

Acoustic Shed Cladding Installation

Project	SMW WTP - Westmead and Parramatta		
Client	Gamuda Laing O'Rourke Consortium		
Assessment Date	26/06/2023	Assessment Id	WEST-068
Proposed start date	03/07/2023	Proposed end date	08/07/2023

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Acoustic terms and acronyms

AA	Acoustic Advisor
AMM	Additional mitigation measures – applicable where standard measures have been implemented and NML is still expected to be exceeded.
dB(A)	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.
DPE	NSW Department of Planning and Environment
EIS	Environmental Impact Statement
ICNG	Interim Construction Noise Guideline (Department of Environment and Climate Change 2009)
NCA	Noise Catchment Area
Noise level statistics	<p>L_{A90} - The A-weighted sound pressure level exceeded 90% of the monitoring period. This is considered to represent the background noise.</p> <p>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.</p> <p>L_{A1} – The A-weighted sound pressure level exceeded 1% of the monitoring period.</p> <p>L_{Amax} – The maximum A-weighted noise level associated with the measurement period.</p>
NML	Noise Management Level
PPV	Peak Particle Velocity – Measurement of ground-borne vibration in units of mm/s
RBL	Rating Background Level - a single figure that represents the background noise level for assessment purposes
ROL	Road Occupancy Licence – granted by Transport for NSW and required for any activity likely to impact on traffic flow.
SWL	Sound Power Level - 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.
SPL	<p>Sound pressure level - 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.</p> <p>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).</p>
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 Overview

The Sydney Metro Western Tunnelling Package is being delivered by the Gamuda Australia and Laing O'Rourke Consortium (GLC) and includes twin nine-kilometre tunnels between Sydney Olympic Park and Westmead, excavation of two new metro stations, and a stabling and maintenance facility at Clyde (the Project).

During the Project, there is potential for nearby sensitive receivers to experience adverse impacts relating to noise and vibration. The project's Noise and Vibration Management Sub Plan (NVMP) was developed to satisfy the project's Conditions of Approval (CoA) and addresses the assessment and management of noise and vibration impacts during construction.

Under the NVMP, KNOWnoise™, a project-specific noise prediction tool, has been developed to prepare a Detailed Noise and Vibration Impact Statement (DNVIS) for site and activity-specific noise works and provide ongoing risk analysis during project delivery and for when out-of-hours work is proposed.

This DNVIS has been prepared using KNOWnoise™ and addresses activities related to installation of the cladding and safety mesh of the acoustic shed at the Westmead Metro Station Construction Site, as illustrated in Figure 1.

The structure of this DNVIS includes:

- Section 1.2 – Construction works and hours with justification for these works in Section 1.3
- Section 2 – Existing environment
- Section 3 – Assessment framework including noise and vibration management levels
- Section 4 – Construction noise assessment
- Section 5 – Mitigation and management, including consultation

1.2 Planned works

GLC plans to install the safety mesh and cladding of the acoustic shed at the Westmead Metro Station Construction Site during out of hours. The works are described in Appendix A, which lists each assessed activity, its timing and proposed equipment.

1.3 Justification of the works

In line with the Interim Construction Noise Guidelines (DECC 2009), justification is typically required to work outside approved construction hours. These situations may involve low impact or emergency works and works under an out-of-hours work protocol.

Works are required to be completed outside of standard construction hours as the applicable council permits and traffic control plans (TCP's) required to access the footpaths and road network, will only be issued for non-peak periods (i.e. weekend, evening and night works) along Alexandra Avenue, Westmead.



Figure 1 Location map - Westmead Metro Station Construction Site

1 Existing environment

1.1 Sensitive receivers

The Westmead study area is centred on the Westmead metro station construction site. The construction site is located to the south of the existing Westmead Station and is bound by Hawkesbury Road to the west, Hassall Street to the east and Baily Street to the south.

Existing noise levels in this study area are generally controlled by transportation noise from the surrounding road network and existing rail line. The area surrounding the construction site is generally suburban and the nearest receivers are residential.

1.2 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 Westmead Metro Station Construction Site have been divided into Noise Catchment Areas (NCAs). The Westmead site contains two noise catchments (NCA01 and NCA02).

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

NCAs established as part of the EIS are summarised in Table 1 and illustrated in the figure below. Background noise monitoring has been completed as part of the EIS to apply appropriate NML to each NCA.

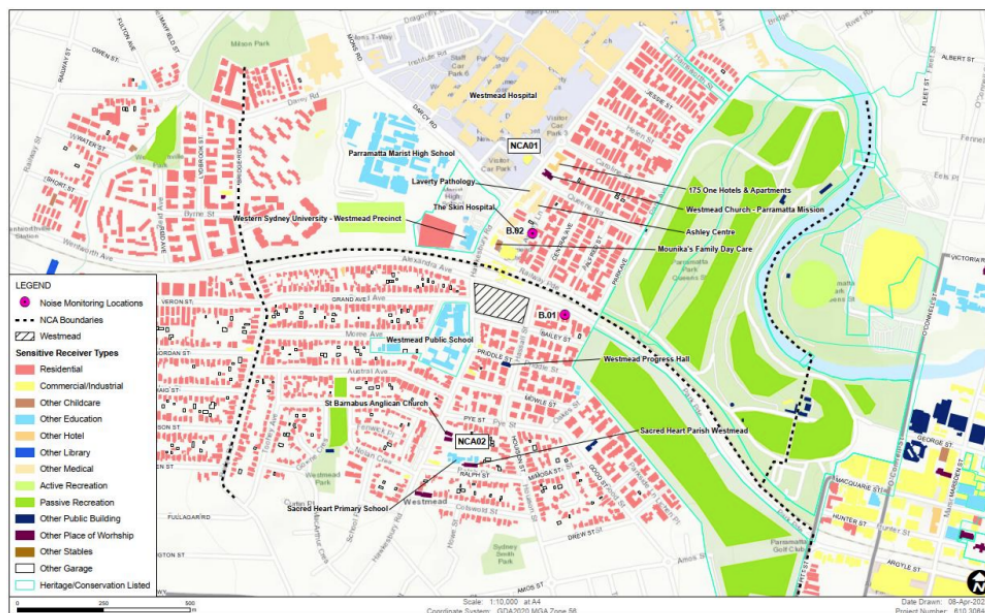


Table 1 Summary of work areas, Noise Catchment Areas and land uses

NCA	Location	Description
1	Westmead	North of the existing rail corridor in Westmead and mainly residential. 'Other sensitive' receivers include Westmead Hospital, Western Sydney University – Westmead, and Parramatta Marist High School. A child care centre and a number of medical facilities are to the north of the existing Westmead Station.
2		South of the existing rail corridor and mainly residential. Westmead Primary School is in the north of the catchment on Hawksbury Road.

