

## ACOUSTICS ADVISOR ENDORSEMENT SYDNEY METRO WEST (SSI 10038)

Review of	Central Tunnelling Package: DNVIS for Burwood North	Reviewed document reference:	21028-NV-RP-4-11
Prepared by:	████████████████████ Alternate Acoustics Advisor		Revision 11
Date of issue:	22 November 2023		Dated: 15 August 2023

As approved Alternate Acoustics Advisor (AA) for the Sydney Metro West project, I reviewed and provided comments on previous versions of revision 11 of the Sydney Metro West – CTP – Detailed Noise and Vibration Impact Statement (DNVIS) for Burwood North.

Revision 11 is an update to include that an acoustic lid will no longer be built over the eastern part of the station box excavation. The omission of an acoustic lid over the eastern part of the station box is based on Out of Hours work at this site not exceeding Noise Management Levels (NMLs). While implementation of the shed may no longer be considered feasible and reasonable, my review has focused on other feasible and reasonable mitigation measures that can be applied to manage impacts.

In relation to omission of the acoustic lid over the eastern part of the station box, I note that the DNVIS commits to meeting evening and night-time NMLs at Burwood North for all activities. Noise from lid construction and removal will no longer be experienced.

The above matters have been assessed and endorsed for consistency with the EIS by Sydney Metro's Planning and Environment team. The Acoustic Advisor has no formal role in reviewing or endorsing Sydney Metro's Consistency Assessment (CA), but we have been provided with the CA and note that it addresses noise and vibration impacts.

The DNVIS outlines the consultation completed by AFJV to date and the specific mitigation measures identified so far, through consultation with affected sensitive land users. It also commits to ongoing consultation to continue this process.

Based on the above, I am satisfied that my comments have been adequately addressed and I endorse Revision 11 of AFJV's DNVIS for Burwood North, in accordance with Condition of Approval A36(e).

████████████████████

████████████████████, Metro West Alternate Acoustics Advisor

**Acciona Ferrovia Joint Venture  
Sydney Metro West Central Tunnelling Package  
Burwood North**

**Detailed noise and vibration impact statement  
August 2023**

**Doc no. 21028-NV-RP-4-11**





## Detailed noise and vibration impact statement

Client	Acciona Ferrovia Joint Venture
Project	Sydney Metro West Central Tunnelling Package
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### Revision history

0	11 November 2021	Draft report to client
1	12 November 2021	Amended following client comments
2	10 December 2021	Amended following AA & ER comments
3	25 February 2022	Updated demolition plan and equipment list
4	18 March 2022	Updated to include AA comments 18/03/2022
5	30 June 2022	Updated to reflect minor change to hoarding
6	8 July 2022	Updated to include capping beam, ground anchor works and acoustic shed references
7	8 August 2022	Updated DNVIS to include acoustic shed and excavation scenarios
8	8 September 2022	Updated with AA comments
9	23 May 2023	Updated acoustic shed design
10	11 July 2023	Updated with AA/ER comments
11	15 August 2023	Additional detail in Section 2.1.1 and 5.3

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## Definition of acoustic terms and acronyms

<b>AA</b>	Acoustic Advisor
<b>AMM</b>	Additional mitigation measures – applicable where standard measures have been implemented and NML is still expected to be exceeded.
<b>Approved hours</b>	Construction hours approved in the Project Conditions of Approval D35. These differ from “standard” hours defined in the ICNG. Work outside the approved hours does not imply the works have not been otherwise approved through the procedures outlined in the NVMP.
<b>Assessment period</b>	The period in a day over which assessments are made.
<b>Background noise</b>	The underlying level of noise present in the ambient noise, excluding the noise source under investigation.
<b>CoA</b>	Sydney Metro West – Concept and Stage 1 Conditions of Approval. Table 1 of the CoA also contains definitions related to the approval.
<b>CSSI</b>	Critical State Significant Infrastructure
<b>Decibel (dB)</b>	A measure of sound equivalent to 20 times the logarithm (to base 10) of the ratio of a given sound pressure to a reference pressure, and 10 times the logarithm (to base 10) of the ratio of a given sound power to a reference power.
<b>dB(A)</b>	Unit used to measure ‘A-weighted’ sound pressure levels. A-weighting is an adjustment made to sound-level measurement to approximate the response of the human ear.
<b>dB(C)</b>	Unit used to measure ‘C-weighted’ sound pressure levels, an adjustment made to sound level to approximate low frequency noise between 10 Hz and 200 Hz.
<b>DPIE</b>	NSW Department of Planning, Industry and Environment
<b>EIS</b>	Environmental Impact Statement
<b>Extraneous noise</b>	Noise resulting from activities that are not typical of the area such as construction, and traffic generated by holiday periods or special events such as concerts or sporting events. Normal daily traffic is not considered to be extraneous.
<b>Highly affected receivers</b>	Residential receivers are considered to be highly noise affected where construction activities are determined to have an LAeq, 15 minute noise level of 75 dB(A) or higher.
<b>Highly noise intensive works</b>	Construction activities which are defined as annoying under the ICNG. See Section 2.1.2.
<b>ICNG</b>	Interim Construction Noise Guideline (Department of Environment and Climate Change 2009)
<b>Noise assessment criteria</b>	A standard rule or test by which the acceptability of the nature and characteristics of noise may be judged or evaluated. Criteria are generally based on guidelines or standards developed by Government agencies (eg EPA) to protect the majority of people for the majority of the time from adverse impacts.
<b>NCA</b>	Noise Catchment Area

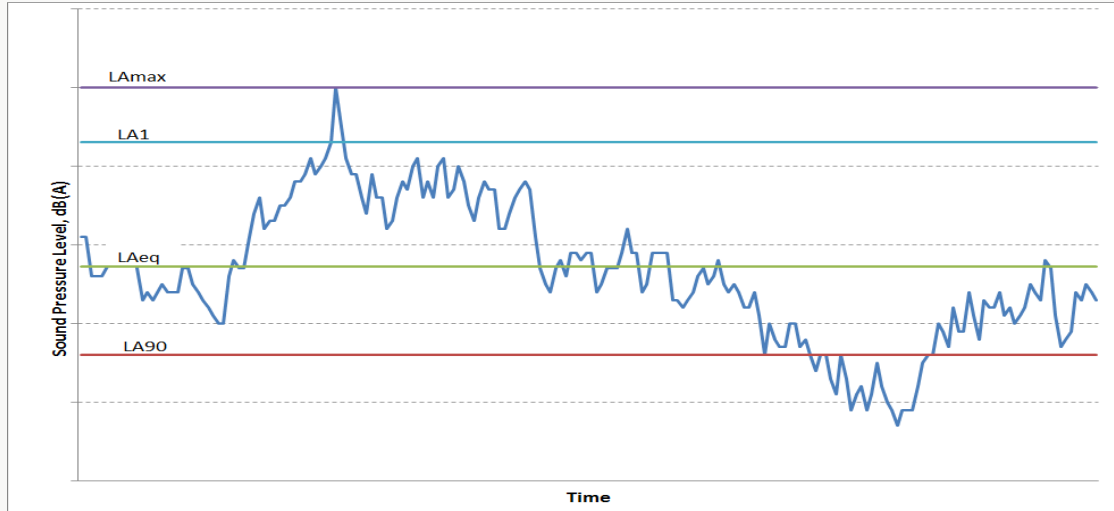
## Noise level statistics

$L_{A90}$  – The A-weighted sound pressure level exceeded 90% of the monitoring period. This is considered to represent the background noise.

$L_{Aeq}$  – The equivalent continuous A-weighted noise level—the level of noise equivalent to the energy average of noise levels occurring over a measurement period.

$L_{A1}$  – The A-weighted sound pressure level exceeded 1% of the monitoring period.

$L_{Amax}$  – The maximum A-weighted noise level associated with the measurement period.



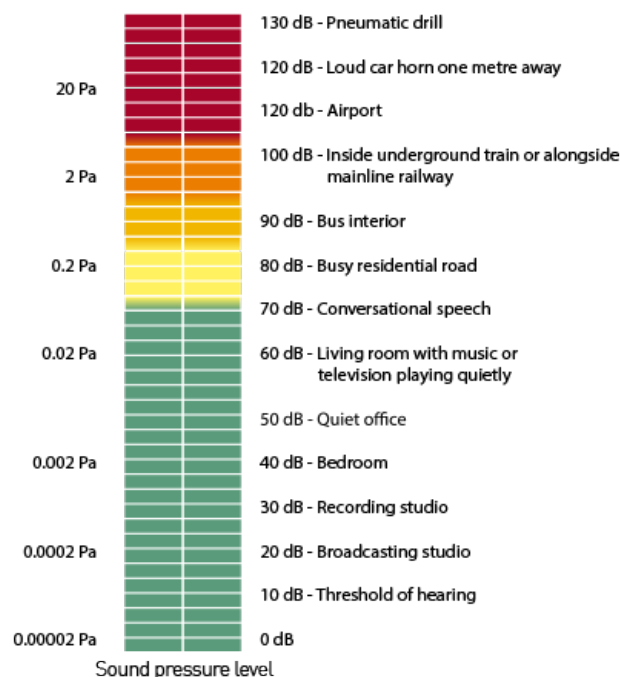
<b>NML</b>	Noise Management Level
<b>NVMP</b>	Noise and Vibration Management Plan
<b>PPV</b>	Peak Particle Velocity – Measurement of ground-borne vibration in units of mm/s
<b>RBL</b>	Rating Background Level - a single figure that represents the background noise level for assessment purposes
<b>ROL</b>	Road Occupancy Licence – granted by Transport for NSW and required for any activity likely to impact on traffic flow.
<b>Sound Power Level (SWL)</b>	The A-weighted sound power level is a logarithmic ratio of the acoustic power output of a source relative to 10-12 watts and expressed in decibels. Sound power level is calculated from measured sound pressure levels and represents the level of total sound power radiated by a sound source.

## Sound Pressure Level (SPL)

This is the level of noise, usually expressed in dB(A), as measured by a standard sound level meter with a pressure microphone. The sound pressure level in dB(A) gives a close indication of the subjective loudness of noise.

A technical definition for the sound pressure level, in decibels, is 20 times the logarithm (base 10) of the ratio of any two quantities related to a given sound pressure to a reference pressure (typically 20 µPa equivalent to 0 dB). Examples of typical sound pressure levels are shown below.

Threshold of pain



Source: [https://www.osha.gov/dts/osta/otm/noise/health\\_effects/soundpropagation.html](https://www.osha.gov/dts/osta/otm/noise/health_effects/soundpropagation.html)

## Tonal noise

Noise with perceptible and definite pitch or tone

## VDV

Vibration dose value – used when assessing intermittent vibration as it is sensitive to peaks in vibration acceleration and accumulates the vibration energy received over the daytime and night-time periods



# 1. Introduction

## 1.1 Project overview

Sydney Metro is Australia's biggest public transport program comprising four main packages of work including Metro North West Line, Sydney Metro City and Southwest, Sydney Metro West and Sydney Metro Greater West. The Sydney Metro West component involves the construction and operation of a metro rail line, around 24km in length, between Westmead and the Sydney CBD.

The planning approvals and environmental impact assessment for Sydney Metro West has been split into a number of stages recognising the size of the project. This includes:

- Stage 1 – Concept and all major civil construction works including station excavation and tunnelling between Westmead and The Bays. Planning approval for this stage was granted in March 2021.
- Stage 2 – All major civil construction works including station excavation and tunnelling from The Bays to Sydney CBD
- Stage 3 – Tunnel fit-out, construction of stations, ancillary facilities and station precincts, and operation and maintenance of the Sydney Metro West line

Acciona Ferroviaria Joint Venture (AFJV) was commissioned to deliver the Central Tunnel Package of Stage 1, comprising excavation of five sites and around 11.5 kilometres of twin-bore tunnel between The Bays and Sydney Olympic Park (the Project). An overview of the Project is presented in Figure 1-1, which includes the tunnel alignment and location of the station boxes at:

- The Bays
- Five Dock
- Strathfield
- Burwood North
- Sydney Olympic Park

This report covers activities for construction of Burwood North Station box and south shaft located near Burwood's shopping district and directly adjacent to Parramatta Road. The project comprises several phases including:

- Site establishment
- Excavation of the station box
- Tunnelling
- Demobilisation

An overview of the site layout of Burwood North is presented in Figure 1-2.

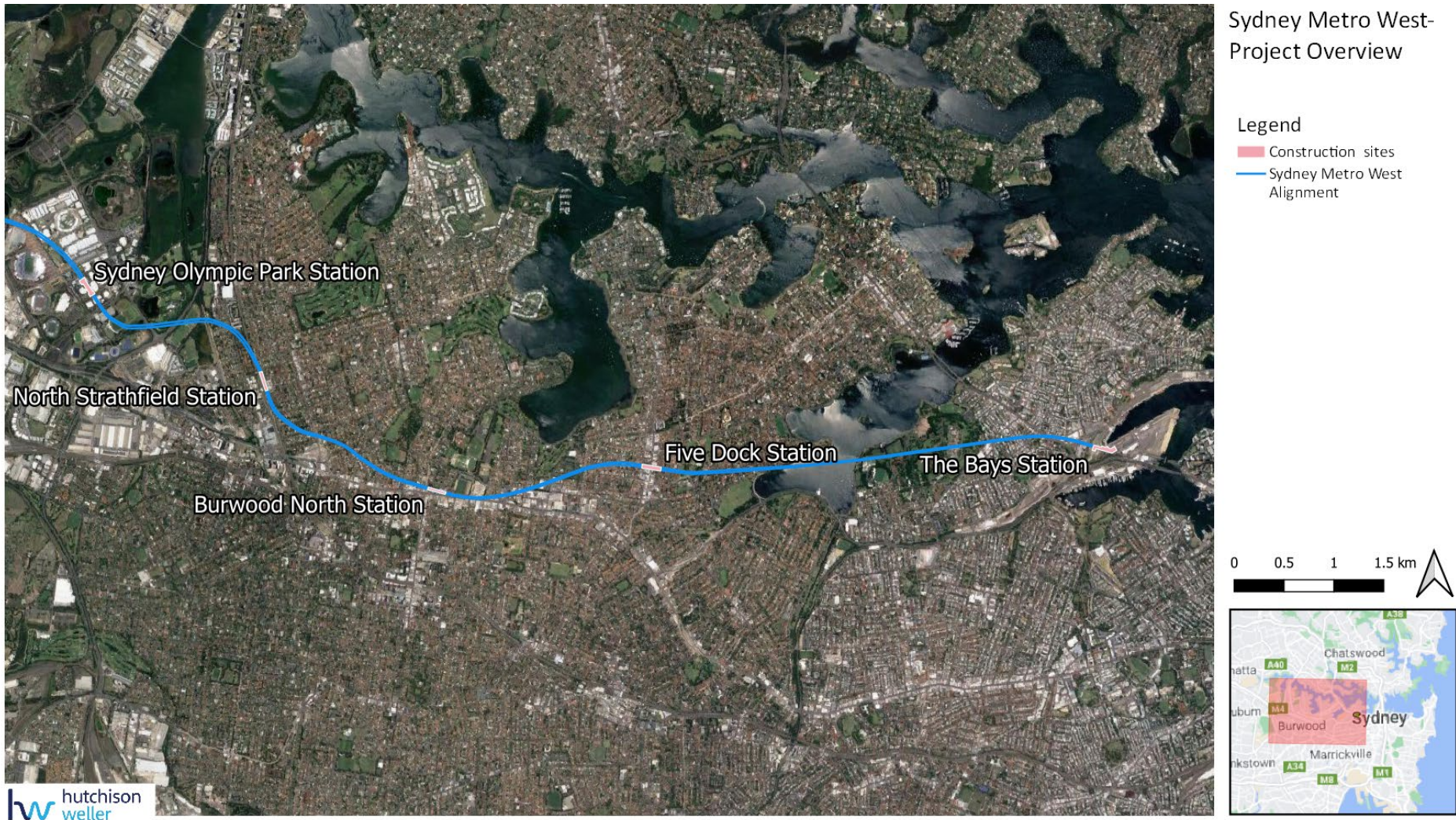


Figure 1-1 Overview of the CTP of Stage 1 of the Sydney Metro West Project.



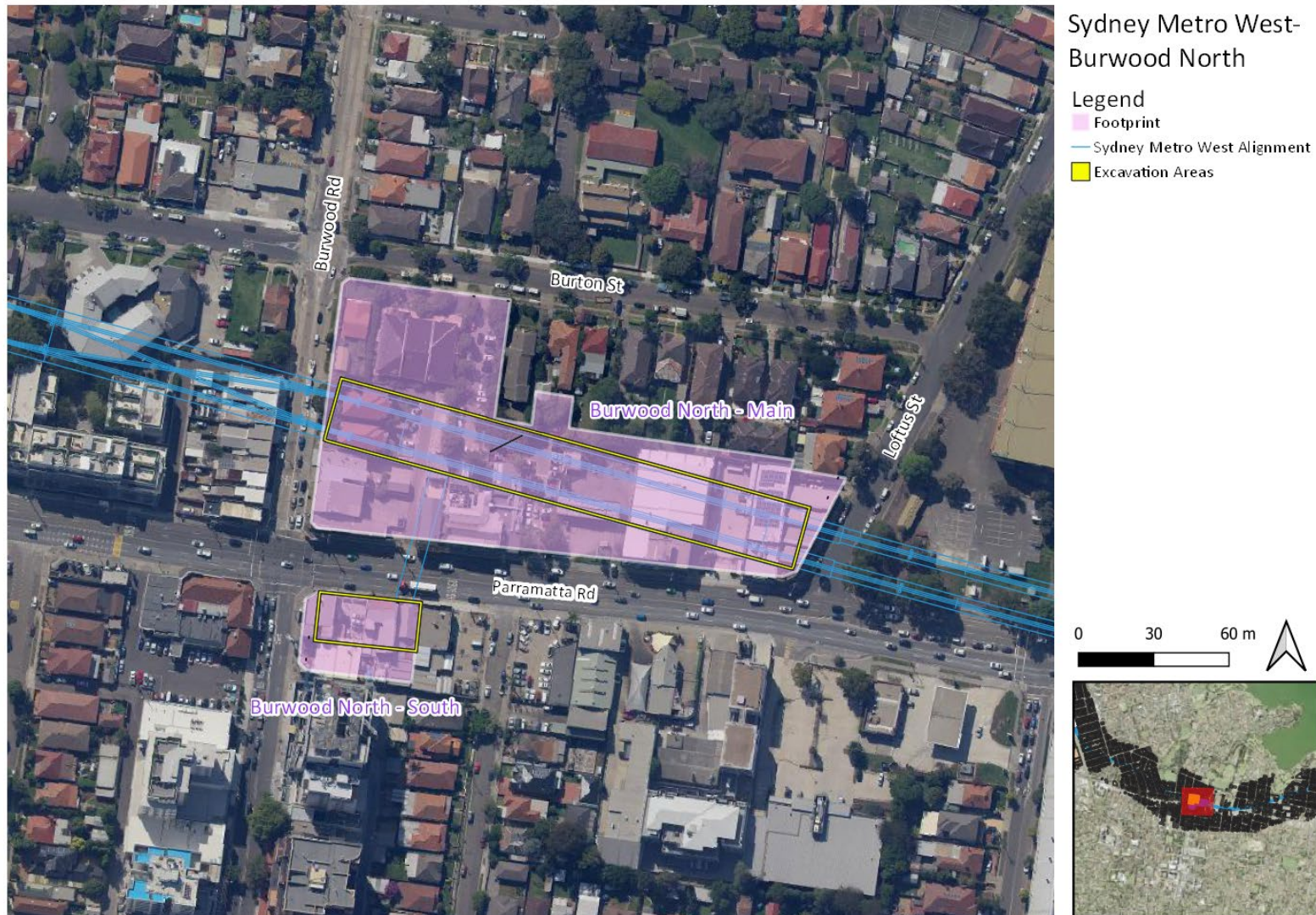


Figure 1-2 Burwood North construction site

## **1.2 Detailed noise and vibration impact statement**

Considering the risk of noise and vibration impact is necessary to ensure appropriate mitigation and management measures can be applied. This Detailed Noise and Vibration Impact Assessment (DNVIS) has been prepared in accordance with the Sydney Metro (2020) Construction Noise and Vibration Standard, v 4.3 (CNVS) and supplements the Project's Construction Noise and Vibration Management Plan (CNVMP) as required in the Project's Condition of Approval (CoA) D43.

The objective of the DNVIS is to establish the location, nature and scale of proposed works, assess the level of impact on the community's amenity and include appropriate mitigation measures identified through consultation with affected sensitive land users.

The structure of this DNVIS addresses the requirements of the Condition of Approval D43 and the CNVS and includes:

- Section 2 – Construction works and hours
- Section 3 – Identification of noise and vibration sensitive receivers and existing noise levels
- Section 4 – Construction noise and vibration objectives
- Section 5 – Description of planned works, equipment and sound power levels
- Section 6 – Construction noise assessment – predicted noise levels and exceedances of objectives, including sleep disturbance
- Section 7 – Construction vibration assessment
- Section 8 – Traffic noise assessment
- Section 9 – Mitigation and management, including consultation



## 2. Construction works and hours

### 2.1.1 Planned works

Activities associated with Burwood North are separated into two areas, the Main Site (including Station Box) and the South Site, a support shaft). Construction work outside these sites is covered under the CNVMP and the out of hours work protocol where activities are completed outside approved hours.

Construction phases for each of these sites broadly include site establishment, excavation and then tunnelling support.

The anticipated program is illustrated in Table 2-3 and shows the duration of each phase. Establishment for the site commenced in November 2021 and continue for around 7 months. Excavation commenced in July 2022 and at the South site in January 2023. In total, the project is expected to take around 2 years to complete in Burwood North.

This update to the DNVIS provides additional assessment of changes to the acoustic shed arrangements for the main north site. Work at the southern shaft is being completed during approved hours and there are no changes to this scenario.

At the main station box, site establishment is complete and station box excavation under the acoustic shed has reached operational levels. The eastern section of the station box and tunnel nozzles are yet to be completed. Previous assessment of these activities is not impacted by the proposed changes to site operations which were completed during approved hours.

As per the initial assessment of acoustic sheds for the project, the main site station box is covered with an acoustic shed to the west while the eastern portion of the station box was to be covered with an 'acoustic roof'. Design of the acoustic shed over the western section of the station box was finalised in September 2022. The construction of the western shed is expected to be completed in May 2023.

Installing a roof enclosure over the Burwood North station box would prolong the excavation process. Program delays at Burwood North could have implications for TBM progress which would have flow-on effects for other sites.

Without the roof, spoil can be handled from the surface adjacent to Parramatta Road and provide an alternative spoil handling location outside the acoustic shed. This enables spoil load out to occur during standard construction hours at two points thus alleviating congestion and eliminating the need for continuous out of hours spoil haulage.

An assessment of the changes to the eastern site acoustic roof and associated noise impacts for approved and OOH works based on the current program, has been completed in this update to the DNVIS.

Construction within the cavern at the western end of the station box is currently underway and operational on a 24 hour basis. These works were initially assessed for the Burwood DNVIS where construction was still within the station box and align with the activities described in Phase 4 for mined excavations at the main northern site.

Once tunnelling is underway, all excavation equipment is located within the cavern and ground borne noise and vibration impacts from this aspect of the works is assessed separately in the Tunnelling DNVIS.

For the Burwood site, tunnelling support activities are assessable against the project NML and will occur within the acoustic shed during the cavern excavation prior to the TBM arrival.

Support activities/equipment within the acoustic shed include gantry and kibble for spoil stockpiling, concrete deliveries and spoil haulage via Parramatta Road. At the station box floor around 30 metres from the surface, excavation within the cavern is underway supported by tunnel ventilation and spoil removal in the station box.

After the caverns and station box are excavated cavern lining and some additional excavation would continue until the TBM walk through around February 2024.

During the cavern excavation, noise from the tunnel portal, the scrubber/ventilation fan and spoil haulage and kibble loading would be the only sources from the station box floor. Other surface activities within the acoustic shed would include the gantry crane stockpiling the spoil, spoil haulage trucks removing the spoil and deliveries of concrete and other materials. These activities have been assessed in this DNVIS for OOHW noise impacts with no eastern acoustic roof in place.

In the eastern section of the station box where the acoustic roof has not been constructed, excavation to the station box floor is being completed in preparation for mining of the eastern tunnel nozzles as described in Phase 3 activities at the main northern site. Without the acoustic roof, these works will be limited to daytime operations only.

Table 2-1 and Table 2-2 present a summary the activities for each of the Burwood construction sites.

