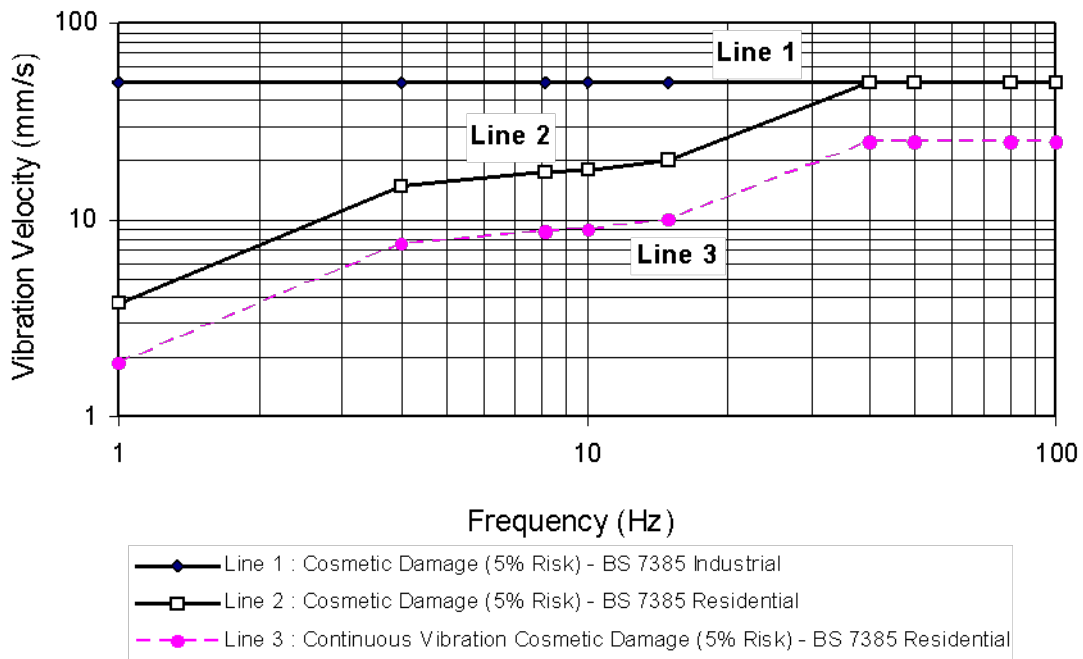
Where the dynamic loading caused by continuous vibration is such as to give rise to dynamic magnification due to resonance, especially at the lower frequencies where lower guide values apply, then the guide values in Table 6.3 may need to be reduced by up to 50%.

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

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 5.3, 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 6.3 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 Figure 6.1.



**Figure 6.1** Graph of transient vibration guide values for cosmetic damage

It is noteworthy that extra to the guide values nominated in Table 6.3, 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 7.5 mm/s (by 50%) if the vibration activity is continuous and has the potential to cause resonance effects in surrounding structures (eg sheet piling).

### 6.3.2 German Standard DIN 4150-3:1999

The German Standard DIN 4150 - Part 3: 1999, provides the strictest guideline levels of vibration velocity for evaluating the effects of vibration in structures. The limits presented in this standard are generally recognised to be conservative.

The DIN 4150 values (maximum levels measured in any direction at the foundation, or maximum levels measured in (x) or (y) horizontal directions, in the plane of the uppermost floor), are summarised in Table 6.4 and shown graphically in Figure 6.2.

For residential and commercial type structures, the standard recommends safe limits as low as 5mm/s and 20mm/s respectively. These limits increase with frequency values above 10Hz. The operational frequency of construction plant typically ranges between 10Hz to 30Hz, and hence according to DIN4150, the safe vibration guide limit range for dwellings is 5 to 15 mm/s. For reinforced commercial type buildings, the limit is as low as 20 mm/s, while for heritage or sensitive structures the lower limit is 3 mm/s.



**Table 6.4 Structural damage guideline values of vibration velocity – DIN4150**

Line <sup>1</sup>	Type of Structure	Vibration Velocity in mm/s			
		At Foundation at a Frequency of		Plane of Floor of Uppermost Storey	
		1Hz to 10Hz	10Hz to 50 Hz	50Hz to 100Hz	All Frequencies
1	Buildings used for commercial purposes, industrial buildings and buildings of similar design	20	20 to 40	40 to 50	40
2	Dwellings and buildings of similar design and/or use	5	5 to 15	5 to 20	15
3	Structures that because of their particular sensitivity to vibration do not correspond to those listed in Lines 1 or 2 and have intrinsic value (eg buildings that are under a preservation order)	3	3 to 8	8 to 10	8

Notes:

1. "Line\*" refers to curves in Figure 1 of DIN4150
2. For frequencies above 100Hz the higher values in the 50Hz to 100Hz column should be used

These levels are "safe limits", for which damage due to vibration effects is unlikely to occur. "Damage" is defined in DIN 4150 to include even minor non-structural effects such as superficial cracking in cement render, the enlargement of cracks already present, and the separation of partitions or intermediate walls from load bearing walls.

Should such damage be observed without vibration levels exceeding the "safe limits" then it is likely to be attributable to other causes. DIN 4150 also states that when vibration levels higher than the "safe limits" are present, it does not necessarily follow that damage will occur.

As indicated by the guide levels from DIN 4150 in Figure 6.2, high frequency vibration has less potential to cause damage than lower frequencies. Furthermore, the "point source" nature of vibration from plant causes the vibratory disturbances to arrive at different parts of nearby large structures in an out-of-phase manner, thereby reducing its potential to excite in-phase motion of the low order modes of vibration in such structures.

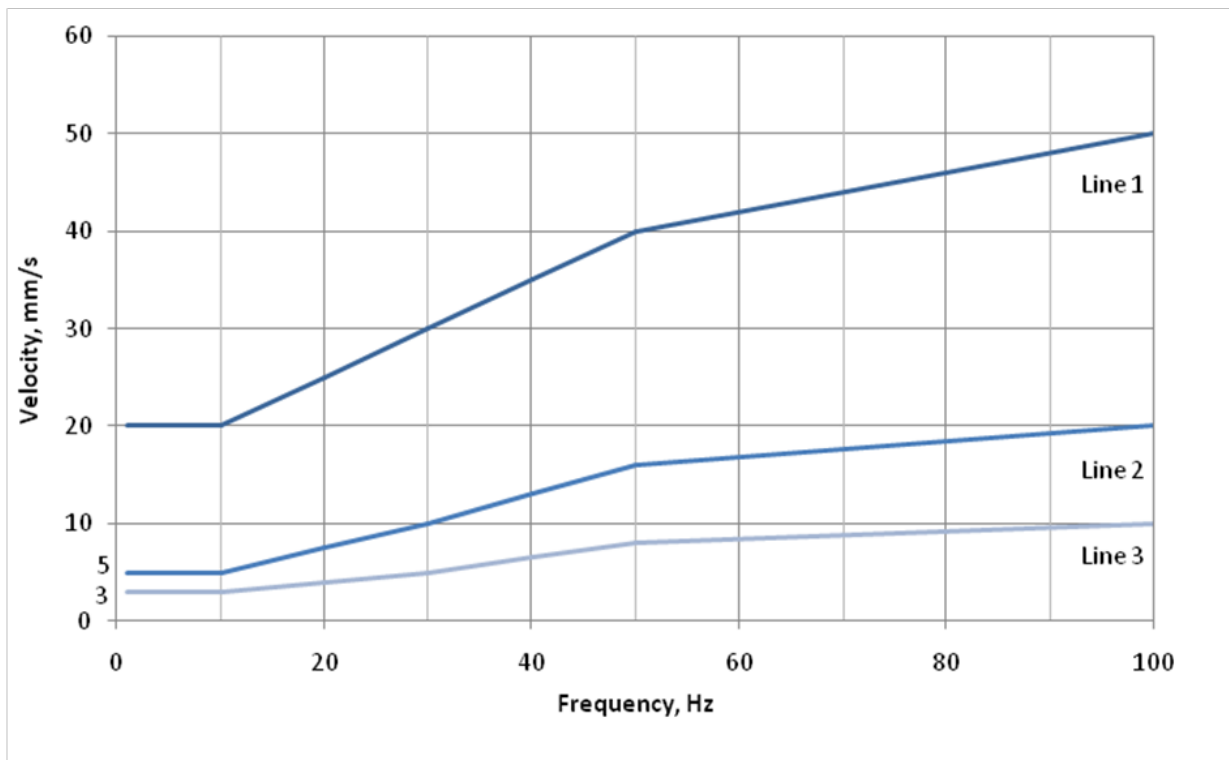


Figure 6.2 DIN4150 structural damage guideline values of vibration velocity

### 6.3.3 Project specific structural vibration criteria

Condition E81 requires that BS7385-2 and DIN4150-3 are both satisfied. DIN4150-3 is more conservative and provides more information for the assessment of heritage structures. If DIN4150-3 limits are satisfied, the limits in BS7385-2 will also be satisfied.

DIN4150-3 has therefore been adopted as the structural vibration criteria for the project.

# 7 Construction noise assessment

## 7.1 Assessment method

The following sections outline the modelling method and key assumptions adopted to assess noise levels from several works scenarios of the site in accordance with the ICNG (EPA 2009) and CNVG (RMS 2015) requirements.

Noise emissions from the Site were modelled using DGMR Software proprietary modelling software, iNoise, from the same developers of Bruel & Kjaer's Predictor. The model allows prediction under the ISO9613-2 "Acoustics – Attenuation of Sound during Propagation Outdoors – general method" algorithm. This algorithm is accepted by the EPA. Features which affect the predicted noise level that are considered in the noise modelling include:

- equipment sound power levels and locations;
- screening from structures (excluding internal walls);
- receiver locations;
- ground topography;
- noise attenuation due to geometric spreading;
- ground absorption; and
- atmospheric absorption.

The model was populated with 3-D topography of the Site area and surrounding area, extending out to nearest assessment locations and 3-D buildings. Construction plant and equipment representing the range of proposed construction scenarios was placed at locations which would represent typical to worst case noise levels throughout the construction program.

## 7.2 Scenarios

The following broad work stages have been assessed:

- Stage 1: Remove electrical store;
- Stage 2: Tunnel backfill;
- Stage 3: Demobilisation of office;
- Stage 4: Demobilisation of decline capping beam, retaining wall and stockpile wall;
- Stage 5: Demobilisation of acoustic shed;
- Stage 6: Level site and chip seal; and
- Stage 7: Reinstate Northcote St as cul-de-sac.

No out of hours works are proposed for any stages. All modelling scenarios assessed, plant and equipment listed and noise mitigation adopted are summarised in Appendix A. Figures showing the site layout for each stage are provided in Appendix B.

For all scenarios, it has been assumed that all plant and equipment is operating simultaneously, unless specific utilisation percentages are stated otherwise. This is considered a conservative representation of a typical worst-case scenario.

Table 7.1 provides a summary of the work stages and the noise criteria applicable to them.

**Table 7.1 Summary of scenarios and applicable noise criteria**

Scenario	Activities included	Applicable noise criteria
Stage 1	Remove electrical store	ICNG Noise Management Levels (as per CoA E73)
Stage 2	Tunnel backfill inside acoustic shed	CoA E70
Stage 3	Demobilisation of office	ICNG Noise Management Levels (as per CoA E73)
Stage 4	Demobilisation at decline capping beam, retaining wall and stockpile wall	ICNG Noise Management Levels (as per CoA E73)
Stage 5	Demobilisation of acoustic shed	ICNG Noise Management Levels (as per CoA E73)
Stage 6	Level site and chip seal	ICNG Noise Management Levels (as per CoA E73)
Stage 7	Reinstate Northcote St as cul-de-sac	ICNG Noise Management Levels (as per CoA E73)

## 7.3 Mitigation

### 7.3.1 Acoustic shed

The existing acoustic shed will remain in place until Stage 5, after which it must be demobilised. The following wall and roof specifications have been referenced from the M4-East project drawing number 00-A601 Revision A (dated 27/11/2015).

#### i Walls

The following construction is indicative of the north-east shed wall:

- outer skin of 0.48 mm sheet steel;
- minimum 55 mm cavity insulation with perforated foil facing inwards;
- 10 kg/m<sup>2</sup> wave bar acoustic membranes fixed either side of girts; and
- inner skin of 0.42 mm sheet steel.

The following construction is indicative of all other shed walls:

- outer skin of 0.48 mm sheet steel;
- 55 mm internal insulation lining walls with perforated foil facing inwards; and
- 10 kg/m<sup>2</sup> wave bar acoustic membrane fixed to inside girts.

The minimum required sound transmission loss of this wall is presented in Table 7.2. This table also presents the anticipated reduction in performance due to detailing leaks at junctions.

**Table 7.2 Minimum sound transmission loss of shed walls**

Shed wall	Description	Octave band centre frequency, minimum transmission loss, dB							Rw + Ctr
		63	125	250	500	1k	2k	4k	
North east wall	In principle performance	11	14	26	38	40	44	53	28
	With shed leakage	6	9	21	31	31	33	35	-
All other walls	In principle performance	6	12	16	21	27	30	40	23
	With shed leakage	1	7	11	14	18	22	32	-

ii **Roof**

The following construction is indicative of the shed roof:

- outer skin of 0.48 mm sheet steel;
- 10kg/m<sup>2</sup> wave bar acoustic membrane fixed to purlins/rafters;
- inner skin of 0.42 mm sheet steel; and
- 55 mm internal insulation lining walls with perforated foil facing inwards.

The minimum required sound transmission loss of the roof is presented in Table 7.3.

**Table 7.3 Minimum sound transmission loss of shed roof**

Element	Octave band centre frequency, minimum transmission loss, dB						
	63	125	250	500	1k	2k	4k
Shed roof	6	9	21	31	31	33	35

iii **Internal reverberation control**

The shed roof will be internally lined with insulation to control reverberation noise build-up and breakout through the open doors. A minimum 90% surface area needs to be covered with a material with minimum absorption coefficient as presented in Table 7.4.

