

5 March 2024

TM372-02-1-03F04 SMW-ETP\_ADD\_DNVIS-HUN-Demo Hauling (r3)

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## Sydney Metro West Eastern Tunnelling Package - Addendum Detailed Noise and Vibration Impact Statement - Hunter Street Station (OOH loading and hauling of demolition material)

### 1 Introduction

A Detailed Noise and Vibration Impact Statement (DNVIS) has been prepared for the **ETP Hunter Street Station surface worksites** [1]. The DNVIS was prepared on behalf of John Holland CPB Contractors Ghella Joint Venture (JCG) to meet the requirements of Planning Approval (SSI 19238057) Condition D29 and the Sydney Metro Construction Noise and Vibration Standard (CNVS)[2] for the construction of the Sydney Metro West – Eastern Tunnelling Package (ETP) Works.

This Addendum has been prepared consistent with the DNVIS to assess potential changes in the assessed noise and vibration impacts from the Hunter Street Station OOH loading and hauling of demolition materials.

### 2 Construction works, hours and objectives

#### 2.1 Construction works addressed in this Addendum DNVIS

##### 2.1.1 Location of works

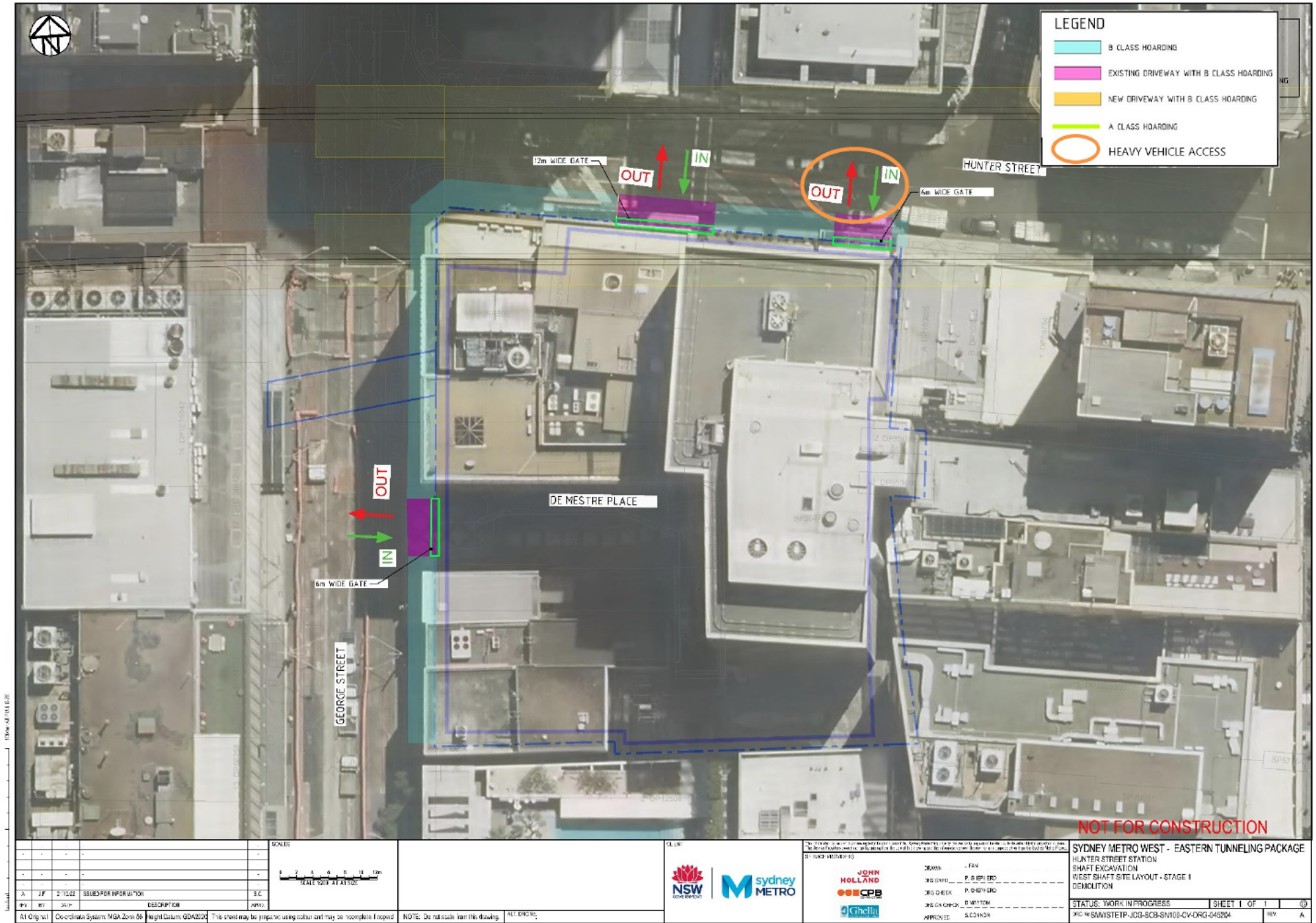
The works assessed in this addendum DNVIS include the loading and hauling of concrete debris from the demolition works at the Hunter Street West and Hunter Street East sites. The truck loading will be undertaken within the site footprint inside of the existing buildings being demolished. At the Hunter Street West site trucks will enter and egress from the site entrance on Hunter Street. At Hunter Street East trucks will enter from O'Connell Street and egress onto Hunter Street. The truck routes entrance and egress are shown below for the Hunter Street West and Hunter Street East sites in Figure 2.1 and Figure 2.2 respectively.

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Figure 2.2 Hunter Street West - for hauling demolition materials



### 2.1.2 Construction works

The additional works assessed in this addendum DNVIS will be undertaken outside standard construction hours from 5am – 7am Monday to Saturday. The works are summarised in Table 2.1.