**Table 2-1 Summary of proposed activities at the Main site**

Construction phase	Activity		Outside approved hours?
<b>1. Site Establishment</b>	1a	General activities	No
	1b	Construction utilities and facilities	No
	1c	Temporary fencing/ hoardings	No
	1d	Utilities disconnection/relocation	No
	1e	Demolition and clearing site (No hammer)	No
	1f	Demolition and clearing site (With hammer)	No
	1g	Site Concrete Works	No
<b>2. Station Box Excavation</b>	2a	Piling	No
	2b	Site structures including acoustic enclosures	No
	2c	Capping beams	Detailed excavation, break back & capping beam
	2d	Active anchors	Ground stabilisation
	2e	Excavation & Retention	Whaler beam installation
	2f		Other Than Rock (OTR) – Dozer (No ripping)
	2g		Rippable – Dozer (Ripping)
	2h		Non-rippable – Excavators with hammers or eccentric rippers
	2i		Retention – Ground Anchors
<b>3 Tunnel Nozzles</b>	3a	Excavation & Lining	Excavation
	3b		Nozzle bolting
<b>4. Mined excavations</b>	4a	Excavations	Tunnelling (cavern excavation)
		Rock bolting	Cavern rock bolting
		Shotcrete	Cavern roof shotcrete
		Spoil muck out	Haulage/stockpile (station box/ acoustic shed)
	4b	Tunnel Lining	Concrete lining
	4c	Tunnelling	TBM Walkthrough

**Table 2-2 Summary of proposed activities at the South site**

Construction phase	Activity		Outside approved hours?
<b>5. Site Establishment</b>	5a	Temporary fencing/ hoardings	No
	5b	Utilities disconnection/relocation	No
	5c	Demolition and clearing site	No
	5d	Site Concrete Works	No
<b>6. Excavation</b>	6a	Piling	No
	6b	Capping beams	Detailed excavation, break back & capping beam
	6c	Active anchors	Ground stabilisation
	6d	Excavation & Retention	Other Than Rock (OTR) – Dozer (No ripping)
	6e		Rippable – Excavator (Ripping and Hammer)
	6f		Retention – Ground Anchors
<b>7 Mucking out</b>	7a	Spoil handling	Excavator load out
<b>8. Pedestrian adit</b>	8a	Excavation	Clearing station entry
	8b	Tunnel Lining	Concrete lining



Table 2-3 Current shaft and cavern construction program for Burwood North

Burwood North		2023							2024											
Site	Phase	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Main site (incl. station box)	1. Site Establishment – Completed																			
	2. Station Box Excavation																			
	3. Nozzle excavation																			
	4. Mined Cavern & Adit excavation																			
	Cavern and adit lining																			
	TBM arrival – Preparatory works																			
South Site	5.Soth shaft Site Establishment Completed																			
	6. South Shaft Excavation																			
	7. Mucking Out																			
All sites	Demobilisation																			



## 2.1.2 Approved construction hours

Working hours are set by CoA D35 to D36 as summarised in Table 2-4. Use of power saws, rock breakers, drills and other tonal or impulsive activities are defined as annoying under the Interim Construction Noise Guideline (ICNG) and are 'highly noise intensive works'.

**Table 2-4 Approved construction hours**

CoA	Construction activity	Monday to Friday	Saturday	Sunday / Public holiday
D35	Approved construction	7:00 am to 6:00 pm	8:00 am to 6:00 pm	No work (unless approved under out-of-hours work protocol)
D36	Highly noise intensive works	8:00 am to 6:00 pm <sup>1</sup>	8:00 am to 1:00 pm <sup>1</sup>	No work (unless approved under out-of-hours work protocol)

Notes:

1. if continuously, then not exceeding three hours, with a minimum cessation of work of not less than one hour.

## 2.1.3 Variations to work hours

In some circumstances, the planned construction activities would be undertaken outside the hours described in CoA D35 and D36. As specified in the Conditions of Approval, these activities include those which are:

- Low impact as described in CoA D37b), including:
  - i. construction that causes LAeq(15 minute) noise levels:
    - no more than 5 dB(A) above the rating background level at any residence in accordance with the ICNG, and
    - no more than the 'Noise affected' NMLs specified in Table 3 of the ICNG at other sensitive land user(s); and
  - ii. construction that causes LAFmax(15 minute) noise levels no more than 15 dB(A) above the rating background level at any residence; or
  - iii. construction that causes:
    - continuous or impulsive vibration values, measured at the most affected residence are no more than the preferred values for human exposure to vibration, specified in Table 2.2 of Assessing Vibration: a technical guideline (DEC, 2006), or
    - intermittent vibration values measured at the most affected residence are no more than the preferred values for human exposure to vibration, specified in Table 2.4 of Assessing Vibration: a technical guideline (DEC, 2006).
- By Prescribed Activity, as described in CoA D37d) and applying to Burwood North construction scenarios:
  - i. tunnelling (excluding cut and cover tunnelling and surface works) which is permitted 24 hours a day, seven days a week; or
  - iii. delivery of material that is required to be delivered outside of standard construction hours in Condition D35 of this schedule to directly support tunnelling activities, except between the hours 10:00 pm and 7:00 am to / from the Five Dock and Westmead construction sites and to / from Burwood North construction site using any roads / streets other than directly from Parramatta Road; or
  - iv. haulage of spoil except between the hours of 10:00 pm and 7:00 am to / from the Five Dock and Westmead construction sites and to / from Burwood North construction site using any roads / streets other than directly from Parramatta Road;

- v. work within an acoustic shed where there is no exceedance of noise levels under Low impact circumstances identified in (37b), unless otherwise agreed by the Planning Secretary.

Note: Tunnelling does not include station box excavation

Where out-of-hours work is necessary, appropriate respite would be identified in consultation with the affected community, in line with the NVMP. As per CoA D51, consultation would include providing:

- a progressive schedule for periods no less than three (3) months, of likely out-of-hours work;
- a description of the potential work, location and duration of the out-of-hours work;
- the noise characteristics and likely noise levels of the work; and
- likely mitigation and management measures which aim to achieve the relevant NMLs (See Section 4) including circumstances of when respite or relocation offers would be available and details about how the affected community can access these offers.

### 3. Existing environment

#### 3.1 Existing environment

The Burwood North construction zone covers two separate locations, namely Burwood North – Main (Main site), which includes the station box, and Burwood North – South (South site), as illustrated in Figure 1-2.

The Main site is located north of Parramatta Road, near the intersection of Parramatta Road and Burwood Road and covers an area of around 1.3 hectares. Adjacent land uses to this site, fronting Parramatta Road, are mostly commercial businesses with some mixed-use commercial/ residential buildings.

North of the Main site, residential receivers are on Burton Street, with the nearest backing directly onto the project boundary. To the north of the site is also St Luke's Church, which is heritage listed.

The South site is located to the south of Parramatta Road, also bounded by Burwood Road and Esher Street and Esher Lane with a footprint of around 1480 m<sup>2</sup>. This site has commercial premises located to the east and mixed commercial and residential 10 storey residences to the south. The heritage listed Bath Arms Hotel is located 20 metres west of the South site.

The acoustic environment in all areas is described in the EIS as dominated by road traffic noise on the major transport corridors such as Parramatta Road and Burwood Road.

To assess and manage construction noise and vibration impacts, a detailed land use survey was prepared for the Project in line with CoA D34, with results of the survey provided in the Construction Noise and Vibration Management Plan (CNVMP) and relevant land uses to Burwood North are presented in Appendix A of this DNVIS.

#### 3.2 Heritage items

There are several items of heritage value identified in the EIS, which include the following. These items will be considered for impacts of vibration-intensive activities.

- St Luke's Anglican Church
- Bath Arms Hotel
- Semi-detached houses along Burwood Rd

#### 3.3 Noise catchment areas

To facilitate the assessment of noise impacts from the project and to apply representative Noise Management Levels (NMLs) to all receivers, receivers adjacent to the Burwood sites have been divided into Noise Catchment Areas (NCAs).

NCAs group individual sensitive receivers by representative traits such as existing noise environment and potential exposure to noise and vibration from the Project.

NCAs were established as part of the EIS, are summarised in Table 3-1 and illustrated in Figure 1-1. Background noise monitoring has been completed as part of the EIS to apply appropriate NML to each NCA (see Section 4.2).

Table 3-1 Summary of work areas, Noise Catchment Areas and land uses

NCA	Location	Description	Ambient noise influences
NCA12	Burwood, North of Parramatta Road	Mainly residential, with some commercial areas along Parramatta Road. 'Other sensitive' receivers include Concord High School, St Mary's Catholic Primary School, St Marys Catholic Church and St Luke's Anglican Church	Existing noise is controlled by road traffic. The area surrounding the construction site is mostly residential and the nearest receivers are near the northern boundary of the northern construction site and the southern boundary of the southern Construction Site. Commercial receivers are also adjacent to the site, along Parramatta Road, and are of general retail use
NCA13	Burwood, South of Parramatta Road	Mainly residential, with commercial areas along Parramatta Road and Burwood Road. 'Other sensitive' receivers include Sydney Central ENT, Bath Arms Hotel, Southern Cross Catholic College and Methodist Ladies College.	

### 3.4 Background noise survey

Background noise monitoring was undertaken as part of the wider Sydney Metro West Project EIS (Section 2, Technical Paper 2) through unattended background noise monitoring at representative locations. Monitoring was completed in March and July 2019 for each of the NCAs listed in Table 3-1.

The Burwood area is heavily influenced by traffic flows that generate lower noise levels during the night-time than the daytime and evening periods. This pattern of reduced noise levels in the evening and night time is characteristic of urban and suburban areas, where there is no industrial or infrastructure noise influences.

The baseline information was used to establish the Rating Background Level (RBL), which represents the average minimum background sound level for each measurement period, averaged over the measurement days. The RBL at each NCA is provided in Table 3-2.

Table 3-2 Background noise levels

NCA	Noise level (dBA) <sup>1</sup>		
	Day <sup>2</sup>	Evening <sup>2</sup>	Night <sup>2</sup>
NCA12	43	43 (47) <sup>3</sup>	42
NCA13	48	48	44

Notes:

1. The RBL values have been extracted from the EIS; refer to Table 4 in the EIS Technical Paper 2.
2. Daytime is 7:00am to 6:00pm, evening is 6:00pm to 10:00pm and night-time is 10:00pm to 7:00am.
3. During the EIS noise assessment, the monitoring level was found to be higher than the daytime. In this situation, the NPfl requires that the evening level be reduced to match the daytime



## 4. Noise and vibration assessment criteria

### 4.1 Overview

Project CoA D43 requires planned works to be assessed within this DNVIS where any planned works may exceed the NMLs, vibration criteria and/or ground-borne noise levels specified in CoA D39 and D40 at any residence outside construction hours identified in CoA D35, or where receivers will be highly noise affected.

This DNVIS includes specific mitigation measures identified through consultation with affected sensitive land user(s) and these mitigation measures will be implemented for the duration of the early works investigations.

This DNVIS has been provided to the AA and ER before the commencement of the planned works.

CoA D39 requires noise and vibration from construction activity to be managed with guidance from:

- Noise: the Interim Construction Noise Guideline (ICNG, DECC 2009)
- Vibration for human exposure: Assessing Vibration: A Technical Guideline (DEC, 2006)
- Vibration for building damage: BS 7385 Part 2-1993 – Evaluation and measurement for vibration in buildings Part 2, and
- Vibration for damage of unsound heritage items: DIN 4150-3 Structural Vibration – effects of vibration on structures.

The over-arching document for assessment and management of noise and vibration impacts on this Sydney Metro project is the Sydney Metro *Construction Noise and Vibration Standard* (CNVS, vers. 4.3, Transport for NSW 2020). The following sections outline the framework of these guidelines and the way this DNVIS will assist to assess and manage impacts.

### 4.2 Noise

#### 4.2.1 ICNG

The CNVS refers to the *Interim Construction Noise Guideline* (ICNG) (DECC 2009), which provides guidance on management of construction noise. The ICNG notes noise that exceeds background noise levels may result in adverse impacts and an increased likelihood of complaints.

During approved hours, where construction noise is within 10 dB(A) of the RBL, impacts are considered acceptable. Where construction noise is more than 10 dB(A) above the RBL, a residential receiver is taken to be noise affected and the proponent should undertake all reasonable and feasible steps to manage the impact and consult with the affected community.

Above a  $L_{Aeq, 15 \text{ minute}}$  noise level of 75 dB(A), a residential receiver is considered to be highly noise affected, requiring respite to be given in consultation with the regulatory authority and the community.

Outside approved construction hours, construction noise at a residential receiver more than 5 dB(A) above the RBL is taken to be noise affected.

In addition, noise from activities/equipment such as rock hammers, impact piling, or other impulsive noise sources usually result in greater annoyance than continuous construction noise. A 5 dB(A) penalty is applicable to such activities prior to comparison with the NMLs and a 3 hours on, 1 hour off respite schedule applies.

A noise level above  $L_{Aeq, 15 \text{ min}}$  70 dB(A) at a commercial property is considered to warrant noise mitigation. Similarly, an industrial facility would warrant noise mitigation at  $L_{Aeq, 15 \text{ minute}}$  noise levels above 75 dB(A).

Table 4-1 presents management levels for noise at other relevant sensitive land uses based on the principle that the characteristic activities for each of these land uses should not be unduly disturbed.

Internal noise levels are assessed at the centre of the occupied room. Where internal noise levels cannot be measured, external noise levels may be used. A conservative estimate of the difference between internal and external noise levels is 10 dB for buildings other than residences.

**Table 4-1 NMLs for non-residential sensitive receivers**

Sensitive receiver type	NML applicable when in use, LAeq, 15 min
Classrooms at schools and other educational institutions	Internal noise level 45 dB(A)
Childcare centres <ul style="list-style-type: none"> <li>- sleeping areas</li> <li>- play areas</li> </ul>	Internal noise level 45 dB(A) External noise level 65 dB(A)
Hospital wards and operating theatres	Internal noise level 45 dB(A)
Places of worship	Internal noise level 45 dB(A)
Active recreation areas (characterised by sporting activities and activities which generate their own noise or focus for participants, making them less sensitive to external noise intrusion)	External noise level 65 dB(A)
Passive recreation areas (characterised by contemplative activities that generate little noise and where benefits are compromised by external noise intrusion, for example, reading, meditation)	External noise level 60 dB(A)
Community centres	Refer to the recommended 'maximum' internal levels in AS2107 for specific uses.

### 4.2.2 Sleep disturbance

The CNVS requires maximum noise levels to be analysed in terms of the extent and number of times the maximum noise exceeds specific noise trigger levels, in general accordance with the Noise Policy for Industry (Npfi) (EPA 2017). These triggers are:

- LAeq, 15 minute 40 dBA or the prevailing RBL plus 5 dB, whichever is greater, and the
- Lmax 52 dBA or the prevailing RBL plus 15 dB, whichever is greater.

The Npfi also recommends the DECCW (2011) Road Noise Policy (RNP) be reviewed for further risk assessment. The RNP recommends maximum internal noise levels below 50–55 dB(A) are unlikely to awaken people from sleep and one or two noise events per night, with maximum internal noise levels of 65–70 dB(A), are not likely to affect health and wellbeing significantly.

### 4.2.3 Ground-borne noise

CoA D40 requires all reasonable and feasible mitigation measures to be applied when the following residential ground-borne noise levels are exceeded. These levels are only applicable when ground-borne noise levels are higher than airborne noise levels at residential receivers during the evening and night periods.

- evening (6:00 pm to 10:00 pm) — internal LAeq(15 minute): 40 dB(A); and
- night (10:00 pm to 7:00 am) — internal LAeq(15 minute): 35 dB(A).

#### 4.2.4 Construction traffic

While operating within the construction site, construction vehicles are assessed as part of the construction activity of which they are a part. However, once these vehicles leave the construction site and enter public roads, they are assessed as road traffic.

The Road Noise Policy (RNP) is generally adopted to assess the impact of construction traffic on public roads. A screening test is first applied to establish whether existing road traffic noise levels will increase by more than 2 dB due to construction traffic. Where any noise increase is less than 2 dB, the objectives of the Road Noise Policy have been met.

The CNVS recommends, where the road traffic noise levels are predicted to increase by more than 2 dB as a result of construction traffic, consideration should be given to feasible and reasonable noise mitigation measures to reduce the potential noise impacts and preserve acoustic amenity.

Actual noise levels associated with construction traffic will be monitored and compared to the following road traffic noise criteria in the RNP.

- 60 dB LAeq(15hour) day and 55 dB LAeq(9hour) night for existing freeway/ arterial/ sub-arterial roads.
- 55 dB LAeq(1hour) day and 50 dB LAeq(1hour) night for existing local roads.

Where exceedances of the RNP are attributed to construction traffic, consideration for mitigation would be made in accordance with the project CoA and the Revised Environmental Mitigation Measures (REMM).

#### 4.2.5 Additional mitigation measures

The CNVS builds on the guidance provided by the ICNG and recommended further mitigation measures where all reasonable and feasible mitigation measures to minimise noise at the nearest receivers have been implemented and construction noise is still predicted to exceed the noise or vibration objectives. The Additional Mitigation Measures Matrix (AMMM) for airborne and ground-borne noise taken from the CNVS are presented in Table 4-2 and Table 4-3.

**Table 4-2 Additional Mitigation Measures Matrix for airborne noise (CNVS)**

Construction hours	dB above NML	Additional management measures
<b>Approved hours</b> Monday – Friday: 7am – 6pm Saturday: 8am to 6pm	0 to 10	-
	10 to 20	LB
	20 to 30	LB, M, SN
	>30	LB, M, SN
<b>Evening</b> Monday – Friday: 6pm – 10pm Saturday: 7am – 8am, 6pm – 10pm Sunday / PH: 8am – 6pm	0 to 10	LB
	10 to 20	LB, M
	20 to 30	LB, M, SN, RO
	> 30	LB, M, SN, IB, PC, RO
<b>Night</b> Monday – Saturday: 10am – 7am Saturday: 10pm – 8am) Sunday / PH: 6pm – 7am	0 to 10	LB
	10 to 20	LB, M, SN, RO
	20 to 30	LB, M, SN, IB, PC, RO, AA
	> 30	LB, M, SN, IB, PC, RO, AA

Notes: PC = Phone call/Email  
M = monitoring  
IB = Individual briefings  
AA = Alternative accommodation  
SN = Specific notification  
LB = Letterbox drops  
DR = Duration reduction  
RO = Project specific respite offer

Table 4-3 Additional Mitigation Measures Matrix for ground-borne noise (CNVS)

Construction hours	dB above NML	Additional management measures
<b>Approved hours</b> Monday – Friday: 7am – 6pm Saturday: 8am to 6pm	No NML for ground-borne noise during standard hours (refer to Table 4-7)	
<b>Evening</b> Monday – Friday: 6pm – 10pm Saturday: 7am – 8am, 6pm – 10pm Sunday / PH: 8am – 6pm	0 to 10	LB
	10 to 20	LB, M, SN
	> 20	LB, M, SN, IB, PC, RO
<b>Night</b> Monday – Saturday: 10am – 7am Saturday: 10pm – 8am) Sunday / PH: 6pm – 7am	0 to 10	LB, M, SN
	10 to 20	LB, M, SN, IB, PC, RO, AA
	> 20	LB, M, SN, IB, PC, RO, AA

Notes: PC = Phone call/Email SN = Specific notification  
M = monitoring LB = Letterbox drops  
IB = Individual briefings DR = Duration reduction  
AA = Alternative accommodation RO = Project specific respite offer

### 4.3 Project-specific construction noise management levels

Based on the measured RBLs for each NCA and requirements of the ICNG and CNVS, project-specific NMLs are summarised in Table 4-4. NMLs for non-residential receivers are described in Table 4-1.

Table 4-4 Noise management levels

NCA	Noise Management Level, LAeq 15 minute						
	Approved hours		Outside approved hours				
	Noise affected	Highly noise affected	Day	Evening	Night	Sleep disturbance (CNVS)	
						LAeq, 15 minute	LAmaz
NCA12	53	75	48	48	47	47	57
NCA13	58	75	53	53	49	49	59

## 4.4 Vibration management

### 4.4.1 Human comfort

When assessing human exposure to construction-related vibration, the CNVS requires vibration goals to be established using *Environmental Noise Management Assessing Vibration: A Technical Guideline* (DECC 2006), which provides criteria for the assessment of vibration impacts on humans.

Construction activities typically generate vibration of an intermittent nature, which is assessed using a Vibration Dose Value (VDV). Acceptable values of vibration doses are presented in Table 4-5 for sensitive receivers.

**Table 4-5 VDV Vibration criteria**

Receiver type	Low probability of adverse comment ( $\text{m/s}^{1.75}$ )	Adverse comment possible ( $\text{m/s}^{1.75}$ )	Adverse comment probable ( $\text{m/s}^{1.75}$ )
Residential buildings – 16 hour day (7am to 11pm) <sup>1</sup>	0.2 to 0.4	0.4 to 0.8	0.8 to 1.6
Residential buildings – 8 hour night (11pm to 7am) <sup>1</sup>	0.13	0.26	0.51

Note 1: Day time and night time as described in BS6472:1992 (as referenced in the CNVS), i.e. a daytime period of 16 h or a night time period of 8 h, for example 23.00 h to 07.00 h.

### 4.4.2 Buildings

Potential building damage from construction vibration requires the application of values in BS 7385 Part 2-1993 *Evaluation and measurement for vibration in buildings* Part 2. These values are presented in Table 4-6 and relate to transient vibration which does not give rise to resonant responses in structures, and to low-rise buildings.

**Table 4-6 Guideline values for vibration velocity for the effects of short-term vibration on structures (BS 7385).**

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	
2	Unreinforced or light framed structures Residential or light commercial type buildings	15 at 4 Hz increasing to 20 mm/s at 15 Hz	20 mm/s at 15 Hz to 50 mm/s at 40 Hz and above

Where vibration may give rise to magnification due to resonance, especially at lower frequencies where lower guide values apply, the guide values may be reduced by 50%. The CNVS describes rock breaking/hammering and sheet piling activities as having potential to cause dynamic loading in some structures (e.g. residences).

For activity involving rock breakers, piling rigs, vibratory rollers, excavators, vibration predominantly occurs at frequencies in the 10 Hz to 100 Hz range. On this basis, a conservative vibration damage screening level is:

- Reinforced or framed structures: 25.0 mm/s
- Unreinforced or light framed structures: 7.5 mm/s

### 4.4.3 Heritage

Heritage buildings and structures would be assessed under a conservative cosmetic damage objectives of 2.5 mm/s peak component particle velocity (from DIN 4150). Where vibration levels at heritage items are identified as exceeding this screening level, structural assessment would be completed by the Project team to confirm the structure's sensitivity to vibration. If a heritage building or structure is found to be structurally unsound

(following inspection) the conservative criterion would stand. Where the structure is suitably sound, the guideline values from Table 4-6 would be applicable.

## 4.4.4 Additional mitigation measures

The CNVS recommends additional mitigation measures where all standard mitigation measures to minimise vibration at the nearest receivers have been implemented and vibration is still predicted to exceed the maximum guideline values. The Additional Mitigation Measures Matrix (AMMM) for vibration from the CNVS is presented in Table 4-7. Acronyms are defined at Table 4-2.

**Table 4-7 Additional Vibration Mitigation Measures (CNVS)**

Construction hours	Mitigation measures where predicted vibration levels exceed maximum levels
<b>Approved hours</b> Monday – Friday: 7am – 6pm, Saturday: 8am to 6pm	LB, M, RO
<b>Evening</b> Monday – Friday: 6pm – 10pm; Saturday: 7am – 8am, 6pm – 10pm; Sunday / PH: 8am – 6pm	LB, M, IB, PC, RO, SN
<b>Night</b> Monday – Saturday: 10am – 7am Saturday: 10pm – 8am); Sunday / PH: 6pm – 7am	LB, M, IB, PC, RO, SN, AA

Notes:

PC = Phone call/Email  
M = monitoring  
IB = Individual briefings  
AA = Alternative accommodation

SN = Specific notification  
LB = Letterbox drops  
DR = Duration reduction  
RO = Project specific respite offer

## 5. Impact assessment

### 5.1 Plant and equipment

A summary of proposed activities at the Burwood sites was provided in Table 2-1. Nominal equipment and estimated sound power levels of each item and activity are presented in Appendix B. All activities are proposed during approved hours only until the acoustic shed is completed.

During site establishment, it is likely several activities would be undertaken concurrently so cumulative impacts have been assessed as part of this DNVIS. Similarly, concurrent excavation of the main station box and southern shaft has been considered (see Section 6).

Sound power levels (SWLs) and predicted noise levels depend on the number of plant items operating at any one time and their precise location relative to a sensitive receiver. The SWLs include item quantities and nominal usage factors (proportion of a 15-minute assessment period the equipment would be operating at its maximum noise output).

### 5.2 Noise modelling

SoundPlan noise modelling software was used to calculate noise impacts in accordance with the ISO9613 prediction method at all identified noise-sensitive receivers. The model included:

- Topography – 1 metre DEM based on LPI Lidar data.
- Individual buildings for façade calculations and to account for shielding and reflections. Building heights are also taken from Lidar data.
- Individual sensitive receivers – One receiver location representing each residential dwelling and located 1.5 metres above most affected floor level (e.g. level 2) and most-affected façade at up to around 600 metres radius.
- Construction noise sources – Activities and equipment included in the noise model as area sources in locations specified by AFJV. SoundPlan takes the worst-case point within each area to perform its calculations, a conservative approach. Sound power levels in Appendix B. Source is modelled at 1.5 metres above ground.
- Meteorology – worst-case conditions: gentle breeze (3-5 m/s) source to receiver and stable conditions (conducive of temperature inversion).

### 5.3 Mitigation measures included in the modelling

Mitigation measures are to be implemented to ameliorate noise impacts as standard practice throughout the duration of the works. Mitigation measures, which may affect the predicted levels include the following, which have been incorporated in the assessment as base assumptions for noise predictions.

- Source noise control strategies:
  - Where the NML outside approved hours cannot be achieved, work is not proposed to be undertaken unless unavoidable and completed under the procedures contained in the CNVMP.
  - Equipment sound power levels will not exceed those described in Table 13 of the CNVS.
  - Residential grade mufflers fitted to all mobile plant, with equipment maintained and operated effectively.
  - ‘Damped’ rock hammers with reductions of around 10 dB in comparison to similar sized un-damped hammers
  - No shouting or swearing or playing of loud radios



- Engine and exhaust brakes avoided
- Site layout planned to allow noisy stationary plant to be placed behind larger objects or as far from receivers as possible
- Engines switched off when not in use for extended periods (15 minutes) and no idling trucks in front of residences
- Dropping of heavy objects or metal-on-metal impacts avoided
- Non-tonal reverse alarms installed on all mobile equipment regularly used on the project and all equipment outside approved hours.