**Table 7.4 Minimum sound absorption coefficient of internal insulation**

Element	Octave band centre frequency, minimum absorption coefficient					
	125	250	500	1k	2k	NRC
Shed roof and walls (at least 90% coverage)	0.3	1.0	1.0	1.0	0.9	1.0

### 7.3.2 Hoarding

The existing perimeter hoarding will remain in place until handover. A small section adjacent to Northcote Street will be removed using hand tools to enable the Stage 7 reinstatement work. The removal of the hoarding will be of a lower impact and duration than the activities and plant used to reinstate Northcote Street, modelled as part of Stage 7.

## 7.4 Stage 1 to 7

### 7.4.1 Results

Predicted noise levels for Stages 1 to 7 are provided in Appendix C. The total number of receivers predicted to exceed NMLs are detailed in Table 7.5.

**Table 7.5 Predicted number of receivers above NMLs**

Exceedance category	Number of exceedances per stage (day standard hours)						
	Stage 1	Stage 2	Stage 3	Stage 4	Stage 5	Stage 6	Stage 7
1-10 dB	0	0	0	0	0	0	16
11-20 dB	0	0	0	0	0	0	0
>20 dB	0	0	0	0	0	0	0
Number of receivers where total predicted noise level is >75 dB (Highly noise affected) <sup>1</sup>	0	0	0	0	0	0	3

Notes:

1. This count of highly affected receivers is independent of the NML exceedance count above.

No exceedances of NML are predicted for Stages 1 to 6. Stage 7 predicted noise levels indicate exceedances of NML by up to 10 dB at 16 locations (six in NCA02, 10 in NCA01), with three of the assessment locations in NCA02 exceeding the highly noise affected level of 75 dB (5, 6 and 8 Northcote Street, Haberfield). This is due to the proximity of the works in relation to residences on Northcote Street and that a portion of the boundary hoarding will and must be removed in order to perform these works.

### 7.4.2 Comparison to EIS

For the demobilisation of the site, the EIS assessed a single broad scenario (OPTA-11 – site rehabilitation and landscape). The predicted number of receivers above NML for this scenario are provided in Table 7.6.

**Table 7.6 EIS predicted number of receivers above NMLs**

NML exceedance category	Number of exceedances per stage (day standard hours)
	OPTA – 11 Site rehabilitation and landscape
1-10 dB	14
11-20 dB	0

**Table 7.6 EIS predicted number of receivers above NMLs**

NML exceedance category	Number of exceedances per stage (day standard hours)	
	OPTA – 11 Site rehabilitation and landscape	
>20 dB	0	
Number of receivers where total predicted noise level is >75 dB (Highly noise affected) <sup>1</sup>	0	

When comparing the EIS impacts to this CNVIS, all stages except for Stage 7 of this CNVIS are predicted to exceed NMLs at less receivers than the EIS. Stage 7 is predicted to exceed NMLs at two more receiver locations, however this scenario is not directly comparable due to the activities assessed. Nevertheless, works are proposed to be completed during standard daytime hours only and will be for a limited period of time to reinstate the cul-de-sac at Northcote Street.

### 7.4.3 Sleep disturbance

The works will not occur during the night-time period (10pm to 7am). Therefore, the assessment of potential sleep disturbance at residences is not required in accordance with the INP application notes.

### 7.5 Road traffic noise

Road traffic noise impacts due to increased truck movements on public roads generated by 24/7 tunnelling activities was assessed in M4-M5 Link Mainline Tunnels Noise and Vibration Assessment – Proposed heavy vehicle changes, and therefore not assessed herein. The proposed works will not result in changes or further impacts than previously assessed.

## 8 Construction vibration assessment

### 8.1 Safe working distances and assessment methodology

Table 8.1 provides an indication of potential offset distances required from sensitive receivers in order to comply with DIN4150-3 vibration criteria. This information should be used by relevant personnel when planning their work to identify when other forms of construction methodology or vibration mitigation and/or management measures may need to be investigated or implemented. This data is based on information provided in the noise and vibration assessment prepared for the EIS as well as publicly available data for other large infrastructure projects in Sydney.

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

**Table 8.1** Vibration levels and safe working distance guidance – transient vibration

Source	Estimated safe working distance			
	Human comfort	Commercial, Industrial or similar structures	Dwellings and similar structures	Heritage and other sensitive structures
Large Vibratory Roller (20t)	100m	5m	33m	50m
Medium Vibratory Roller (10t)	100m	5m	20m	31m
Compactor (7t)	50m	5m	20m	20m
Hand operated wacka packer on backfill	10m	5m	5m	5m
Hand operated wacka packer on asphalt	10m	5m	5m	5m
Heavy Hydraulic Hammer (1500kg hammer on 30t excavator)	73m	5m	22m	44m
Medium Hydraulic Hammer (900kg hammer on 18t excavator)	23m	5m	10m	15m
Light Hydraulic Hammer (300kg on 5t excavator)	10m	5m	5m	5m
Jack Hammer	Avoid contact with structure	5m	5m	5m
Air Track Drill	20m	5m	5m	10m
Small rock drill (estimate)	10m	5m	5m	5m
Down the Hole Hammer	10m	5m	5m	5m
Ripping (measured in Sydney sandstone)	10m	5m	5m	5m
Impact Piling	30m	5m	10m	20m
Vibratory Piling	30m	5m	26m	100m



**Table 8.1 Vibration levels and safe working distance guidance – transient vibration**

Source	Estimated safe working distance			
	Human comfort	Commercial, Industrial or similar structures	Dwellings and similar structures	Heritage and other sensitive structures
Rock Sawing	10m	5m	5m	5m
Bored Piling	N/A	5m	10m	10m

Notes:

1. Based on information provided in the NorthConnex Construction Noise and Vibration Management Sub Plan prepared by Lend Lease Bouygues Joint Venture dated 1 May 2017.

Proposed demobilisation construction plant and equipment has been utilised to determine where, if at all, the safe working distances are likely to be encroached and, if so, likely areas of impact.

Proposed works with the potential to cause vibration impact at nearby vibration-sensitive receptors include the use of spoil trucks, vibratory rollers, dozers or excavations including the use of a rock hammer for Stages 4, 6 and 7.

The number of receptors with potential to exceed relevant vibration criteria at each stage is summarised in Table 8.2. Figures showing the receptors with potential to exceed relevant vibration criteria for each stage, based on a worst-case operational location are provided in Appendix D.

**Table 8.2 Potential vibration impacts**

Equipment item	Relevant stages	Number of receptors with potential to exceed vibration criteria <sup>1</sup>			
		Human comfort (residences)	Cosmetic damage		
			Dwellings, garages	Commercial, industrial or similar	Heritage and other sensitive structures
Heavy hydraulic hammer <sup>2</sup>	Stages 4 and 6	28	5	0	0
Large vibratory roller (20t)	Stage 6	28	6	0	0
Heavy hydraulic hammer <sup>2</sup>	Stage 7	12	4	0	0

Notes:

1. The number of potentially affected receptors have been calculated based on the most conservative safe distances provided in Table 8.1 for the relevant task.
2. 1500kg hammer on 30t excavator.

## 9 Noise mitigation and management

### 9.1 General

The EPA's NSW ICNG requires that construction noise levels are assessed against NMLs.

Noise levels above NMLs have been predicted with the incorporation of noise mitigation measures. It is not uncommon for construction projects to exceed NMLs. For this reason, they are not considered as noise criteria, but as a trigger for all feasible and reasonable noise mitigation and management to be considered, once exceeded.

Noise mitigation and management for the site is described in Appendix A. Other mitigation and management measures that can be implemented on site are provided in the following sections.

### 9.2 Work practices

Work practice methods 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;
- develop routes for the delivery of materials and parking of vehicles to minimise noise;
- where possible, avoid the use of equipment that generates impulsive noise;
- minimise the movement of materials and plant and unnecessary metal-on-metal contact;
- minimise truck movements; and
- schedule 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).

### 9.3 Plant and equipment

Additional measures for plant and equipment include:

- where possible, choose quieter plant and equipment based on the optimal power and size to most efficiently perform the required tasks;
- operate plant and equipment in the quietest and most efficient manner; and
- regularly inspect and maintain plant and equipment to minimise noise and vibration level increases, to ensure that all noise and vibration reduction devices are operating effectively.

### 9.4 Quantifying noise reductions

Approximate noise reductions provided by some of these measures are provided in Table 9.1.

**Table 9.1** 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 <sup>1</sup>	approximately 6 dB for each doubling of distance
Reduce equipment operating times or turn off idling machinery <sup>2</sup>	approximately 3 dB per halving of operating time
Operating training on quiet operation <sup>2</sup>	typically 3 to 5 dB
Screening (eg noise barrier) <sup>1</sup>	typically 5dB to 10 dB, maximum 15 dB
Enclosure (eg shed/building) <sup>1</sup>	typically 15 dB to 25 dB, maximum 50 dB
Silencing (eg exhaust mufflers) <sup>1</sup>	typically 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

## 9.5 Additional noise mitigation measures – Construction Noise and Vibration Guideline

In many instances, impacts from construction noise and vibration are unavoidable where works are undertaken in relatively close proximity to surrounding receivers. The CNVG includes a list of additional mitigation measures which aim to manage the potential noise impacts. Additional mitigation measures from the CNVG that have been adopted for the project are summarised in Table 9.2.

**Table 9.2** CNVG additional noise mitigation measures

ID	Name	Description
N	Notification (letterbox drop or equivalent)	Advanced warning of works and potential disruptions can assist in reducing the impact to the community. The notification may consist of a letterbox drop (or equivalent) detailing work activities, time periods over which these will occur, impacts and mitigation measures. Notification should be a minimum of seven calendar days prior to the start of works. The approval conditions for projects may also specify requirements for notification to the community about works that may impact on them.
SN	Specific notifications	Specific notifications are letterbox drops (or equivalent) to identified stakeholders no later than seven calendar days ahead of construction activities that are likely to exceed the noise objectives. The specific notification should provide additional information to that covered in the general notifications and be targeted at highly affected receivers.
RO	Respite offers	Respite Offers should be considered and or adopted where there are high noise and vibration generating activities near receivers. As a guide work should be carried out in continuous blocks that do not exceed three hours each, with a minimum respite period of one hour between each block. The actual duration of each block of work and respite should be flexible to accommodate the usage of and amenity at nearby receivers. The purpose of such an offer is to provide residents with respite from an ongoing impact. This measure is evaluated on a project-by-project basis, and may not be applicable to all projects.
R1	Respite period 1	Out of hours construction conducted during the OOHW period 1 (Monday to Friday 6pm to 10pm, Saturday 7am to 8am and 1pm to 10pm, Sunday/Public Holiday 8am to 6pm) shall be limited to no more than three consecutive evenings per week except where there is a duration respite. For night work these periods of work should be separated by not less than one week and no more than six evenings per month.

**Table 9.2 CNVG additional noise mitigation measures**

ID	Name	Description
R2	Respite period 2	Night time construction in OOHW period 2 (Monday to Friday 10pm to 7am, Saturday 10pm to 8am, Sunday/Public Holiday 6pm to 7am) shall be limited to two consecutive nights except for where there is a Duration Respite. For night work these periods of work should be separated by not less than one week and six nights per month. Where possible, high noise generating works shall be completed before 11pm.
AA	Alternative accommodation	Alternative accommodation options may be offered to residents living in close proximity to construction works that are likely to experience highly intrusive noise levels (refer to Tables C1-C3 of the CNVG). The specifics of the offer will be identified on a project-by-project basis. Additional aspects for consideration shall include whether the highly intrusive activities occur throughout the night or before midnight.
DR	Duration respite	Respite offers and respite periods 1 and 2 may be counterproductive in reducing the impact on the community for longer duration projects. In this instance and where it can be strongly justified that it may be beneficial to increase the work duration, number of evenings or nights worked through Duration Respite so that the project can be completed more quickly The project team should engage with the community where noise levels are expected to exceed the NML to demonstrate support for Duration Respite Where there are few receivers above the NML each of these receivers should be visited to discuss the project to gain support for Duration Respite.
V	Verification	Refer to Appendix F of the CNVG for more details about verification of noise and vibration levels as part of routine checks of noise levels or following reasonable complaints. This verification should include measurement of the background noise level and construction noise. Note this is not required for projects less than three weeks unless to assist in managing complaints.

The level of additional mitigation is then assigned based on the impact classification (ie predicted noise level above NML) and the list of measures in Table 9.3.

**Table 9.3 Additional mitigation measures matrix – airborne construction noise**

Perception	Predicted airborne $L_{Aeq(15min)}$ noise level at receiver		Additional mitigation measures	
	dBA above RBL	dBA above NML	Type	Mitigation levels
<b>All hours</b>				
75 dBA or greater			N, V, RO	HA
<b>Standard hours: Mon - Fri (7am – 6pm), Sat (8am – 1pm), Sun/Pub Hol (Nil)</b>				
Noticeable	5 to 10	0	-	NML
Clearly audible	10 to 20	<10	-	NML
Moderately intrusive	20 to 30	10 to 20	N, V	NML + 10
Highly intrusive	>30	> 20	N, V	NML + 20
<b>OOHW Period 1: Mon – Fri (6pm – 10pm), Sat (7am – 8am &amp; 1pm – 10pm), Sun/Pub Hol (8am – 6pm)</b>				
Noticeable	5 to 10	<5	-	NML
Clearly audible	10 to 20	5 to 15	N, R1, DR	NML +5
Moderately intrusive	20 to 30	15 to 25	V, N, R1, DR	NML + 15

**Table 9.3 Additional mitigation measures matrix – airborne construction noise**

Predicted airborne L <sub>Aeq(15min)</sub> noise level at receiver			Additional mitigation measures	
Perception	dBA above RBL	dBA above NML	Type	Mitigation levels
Highly intrusive	>30	>25	V, N, SN, R2, DR	NML + 25
<b>OOHW period 2: Mon - Fri (10pm – 7am), Sat (10pm – 8am), Sun/Pub Hol (6pm – 7am)</b>				
Noticeable	5 to 10	<5	N	NML
Clearly audible	10 to 20	5 to 15	V, N, R2, DR	NML + 5
Moderately intrusive	20 to 30	15 to 25	V, N, SN, R2, DR	NML + 15
Highly intrusive	>30	>25	AA, V, N, SN, R2, DR	NML + 25

Note:

- The following abbreviations are used: Alternative Accommodation (AA), Respite Period 1 (R1), Verification (V), Specific Notifications (SN), Notification drops (N), Respite Period 2 (R2), Negotiated Respite (NR), Highly Affected (HA), Respite Offer (RO), Duration Respite (DR).