**Table 2.1: Summary of construction works under this DNVIS**

Worksite	Aspect	Plant	Construction hours
Hunter Street West	Demolition hauling	Dump truck	OOHW (N)
		Excavator with bucket attachment (up to 25t)	OOHW (N)
Hunter Street East	Demolition hauling	Dump truck	OOHW (N)
		Excavator with bucket attachment (up to 25t)	OOHW (N)

Notes: 'OOHW' means Out of Hours works, or work outside the standard construction hours (see Section 2.2)

'OOHW(N)' is the OOH 'Night' period, 10pm to 7am Sunday/Monday to Thursday/ Friday; 10pm to 8am Friday/Saturday and Saturday/ Sunday

### 2.1.3 Construction traffic

Based on the proposed activities presented in Table 2.1, the construction traffic is consistent with what was assessed in the DNVIS. No further assessment is required.

## 2.2 Construction Hours

Construction hours are as reported in the DNVIS Section 2.2.

### 2.3 Justification for OOHW

The early commencement of load out of concrete rubble from the Hunter Street East and Hunter Street West demolition sites will allow for the maintenance or reduction of the overall demolition program. This in turn will result in a reduction in the overall duration of impact to receivers surrounding these sites. The removal of demolition waste from the sites is seen as the key constraint in meeting the demolition program. By undertaking low noise impact works in accordance with the EPL prior to 7am this will assist in minimising the risk of an extended demolition program and associated impacts.

The OOH loading and hauling demolition materials works included in this addendum will meet the low impact requirements of Condition D23(b).

### 2.4 Construction noise and vibration objectives

The DNVIS Section 3 describes the Land Use Survey and Noise Catchment Areas used to identify sensitive receivers potentially impacted by the Project and establish receiver groups for the purpose of assessment and management of impact.



Construction noise and vibration objectives are detailed in the CNVS Section 2. A summary of the objectives as applicable to the Hunter Street Station works is provided in Table 4.1 of the DNVIS. Construction noise objectives specific to these works are presented in Table B1 in APPENDIX B.

### 3 Construction noise and vibration assessment

#### 3.1 Construction activities and work areas

The proposed loading and hauling of demolition materials works will be undertaken within the buildings to be demolished in the Hunter Street West and Hunter Street East sites.

Construction activities, plant and equipment and hours of operation are presented in Table 3.1.

**Table 3.1: Proposed construction activities and associated sound power levels**

Worksite	Activity	Plant and equipment	No. of Items			Sound power level per item, dB(A)		High impact item	Vibration significant item
			Day	Evening	Night	L <sub>Aeq</sub>	L <sub>Amax</sub>		
Hunter Street West	Demolition hauling	Dump truck	-	-	6 from 5am-7am	106	111	-	-
		Excavator with bucket attachment (up to 25t)	-	-	1	103	108	-	-
Hunter Street East	Demolition hauling	Dump truck	-	-	6 from 5am-7am	106	111	-	-
		Excavator with bucket attachment (up to 25t)	-	-	1	103	108	-	-

#### 3.2 Airborne noise assessment

The airborne noise prediction methodology is consistent with the DNVIS (Section 5.1).

Airborne noise impacts during construction works have been predicted and compared to the noise management levels (NMLs). A receiver is considered construction noise affected when the predicted construction noise level is above the NML. Table 3.3 and Table 3.4 present a summary of the number of residential receivers and 'other sensitive receivers (respectively) likely to be noise affected by the additional activity associated with the OOH demolition haulage works. The tables are colour coded to indicate how much the predicted noise level is above the NML and the corresponding perceived noise impact, based on the CNVS, as noted in Table 3.2.

**Table 3.2: Key to the predicted construction airborne noise results tables**

Assessment	Time of day	Key			
L <sub>Aeq</sub> (15min)	Standard hours <sup>1</sup> or Outside standard hours	0-10 dB(A) above NML (green)	11-20 dB(A) above NML (yellow)	21-30 dB(A) above NML (orange)	>30 dB(A) above NML (purple)
Sleep disturbance	Night only	L <sub>Aeq,15min</sub> above 40 dB(A) or RBL plus 5 dB, whichever is the greater (yellow)		L <sub>Amax</sub> above 52 dB(A) or RBL plus 15 dB, whichever is the greater (purple)	

Notes: 1. Highly noise affected (HNA) which is greater than 75dB(A) during standard construction hours is shown with **Bold** text and applies to residential receiver buildings only.

Table 3.3 summarises the number of construction air-borne noise affected residential receivers (i.e. receivers where predicted L<sub>Aeq</sub> noise levels construction works are above the NML and the likely perceived noise impact. Table 3.4 presents the number of construction air-borne noise affected other sensitive receivers. The works at Hunter Street West and Hunter Street East will be undertaken concurrently and have been assessed as concurrent works. Predicted noise levels are presented in Appendix C.1.

Noise monitoring was undertaken by Renzo Tonin & Associates on Saturday morning (3 February 2024) between 8:00 am and 9:00 am to measure the works outlined in Table 3.1. The monitoring results were used to verify the noise model, to provide greater certainty of the predicted noise levels (refer to APPENDIX C.2 for detail.

### 3.2.1 Standard construction hours

No additional loading and hauling of demolition materials works are scheduled to be undertaken during standard construction hours.

### 3.2.2 Out of hours work

The results summarised in Table 3.3 and Table 3.4 show that the activities required during the loading and hauling of demolition materials works do not construction noise affect any residential and other sensitive receivers (in use) outside standard construction hours.

Mitigation and management measures summarised in Section 9 of the DNVIS will continue to be implemented during the OOH loading and hauling of demolition materials works.

### 3.2.3 Sleep disturbance

The results summarised in Table 3.3 show that no residential receivers would experience construction noise levels above the L<sub>Aeq</sub>(15min) and L<sub>Amax</sub> sleep disturbance criteria caused by the works undertaken at Hunter Street.



