7 April 2025

TM372-02-1-02F19 SMW-ETP_ADD-DNVIS-PYR_Nozzle(r2)

John Holland CPB Contractors Ghella Joint Venture
Level 4, 60 Union Street
Pyrmont NSW 2009

Sydney Metro West Eastern Tunnelling Project - Addendum DNVIS - Pyrmont Station - Nozzle Excavation

1 Introduction

A Detailed Noise and Vibration Impact Statements (DNVISs) have been prepared for the Sydney Metro West – Eastern Tunnelling Package (ETP) **Pyrmont Station** surface worksites (Pyrmont DNVIS) [1] and for Tunnelling (Tunnelling DNVIS) [2]. 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) Sydney Metro Construction Noise and Vibration Standard Version 4.3 (SM-20-00098866) – 4 November 2020 for the construction of the ETP Works.

This Sydney Metro West Eastern Tunnelling Package – Addendum Detailed Noise and Vibration Impact Statement – Pyrmont Station – Nozzle Excavation (Addendum) has been prepared consistent with the DNVISs to assess changes in the delivery of the scope of works assessed in the Pyrmont DNVIS [1] and the Tunnelling DNVIS.

2 Construction works and hours

2.1 Construction works addressed in this Addendum DNVIS

This Addendum assesses changes in noise and vibration impact associated with the nozzle excavation from the Pyrmont East shaft. This will require an additional (fourth) roadheader and (third) dustscrubber to be located at the bottom of the Pyrmont East Shaft. Table 2-1 summarises the proposed changes to works, and where the changes result in a change in the works assessed in the DNVIS requiring reassessment.

Table 2-1: Changes addressed in this DNVIS Addendum

Site	Change	Change to DNVIS?		Comment
		Pyrmont	Tunnel	
Pyrmont West	West Shaft excavation updated to suit gantry cycles and CONO productivities	No	No	Pyrmont DNVIS Table C1 assumptions remain unchanged for Pyrmont West (no additional spoil haulage or deliveries).
Pyrmont East	4th roadheader on site for Nozzle & Adits, supported from West Shaft - 3rd dustscrubber located in East shaft (inside acoustic shed) - Temporary Switchyard on Union Street to support roadheader #4	Yes	No	Pyrmont DNVIS Table C1 assumption updates for Pyrmont East in blue text (see Table C1). Ground-borne noise and vibration impacts assessed in the Tunnelling DNVIS remain unchanged. Roadheaders separated more than 60 metres. No cumulative impact.

To expedite completion of the nozzles at Pyrmont East, a fourth roadheader will be brought onto site, excavating from the east shaft. Spoil from the nozzle excavation will be removed from site via the eastern shaft. A third dustcrubber will be required for the roadheader, and a temporary switchyard will be located on Union Street, adjacent to the East worksite, to support the roadheader. Activities at the Pyrmont West site are unchanged.

Table C.1 in presents the list of plant proposed to be used for these works and their assumed sound power levels. Vibration intensive plants are also identified. The proposed site layout for the works is presented in Figure C-1 in APPENDIX C.

2.1.1 Construction traffic noise

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

2.1.2 Ground-borne noise and vibration

There are no vibration intensive activities required for these works, aside from the excavation and support plant (roadheader and bolting rig) required for tunnelling. Ground-borne noise and vibration impacts from tunnelling, including excavation of the nozzle by roadheader are assessed in the Tunnelling DNVIS (ref: TM372-02-1-04F01 SMW-ETP_DNVIS-TUN (rev05)). No further assessment is required.

2.2 Construction Hours

Construction hours are as reported in the DNVIS Section 2.2. The nozzle excavation works are tunnelling works and are a prescribed activity permitted 24 hours a day under condition D23(d).

2.2.1 Justification for OOHW

Mined tunnelling and associated activities for tunnel nozzles (including tunnel lining) at the Pyrmont East worksite is a prescribed activity permitted 24 hours a day under condition D23(d).

3 Construction noise 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 airborne noise objectives are detailed in the CNVS Section 2. A summary of the objectives as applicable to the Pyrmont Station works is provided in Table 4.1 of the DNVIS. Construction noise objectives specific to these works and sensitive receivers and noise management levels (NMLs) are presented in Table B1. All reasonable and feasible mitigation measures will be implemented to reduce noise impacts from the tunnelling works towards (or below) the NMLs.