The above measures were included in the assessment and are reiterated in Section 7.

- Noise control strategies:
  - Various forms of hoarding are proposed, with a mix of 2.4m high Class A hoarding direct to slab, 2.4m high Class A hoarding on concrete barriers and retention of existing building facades at the site boundary. These are summarised in Figure 5-1 and were included in modelling for all site establishment activities.
  - Rock hammers were used where required when breaking up building slabs, with alternative methods used in “no hammer” zones within the SWD detailed in Section 6.3. where use of hammers was unavoidable, noise mats or suitable noise screens around the activity were implemented where practicable.
  - During the piling and capping beam phase, work on the site structures including the acoustic shed began. The final layout for the station box will be a combination of acoustic shed over the western end of the station box and hoarding around the eastern excavation area.

To provide safe access around the boundary, an interim hoarding configuration will be used after the demolition phase, during the construction of the acoustic shed. Following shed construction, the final hoarding design will be implemented. The planned hoarding arrangement pre and post shed construction is presented in Figure 5-1 and Figure 5-2.

- Acoustic shed:
  - The 20 metre tall acoustic shed over the main shaft excavation has been modelled with a weighted noise reduction,  $R_w$  of 35 with transmission loss equivalent or better than values in Table 5-1. Modelling assumes roller doors are closed during OOHW periods. Closing of shed doors will be managed through on-site practices, inspections and monitoring.

**Table 5-1: Acoustic shed transmission loss at frequencies (Hz)**

63	125	250	500	1000	2000	4000
19.7	18.8	24.7	31.1	39.5	45.8	52.5

Intake and exhaust noise from the Acoustic shed has been accounted for in the model based on the preliminary shed design with the vent openings in the roof. Intake and exhaust fans have silenced, ducted inlets and exhausts on the roof.

Figure 5-3 presents an artist impression of the location and scale of the main acoustic shed

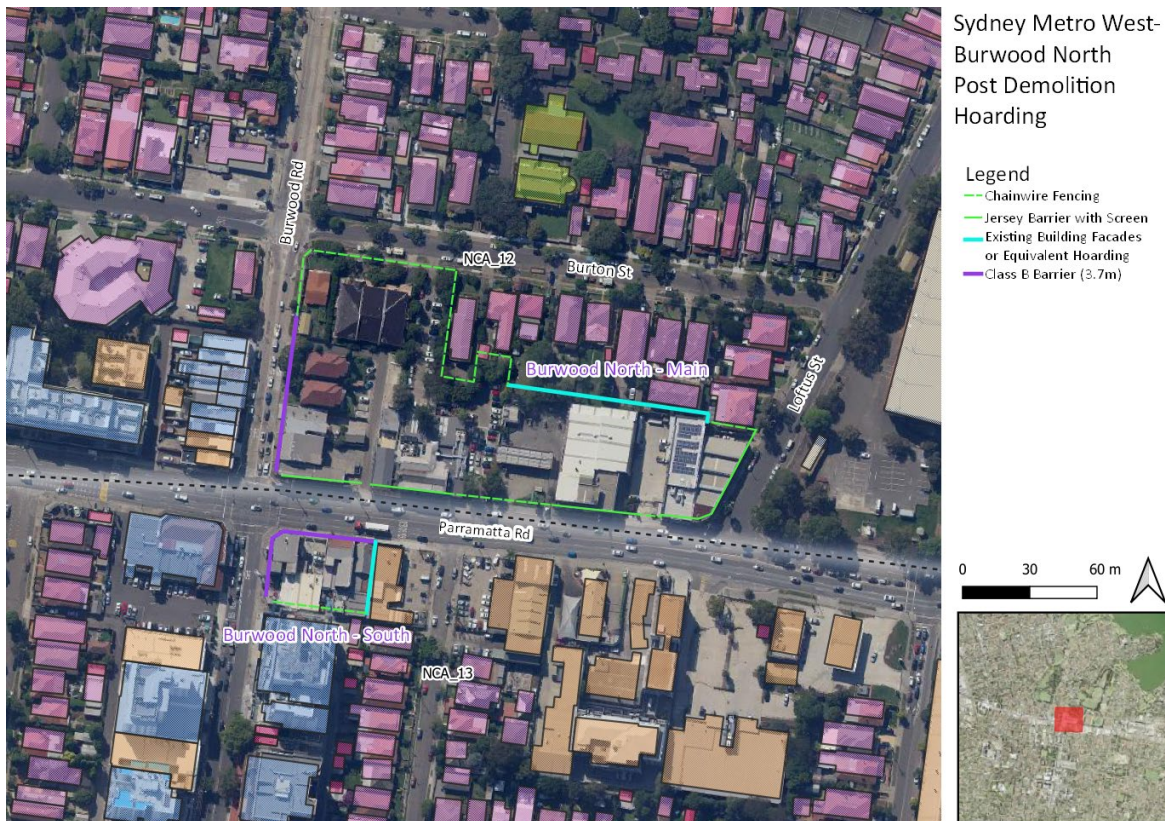


Figure 5-1 Hoarding layout – Post demolition, pre acoustic shed

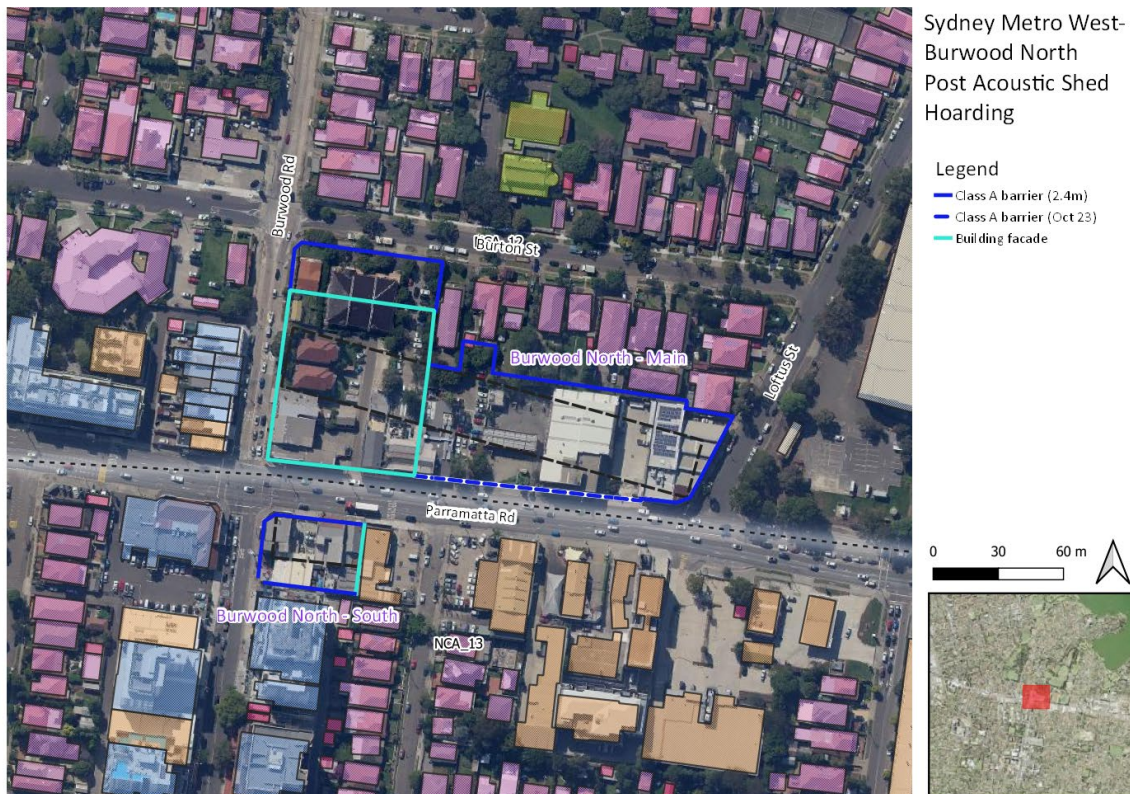


Figure 5-2 Hoarding layout – Final layout





Figure 5-3 Burwood Acoustic shed and open station box excavation (looking west along Parramatta Road)

## 6. Predicted noise levels

### 6.1.1 Overview

A summary of predicted noise levels for works during approved hours is provided in the following sections for each construction phase. For site establishment and initial shaft construction, there would be no OOHW undertaken. Detailed results for all sensitive receivers are provided in Appendix D.

Noise contours for selected activities are presented in Appendix C showing the extent of the impacts with the greatest impacts predicted at receivers immediately adjacent to the works. Contours illustrate that existing buildings around the work sites generally provide good noise screening to houses situated further back from the construction sites.

### 6.1.2 Site establishment works (Phases 1 & 5)

A summary of predicted noise levels at residential and non-residential land uses and predicted exceedances of the NMLs are presented in Table 6-1.

Site establishment have been completed during approved hours. At that time, exceedances of the NML were likely, with most being minor (1 – 10 dB). However, 4 – 6 receivers may have experienced highly intrusive noise levels during activities like concrete pours, utilities relocations and general construction works.

Where hammering was required at the main site to excavate existing building foundations the noise impacts were predicted to be high with up to 17 residential receivers likely to be highly noise affected (>75 dBA) when works are in close proximity. Any highly noise intensive work was undertaken in accordance with COA D36 and are reflected in Table 7-1 detailing standard mitigation measures relating to construction hours.

At the South site, exceedances of impact classes were lower given the higher NML and the greater number of commercial receivers in the area. During demolition at the south site, the highest impact was predicted for demolition where 163 receivers may have experienced exceedances of the daytime NML of up to 10 dB, with 38 receivers experiencing impacts in the 10-20 dB range and up to 10 receivers in the greater than 20 dB range.

### 6.1.3 Construction within shed (Phases 2 - 4 & 6 – 8)

At the Main and South sites work of the initial shaft construction included piling and break-back (by cropping where possible), pouring of capping beams and installation of active ground anchors, and construction of the acoustic shed.

The western end of the station box is covered with an acoustic shed while the eastern section is an open excavation. Construction of the acoustic shed west began after piling and capping beams within the footprint of the shed were completed. Erection of the shed followed the footing foundations, spoil structure, and slab pours.

The acoustic shed construction is now complete and this update to the DNVIS covers activities inside the station box area below the shed during tunnelling for all assessment periods for the main site. Work within the station box has progressed out of sequence for some of the assessed activities and with the eastern end of the station box uncovered, some activities are restricted to daytime only operations.

Work within the western end of the station box has progressed to the cavern excavation stage where all activities are associated with tunnelling operations. Excavation using road headers, drill rigs and shotcrete rig is wholly within the cavern, while tunnelling support for spoil removal and ventilation facilities are operational within the station box.

Currently spoil stockpiling from tunnelling is confined to the middle section of the station box during the day. This location is also used for stockpiling to facilitate the remaining excavation around the tunnel nozzles at the eastern portal.

During OOH periods, stockpiling will be confined to the western end of the station box below the acoustic shed and all stockpiling and spoil handling activities will be handled within the acoustic shed by the end of April 2023.

Activities within the acoustic shed and the station box directly below will be limited to spoil removal and tunnelling support during OOH periods. Noisy activities such as hammering and nozzle construction in the station box east would be undertaken during approved hours only. Other construction activities within the station box and adit may be undertaken during OOH periods where the works are NML compliant at the nearest residences.

There are no predicted exceedances of the NML for the tunnelling within the mined cavern and tunnelling support inside the acoustic shed during the OOH periods.

As there are no excavation activities within the station box area during the evening and night, and noisy activities are scheduled for approved hours only, the deletion of the acoustic roof over the eastern section of the station box is not expected to impact nearby residential receiver locations during the cavern excavation. During standard construction hours, noise levels will be higher during shaft excavations in the absence of an acoustic roof, however, the noise levels will decrease as the excavation deepens.

A noise monitoring survey of the tunnelling and support activities would be completed to confirm compliance with the predicted noise levels for the revised OOH scenario for tunnelling and support. Without the eastern acoustic roof, general excavation within the station box including the nozzle excavation work at the eastern portal would have an increased noise impact at the nearest residences. Predicted exceedances of up to 10 dB above the daytime NML for 21 receiver locations and 3 receivers would experience noise impacts in the 10-20 dB range.

The predicted noise impacts for the cavern and nozzle excavations are presented in Table 6-2 and the modelled noise contours are shown in Appendix C.

**Table 6-1 Summary of predicted NML exceedances for Site establishment**

Activity		Maximum level, dBA			Predicted no. receivers with exceedance of NML														
					Approved hours			Outside approved hours - Day				Outside approved hours - Evening				Outside approved hours - night			
		Res	Non-res	Rec. >75	0-10	10-20	20+	0-10	10-20	20-30	30+	0-10	10-20	20-30	30+	0-10	10-20	20-30	30+
<b>Main site</b>																			
1a	General activities	88	71	3	48	18	6	-	-	-	-	-	-	-	-	-	-	-	-
1b	Construction facilities	90	72	4	57	21	8	-	-	-	-	-	-	-	-	-	-	-	-
1c	Fencing & hoarding	90	70	4	32	22	7	-	-	-	-	-	-	-	-	-	-	-	-
1d	Utilities disconnection	91	73	5	60	22	8	-	-	-	-	-	-	-	-	-	-	-	-
1e	Demolition (no hammer)	89	71	3	49	18	6	-	-	-	-	-	-	-	-	-	-	-	-
1f	Demolition (with hammer)	109	78	17	136	54	26	-	-	-	-	-	-	-	-	-	-	-	-
1g	Site Concreting	90	72	4	56	20	8	-	-	-	-	-	-	-	-	-	-	-	-
<b>South site</b>																			
5a	General activities	78	74	1	21	9	0	-	-	-	-	-	-	-	-	-	-	-	-
5b	Construction facilities	77	72	1	20	6	0	-	-	-	-	-	-	-	-	-	-	-	-
5c	Fencing & hoarding	77	73	1	18	6	0	-	-	-	-	-	-	-	-	-	-	-	-
5d	Utilities disconnection	81	76	3	37	11	1	-	-	-	-	-	-	-	-	-	-	-	-
5e	Demolition (no hammer)	79	75	2	27	10	1	-	-	-	-	-	-	-	-	-	-	-	-
5f	Demolition (with hammer)	88	83	14	163	38	11	-	-	-	-	-	-	-	-	-	-	-	-
5g	Site concreting	80	75	3	26	11	1	-	-	-	-	-	-	-	-	-	-	-	-





Table 6-2 Summary of predicted NML exceedances for excavation activities

Activity		Maximum level, dBA			Predicted no. receivers with exceedance of NML														
					Approved hours			Outside approved hours - Day				Outside approved hours - Evening				Outside approved hours - night			
		Res	Non-res	Rec. >75	0-10	10-20	20+	0-10	10-20	20-30	30+	0-10	10-20	20-30	30+	0-10	10-20	20-30	30+
2a	Piling	80	71	3	54	17	3	-	-	-	-	-	-	-	-	-	-	-	-
2b	Acoustic shed construction	93	66	1	18	6	2	-	-	-	-	-	-	-	-	-	-	-	-
2c	Capping Beams	76	66	1	26	6	2	-	-	-	-	-	-	-	-	-	-	-	-
2d	Active Anchors	85	75	8	105	21	9	-	-	-	-	-	-	-	-	-	-	-	-
2e	Whaler beams	74	65		21	6	1	-	-	-	-	-	-	-	-	-	-	-	-
2f	Excavation OTR	84	75	10	96	20	13	-	-	-	-	-	-	-	-	-	-	-	-
2g	Excavation Rippable	54	48		1			-	-	-	-	-	-	-	-	-	-	-	-
2h	Excavation Non-Rippable	57	53		2			-	-	-	-	-	-	-	-	-	-	-	-
2i	Rock bolting	51	42					-	-	-	-	-	-	-	-	-	-	-	-
3a	Nozzle excavation	72	65		21	3		-	-	-	-	-	-	-	-	-	-	-	-
3b	Concrete lining	47	40					-	-	-	-	-	-	-	-	-	-	-	-
4a	Cavern excavation	47	37					-	-	-	-	-	-	-	-	-	-	-	-
4b	Cavern lining	47	37					-	-	-	-	-	-	-	-	-	-	-	-
4c	TBM walkthrough	51	39					-	-	-	-	-	-	-	-	-	-	-	-
6a	Piling	77	97	2	40	12	1	-	-	-	-	-	-	-	-	-	-	-	-
6b	Caping Beams	74	94	1	18	8	1	-	-	-	-	-	-	-	-	-	-	-	-
6c	Active Anchors	81	101	6	71	16	6	-	-	-	-	-	-	-	-	-	-	-	-
6d	Excavation OTR	75	95	1	26	9	1	-	-	-	-	-	-	-	-	-	-	-	-
6e	Excavation Rippable	86	106	14	161	33	12	-	-	-	-	-	-	-	-	-	-	-	-
6f	Retention ground anchors - rock bolts	78	98	2	49	13	2	-	-	-	-	-	-	-	-	-	-	-	-
7a	Mucking out - Shaft	74	94	1	20	8	1	-	-	-	-	-	-	-	-	-	-	-	-
8a	Pedestrian Adit	82	101	6	76	17	6	-	-	-	-	-	-	-	-	-	-	-	-
8b	Segment lining	75	95	1	26	9	1	-	-	-	-	-	-	-	-	-	-	-	-

#### **6.1.4 Cumulative impacts**

Works in the Main and South sites may occur concurrently. Considering the placement of sensitive receivers relative to each site, cumulative impacts would be minimal, with the nearest site to each residence being the dominant influence on construction noise levels.

When multiple activities are underway on the Main or South sites, predicted levels at any receiver would be influenced primarily by the closest activity. As a worst case, if two similarly noisy activities were underway equidistant from a single receiver, the noise level would increase by 3 dB.

#### **6.1.5 Sleep disturbance**

For activities outside approved hours any work within the main station box would be compliant with CoA D37 or the project the EPL. Activities external to the site undertaken outside of approved hours is covered separately under the project OOHW protocol.

Activities to be completed outside standard hours would be wholly within the cavern or within the footprint of the acoustic shed. These works have been assessed to be NML compliant, therefore would not exceed the sleep disturbance criteria.

At the southern shaft site, there are no planned excavation works outside approved hours and therefore sleep disturbance impacts are not applicable.

Other out of hours work not associated with site activities may be undertaken where they comply with CoA D37 and EPL 21610 and these works would be assessed through the out of hours works process.

### **6.2 Ground-borne noise**

Ground-borne noise impacts are associated with tunnelling or other subterranean works, which have the potential to generate vibration in the ground which translates into noise as it radiates to internal living spaces. These impacts are considered where noise within a building envelope caused by ground transmission is greater than airborne noise from the construction project.

During site establishment, no substantial vibration-intensive activities are proposed that would create indoor noise levels greater than airborne noise from construction activity. Further, no works are proposed below ground. Therefore, ground-borne noise does not require further assessment or consideration of mitigation measures.

The requirement to consider ground-borne noise is applicable to tunnelling or other subterranean works which have the potential to generate airborne noise impacts at the same receiver. During excavation of the tunnel support shafts, vibration-intensive equipment such as rock hammers and rock bolters would be used. Road headers would also be employed to excavate the mined cavern at the western end of the station box.

A range of ground-borne noise monitoring has been completed over the last few years in Sydney, which provides an indication of the level of ground-borne noise to be experienced by sensitive receivers for work at various 3-dimensional slant distances from the vibration sources. A sample of measured ground-borne noise data for road headers, rock breaking and rock bolting is provided in Figure 6-1 to Figure 6-3.



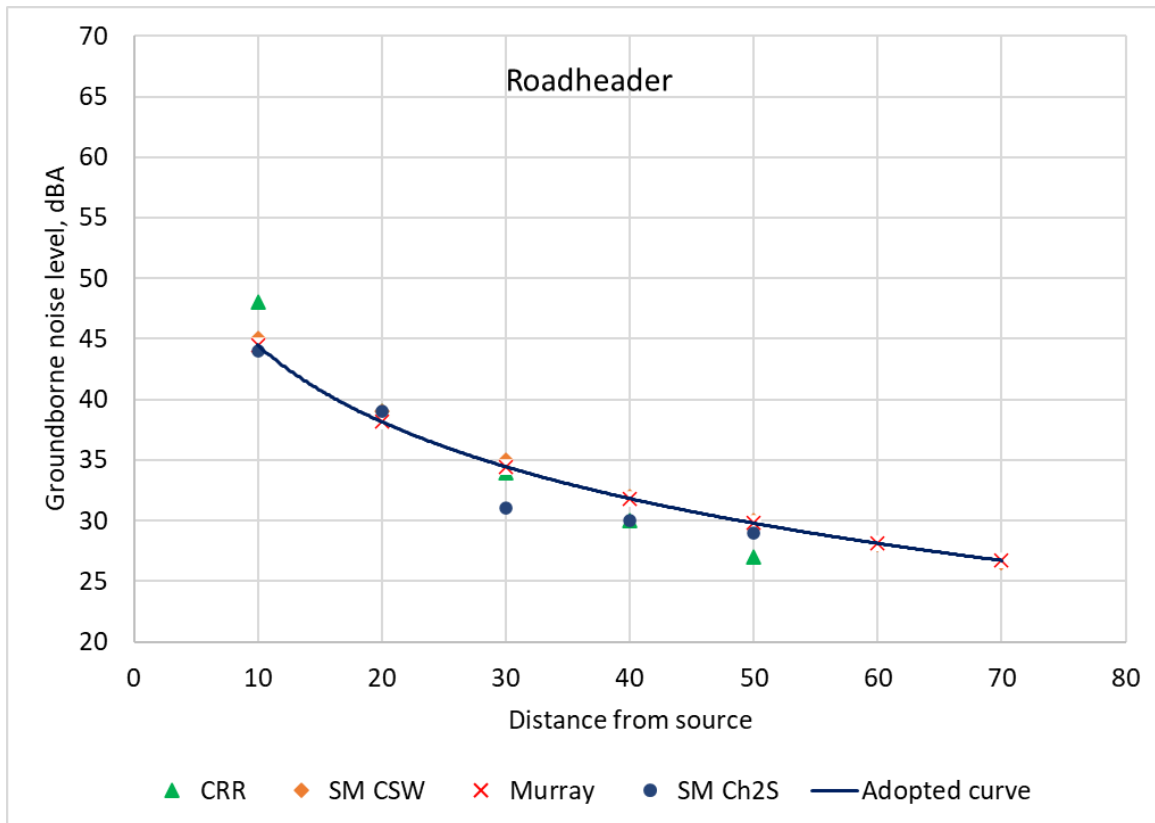


Figure 6-1 Ground-borne noise for road header at various slant distances<sup>1</sup>

<sup>1</sup> CRR (2011) Cross River Rail EIS Construction noise and vibration, SM CSW (2019) Sydney Metro City and Southwest EIS construction noise and vibration, Murray (2003) Tunnelling noise and vibration management, Technical Review, SM Ch2S (2016) Sydney Metro Chatswood to Sydenham Technical Paper.