2 Assessment framework

2.1 Approved construction hours

Working hours are set by CoA D35 to D36 as summarised in Table 2. 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 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 EPL or out-of-hours work protocol)
D36	Highly noise intensive works	8:00 am to 6:00 pm ¹	8:00 am to 1:00 pm ¹	No work (unless approved under EPL or 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.

2.2 Noise assessment criteria

2.2.1 Construction noise

The ICNG describes noise in excess of the background level as potentially having an adverse impact on sensitive receivers and increasing the likelihood of complaint. During standard construction hours, where construction noise is within 10 dB(A) of the RBL, impacts would be acceptable.

Where construction noise is more than 10 dB(A) above the RBL during standard construction hours, a residential receiver is considered noise affected and the proponent should undertake all reasonable and feasible steps necessary to manage the impact and consult with the affected community.

Above a $L_{Aeq, 15 \text{ minute}}$ noise level of 75 dB(A), a receiver is highly affected, requiring consideration of additional mitigation measures including alternative accommodation in the night period.

Outside standard construction hours, construction noise at a residential receiver more than 5 dB(A) above the RBL is taken to be noise affected. Table 1 (reproduced from Table 2 of the ICNG) sets out the NMLs for residences and how they are to be applied.

In addition, annoying noise 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.

2.2.2 Sleep disturbance

The Construction Noise Vibration Strategy (CNVS TfNSW 2019) 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:

- $L_{Aeq, 15 \text{ minute}}$ 40 dBA or the prevailing RBL plus 5 dB, whichever is greater, and the
- L_{Amax} 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.

Table 3 Residential noise management levels

Time of day	NML L_{Aeq} (15 min) *	How to apply
Standard hours: Monday to Friday 7 am to 6 pm Saturday 8 am to 1 pm	Noise affected RBL + 10 dB	<p>The noise affected level represents the point above which there may be some community reaction to noise.</p> <p>Where the predicted or measured L_{Aeq} (15 min) is greater than the noise affected level, the proponent should apply all feasible and reasonable work practices to meet the noise affected level.</p> <p>The proponent should also inform all potentially impacted residents of the nature of works to be carried out, the expected noise levels and duration, as well as contact details.</p>
	Highly noise affected 75 dB(A)	<p>The highly noise affected level represents the point above which there may be strong community reaction to noise.</p> <p>Where noise is above this level, the relevant authority may require respite periods by restricting the hours that the very noisy activities can occur, taking into account:</p> <ul style="list-style-type: none"> - times identified by the community when they are less sensitive to noise (such as before and after school for works near schools, or mid-morning or mid-afternoon for works near residences); - if the community is prepared to accept a longer period of construction in exchange for restrictions on construction times.
Outside recommended standard hours	Noise affected RBL + 5 dB	<p>A strong justification would typically be required for works outside the recommended standard hours.</p> <p>The proponent should apply all feasible and reasonable work practices to meet the noise affected level.</p> <p>Where all feasible and reasonable practices have been applied and noise is more than 5 dB(A) above the noise affected level, the proponent should negotiate with the community.</p>

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

Other sensitive land uses, such as schools and offices, typically find noise from construction disruptive when the properties are being used (such as during work and school times). The noise management levels for non-residential receivers set in accordance with the Interim Construction Noise Guideline are provided in Table 4. These levels apply only during hours when the non-residential premises are being used.

The difference between an internal noise level and the external noise level is about 10 dB(A), which provides a conservative assumption that windows are open for ventilation. Buildings where windows are fixed or cannot otherwise be opened may achieve a greater noise level performance.

Table 4 Non-residential sensitive land uses noise management levels

Land use	Noise assessment location	NML (L _{Aeq,15min})
Classrooms at schools and other educational institutions	Internal	45
Places of worship		
Active recreation areas (such as sporting activities and activities which generate their own noise or focus for participants)	External	65
Passive recreation areas (contemplative activities that generate little noise and where benefits are compromised by external noise intrusion, for example, reading, meditation)	External	60
Industrial premises	External	75
Office, retail outlets	External	70

2.3 Project construction noise management levels

The Project specific construction noise management levels for residential receivers have been established in line with the ICNG, based on the RBLs relevant to each NCA. These are presented in Table 5. NMLs for non-residential sensitive receivers are described in Table 4.

Table 5 Project specific construction NMLs

NCA	Noise Management Level, L _{Aeq} 15 minute						
	Approved hours		Outside approved hours				
	Noise affected	Highly noise affected	Day	Evening	Night	Sleep disturbance (CNVS)	
						L _{Aeq} , 15 minute	L _{Amax}
1	58	75	53	51	46	46	56
2	59	75	54	52	42	42	52

As part of planning for out of hours works, standard mitigation measures, as described in the CNVMP, are implemented where reasonable and feasible. However, after these measures have been applied, noise and vibration levels may continue to exceed the NMLs.

In this case, additional mitigation measures outlined in the CNVS, which largely focus on engagement with affected sensitive receivers, should be implemented where reasonable and feasible, unless other agreements are in place with the impacted receiver.

Triggers and additional mitigation measures for airborne noise are taken from the Project's requirements and summarised in Table 6. Further details of specific additional mitigation measures are described in the CNVS.

Table 6 Triggers for additional mitigation measures – Airborne noise (Sydney Metro 2020)

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

Notes: PC = Phone Calls and emails
M = Monitoring
IB = Individual briefings
AA = Alternative accommodation

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

N = Noticeable CA = Clearly audible MI Moderately intrusive HI = Highly intrusive

2.4 Vibration management

2.4.1 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 7 for sensitive receivers.

Table 7 VDV Vibration criteria

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

2.4.2 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 8 and relate to transient vibration which does not give rise to resonant responses in structures, and to low-rise buildings.

Table 8 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

2.4.3 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 8 would be applicable.

2.4.4 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 9.