4 Construction airborne noise impacts

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

4.1 Predicted noise levels

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 4-2 summarises the number of construction airborne noise affected residential receivers (i.e. receivers where predicted L_{Aeq} noise levels construction works are above the NML). Table 4-3 presents a summary of the number of 'other sensitive receivers' (in use) likely to be noise affected by the nozzle excavation works. For comparison, predicted noise levels for mined tunnelling from the Pyrmont DNVIS are also presented.

Table 4-2 and Table 4-3 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 4.1.

Table 4-1: Key to the predicted construction airborne noise results tables

Assessment	Time of day	Key			
$L_{Aeq(15min)}$	Standard hours[1] 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	$L_{Aeq,15min}$ above 40 dB(A) or RBL plus 5 dB, whichever is the greater (yellow)		L_{Amax} 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 4-2: Number of receiver buildings over the airborne noise management level (all NCAs) – residential receivers

Worksite	Construction activity	Assessment reference[1]	Highly noise affected[2]	Day (standard hours)				Day (outside standard hours)				Evening				Night				Sleep disturbance	
			L_{Aeq}	L_{Aeq}				L_{Aeq}				L_{Aeq}				L_{Aeq}				L_{Aeq}	L_{Amax}
			> 75 dB(A)	1-10 dB(A)	11-20 dB(A)	21-30 dB(A)	> 30 dB(A)	1-2 dB(A)	2- 5 dB(A)	5-10 dB(A)	> 10 dB(A)	1- 2 dB(A)	2- 5 dB(A)	5-10 dB(A)	> 10 dB(A)	1-2 dB(A)	2-5 dB(A)	5-10 dB(A)	> 10 dB(A)	> 40 or RBL+5 dB(A)	> 52 or RBL+15 dB(A)
Site wide (Pyrmont West and Pyrmont East, with shed)	Mined tunnelling and associated activities [as presented in Pyrmont DNVIS]	SW-MTS	0	1	0	0	0	7	2	0	0	4	8	2	0	6	7	1	0	14	5 (18)[3]
	Mined tunnelling and associated activities (inc. Nozzle excavation by 4th roadheader) [assessed in this Addendum]	SW-MTS4	0	1	0	0	0	7	2	0	0	4	9	2	0	6	8	1	0	15	5 (18)[3]

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. For detail, refer to Table C1 in APPENDIX C
2. Highly noise affected applies to residential receivers, as per the ICNG.
3. Up to eighteen (18) residential receivers may be exposed to noise levels above the sleep disturbance screening level, five (5) associated with truck movements at Pyrmont East, the remainder from truck movements at Pyrmont West.

Grey text indicates predicted impacts from DNVIS

Table 4-3: Number of other sensitive receivers over the airborne noise management levels (all NCAs)

Stage	Construction activity	Assessment reference	Commercial[1]				Childcare[1]				Educational[1]				Recreational[1]				Places of worship[1]				Hotel/Motel/ Hostel[1]				Recording Studio[1]			
			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)
Site wide (Pyrmont West and Pyrmont East, with shed)	Mined tunnelling and associated activities [as presented in Pyrmont DNVIS]	SW-MTS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0
	Mined tunnelling and associated activities (inc Nozzle excavation by 4th roadheader) [assessed in this Addendum]		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0

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

1. Impacts only applicable when facility is in use.
2. Recording studios assume facade attenuation 30 dB. For more detail on specific impacts to receivers refer to Appendix D (Table D.1)

Grey text indicates predicted impacts from DNVIS

4.1.1 Standard hours

The predicted noise levels during standard hours indicate there will be a marginal (up to 1 dB) increase in noise from the site. There are no additional noise affected receivers.

4.1.2 Out of hours work

The predicted noise levels outside standard hours indicate there will be a marginal (up to 2dB) increase in noise from the site. There is one additional noise affected receiver (63 EDWARD STREET, PYRMONT) during the evening and night period. The predicted noise level at this receiver is within 1 dB of the NML, which is unlikely to be a noticeable change compared to current operations at the Pyrmont site.

4.1.3 Sleep disturbance

There is no change in the predicted L_{Amax} noise levels from surface activities. As per the Pyrmont DNVIS, up to eighteen (18) residential receivers may be exposed to noise levels above the sleep disturbance screening level, five (5) associated with truck movements at Pyrmont East, the remainder from truck movements at Pyrmont West.

4.2 Mitigation and management measures

4.2.1 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 proposed OOH works, taking into consideration industry best practice methods in accordance with Condition D28 of the Planning Approval.