### 9.5.1 Additional mitigation outcomes for the project

Based on the noise level predictions (provided in Appendix C), several residences will require additional mitigation measures during standard daytime hours, according to the CNVG. Table 9.4 indicates the number of receivers requiring these additional measures for each stage detailed in Appendix A.

**Table 9.4 Receivers requiring additional mitigation**

CNVG Perception Category	Stage 1	Stage 2	Stage 3	Stage 4	Stage 5	Stage 6	Stage 7	CNVG Additional Mitigation Measures	CNVG Additional Mitigation Levels
Clearly Audible	0	0	0	0	0	0	16	-	NML
Moderately Intrusive	0	0	0	0	0	0	0	-	NML
Highly intrusive	0	0	0	0	0	0	0	N, V	NML + 10
75 dBA or greater	0	0	0	0	0	0	3	N, V, RO	HA

Note:

- The following abbreviations are used: Verification (V), Notification drops (N), Highly Affected (HA), Respite Offer (RO).

ASBJV will implement the additional mitigation and management measures in accordance with Table 9.4. Further, ASBJV will actively consult with the residents at upper floors of neighbouring properties to confirm the level of impact is acceptable and where appropriate apply additional feasible and reasonable mitigation.

## 9.6 Vibration mitigation measures

The primary form of mitigation of vibration would be ensuring vibration intensive works do not occur within the safe working distances. Further mitigation of vibration would not be required where the safe working distances are adhered to.

Vibration monitoring will be undertaken on the property boundary or at Northcote Street as backfilling approaches the relevant safe working distances and before hammering work associated with reinstatement respectively. Vibration monitoring will be adopted to verify actual vibration levels generated and compared against the DIN-4150 criteria. Where compliance with the DIN-4150 criteria is confirmed, works will continue as planned.

For vibration intensive activities that occur within the safe working distances and it has been confirmed that the DIN-4150 cannot be complied with, the following management methods will be adopted:

- Equipment selection and maintenance:
  - Equipment size would be selected taking into account the safe working distances/DIN-4150 criteria. The use of less vibration intensive methods of construction or equipment would be considered where feasible and reasonable when working in proximity to existing structures. Equipment would be maintained and operated in an efficient manner, in accordance with manufacturer's specifications, to reduce the potential for adverse vibration impacts.
- Construction scheduling:
  - Wherever feasible and reasonable, vibration intensive works should be limited to the least sensitive times of the day. These times would be determined based on the outcomes of consultation with relevant sensitive receivers.

If ongoing works are required, where monitoring has confirmed actual vibration levels are nearing the DIN-4150 criteria, a temporary relocatable vibration monitoring system may be considered to warn operators (via flashing light, audible alarm etc.) when vibration levels are approaching the cosmetic damage objective.

Additional noise mitigation measures with respect to human response to vibration will be applied in accordance with the CNVG as presented in Table 9.5.

**Table 9.5 Additional mitigation measures matrix – construction vibration**

Predicted human response vibration levels <sup>3</sup>	Additional mitigation measures	
	Type <sup>1</sup>	Apply to <sup>2</sup>
<b>Standard hours: Mon - Fri (7am – 6pm), Sat (8am – 1pm), Sun/Pub Hol (Nil)</b>		
Predicted vibration exceeds maximum human comfort levels	V, N, RO	All

Notes:

1. The following abbreviations are used: Alternative Accommodation (AA), Respite Offer (RO), Respite Period 1 (R1), Validation of predicted noise levels (V), Specific Notifications (SN), Notification drops (N), Respite Period 2 (R2), Duration respite (DR).
2. All affected receivers.
3. This text has been amended from what is displayed in the CVNG which references an LAeq(15min) noise level.

## 9.7 Community consultation and complaints handling

Community consultation and complaints handling will be undertaken in accordance with the project's Community Communication Strategy (CCS).

Few complaints were received throughout construction a result of early stakeholder engagement and ongoing consultation. Managing community expectations has already commenced with project updates of work and expected commencement dates.

Discussions were held with representatives of the adjacent Kingdom Hall, whilst a door knock and notification distribution of nearby businesses and residences on Wolseley Street, Northcote Street, Ash Lane, Wattle Street, Cove Street, Frederick Street, Earle Avenue and Parramatta Road was delivered. Information sessions are also to be held at the CIC prior to demolition which was notified during the door knock. Individual sessions with residents as well as meetings to further discuss plans with engineers and environment team have been offered to those likely to be impacted following initial communication. Community updates are also posted on the Project website and further information provided via email as requested.

Mitigation measures adopted from the CNVG are detailed in Section 9.5; notifications and complaints will be managed through the project's CCS including three monthly updates and specific notification for noisy or out of hours work. Results of monitoring as new work commences or in response to complaints and OOHW will be provided to residents as deemed suitable or on request.

## 10 Conclusion

EMM has completed a construction noise and vibration impact statement (CNVIS) to review potential noise and vibration impacts from the demobilisation of the Northcote ancillary facility at Haberfield.

The Site will be extensively mitigated and managed to reduce noise emissions. The mitigation and management applied at site satisfies the feasible and reasonable approach as outlined in the ICNG (EPA 2009) and the requirements of the conditions of approval (CoA).

This CNVIS assesses noise levels from the following stages:

- Stage 1: Remove electrical store;
- Stage 2: Tunnel backfill;
- Stage 3: Demobilisation of office;
- Stage 4: Demobilisation at decline capping beam, retaining wall and stockpile wall;
- Stage 5: Demobilisation of acoustic shed;
- Stage 6: Level site and chip seal; and
- Stage 7: Reinstate Northcote St as cul-de-sac.

All proposed works are for standard daytime construction hours only, with no out-of-hours works proposed.

No exceedances of NML are predicted for Stages 1 to 6. Stage 7 predicted noise levels indicate exceedances of NML by up to 10 dB at 16 locations (six in NCA02, 10 in NCA01), with three of the assessment locations in NCA02 exceeding the highly noise affected level of 75 dB (5, 6 and 8 Northcote Street, Haberfield). This is due to the proximity of the works in relation to residences on Northcote Street and that a portion of the boundary hoarding will and must be removed in order to perform these works.

When comparing the EIS impacts to this CNVIS, all stages except for Stage 7 of this CNVIS are predicted to exceed NMLs at less receivers than the EIS. Stage 7 is predicted to exceed NMLs at two more receiver locations, however this scenario is not directly comparable due to the activities assessed. Nevertheless, works are proposed to be completed during standard daytime hours only and will be for a limited period of time to reinstate the cul-de-sac at Northcote Street.

The works will not occur during the night-time period (10pm to 7am). Therefore, the assessment of potential sleep disturbance at residences is not required.

An assessment of construction vibration was conducted, with a number of premises inside safe working distances noted. Construction management and mitigation measures are recommended.

Additional mitigation measures in line with the CNVG have been recommended for each stage assessed.



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# Appendix A

## Equipment list and sound power levels

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**Table A.1 Description of scenarios – Stages 1-7**

Scenario	Description	Equipment	Item sound power level <sup>4</sup>		Equipment quantity per assessment period (% utilisation per 15 minutes where shown) <sup>2</sup>					Physical noise mitigation	
			L <sub>Aeq, 15min</sub>	L <sub>Amax</sub>	MS	D(s)	Day (o)	E	ES		N
Stage 1	Remove Electrical store and LV/HV switchyard	Excavator	104			2					Acoustic shed remains, hoarding will remain in place on perimeter. 1 Agi working at a time.
		Concrete agi	106			3					
		Hand tools/concrete vibrator	109			1					
		Mobile crane	98			1					
		Moxy	109			1					
Stage 2	Tunnel Backfill	Moxy	109			3					Acoustic shed remains, hoarding will remain in place on perimeter
		Spoil truck	103			3					
		Vibratory roller	114			1					
		Front end loader	110			1					
		Excavator	104			1					
		Bobcat	102			1					
		Dozer	111			1					
Stage 3	Office demob, remove vent cans and fans and low shed and fan buildings	EWP	97			2					Acoustic shed remains, hoarding will remain in place on perimeter
		Excavators (buckets and/or shears)	111			2					
		Mobile crane	98			1					
		Delivery truck	105			2					

**Table A.1 Description of scenarios – Stages 1-7**

Scenario	Description	Equipment	Item sound power level <sup>4</sup>		Equipment quantity per assessment period (% utilisation per 15 minutes where shown) <sup>2</sup>					Physical noise mitigation
			L <sub>Aeq, 15min</sub>	L <sub>Amax</sub>	MS	D(s)	Day (o)	E	ES	
Stage 4	Demo at decline, capping beam, retaining wall and stockpile wall	Rock hammer	117			2				Acoustic shed remains, hoarding will remain in place on perimeter
		Excavators	111			2				
		Moxy	109			1				
		Spoil trucks	103			2				
		Pulveriser on excavator in shed	108			1				
Stage 5	Demo acoustic shed	EWP	97			3				Hoarding will remain in place on perimeter.
		Mobile crane	98			1				
		Trucks	105			4				
		Excavators with shears	111			2				
Stage 6	Level site and chip seal	Vibratory roller	114			1				Hoarding will remain in place on perimeter.
		Dozer	111			1				
		Delivery trucks	105			2				
		Moxy	109			1				
		Loader	110			1				
		Excavator	104			1				
		Spray seal truck	107			1				

**Table A.1 Description of scenarios – Stages 1-7**

Scenario	Description	Equipment	Item sound power level <sup>4</sup>		Equipment quantity per assessment period (% utilisation per 15 minutes where shown) <sup>2</sup>					Physical noise mitigation	
			L <sub>Aeq, 15min</sub>	L <sub>Amax</sub>	MS	D(s)	Day (o)	E	ES		N
Stage 7	Reinstate Northcote Street as cul-de-sac	Delivery truck	105			2					Hoarding remains in place however section along works on Northcote Street will be removed.
		Pavement machine	114			1					
		Excavator with hammer	117			1					
		Concrete saw	115			1					
		Concrete agitator	106			1					
		Bobcat	102			1					

Notes: MS = morning shoulder, Day(s) = day standard hours; Day(o) = day out of hours; E = evening; N = night; ES = evening shoulder.

1. Sound power level does not include the attenuation provided by the workshop enclosure, as applicable.
2. Utilisation indicates the percentage of time a piece of equipment will be used per 15 minutes. When combined with all other plant assumed to operate simultaneously, this approach is representative of typical activities.
3. L<sub>Amax</sub> noise level based on attended measurements of concrete agitators entering/leaving site at max 10km/h, conducted 14 May 2020
4. Item sound power levels sourced from Department for Environment, Food & Rural Affairs UK (DEFRA), TfNSW databases or EMM measurements.