Table 9 Additional Vibration Mitigation Measures (CNVS)

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

3 Impact assessment

3.1 Modelling method

Predictions of noise impacts were performed using KNOWnoise™, a project-specific noise assessment tool developed by Hutchison Weller for the WTP Project. KNOWnoise calculates the maximum $L_{Aeq,15\text{minute}}$ noise level for each identified receiver for each proposed activity using predictions from SoundPlan noise modelling software. Predictions include geometric spreading, air and ground absorptions as well as topographical and structural screening and reflection.

The following components were incorporated in the model:

- Topography – Based on terrain data of 1 m resolution.
- Individual sensitive receivers – Worst-affected façade of each building to 700 metres from the works
- Construction noise sources – Activities and equipment provided by GLC were included in the noise model as individual sources across the nominated work areas for each activity. The maximum predicted L_{Aeq} noise level within each work area was identified for each receiver.
- Cumulative impacts – all activities with overlapping time periods are included in cumulative results
- Source height – construction noise sources assumed to be at 1.5 metres above ground level.
- Ground Absorption – Ground assumed to be mixed hard and soft with absorption factor of 0.5
- Meteorology – worst-case meteorological conditions (gentle breeze from source to receiver and stable conditions).
- Residential building structures are included in the model, meaning screening provided by neighboring houses is considered.
- Results are shown for all floors of assessed buildings with the worst-case façade result assumed for the whole floor.

Equipment proposed to be used for OOHW activities together with estimated sound power levels for each item are summarised in Appendix A.

The sound power levels and ultimate predicted noise levels will depend on the number of plant items operating at any one time and their precise location relative to a sensitive receiver. In practice, the predicted levels will vary due to plant moving around the site and not operating intensively or concurrently for a 15 minute assessment period. Shielding and reflection provided by buildings will also vary as plant moves around the site. Therefore, predicted noise levels are conservative.

3.2 Predicted noise levels

Predicted impact classes for the Night period are illustrated graphically in Appendix B. Each identified receiver in the study area has been coloured to highlight the predicted level of impact.

Detailed predicted noise levels for each potentially affected receiver are presented Appendix C.

Table 10 presents the worst-case predicted noise level of 61 dB(A) during the works, resulting in 0 receivers classed as highly noise affected.

Table 10 Summary of maximum predicted noise level and highly affected receivers for the Night period.

Maximum cumulative predicted $L_{Aeq, 15 \text{ minute}}$ noise level	61 dB(A)
Number of highly noise affected receivers (>75 dB)	0

With reference to the CNVS, the number of sensitive receivers classified in each impact class for each assessment period are summarised in the following tables.

Table 11 Summary of NML exceedance ranges for standard hours.

Impact class	Predicted noise level	Predicted number of receivers
Noticable	0 ≤ 10 dB above NML	2
Clearly Audible	10 ≤ 20 dB above NML	0
Moderately Intrusive	20 ≤ 30 dB above NML	0
Highly Intrusive	> 30 dB above NML	0

Table 12 Summary of NML exceedance ranges for outside standard hours - weekend.

Impact class	Predicted noise level	Predicted number of receivers
Noticable	0 ≤ 10 dB above NML	10
Clearly Audible	10 ≤ 20 dB above NML	0
Moderately Intrusive	20 ≤ 30 dB above NML	0
Highly Intrusive	> 30 dB above NML	0

Table 13 Summary of NML exceedance ranges for outside standard hours - evenings.

Impact class	Predicted noise level	Predicted number of receivers
Noticable	0 ≤ 10 dB above NML	26
Clearly Audible	10 ≤ 20 dB above NML	0

Impact class	Predicted noise level	Predicted number of receivers
Moderately Intrusive	20 <= 30 dB above NML	0
Highly Intrusive	> 30 dB above NML	0

Table 14 Summary of NML exceedance ranges for outside standard hours - nights.

Impact class	Predicted noise level	Predicted number of receivers
Noticable	0 <= 10 dB above NML	91
Clearly Audible	10 <= 20 dB above NML	16
Moderately Intrusive	20 <= 30 dB above NML	0
Highly Intrusive	> 30 dB above NML	0

In the event works are planned for more than two consecutive nights, sleep disturbance has been considered. Table 15 summarises the number of residents predicted to exceed the sleep disturbance screening criterion. Further analysis is also provided to indicate the number of receivers expected to be woken, at L_{Amax} noise levels greater than 65 dBA.

Where exceedances of the awakening criteria are predicted, additional care should be taken, and mitigation measures implemented in line with the CNVS.

Table 15 Summary of predicted exceedances of sleep disturbance screening criterion and awakening criterion.

Criterion	Predicted number of receivers
Potentially Sleep Disturbed (exceed RBL + 15 screening criterion)	133
Exceed 65 dBA awakening criterion	12

3.3 Vibration

The CNVS requires attended vibration measurements at commencement of vibration generating activities to confirm vibration levels satisfy the criteria for that activity.

Where there is potential for exceedances of the criteria further vibration site law investigations would be undertaken to determine the site-specific safe working distances for that vibration generating activity. Continuous vibration monitoring with audible and visible alarms would be conducted at the nearest sensitive receivers whenever vibration generating activities need to take place inside the calculated safe-working distances.

Based on the proposed work locations and selected equipment, indicative exceedances of the vibration criteria are summarised in Table 16. The exceedances are based on recommended minimum working distances from vibration intensive plant given in Appendix D of the Construction Noise and Vibration Strategy (Transport for NSW 2019). Vibration impacts for each sensitive receiver are listed in Appendix C.

Table 16 Predicted exceedances of vibration criteria

Impact classification	Number of potentially affected receivers
Human comfort	0
Cosmetic damage	0
Heritage structure	0

4 Controls and safeguards

The Project represents a risk of adverse impacts on sensitive receivers, particularly when working close to the project boundary and outside approved hours.

Where short term noise impacts are unavoidable, mitigation measures described in the project construction environment management plan should be implemented together with the recommendations in in Table 14.

Table 17 and additional mitigation measures for each receiver identified in Appendix B and summarised in Table 14.