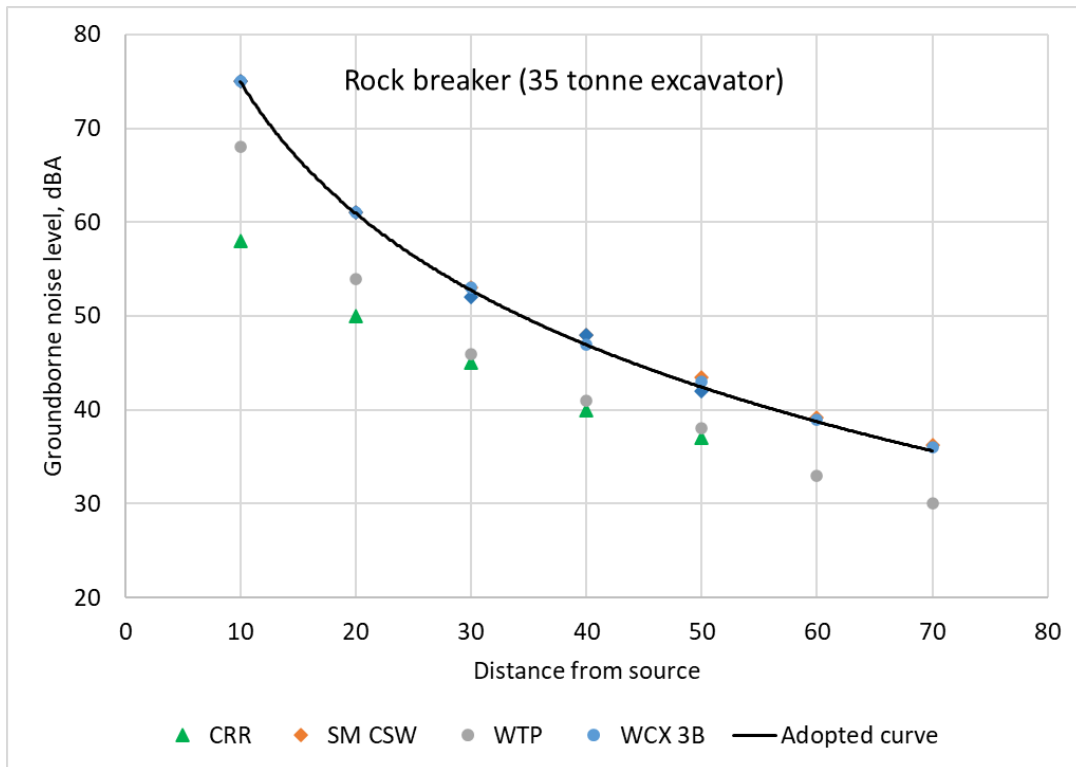


Figure 6-2 Ground-borne noise for 32 tonne excavator with rock breaker at various slant distances<sup>2</sup>

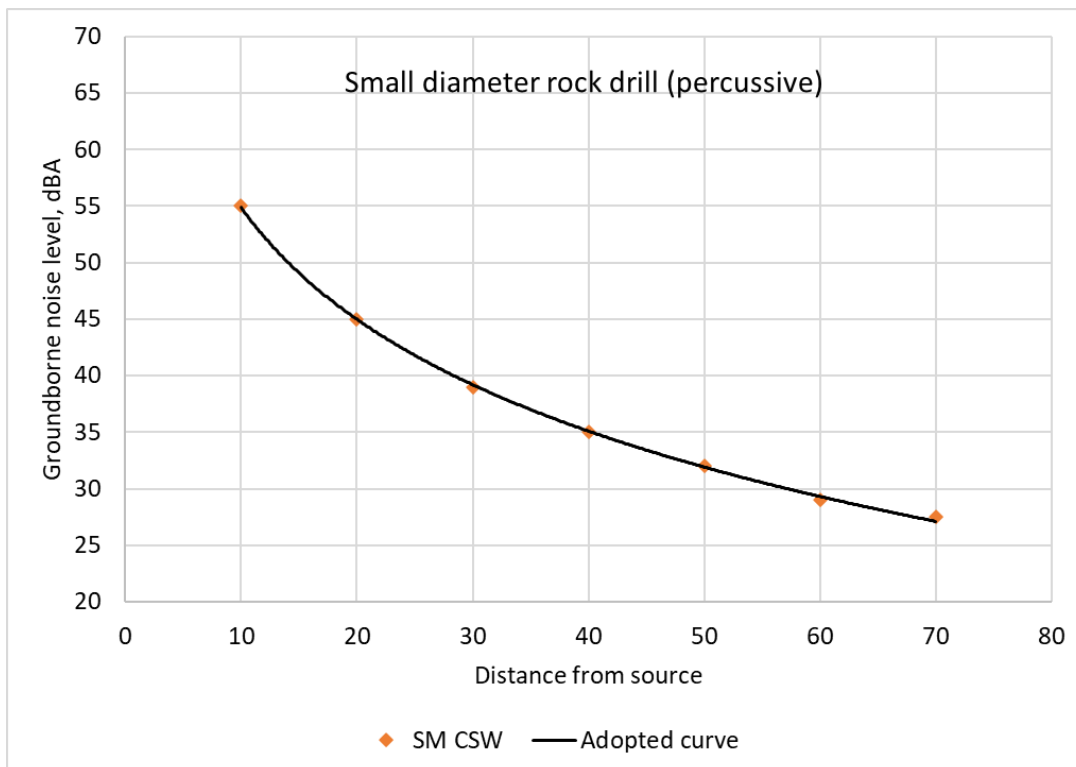


Figure 6-3 Ground-borne noise for road bolter at various slant distances

<sup>2</sup> WTP(2020) Sydney Metro West Stage 1 EIS Technical Paper on Noise and Vibration, WCX 3B (2020) M4-M5 Link Rozelle Interchange Construction Noise and Vibration Impact Statement

Ground-borne noise criteria are not applicable while airborne noise remains the dominant influence on amenity at a sensitive receiver. With the removal of the eastern acoustic roof, night works within the station box that generate ground borne noise are no longer applicable to this DNVIS. Where vibration generating activities occur outside approved hours within the western cavern, the GBN impacts are assessed separately in the tunnelling DNVIS.

### 6.3 Vibration impact assessment

#### 6.3.1 Assessment method and reference data

There are two stages of works where vibration-intensive works are required. The first during site establishment, which would be limited to some compaction by vibratory rollers and some hammering if necessary during demolition of existing buildings. The second, is where non-rippable excavation occurs within the station box area.

Potential items of plant that can generate vibration impacts are:

- Rock hammers
- Vibratory rollers

To assess the likelihood of impacts on human comfort and structures, reference vibration levels are summarised in Table 6-3 and curves of vibration with distance are presented in Figure 6-1. Reference vibration levels are based on previously measured levels.

**Table 6-3 Summary of vibration-intensive activities**

Activity	Typical equipment	Typical PPV vibration emission levels	Source
Demolition/Rock hammer	20 t Excavator with hammer	2.9 mm/s at 10 m	Site measurement
	47 t Excavator with hammer	4.8 mm/s at 10 m	Site measurement
Site compaction	Vibratory roller 11 tonne	3.6 mm/s at 10 m	Site measurement

Based on the estimated vibration emission levels of each activity and the following equation for geometric damping (conservatively ignoring material damping), predicted levels of vibration with distance can be established.

$$PPV_2 = PPV_1 \left( \frac{R_1}{R_2} \right)^n$$

Where:

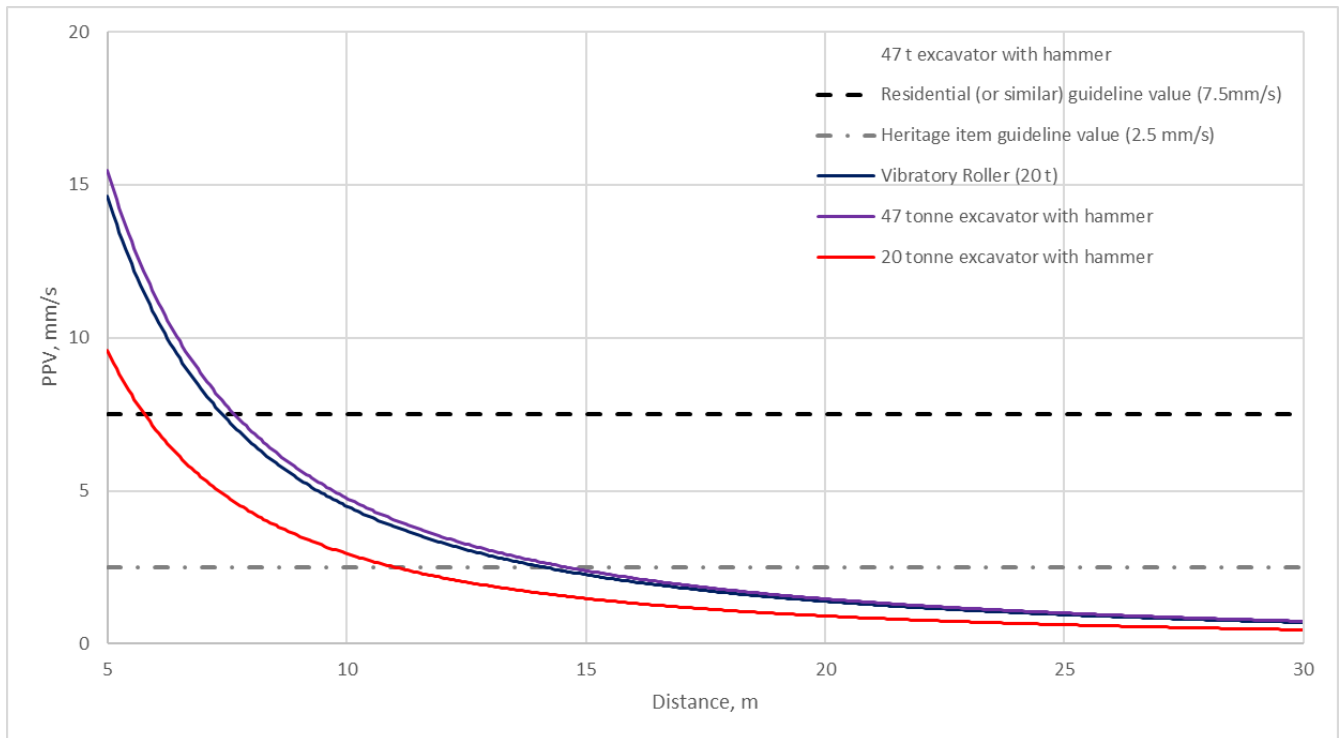
PPV – Peak Particle Velocity at the source (PPV<sub>1</sub>) and Receiver (PPV<sub>2</sub>)

R – distance from source of reference level (R<sub>1</sub>) and distance from source of receiver (R<sub>2</sub>)

n – ground factor assumed as 1.7 for body waves near the ground surface

#### 6.3.2 Risk of cosmetic damage

Predicted levels of vibration over distance are illustrated in Figure 6-1. Considering the vibration guideline values prescribed in the CNVS, with residential dwellings at 7.5 mm/s, the risk of cosmetic damage is low for equipment outside around 8 metres from the source. Where unsound heritage items are present, with a guideline value of 2.5 mm, the risk of damage increases below about 13 metres.



**Figure 6-4 Curves of vibration with distance from the source**

Contours representing the distance at which the vibration guideline values for each item are predicted to be achieved are presented in Appendix C. Where sensitive structures are within the buffer distances identified for each site, trial monitoring should be undertaken prior to any works commencing to determine actual vibration levels.

The AFJV will require the use of vibratory demolition equipment such as rock hammers during some portions of the site establishment works. Rock hammers are needed to remove thick sections of foundation slab that cannot be cut or broken efficiently in other ways.

Several homes along Burton Street and Esher Street as well as a commercial premises on Parramatta Road are within the 7.5 mm/s contour for cosmetic damage and care will be needed to protect their property when working close to the site boundary by following recommendations in Section 7.1.2. No heritage structures are identified within the 2.5 mm/s contour.

Sensitive receivers identified within the minimum distance to meet the applicable vibration guidelines are listed in Table 6-4. Monitoring (Section 7.1.4) and consultation (Section 7.1.5) would focus on these locations.

**Table 6-4 Properties identified within safe working distance cosmetic damage - Demolition**

Activity	Activity Location	Address	Distance to works (m)
Demolition	Station box	1 Loftus Street, Burwood	5
	Station box	2-4 Burton Street, Burwood	5
	Station box	8 Burwood Rd, Burwood	5
	South Shaft	1 Esher Street, Burwood	7
	South Shaft	336 Parramatta Road, Burwood	1

The location of sensitive receivers surrounding each site means that the potential for adverse comment is high and the perceived impact to property will be elevated given the presence of construction activities adjacent to residences.

Where vibratory demolition works are undertaken within the safe working distances (SWD) for cosmetic and human comfort impacts, non-hammering methods will be employed. When working within these zones, vibration monitoring will be used to confirm the vibration levels at the nearest dwellings.

General consideration of vibration generating activities will include alternative methods where possible to minimise vibration risk, such as:

- Employ smaller rollers or non-vibratory (static) rolling methods for compaction where practicable.
- Use a ripper and bucket in place of a hammer where possible.
- Use smallest available excavator and hammer combination when breaking concrete or rock.

To minimise the potential for recourse of vibration type impacts including ground settling, a thorough investigation and survey of all adjacent properties will be necessary. Vibration monitoring for the most affected buildings including the heritage listed items will be required to confirm actual vibration levels against cosmetic damage criteria (see Section 7.1.4).

Following demolition, the station box and shaft excavations will commence initially with spoil removal via excavator and dozer down to a level of around three metres. Excavation using rock hammers within the station box and the southern shaft would continue to be used to remove non-rippable material as the excavation depth increases.

Vibration from rock hammering at these locations will be less than the predicted levels from demolition due to the distance from the excavations to the residences. As the depth of hammering increases, the slant distance to buildings and structures would also increase.

Based on the vibration curves in Figure 6-4, no residential dwellings would be within the 6 metre SWD buffer for a 20 tonne hammer. At the southern shaft, the Eagle Riders Motorcycle shop, which is adjacent to the excavation shaft, would be within the SWD at the shallower depths.

This location has previously been identified as a potential risk for cosmetic damage to a non-residential building and has a 24 hour vibration monitoring system installed to alert the Project team of any potential exceedances of the vibration criteria.

Where larger equipment such as a 47-50 tonne hammer is used for the station box site, the 10 metre SWD may not be met for one residential dwelling in Burton Street, adjacent to the station box. It is important to consider that distances representing the SWD are at the closest boundary points of the station box excavation and the residences. As hammering work moves away from these areas or where smaller hammers are used, there would be no expected exceedance of the predicted SWD for the station box.

The closest receiver locations to the station box and southern shaft are listed in Table 6-5. Monitoring (Section 7.1.4) and consultation (Section 7.1.5) would focus on these locations.



Table 6-5 Properties identified within safe working distance cosmetic damage - Excavation

Activity	Activity Location	Address	Distance to works (m)
Excavation	Station box	1 Loftus Street, Burwood	13
	Station box	2-4 Burton Street, Burwood	15
	Station box	16 Burton Street, Burwood	10
	South Shaft	14 Burwood Rd, Burwood	18
	South Shaft	1 Esher Street, Burwood	17
	South Shaft	336 Parramatta Road, Burwood	1

### 6.3.3 Human exposure

During site establishment, rock hammering is not likely to extend over substantial periods of time, so human exposure to vibration would be limited. Rolling also, is likely to be of limited duration in any single location. Based on the distance to the nearest residences, it is unlikely the vibration level and duration of operation would result in vibration dose values exceeding the criteria.

To estimate the vibration dose value of hammering, the estimated VDV (eVDV) equation from DEC 2006 has been used:

$$eVDV = 1.4 \times a \times t^{0.25}$$

where  $a$  represents the root mean square (rms) vibration acceleration in  $m/s^2$  and  $t$  is the duration of the activity in seconds. Since we only have velocity values for vibration, acceleration is substituted for velocity by the following equation:

$$a_{rms} = 2 \times \pi \times f \times v_{rms} / 1000$$

where  $f$  is the dominant frequency of the vibration and  $v$  is the root mean square (rms) velocity.

The rms velocity was derived from the peak particle velocity assuming a crest factor (the ratio of the peak value to its rms value) of 3.5 for rolling and 5 for hammering. The dominant frequency of compacting is taken as 40 Hz and hammering 80 Hz.

eVDVs for durations of rolling and hammering of between 1 hour and 8 hours, are presented in Figure 6-2 and Figure 6-3 respectively, which show the eVDV at various distances from the source for a range of exposure durations.

From the graph, rolling in the daytime would result in possible adverse comment within 20 to 25 metres from the source for a total of up to 8 hours of work. Hammering is likely to result in adverse comment when works are closer than 15 metres for 8 hours a day or about 10 metres for short durations such as 1 – 2 hours.

Vibratory works such as rolling and hammering during site establishment will generally be of short duration and can be managed using recommendations in Section 6.3.2 combined with respite periods.

Human exposure to vibration applies when a sensitive receiver is impacted in a habitable room, where no receiver is present, human comfort criteria would not apply. In addition, where the work moves further from the impacted building a reduced impact would be predicted and duration of exposure would increase proportionally.

Human comfort should be assessed inside the residence at the centre of a habitable room. Therefore, the building's construction, how many floors, how the building is coupled to the ground and the distance to the nearest habitable room would influence the actual levels measured during compaction and would likely be lower than predicted.

Vibration contours are presented in Appendix C and illustrate the homes that may fall within 25 metres for possible adverse comment during daytime hours. Several homes on Burton Street fall within this category.

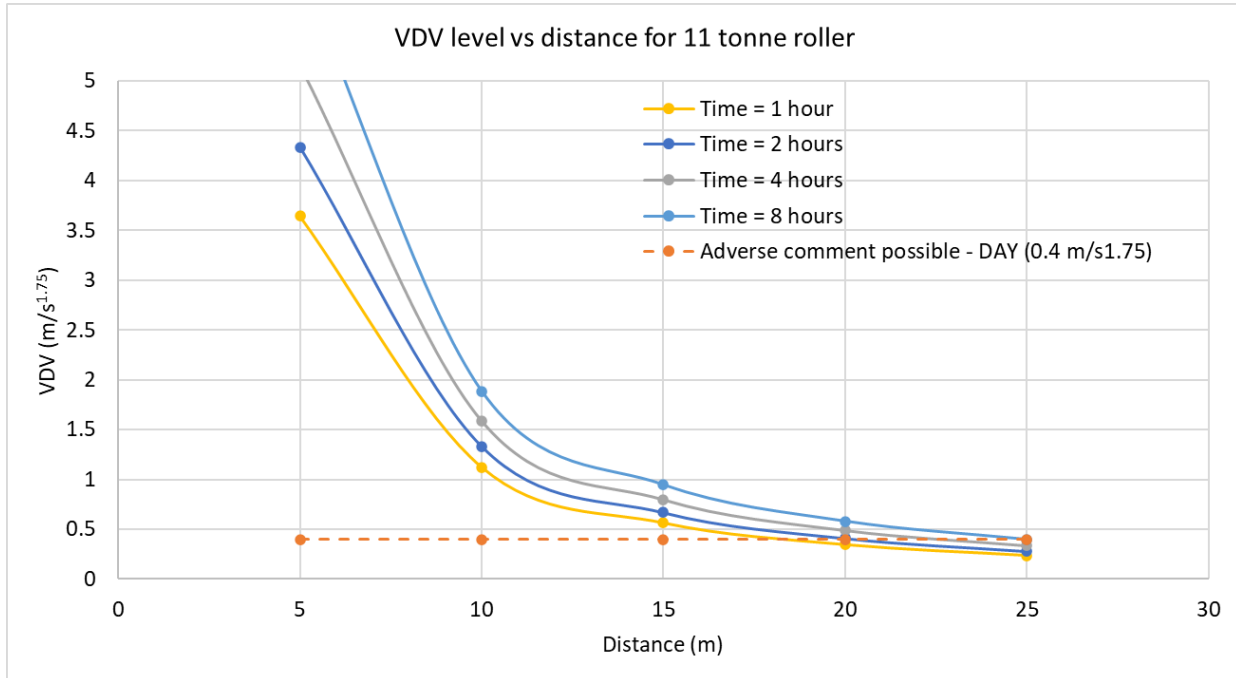


Figure 6-5 VDV curves for vibratory roller

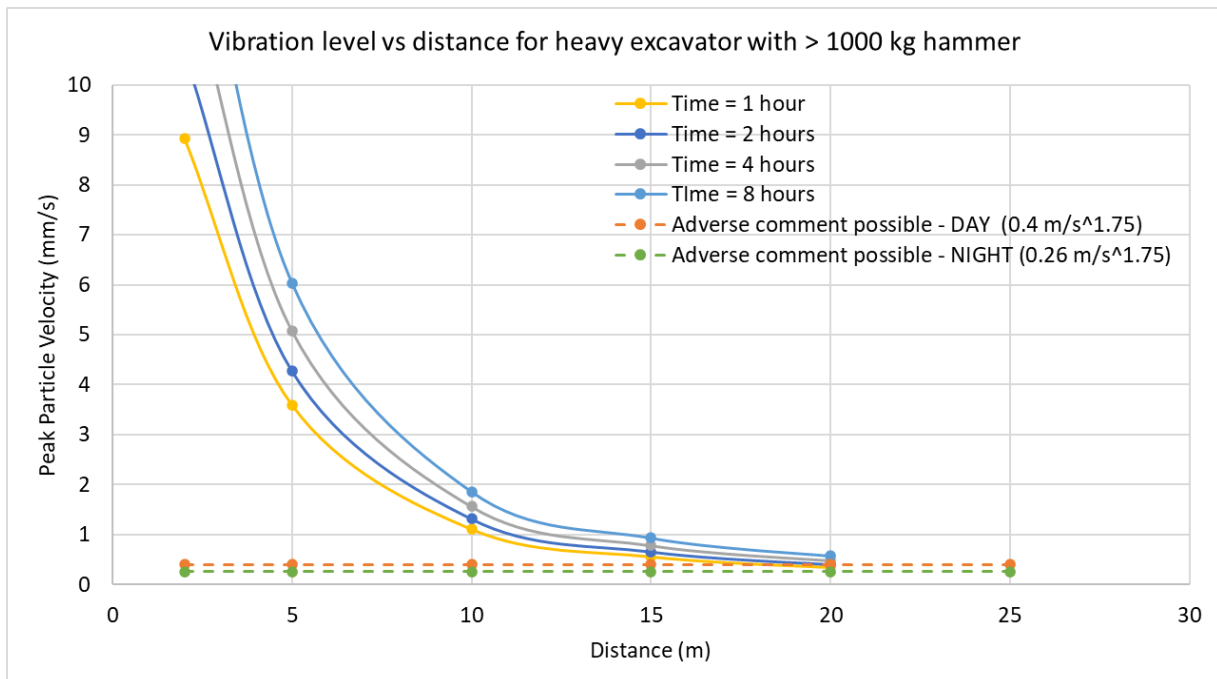


Figure 6-6 VDV curves for 47 tonne excavator with hammer

## 6.4 Construction traffic

The Burwood north main station box site is bounded by 2 arterial roads, Parramatta Road and Burwood Road, and two local roads, Burton Street and Loftus Street. The southern site is bounded by Parramatta Road and Burwood Road and a laneway access from Esher Lane at the rear of the site.

Figure 6-7 presents the traffic access points for the main and southern sites. Spoil removal from the site will be ongoing up to the completion of the station box and cavern excavation at the western end of the station box until late 2023. Additional deliveries of materials and equipment will continue as necessary during this time.

Based on the nominal activities during site establishment, up to 2 heavy vehicles are expected to access and exit the site each hour during the establishment phase and 8 to 12 heavy vehicles per hour during excavation of the station box and the southern station entry. Condition D37, limits truck movements from the Burwood site to daytime traffic hours from 7am to 10pm for local roads while outside approved hours truck movements must access and exit site via Parramatta Road.

Currently, there is no access to Burton Street therefore all spoil truck movements enter and exit the site via Parramatta Road during the day. Other irregular deliveries of equipment and concrete may use Burton Street during the day. From about mid May 2023 spoil movements of around 120 vehicles per day would use the Parramatta Road exits and an additional 80 spoil/delivery trucks would exit via Burton Street.

Public roads such as Burton Street have low volumes of existing traffic and the EIS indicated a 2 dB increase above existing traffic noise on these roads was likely. For the main site the Burton Street exit is expected to be impacted by daytime traffic defined in the RNP as 7am to 10pm and have been assessed against the RNP criteria for local roads. Local roads have an RNP assessment criteria of  $L_{Aeq} 1hr$  55 dBA for daytime.

To determine potential impacts, an estimate of expected traffic noise using the *Calculation of Road Traffic Noise* (CoRTN) methodology has been completed for the local roads. Based on a speed limit of 40 km/h for vehicles entering and exiting the site, predicted noise levels for the average peak periods of 5-6 vph for Burton Street. An assessment of the construction-related heavy vehicle noise impacts are estimated to be 57 dB  $L_{Aeq} 1hr$  for local roads.

For Burton Street the predicted noise levels indicate an exceedance of 2 dBA for the  $L_{Aeq} 1hr$  daytime period. Where the predicted exceedance of the daytime traffic is no greater than 2dB(A), traffic noise impacts would be managed in accordance with the NVMP.

The southern site construction traffic will use Parramatta Road and Burwood Road which have the noise profile of an arterial road. The additional construction traffic on these roads is only a minor increase in percentage heavy vehicle terms and the predicted traffic noise for 6 hvph is 58 dB(A). The additional traffic on Burwood and Parramatta Roads would therefore be below RNP criteria for daytime road traffic of 60 dB  $L_{Aeq} 15hr$  with no substantial increase in traffic volume.

Considering the estimated traffic noise impacts on local roads, the project noise and vibration sub plan provides for the management of construction traffic related noise impacts as follows:

*Where road traffic noise levels increase by more than 2 dBA because of construction traffic, consideration will be given to applying feasible and reasonable noise mitigation measures to reduce the potential noise impacts and preserve acoustic amenity. Consideration will also be given to the actual noise levels associated with construction traffic and whether these levels comply with the following road traffic noise criteria in the RNP:*



An important consideration of potential mitigation will include the limited duration of construction noise impact during standard construction hours only and the predicted exceedance of less than 2 dBA above the RNP traffic noise criteria.

A review of the predicted impacts from construction traffic for the nearest receivers indicates that there were no viable options for traffic noise mitigation detailed in the EIS. Heavy vehicle traffic would begin to access Burton Street around mid May 2023, after which time a traffic noise monitoring survey and report would be completed to determine the actual noise levels from the main site prior to the consideration of any mitigation options in accordance with the project Revised Environmental Mitigation Measure (REMM) NV14.

In addition to spoil and delivery movements, a street sweeper is also being used as a mitigation measure for tracking and dust management onsite, at access points and along the haul routes around the Burwood Main and southern sites.

Onsite mitigation measures such as working on hardstand areas and use of a wheel wash where reasonable and feasible will be implemented to reduce frequency of street sweeper use. The street sweeper will be fitted with a non-tonal reverse alarm. If required the street sweeper will be in regular use during standard construction hours. On local roads infrequent use of the street sweeper between 6pm and 10pm during hauling may be required but will be minimised where possible. On Parramatta Road, the street sweep will operate as required. The street sweeper will be included in the traffic noise monitoring survey.