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# Appendix B

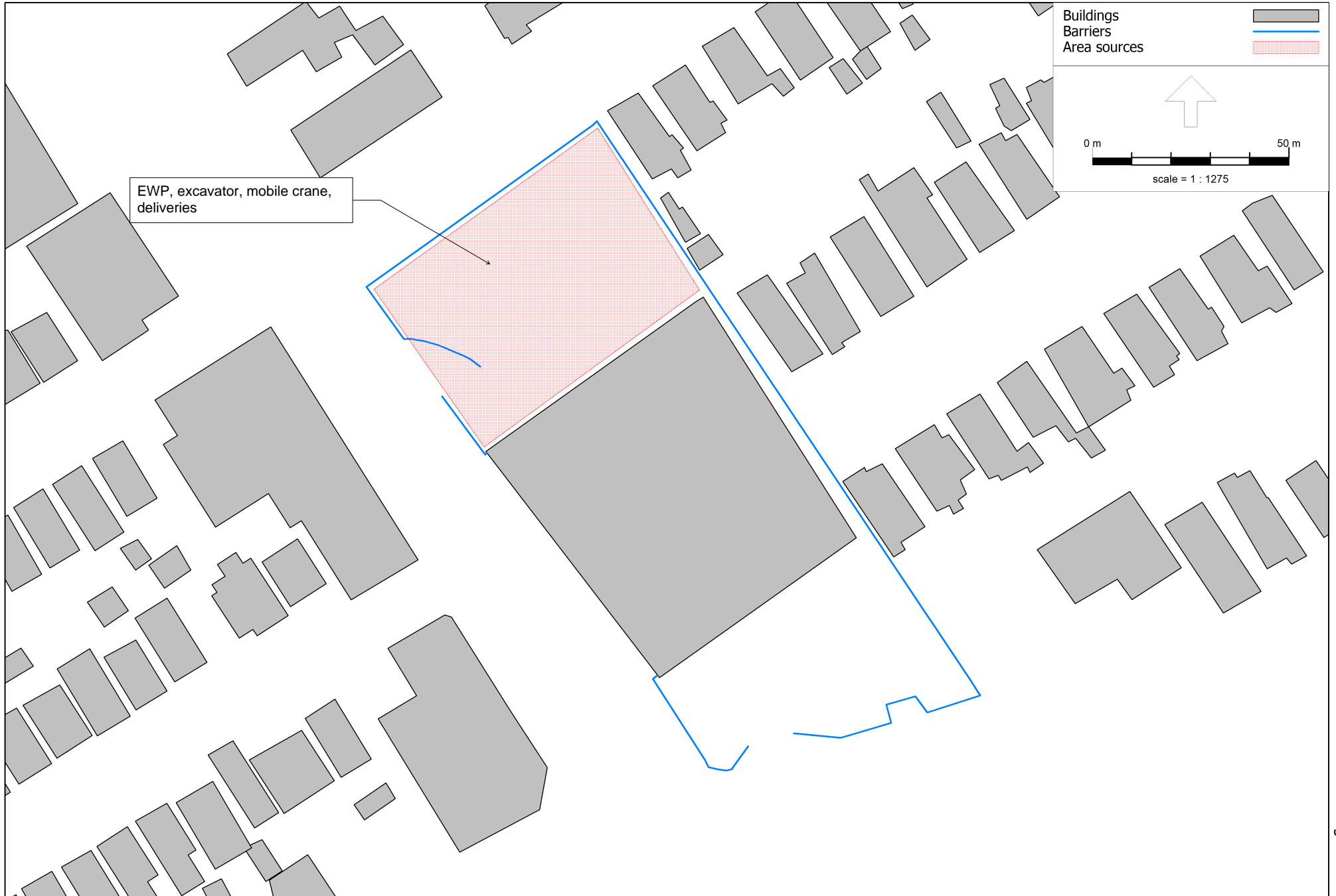
## Site layout – Stages 1-7



Figure B.1 Site layout – Stage 1



**Figure B.2 Site layout – Stage 2**



**Figure B.3** Site layout – Stage 3





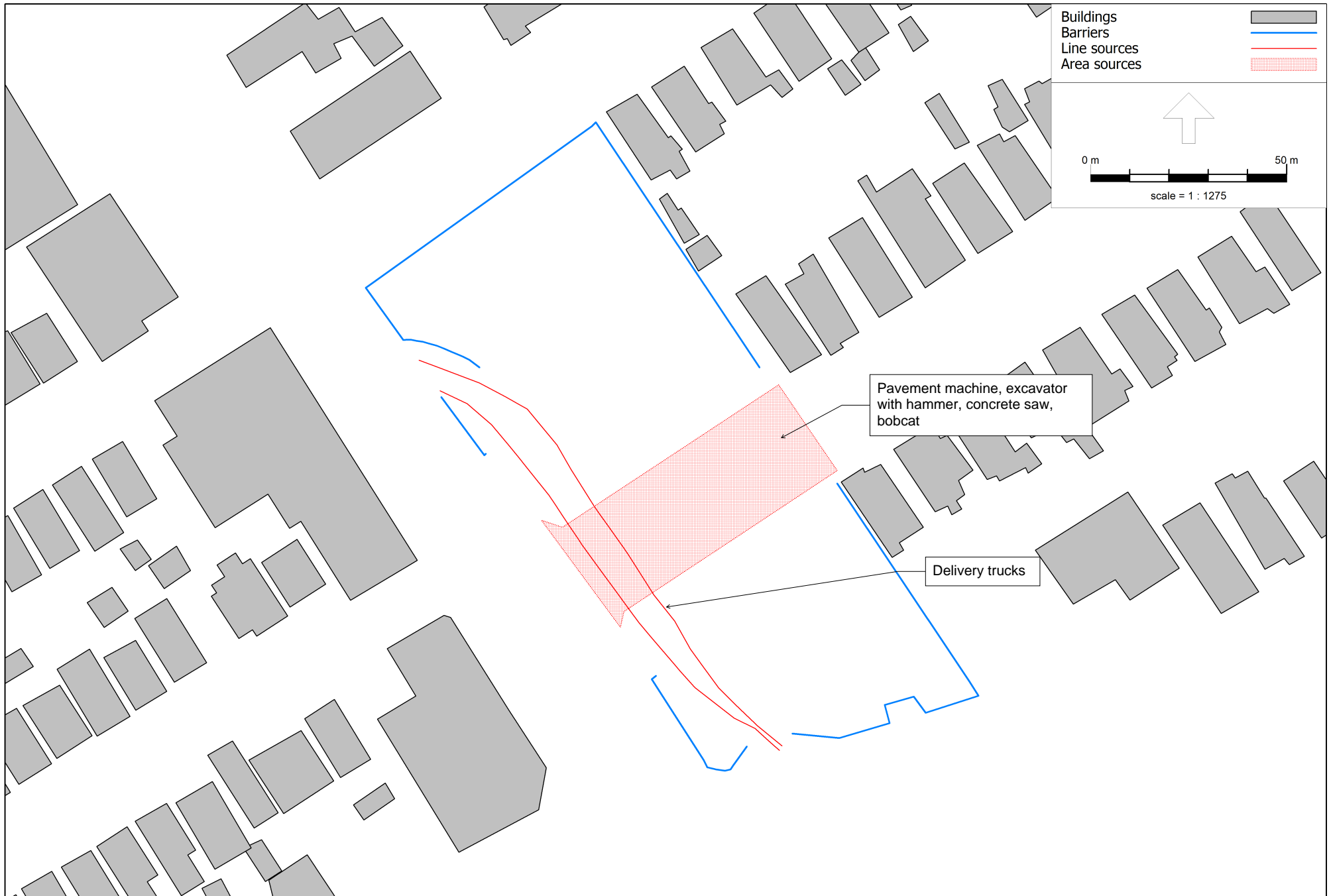
**Figure B.4** Site layout – Stage 4



**Figure B.5** Site layout – Stage 5



**Figure B.6** Site layout – Stage 6



**Figure B.7** Site layout – Stage 7

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# Appendix C

## Predicted noise levels

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ID	NCA	Latitude	Longitude	Address	Land Use	NML Day (s)	Predicted noise levels, dB Laeq,15min						
							Stage 1	Stage 2	Stage 3	Stage 4	Stage 5	Stage 6	Stage 7
22823	1	326976.44	6249961.65	512 PARRAMATTA ROAD, ASHFIELD NSW 2131	COM	70	52	48	51	51	55	59	72
18848	1	326923.75	6249971.27	22 EARLE AVENUE, ASHFIELD NSW 2131	RES	56	46	39	40	44	49	51	65
16423	1	326941.83	6250017.6	530 PARRAMATTA ROAD, ASHFIELD NSW 2131	COM	70	45	55	63	52	61	65	63
18189	1	326892.74	6249952.07	18 EARLE AVENUE, ASHFIELD NSW 2131	RES	56	47	38	40	43	48	51	62
21159	1	326883.14	6249945.61	16 EARLE AVENUE, ASHFIELD NSW 2131	RES	56	47	37	37	42	48	50	61
19172	1	326873.14	6249940.32	14 EARLE AVENUE, ASHFIELD NSW 2131	RES	56	47	36	38	41	47	49	60
22833	1	326890.92	6250068.19	30 PAGE AVENUE, ASHFIELD NSW 2131	COM	70	42	51	55	46	55	58	60
29318	1	326997.06	6249876.38	476-500 PARRAMATTA ROAD, ASHFIELD NSW 2131	COM	70	57	42	41	45	51	56	59
14657	1	326910.17	6249940.2	17 EARLE AVENUE, ASHFIELD NSW 2131	RES	56	42	38	47	43	48	51	58
19687	1	326843.09	6249920.25	8 EARLE AVENUE, ASHFIELD NSW 2131	RES	56	47	35	35	40	47	50	58
24501	1	326862.66	6250097.29	552-554 PARRAMATTA ROAD, ASHFIELD NSW 2131	COM	70	42	48	52	44	53	56	58
19072	1	326932.61	6249978.88	24 EARLE AVENUE, ASHFIELD NSW 2131	RES	56	45	38	42	43	46	49	57
18315	1	326823.14	6249908.87	4 EARLE AVENUE, ASHFIELD NSW 2131	RES	56	47	34	33	39	45	48	57
19112	1	326834.65	6249960.97	15 PAGE AVENUE, ASHFIELD NSW 2131	RES	56	46	39	46	42	47	51	57
20754	1	326841.38	6249971.37	17 PAGE AVENUE, ASHFIELD NSW 2131	RES	56	46	38	44	40	47	50	56
22181	1	326799.58	6249896.13	51 HENRY STREET, ASHFIELD NSW 2131	RES	56	47	33	37	39	45	48	56
18377	1	326825.69	6250171.52	18-20 KNOCKLAYDE STREET, ASHFIELD NSW 2131	COM	70	41	43	48	41	49	52	55
19073	1	326887.36	6249869.62	152 FREDERICK STREET, ASHFIELD NSW 2131	RES	56	42	35	42	39	46	49	54
22833	1	326893.23	6250046.67	30 PAGE AVENUE, ASHFIELD NSW 2131	COM	70	43	41	53	43	50	54	54
18188	1	326860.99	6249982.01	21 PAGE AVENUE, ASHFIELD NSW 2131	RES	56	44	38	47	42	47	51	54
17004	1	326784.83	6249930.11	5 PAGE AVENUE, ASHFIELD NSW 2131	RES	56	45	38	46	40	46	50	54
25100	1	326849.8	6249721.02	28 HENRY STREET, ASHFIELD NSW 2131	RES	56	49	35	39	37	47	49	54
17186	1	326851.62	6249974.98	19 PAGE AVENUE, ASHFIELD NSW 2131	RES	56	44	39	48	42	47	51	54
21423	1	327111.72	6249722.62	306 PARRAMATTA ROAD, ASHFIELD NSW 2131	RES	56	51	35	36	38	47	51	54
20472	1	326764.04	6249920.7	1 PAGE AVENUE, ASHFIELD NSW 2131	RES	56	44	34	36	38	44	47	54
18412	1	326875.15	6249862.85	150 FREDERICK STREET, ASHFIELD NSW 2131	RES	56	44	34	43	38	45	48	54
17823	1	326791.26	6249940.42	7 PAGE AVENUE, ASHFIELD NSW 2131	RES	56	46	33	41	35	44	47	53
22220	1	327118.9	6249712.14	304 PARRAMATTA ROAD, ASHFIELD NSW 2131	RES	56	51	36	38	38	47	51	53
18803	1	326935.48	6249950.16	21 EARLE AVENUE, ASHFIELD NSW 2131	RES	56	42	39	47	44	47	51	53
22599	1	327123.22	6249703.68	302 PARRAMATTA ROAD, ASHFIELD NSW 2131	COM	70	51	35	36	37	47	50	53
21021	1	326825.59	6249882.63	1 EARLE AVENUE, ASHFIELD NSW 2131	RES	56	37	35	48	38	47	51	53
20755	1	326803.63	6249943.37	9 PAGE AVENUE, ASHFIELD NSW 2131	RES	56	45	37	45	39	45	49	53
15277	1	326890.81	6249766.15	27 HENRY STREET, ASHFIELD NSW 2131	RES	56	50	36	39	38	47	50	53
20077	1	326863.42	6249906.62	9 EARLE AVENUE, ASHFIELD NSW 2131	RES	56	39	36	48	40	47	51	53
22713	1	326666.61	6249858.38	42 LUCY STREET, ASHFIELD NSW 2131	RES	56	45	32	39	34	44	47	53
14949	1	326924.14	6249775.07	17 HENRY STREET, ASHFIELD NSW 2131	RES	56	42	35	40	40	45	48	53
27860	1	327131.85	6249687.18	298 PARRAMATTA ROAD, ASHFIELD NSW 2131	COM	70	50	35	38	37	46	50	53
28475	1	327127.27	6249695.87	300 PARRAMATTA ROAD, ASHFIELD NSW 2131	RES	56	50	34	35	36	46	50	53
22043	1	326668.69	6249903.8	48 LUCY STREET, ASHFIELD NSW 2131	RES	56	42	32	43	35	43	47	52
21829	1	326812.69	6249950.5	11 PAGE AVENUE, ASHFIELD NSW 2131	RES	56	44	37	45	40	46	49	52
19889	1	326802.19	6249993.66	14 PAGE AVENUE, ASHFIELD NSW 2131	RES	56	42	36	47	39	46	50	52
18629	1	326804.25	6249871.78	49 HENRY STREET, ASHFIELD NSW 2131	RES	56	35	33	47	38	45	49	52
17113	1	326811.2	6250000.22	16 PAGE AVENUE, ASHFIELD NSW 2131	RES	56	42	36	48	39	46	50	52
16728	1	326840.65	6250018.06	22 PAGE AVENUE, ASHFIELD NSW 2131	RES	56	42	37	48	40	47	51	52
19111	1	326790.68	6249987.61	12 PAGE AVENUE, ASHFIELD NSW 2131	RES	56	42	36	47	39	46	50	52
18670	1	326861.61	6249705.89	26 HENRY STREET, ASHFIELD NSW 2131	OME	65	44	34	39	38	45	48	52
18256	1	326820.47	6250006.58	18 PAGE AVENUE, ASHFIELD NSW 2131	RES	56	42	37	48	39	46	51	52
16440	1	326829.86	6250011.54	20 PAGE AVENUE, ASHFIELD NSW 2131	RES	56	42	37	48	40	47	51	52
22720	1	326869.03	6249693.7	24 HENRY STREET, ASHFIELD NSW 2131	RES	56	44	34	41	37	45	48	52
17266	1	326808.57	6249772.17	181 FREDERICK STREET, ASHFIELD NSW 2131	RES	56	48	36	42	38	45	49	52
17028	1	326797.72	6249765.33	179 FREDERICK STREET, ASHFIELD NSW 2131	RES	56	49	36	42	37	45	49	52
15026	1	326899.28	6249719.92	13 HENRY STREET, ASHFIELD NSW 2131	OCC	65	43	35	40	38	45	48	52
23685	1	326907.92	6249831.42	187 FREDERICK STREET, ASHFIELD NSW 2131	RES	56	50	37	40	40	46	49	52
18631	1	326875.52	6249683.75	22 HENRY STREET, ASHFIELD NSW 2131	RES	56	43	33	41	37	44	48	52
17656	1	326920.31	6249841.35	189 FREDERICK STREET, ASHFIELD NSW 2131	RES	56	53	38	41	40	46	51	52
17299	1	326787.57	6249758.88	177 FREDERICK STREET, ASHFIELD NSW 2131	RES	56	49	36	42	37	45	49	52
21704	1	326724.89	6249892.47	54 LUCY STREET, ASHFIELD NSW 2131	RES	56	44	34	42	36	43	47	51
20311	1	326850.58	6250024.64	24 PAGE AVENUE, ASHFIELD NSW 2131	RES	56	42	37	48	40	46	51	51
19810	1	326715.56	6249886.68	52 LUCY STREET, ASHFIELD NSW 2131	RES	56	44	35	43	36	44	48	51
19759	1	326676.83	6249685.28	151 FREDERICK STREET, ASHFIELD NSW 2131	RES	56	46	34	44	37	45	49	51
31164	1	326879.12	6249815.9	185 FREDERICK STREET, ASHFIELD NSW 2131	RES	56	52	37	41	39	45	50	51
21196	1	326780.02	6249982.16	10 PAGE AVENUE, ASHFIELD NSW 2131	RES	56	42	36	48	39	46	50	51
21020	1	326772.3	6249975.63	8 PAGE AVENUE, ASHFIELD NSW 2131	RES	56	42	36	47	38	45	50	51
19654	1	326844.15	6249894.57	5 EARLE AVENUE, ASHFIELD NSW 2131	RES	56	38	34	47	39	46	50	51
14656	1	326800.56	6250025.86	16 PAGE AVENUE, ASHFIELD NSW 2131	RES	56	42	36	44	37	45	49	51
27422	1	326714.64	6249948.92	42 HENRY STREET, ASHFIELD NSW 2131	RES	56	43	32	40	35	43	47	51
22499	1	326880.84	6249673.93	20 HENRY STREET, ASHFIELD NSW 2131	RES	56	43	33	41	36	44	48	51
20977	1	326762.41	6249969.33	6 PAGE AVENUE, ASHFIELD NSW 2131	RES	56	42	36	47	38	45	49	51
20432	1	326852.55	6249801.14	37 HENRY STREET, ASHFIELD NSW 2131	OME	65	52	36	42	38	45	50	51
20162	1	326735.15	6249898.43	56 LUCY STREET, ASHFIELD NSW 2131	RES	56	44	35	44	37	43	47	51
20602	1	326743.02	6249903.35	58 LUCY STREET, ASHFIELD NSW 2131	RES	56	43	34	43	35	43	47	51
19768	1	326924.13	6249940.92	19 EARLE AVENUE, ASHFIELD NSW 2131	RES	56	41	39	47	42	47	51	51
25830	1	326702.36	6249881	50 LUCY STREET, ASHFIELD NSW 2131	RES	56	44	32	38	34	42	46	51
24480	1	326691.06	6249872.53	46 LUCY STREET, ASHFIELD NSW 2131	RES	56	44	34	43	35	44	48	51
18804	1	326722.41	6249942.03	40 HENRY STREET, ASHFIELD NSW 2131	RES	56	42	34	46	35	44	49	51
17087	1	326790.96	6249917.71	55 HENRY STREET, ASHFIELD NSW 2131	RES	56	39	36	47	37	43	48	51
23667	1	326639.31	6249786.03	39 LUCY STREET, ASHFIELD NSW 2131	RES	56	46	28	25	34	42	45	51
18378	1	326825.49	6249780.18	183 FREDERICK STREET, ASHFIELD NSW 2131	RES	56	44	32	42	37	43	47	51
18281	1	326867.03	6249855.92	148 FREDERICK STREET, ASHFIELD NSW 2131	RES	56	43	34	45	38	44	48	51
22004	1	326752.13	6249962.66	4 PAGE AVENUE, ASHFIELD NSW 2131	RES	56	42	35	46	37	45	49	51
17354	1	326713.82	6249918.81	38 HENRY STREET, ASHFIELD NSW 2131	RES	56	43	32	43	34	42	47	51
27734	1	326805	6250044.67	18-20 KNOCKLAYDE STREET, ASHFIELD NSW 2131	RES	56	41	36	46	38	46	49	51
22336	1	326677.75	6249864.14	44 LUCY STREET, ASHFIELD NSW 2131	RES	56	44	35	44	35	43	48	51
17349	1	326742.07	6249957.18	2 PAGE AVENUE, ASHFIELD NSW 2131	RES	56	43	35	46	37	44	49	51
17559	1	326763.53	6249743.96	173 FREDERICK STREET, ASHFIELD NSW 2131	RES	56	49	35	42	36	44	48	51
16979	1	326859.98	6250030.09	26 PAGE AVENUE, ASHFIELD NSW 2131	RES	56	42	37	48	40	45	50	51
20068	1	326752.42	6249738.3	171 FREDERICK STREET, ASHFIELD NSW 2131	RES	56	49	34	43	36	44	48	50
21831	1	326662.34	6249925.54	17 KNOCKLAYDE STREET, ASHFIELD NSW 2131	RES	56	43	30	39	33	42	45	50
21191	1	326656.53	6249848.86	40 LUCY STREET, ASHFIELD NSW 2131	RES	56	45	33	42	35	43	47	50
22117	1	326648.56	6249843.82	38 LUCY STREET, ASHFIELD NSW 2131	RES	56	45	32	42	35	42	47	50
22154	1	326753.26	6249673.4	2A TAWA STREET, ASHFIELD NSW 2131	RES	56	40	31	43	34	43	47	50
2020													