Table 4-4: Specific mitigation measures

Control measure	Description of the control measure	Feasible/ reasonable test	Adopted?
Limit activities during OOH period as noted in Table C1	OOH works would be limited to the plant and activities nominated in Table C1, to manage noise emission from site.	This measure could be feasibly and reasonably implemented.	Yes
Works will be contained within the acoustic shed and shaft.	Works will be contained within the contained within the acoustic shed and shaft during OOHW, as noted in Table C1.	This measure could be feasibly and reasonably be implemented.	Yes
Acoustic shed roller door openings.	During works, the roller door openings of the acoustic shed will be closed, during OOHW period, except to allow vehicle entry/egress.	This measure could be feasibly and reasonably be implemented.	Yes
Dust scrubber	The dust scrubber will be located at the bottom of the PYR-E shaft, and underneath the office deck (i.e. entirely within the large acoustic shed). The dust scrubber will be fitted with two additional silencers to reduce the overall noise level as noted in Table C4b of APPENDIX C.	This measure could be feasibly and reasonably be implemented.	Yes

Control measure	Description of the control measure	Feasible/ reasonable test	Adopted?
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
Switch off plant not in use.	Any plant not in use for an extended period (e.g. delivery trucks) would be switched off and not left idling on site.	This measure could be feasibly and reasonably be implemented.	Yes
Alternative audible alarms, such as 'quackers' or flashing lights	All plant would be fitted with non-tonal audible alarms as a minimum. Where practicable, flashing lights would be used for the gantry crane to reduce instantaneous noise, provided this does not compromise safety on site.	This measure could be feasibly and reasonably be implemented.	Yes
Toolbox talks	Toolbox Talks will be provided to all personnel involved in the OOH works (as per the DNVIS). Toolbox talks should encourage employees to limit the occurrence of high instantaneous noise sources that may trigger sleep disturbance by following good behavioural practices, including: - No unnecessary shouting or loud stereos/radios on site. - No dropping of materials from height, throwing of metal items and slamming of doors. - No excessive revving of plant and vehicle engines. - Controlled release of compressed air.	This measure could be feasibly and reasonably be implemented.	Yes

4.2.2 Additional noise mitigation measures

The steps to be carried out to determine the additional airborne noise management measures to be implemented are identified in Section 9.4.1 of the DNVIS. Prior to the commencement of works, receivers identified in APPENDIX D.3 will be notified to advise that noise from the works may at times be audible. Additional airborne noise management measures will be implemented as per Table D3 in APPENDIX D.

4.2.3 Consultation with noise affected receivers

The following proposed actions will be completed by the Communications Team prior to the nozzle excavation works. JCG JV will start proactively engaging with stakeholders prior to the activities occurring and in accordance with the CNVS.

Table 4-5: Proposed consultation plan prior to commencement of and during OOHW

Date	Item	Status
March 25	Monthly update	Ongoing
March 25	Install flyers in building foyers	Completed
One week prior	Work notification – nozzle excavation commencement	Completed
One week prior	Weekly email update	Completed
One week prior	Direct email to residents and businesses	Completed
One day prior (and as required)	Text message	Completed
Ongoing	Weekly email updates – work updates	Commenced, ongoing

4.2.4 Attended airborne noise monitoring

Consistent with Section 9.6.1 of the DNVIS, attended noise monitoring is to be undertaken to verify that noise levels resulting from nozzle excavation works are in accordance with (or below) the levels predicted in this report and confirm that all reasonable and reasonable mitigation measures detailed in Section 4.2.1 and Section 9.3 of the DNVIS have been implemented.

Attended noise monitoring will be completed at the nominated receiver locations, subject to gaining access to properties. Where access to properties is denied, monitoring will be undertaken in publicly accessible areas on or near the nominated receivers. The nominated monitoring locations are:

Table 4-6: Nominated verification monitoring locations

Type of monitoring	NCA/ Receiver type	Nominated receiver address
Unattended	PYR-E1 FIXED RTM	69 EDWARD STREET PYRMONT, NSW (balcony)
Unattended	PYR-E2 FIXED RTM	1-5 HARWOOD STREET, PYRMONT, NSW (rooftop balcony)
Attended	NCA05	1-5 HARWOOD STREET, PYRMONT, NSW
Attended	NCA04	63 EDWARD STREET PYRMONT, NSW
Attended	OSR (HOTEL)	104 PYRMONT STREET, PYRMONT, NSW (THE SEBEL HOTEL)

Verification monitoring will be consistent with the DNVIS and the CNVMP (Appendix A), supplemented with the following verification process:

1. Site noise level checks
Noise monitoring would be undertaken on site to confirm plant sound power levels are consistent with (or below) the assumptions in Table C1 in APPENDIX C. Where noise levels are above the levels in Table C1, mitigation and/ or management measures would be implemented to reduce noise levels to meet the levels reported in Table C1. Noise monitoring would be conducted during the daytime to confirm noise levels from plant items are at or below the levels prescribed in Table C1 before commencing use during the OOHW period. If measured noise levels are above the levels reported in Table C1, additional mitigation measures will be implemented to reduce noise levels from the identified source prior to its operation during the OOHW period.