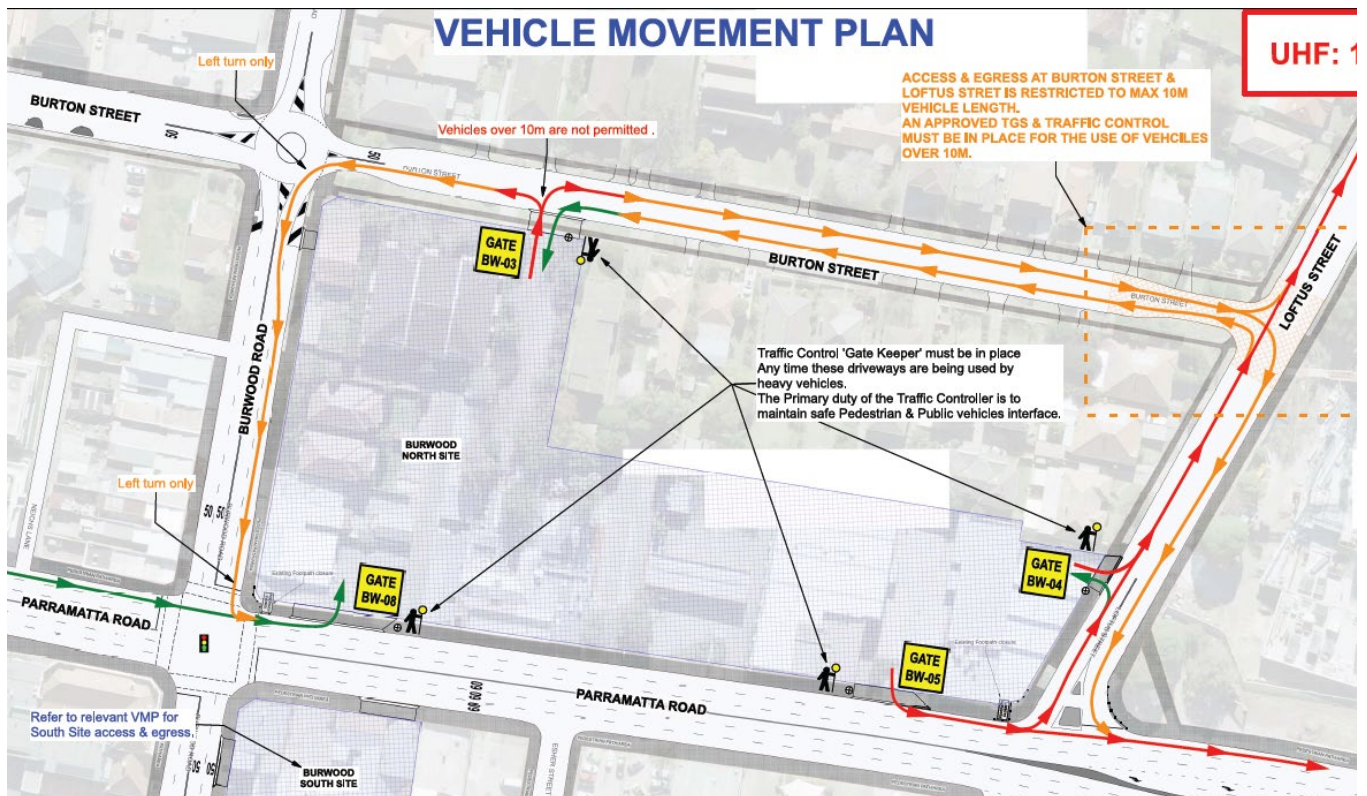


Figure 6-7a Burwood North construction traffic movements – Main site

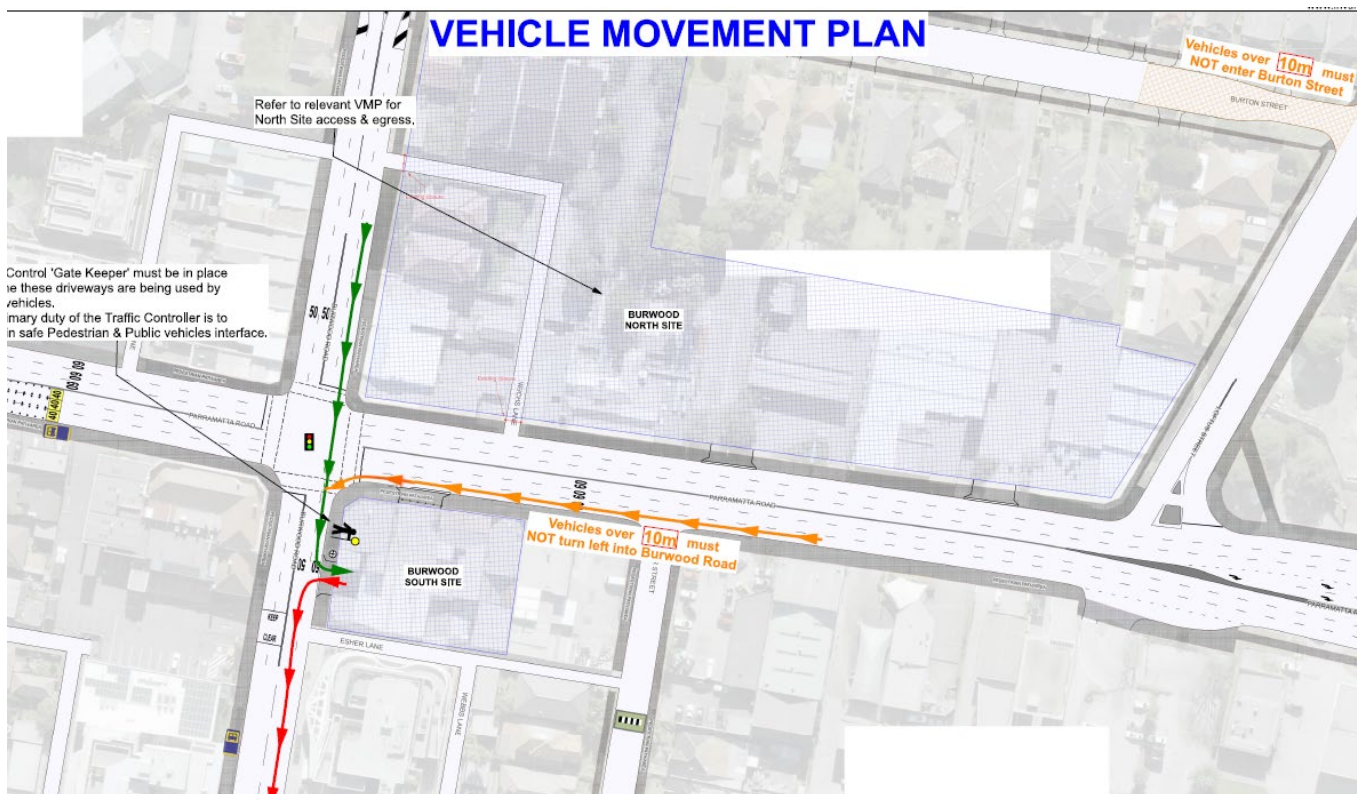


Figure 6-8 Burwood North construction traffic movements – South site

## Summary and recommendations

### 6.4.1 Impact summary

Predicted noise levels indicate some construction activities will result in adverse impacts on the local community, with residents directly adjacent to the works to experience the greatest level of impact.

As there are no noisy works programmed during the evening or night, there are no sleep disturbance expected at this stage.

Where out of hours work are required outside the scope of this DNVIS such as out of hours utility relocations and oversized plant deliveries and this will be assessed through the out of hours work process. These activities may cause impacts above NML and sleep disturbance levels and mitigation measures such as offering alternative accommodation will be implemented as required.

Hoarding was included as a safety and noise mitigation measure for early works based on the review of mitigation requirements from Sydney Metro West. Some of these areas have existing barriers at the boundary or will be retained as facades of several of the demolished buildings or an equivalent noise wall. Predicted noise levels at receiver locations reflect this level of mitigation.

Despite noisy activities in the eastern end of the station box being approved hours only, predicted noise levels and sensitivity of the community to noise and vibration, results in a moderate level of risk. Mitigation measures in line with this classification are proposed.

Vibration impacts from surface works may be perceptible where vibration generating equipment such as rock hammering or vibratory rolling is undertaken. These impacts need to be managed where vibratory work is required at the closest boundary locations adjacent to sensitive receivers.

With respite, the level of impact on residents is not likely to exceed any vibration management levels outside of the 25 metre buffer zone around these activities. However, within this buffer several homes on Burton Street, Burwood Road and Esher Street may experience vibration above the human comfort thresholds. Cosmetic damage risk is relatively high where vibratory activities are close to the boundary, particularly adjacent to receivers on Burton Street.

### 6.4.2 Standard mitigation

Standard noise mitigation measures described in Table 7-1 should be implemented at all phases of the project in addition to those described in the project Construction Noise and Vibration Management Plan (CNVMP).

In line with CoA D42 best practice construction methods will be implemented where reasonable and feasible to ensure noise is maintained at a practical minimum. Practices will include:

- use of regularly serviced low sound power equipment;
- temporary noise barriers (including the arrangement of plant and equipment) around noisy equipment and activities; and
- use of alternative construction techniques to minimise noise and vibration will be adopted including:
  - Minimising use of rock hammers during demolition phase of the work by using shear and jaw attachments for excavators
  - Avoid hammering foundations during demolition where practicable by saw cutting and lifting slabs with the excavator bucket
  - Completing pile cap breaking using non percussive equipment such as pile croppers



The acoustic shed will be designed and constructed with the aim of meeting the NMLs for evening and night periods for the activities proposed during these times. Shed walls will be erected as early as possible, with walls protecting the nearest residential receivers to be scheduled as a priority.

Where external noise sources are identified outside of this DNVIS, use of noise mats and timber hoarding will provide both an acoustic benefit and a visual indicator to the public that all reasonable and feasible measures are being undertaken.

Equipment should be selected with consideration of noise emissions and the quietest equipment that can do the job should be chosen.

As required by CoA D37(a), any emergency works predicted to exceed the NML would be undertaken in accordance with Section 6.6 of the out-of-hours works protocol (SMWSTCTP-AFJ-1NL-PE-PLN-000005 Revision 02).

Consultation will be critical in ensuring the community's expectations are managed, with impacts and durations clearly conveyed, resident's concerns heard, appropriate respite and other mitigation is offered and/or implemented and works outside of hours are not unexpected.

**Table 6-7 Properties Standard mitigation measures**

Measure	Description
<b>Administrative</b>	
Construction hours	<ul style="list-style-type: none"> <li>As much work as possible will be programmed during approved hours. Where work outside approved hours is proposed, this will be completed in line with the CNVMP and Out of hours works protocol.</li> </ul>
	<ul style="list-style-type: none"> <li>When working outside schools, medical facilities and child care centres, excessively noisy activities will be completed outside normal working hours where practicable.</li> </ul>
	<ul style="list-style-type: none"> <li>When working outside churches, particularly noisy activities will be undertaken outside scheduled service times where reasonable and feasible.</li> </ul>
	<ul style="list-style-type: none"> <li>In accordance with CoA D36 noisy activities as defined in the ICNG, such as concrete cutting, will be undertaken on a, 3 hours on, 1 hour off, basis unless otherwise approved.</li> </ul>
Community consultation	<ul style="list-style-type: none"> <li>In line with the CNVMP, nearby receivers should be notified of the upcoming works, including the duration and predicted level of impact.</li> </ul>
	<ul style="list-style-type: none"> <li>In line with the CNVS, community consultation will be undertaken regarding the DNVIS and proposed mitigation such as respite offers</li> </ul>
Site induction	<ul style="list-style-type: none"> <li>Site Environmental Induction should be delivered to the team and should include consideration and awareness of noise impacts.</li> </ul>
Cumulative impacts	<ul style="list-style-type: none"> <li>Programming for works undertaken outside approved hours will also consider works being undertaken by third parties</li> </ul>
Behaviour	<ul style="list-style-type: none"> <li>Avoid yelling and swearing near sensitive receivers.</li> </ul>
	<ul style="list-style-type: none"> <li>Trucks shall enter and exit the sites via Parramatta and Burwood Roads during establishment.</li> </ul>
<b>Noise control</b>	
Equipment selection	<ul style="list-style-type: none"> <li>Priority will be given to the use of quieter and less vibration emitting construction methods and plant alternatives where feasible and reasonable.</li> </ul>
	<ul style="list-style-type: none"> <li>All equipment shall be well maintained, including mufflers and any noise suppression</li> </ul>
	<ul style="list-style-type: none"> <li>Use shears to break up building slabs where possible. If unavoidable, use of hammers would be of short duration, during standard hours, follow 3 hours on 1 hour off and be surrounded by noise mats.</li> </ul>
	<ul style="list-style-type: none"> <li>All equipment will meet the maximum sound power requirements of Table 13 of the CNVS.</li> </ul>

Measure	Description
	<ul style="list-style-type: none"> <li>Trucks approaching construction sites will avoid the use of compression braking, especially in the night period</li> <li>Traffic management signage vehicles shall be padded to reduce rattling as much as possible.</li> </ul>
Noise barriers	<ul style="list-style-type: none"> <li>Use temporary noise screens and enclosures as much as possible to reduce noise emissions from equipment when stationary or operating in one location for a reasonable duration. Screens (such as Echobarrier) should be placed between source and receivers, be continuous (without gaps) and installed according to manufacturer directions.</li> <li>During demolition, existing buildings will be removed with consideration of retaining noise barriers for as long as possible. Work should generally progress in an anticlockwise direction starting at Burton Road then moving south to Parramatta Road towards Loftus Street with the general aim of providing maximum duration of shielding from the existing buildings and infrastructure.</li> <li>Erection of hoarding will be considered along boundaries with noise affected residents.</li> </ul>
Use and siting of plant	<ul style="list-style-type: none"> <li>Plant used intermittently to be throttled down or shut down. Switch engines off when not in use for a short time (e.g. 15 minutes)</li> <li>Noise-emitting plant to be directed away from sensitive receivers where possible.</li> <li>Stationary plant should be located behind a structure or enclosed if practicable.</li> <li>Avoid compression breaking on approach to the site.</li> </ul>
Non-tonal reversing alarms.	<ul style="list-style-type: none"> <li>Non-tonal reversing beepers (or equivalent) must be fitted and used on all construction vehicles and mobile plant regularly used on site and for any out of hours work.</li> </ul>
<b>Monitoring</b>	
Noise monitoring	<ul style="list-style-type: none"> <li>Noise monitoring shall be completed to: <ul style="list-style-type: none"> <li>verify assumptions of this DNVIS regarding estimated equipment noise emissions,</li> <li>ensure noise levels below NMLs,</li> <li>as required by the AMM for each assessed activity and</li> <li>as required by the NVMP and associated monitoring program.</li> </ul> </li> </ul>
Vibration monitoring	<ul style="list-style-type: none"> <li>Attended vibration measurements would be undertaken at the commencement of vibration generating activities within safe working distances shown in Appendix B. Where there is potential for exceedances of criteria vibration, site law investigations would be undertaken to determine site-specific safe working.</li> </ul>

### 6.4.3 Additional mitigation measures

Additional noise mitigation measures described in the CNVS AMMM should also be implemented as indicated in Appendix A for each receiver. AMM for each receiver is indicated by colour-coding as per the AMMM in Table 4-2.

For vibration, AMM should be applied for sensitive receivers where measurement indicates it is applicable. In this case, measurement means either at a single location, which also indicates the likely level (and relevant AMM) at other similarly exposed locations or as established by site law measurements to indicate which receivers would be within the site-specific safe working distances.

### 6.4.4 Monitoring

Several assumptions have been made in this assessment to provide representative predictions, such as work location, equipment types, numbers, intensity of operation and noise screening options and these will be verified once works commence and regularly throughout the program.

Noise and vibration monitoring will be undertaken in line with the Noise and Vibration Monitoring Program and out-of-hours protocol as appropriate, with the following monitoring to be completed as a minimum.

#### Noise

- Sound power level verification (on-site) to ensure equipment meets the requirements of the CNVS
- Monitoring at representative nearby sensitive receivers to verify predictions at various phases of construction.
- Evaluation of the acoustic shed for Burwood north to establish that it meets the design requirements described in this DNVIS.
- Ground-borne noise monitoring would be conducted within the centre of habitable rooms at locations identified to exceed the ground-borne noise NMLs or in the event of a complaint if monitoring is identified as an appropriate response.

#### Vibration

- To verify predicted levels and assist in meeting objectives. This will be done as new vibration intensive activities commence such as ground compaction, percussive drilling, non-rippable excavation with hammers. Monitoring locations will be at the nearest sensitive receiver or at the closest boundary if private property access is unavailable.
- The closest heritage item for the Burwood north and south shafts is the Bath Arms Hotel. This location is expected to fall outside the safe working distance for heritage vibration impacts during demolition and shaft excavation but may experience some low levels of vibration in the range of human comfort levels. While any vibratory work is underway within safe working distances. Consultation prior to potential vibration generating works would be necessary for this site.

#### Continuous monitoring

- To meet the requirements of CoA D63, fixed monitoring locations have been identified for this site and are detailed in the CNVMP. Long-term noise and vibration monitoring data at these locations will be readily available as required in the CNVMP and Monitoring Program.

#### 6.4.5 Consultation

Condition of Approval D43 requires mitigation measures presented in this DNVIS to be identified through consultation with the affected community. This applies to standard hours and works outside standard hours. All mitigation measures developed as part of this DNVIS have been formed around community needs and concerns established through the community consultation process, as required by CoA D43. This process will continue for further phases of work.

In reviewing sensitive land uses near the Burwood North sites, specific receivers requiring consultation has included nearby receivers on Burton Street, Loftus Street, Esher Lane, Parramatta Road and Burwood Road, as well as businesses, schools and places of worship, which may be sensitive to noise.

AFJV's Place Manager presence on site since 20 October 2021 has been instrumental in identifying the needs of local residents, businesses and community organisations. Regular standardised and tailored communication material has been provided to stakeholders at each stage of site development, including targeted doorknocks and communication material at key construction milestones such as installation of the water treatment plant, excavation progress, Tasman tank and acoustic shed construction.

In addition, many properties around Loftus and Burton Street are suffering construction fatigue resulting from the recently completed Concord Oval redevelopment. AFJV worked closely with ADCO Construction Australia (Concord Oval construction contractor) and the Concord Oval Redevelopment to ensure a consistent interface, plan works to avoid cumulative impacts to nearby receivers and to communicate and advocate any concerns of residents.

AFJV has continued to utilise the mitigation measure of relocation (alternative accommodation) for residents impacted by OOHW, complementing this with additional respite offers such as noise cancelling headphones and movie vouchers for stakeholders with specific and/or unique circumstances. These offers are extended for both airborne and groundborne noise impacts where appropriate.

AFJV continues to work closely with St Luke's Anglican Church in Burton Street during construction with open dialogue on the construction timeline, precondition property inspections for the heritage site and specific requirements for the additional activities held at the Church grounds (such as playgroups and classes). Tailored communication has been very effective with this sensitive receiver to ensure all disruptive activity is communicated clearly in advance to minimise any impact on the day to day running of the Church and the wider congregation. To date the Church has expressed great satisfaction with the operation of the site and communications regarding impacts on Burton Street and continues to be an advocate of Sydney Metro as a result. In particular, the Church expressed gratitude for the detailed attention to the needs of the Church such as ensuring VMS signs are in place advising the community the Church access was open when Burton Street was closed. The Church continues to work closely with the Place Manager and participate in significant events on site such as the blessing of the St Barbara statue prior to tunnelling commencement.

AFJV has also commenced discussions with St Marys Church, Catholic Primary School and Residential Retirement Villas, all located on the block from Parramatta Road, Broughton Street and Burton Street. Whilst these stakeholders are located some 300m from site, they will be affected by tunnelling activity. After close consultation with the primary school and Parish Priest, AFJV adjusted the program of geotechnical investigation work that was set to occur in front of the school building to undertake this activity during the school holidays to minimise disruption. This willingness to adjust set programs to consider the needs of the school has been well received by these important stakeholders. AFJV has also commenced engagement activities with the school to ensure the wider school community is aware and informed of the activities occurring at the Burwood North construction site.

AFJV has also commenced discussions with local businesses in the area to ascertain their specific needs and concerns and ensure the construction team are fully aware of these, such as the Royal Enfield Motorcycle shop that shares a wall with the South site. The Royal Enfield has been appreciative of the collegiate relationship with AFJV and assistance with modifying disruptive work when major promotions or filming is underway. AFJV continues to ensure construction methodology and sequencing is sensitive to the impact of the Royal Enfield and the program planning is reflective of this with all attempts to undertake disruptive work such as pile trimming and shotcrete adjacent to the wall undertaken on the day the business is not operational wherever possible.

Businesses and residents on Burton Street and Burwood Road have been kept well informed of the updates to the sewer relocation package to ensure they understood their access to alternative accommodation and to minimise impacts of work on shop trading.

AFJV will continue to consult with the community about planned works, including regular updates about upcoming out of hours activities, associated impacts and mitigation measures being implemented as well as invite ongoing feedback to be provided via email, 24-hour phone line or in person meetings.

An out of hours work lookahead of no less than 3 months is provided to the community on a quarterly basis while monthly site-based notifications are distributed and emailed as well as sent via Sydney Metro Connect App and weekly email updates provide regular updates on progress of current out of hours work as well as upcoming work. A recent Community information drop-in session was held on 4 May 2023. Information obtained from the ongoing engagement will be considered as the out of hours scope of work is confirmed and where appropriate, targeted mitigation measures would be implemented



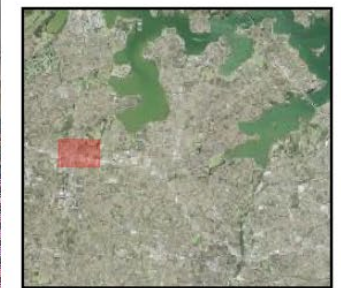
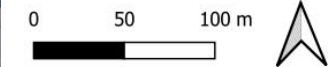
## Appendix A. Land use survey and NCA maps





Sydney Metro West  
Central Tunneling Package  
Land Use Survey

- Project Footprint
- Receiver Type
- Childcare
  - Commercial/Business
  - Commercial/Residential
  - Community Use
  - Community/Residential
  - Education
  - Hotel
  - Industrial/Utilities
  - Recreational/Open Space
  - Residential
  - Medical
  - Place of Worship
  - Recreational Passive
  - None







Appendix B. Proposed equipment and sound power levels

B.1 Site establishment

Phase		Activity/ Work Area	Aspect		Plant/Equipment	Day	Evening	Night	SWL, dBA	Usage	Temp. barrier reduction, dB	Penalty, dB	SWL	Adjusted SWL, LAeq,15 minute			Activity LAeq, 15 min SWL		
						7am - 6pm	6pm - 10pm	10pm - 7am					Lmax	Day	Eve	Night	Day	Eve	Night
1	Site Establishment- North shaft	Construction Compound	1a	Daily activities	Power Generator	1			106	1	5	0	107	101	0	0	108	0	0
					Road truck (d per 15 minutes)	2			107	0.4		0	112	106	0	0			
					Light vehicle / 15 min	4			93	0.3		0	98	93	0	0			
					Compressor	1			101	0.3		0	106	95	0	0			
					Hand tools	1			94	0.2		0	99	87	0	0			
					Franna Crane	1			98	0.4		0	103	94	0	0			
		Construction facilities	1b	Construction facilities	Excavator w bucket	2			107	0.6		0	112	108	0	0	111	0	0
					Franna Crane	1			98	0.6		0	103	96	0	0			
					Small Truck / 15 min	1			93	0.3		0	98	88	0	0			
					Concrete Agi / 15 min	2			103	0.3		0	108	101	0	0			
					Pneumatic vibrator	1			95	1		0	100	95	0	0			
					Compressor trailer mount	1			94	0.4		0	99	90	0	0			
					Concrete pump	1			108	0.3		0	113	103	0	0			
					Mobile crane	1			104	1.4		0	109	105	0	0			
					Hand tools	2			94	0.2		0	99	90	0	0			
					Elevated work platform	2			89	2.4		0	94	96	0	0			
		Temporary fencing/ hoardings	1c	Fencing & hoarding	Bobcat	1			107	0.3		0	112	102	0	0	107	0	0
					Tracked excavator w bucket	1			107	0.4		0	112	103	0	0			
					Flat bed truck	1			93	0.3		0	98	88	0	0			
					Hiab	1			101	0.3		0	106	96	0	0			
					Hand tools	1			94	0.2		0	99	87	0	0			
		Utilities Disconnection	1d	Utilities disconnection	Concrete agitator trucks	1			103	0.3		0	108	98	0	0	110	0	0
					15t tracked excavator + bucket	1			107	0.4		0	112	103	0	0			
					EWP	1			89	0.3		0	94	84	0	0			
					Bogie trucks	1			93	1		0	98	93	0	0			
					Compressor	1			93	0.5		0	98	90	0	0			
		Demolition	1e	Demolition (no hammer)	Jackhammer*	1			111	0.2		5	119	109	0	0	113	0	0
					47t Excavator bucket/shears	3			112	0.4		0	117	108	0	0			
					Tipper trucks	2			98	0.4		0	103	97	0	0			
					Watercart	1			103	0.4		0	108	99	0	0			
					Possi Track bobcat	1			107	0.3		0	112	102	0	0			
			1f	Demolition (with hammer)	47t Excavator + hammer	1			122	0.3		5	128	122	0	0	122	0	0
					10t Excavator	1			99	0.4		0	109	100	0	0			
					Tipper trucks	1			98	0.4		0	103	94	0	0			
		Site Concrete Works	1g	Site Concreting	15t tracked excavator + bucket	1			107	0.4		0	112	103	0	0	109	0	0
					Franna	1			98	0.4		0	103	94	0	0			
					Concrete agitator	1			103	0.3		0	108	98	0	0			
					Compressor, trailer mounted	1			94	0.5		0	99	91	0	0			