Table 17 Standard mitigation measures

Community consultation	<ul style="list-style-type: none"> Potentially affected receivers will be notified of OOH works in accordance with project requirements. Where practicable, works will be scheduled to not conflict with major student examination periods, church congregation times, and other sensitive periods identified through community consultation.
Site induction	<ul style="list-style-type: none"> All workers will be inducted to the project prior to commencing work and will be cognisant of their noise and vibration obligations under the CNVMP.
Behavioural practices	<ul style="list-style-type: none"> Avoid swearing and unnecessary shouting or loud radios onsite. Avoid dropping materials from height.
Equipment selection	<ul style="list-style-type: none"> Priority given to the use of quieter and less vibration emitting construction methods and plant alternatives where feasible and reasonable. The noise levels of plant and equipment would meet the maximum noise requirements of the CNVS.
Use and siting of plant	<ul style="list-style-type: none"> Locate compounds away from sensitive receivers and discourage access from local roads. Plant used intermittently to be throttled down or shut down. Noise-emitting plant to be directed away from sensitive receivers where possible. Stationary plant should be located behind a structure or enclosed if practicable. Deliveries should be made as far as practical from sensitive receivers. Dedicated loading/unloading sites should be shielded where possible, if close to receivers. Plan traffic flow, parking and loading/unloading areas to minimise reversing. Avoid compression breaking on approach to the site. Where additional activities or plant may result in marginal noise increases and speed works up, consider concentrating activities at one location and complete works as quickly as possible.
Non-tonal reversing alarms.	<ul style="list-style-type: none"> Non-tonal reversing beepers (or an equivalent mechanism) must be fitted and used on all construction vehicles and mobile plant regularly used on site and for any out of hours work.
Noise monitoring	<ul style="list-style-type: none"> Monitoring should be completed to verify the assumptions of this DNVIS regarding estimated equipment noise emissions and to ensure compliance with the CNVS.
Vibration monitoring	<ul style="list-style-type: none"> Attended vibration measurements should be completed at commencement of vibration generating activities predicted to occur within safe working distances for cosmetic damage. Where monitoring demonstrates maximum levels exceeded, consider alternative methodologies/equipment

Implement any other specific mitigation measures:

1. In accordance with MCoA, any specific mitigation measures identified through consultation will be implemented.
2. Non tonal reversing alarm to be fitted on the EWP
3. Quietest drill available to be used
4. Refer to Appendix A for other specific mitigation measures to be implemented during the works

Table 18 Additional mitigation measures

Code	Measure	Description
AA	Alternative accommodation	Alternative accommodation options may be provided for residents living in close proximity to construction works that are likely to incur unreasonably high impacts over an extended period of time. Alternative accommodation will be determined on a case-by-case basis.
M	Monitoring	Where it has been identified that specific construction activities are likely to exceed the relevant noise or vibration goals, noise or vibration monitoring may be conducted at the affected receiver(s) or a nominated representative location (typically the nearest receiver where more than one receiver have been identified). Monitoring can be in the form of either unattended logging or operator attended surveys. The purpose of monitoring is to inform the relevant personnel when the noise or vibration goal has been exceeded so that additional management measures may be implemented.
IB	Individual briefings	Individual briefings are used to inform stakeholders about the impacts of high noise activities and mitigation measures that will be implemented. Communications representatives from the contractor would visit identified stakeholders at least 48 hours ahead of potentially disturbing construction activities. Individual briefings provide affected stakeholders with personalised contact and tailored advice, with the opportunity to comment on the project.
LB	Letterbox drops	For each Sydney Metro project, a newsletter is produced and distributed to the local community via letterbox drop and the project mailing list. These newsletters provide an overview of current and upcoming works across the project and other topics of interest. The objective is to engage and inform and provide project-specific messages. Advanced warning of potential disruptions (e.g. traffic changes or noisy works) can assist in reducing the impact on the community. Content and newsletter length is determined on a project-by-project basis. Most projects distribute notifications on a monthly basis. Each newsletter is graphically designed within a branded template.
RO	Respite offer	The purpose of a project specific respite offer is to provide residents subjected to lengthy periods of noise or vibration respite from an ongoing impact.
PC	Phone calls	Phone calls and/or emails detailing relevant information would be made to identified/affected stakeholders within 7 days of proposed work. Phone calls and/or emails provide affected stakeholders with personalised contact and tailored advice, with the opportunity to provide comments on the proposed work and specific needs etc.
SN	Specific notifications	Specific notifications would be letterbox dropped or hand distributed to identified stakeholders no later than 7 days ahead of construction activities that are likely to exceed the noise objectives. This form of communication is used to support periodic notifications, or to advertise unscheduled works.

Appendix A Proposed activities and associated sound power levels

Installation of Cladding & Safety Mesh

Installation of cladding and safety mesh to the northern face of the acoustic shed using an elevated work platform (EWP) to access the work area.



7/3/2023 6:00:22 PM - 7/8/2023 8:00:38 AM

Equipment	Quantity	Usage	Reduction	SWL
Elevated Working Platform	1	10 %	0	79
Cordless Drill - Revised ¹	1	20 %	0	103
Daymakers / Lighting plant	1	100 %	0	93

Activity Sound Power Level: 103

* includes 5 dB penalty for potentially annoying characteristics in line with the ICNG