Table 3.3: Number of residential receivers over the airborne noise management levels (all NCAs)

Worksite	Construction activity	Highly noise affected <sup>1</sup>	Day (standard hours) <sup>2</sup>				Day (outside standard hours) <sup>2</sup>				Evening <sup>2</sup>				Night <sup>2</sup>				Sleep disturbance <sup>2</sup>	
		L <sub>Aeq</sub>	L <sub>Aeq</sub>				L <sub>Aeq</sub>				L <sub>Aeq</sub>				L <sub>Aeq</sub>				L <sub>Aeq</sub>	L <sub>Amax</sub>
		> 75 dB(A)	1 – 10 dB(A)	11 – 20 dB(A)	21-30 dB(A)	> 30 dB(A)	1 – 10 dB(A)	11 – 20 dB(A)	21-30 dB(A)	> 30 dB(A)	1 – 10 dB(A)	11 – 20 dB(A)	21-30 dB(A)	> 30 dB(A)	1 – 10 dB(A)	11 – 20 dB(A)	21-30 dB(A)	> 30 dB(A)	> 40 or RBL+5 dB(A)	> 52 or RBL+15 dB(A)
Hunter Street West & Hunter Street East	Demolition hauling	0	2	2	2	2	2	2	2	2	2	2	2	2	0	0	0	0	0	0

Note: Construction noise level cells are shaded based upon the predicted worst case NML exceedance in accordance with the key presented in Table 5.2

1. Highly noise affected applies to residential receivers, as per the ICNG.
2. All work is proposed to be completed during the night period.

Table 3.4: Number of other sensitive receivers over the airborne noise management levels (all NCAs)

Stage	Construction activity	Commercial <sup>1</sup>				Childcare <sup>1</sup>				Educational <sup>1</sup>				Recreational <sup>1</sup>				Places of worship <sup>1</sup>				Hotel/Motel/Hostel <sup>1</sup>				Other <sup>1</sup>			
		L <sub>Aeq</sub>				L <sub>Aeq</sub>				L <sub>Aeq</sub>				L <sub>Aeq</sub>				L <sub>Aeq</sub>				L <sub>Aeq</sub>				L <sub>Aeq</sub>			
		1 – 10 dB(A)	11 – 20 dB(A)	21-30 dB(A)	> 30 dB(A)	1 – 10 dB(A)	11 – 20 dB(A)	21-30 dB(A)	> 30 dB(A)	1 – 10 dB(A)	11 – 20 dB(A)	21-30 dB(A)	> 30 dB(A)	1 – 10 dB(A)	11 – 20 dB(A)	21-30 dB(A)	> 30 dB(A)	1 – 10 dB(A)	11 – 20 dB(A)	21-30 dB(A)	> 30 dB(A)	1 – 10 dB(A)	11 – 20 dB(A)	21-30 dB(A)	> 30 dB(A)	1 – 10 dB(A)	11 – 20 dB(A)	21-30 dB(A)	> 30 dB(A)
Hunter Street West & Hunter Street East	Demolition hauling	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Note: Highly noise affected does not apply to OSRs, as per the ICNG.

1. Commercial, recreational and other sensitive receivers have been assessed against the respective NMLs (see Table B1 in APPENDIX B), and exceedances have been presented in the count table. 'Other' includes industrial receivers, theatre, television or recording studios. For more detail on specific impacts to receivers refer to Appendix D (Table D.1) in the DNVIS
2. Impacts only applicable when facility is in use.

### 3.3 Ground-borne noise assessment

There are no vibration significant plant or equipment proposed to be used during the loading and hauling of demolition materials works. Ground-borne noise impacts are unchanged from the impacts presented in the DNVIS. (Section 6).

### 3.4 Vibration assessment

There are no vibration significant plant or equipment proposed to be used during the loading and hauling of demolition materials works. Vibration impacts are unchanged from the impacts presented in the DNVIS. (Section 7).

### 3.5 Mitigation and management measures

#### 3.5.1 Specific mitigation measures

In addition to the mitigation and management measures outlined in Section 9 of the DNVIS, the following specific mitigation measures will be implemented as applicable during the OOH loading and hauling of demolition materials works, taking into consideration industry best practice methods in accordance with Planning Condition of Approval D28.

**Table 3.5: Specific mitigation measures**

Control measure	Description of the control measure	Feasible/ reasonable test	Adopted?
Use of remaining buildings as screening/ partial noise enclosure.	Trucks will be loaded in the basement or ground level of the remaining part of the building. Noise blankets to minimise gaps and openings.	This measure could be feasibly and reasonably be implemented.	Yes
Truck loading area on site	The loading area used within the site will be selected to ensure the longest path from and/ or obstructions (barriers) between the loading area to the access gate, as much as possible.	This measure will be implemented where site conditions make it practicable	Yes
Access gates closed during loading of spoil trucks	The access gate to the worksite is opposite a sensitive receiver site (hotels) for both locations. The roller (solid) gate would be opened to allow a vehicle on site. Loading of demolition spoil would not commence until the roller door has been closed.	This measure could be feasibly and reasonably be implemented.	Yes
Smooth access driveways	Access driveways to the worksites will be maintained smooth, to minimise the occurrence of clangs or bangs as trucks enter the worksite	This measure could be feasibly and reasonably be implemented.	Yes
Management of truck loading on site	Higher levels of instantaneous noise levels can be generated by demolition material being loaded into empty trucks. Careful placement of material into the truck, instead of dropping the material from height may reduce instantaneous noise levels by up to 10 dB(A).	This measure could be feasibly and reasonably be implemented.	Yes



Control measure	Description of the control measure	Feasible/ reasonable test	Adopted?
Toolbox talks	Toolbox Talks will be provided to all personnel involved in the early morning loading and haulage activity (as per the DNVIS), specifically targeted to ensure the noise impacts from loading and haulage of demolition materials are minimised.	This measure could be feasibly and reasonably be implemented.	Yes

### 3.5.2 Attended airborne noise monitoring

As noted in Section 9.6.1 of the DNVIS, attended noise monitoring is to be undertaken to verify that noise levels resulting from loading and haulage of demolition materials works are in accordance with the levels predicted in this report. Noise monitoring will be completed in publicly accessible areas on or near the nominated receivers, at ground floor level. The nominated monitoring locations are:

**Table 3.6: Nominated verification monitoring locations**

Type of monitoring	NCA/ Receiver type	Nominated receiver address
Attended	N/A	Location M1 (see Appendix C.2)
Attended	OSR (HOTEL)	2 HUNTER STREET SYDNEY (A BY ADINA)
Attended	OSR (HOTEL)	30 HUNTER STREET SYDNEY (THE GRAND HOTEL)
Attended	N/A	Location M2 (see Appendix C.2)
Attended	OSR (HOTEL)	27 O'CONNELL STREET SYDNEY (RADISSON PLAZA HOTEL)

## 4 Impact classification

The impact classification from the in Section 10 of the DNVIS has been reviewed taking into consideration the outcomes of this Addendum assessment report. The impact classification for these works is **low** as predicted noise levels are below the NML and all reasonable and feasible mitigation measures have been incorporated into the site design.