## Detailed noise and vibration impact statement

Phase		Activity/ Work Area	Aspect		Plant/Equipment	Day	Evening	Night	SWL, dBA	Usage	Temp. barrier reduction, dB	Penalty, dB	SWL	Adjusted SWL, LAeq,15 minute			Activity LAeq, 15 min SWL		
						7am - 6pm	6pm - 10pm	10pm - 7am					Lmax	Day	Eve	Night	Day	Eve	Night
5	Site Establishment- South Shaft	Construction Compound	5a	Daily activities	Generator	1			106	1		0	107	106	0	0	108	0	0
					Concrete Pump	1			108	0.3		0	113	103	0	0			
					Power Generator	1			106	1	5	0	107	101	0	0			
					Road truck (deliveries per 15 minutes)	2			107	0.4		0	112	106	0	0			
					Light vehicle / 15 min	4			93	0.3		0	98	93	0	0			
					Compressor	1			101	0.3		0	106	95	0	0			
					Hand tools	1			94	0.2		0	99	87	0	0			
		Franna Crane	1			98	0.4		0	103	94	0	0	107	0	0			
		Construction Compound	5b	Construction facilities	Excavator w bucket	1			107	0.6		0	112				105	0	0
					Franna Crane	1			98	0.6		0	103				96	0	0
					Small Truck / 15 min	1			93	0.3		0	98				88	0	0
					Concrete Agi / 15 min	1			103	0.3		0	108				98	0	0
					Pneumatic vibrator	1			95	1		0	100				95	0	0
					Compressor trailer mounted diesel	1			94	0.4		0	99				90	0	0
					Hand tools	1			94	0.2		0	99	87	0	0			
		Elevated work platform	1			89	2.4		0	94	93	0	0	107	0	0			
		Temporary fencing/ hoardings	5c	Fencing & hoarding	Bobcat	1			107	0.3		0	112				102	0	0
					15t Tracked excavator w bucket	1			107	0.4		0	112				103	0	0
					Flat bed truck	1			93	0.3		0	98				88	0	0
					Hiab	1			101	0.3		0	106				96	0	0
					Hand tools	1			94	0.2		0	99				87	0	0
					Concrete agitator trucks	1			103	0.3		0	108	98	0	0			
		Utilities Disconnection	5d	Utilities disconnection	15t tracked excavator + bucket	1			107	0.4		0	112	103	0	0	110	0	0
					EWP	1			89	0.3		0	94	84	0	0			
					Bogie trucks	1			105	0.2		0	110	98	0	0			
					Compressor	1			93	0.5		0	98	90	0	0			
					Jackhammer*	1			111	0.2		5	119	109	0	0			
		Demolition	5e	Demolition (no hammer)	20t Excavator bucket/shears	1			109	0.4		0	117	108	0	0	111	0	0
					15t Excavator	1			107	0.4		0	112	103	0	0			
					Franna	1			98	0.4		0	103	94	0	0			
					Saw cutter	1			100	0.2		5	108	98	0	0			
					1x Watercart	1			103	0.4		0	108	99	0	0			
					60T Mobile Crane	1			109	0.4		0	114	105	0	0			
			5f	Demolition (with hammer)	20t Excavator + Hammer	1			120	0.3		5	128	120	0	0	120	0	0
					14t Excavator	1			104	0.4		0	109	100	0	0			
					Tipper trucks	1			98	0.4		0	103	94	0	0			
		Temporary construction and concrete slabs	5g	Site concreting	15t excavator + Bucket	1			107	0.4		0	112	103	0	0	109	0	0
					Franna	1			98	0.4		0	103	94	0	0			
					Concrete Agi	1			103	0.3		0	108	98	0	0			
					Compressor (Diesel)	1			93	0.5		0	98	90	0	0			
					Concrete Pump	1			108	0.3		0	113	103	0	0			



Phase	Activity/ Work Area	Aspect	Plant/Equipment	Day	Evening	Night	SWL, dBA	Usage	Temp. barrier reduction, dB	Penalty, dB	SWL	Adjusted SWL, LAeq,15 minute			Activity LAeq, 15 min SWL		
				7am - 6pm	6pm - 10pm	10pm - 7am					Lmax	Day	Eve	Night	Day	Eve	Night
							Generator	1			106	1		0	107	106	0

B.2 Burwood North Station Box Excavation (Main)\ Shaft excavation (South)

Phase		Activity/ Work Area	Aspect		Plant/Equipment	Day	Evening	Night	SWL, dBA	Usage	Temp. barrier reduction, dB	Penalty, dB	SWL	Adj equipment SWL, LAeq,15 minute			Activity LAeq, 15 min SWL		
						7am - 6pm	6pm - 10pm	10pm - 7am					Lmax	Day	Evening	Night	Day	Evening	Night
2	Station Box Surface Works	Piling	2a	Piling	Piling Rig (Bauer BG50)	1			113	0.4	0	118	109	0	0	111	0	0	
					Franna x2	1			98	0.4	0	103	94	0	0				
					Concrete Pump	1			108	0.3	0	113	103	0	0				
					15t tracked excavator + bucket	1			107	0.4	0	112	103	0	0				
		Acoustic Shed	2b	Acoustic shed construction	400t mobile crane	1			98	0.4	0	103	94	0	0	103	0	0	
					EWP	1			89	0.3	0	94	84	0	0				
					Delivery truck	1			93	1	0	98	93	0	0				
					Table saw*	1			100	0.2	5	108	98	0	0				
					Rattle gun*	1			105	0.2	0	110	98	0	0				
					5" grinder *	1			93	0.2	5	101	91	0	0				
					25T Mobile pick and carry crane (franna)	1			98	0.4	0	103	94	0	0				
		Caping Beams	2c	Caping Beams	Franna	1			98	0.4	0	103	94	0	0	106	0	0	
					5t Excavator + Pile Cropper	1			94	0.4	0	99	90	0	0				
					20t Excavator	1			105	0.4	0	110	101	0	0				
					Concrete Pump	1			108	0.3	0	113	103	0	0				
					Concrete vibrator	1			100	0.4	0	105	99	0	0				
		Active Anchors	2d	Active Anchors	Drill rig*	1			114	0.4	5	119	115	0	0	115	0	0	
					Shotcrete rig	1			106	0.4	0	111	102	0	0				
					Franna	1			98	0.4	0	103	94	0	0				
	Station Box Excavation	Retention - Whaler Beam	2e	Whaler Beams	60t mobile crane	1			109	0.4	0	114	105	0	0	105	-	-	
				EWP x2	2			89	0.3	0	94	87	0	0					
		Excavation- OTR	2f	OTR 0m-3m	D10 Dozer	1	1	118	0.4	0	123	114	114	0	117	0	0		
					50t Excavator + Bucket (Bulk)	2	2	112	0.4	0	117	111	111	0					
					35t Excavator + Bucket	1	1	109	0.4	0	114	105	105	0					
					20t Excavator + Bucket	2	2	105	0.4	0	110	104	104	0					
					14t Excavator + Bucket	1	1	107	0.4	0	112	103	103	0					



3	Tunnel Nozzles	Excavation Rippable	2g	Rip 3m-18m	30T Articulated Dump Trucks	2	2		107	0.3	0	112	105	105	0	
					D10 Dozer	1	1		118	0.4	0	123	114	114	0	125 116 0
					50t Excavator + Hammer	2	0		122	0.3	5	130	125	0	0	
					Gantry Cranes (electric) within acoustic shed	1	1		99	0.6	0	100	97	97	0	
					35texcavator	1	1		109	0.4	0	114	105	105	0	
					35t telescopic excavator	1	1		109	0.4	0	114	105	105	0	
					20t Excavator	2	1		105	0.6	0	110	106	103	0	
					14t Excavator	1	1		112	0.4	0	117	108	108	0	
		Excavation Non-Rippable	2h	Non_Rip 18m-31m	70t Excavator + Bucket + Hammer (Bulk)	2			122	0.4	5	130	126			131 123 0
					50t Excavator + Bucket + Hammer (Bulk)	3			122	0.4	5	130	128			
					35t Excavator + Bucket + Hammer (Bulk)	1	1		122	0.4	5	130	123	123		
					35t telescopic excavator at surface for muck out	2	1		109	0.4	0	114	108	105		
					20t Excavator	2	1		105	0.4	0	110	104	101		
					14t Excavator + Trimming	1	1		104	0.4	0	109	100	100		
		Retention-Rockbolts	2i	Rock Bolting	Drill Rig (ECM 660IV)	2	1	1	118	0.5	5	126	123	120	120	123 120 120
					Shotcrete rig	1	1	1	106	0.4	0	111	102	102	102	
					telehandler	1	1	1	89	0.3	0	94	84	84	84	
					EWP x 2	2	1	1	100	0.4	0	105	99	96	96	
					Franna	1	1	1	98	0.4	0	103	94	94	94	
	Tunnel Nozzles	Tunnel nozzle excavation	3a	Nozzle Excavation (east)	20t Excavator + hammer	1			120	0.3	5	128	120	0	0	121 0 0
					Roadheader Mitsui S300	1			100	1	0	108	100	0	0	
					14T Excavator + Bucket + Ripper	1			107	0.4	0	112	103	0	0	
					Shotcrete Rig 8100 Spraymec	1			106	0.4	0	111	102	0	0	
					Drill Rig - Robodrill - Electric	1			114	0.4	0	119	110	0	0	
					50m3 scrubber	1			104	1	0	106	104	0	0	
					30t Dump truck	1			107	0.3	0	112	102	0	0	
		Concrete Lining	3b	Concrete lining	Telehandler	1	1	1	100	0.4	0	105	96	96	96	107 107 107
					E.W.P	4	4	4	89	0.5	0	94	90	87	87	
					1x Diesel Concrete Line Pump	1	1	1	108		0	113	105	105	105	
					2x Concrete Trucks (at Surface level)	2	2	2	103	0.5	0	108	103	103	103	



4	Mined Caverns	Cavern excavation	4a	Cavern Excavation* (Tunnelling)	300kW Road header (Mitsui S300)	2	2	2	100	1	0	108	103	103	103	122	122	122
					Twin Boom Jumbo Drill Rig	1	1	1	120	0.4	5	128	121	121	121			
					Normet 8100 Shotcrete rig	2	2	2	106	0.4	0	111	105	105	105			
					CAR325 Dump Trucks	2	2	2	107	1	0	112	110	110	110			
					14t Excavator	1	1	1	107	0.6	0	112	105	105	105			
					50m3 scrubber	2	2	2	104	1	0	106	107	107	107			
		Concrete Lining	4b	Cavern lining	Spoil Truck	1	1	1	100	0.6	0	105	98	98	98	107	106	106
					Gantry crane (Kibble)	1	1	1	99	0.2	0	100	92	92	92			
					8m3 Agi Truck	2	1	1	103	0.3	0	108	98	98	98			
					14t Excavator + Bucket	1	1	1	107	0.6	0	112	105	105	105			
	TBM Launch	TBM Walkthrough	4c	TBM walkthrough	6m3 agi truck	4	3	3	103	0.3	0	108	104	103	103	108	107	107
					Concrete Line Pumps	2	1	1	108	0.3	0	113	106	103	103			
					Telehandlers	2	2	2	100	0.4	0	105	99	99	99			
					E.W.Ps	4	4	4	89	0.3	0	94	90	90	90			
6	Southern Shaft Surface works	Piling	6a	Piling	2x Telehandlers	2	2	2	100	0.5	0	105	100	100	100	109	109	109
					2x E.W.Ps	2	2	2	89	0.5	0	94	89	89	89			
					1x Bobcat	1	1	1	107	0.5	0	112	104	104	104			
		Caping Beams	6b	Caping Beams	1x 40T Volvo Loader	1	1	1	110	0.5	0	115	107	107	107			
		Active Anchors	6c	Active Anchors	750 dia piling rig	1			113	0.4	0	118	109	0	0	111	0	0
					40t crawler crane	1			109	0.4	0	114	105	0	0			
					15t excavator + Bucket	1			107	0.4	0	112	103	0	0			
		Caping Beams	6b	Caping Beams	Franna	1			98	0.4	0	103	94	0	0	107	0	0
					14T Excavator + Pile Cropper	1			107	0.4	0	112	103	0	0			
					Concrete Pump	1			108	0.3	0	113	103	0	0			
					Concrete vibrator	1			100	0.4	0	105	96	0	0			
		Active Anchors	6c	Active Anchors	Drill rig (Percussion)	1			114	0.4	5	119	115	0	0	115	0	0
					Shotcrete rig	1			106	0.4	0	111	102	0	0			
					Franna	1			98	0.4	0	103	94	0	0			
	Southern Shaft Excavation & Retention	Excavation OTR	6d	Excavation OTR	2x 50T Excavator + Bucket (Bulk)	2			112	0.4	0	117	111	0	0	112	0	0
					1x 30T Excavator + Bucket (Trim)	1			109	0.4	0	114	105	0	0			
		Excavation Rippable	6e	Excavation Rippable 3m - 17m	2x 50T Excavator + Bucket + Ripper + Hammer (Bulk)	2			122	0.3	5	130	125	0	0	125	0	0
					1x 30T Excavator + Bucket + Ripper (Trim Walls)	1			109	0.4	0	114	105	0	0			
					1x 30T Excavator + Bucket +	1			110	0.4	5	118	111	0	0			



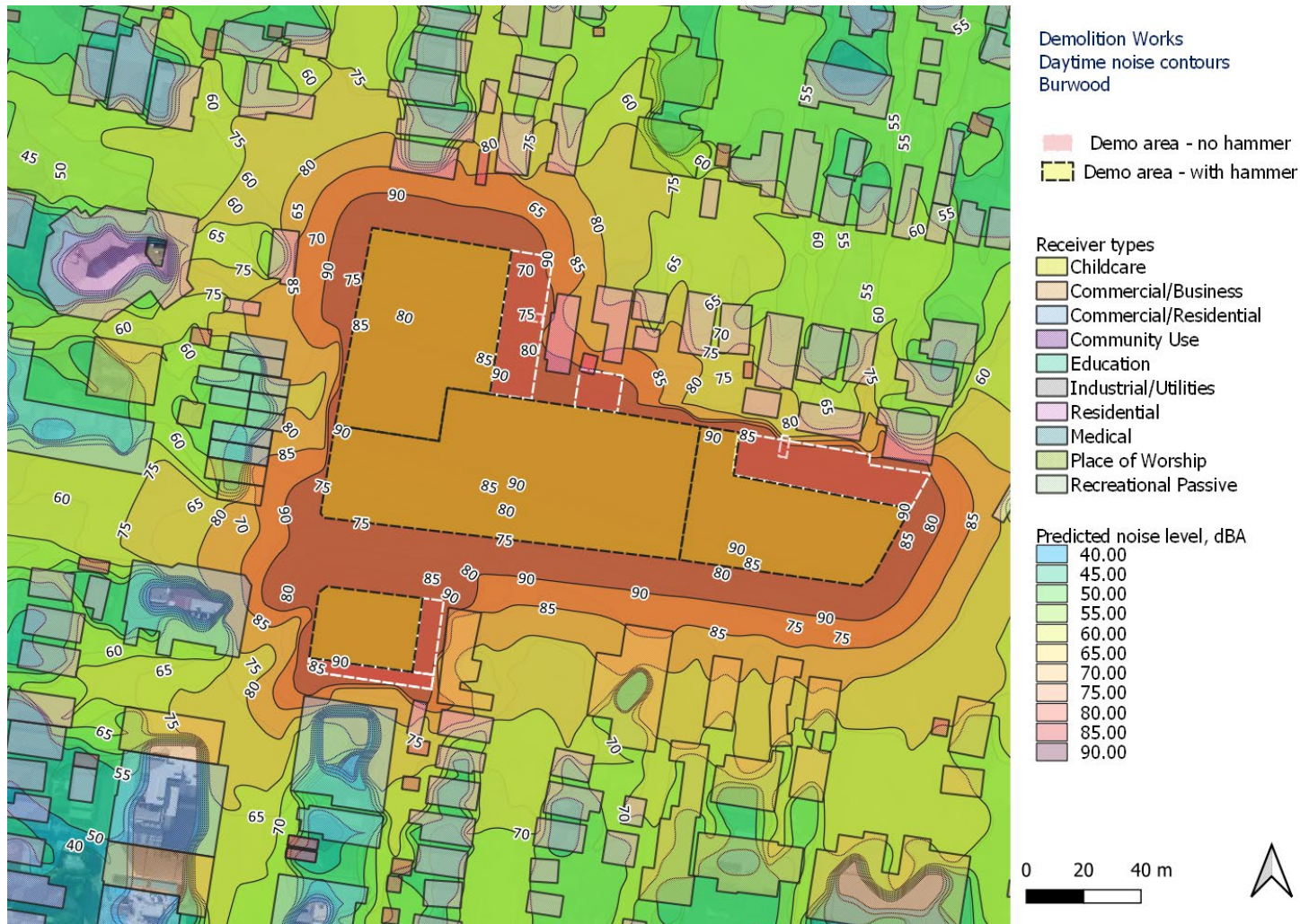
					Ripper (Saw Cutting/ Trimming))											
		Retention-Ground Anchors /Rockbolts	6f	Retention	Drill Rig (ECM 660IV)	1	114	0.4	5	119	115	0	0	115	0	0
					Shotcrete rig	1	106	0.4	0	111	102	0	0			
					EWP	1	100	0.4	0	105	96	0	0			
7	Mucking out-Southern Shaft	Mucking Out - Excavator	7a	Mucking Out - Excavator	50T Excavator + Bucket	1	112	0.4	0	117	108	0	0	108	0	0
8	Pedestrian adit	Adit Excavation	8a	Adit nozzle	50t Excavator	1	108	0.8	0	113	107	0	0	121	0	0
					35t Excavator	1	109	-0.5	0	114	0	0	0			
					Twin Boom Jumbo Drill Rig	1	118	0.5	0	126	115	0	0			
					Meyco Potenza Shotcrete Rig	1	106	0.4	0	111	102	0	0			
					15T Excavator (Hammer)	1	118	0.4	5	126	119	0	0			
					E.W.P	2	89	0.3	0	94	87	0	0			
		Concrete Lining	8b	Concrete lining	6m3 agi truck	3	103	0.3	0	108	103	0	0	107	0	0
					Concrete Line Pumps	1	108	0.3	0	113	103	0	0			
					Telehandlers	2	100	0.4	0	105	99	0	0			
					E.W.Ps	4	89	0.3	0	94	90	0	0			

Notes: \* All equipment located inside cavern tunnel

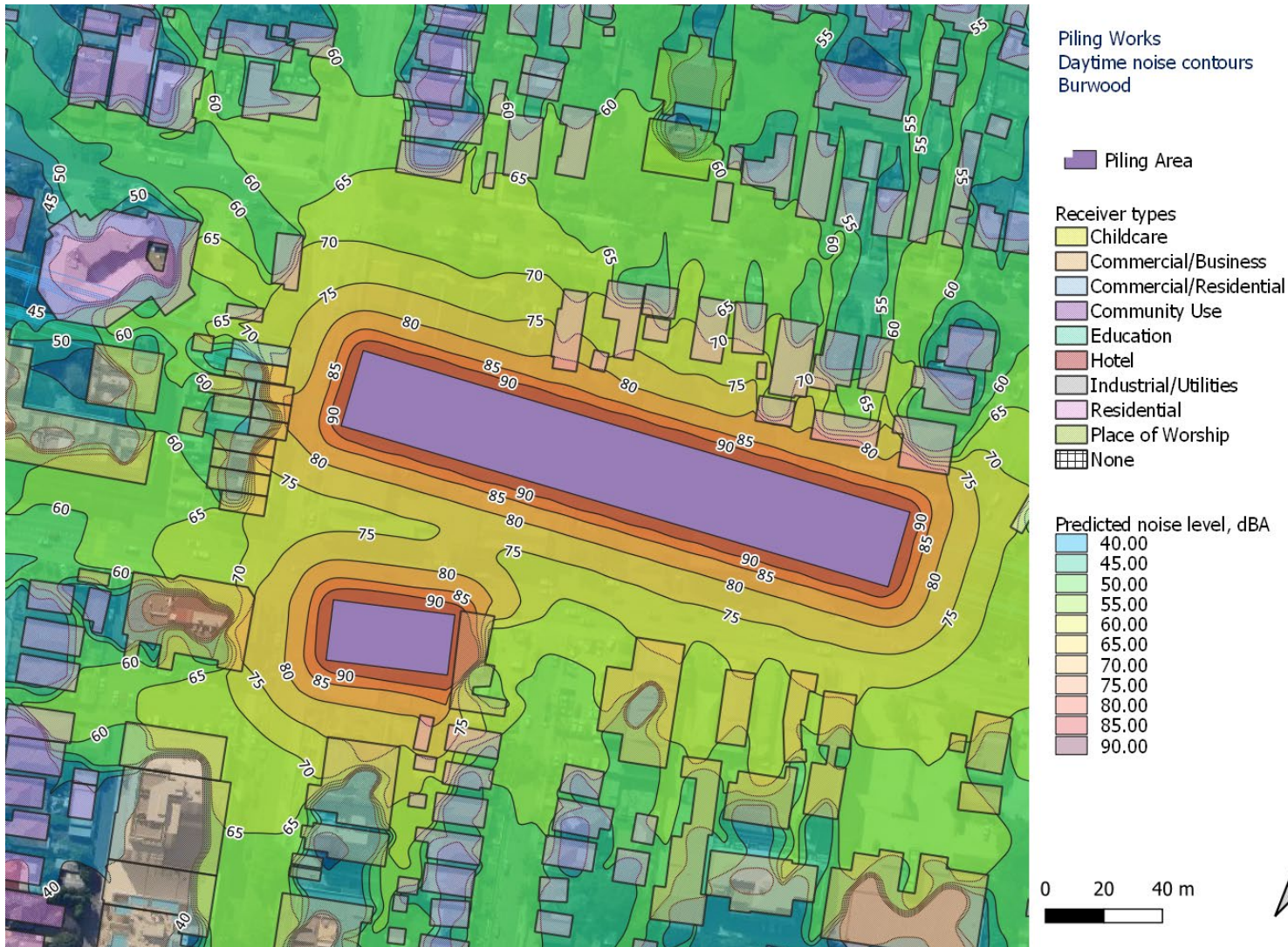


## Appendix C. Construction noise and vibration contours

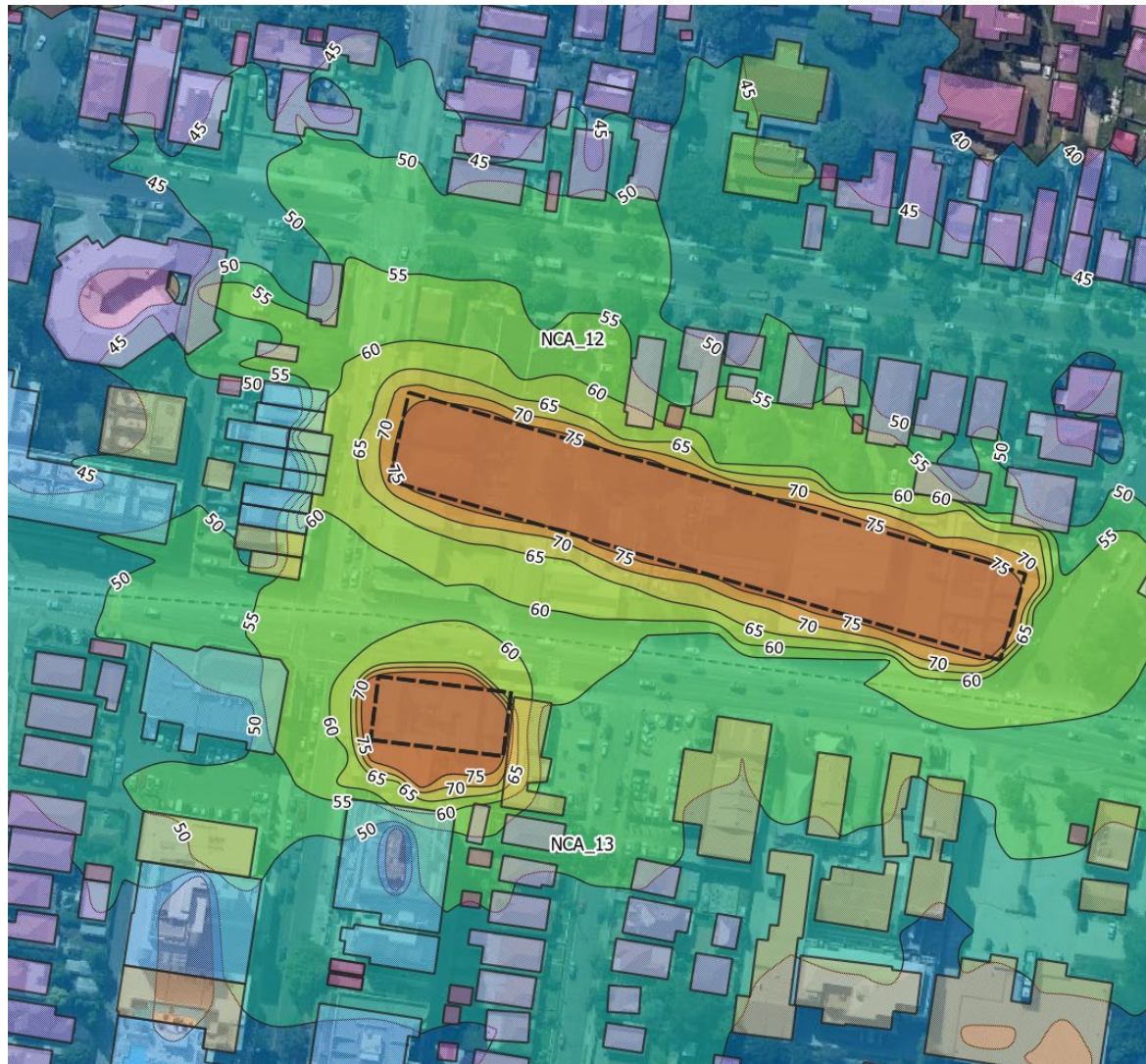
### C.1 Construction noise contours



















OTR Excavation Works  
Daytime Noise Contours  
Burwood

 Excavation Area

Receiver types

-  Childcare
-  Commercial/Business
-  Commercial/Residential
-  Community Use
-  Education
-  Industrial/Utilities
-  Residential
-  Medical
-  Place of Worship
-  Recreational Passive