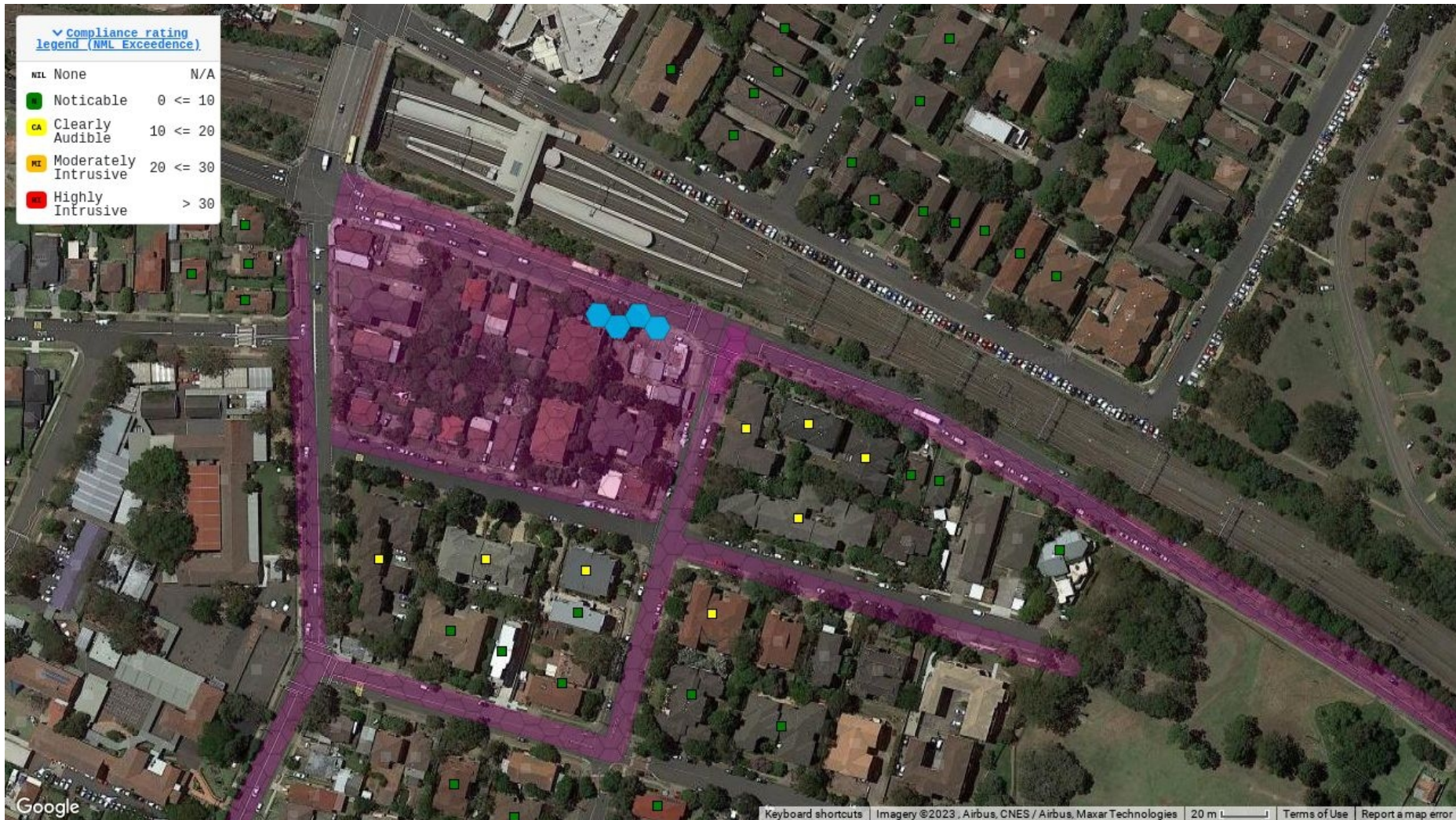
The type of drills to be used for the works are detailed below. Sound Power Level monitoring was undertaken and results are summarised below.

Type/Model	OOH Use Timeframe (KnowNoise model)	OOH Stage of Works (KnowNoise model)	Machine Sound Power Levels (SPL)			
			Technical Specification SPL (Guaranteed)	KnowNoise SPL (L _{MAX})	Sydney Metro Construction Equipment List (L _{MAX})	In-Field SPL (L _{MAX})
 HiKoki impact driver drill (cordless)	OOHW 1 OOHW 2	Installation of safety mesh and cladding on acoustic shed	99dBA	99dBA	90dBA	95.4 – 76.5dBA
 Makita heavy duty hammer drill (cordless)			99dBA			82.6 – 79.7dBA

The below specific mitigation measures will be implemented and discussed with the work crew as required:

- Ensure the minimum sized equipment necessary to complete the works are used.
- Shut down plant and machinery, including vehicles when not in operation (i.e. no vehicles to be left idling).
- Consultation with adjacent receivers via letterbox drop
- Specific Notifications (SN), Respite Offers (RO) to be provided to identified Receivers
- Non-tonal reverse alarms on all vehicles being utilised to support the works.
- All personnel to be tool-boxed on appropriate working behaviours and the requirements contained within this OOHW permit.
- Undertake noise monitoring at nearest sensitive receivers during works to confirm noise predictions.
- The use of battery and/or solar-powered lighting plants and generators will be prioritised over diesel-powered equipment.
- No activities generating vibration are planned to be completed as part of these works.