18148	1	326616.75	6249773.42	37 CHURCH STREET, ASHFIELD NSW 2131	RES	56	46	27	33	32	39	43	48
17005	1	326618.52	6249934.64	16 KNOCKLAYDE STREET, ASHFIELD NSW 2131	RES	56	40	29	41	32	40	44	47
15018	1	326614.42	6249932.19	14 KNOCKLAYDE STREET, ASHFIELD NSW 2131	RES	56	40	29	40	32	39	43	47
25322	1	326699.86	6249972.22	46 HENRY STREET, ASHFIELD NSW 2131	RES	56	40	31	42	34	41	45	47
31182	1	326816.05	6250093.12	18-20 KNOCKLAYDE STREET, ASHFIELD NSW 2131	RES	56	37	32	43	36	41	45	47
20122	1	326832.69	6249824.28	39 HENRY STREET, ASHFIELD NSW 2131	RES	56	41	30	39	35	40	44	47
19800	1	326631.64	6249734.92	31 CHURCH STREET, ASHFIELD NSW 2131	RES	56	45	26	26	31	40	43	46
17025	1	326583.98	6249905.36	8 KNOCKLAYDE STREET, ASHFIELD NSW 2131	RES	56	39	27	38	31	39	43	46
20347	1	326881.44	6250016.06	27 PAGE AVENUE, ASHFIELD NSW 2131	RES	56	39	35	42	32	40	44	46
20501	1	326592.89	6249912.88	10 KNOCKLAYDE STREET, ASHFIELD NSW 2131	RES	56	39	27	36	31	38	42	46
16581	1	326605.88	6249869.35	5 KNOCKLAYDE STREET, ASHFIELD NSW 2131	RES	56	40	27	38	31	37	42	46
22439	1	326707.97	6249965.28	44 HENRY STREET, ASHFIELD NSW 2131	RES	56	40	29	40	34	40	44	46
20121	1	326833.45	6249833.11	41 HENRY STREET, ASHFIELD NSW 2131	RES	56	44	30	43	35	40	46	46
17851	1	326601.32	6249916.81	12 KNOCKLAYDE STREET, ASHFIELD NSW 2131	RES	56	39	27	38	31	38	42	46
20312	1	326892.15	6249899.66	13 EARLE AVENUE, ASHFIELD NSW 2131	RES	56	50	34	36	36	42	46	46
18750	1	326596.46	6249865.08	3 KNOCKLAYDE STREET, ASHFIELD NSW 2131	RES	56	38	26	33	30	36	40	46
31676	1	326630.87	6250003.5	18-20 KNOCKLAYDE STREET, ASHFIELD NSW 2131	RES	56	37	29	40	32	40	44	45
24389	1	326744.66	6249700.9	163 FREDERICK STREET, ASHFIELD NSW 2131	RES	56	41	28	38	31	39	43	45
17755	1	326687.12	6249690.96	153 FREDERICK STREET, ASHFIELD NSW 2131	RES	56	44	30	42	32	42	46	45
17474	1	326903.31	6249904.27	15 EARLE AVENUE, ASHFIELD NSW 2131	RES	56	48	34	37	36	42	46	45
31030	1	326778.28	6250071.87	18-20 KNOCKLAYDE STREET, ASHFIELD NSW 2131	RES	56	38	30	41	35	40	43	45
29874	1	326843.13	6249735.96	30 HENRY STREET, ASHFIELD NSW 2131	RES	56	49	33	37	35	42	46	45
31618	1	326720.78	6250108.58	18-20 KNOCKLAYDE STREET, ASHFIELD NSW 2131	RES	56	35	26	36	28	37	41	45
21160	1	326819.53	6249862.55	47 HENRY STREET, ASHFIELD NSW 2131	RES	56	42	28	38	34	38	42	44
18848	1	326911.73	6249988.36	22 EARLE AVENUE, ASHFIELD NSW 2131	RES	56	38	35	45	35	41	46	44
21932	1	326617.3	6249802.5	37 LUCY STREET, ASHFIELD NSW 2131	RES	56	29	29	43	32	39	44	44
19767	1	326892.49	6249975.76	20 EARLE AVENUE, ASHFIELD NSW 2131	RES	56	38	34	47	34	40	47	44
17235	1	326615.71	6249876.59	7 KNOCKLAYDE STREET, ASHFIELD NSW 2131	RES	56	38	28	39	31	37	42	44
29584	1	326582.16	6249953.4	18-20 KNOCKLAYDE STREET, ASHFIELD NSW 2131	RES	56	37	26	37	31	37	41	44
21012	1	326578.83	6249747.15	48 CHURCH STREET, ASHFIELD NSW 2131	RES	56	28	23	36	28	34	39	44
18666	1	326861.25	6250003.7	23 PAGE AVENUE, ASHFIELD NSW 2131	RES	56	39	33	39	32	38	42	44
17498	1	326642.69	6249906.22	13 KNOCKLAYDE STREET, ASHFIELD NSW 2131	RES	56	38	26	37	32	37	41	44
26115	1	326722.3	6249714.62	161 FREDERICK STREET, ASHFIELD NSW 2131	RES	56	40	29	43	33	39	45	44
14855	1	326757.92	6249705.95	169 FREDERICK STREET, ASHFIELD NSW 2131	RES	56	41	26	35	29	37	41	44
20655	1	326884.89	6249893.43	11 EARLE AVENUE, ASHFIELD NSW 2131	RES	56	50	35	34	36	42	47	44
15343	1	326831.9	6249861.9	45 HENRY STREET, ASHFIELD NSW 2131	RES	56	41	27	34	33	37	41	43
16582	1	326581.11	6249834.6	43 CHURCH STREET, ASHFIELD NSW 2131	RES	56	35	27	39	30	36	41	43
15324	1	326965.05	6249754.72	13 HENRY STREET, ASHFIELD NSW 2131	OCC	65	41	30	38	34	38	43	43
30053	1	326607.06	6249704.89	134 FREDERICK STREET, ASHFIELD NSW 2131	RES	56	34	25	38	29	36	40	43
17490	1	326636.31	6249887.64	11 KNOCKLAYDE STREET, ASHFIELD NSW 2131	RES	56	36	25	36	29	35	39	43
20601	1	326645.85	6249959.49	18-20 KNOCKLAYDE STREET, ASHFIELD NSW 2131	RES	56	38	27	39	32	37	42	43
31383	1	326739.36	6250049.12	18-20 KNOCKLAYDE STREET, ASHFIELD NSW 2131	RES	56	36	28	39	34	38	42	43
20699	1	326925.14	6249873.73	158 FREDERICK STREET, ASHFIELD NSW 2131	RES	56	53	34	35	33	39	47	43
19883	1	326594.79	6249733.67	46 CHURCH STREET, ASHFIELD NSW 2131	RES	56	38	28	41	31	38	43	43
17857	1	326854.04	6249947.93	12 EARLE AVENUE, ASHFIELD NSW 2131	RES	56	38	33	44	35	39	45	43
21265	1	326580.29	6249758.76	50 CHURCH STREET, ASHFIELD NSW 2131	RES	56	39	24	35	29	35	40	43
19732	1	326871.13	6250009.58	25 PAGE AVENUE, ASHFIELD NSW 2131	RES	56	37	34	40	32	38	42	43
15337	1	326700.85	6250027.14	18-20 KNOCKLAYDE STREET, ASHFIELD NSW 2131	RES	56	36	28	39	33	38	42	43
18667	1	326904.42	6249860.71	154 FREDERICK STREET, ASHFIELD NSW 2131	RES	56	52	30	34	31	38	46	43
17209	1	327058.07	6249677.68	5 ILFORD AVENUE, ASHFIELD NSW 2131	RES	56	41	24	31	30	35	39	41
18590	1	326672.89	6249934.46	19 KNOCKLAYDE STREET, ASHFIELD NSW 2131	RES	56	38	27	36	31	35	40	41
18540	1	326581.94	6249814.25	41 CHURCH STREET, ASHFIELD NSW 2131	RES	56	33	23	34	29	33	37	41
18798	1	326598.57	6249785.84	35 CHURCH STREET, ASHFIELD NSW 2131	RES	56	31	25	40	29	35	41	41
18710	1	326866.91	6249837.7	146 FREDERICK STREET, ASHFIELD NSW 2131	RES	56	50	29	33	30	36	45	41
20348	1	326841.35	6249942.3	10 EARLE AVENUE, ASHFIELD NSW 2131	RES	56	35	34	47	35	38	47	40
22005	1	326802.1	6249920.74	2 EARLE AVENUE, ASHFIELD NSW 2131	RES	56	35	32	47	34	38	47	39
14810	1	326800.57	6249706.84	28A HENRY STREET, ASHFIELD NSW 2131	RES	56	36	30	41	31	34	42	38
18849	1	326826.54	6249835.46	43 HENRY STREET, ASHFIELD NSW 2131	RES	56	45	29	32	32	36	41	38
18373	1	326627.52	6249885.49	9 KNOCKLAYDE STREET, ASHFIELD NSW 2131	RES	56	34	22	32	26	32	36	38
15358	1	326746.64	6249707.91	167 FREDERICK STREET, ASHFIELD NSW 2131	RES	56	37	23	30	24	33	36	38
28348	1	326558.9	6249699.72	130 FREDERICK STREET, ASHFIELD NSW 2131	RES	56	30	22	36	27	33	38	37
18996	1	326782.27	6249905.43	53 HENRY STREET, ASHFIELD NSW 2131	RES	56	34	28	39	31	34	40	37
22364	1	326626.77	6249831.2	34 LUCY STREET, ASHFIELD NSW 2131	RES	56	46	29	34	32	37	43	36
21609	1	326983.42	6249667.25	10 ILFORD AVENUE, ASHFIELD NSW 2131	RES	56	34	23	28	22	31	34	36
31635	1	326768.66	6250138.26	18-20 KNOCKLAYDE STREET, ASHFIELD NSW 2131	RES	56	31	30	35	27	31	36	36
20756	1	327034.02	6249673.74	7 ILFORD AVENUE, ASHFIELD NSW 2131	RES	56	35	23	28	21	30	34	36
18190	1	326796.05	6249728.5	175 FREDERICK STREET, ASHFIELD NSW 2131	RES	56	35	26	35	25	31	37	35
19882	1	326660.89	6249725.18	142 FREDERICK STREET, ASHFIELD NSW 2131	RES	56	39	23	30	27	30	36	35
31041	1	326695.02	6250093.83	18-20 KNOCKLAYDE STREET, ASHFIELD NSW 2131	RES	56	29	21	31	25	29	33	34
22707	1	326565.81	6249774.56	31-33 LUCY STREET, ASHFIELD NSW 2131	RES	56	30	25	42	25	30	41	33
21521	1	326739.97	6249670.05	2 TAWA STREET, ASHFIELD NSW 2131	RES	56	33	23	25	24	27	31	31
28511	1	326587.71	6249684.54	132 FREDERICK STREET, ASHFIELD NSW 2131	RES	56	31	19	27	19	26	31	30
21102	2	327071.17	6250009.74	5 NORTHCOTE STREET, HABERFIELD NSW 2045	RES	68	49	40	46	50	53	56	78
22766	2	327048.45	6250045.72	6 NORTHCOTE STREET, HABERFIELD NSW 2045	RES	68	49	43	51	52	55	58	78
22069	2	327059.39	6250064.78	8 NORTHCOTE STREET, HABERFIELD NSW 2045	RES	68	43	40	54	44	47	55	75
15276	2	327086.71	6250019.34	7 NORTHCOTE STREET, HABERFIELD NSW 2045	RES	68	49	39	45	48	54	56	73
22715	2	327069.52	6250072.72	10 NORTHCOTE STREET, HABERFIELD NSW 2045	RES	68	42	39	54	42	47	54	70
16948	2	327099.08	6250027.67	9 NORTHCOTE STREET, HABERFIELD NSW 2045	RES	68	46	38	45	46	52	54	70
17616	2	327111.45	6250035.8	11 NORTHCOTE STREET, HABERFIELD NSW 2045	RES	68	45	37	44	45	51	53	68
21651	2	327095.02	6250060.77	12 NORTHCOTE STREET, HABERFIELD NSW 2045	RES	68	48	38	40	44	51	53	68
20838	2	327124.48	6250044.47	13 NORTHCOTE STREET, HABERFIELD NSW 2045	RES	68	43	36	44	44	50	52	66
18201	2	327107.72	6250068.78	16 NORTHCOTE STREET, HABERFIELD NSW 2045	RES	68	47	37	39	43	50	52	66
19754	2	327150.21	6250059.69	17 NORTHCOTE STREET, HABERFIELD NSW 2045	RES	68	42	35	42	42	49	50	65
18740	2	327163.57	6250067.89	19 NORTHCOTE STREET, HABERFIELD NSW 2045	RES	68	40	35	41	41	49	51	65
22146	2	327138.97	6250053.14	15 NORTHCOTE STREET, HABERFIELD NSW 2045	RES	68	42	36	42	43	49	51	65
20735	2	327119.5	6250077.31	18 NORTHCOTE STREET, HABERFIELD NSW 2045	RES	68	47	36	38	42	48	51	64
19024	2	327133.85	6250087.63	20 NORTHCOTE STREET, HABERFIELD NSW 2045	RES	68	46	35	37	41	48	50	63
22206	2	327171.31	6250077.74	21 NORTHCOTE STREET, HABERFIELD NSW 2045	RES	68	39	33	41	41	47	49	62
22184	2	327145.29	6250096.16	24 NORTHCOTE STREET, HABERFIELD NSW 2045	RES	68	45	34	36	40	47	49	62
17406	2	327158.85	6250102.31	26 NORTHCOTE STREET, HABERFIELD NSW 2045	RES	68	43	33	34	40	47	48	61
22778	2	327122.67	6249983.61	6-12 WATTLE STREET, HABERFIELD NSW 2045	OPW	65	56	42	44	46	52	56	58
18114	2	327028.26	6250085.98	5 WOLSELEY STREET, HABERFIELD NSW 2045	RES	68	45	41	54	47	52	56	58
17286	2	32705											