There is no change to the overall noise and vibration impact classification. That is, the overall noise impact of the Hunter Street Station (Stage 1 demolition and Stage 2 excavation) works is considered **low to moderate**. Mitigation measures will be implemented to reduce noise levels with the aim of achieving the NMLs and limit the overall noise impact to **low**. Where this is not feasible or reasonable, residual impacts will be managed as outlined in Section 9.4 of the DNVIS.

## 5 Conclusion

In conclusion, works associated the Hunter Street Station OOH loading and hauling of demolition materials works have been described in this Addendum DNVIS to identify potential environmental risks associated with construction noise and vibration. Construction noise and vibration objectives have been established in the DNVIS, consistent with the conditions of approval for the Project and the EIS.

### **Construction airborne noise**

The predicted airborne noise levels indicate there are no construction noise affect any residential and other sensitive receivers outside standard construction hours caused by activities required during the OOH demolition haulage works. Mitigation and management measures summarised in Section 9 of the DNVIS and specific mitigation measures outlined in Section 3.5 of this Addendum report will continue to be implemented during the loading and hauling of demolition materials works.

### **Construction ground-borne noise and vibration**

There are no vibration significant plant or equipment proposed to be used during the OOH demolition haulage works. Ground-borne noise and vibration impacts are unchanged from the impacts presented in the DNVIS.



## Document control

Date	Revision history	Non-issued revision	Issued revision	Prepared	Instructed	Reviewed / Authorised
19.02.2024	Initial issue	0	1	██████	-	██████
23.02.2024	Respond to JCG comments	-	2	██████	-	██████
5.03.2024	Respond to AA/ER/SM comments	-	3	██████	-	██████
File Path: R:\AssocSydProjects\TM351-TM400\TM372 mt SMW - Eastern Tunnelling Pkge\1 Docs\03 HUNTER ST\TM372-02-1-03F04 SMW-ETP_ADD_DNVIS-HUN-Demo Hauling (r3).docx						

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This document is issued subject to review and authorisation by the suitably qualified and experienced person named in the last column above. If no name appears, this document shall be considered as preliminary or draft only and no reliance shall be placed upon it other than for information to be verified later.

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We have derived data in this report from information sourced from the Client (if any) and/or available in the public domain at the time or times outlined in this report. The passage of time, manifestation of latent conditions or impacts of future events may require further examination and re-evaluation of the data, findings, observations and conclusions expressed in this report.

We have prepared this report in accordance with the usual care and thoroughness of the consulting profession, for the sole purpose described above and by reference to applicable standards, guidelines, procedures and practices at the date of issue of this report. For the reasons outlined above, however, no other warranty or guarantee, whether expressed or implied, is made as to the data, observations and findings expressed in this report, to the extent permitted by law.

The information contained herein is for the purpose of acoustics only. No claims are made and no liability is accepted in respect of design and construction issues falling outside of the specialist field of acoustics engineering including and not limited to structural integrity, fire rating, architectural buildability and fit-for-purpose, waterproofing and the like. Supplementary professional advice should be sought in respect of these issues.

External cladding disclaimer: No claims are made and no liability is accepted in respect of any external wall and/or roof systems (eg facade / cladding materials, insulation etc) that are: (a) not compliant with or do not conform to any relevant non-acoustic legislation, regulation, standard, instructions or Building Codes; or (b) installed, applied, specified or utilised in such a manner that is not compliant with or does not conform to any relevant non-acoustic legislation, regulation, standard, instructions or Building Codes.

## References

- [1] Renzo Tonin & Associates 2023 Sydney Metro West Eastern Tunnelling Package - Detailed Noise and Vibration Impact Statement – Hunter Street Station – 24 May 2023 (TM372-02-1-03F01 SMW-ETP\_DNVIS-HUN (revB))
- [2] Sydney Metro Construction Noise and Vibration Standard Version 4.3 (SM-20-00098866) – 4 November 2020
- [3] Transport for NSW Construction Noise and Vibration Strategy (ref: ST-157/4.1) April 2019
- [4] Sydney Metro West Out-of-hours Work Protocol (in progress)
- [5] SLR Consulting Australia Pty Ltd 2021 Sydney Metro West - Major civil construction between The Bays and Sydney CBD - Technical Paper 2: Noise and Vibration October 2020
- [6] Sydney Metro 2022 Sydney Metro West – Submissions Report - Major civil construction between The Bays and Sydney CBD
- [7] Department of Environment and Climate Change 2009 NSW Interim Construction Noise Guideline (ICNG)
- [8] Environment Protection Authority 2017 NSW Noise Policy for Industry (NPfl)
- [9] Department of Environment, Climate Change and Water 2011 NSW Road Noise Policy (RNP)
- [10] Department of Environment Conservation NSW 2006 Assessing Vibration; a technical guideline
- [11] Environment Protection Authority 2000 NSW Industrial Noise Policy (INP)
- [12] British Standard BS 6472-2008, Evaluation of human exposure to vibration in buildings (1-80Hz)
- [13] Australian Standard AS 2187.2-2006 Explosives - Storage and Use - Use of Explosives
- [14] British Standard BS 7385 Part2-1993, Evaluation and measurements for vibration in buildings Part 2
- [15] German Standard DIN 4150-3: 2016-12, Structural vibration - Effects of vibration on structures, December 2016
- [16] ASHRAE Applications Handbook (SI) 2003, Chapter 47 Sound and Vibration Control, pp47.39-47.40
- [17] Australian Standard 2834-1995 Computer Accommodation, Chapter 2.9 Vibration, p16
- [18] Australian Standard AS/NZS 2107:2000 Acoustics - Recommended design sound levels and reverberation times for building interiors