Appendix B Map showing predicted noise impacts by impact class



Appendix C Detailed predictions

C.1 Noise

Construction noise impact statement

Assessment: Acoustic Shed Cladding Installation					NML, LAeq, 15 minute				Sleep, LAmax		Predicted noise level, dBA		Exceedance summary										
NCA	Rec	Address	Flr	Land use	Day	O/day	Eve	Night	Screen	Awake	Cumulative LAeq, 15 minute	LMax	Highly Affected?	Exceed NML by (dB):				Exceed sleep disturbance by (dB):		Impact classification			
														Day	O/day	Eve	Night	Awake	Screen	Day	O/day	Eve	Night
NCA01	7440 34	"12 CENTRAL AV, WESTMEAD"	3	RES	58	53	51	46	Y		49	60		0	0	0	3	-	3	None	None	None	Noticable
NCA01	7440 33	"12 CENTRAL AV, WESTMEAD"	2	RES	58	53	51	46	Y		48	60		0	0	0	2	-	2	None	None	None	Noticable
NCA01	7440 32	"12 CENTRAL AV, WESTMEAD"	1	RES	58	53	51	46	Y		47	59		0	0	0	1	-	1	None	None	None	Noticable
NCA01	7439 65	"7 CENTRAL AV, WESTMEAD"	3	RES	58	53	51	46	Y		48	60		0	0	0	2	-	2	None	None	None	Noticable
NCA01	7439 64	"7 CENTRAL AV, WESTMEAD"	2	RES	58	53	51	46	Y		48	59		0	0	0	2	-	2	None	None	None	Noticable
NCA01	7439 63	"7 CENTRAL AV, WESTMEAD"	1	RES	58	53	51	46	Y		48	59		0	0	0	2	-	2	None	None	None	Noticable
NCA01	7439 59	"6-10 RAILWAY PDE, WESTMEAD"	3	RES	58	53	51	46	Y		52	64		0	0	1	6	-	6	None	None	Noticable	Noticable
NCA01	7439 58	"6-10 RAILWAY PDE, WESTMEAD"	2	RES	58	53	51	46	Y		52	63		0	0	1	6	-	6	None	None	Noticable	Noticable
NCA01	7439 57	"6-10 RAILWAY PDE, WESTMEAD"	1	RES	58	53	51	46	Y		51	62		0	0	0	5	-	5	None	None	None	Noticable
NCA01	7439 49	"6 CENTRAL AV, WESTMEAD"	2	RES	58	53	51	46	Y		51	62		0	0	0	5	-	5	None	None	None	Noticable
NCA01	7439 48	"6 CENTRAL AV, WESTMEAD"	1	RES	58	53	51	46	Y		50	62		0	0	0	4	-	4	None	None	None	Noticable
NCA01	7439 25	"4 RAILWAY PDE, WESTMEAD"	3	RES	58	53	51	46	Y		49	61		0	0	0	3	-	3	None	None	None	Noticable
NCA01	7439 24	"4 RAILWAY PDE, WESTMEAD"	2	RES	58	53	51	46	Y		49	60		0	0	0	3	-	3	None	None	None	Noticable
NCA01	7439 23	"4 RAILWAY PDE, WESTMEAD"	1	RES	58	53	51	46	Y		48	60		0	0	0	2	-	2	None	None	None	Noticable
NCA01	7439 13	"2 RAILWAY PDE, WESTMEAD"	3	RES	58	53	51	46	Y		48	60		0	0	0	2	-	2	None	None	None	Noticable
NCA01	7439 12	"2 RAILWAY PDE, WESTMEAD"	2	RES	58	53	51	46	Y		48	60		0	0	0	2	-	2	None	None	None	Noticable
NCA01	7439 11	"2 RAILWAY PDE, WESTMEAD"	1	RES	58	53	51	46	Y		48	59		0	0	0	2	-	2	None	None	None	Noticable
NCA01	7439 09	"16 RAILWAY PDE, WESTMEAD"	3	RES	58	53	51	46	Y	Y	56	67		0	3	5	10	2	10	None	Noticable	Noticable	Noticable
NCA01	7439 08	"16 RAILWAY PDE, WESTMEAD"	2	RES	58	53	51	46	Y	Y	55	67		0	2	4	9	2	9	None	Noticable	Noticable	Noticable
NCA01	7439 07	"16 RAILWAY PDE, WESTMEAD"	1	RES	58	53	51	46	Y	Y	54	66		0	1	3	8	1	8	None	Noticable	Noticable	Noticable
NCA01	7438 09	"8 CENTRAL AV, WESTMEAD"	2	RES	58	53	51	46	Y		50	62		0	0	0	4	-	4	None	None	None	Noticable
NCA01	7438 08	"8 CENTRAL AV, WESTMEAD"	1	RES	58	53	51	46	Y		50	62		0	0	0	4	-	4	None	None	None	Noticable
NCA01	7437 97	"17 CENTRAL AV, WESTMEAD"	1	RES	58	53	51	46	Y		46	58		0	0	0	0	-	0	None	None	None	Noticable
NCA01	7437 74	"11-13 CENTRAL AV, WESTMEAD"	3	RES	58	53	51	46	Y		47	58		0	0	0	1	-	1	None	None	None	Noticable
NCA01	7437 73	"11-13 CENTRAL AV, WESTMEAD"	2	RES	58	53	51	46	Y		46	58		0	0	0	0	-	0	None	None	None	Noticable
NCA01	7437 72	"11-13 CENTRAL AV, WESTMEAD"	1	RES	58	53	51	46	Y		46	58		0	0	0	0	-	0	None	None	None	Noticable
NCA01	7437 59	"14A CENTRAL AV, WESTMEAD"	3	RES	58	53	51	46	Y		47	59		0	0	0	1	-	1	None	None	None	Noticable
NCA01	7437 58	"14A CENTRAL AV, WESTMEAD"	2	RES	58	53	51	46	Y		48	59		0	0	0	2	-	2	None	None	None	Noticable
NCA01	7437 57	"14A CENTRAL AV, WESTMEAD"	1	RES	58	53	51	46	Y		48	59		0	0	0	2	-	2	None	None	None	Noticable
NCA01	7437 52	"14 RAILWAY PDE, WESTMEAD"	2	RES	58	53	51	46	Y		53	65		0	0	2	7	-	7	None	None	Noticable	Noticable
NCA01	7437 51	"14 RAILWAY PDE, WESTMEAD"	1	RES	58	53	51	46	Y		52	64		0	0	1	6	-	6	None	None	Noticable	Noticable
NCA01	7437 15	"16 CENTRAL AV, WESTMEAD"	4	RES	58	53	51	46	Y		47	59		0	0	0	1	-	1	None	None	None	Noticable
NCA01	7436 78	"21 RAILWAY PDE, WESTMEAD"	3	RES	58	53	51	46	Y	Y	56	67		0	3	5	10	2	10	None	Noticable	Noticable	Noticable