18302	2	327048.15	6250170.67	2 WOLSELEY STREET, HABERFIELD NSW 2045	RES	68	41	35	46	40	44	48	49
24452	2	327085.07	6250128.57	15 WOLSELEY STREET, HABERFIELD NSW 2045	RES	68	40	34	44	38	43	47	48
21508	2	327066.49	6250126.49	13 WOLSELEY STREET, HABERFIELD NSW 2045	RES	68	43	33	43	38	42	46	47
17557	2	327139.8	6250167.13	25 WOLSELEY STREET, HABERFIELD NSW 2045	RES	68	40	36	42	39	43	46	47
16877	2	326914.29	6250112.41	273 PARRAMATTA ROAD, HABERFIELD NSW 2045	COM	70	38	34	43	35	43	45	47
19753	2	327075.01	6250180.91	4 WOLSELEY STREET, HABERFIELD NSW 2045	RES	68	40	34	45	39	43	47	47
15039	2	326905	6250174.43	315 PARRAMATTA ROAD, HABERFIELD NSW 2045	COM	70	39	30	41	33	41	45	47
21150	2	327155.04	6249999.82	16 WATTLE STREET, HABERFIELD NSW 2045	RES	68	46	32	41	37	40	45	46
25367	2	327110.15	6250204.64	12 WOLSELEY STREET, HABERFIELD NSW 2045	RES	68	39	32	43	37	41	45	46
25215	2	327098.29	6250196.94	8 WOLSELEY STREET, HABERFIELD NSW 2045	RES	68	40	33	44	37	41	46	46
24244	2	327120.54	6250215.75	14 WOLSELEY STREET, HABERFIELD NSW 2045	RES	68	39	31	36	36	40	43	45
14603	2	327011.05	6250187.71	5 COVE STREET, HABERFIELD NSW 2045	RES	68	39	31	42	32	40	44	45
28147	2	326900.3	6250205.18	113 DOBROYD PARADE, HABERFIELD NSW 2045	OCC	65	38	28	40	35	39	43	45
19724	2	327123.99	6250154.24	23 WOLSELEY STREET, HABERFIELD NSW 2045	RES	68	41	30	37	36	40	43	45
18831	2	326988.34	6250146.65	4 COVE STREET, HABERFIELD NSW 2045	RES	68	38	31	42	32	38	43	44
22263	2	327077.3	6250194.75	6 WOLSELEY STREET, HABERFIELD NSW 2045	RES	68	39	28	39	33	38	42	43
22262	2	326979.01	6250159.94	6 COVE STREET, HABERFIELD NSW 2045	RES	68	37	31	41	31	38	42	43
17104	2	326982.55	6250212.41	11 COVE STREET, HABERFIELD NSW 2045	RES	68	36	27	39	32	37	41	42
20583	2	326954.01	6250195.26	12 COVE STREET, HABERFIELD NSW 2045	RES	68	36	28	38	28	35	39	41
20585	2	327266.61	6249904.83	26 WALKER AVENUE, HABERFIELD NSW 2045	RES	68	38	26	29	35	33	37	39
21348	2	327306.92	6249912.97	32 WALKER AVENUE, HABERFIELD NSW 2045	RES	68	36	23	29	24	31	35	37
20297	2	327289.05	6249900.59	28 WALKER AVENUE, HABERFIELD NSW 2045	RES	68	37	26	28	26	30	34	35
21928	2	327296.76	6249906.7	30 WALKER AVENUE, HABERFIELD NSW 2045	RES	68	36	25	28	25	30	34	35
24937	2	327313.11	6249916.86	34 WALKER AVENUE, HABERFIELD NSW 2045	RES	68	34	22	27	23	29	33	34
22555	3	327197.29	6250092.49	23 NORTHCOTE STREET, HABERFIELD NSW 2045	RES	68	38	31	40	38	45	47	60
20148	3	327209.52	6250101.61	25 NORTHCOTE STREET, HABERFIELD NSW 2045	RES	68	38	31	39	38	45	47	60
18534	3	327183.5	6250119.77	28 NORTHCOTE STREET, HABERFIELD NSW 2045	RES	68	42	32	36	37	45	47	59
19725	3	327233.02	6250152.57	36 NORTHCOTE STREET, HABERFIELD NSW 2045	RES	68	40	30	34	37	44	46	59
20462	3	327207.25	6250134.65	32 NORTHCOTE STREET, HABERFIELD NSW 2045	RES	68	41	31	34	37	45	46	58
17881	3	327220.28	6250144.19	34 NORTHCOTE STREET, HABERFIELD NSW 2045	RES	68	41	30	35	36	44	46	58
22771	3	327243.26	6250158.68	38 NORTHCOTE STREET, HABERFIELD NSW 2045	RES	68	40	30	33	36	43	45	57
15166	3	327258.39	6250131.74	33 NORTHCOTE STREET, HABERFIELD NSW 2045	RES	68	35	30	39	37	43	45	57
18835	3	327273.32	6250141.32	35 NORTHCOTE STREET, HABERFIELD NSW 2045	RES	68	37	29	38	37	43	45	56
21258	3	327294.24	6250192.8	46 NORTHCOTE STREET, HABERFIELD NSW 2045	RES	68	38	27	30	32	41	43	54
20736	3	327248.68	6250123.77	31 NORTHCOTE STREET, HABERFIELD NSW 2045	RES	68	37	30	39	36	41	44	54
21852	3	327324.21	6250176	43 NORTHCOTE STREET, HABERFIELD NSW 2045	RES	68	32	27	36	34	41	43	54
17922	3	327307.02	6250200.74	48 NORTHCOTE STREET, HABERFIELD NSW 2045	RES	68	38	27	33	33	41	43	54
19026	3	327336.39	6250183.47	45 NORTHCOTE STREET, HABERFIELD NSW 2045	RES	68	34	27	36	31	39	42	53
17816	3	327320.11	6250208.99	50 NORTHCOTE STREET, HABERFIELD NSW 2045	RES	68	38	27	31	33	41	43	52
15241	3	327332.66	6250217.17	52 NORTHCOTE STREET, HABERFIELD NSW 2045	RES	68	37	26	30	33	41	42	52
22812	3	327336.5	6250111.96	44 WATTLE STREET, HABERFIELD NSW 2045	RES	68	39	30	38	36	41	44	52
21151	3	327362.39	6250200.66	49 NORTHCOTE STREET, HABERFIELD NSW 2045	RES	68	29	25	35	32	39	41	51
22270	3	327272.43	6250081.53	36A WATTLE STREET, HABERFIELD NSW 2045	RES	68	43	34	38	37	43	46	51
16607	3	327314.85	6250162.3	41 NORTHCOTE STREET, HABERFIELD NSW 2045	RES	68	35	29	39	31	39	43	51
20792	3	327269.34	6250067.17	32 WATTLE STREET, HABERFIELD NSW 2045	RES	68	42	32	39	36	42	45	50
16996	3	327349.83	6250192.84	47 NORTHCOTE STREET, HABERFIELD NSW 2045	RES	68	33	25	35	31	38	40	50
22413	3	327257.28	6250056.37	30 WATTLE STREET, HABERFIELD NSW 2045	RES	68	41	31	38	36	42	45	48
20386	3	327287.65	6250148.25	37 NORTHCOTE STREET, HABERFIELD NSW 2045	RES	68	35	25	37	30	33	39	48
15355	3	327308.59	6250091.26	40 WATTLE STREET, HABERFIELD NSW 2045	RES	68	40	29	34	34	39	42	48
27301	3	327219.27	6250046.92	26 WATTLE STREET, HABERFIELD NSW 2045	RES	68	42	32	37	37	41	44	48
20734	3	327163.28	6250175.87	27 WOLSELEY STREET, HABERFIELD NSW 2045	RES	68	40	36	43	38	43	46	48
22687	3	327236.71	6250114.71	29 NORTHCOTE STREET, HABERFIELD NSW 2045	RES	68	38	27	34	32	36	39	47
21773	3	327171.59	6250180.42	29 WOLSELEY STREET, HABERFIELD NSW 2045	RES	68	39	34	42	38	42	45	47
22454	3	327186.4	6250188.16	31 WOLSELEY STREET, HABERFIELD NSW 2045	RES	68	39	34	41	37	41	45	47
21851	3	327301.55	6250261.82	49 WOLSELEY STREET, HABERFIELD NSW 2045	RES	68	34	28	36	33	38	40	46
21471	3	327258.69	6250256.11	43 WOLSELEY STREET, HABERFIELD NSW 2045	RES	68	37	28	36	31	38	41	46
27684	3	327268.05	6250261.9	45 WOLSELEY STREET, HABERFIELD NSW 2045	RES	68	38	28	36	32	38	41	45
22585	3	327318.18	6250101.51	42 WATTLE STREET, HABERFIELD NSW 2045	RES	68	39	28	36	33	38	41	45
22297	3	327337.92	6250121.61	48 WATTLE STREET, HABERFIELD NSW 2045	RES	68	40	32	34	33	40	42	45
24476	3	327279.03	6250261.77	47 WOLSELEY STREET, HABERFIELD NSW 2045	RES	68	37	28	35	32	37	40	45
22602	3	327138.72	6250240.75	16 WOLSELEY STREET, HABERFIELD NSW 2045	RES	68	38	29	36	35	39	42	45
14854	3	327160.25	6250242.16	18 WOLSELEY STREET, HABERFIELD NSW 2045	RES	68	38	31	37	35	40	42	45
18402	3	327176.76	6250253.99	20 WOLSELEY STREET, HABERFIELD NSW 2045	RES	68	37	30	37	35	39	42	44
24611	3	327190.26	6250265.02	22 WOLSELEY STREET, HABERFIELD NSW 2045	RES	68	37	28	35	34	39	41	44
22777	3	327359.77	6250123.88	52 WATTLE STREET, HABERFIELD NSW 2045	RES	68	37	26	35	29	37	40	44
22147	3	327242.83	6250087.62	27 NORTHCOTE STREET, HABERFIELD NSW 2045	RES	68	46	34	31	31	40	45	43
18741	3	327296.73	6250082.25	38 WATTLE STREET, HABERFIELD NSW 2045	RES	68	40	28	34	32	37	41	43
16640	3	327196.83	6250201.22	33 WOLSELEY STREET, HABERFIELD NSW 2045	RES	68	39	28	34	33	37	40	43
21850	3	327272.41	6250202.79	44 NORTHCOTE STREET, HABERFIELD NSW 2045	RES	68	35	24	28	22	34	36	42
22250	3	327236.61	6250226.65	39 WOLSELEY STREET, HABERFIELD NSW 2045	RES	68	37	27	34	32	36	39	42
17182	3	327320.19	6250139.48	39 NORTHCOTE STREET, HABERFIELD NSW 2045	RES	68	40	28	33	30	36	39	42
27283	3	327244.1	6250049.38	28 WATTLE STREET, HABERFIELD NSW 2045	RES	68	38	28	34	31	36	39	42
19166	3	327367.89	6250129.72	54 WATTLE STREET, HABERFIELD NSW 2045	RES	68	34	24	34	30	34	38	41
22453	3	327184.98	6250143.09	30 NORTHCOTE STREET, HABERFIELD NSW 2045	RES	68	37	28	37	30	36	40	40
22165	3	327382.8	6250143.89	56 WATTLE STREET, HABERFIELD NSW 2045	RES	68	32	21	30	26	32	35	39
15024	3	327232.95	6250259.29	41 WOLSELEY STREET, HABERFIELD NSW 2045	RES	68	34	24	33	24	33	37	39
17407	3	327200.45	6250230.6	35 WOLSELEY STREET, HABERFIELD NSW 2045	RES	68	34	24	35	24	33	37	38
22583	3	327244.26	6250184.16	40 NORTHCOTE STREET, HABERFIELD NSW 2045	RES	68	34	25	42	27	33	42	37
22432	3	327255.46	6250195.04	42 NORTHCOTE STREET, HABERFIELD NSW 2045	RES	68	33	25	44	26	33	43	37
19195	3	327211.96	6250240.36	37 WOLSELEY STREET, HABERFIELD NSW 2045	RES	68	33	27	33	23	31	36	37
18981	3	327347.79	6249952.62	38 WALKER AVENUE, HABERFIELD NSW 2045	RES	68	35	22	29	24	31	34	36
22375	3	327359.59	6249959.55	40 WALKER AVENUE, HABERFIELD NSW 2045	RES	68	34	22	29	23	31	34	36
17339	3	327329.47	6249936.38	36 WALKER AVENUE, HABERFIELD NSW 2045	RES	68	34	23	28	29	30	34	35
16762	3	327388.58	6249976.96	46 WALKER AVENUE, HABERFIELD NSW 2045	RES	68	33	21	26	23	29	32	35
21428	3	327408.2	6249975.08	48 WALKER AVENUE, HABERFIELD NSW 2045	RES	68	32	21	27	21	29	32	34
20109	3	327429.41	6249988.25	52 WALKER AVENUE, HABERFIELD NSW 2045	RES	68	32	21	26	18	28	32	34
17884	3	327438.94	6249994.02	54 WALKER AVENUE, HABERFIELD NSW 2045	RES	68	32	20	26	18	28	32	33
20646	3	327409.85	6249987.54	50 WALKER AVENUE, HABERFIELD NSW 2045	RES	68	32	20	25	22	28	31	33
21299	3	327449.48	6250000.24	56 WALKER AVENUE, HABERFIELD NSW 2045	RES	68	31	19	25	17	28	31	33
22425	3	327375.02	6249954.13	42 WALKER AVENUE, HABERFIELD NSW 2045	RES	68	34	21	26	23	28	32	33
20004	3	327378.58	6249969.13	44 WALKER AVENUE, HABERFIELD NSW 2045	RES	68	32	21	26	24	28	31	33
17618	3	327451.19	6250012.23	58 WALKER AVENUE, HABERFIELD NSW 2045	RES	68	31	18	24	19	27	30	33
22035	4	327396.76	6250151.4	58 WATTLE STREET, HABERFIELD NSW 2045	RES	66	33	23	33	29	34	37	41
17340	6	327178.38	6249797.02	3 WALKER									