## APPENDIX A Glossary of terminology

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

Adverse weather	Weather effects that enhance noise (that is, wind and temperature inversions) that occur at a site for a significant period of time (that is, wind occurring more than 30% of the time in any assessment period in any season and/or temperature inversions occurring more than 30% of the nights in winter).
Ambient noise	The all-encompassing noise associated within a given environment at a given time, usually composed of sound from all sources near and far.
Assessment period	The period in a day over which assessments are made.
Assessment point	A point at which noise measurements are taken or estimated. A point at which noise measurements are taken or estimated.
Background noise	Background noise is the term used to describe the underlying level of noise present in the ambient noise, measured in the absence of the noise under investigation, when extraneous noise is removed. It is described as the average of the minimum noise levels measured on a sound level meter and is measured statistically as the A-weighted noise level exceeded for ninety percent of a sample period. This is represented as the L90 noise level (see below).
Decibel [dB]	The units that sound is measured in. The following are examples of the decibel readings of every day sounds: 0dB The faintest sound we can hear 30dB A quiet library or in a quiet location in the country 45dB Typical office space. Ambience in the city at night 60dB CBD mall at lunch time 70dB The sound of a car passing on the street 80dB Loud music played at home 90dB The sound of a truck passing on the street 100dB The sound of a rock band 115dB Limit of sound permitted in industry 120dB Deafening
dB(A)	A-weighted decibels. The A-weighting noise filter simulates the response of the human ear at relatively low levels, where the ear is not as effective in hearing low frequency sounds as it is in hearing high frequency sounds. That is, low frequency sounds of the same dB level are not heard as loud as high frequency sounds. The sound level meter replicates the human response of the ear by using an electronic filter which is called the "A" filter. A sound level measured with this filter switched on is denoted as dB(A). Practically all noise is measured using the A filter.
dB(C)	C-weighted decibels. The C-weighting noise filter simulates the response of the human ear at relatively high levels, where the human ear is nearly equally effective at hearing from mid-low frequency (63Hz) to mid-high frequency (4kHz), but is less effective outside these frequencies.
Frequency	Frequency is synonymous to pitch. Sounds have a pitch which is peculiar to the nature of the sound generator. For example, the sound of a tiny bell has a high pitch and the sound of a bass drum has a low pitch. Frequency or pitch can be measured on a scale in units of Hertz or Hz.
Impulsive noise	Having a high peak of short duration or a sequence of such peaks. A sequence of impulses in rapid succession is termed repetitive impulsive noise.
Intermittent noise	The level suddenly drops to that of the background noise several times during the period of observation. The time during which the noise remains at levels different from that of the ambient is one second or more.
L <sub>Max</sub>	The maximum sound pressure level measured over a given period.

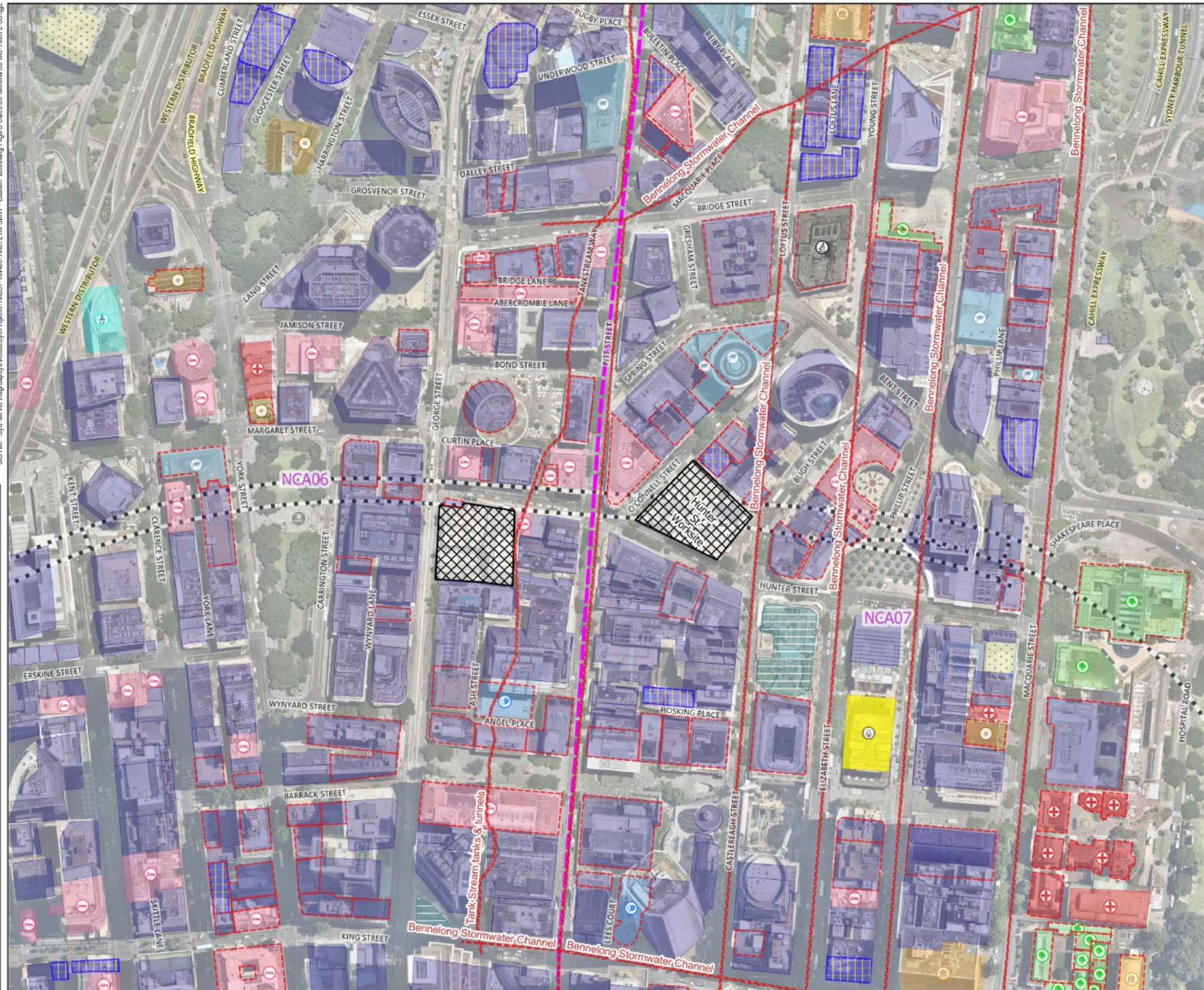
$L_{Min}$	The minimum sound pressure level measured over a given period.
$L_1$	The sound pressure level that is exceeded for 1% of the time for which the given sound is measured.
$L_{10}$	The sound pressure level that is exceeded for 10% of the time for which the given sound is measured.
$L_{90}$	The level of noise exceeded for 90% of the time. The bottom 10% of the sample is the $L_{90}$ noise level expressed in units of dB(A).
$L_{eq}$	The "equivalent noise level" is the summation of noise events and integrated over a selected period of time.
Reflection	Sound wave changed in direction of propagation due to a solid object obscuring its path.
SEL	Sound Exposure Level (SEL) is the constant sound level which, if maintained for a period of 1 second would have the same acoustic energy as the measured noise event. SEL noise measurements are useful as they can be converted to obtain $L_{eq}$ sound levels over any period of time and can be used for predicting noise at various locations.
Sound	A fluctuation of air pressure which is propagated as a wave through air.
Sound absorption	The ability of a material to absorb sound energy through its conversion into thermal energy.
Sound level meter	An instrument consisting of a microphone, amplifier and indicating device, having a declared performance and designed to measure sound pressure levels.
Sound pressure level	The level of noise, usually expressed in decibels, as measured by a standard sound level meter with a microphone.
Sound power level	Ten times the logarithm to the base 10 of the ratio of the sound power of the source to the reference sound power.
Tonal noise	Containing a prominent frequency and characterised by a definite pitch.