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NCA01	7436 77	"21 RAILWAY PDE, WESTMEAD"	2	RES	58	53	51	46	Y	Y	55	67		0	2	4	9	2	9	None	Noticable	Noticable	Noticable
NCA01	7436 76	"21 RAILWAY PDE, WESTMEAD"	1	RES	58	53	51	46	Y	Y	54	66		0	1	3	8	1	8	None	Noticable	Noticable	Noticable
NCA01	7436 71	"3 RAILWAY PDE, WESTMEAD"	3	RES	58	53	51	46	Y		48	60		0	0	0	2	-	2	None	None	None	Noticable
NCA01	7436 70	"3 RAILWAY PDE, WESTMEAD"	2	RES	58	53	51	46	Y		48	59		0	0	0	2	-	2	None	None	None	Noticable
NCA01	7436 69	"3 RAILWAY PDE, WESTMEAD"	1	RES	58	53	51	46	Y		48	59		0	0	0	2	-	2	None	None	None	Noticable
NCA01	7436 11	"6-10 RAILWAY PDE, WESTMEAD"	3	RES	58	53	51	46	Y		51	62		0	0	0	5	-	5	None	None	None	Noticable
NCA01	7436 10	"6-10 RAILWAY PDE, WESTMEAD"	2	RES	58	53	51	46	Y		50	62		0	0	0	4	-	4	None	None	None	Noticable
NCA01	7436 09	"6-10 RAILWAY PDE, WESTMEAD"	1	RES	58	53	51	46	Y		50	61		0	0	0	4	-	4	None	None	None	Noticable
NCA01	7435 70	"5 RAILWAY PDE, WESTMEAD"	3	RES	58	53	51	46	Y		50	62		0	0	0	4	-	4	None	None	None	Noticable
NCA01	7435 69	"5 RAILWAY PDE, WESTMEAD"	2	RES	58	53	51	46	Y		50	61		0	0	0	4	-	4	None	None	None	Noticable
NCA02	7429 76	"8-12 ALEXANDRA AV, WESTMEAD"	2	RES	59	54	52	42	Y	Y	55	66		0	1	3	13	1	13	None	Noticable	Noticable	Clearly Audible
NCA02	7429 75	"8-12 ALEXANDRA AV, WESTMEAD"	1	RES	59	54	52	42	Y	Y	54	66		0	0	2	12	1	12	None	None	Noticable	Clearly Audible
NCA02	7429 66	"27 HASSALL ST, WESTMEAD"	3	RES	59	54	52	42	Y		52	63		0	0	0	10	-	10	None	None	None	Noticable
NCA02	7429 65	"27 HASSALL ST, WESTMEAD"	2	RES	59	54	52	42	Y		51	63		0	0	0	9	-	9	None	None	None	Noticable
NCA02	7429 64	"27 HASSALL ST, WESTMEAD"	1	RES	59	54	52	42	Y		51	62		0	0	0	9	-	9	None	None	None	Noticable
NCA02	7429 20	"31 ALEXANDRA AV, WESTMEAD"	2	RES	59	54	52	42	Y		46	57		0	0	0	4	-	4	None	None	None	Noticable
NCA02	7429 19	"31 ALEXANDRA AV, WESTMEAD"	1	RES	59	54	52	42	Y		43	55		0	0	0	1	-	1	None	None	None	Noticable
NCA02	7429 07	"23-25 PRIDDLE ST, WESTMEAD"	1	RES	59	54	52	42	Y		46	58		0	0	0	4	-	4	None	None	None	Noticable
NCA02	7429 06	"23-25 PRIDDLE ST, WESTMEAD"	2	RES	59	54	52	42	Y		47	58		0	0	0	5	-	5	None	None	None	Noticable
NCA02	7428 87	"40 HASSALL ST, WESTMEAD"	2	RES	59	54	52	42	Y		45	57		0	0	0	3	-	3	None	None	None	Noticable
NCA02	7428 86	"40 HASSALL ST, WESTMEAD"	1	RES	59	54	52	42	Y		45	56		0	0	0	3	-	3	None	None	None	Noticable
NCA02	7428 71	"13-17 BAILEY ST, WESTMEAD"	1	RES	59	54	52	42	Y		46	57		0	0	0	4	-	4	None	None	None	Noticable
NCA02	7428 70	"13-17 BAILEY ST, WESTMEAD"	3	RES	59	54	52	42	Y	Y	54	66		0	0	2	12	1	12	None	Noticable	Noticable	Clearly Audible
NCA02	7428 69	"13-17 BAILEY ST, WESTMEAD"	2	RES	59	54	52	42	Y		54	65		0	0	2	12	-	12	None	None	Noticable	Clearly Audible
NCA02	7427 89	"24 BAILEY ST, WESTMEAD"	2	RES	59	54	52	42	Y		52	64		0	0	0	10	-	10	None	None	Noticable	Clearly Audible
NCA02	7427 88	"24 BAILEY ST, WESTMEAD"	1	RES	59	54	52	42	Y		52	63		0	0	0	10	-	10	None	None	None	Noticable
NCA02	7427 47	"45-53 HASSALL ST, WESTMEAD"	4	RES	59	54	52	42	Y		47	58		0	0	0	5	-	5	None	None	None	Noticable
NCA02	7427 46	"45-53 HASSALL ST, WESTMEAD"	3	RES	59	54	52	42	Y		43	54		0	0	0	1	-	1	None	None	None	Noticable
NCA02	7426 97	"21 PRIDDLE ST, WESTMEAD"	4	RES	59	54	52	42	Y		50	62		0	0	0	8	-	8	None	None	None	Noticable
NCA02	7426 96	"21 PRIDDLE ST, WESTMEAD"	3	RES	59	54	52	42	Y		50	61		0	0	0	8	-	8	None	None	None	Noticable
NCA02	7426 95	"21 PRIDDLE ST, WESTMEAD"	2	RES	59	54	52	42	Y		49	61		0	0	0	7	-	7	None	None	None	Noticable
NCA02	7426 94	"21 PRIDDLE ST, WESTMEAD"	1	RES	59	54	52	42	Y		49	60		0	0	0	7	-	7	None	None	None	Noticable
NCA02	7426 66	"1 BAILEY ST, WESTMEAD"	3	RES	59	54	52	42	Y		44	56		0	0	0	2	-	2	None	None	None	Noticable
NCA02	7426 33	"8-12 ALEXANDRA AV, WESTMEAD"	3	RES	59	54	52	42	Y		53	64		0	0	1	11	-	11	None	None	Noticable	Clearly Audible
NCA02	7426 32	"8-12 ALEXANDRA AV, WESTMEAD"	2	RES	59	54	52	42	Y		52	64		0	0	0	10	-	10	None	None	Noticable	Clearly Audible
NCA02	7426 31	"8-12 ALEXANDRA AV, WESTMEAD"	1	RES	59	54	52	42	Y		52	63		0	0	0	10	-	10	None	None	None	Noticable