2. Initial and ongoing noise checks at receiver monitoring locations
Noise monitoring would be undertaken and compared to the predicted noise levels and the noise management levels for the evening and night period. Site inspection should be undertaken to confirm that all reasonable and reasonable mitigation measures detailed in Section 4.2.1 above and Section 9.3 of the DNVIS have been implemented.

5 Impact classification

The impact classification from 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** to **moderate**, consistent with the classification in the DNVIS. It is noted that the OOH works will expedite

the completion of tunnelling excavation which will reduce the overall impacts from the excavation works at Pyrmont East.

Whilst predicted noise levels from the OOHW were found to exceed the NMLs at up to fifteen locations, the impacts will be managed through the mitigation and management measures outlined in Section 9 of the Pyrmont DNVIS [1] and Section 4.2 of this Addendum report, including suitable community notification regarding the works and noise monitoring to verify noise levels.

6 Conclusion

In conclusion, works associated the nozzle excavation by fourth roadheader from the Pyrmont East worksite 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 Pyrmont DNVIS, consistent with the conditions of approval for the Project and the EIS.

Construction airborne noise

The predicted airborne noise levels were found to be consistent with the predicted noise levels in the DNVIS, with 1 to 2 dB increase at some receivers. This change in impact is unlikely to be noticeable. Airborne noise impacts will be managed through the mitigation and management measures outlined in Section 9 of the DNVIS and Section 4.2 of this Addendum report, including implementing community notification regarding potential impacts from the works.

Construction ground-borne noise and vibration

There are no vibration significant plant or equipment proposed to be used during the OOH works that have not already been assessed in the Pyrmont DNVIS or the Tunnelling DNVIS. Ground-borne noise and vibration impacts are unchanged from the impacts presented in the Tunnelling DNVIS.

Document control

Date	Revision history	Non-issued revision	Issued revision	Prepared	Instructed	Reviewed / Authorised
28.03.2025	Initial issue	0	1	T. Gowen	-	M. Tabacchi
7.04.2025	Respond to AA/ER/SM comments	-	2	T. Gowen	-	M. Tabacchi

File Path: R:\AssocSydProjects\TM351-TM400\TM372 mt SMW - Eastern Tunnelling Pkge\1 Docs\02 PYRMONT\TM372-02-1-02F19 SMW-ETP_ADD-DNVIS-PYR_Nozzle(r2).docx

Important Disclaimers:

The work presented in this document was carried out in accordance with the Renzo Tonin & Associates Quality Assurance System, which is based on Australian/New Zealand Standard AS/NZS ISO 9001.

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.

This document is prepared for the particular requirements of our Client referred to above in the 'Document details' which are based on a specific brief with limitations as agreed to with the Client. It is not intended for and should not be relied upon by a third party and no responsibility is undertaken to any third party without prior consent provided by Renzo Tonin & Associates. The information herein should not be reproduced, presented, or reviewed except in full. Prior to passing on to a third party, the Client is to fully inform the third party of the specific brief and limitations associated with the commission.

In preparing this report, we have relied upon, and presumed accurate, any information (or confirmation of the absence thereof) provided by the Client and/or from other sources. Except as otherwise stated in the report, we have not attempted to verify the accuracy or completeness of any such information. If the information is subsequently determined to be false, inaccurate, or incomplete then it is possible that our observations and conclusions as expressed in this report may change.