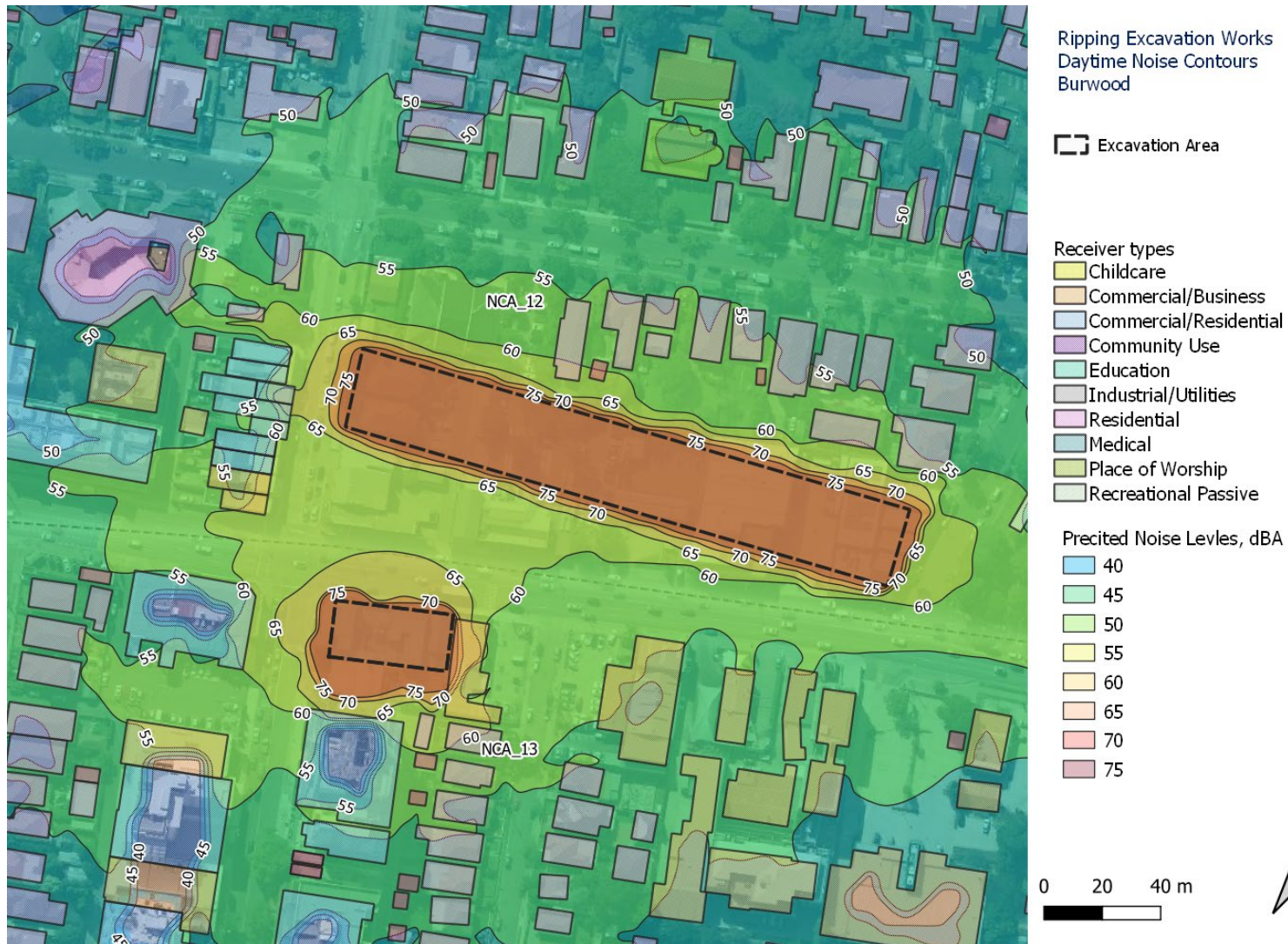
Predicted Noise Levels, dBA

-  40
-  45
-  50
-  55
-  60
-  65
-  70
-  75

0 20 40 m



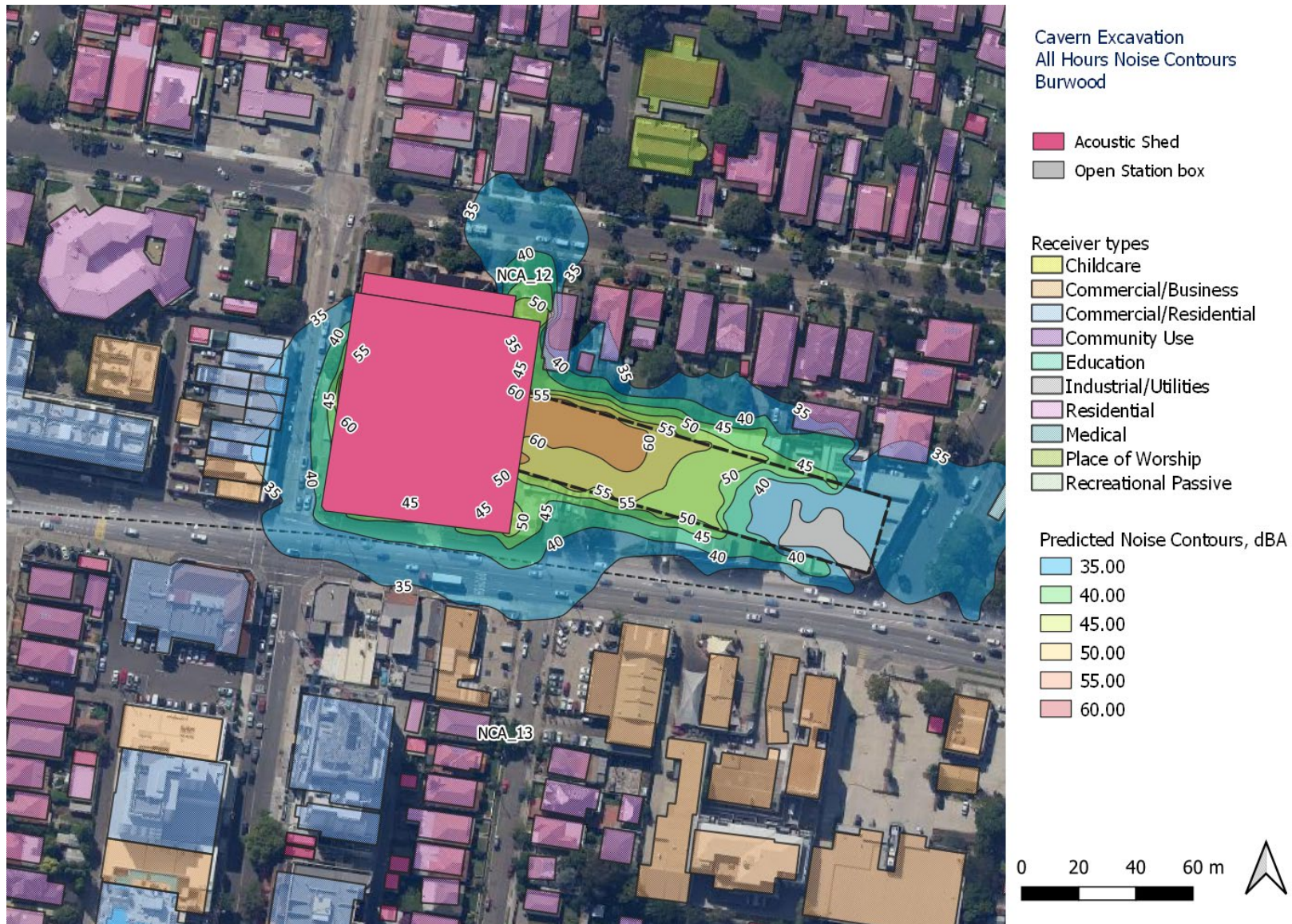






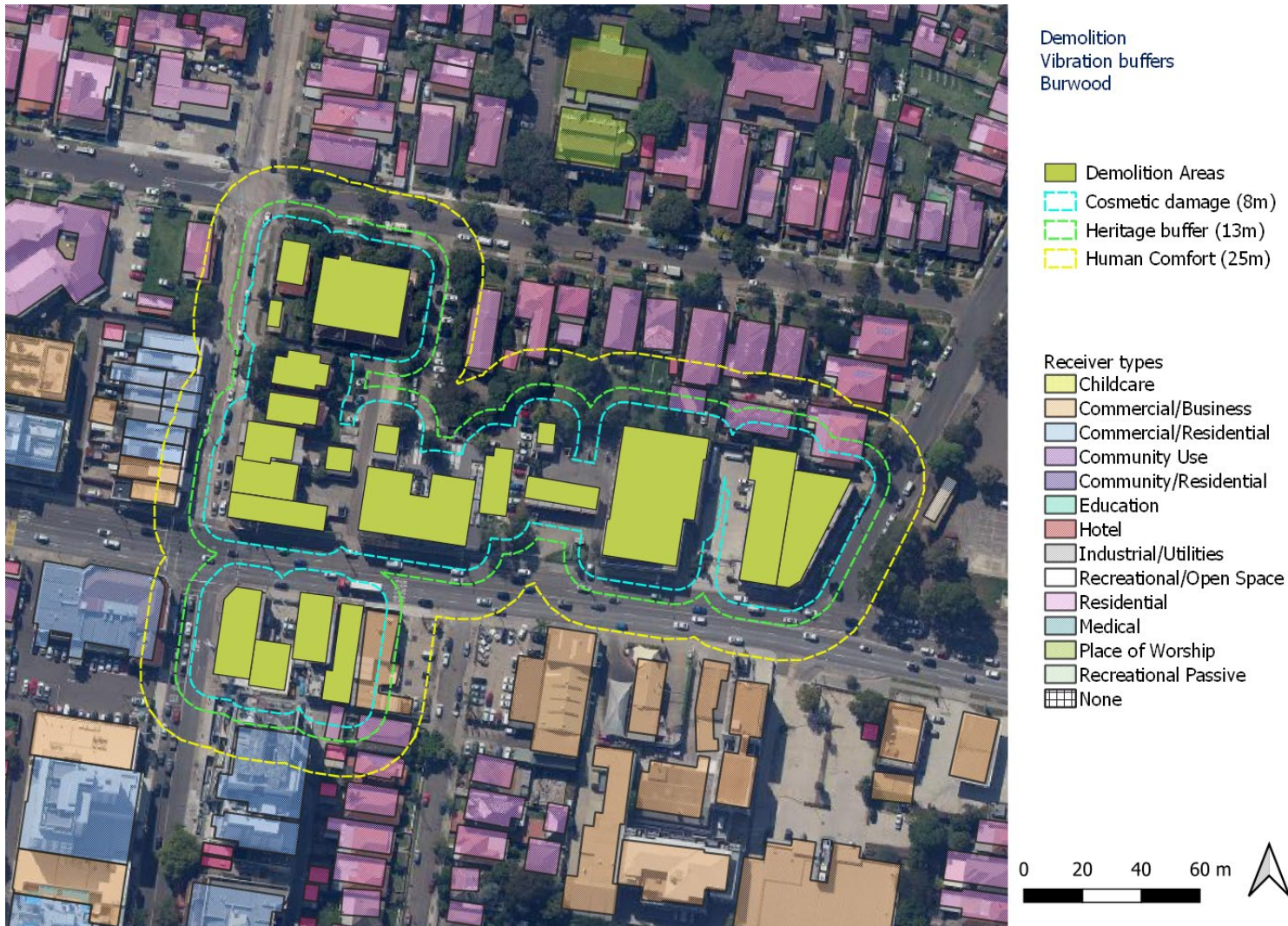








## C.2 Construction vibration contours





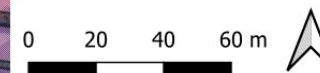


Excavation vibration buffers  
Cosmetic damage  
Burwood

- Site Boundary
- Excavation Areas
- Cosmetic Damage buffer 6m
- Cosmetic Damage buffer 10m

## Receiver types

- Childcare
- Commercial/Business
- Commercial/Residential
- Community Use
- Community/Residential
- Education
- Hotel
- Industrial/Utilities
- Recreational/Open Space
- Residential
- Medical
- Place of Worship
- Recreational Passive
- None





## Appendix D. Detailed noise predictions for individual receivers

D.1 Phase 1 and 5 - Site Establishment

D.2 Phase 2 to 8 Piling and Excavation

Supplied as Excel spreadsheets







[illegible]

Receivers			Phase 2 Excavation - Main/South										Phase 2 Excavation - Main/South																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																
			Sleep disturbance					Sleep disturbance					Excavation					Excavation																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																											
			Standard					2a					2b					2c					2d					2e					2f					2g					2h					2i					2j					2k					2l					2m					2n					2o					2p					2q					2r					2s					2t					2u					2v					2w					2x					2y					2z																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																								
			Weekend	Evening	Night	LAeq	Lmax	Water	OTR	Rip	Non-Rip	Rock	Nozzle	Concrete	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement	Cement

163	NCA_13	15 PARK RD, BURWOOD NSW 2134	RES	58	53	53	49	49	49	42	53	27	30	23	39	10	18	11	9	46	57	49	45	53	39
164	NCA_12	29 BURWOOD RD, CONCORD NSW 2137	RES	53	48	48	47	47	47	49	59	31	32	28	42	14	23	16	11	45	56	48	44	52	38
165	NCA_12	1/14 GIPPS ST, CONCORD NSW 2137	RES	53	48	48	47	47	47	49	59	31	31	36	26	13	17	10	9	46	56	48	44	51	37
166	NCA_12	10 BURWOOD RD, CONCORD NSW 2137	RES	53	48	48	47	47	47	42	80	46	46	43	56	27	36	29	27	66	77	69	65	72	58
167	NCA_12	89 GIPPS ST, CONCORD NSW 2137	COM	70	70	70	70	70	70	29	40	19	23	15	29	1	5	-2	-4	34	45	38	33	41	27
169	NCA_12	14 PARK AV, CONCORD NSW 2137	RES	53	48	48	47	47	47	26	37	15	17	12	26	-3	6	-1	-3	29	40	32	28	35	21
170	NCA_12	15 BURTON ST, CONCORD NSW 2137	RES	53	48	48	47	47	47	47	52	28	28	25	39	10	12	0	33	44	37	32	46	32	32
171	NCA_12	CONCORD OVAL & GIPPS ST, CONCORD NSW 2137	REC/A	65	65	65	65	65	65	56	64	39	45	34	52	23	22	15	13	51	62	55	50	58	44
172	NCA_12	29 BROUGHTON ST, CONCORD NSW 2137	RES	53	48	48	47	47	47	31	41	20	22	17	31	3	11	4	2	35	46	38	34	41	27
173	NCA_13	7 MILTON ST, BURWOOD NSW 2134	RES	58	53	53	49	49	49	42	53	24	28	20	36	8	15	8	6	46	57	49	45	53	39
174	NCA_13	16 LUKE AV, BURWOOD NSW 2134	RES	58	53	53	49	49	49	44	54	30	35	25	40	12	15	8	6	44	55	47	43	50	38
175	NCA_13	29 ARCHER ST, BURWOOD NSW 2134	RES	53	48	48	47	47	47	53	53	49	53	23	37	8	17	10	9	45	56	47	43	50	38
176	NCA_12	2 LOFTUS ST, CONCORD NSW 2137	RES	53	48	48	47	47	47	53	64	37	42	32	48	20	33	26	24	45	56	48	44	52	38
177	NCA_12	7 ADA ST, CONCORD NSW 2137	RES	53	48	48	47	47	47	22	34	12	14	9	23	-6	4	-3	-5	28	39	31	27	35	21
178	NCA_12	5/2-4 BURTON ST, CONCORD NSW 2137	RES	53	48	48	47	47	47	66	79	49	54	43	62	33	42	35	33	54	65	58	53	61	47
179	NCA_12	23 BROUGHTON ST, CONCORD NSW 2137	RES	65	65	65	65	65	65	63	69	43	48	36	55	26	39	12	0	33	44	37	32	46	32
180	NCA_13	9 PARK RD, BURWOOD NSW 2134	RES	58	53	53	49	49	49	39	51	24	25	21	35	7	16	9	7	43	54	47	42	50	36
181	NCA_12	17 BURTON ST, CONCORD NSW 2137	POW	65	65	65	65	65	65	56	65	40	44	36	51	22	33	26	24	55	66	58	54	61	47
182	NCA_12	5 ADA ST, CONCORD NSW 2137	RES	53	48	48	47	47	47	25	36	15	17	12	26	-3	6	-1	-3	27	38	30	26	34	20
183	NCA_13	4 NEICH PDE, BURWOOD NSW 2134	RES	58	53	53	49	49	49	43	54	28	30	25	39	11	20	13	11	44	55	47	43	51	37
184	NCA_12	17 LANSOWNE ST, CONCORD NSW 2137	RES	53	48	48	47	47	47	37	48	25	28	24	38	9	17	10	8	46	49	41	37	45	31
185	NCA_12	39 BURWOOD RD, CONCORD NSW 2137	RES	53	48	48	47	47	47	38	49	26	28	23	37	8	15	8	6	42	53	46	41	49	35
186	NCA_13	21 BRITANNIA AV, BURWOOD NSW 2134	RES	58	53	53	49	49	49	39	50	25	26	22	36	7	17	10	8	37	48	40	36	44	30
187	NCA_12	85 BURTON ST, CONCORD NSW 2137	RES	53	48	48	47	47	47	28	39	20	21	17	31	2	11	4	2	27	38	30	26	34	20
188	NCA_12	CONCORD OVAL & GIPPS ST, CONCORD NSW 2137	REC/A	65	65	65	65	65	65	63	69	43	48	36	55	26	39	12	0	33	44	37	32	46	32
189	NCA_12	CONCORD OVAL & GIPPS ST, CONCORD NSW 2137	REC/A	65	65	65	65	65	65	47	57	34	39	29	45	17	18	11	9	48	59	51	47	54	40
190	NCA_13	3 SHAFTESBURY RD, BURWOOD NSW 2134	RES	58	53	53	49	49	49	51	60	34	39	29	45	16	17	10	8	42	53	45	41	48	34
191	NCA_13	24 GRANTHAM ST, BURWOOD NSW 2134	RES	58	53	53	49	49	49	38	50	26	29	22	38	9	16	9	7	45	56	49	44	52	38
192	NCA_12	56-60 BURTON ST, CONCORD NSW 2137	RES	53	48	48	47	47	47	41	52	28	29	25	38	10	18	11	9	33	44	36	32	39	25
193	NCA_12	17 BURWOOD RD, CONCORD NSW 2137	RES	53	48	48	47	47	47	38	49	25	28	22	37	8	15	8	6	38	49	41	37	45	31
194	NCA_12	9 GIPPS ST, CONCORD NSW 2137	RES	53	48	48	47	47	47	35	45	23	24	20	33	5	13	6	4	41	52	44	40	48	34
196	NCA_12	11/14 GIPPS ST, CONCORD NSW 2137	RES	53	48	48	47	47	47	47	59	34	38	29	44	15	21	14	12	51	62	54	50	57	43
197	NCA_13	16 ARCHER ST, BURWOOD NSW 2134	RES	58	53	53	49	49	49	42	53	28	31	24	39	10	18	11	9	48	59	51	47	54	40
198	NCA_13	11 ESHER ST, BURWOOD NSW 2134	RES	58	53	53	49	49	49	48	54	28	33	25	39	10	18	11	9	55	66	58	53	61	47
199	NCA_13	31 NEICH PDE, BURWOOD NSW 2134	RES	58	53	53	49	49	49	38	49	24	24	21	35	6	16	9	7	34	45	37	33	40	26
200	NCA_12	23 GIPPS ST, CONCORD NSW 2137	RES	53	48	48	47	47	47	33	44	23	25	20	34	5	14	7	5	38	49	41	37	44	30
201	NCA_12	49B BURTON ST, CONCORD NSW 2137	RES	53	48	48	47	47	47	25	35	15	17	11	25	-4	5	-2	-4	27	38	31	26	34	20
202	NCA_13	26 LUKE AV, BURWOOD NSW 2134	RES	58	53	53	49	49	49	38	48	23	28	19	33	5	10	3	1	40	51	43	39	46	32
203	NCA_13	16 LUKE AV, BURWOOD NSW 2134	RES	58	53	53	49	49	49	41	52	30	35	25	39	11	16	9	7	40	51	43	39	47	33
204	NCA_13	26 SHAFTESBURY RD, BURWOOD NSW 2134	RES	58	53	53	49	49	49	46	56	29	33	25	41	13	17	10	8	48	59	52	47	55	41
205	NCA_13	1 MILTON ST, BURWOOD NSW 2134	RES	58	53	53	49	49	49	38	47	25	28	21	36	8	15	8	6	40	51	43	39	47	33
206	NCA_13	19 ESHER ST, BURWOOD NSW 2134	RES	58	53	53	49	49	49	48	59	29	34	26	39	11	18	11	9	56	67	59	55	62	48
208	NCA_12	62 BURTON ST, CONCORD NSW 2137	RES	53	48	48	47	47	47	34	47	21	23	16	31	11	15	8	6	34	45	37	33	41	27
209	NCA_12	6 BROUGHTON ST, CONCORD NSW 2137	RES	53	48	48	47	47	47	32	43	25	25	22	36	7	16	9	7	34	45	37	33	41	27
210	NCA_13	BUS DEPOT 262 PARAMATTA RD, BURWOOD NSW	COM	70	70	70	70	70	70	50	60	36	41	31	48	19	21	14	12	47	58	51	46	54	40
211	NCA_13	12 SHAFTESBURY RD, BURWOOD NSW 2134	RES	58	53	53	49	49	49	47	56	30	35	25	42	13	15	8	6	43	54	46	42	50	36
212	NCA_13	8 MILTON ST, BURWOOD NSW 2134	RES	58	53	53	49	49	49	44	54	30	33	27	41	12	20	13	11	49	60	53	48	56	42
213	NCA_13	23 NEICH PDE, BURWOOD NSW 2134	RES	58	53	53	49	49	49	47	52	30	33	27	41	12	20	13	11	49	60	53	48	56	42
214	NCA_12	20 PARK AV, CONCORD NSW 2137	RES	53	48	48	47	47	47	22	33	12	15	9	23	-6	3	-4	-6	27	38	30	26	34	20
215	NCA_12	5/24 BURWOOD RD, CONCORD NSW 2137	RES	53	48	48	47	47	47	50	60	33	35	30	44	16	24	17	15	51	62	55	50	58	44
216	NCA_13	M/LC SCHOOL SPORTING FACILITY 19 BRITANNIA	RES	58	53	53	49	49	49	41	52	28	31	25	40	11	18	11	9	51	62	54	50	57	43
217	NCA_12	1/2-4 BURTON ST, CONCORD NSW 2137	RES	53	48	48	47	47	47	47	56	33	36	31	46	13	15	8	6	42	53	46	41	49	35
218	NCA_12	11 LOFTUS ST, CONCORD NSW 2137	RES	53	48	48	47	47	47	39	51	26	29	22	37	8	15	8	6	42	53	46	41	49	35
220	NCA_12	46 GIPPS ST, CONCORD NSW 2137	RES	53	48	48	47	47	47	30	41	19	20	15	29	1	11	4	2	34	45	37	33	41	27
222	NCA_13	17 PARK RD, BURWOOD NSW 2134	RES	58	53	53	49	49	49	42	53	28	32	24	40	12	18	11	9	47	58	50	46	54	40
225	NCA_13	6 NEICH PDE, BURWOOD NSW 2134	RES	58	53	53	49	49	49	45	57	31	35	27	41	13	19	12	10	55	66	59	54	62	48
224	NCA_13	24 BURWOOD RD, CONCORD NSW 2134	RES	58	53	53	49	49	49	45	57	29	30	26	39	11	17	10	8	47	58	50	46	54	40
226	NCA_12	36 BURWOOD RD, CONCORD NSW 2137	RES	53	48	48	47	47	47	45	55	29	30	26	39	11	21	14	12	47	58	50	46	54	39
228	NCA_12	1/15 BURTON ST, CONCORD NSW 2137	RES	53	48	48	47	47	47	50	62	36	41	32	46	18	30	23	21	52	63	55	51	59	45
228	NCA_12	20 BURWOOD RD, CONCORD NSW 2137	RES	53	48	48	47	47	47	54	65	36	37	33	47	19	28	21	19	55	66	58	54	61	47
231	NCA_13	5 NEICH PDE, BURWOOD NSW 2134	RES	58	53	53	49	49	49	45	56	33	36	31	46	13	15	8	6	42	53	46	41	49	35
232	NCA_13	386 PARAMATTA RD, BURWOOD NSW 2134	COM	70	70	70	70	70	70	37	46	22	24	19	33	5	15	8	6	41	52	44	40	47	33
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332	NCA_12	12 PARK AV, CONCORD NSW 2137	RES	53	48	48	47	47	47	24	36	13	15	9	23	-6	4	-3	-5	29	40	32	28	36	22	
333	NCA_12	42 GIPPS ST, CONCORD NSW 2137	RES	53	48	48	47	47	47	35	46	25	27	12	36	8	17	10	8	42	55	45	41	48	34	
334	NCA_12	60 BURTON ST, CONCORD NSW 2137	RES	53	48	48	47	47	47	36	47	26	27	12	36	-2	6	-1	-3	29	40	32	28	36	22	
335	NCA_13	27 NEICH PDE, BURWOOD NSW 2134	RES	58	53	53	49	49	49	36	47	26	26	23	36	8	17	10	8	36	47	40	35	43	29	
336	NCA_12	1 GIPPS ST, CONCORD NSW 2137	RES	53	48	48	47	47	47	41	46	24	26	21	34	6	14	7	5	39	50	42	38	46	32	
337	NCA_13	20/19 BURWOOD RD, BURWOOD NSW 2134	RES	58	53	53	49	49	49	46	57	28	29	25	38	10	19	12	10	56	67	59	55	62	48	
338	NCA_13	14 SHAFTESBURY RD, BURWOOD NSW 2134	RES	58	53	53	49	49	49	47	56	29	34	25	42	13	16	9	7	44	60	52	47	51	36	
339	NCA_13	4 BRITANNIA AV, BURWOOD NSW 2134	RES	58	53	53	49	49	49	36	47	27	28	24	38	10	19	12	10	41	52	44	40	47	33	
340	NCA_13	320-324 PARRAMATTA RD, BURWOOD NSW 2134	COM	70	70	70	70	70	70	64	70	45	51	40	57	28	31	24	22	49	60	52	48	56	42	
341	NCA_13	21 LUKE AV, BURWOOD NSW 2134	RES	58	53	53	49	49	49	41	52	27	32	22	38	10	15	8	6	46	57	49	45	53	39	
342	NCA_13	40 NEICH PDE, BURWOOD NSW 2134	RES	58	53	53	49	49	49	28	39	15	17	11	25	-4	5	-2	-4	31	42	35	30	38	24	
343	NCA_13	22 SHAFTESBURY RD, BURWOOD NSW 2134	RES	58	53	53	49	49	49	47	56	29	33	25	49	13	17	17	10	48	59	51	50	51	41	
344	NCA_13	UNIT 1 23 SHAFTESBURY RD, BURWOOD NSW 21	RES	58	53	53	49	49	49	45	54	29	33	25	40	12	19	12	10	45	56	48	44	52	37	
346	NCA_13	11 MILTON ST, BURWOOD NSW 2134	RES	58	53	53	49	49	49	44	53	26	29	22	36	8	15	8	6	44	55	47	43	51	37	
347	NCA_12	10/45A BURTON ST, CONCORD NSW 2137	RES	53	48	48	47	47	47	32	43	24	25	21	35	7	16	9	7	31	42	34	30	37	23	
348	NCA_13	20 NEICH PDE, BURWOOD NSW 2134	RES	58	53	53	49	49	49	26	38	16	19	23	25	-2	4	33	44	36	32	40	46	32		
350	NCA_13	4 ARCHER ST, BURWOOD NSW 2134	RES	58	53	53	49	49	49	43	52	27	30	24	38	10	18	11	9	48	59	51	47	55	41	
351	NCA_12	52 GIPPS ST, CONCORD NSW 2137	RES	53	48	48	47	47	47	31	42	20	22	17	31	2	10	3	1	34	45	37	33	40	26	
352	NCA_13	35 ESHER ST, BURWOOD NSW 2134	RES	58	53	53	49	49	49	43	54	28	33	24	38	9	13	6	4	41	52	45	40	48	34	
353	NCA_12	2 JOHN ST, CONCORD NSW 2137	RES	53	48	48	47	47	47	28	39	20	21	17	31	3	12	5	3	27	38	30	26	34	20	
354	NCA_12	57/59 PARRAMATTA RD, CONCORD NSW 2137	COM	70	70	70	70	70	70	39	51	24	27	21	34	5	10	13	11	5	52	44	56	52	40	
355	NCA_12	54 BURTON ST, CONCORD NSW 2137	RES	53	48	48	47	47	47	32	44	23	24	20	34	6	16	9	7	33	44	36	32	40	26	
357	NCA_13	19 SHAFTESBURY RD, BURWOOD NSW 2134	RES	58	53	53	49	49	49	44	54	29	33	25	40	12	18	11	9	48	59	52	47	55	41	
358	NCA_13	7 NEICH PDE, BURWOOD NSW 2134	RES	58	53	53	49	49	49	38	50	29	30	26	40	11	20	13	11	43	54	46	42	49	35	
359	NCA_13	302-314 PARRAMATTA RD, BURWOOD NSW 2134	COM	70	70	70	70	70	70	54	64	34	40	29	20	22	15	13	48	60	53	48	56	42	42	
360	NCA_12	40 BURWOOD RD, CONCORD NSW 2137	RES	53	48	48	47	47	47	43	53	28	29	25	38	10	19	12	10	46	57	49	45	53	38	
361	NCA_13	1 ARCHER ST, BURWOOD NSW 2134	RES	58	53	53	49	49	49	44	54	29	31	25	39	11	19	12	10	46	57	49	45	53	39	
362	NCA_12	2/16 GIPPS ST, CONCORD NSW 2137	RES	53	48	48	47	47	47	49	58	29	35	25	42	14	17	10	8	46	57	49	45	52	38	
363	NCA_13	17/15 BURWOOD RD, BURWOOD NSW 2134	RES	58	53	53	49	49	49	46	58	28	29	26	39	10	19	12	10	57	68	60	56	63	49	
364	NCA_13	4 MILTON ST, BURWOOD NSW 2134	RES	58	53	53	49	49	49	48	54	30	34	27	41	13	20	13	11	51	62	55	50	58	44	
365	NCA_13	9 ESHER ST, BURWOOD NSW 2134	RES	58	53	53	49	49	49	50	62	35	40	30	44	15	22	15	13	53	64	56	52	59	45	
366	NCA_12	1/16 GIPPS ST, CONCORD NSW 2137	RES	53	48	48	47	47	47	45	56	27	33	23	30	40	11	16	9	7	42	53	45	41	48	34
367	NCA_13	374-380 PARRAMATTA RD, BURWOOD NSW 2134	COM	70	70	70	70	70	70	42	53	26	28	23	38	9	16	9	7	46	57	49	45	53	39	
368	NCA_13	11 BRITANNIA AV, BURWOOD NSW 2134	RES	58	53	53	49	49	49	40	50	28	30	25	39	10	18	11	9	48	59	52	47	55	41	
369	NCA_13	20 BRITANNIA AV, BURWOOD NSW 2134	RES	58	53	53	49	49	49	38	49	27	28	24	37	9	18	11	9	43	54	46	42	49	35	
370	NCA_13	21 ARCHER ST, BURWOOD NSW 2134	RES	58	53	53	49	49	49	42	52	27	31	23	38	9	17	10	8	47	58	50	46	54	39	
371	NCA_12	2A BURWOOD RD, CONCORD NSW 2137	RES	53	48	48	47	47	47	59	74	43	43	40	53	25	34	27	25	71	82	74	70	76	64	
372	NCA_12	19 BROUGHTON ST, CONCORD NSW 2137	RES	53	48	48	47	47	47	33	44	21	22	18	31	3	12	5	3	36	47	39	35	43	29	
374	NCA_13	5 MILTON ST, BURWOOD NSW 2134	RES	58	53	53	49	49	49	42	52	27	31	23	38	9	16	9	7	43	54	46	42	49	35	
375	NCA_12	2 NEW ST, BURWOOD NSW 2134	RES	58	53	53	49	49	49	43	53	27	30	24	38	9	18	11	9	48	59	51	47	55	41	
376	NCA_12	12 PARK AV, CONCORD NSW 2137	RES	53	48	48	47	47	47	26	37	14	17	11	25	-4	6	-1	-3	-29	40	32	28	36	22	
377	NCA_12	27 BURTON ST, CONCORD NSW 2137	RES	53	48	48	47	47	47	49	62	33	34	31	44	15	25	18	16	41	52	45	40	48	34	
378	NCA_13	BUS DEPOT 262 PARRAMATTA RD, BURWOOD NSW	COM	70	70	70	70	70	70	44	54	24	27	23	36	12	15	13	11	49	60	52	48	56	42	
379	NCA_13	22 ARCHER ST, BURWOOD NSW 2134	RES	58	53	53	49	49	49	40	51	25	29	21	36	7	15	8	6	45	56	48	44	52	37	
381	NCA_12	5 MORETON ST, CONCORD NSW 2137	RES	53	48	48	47	47	47	43	52	29	31	26	40	12	20	13	11	44	55	47	43	50	36	
382	NCA_12	8 PARK AV, CONCORD NSW 2137	RES	53	48	48	47	47	47	30	39	19	21	16	30	1	10	3	1	32	43	36	31	39	25	
383	NCA_13	10 PARK RD, BURWOOD NSW 2134	RES	58	53	53	49	49	49	42	54	28	31	25	40	12	19	12	10	48	59	51	47	55	41	
384	NCA_13	4 ESHER ST, BURWOOD NSW 2134	RES	58	53	53	49	49	49	54	66	34	39	34	48	20	22	15	13	58	69	61	57	65	51	
385	NCA_13	25 SHAFTESBURY RD, BURWOOD NSW 2134	RES	58	53	53	49	49	49	45	55	29	33	25	41	12	19	12	10	47	58	50	46	53	39	
386	NCA_13	13 ESHER ST, BURWOOD NSW 2134	RES	58	53	53	49	49	49	50	60	34	39	29	43	15	20	13	11	56	67	59	55	63	49	
387	NCA_13	21 LUKE AV, BURWOOD NSW 2134	RES	58	53	53	49	49	49	45	56	30	35	25	42	13	17	10	8	47	58	50	46	53	39	
389	NCA_13	25 SHAFTESBURY RD, BURWOOD NSW 2134	RES	58	53	53	49	49	49	46	58	29	34	25	40	12	19	12	10	50	61	47	43	50	36	
390	NCA_12	40 GIPPS ST, CONCORD NSW 2137	RES	53	48	48	47	47	47	33	44	21	23	18	32	3	12	5	3	35	46	38	34	41	27	
392	NCA_13	18 NEICH PDE, BURWOOD NSW 2134	RES	58	53	53	49	49	49	30	44	20	22	17	32	3	13	6	4	38	49	41	37	44	30	
394	NCA_12	1E BROUGHTON ST, CONCORD NSW 2137	RES	53	48	48	47	47	47	41	52	29	30	26	40	12	20	13	11	36	47	39	35	42	28	
395	NCA_13	5H/37 1-52 BURWOOD RD, BURWOOD NSW 2134	RES	58	53	53	49	49	49	42	53	28	33	24	39	10	16	9	7	48	60	52	48	55	41	
396	NCA_13	UNIT 5 14 BRITANNIA AV, BURWOOD NSW 2134	RES	58	53	53	49	49	49	42	52	27	31	23	38	9	19	12	10	47	58	50	46	54	39	
398	NCA_12	17 BROUGHTON ST, CONCORD NSW 2137	RES	53	48	48	47	47	47	32	42	19	21	16	30	1	10	3	1	34	45	37	33	41	26	
399	NCA_12	1 LANSOWNE ST, CONCORD NSW 2137	RES	53	48	48	47	47	47	50	61	33	35	30	45	16	25	18	16	48	59	51	47	54	40	
400	NCA_12	7 LOFTUS ST, CONCORD NSW 2137	RES	53	48	48	47	47	47	46	56	29	32	26	40	12	20	13	11	45	56	48	44	52	38	
401	NCA_13	1 MILTON ST, BURWOOD NSW 2134	RES	58	53	53	49	49	49	48	54	29	31	25	40	12	19	12	10	49	60	52	48	56	42	
403	NCA_13	23 NEICH PDE, BURWOOD NSW 2134	RES	58	53	53	49	49	49	40	50	29	29	26	39	11	21	14	12	44						