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NCA02	7425 31	"6 ALEXANDRA AV, WESTMEAD"	2	RES	59	54	52	42	Y		49	60		0	0	0	7	-	7	None	None	None	Noticable
NCA02	7425 30	"6 ALEXANDRA AV, WESTMEAD"	1	RES	59	54	52	42	Y		48	60		0	0	0	6	-	6	None	None	None	Noticable
NCA02	7425 03	"48-52 HASSALL ST, WESTMEAD"	4	RES	59	54	52	42	Y		43	54		0	0	0	1	-	1	None	None	None	Noticable
NCA02	7424 98	"22 PRIDDLE ST, WESTMEAD"	3	RES	59	54	52	42	Y		45	57		0	0	0	3	-	3	None	None	None	Noticable
NCA02	7424 97	"22 PRIDDLE ST, WESTMEAD"	2	RES	59	54	52	42	Y		44	56		0	0	0	2	-	2	None	None	None	Noticable
NCA02	7424 96	"22 PRIDDLE ST, WESTMEAD"	1	RES	59	54	52	42	Y		44	56		0	0	0	2	-	2	None	None	None	Noticable
NCA02	7424 83	"48-52 HASSALL ST, WESTMEAD"	3	RES	59	54	52	42	Y		43	55		0	0	0	1	-	1	None	None	None	Noticable
NCA02	7424 82	"48-52 HASSALL ST, WESTMEAD"	2	RES	59	54	52	42	Y		43	54		0	0	0	1	-	1	None	None	None	Noticable
NCA02	7424 77	"12 HASSALL ST, WESTMEAD"	2	RES	59	54	52	42	Y	Y	61	73		2	7	9	19	8	19	Noticable	Noticable	Noticable	Clearly Audible
NCA02	7424 76	"12 HASSALL ST, WESTMEAD"	1	RES	59	54	52	42	Y	Y	59	71		0	5	7	17	6	17	Noticable	Noticable	Noticable	Clearly Audible
NCA02	7424 75	"15-23 MOWLE ST, WESTMEAD"	3	RES	59	54	52	42	Y		44	56		0	0	0	2	-	2	None	None	None	Noticable
NCA02	7424 74	"15-23 MOWLE ST, WESTMEAD"	2	RES	59	54	52	42	Y		44	56		0	0	0	2	-	2	None	None	None	Noticable
NCA02	7424 73	"15-23 MOWLE ST, WESTMEAD"	1	RES	59	54	52	42	Y		44	55		0	0	0	2	-	2	None	None	None	Noticable
NCA02	7424 68	"3 GRAND AV, WESTMEAD"	1	RES	59	54	52	42	Y		44	56		0	0	0	2	-	2	None	None	None	Noticable
NCA02	7424 16	"34-38 HASSALL ST, WESTMEAD"	2	RES	59	54	52	42	Y		47	59		0	0	0	5	-	5	None	None	None	Noticable
NCA02	7424 15	"34-38 HASSALL ST, WESTMEAD"	1	RES	59	54	52	42	Y		47	59		0	0	0	5	-	5	None	None	None	Noticable
NCA02	7424 12	"152 HAWKESBURY RD, WESTMEAD"	1	RES	59	54	52	42	Y		50	61		0	0	0	8	-	8	None	None	None	Noticable
NCA02	7424 04	"7 ALEXANDRA AV, WESTMEAD"	2	RES	59	54	52	42	Y		46	57		0	0	0	4	-	4	None	None	None	Noticable
NCA02	7424 03	"7 ALEXANDRA AV, WESTMEAD"	1	RES	59	54	52	42	Y		45	56		0	0	0	3	-	3	None	None	None	Noticable
NCA02	7423 50	"55-57 HASSALL ST, WESTMEAD"	4	RES	59	54	52	42	Y		42	54		0	0	0	0	-	0	None	None	None	Noticable
NCA02	7423 49	"55-57 HASSALL ST, WESTMEAD"	3	RES	59	54	52	42	Y		42	54		0	0	0	0	-	0	None	None	None	Noticable
NCA02	7423 29	"45 HASSALL ST, WESTMEAD"	3	RES	59	54	52	42	Y		43	55		0	0	0	1	-	1	None	None	None	Noticable
NCA02	7423 22	"156 HAWKESBURY RD, WESTMEAD"	1	RES	59	54	52	42	Y		48	60		0	0	0	6	-	6	None	None	None	Noticable
NCA02	7422 92	"154 HAWKESBURY RD, WESTMEAD"	1	RES	59	54	52	42	Y		49	61		0	0	0	7	-	7	None	None	None	Noticable
NCA02	7422 85	"123-129 HAWKESBURY RD, WESTMEAD"	3	RES	59	54	52	42	Y		53	64		0	0	1	11	-	11	None	None	Noticable	Clearly Audible
NCA02	7422 84	"123-129 HAWKESBURY RD, WESTMEAD"	2	RES	59	54	52	42	Y		52	64		0	0	0	10	-	10	None	None	Noticable	Clearly Audible
NCA02	7422 83	"123-129 HAWKESBURY RD, WESTMEAD"	1	RES	59	54	52	42	Y		52	64		0	0	0	10	-	10	None	None	None	Noticable
NCA02	7422 82	"37 HASSALL ST, WESTMEAD"	2	RES	59	54	52	42	Y		49	60		0	0	0	7	-	7	None	None	None	Noticable
NCA02	7422 81	"37 HASSALL ST, WESTMEAD"	1	RES	59	54	52	42	Y		48	60		0	0	0	6	-	6	None	None	None	Noticable
NCA02	7422 76	"9-11 PRIDDLE ST, WESTMEAD"	3	RES	59	54	52	42	Y		45	57		0	0	0	3	-	3	None	None	None	Noticable
NCA02	7422 61	"26-30 BAILEY ST, WESTMEAD"	1	RES	59	54	52	42	Y		53	65		0	0	1	11	-	11	None	None	Noticable	Clearly Audible
NCA02	7422 60	"26-30 BAILEY ST, WESTMEAD"	3	RES	59	54	52	42	Y	Y	54	66		0	0	2	12	1	12	None	None	Noticable	Clearly Audible
NCA02	7422 59	"26-30 BAILEY ST, WESTMEAD"	2	RES	59	54	52	42	Y		54	65		0	0	2	12	-	12	None	None	Noticable	Clearly Audible
NCA02	7422 34	"48-52 HASSALL ST, WESTMEAD"	3	RES	59	54	52	42	Y		43	54		0	0	0	1	-	1	None	None	None	Noticable
NCA02	7422 33	"48-52 HASSALL ST, WESTMEAD"	2	RES	59	54	52	42	Y		42	54		0	0	0	0	-	0	None	None	None	Noticable
NCA02	7421 86	"23-25 HASSALL ST, WESTMEAD"	2	RES	59	54	52	42	Y		54	65		0	0	2	12	-	12	None	None	Noticable	Clearly Audible

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NCA02	7421 85	"23-25 HASSALL ST, WESTMEAD"	1	RES	59	54	52	42	Y		53	65		0	0	1	11	-	11	None	None	Noticable	Clearly Audible
NCA02	7421 65	"46 HASSALL ST, WESTMEAD"	1	RES	59	54	52	42	Y		43	55		0	0	0	1	-	1	None	None	None	Noticable

C.2 Vibration

NCA	Receiver	Address	Land use	Vibration Impact
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