## APPENDIX B      Sensitive receivers and noise management levels



**B.1      NCAs and sensitive receiver identification**





## LEGEND

Noise Sensitive Receiver		Childcare
Residential		Educational
Mixed use		Theatre/Auditorium
Commercial		Cinema
Industrial		Laboratory
Hotel/Motel/Hostel		Flight simulator
Medical facility		Animal Enclosure
Place of Worship		Recreational - Passive
Community centre		Recreational - Active
Recording studio		Other
Library/Museum		Heritage
Project NCAs		
Project Worksites		
Tunnel Alignment		

NCA	NML DS	NML DO	NML E	NML N
NCA06	71	66	61	57
NCA07	71	66	61	57

NCA: Noise Catchment Area  
NML: Noise Management Level  
D(S): standard construction hours from 7 am to 6 pm Monday to Friday and from 8 am to 6 pm Saturday  
D(O): out-of-hours day period from 8 am to 6 pm Sunday and Public holidays - OOHWP P1  
E: evening period from 6 pm to 10 pm Monday to Sunday - OOHWP P1  
N: night-time period from 10 pm to 7 am Monday to Friday, from 10 pm to 8 am Saturday, Sunday and Public holidays - OOHWP P2



SYDNEY METRO WEST – EASTERN  
TUNNELLING PACKAGE

Landuse, Worksites and NCAs

r4	SS	19/01/23	Updated Landuse	TG
r3	SS	12/12/22	Labeling specific Heritage	TG
r2	SS	23/11/22	OSR Corrections	TG
r1	SS	16/11/22	Update Landuse	TG
r0	SS	23/06/22	Prepare figures	TG
REV	BY	DATE	DESCRIPTION	APPROVER
A3	Original		Co-ordinate System: MGA Zone 56	

0 50 100 150 200 m

1:3,000 At A3

NOTE: Do not scale from this drawing.

CLIENT

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inspired to achieve

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**B.2      NCAs and noise management levels**

HUNTER STREET STATION

Table B1: Noise Sensitive Receivers and Construction Noise Management Levels (airborne noise)