504	NCA_12	12A BURWOOD RD, CONCORD NSW 2137	RES	53	48	48	47	47	47	66	81	47	47	44	57	28	37	30	28	66	77	69	65	72	58
505	NCA_13	23A LUKE AV, BURWOOD NSW 2134	RES	58	53	53	49	49	49	51	52	24	24	30	37	9	9	2	0	37	48	41	36	47	30
506	NCA_13	15 ESHER ST, BURWOOD NSW 2134	RES	58	53	53	49	49	49	53	48	24	24	31	46	17	27	20	18	66	77	69	66	73	59
507	NCA_12	48 BURTON ST, CONCORD NSW 2137	RES	53	48	48	47	47	47	35	47	27	28	24	38	9	18	11	9	37	48	40	36	43	29
508	NCA_12	14 PARK AV, CONCORD NSW 2137	RES	53	48	48	47	47	47	29	41	22	22	19	32	4	13	6	4	32	43	35	31	39	25
510	NCA_13	5 PARK RD, BURWOOD NSW 2134	RES	58	53	53	49	49	49	33	44	21	22	18	32	3	12	5	3	37	48	40	36	43	29
511	NCA_13	24 BRITANNIA AV, BURWOOD NSW 2134	RES	58	53	53	49	49	49	35	45	25	25	22	35	7	16	9	7	39	50	42	34	40	32
512	NCA_12	43 BURWOOD RD, CONCORD NSW 2137	RES	53	48	48	47	47	47	35	44	23	25	20	33	5	13	6	4	39	50	42	38	46	32
513	NCA_13	19 LUKE AV, BURWOOD NSW 2134	RES	58	53	53	49	49	49	42	53	28	34	24	40	11	16	9	7	46	57	50	45	53	39
514	NCA_13	13 SHAFTESBURY RD, BURWOOD NSW 2134	RES	58	53	53	49	49	49	43	53	27	31	23	39	11	16	9	7	49	60	52	48	55	41
515	NCA_13	16 NEICH PDE, BURWOOD NSW 2134	RES	58	53	53	49	49	49	34	44	24	25	11	34	6	15	8	6	39	50	42	38	45	31
516	NCA_12	12 GIPPS ST, CONCORD NSW 2137	RES	53	48	48	47	47	47	46	56	30	31	28	37	19	7	14	5	53	60	42	34	40	32
517	NCA_12	49A BURTON ST, CONCORD NSW 2137	RES	53	48	48	47	47	47	29	40	22	22	19	32	4	13	6	4	29	40	32	28	36	22
518	NCA_13	22 LUKE AV, BURWOOD NSW 2134	RES	58	53	53	49	49	49	41	52	29	34	24	39	10	15	8	6	41	52	44	40	47	33
519	NCA_12	6 ADA ST, CONCORD NSW 2137	RES	53	48	48	47	47	47	26	37	17	18	14	27	-2	6	-1	-3	33	44	36	32	40	26
520	NCA_13	11 NEW ST, BURWOOD NSW 2134	RES	58	53	53	49	49	49	45	55	31	35	28	42	13	21	14	12	51	62	55	50	44	34
521	NCA_13	10 PARK RD, BURWOOD NSW 2134	RES	58	53	53	49	49	49	36	44	24	25	21	35	6	16	9	7	44	55	47	43	51	37
522	NCA_12	29 BURWOOD RD, CONCORD NSW 2137	RES	53	48	48	47	47	47	49	58	30	32	27	41	12	21	14	12	48	59	51	47	54	40
524	NCA_13	45/16 PARRAMATTA RD, BURWOOD NSW 2134	COM	70	70	70	70	70	70	56	66	41	46	36	52	23	28	21	19	58	69	61	57	65	50
525	NCA_12	19 BURWOOD RD, CONCORD NSW 2137	RES	53	48	48	47	47	47	52	64	32	33	29	42	14	26	19	17	43	58	46	42	50	36
526	NCA_12	2 BURTON ST, CONCORD NSW 2137	RES	53	48	48	47	47	47	53	59	35	30	47	18	23	16	14	48	59	53	47	57	50	40
527	NCA_12	30 GIPPS ST, CONCORD NSW 2137	RES	53	48	48	47	47	47	42	49	25	27	21	35	7	18	11	9	42	53	46	41	49	35
528	NCA_13	10 MILTON ST, BURWOOD NSW 2134	RES	58	53	53	49	49	49	47	57	31	34	27	41	13	20	13	11	50	61	53	49	56	42
529	NCA_13	31 PARK RD, BURWOOD NSW 2134	RES	58	53	53	49	49	49	34	45	23	25	20	34	5	13	6	4	41	52	44	40	48	33
531	NCA_13	27 PARK RD, BURWOOD NSW 2134	RES	58	53	53	49	49	49	34	43	23	24	19	33	14	23	14	12	57	61	53	49	47	39
533	NCA_13	15 SHAFTESBURY RD, BURWOOD NSW 2134	RES	58	53	53	49	49	49	43	54	27	31	23	39	10	15	8	6	48	59	51	47	55	41
534	NCA_13	17 SHAFTESBURY RD, BURWOOD NSW 2134	RES	58	53	53	49	49	49	41	54	26	30	22	37	8	13	6	4	42	53	45	41	49	35
535	NCA_12	29A BURTON ST, CONCORD NSW 2137	RES	53	48	48	47	47	47	45	57	31	31	28	41	13	23	16	14	41	52	45	40	48	34
536	NCA_12	UNIT 2 6 PARK RD, BURWOOD NSW 2134	RES	58	53	53	49	49	49	38	49	24	25	21	35	7	16	9	7	54	46	42	38	45	31
537	NCA_13	5 NEICH PDE, BURWOOD NSW 2134	RES	58	53	53	49	49	49	46	56	31	38	28	41	13	22	15	13	48	59	51	47	54	40
538	NCA_13	15 ESHER ST, BURWOOD NSW 2134	RES	58	53	53	49	49	49	49	60	33	38	28	41	13	18	11	9	54	65	58	53	61	47
539	NCA_13	19 NEICH PDE, BURWOOD NSW 2134	RES	58	53	53	49	49	49	39	50	30	31	27	40	12	22	15	13	45	56	48	44	52	38
540	NCA_13	32 LUKE AV, BURWOOD NSW 2134	RES	58	53	53	49	49	49	40	51	27	32	22	38	9	13	6	4	43	54	46	42	50	36
541	NCA_12	4 MORETON ST, CONCORD NSW 2137	RES	53	48	48	47	47	47	50	59	39	40	34	28	17	24	16	14	50	61	53	49	56	42
542	NCA_13	25 BRITANNIA AV, BURWOOD NSW 2134	RES	58	53	53	49	49	49	31	42	21	22	18	31	3	12	5	3	34	45	37	33	41	26
543	NCA_13	336-336A PARRAMATTA RD, BURWOOD NSW 2134	COM	70	70	70	70	70	70	61	70	44	48	40	55	26	34	27	25	95	106	98	94	101	87
544	NCA_12	28 BURTON ST, CONCORD NSW 2137	RES	53	48	48	47	47	47	61	74	42	42	39	52	23	32	25	23	58	69	61	57	65	50
545	NCA_12	11 LANSOWNE ST, CONCORD NSW 2137	RES	53	48	48	47	47	47	37	49	26	27	23	37	6	17	10	8	43	54	47	42	50	36
546	NCA_13	26-40 BURWOOD RD, BURWOOD NSW 2134	RES	58	53	53	49	49	49	46	56	29	34	25	39	10	16	9	7	40	51	43	39	46	34
547	NCA_12	25 ESHER ST, BURWOOD NSW 2134	RES	58	53	53	49	49	49	46	58	31	36	26	40	11	11	4	2	40	54	47	39	46	32
548	NCA_12	9 LANSOWNE ST, CONCORD NSW 2137	RES	53	48	48	47	47	47	40	50	27	28	24	37	9	18	11	9	45	56	48	44	52	38
549	NCA_13	28 LUKE AV, BURWOOD NSW 2134	RES	58	53	53	49	49	49	39	50	26	31	22	36	7	13	6	4	41	52	45	40	48	34
550	NCA_13	320 PARRAMATTA RD, BURWOOD NSW 2134	COM	70	70	70	70	70	70	53	48	29	34	28	42	14	26	19	17	43	58	50	45	53	39
551	NCA_12	15 LANSOWNE ST, CONCORD NSW 2137	RES	53	48	48	47	47	47	30	42	19	23	16	31	2	9	2	0	33	44	36	32	40	25
552	NCA_12	3 ADA ST, CONCORD NSW 2137	RES	53	48	48	47	47	47	25	36	15	17	12	26	-3	6	-1	-3	28	39	31	27	35	21
553	NCA_13	5 BRITANNIA AV, BURWOOD NSW 2134	RES	58	53	53	49	49	49	34	45	27	28	24	38	10	19	12	10	43	54	46	42	50	36
554	NCA_13	9 GRANTHAM ST, BURWOOD NSW 2134	RES	58	53	53	49	49	49	30	41	20	21	17	30	2	8	-1	-33	44	36	32	39	25	
555	NCA_13	27A NEICH PDE, BURWOOD NSW 2134	RES	58	53	53	49	49	49	52	61	29	34	27	40	12	19	9	6	42	53	45	41	49	35
556	NCA_12	6/50 BURTON ST, CONCORD NSW 2137	RES	53	48	48	47	47	47	37	48	30	30	27	40	12	21	14	12	38	49	42	37	45	31
557	NCA_13	17 ESHER ST, BURWOOD NSW 2134	RES	58	53	53	49	49	49	48	59	32	37	27	41	12	17	10	8	56	67	59	55	62	48
558	NCA_12	UNIT 2 3 MELBOURNE ST, CONCORD NSW 2137	COM	70	70	70	70	70	70	24	35	16	17	13	27	-2	3	-4	-6	35	46	38	34	42	27
559	NCA_13	19 MILTON ST, BURWOOD NSW 2134	RES	58	53	53	49	49	49	50	59	33	38	34	28	15	23	14	12	53	64	56	50	46	46
560	NCA_12	12A BROUGHTON ST, CONCORD NSW 2137	RES	53	48	48	47	47	47	30	43	20	21	17	30	2	10	3	1	35	46	38	34	42	28
561	NCA_12	38 LOFTUS ST, CONCORD NSW 2137	RES	53	48	48	47	47	47	48	58	32	36	27	44	16	19	12	10	45	56	48	44	52	38
562	NCA_13	14 MILTON ST, BURWOOD NSW 2134	RES	58	53	53	49	49	49	47	58	32	35	28	43	14	22	15	13	51	62	54	50	58	44
563	NCA_12	8 BROUGHTON ST, CONCORD NSW 2137	RES	53	48	48	47	47	47	32	43	25	25	22	35	7	16	9	7	35	46	38	34	41	27
564	NCA_12	12 GIPPS ST, CONCORD NSW 2137	RES/A	53	48	48	47	47	47	39	50	27	31	25	39	10	16	9	7	42	53	45	40	48	34
565	NCA_12	25 PARK RD, BURWOOD NSW 2134	RES	58	53	53	49	49	49	31	42	21	22	17	31	3	11	4	2	37	48	41	36	44	30
566	NCA_12	15/38 BURTON ST, CONCORD NSW 2137	RES	53	48	48	47	47	47	54	69	39	40	37	50	21	31	24	22	54	65	57	53	61	47
567	NCA_13	13 MILTON ST, BURWOOD NSW 2134	RES	58	53	53	49	49	49	44	54	26	29	22	37	8	14	7	5	44	55	48	43	51	37
568	NCA_13	21/5 BURWOOD RD, BURWOOD NSW 2134	RES	58	53	53	49	49	49	31	40	21	22	16	30	1	16	9	7	40	51	43	39	47	33
570	NCA_12	38 BURWOOD RD, CONCORD NSW 2137	RES	53	48	48	47	47	47	44	55	29	31	26	40	11	20	13	11	46	57	50	45	53	39
571	N																								

673	NCA_12	56 BURWOOD RD, CONCORD NSW 2137	RES	53	48	48	47	47	47	36	48	25	27	22	35	7	13	6	4	39	50	42	38	46	32
674	NCA_13	17 MILTON ST, BURWOOD NSW 2134	RES	58	53	53	49	49	49	44	52	27	30	23	37	9	16	9	7	47	58	50	46	53	39
675	NCA_12	29 BROUGHTON ST, CONCORD NSW 2137	RES	53	48	48	47	47	47	33	43	22	24	19	33	4	13	6	4	37	48	40	36	43	29
676	NCA_13	15/10-12 GRANTHAM ST, BURWOOD NSW 2134	RES	58	53	53	49	49	49	39	50	26	28	23	38	9	16	9	7	44	55	47	43	51	37
677	NCA_13	10 SHAFTESBURY RD, BURWOOD NSW 2134	RES	58	53	53	49	49	49	46	56	30	36	25	41	13	15	8	6	43	54	46	42	50	36
678	NCA_12	16 LANSDOWNE ST, CONCORD NSW 2137	RES	53	48	48	47	47	47	34	44	23	24	20	33	5	13	6	4	39	50	42	38	45	31
679	NCA_13	22 BRITANNIA AV, BURWOOD NSW 2134	RES	58	53	53	49	49	49	37	47	26	26	23	36	8	17	10	8	39	50	42	38	46	32
680	NCA_13	9/28-30A BURWOOD RD, BURWOOD NSW 2134	RES	58	53	53	49	49	49	49	59	33	38	28	43	14	18	11	9	54	65	57	53	61	47
681	NCA_12	11A JOHN ST, CONCORD NSW 2137	RES	53	48	48	47	47	47	23	34	14	15	11	26	-3	8	1	-1	26	37	29	25	33	19
682	NCA_13	25 NEICH PDE, BURWOOD NSW 2134	RES	58	53	53	49	49	49	36	47	27	27	24	37	9	18	11	9	37	48	41	36	44	30
683	NCA_13	8 NEW ST, BURWOOD NSW 2134	RES	58	53	53	49	49	49	43	51	26	28	23	37	8	16	9	7	50	61	53	49	56	42
685	NCA_12	18 BURWOOD RD, CONCORD NSW 2137	RES	53	48	48	47	47	47	60	78	45	45	42	54	26	34	27	25	69	80	73	68	76	62