21970	6	327302.97	6249871.82	25 WALKER AVENUE, HABERFIELD NSW 2045	RES	56	45	35	35	38	41	45	46
22178	6	327277.3	6249758.45	156 ALT STREET, HABERFIELD NSW 2045	RES	56	42	32	33	35	40	44	46
22532	6	327287.71	6249775.09	158 ALT STREET, HABERFIELD NSW 2045	RES	56	43	31	34	36	40	44	45
19721	6	327153.82	6249721.79	209 PARRAMATTA ROAD, HABERFIELD NSW 2045	COM	70	39	31	34	33	39	43	45
22508	6	327306.4	6249800.43	162 ALT STREET, HABERFIELD NSW 2045	RES	56	42	29	35	38	40	44	45
22381	6	327299.79	6249787.76	160 ALT STREET, HABERFIELD NSW 2045	RES	56	42	30	34	36	39	44	45
19886	6	327339.74	6249806.78	168 ALT STREET, HABERFIELD NSW 2045	RES	56	42	29	35	35	39	44	45
17753	6	327321.12	6249870.01	27 WALKER AVENUE, HABERFIELD NSW 2045	RES	56	41	29	33	36	39	43	44
22760	6	327308.53	6249714.09	151 ALT STREET, HABERFIELD NSW 2045	RES	56	41	29	34	35	38	43	44
21071	6	327354.96	6249819.15	170 ALT STREET, HABERFIELD NSW 2045	RES	56	41	30	34	35	38	43	44
25128	6	327361.92	6249822.44	172 ALT STREET, HABERFIELD NSW 2045	RES	56	41	30	34	35	38	42	43
21774	6	327321.78	6249724.41	153 ALT STREET, HABERFIELD NSW 2045	RES	56	40	29	33	34	38	42	43
15136	6	327147.79	6249735.28	211 PARRAMATTA ROAD, HABERFIELD NSW 2045	COM	70	40	27	33	29	37	40	43
21309	6	327357.78	6249759.28	159 ALT STREET, HABERFIELD NSW 2045	RES	56	40	28	32	34	37	42	43
20196	6	327337.68	6249882.7	29 WALKER AVENUE, HABERFIELD NSW 2045	RES	56	41	29	29	35	37	41	43
18397	6	327190.67	6249738.25	207-209 PARRAMATTA ROAD, HABERFIELD NSW 2045	COM	70	42	25	32	31	36	41	43
16778	6	327241.31	6249673.24	139 ALT STREET, HABERFIELD NSW 2045	RES	56	42	26	32	34	37	42	43
20111	6	327394.18	6249833.8	174 ALT STREET, HABERFIELD NSW 2045	RES	56	40	28	31	34	37	41	42
19726	6	327509.24	6250085.94	251 RAMSAY STREET, HABERFIELD NSW 2045	RES	56	33	23	32	29	35	38	42
22531	6	327323.5	6249792.81	164A ALT STREET, HABERFIELD NSW 2045	RES	56	40	26	32	33	36	40	41
17694	6	327343.76	6249742.58	157 ALT STREET, HABERFIELD NSW 2045	RES	56	40	25	32	34	36	40	41
20333	6	327200.11	6249708.95	207-209 PARRAMATTA ROAD, HABERFIELD NSW 2045	COM	70	41	24	31	30	35	40	41
26640	6	327336.31	6249729.25	155 ALT STREET, HABERFIELD NSW 2045	RES	56	39	26	33	33	36	41	41
20306	6	327374.31	6249770.14	161 ALT STREET, HABERFIELD NSW 2045	RES	56	39	25	31	33	35	39	41
22523	6	327393.85	6249775.48	38 DENMAN AVENUE, HABERFIELD NSW 2045	RES	56	38	27	32	33	35	40	41
15290	6	327399.96	6249859.14	176 ALT STREET, HABERFIELD NSW 2045	RES	56	39	26	29	33	35	39	40
14919	6	327311.24	6249703.88	149 ALT STREET, HABERFIELD NSW 2045	RES	56	39	26	31	32	35	39	40
24909	6	327450.4	6249792.93	17 DENMAN AVENUE, HABERFIELD NSW 2045	RES	56	37	25	30	33	35	39	40
24613	6	327440.61	6249805.69	19 DENMAN AVENUE, HABERFIELD NSW 2045	RES	56	38	26	28	32	34	38	40
20883	6	327402.63	6249758.74	36 DENMAN AVENUE, HABERFIELD NSW 2045	RES	56	37	23	31	29	35	38	40
20296	6	327421.8	6249861.99	180 ALT STREET, HABERFIELD NSW 2045	RES	56	38	26	28	32	34	38	39
19296	6	327356.53	6249895.39	31 WALKER AVENUE, HABERFIELD NSW 2045	RES	56	37	27	29	32	34	38	39
24993	6	327458.87	6249777.18	15 DENMAN AVENUE, HABERFIELD NSW 2045	RES	56	36	24	31	32	33	38	39
22483	6	327430.86	6249869.99	184 ALT STREET, HABERFIELD NSW 2045	RES	56	36	26	28	32	34	37	39
16491	6	327264.8	6249689.11	143 ALT STREET, HABERFIELD NSW 2045	RES	56	37	21	28	29	31	35	37
17052	6	327366.48	6249912.4	33 WALKER AVENUE, HABERFIELD NSW 2045	RES	56	35	24	28	32	32	36	37
20794	6	327477.85	6249827.26	171 ALT STREET, HABERFIELD NSW 2045	RES	56	35	22	26	29	31	34	36
17726	6	327418.78	6249945.35	45 WALKER AVENUE, HABERFIELD NSW 2045	RES	56	34	23	27	31	30	34	36
17376	6	327491.9	6249841.35	173 ALT STREET, HABERFIELD NSW 2045	RES	56	35	22	26	28	30	34	36
22073	6	327407.26	6249934.9	43 WALKER AVENUE, HABERFIELD NSW 2045	RES	56	33	23	27	31	30	34	36
21510	6	327523.22	6250085.75	249 RAMSAY STREET, HABERFIELD NSW 2045	RES	56	29	17	26	22	28	31	34
16309	6	327400.43	6249920.66	41 WALKER AVENUE, HABERFIELD NSW 2045	RES	56	33	20	26	24	29	32	34
21997	6	327473.95	6249970.45	53 WALKER AVENUE, HABERFIELD NSW 2045	RES	56	31	18	26	19	28	31	33
26786	6	327390.8	6249900.32	37 WALKER AVENUE, HABERFIELD NSW 2045	RES	56	33	21	25	20	28	31	33
18889	6	327458.19	6249941.37	49 WALKER AVENUE, HABERFIELD NSW 2045	RES	56	31	20	26	17	28	31	33
22414	6	327468.35	6249945.17	51 WALKER AVENUE, HABERFIELD NSW 2045	RES	56	31	19	25	16	27	31	33
25957	6	327469.61	6250036.08	150 RAMSAY STREET, HABERFIELD NSW 2045	RES	56	29	18	24	24	27	30	32
21889	6	327532.59	6249950.23	132 RAMSAY STREET, HABERFIELD NSW 2045	RES	56	30	17	24	21	27	30	32
22542	6	327522.03	6249963.73	134 RAMSAY STREET, HABERFIELD NSW 2045	RES	56	30	17	24	21	26	30	32
21890	6	327532.55	6250058.17	245 RAMSAY STREET, HABERFIELD NSW 2045	RES	56	28	17	24	23	26	30	32
19295	6	327400.89	6249904.96	39 WALKER AVENUE, HABERFIELD NSW 2045	RES	56	31	20	25	21	26	30	32
24636	6	327460.59	6249816.67	169 ALT STREET, HABERFIELD NSW 2045	RES	56	31	18	25	19	26	30	32
21427	6	327478.54	6249967.91	55 WALKER AVENUE, HABERFIELD NSW 2045	RES	56	31	18	23	18	26	30	31
22543	6	327518.16	6249925.25	142 RAMSAY STREET, HABERFIELD NSW 2045	RES	56	28	17	25	15	26	29	31
17750	6	327444.39	6249927.24	47 WALKER AVENUE, HABERFIELD NSW 2045	RES	56	30	20	24	22	26	29	31
21996	6	327488.7	6249979.03	57 WALKER AVENUE, HABERFIELD NSW 2045	RES	56	29	16	24	19	25	29	31
22167	6	327466.7	6250050.19	154 RAMSAY STREET, HABERFIELD NSW 2045	RES	56	28	16	24	16	25	29	30
18024	6	327523.28	6249899.88	202 ALT STREET, HABERFIELD NSW 2045	RES	56	30	17	22	16	25	28	30
25414	6	327480.85	6250015.66	146 RAMSAY STREET, HABERFIELD NSW 2045	RES	56	28	17	23	17	25	28	30
18058	6	327459.26	6249860.03	186 ALT STREET, HABERFIELD NSW 2045	RES	56	30	18	23	20	25	28	30
17956	6	327471.43	6249880.04	192 ALT STREET, HABERFIELD NSW 2045	RES	56	29	17	23	20	25	28	30
17410	6	327470.77	6249867.04	190 ALT STREET, HABERFIELD NSW 2045	RES	56	30	20	23	19	24	28	30
22166	6	327521.57	6249990.17	138 RAMSAY STREET, HABERFIELD NSW 2045	RES	56	28	15	23	18	24	28	30
18659	6	327494.88	6249895.55	198 ALT STREET, HABERFIELD NSW 2045	RES	56	29	17	23	18	24	28	30
22520	6	327493.11	6249881.06	194 ALT STREET, HABERFIELD NSW 2045	RES	56	30	18	23	16	25	28	30
16849	6	327515.43	6249826.17	175 ALT STREET, HABERFIELD NSW 2045	RES	56	29	16	22	17	24	27	29
22475	6	327537.41	6249908.29	206 ALT STREET, HABERFIELD NSW 2045	RES	56	28	16	22	15	23	27	29
22326	6	327547.76	6250085.13	247 RAMSAY STREET, HABERFIELD NSW 2045	RES	56	26	18	22	14	24	27	29
20110	6	327527.86	6249842.44	177 ALT STREET, HABERFIELD NSW 2045	RES	56	29	17	22	15	24	27	29
22678	6	327541.23	6249845.35	179 ALT STREET, HABERFIELD NSW 2045	RES	56	30	17	22	15	24	28	29
19730	7	327432.32	6249724.43	30 DENMAN AVENUE, HABERFIELD NSW 2045	RES	56	39	26	32	32	37	40	42
18708	7	327430.74	6249706.5	28 DENMAN AVENUE, HABERFIELD NSW 2045	RES	56	38	25	31	30	36	40	42
16699	7	327383.6	6249676.29	154 BLAND STREET, HABERFIELD NSW 2045	RES	56	39	27	31	32	36	40	41
21825	7	327402.32	6249706.72	158 BLAND STREET, HABERFIELD NSW 2045	RES	56	38	25	30	32	35	39	40
15097	7	327413.19	6249738.29	32 DENMAN AVENUE, HABERFIELD NSW 2045	RES	56	37	25	30	31	33	38	39
22688	7	327339.98	6249665.26	140 BLAND STREET, HABERFIELD NSW 2045	RES	56	35	21	32	28	32	39	38
15331	7	327401.12	6249748.38	34 DENMAN AVENUE, HABERFIELD NSW 2045	RES	56	36	24	29	30	32	36	38
15341	7	327455.91	6249669.8	149A BLAND STREET, HABERFIELD NSW 2045	OED	65	35	23	29	30	32	36	37
21695	7	327472.46	6249760.39	160 BLAND STREET, HABERFIELD NSW 2045	RES	56	35	22	29	31	32	36	37
22208	7	327507.39	6249697.11	151 BLAND STREET, HABERFIELD NSW 2045	RES	56	34	21	28	29	31	35	36
19680	7	327533.74	6249715.63	155 BLAND STREET, HABERFIELD NSW 2045	RES	56	32	18	26	26	28	32	34
18837	7	327524.42	6249778.63	168 BLAND STREET, HABERFIELD NSW 2045	RES	56	32	18	25	26	28	32	34
17924	7	327521.25	6249707.06	153 BLAND STREET, HABERFIELD NSW 2045	RES	56	30	17	26	23	26	30	31
16469	7	327487.18	6249754.16	162 BLAND STREET, HABERFIELD NSW 2045	RES	56	30	16	24	22	26	29	31
25559	7	327409.23	6249690.77	156 BLAND STREET, HABERFIELD NSW 2045	RES	56	31	18	24	19	26	29	31
22390	7	327515.29	6249767.39	166 BLAND STREET, HABERFIELD NSW 2045	RES	56	29	15	22	20	24	28	30
22733	7	327511.92	6249755.52	164 BLAND STREET, HABERFIELD NSW 2045	RES	56	28	16	22	17	23	26	28
19794	7	327548.39	6249781.13	170 BLAND STREET, HABERFIELD NSW 2045	RES	56	28	15	21	14	22	26	28