NCA	Receiver Type	Reference RBL	Existing Noise Levels, dB(A)			Airborne NMLs based on ICNG (external)					Sleep Dist. L <sub>Amax</sub>		Comments			
			RBL Day	RBL Evening	RBL Night	LAeq_D	LAeq_E	LAeq_N	NMLD(S)	NMLD(O)	NMLE	NMLN		NMLMS	L <sub>Aeq</sub> (15min)	L <sub>Af</sub> max
Residential receivers																
NCA06	Predominantly Residential	B.06	61	56	52	66	62	63	71	66	61	57	62	57	67	Nearest worksite
NCA07	Predominantly Residential	B.06	61	56	52	66	62	63	71	66	61	57	62	57	67	Hunter Street
ICNG 'Other sensitive' receivers (NML applicable when in use)																
Classrooms at schools and other educational institutions									55	55	55	55	55	-	-	Source: ICNG, assuming a conservative façade loss of 10 dB(A)
Hospital wards and operating theatres									65	65	65	65	65	-	-	Source: ICNG, assuming a conservative façade loss of 20 dB(A)
Places of worship									55	55	55	55	55	-	-	Source: ICNG, assuming a conservative façade loss of 10 dB(A)
Passive recreation areas (e.g. area used for reading, meditation)									60	60	60	60	60	-	-	Source: ICNG
Active recreation areas (e.g. sports fields)									65	65	65	65	65	-	-	Source: ICNG
Commercial premises (including offices and retail outlets)									70	70	70	70	70	-	-	Source: ICNG
Industrial premises									75	75	75	75	75	-	-	Source: ICNG
Non-ICNG 'Other sensitive' receivers (GBNML applicable when in use)																
Hotel - daytime and evening									70	70	70	70	70	-	-	Source: CNVS Section 2.2.1 & AS2107 'maximum', assuming 20 dB(A) facade loss
Hotel - night-time									60	60	60	60	60	-	-	Source: CNVS Section 2.2.1 & AS2107 'maximum', assuming 20 dB(A) facade loss
Café/ Bar/ Restaurant									60	60	60	60	60	-	-	Source: CNVS Section 2.2.1 & AS2107 'maximum', assuming 10 dB(A) facade loss
Childcare centre (indoor sleeping areas)									55	55	55	55	55	-	-	Source: CNVS Section 2.2.1, assuming a conservative façade loss of 10 dB(A)
Childcare centre (play areas)									65	65	65	65	65	-	-	Source: CNVS Section 2.2.1
Public Building									60	60	60	60	60	-	-	Source: CNVS Section 2.2.1 & AS2107 'maximum', assuming 10 dB(A) facade loss
Studio building (music recording studio)									45	45	45	45	45	-	-	Source: CNVS Section 2.2.1 & AS2107 'maximum', assuming 20 dB(A) facade loss
Studio building (film or television studio)									50	50	50	50	50	-	-	Source: AS2107 'maximum', assuming 20 dB(A) facade loss
Theatre/ Auditorium									50	50	50	50	50	-	-	Source: CNVS Section 2.2.1 & AS2107 'maximum', assuming 20 dB(A) facade loss

Notes: D(S): standard construction hours from 7 am to 6 pm Monday to Friday and from 8 am to 6 pm Saturday  
D(O): out-of-hours day period from 8 am to 6 pm Sunday and Public holidays - OOHW P1  
E: evening period from 6 pm to 10 pm Monday to Sunday - OOHW P1  
N: night-time period from 10 pm to 7 am Monday to Friday, from 10 pm am to 8 am Saturday, Sunday and Public holidays - OOHW P2  
MS: Morning shoulder from 05:00 to 07:00 Monday to Friday, and from 06:00 to 08:00 Saturday, Sunday and Public holidays - OOHW P2



**APPENDIX C**      **Construction airborne noise impacts**

## C.1 Predicted noise levels

NCA	Address	Night NML (dB(A))	Predicted noise level (dB(A))
NCA07	16 O'CONNELL STREET SYDNEY	57	44
OSR_COM	1-15 O'CONNELL STREET SYDNEY	70	43
OSR_COM	12-14 O'CONNELL STREET SYDNEY	70	46
OSR_COM	1 BLIGH STREET SYDNEY	70	36
OSR_COM	6-10 O'CONNELL STREET SYDNEY	70	42
OSR_COM	72 PITT STREET SYDNEY	70	34
OSR_COM	70 PITT STREET SYDNEY	70	43
OSR_COM	9 CASTLEREAGH STREET SYDNEY	70	41
OSR_COM	8-12 CHIFLEY SQUARE SYDNEY	70	35
OSR_COM	1-15 O'CONNELL STREET SYDNEY	70	46
OSR_COM	10-14 SPRING STREET SYDNEY	70	43
OSR_COM	1 FARRER PLACE SYDNEY	70	36
OSR_COM	76-78 PITT STREET SYDNEY	70	39
OSR_COM	33-39 HUNTER STREET SYDNEY	70	53
OSR_COM	1-7 CASTLEREAGH STREET SYDNEY	70	47
OSR_COM	68-96 HUNTER STREET SYDNEY	70	41
OSR_COM	66 HUNTER STREET SYDNEY	70	42
OSR_COM	4-6 BLIGH STREET SYDNEY	70	35
OSR_COM	23-25 O'CONNELL STREET SYDNEY	70	51
OSR_COM	68 PITT STREET SYDNEY	70	56
OSR_COM	2 CHIFLEY SQUARE SYDNEY	70	34
OSR_COM	25 BLIGH STREET SYDNEY	70	44
OSR_COM	19-21 O'CONNELL STREET SYDNEY	70	47
OSR_COM	8 SPRING STREET SYDNEY	70	40
OSR_COM	17 O'CONNELL STREET SYDNEY	70	46
OSR_COM	264-278 GEORGE STREET, SYDNEY, NSW	70	35
OSR_COM	109 PITT STREET, SYDNEY (SYDNEY)	70	42
OSR_COM	101-103 PITT STREET, SYDNEY	70	50
OSR_COM	19-21 HUNTER STREET SYDNEY	70	48
OSR_COM	20 HUNTER STREET, SYDNEY (SYDNEY)	70	51
OSR_COM	275-281 GEORGE STREET, SYDNEY, NSW	70	39
OSR_COM	37 MARGARET STREET, SYDNEY, NSW	70	38
OSR_COM	301 GEORGE STREET, SYDNEY, NSW	70	35
OSR_COM	123 PITT STREET, SYDNEY	70	37
OSR_COM	285-287 GEORGE STREET, SYDNEY, NSW	70	41
OSR_COM	107 PITT STREET, SYDNEY, NSW 2000	70	43
OSR_COM	10 HUNTER STREET, SYDNEY, NSW	70	46
OSR_COM	283 GEORGE STREET, SYDNEY, NSW	70	42
OSR_COM	16 O'CONNELL STREET SYDNEY	70	44

NCA	Address	Night NML (dB(A))	Predicted noise level (dB(A))
OSR_HTL	27 O'CONNELL STREET SYDNEY	60	58
OSR_HTL	30 HUNTER STREET, SYDNEY, NSW 2000	60	48
OSR_HTL	97-99 PITT STREET SYDNEY	60	47
OSR_HTL	2 HUNTER STREET, SYDNEY, NSW	60	44
OSR_OTH	35-39 BRIDGE STREET SYDNEY	65	37
OSR_REC	52-56 MARTIN PLACE SYDNEY	45	36

## C.2 Verification noise monitoring

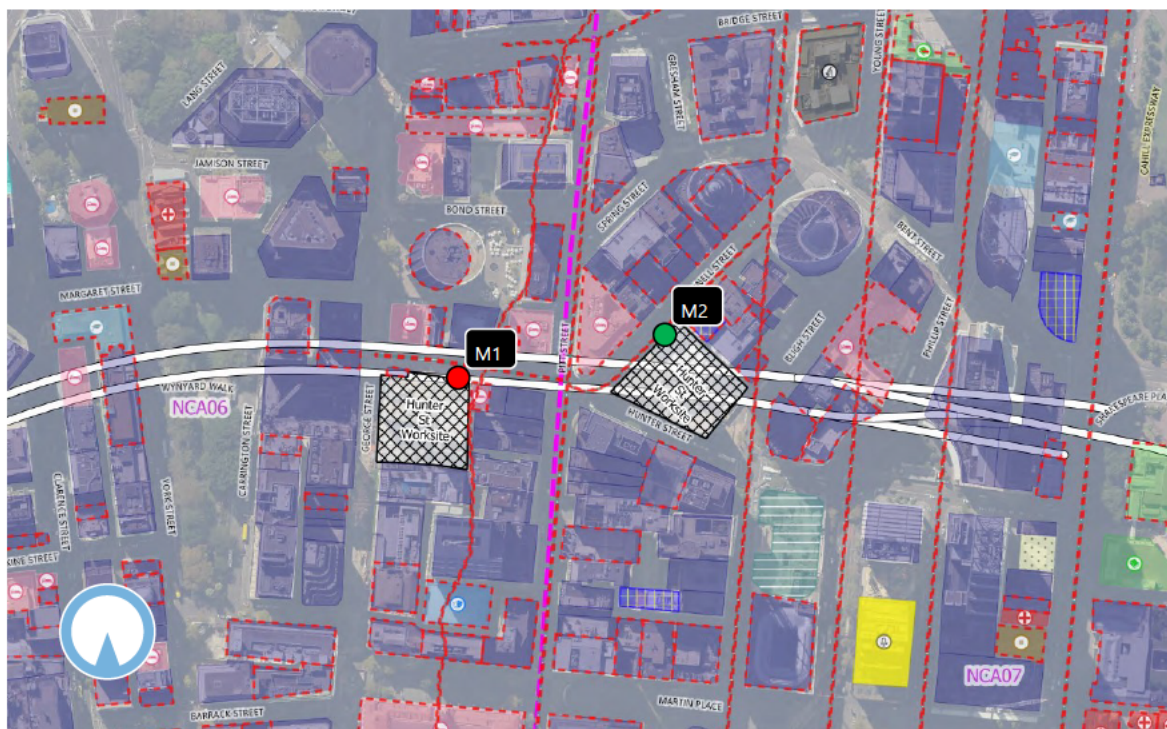
Noise monitoring was undertaken by Renzo Tonin & Associates on Saturday morning (3 February 2024) between 8:00 am and 9:00 am during the loading of demolition materials into spoil trucks at the Hunter Street East and West worksites. The monitoring was undertaken during the most representative available period during standard construction hours, while ambient noise levels surrounding the Hunter Street worksites were relatively low.

Monitoring was undertaken at two locations:

- Location M1 – on Hunter Street, approximately 2 metres from the heavy vehicle access gate to the Hunter Street West worksite;
- Location M2 – on O’Connell Street, approximately 2 metres from the heavy vehicle access gate to the Hunter Street east demolition worksite.

The monitoring locations are depicted in Figure C.1. Observations at the nearest sensitive receivers to the entrance gates (Adina Hotel on Hunter Street, and Radison Hotel on O’Connell Street) found that noise emission from the loading activity on site was barely audible and immeasurable above the ambient noise level.

**Figure C.1: Noise monitoring locations for loading of demolition materials at Hunter Street worksites**





## ACOUSTICS ADVISOR ENDORSEMENT SYDNEY METRO WEST (SSI 19238057)

Review of	<b>Eastern Tunnelling Package:</b> Detailed Noise and Vibration Impact Statement (DNVIS) – Hunter Street Station – addendum for OOH demolition load-out and haulage	Reviewed document reference:	TM372-02-1-03F04 SMW-ETP_ADD_DNVIS-HUN-Demo Hauling (r3)  Revision 3 dated 5 March 2024
Prepared by:	[REDACTED], Acoustics Advisor		
Date of issue:	14 March 2024		

As approved Acoustics Advisor for the Sydney Metro West project, I recently endorsed Revision 2 of the Detailed Noise and Vibration Impact Statement (DNVIS) for Hunter Street Station Works. JCG has now prepared an addendum to the DNVIS which covers the proposed OOH load-out and haulage of demolition materials at both Hunter Street sites (East and West) between 5am and 7am, Monday to Saturday. The activity is proposed as Low Noise Impact Work under Condition 23(b) of the approval.

I reviewed Revision 2 of this addendum and I'm satisfied that Revision 3 has addressed my comments. I note that:

- Specific mitigation measures are detailed in section 3.5 of the addendum.
- JCG confirmed that these mitigation measures been developed in consultation with affected receivers. The nearest affected receivers in this area are hotels.
- The noise predictions show compliance with applicable noise management levels (as required by Condition D23(b)).
- In addition to Condition D23(b), the addendum also notes the requirement of D28 to implement best practice construction methods to minimise noise “where reasonably practicable to ensure that noise levels are minimised around sensitive land user(s).” This is relevant because sleep disturbance impacts at hotels are not specifically assessed under Condition D23(b) but, in my view, should be minimised near sensitive land uses such as hotels.
- Management of behavioural practices, such as avoiding transient noise from impacts, will be important and JCG confirmed that they will implement ongoing supervision of the work as well as the noise monitoring proposed in the addendum.

I endorse this addendum for implementation and understand that the OOH work will be approved under JCG's Environment Protection Licence.

[REDACTED], Metro West Acoustics Advisor