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# Appendix D

## Vibration impact figures

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\*Yellow shaded buildings indicate receptors with potential to exceed structural vibration criteria

**Figure D.1** Vibration impacts – Heavy hydraulic hammer – Stages 4 and 6 - PPV



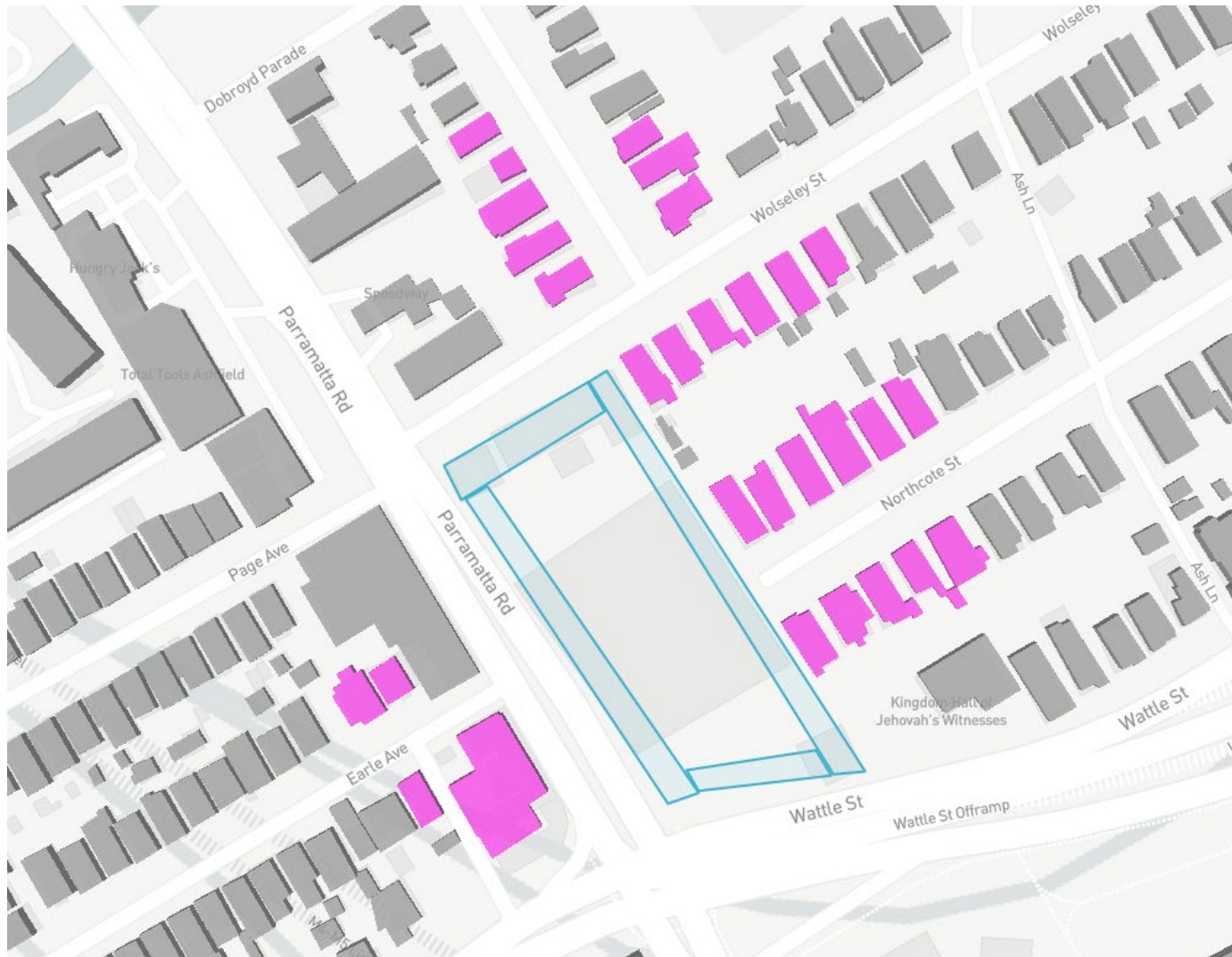
\*Pink shaded buildings indicate receptors with potential to exceed human comfort vibration criteria

**Figure D.2** Vibration impacts – Heavy hydraulic hammer – Stages 4 and 6 – VDV



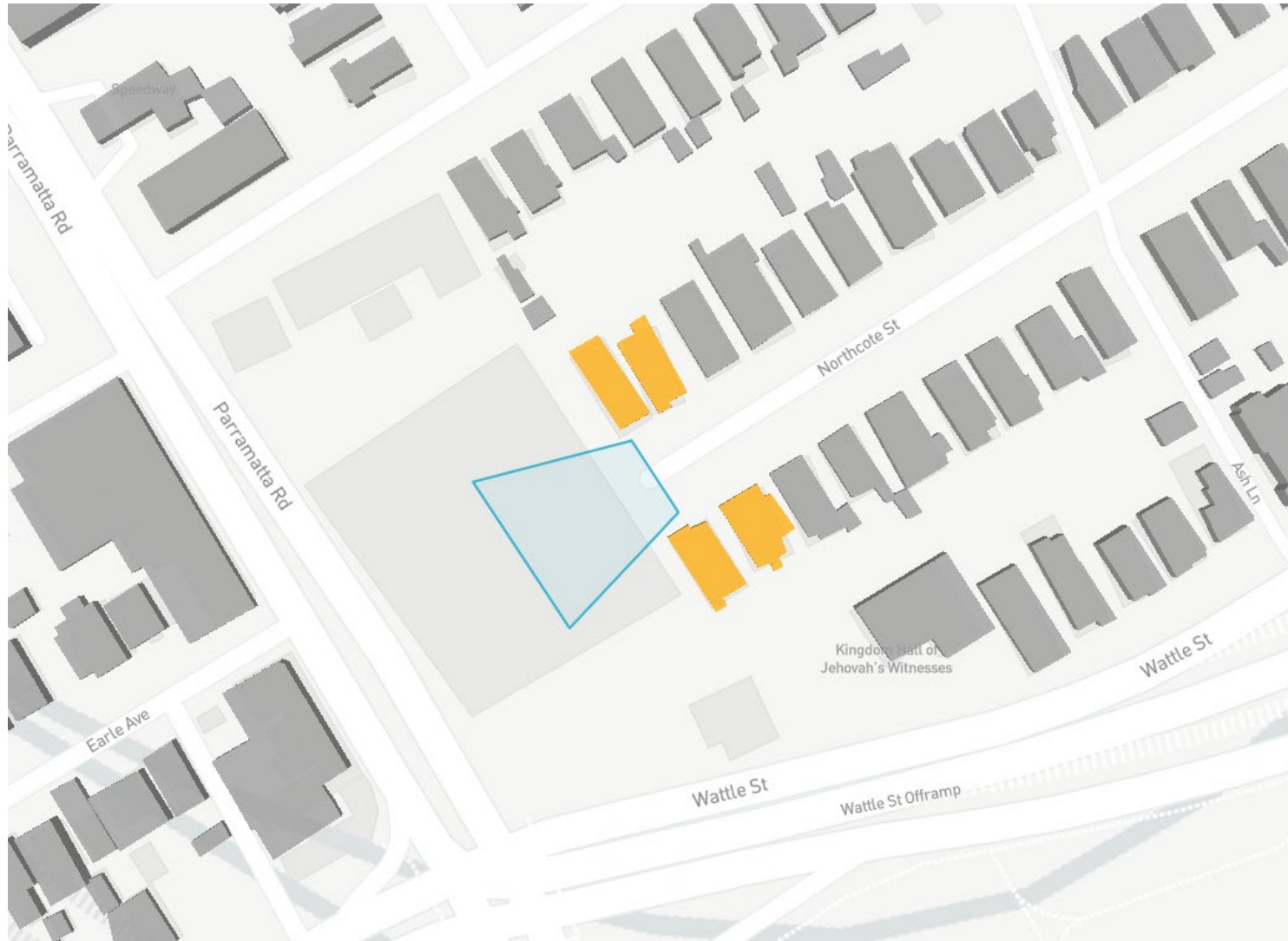
\*Yellow shaded buildings indicate receptors with potential to exceed structural vibration criteria

**Figure D.3** Vibration impacts – Large vibratory roller – Stages 4 and 6 – PPV



\*Pink shaded buildings indicate receptors with potential to exceed human comfort vibration criteria

**Figure D.4** Vibration impacts – Vibratory roller – Stages 4 and 6 – VDV



\*Yellow shaded buildings indicate receptors with potential to exceed structural vibration criteria

**Figure D.5** Vibration impacts – Heavy hydraulic hammer – Stage 7 – PPV



\*Pink shaded buildings indicate receptors with potential to exceed human comfort vibration criteria

**Figure D.6** Vibration impacts – Heavy hydraulic hammer – Stages 7 - VDV



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