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: 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 2025 Sydney Metro West Eastern Tunnelling Package - Detailed Noise and Vibration Impact Statement – Pyrmont Station – 5 March 2024 (TM372-02-1-02F01 SMW-ETP_DNVIS-PYR (rev06))

[2] Renzo Tonin & Associates 2025 Sydney Metro West Eastern Tunnelling Package - Detailed Noise and Vibration Impact Statement – Tunnelling – 19 October 2023 (TM372-02-1-04F01 SMW-ETP_DNVIS-TUN (rev05))

[3] Sydney Metro Construction Noise and Vibration Standard Version 4.3 (SM-20-00098866) – 4 November 2020

[4] Transport for NSW Construction Noise and Vibration Strategy (ref: ST-157/4.1) April 2019

[5] Sydney Metro West Out-of-hours Work Protocol (in progress)

[6] 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

[7] Sydney Metro 2022 Sydney Metro West – Submissions Report - Major civil construction between The Bays and Sydney CBD

[8] Department of Environment and Climate Change 2009 NSW Interim Construction Noise Guideline (ICNG)

[9] Environment Protection Authority 2017 NSW Noise Policy for Industry (NPfI)

[10] Department of Environment, Climate Change and Water 2011 NSW Road Noise Policy (RNP)

[11] Department of Environment Conservation NSW 2006 Assessing Vibration; a technical guideline

[12] Environment Protection Authority 2000 NSW Industrial Noise Policy (INP)

[13] British Standard BS 6472-2008, Evaluation of human exposure to vibration in buildings (1-80Hz)

[14] Australian Standard AS 2187.2-2006 Explosives - Storage and Use - Use of Explosives

[15] British Standard BS 7385 Part2-1993, Evaluation and measurements for vibration in buildings Part 2

[16] German Standard DIN 4150-3: 2016-12, Structural vibration - Effects of vibration on structures, December 2016

[17] ASHRAE Applications Handbook (SI) 2003, Chapter 47 Sound and Vibration Control, pp47.39-47.40

[18] Australian Standard 2834-1995 Computer Accommodation, Chapter 2.9 Vibration, p16

[19] 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 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_{Max}	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 L90 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 Leq 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

Plot Date: 25/01/24 - 13:49 Layout: TM372 LU Template
Atlas feature: TM372 Large Overall LU atlas
GIS File: R:\Assoc\Syd\Projects\TM351-TM400\TM372 mt SMW - Eastern Tunnelling Pkge\5 Calcs\00 General\00 GIS\TM372-SS.qgz

LEGEND

Noise Sensitive Receiver

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

- Tunnel Alignment
- Project Worksites
- Project NCAs

NCA	NML DS	NML DO	NML E	NML N
NCA04	60	55	52	50
NCA05	62	57	54	51
NCA06	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 - 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

REV	BY	DATE	DESCRIPTION	APPROVED
r2	SS	25/01/24	Landuse Update	TG
r1	SS	18/10/23	Heritage update	TG
r0	DA	03/04/23	Prepare figures	TG

A3 Original | Co-ordinate System: MGA Zone 56

0 50 100 150 m

1:3,000 At A3

FULL SIZE A3, REDUCED TO A4

NOTE: Do not scale from this drawing.

N

CLIENT

SYDNEY METRO WEST

JOHN HOLLAND CPB CONTRACTORS Ghella

ACOUSTIC CONSULTANT

RENZO TONIN & ASSOCIATES

inspired to achieve

Ph (02) 8218 0500 Fax (02) 8218 0501

SYDNEY METRO WEST – EASTERN TUNNELLING PACKAGE
Hunter Street Station Site

Landuse, Worksites and NCAs

B.2 NCAs and noise management levels

Table B1: Noise Sensitive Receivers and Construction Noise Management Levels (airborne noise) — **PYRMONT STATION (NOZZLE EXCAVATION)**

NCA	Receiver Type	Reference RBL	Existing Noise Levels, dB(A) RBL Day	RBL Evening	RBL Night	LAeq_D	LAeq_E	LAeq_N	Airborne NMLs based on ICNG (external) NML(S)	NML(O)	NMLE	NMLN	Sleep Dist. L_{AMAX} NMLMS	$L_{Aeq(15min)}$	L_{AFmax}	Comments
Residential receivers																Nearest worksite
NCA04	Predominantly Residential	B.04	50	47	45	56	50	47	60	55	52	50	53	50	60	Pyrmont
NCA05	Predominantly Residential	B.05	52	49	46	61	59	56	62	57	54	51	54	51	61	Pyrmont
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) façade loss
Hotel - night-time									60	60	60	60	60	-	-	Source: CNVS Section 2.2.1 & AS2107 'maximum', assuming 20 dB(A) façade loss
Café/ Bar/ Restaurant									60	60	60	60	60	-	-	Source: CNVS Section 2.2.1 & AS2107 'maximum', assuming 10 dB(A) façade 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) façade loss
Studio building (music recording studio)									45	45	45	45	45	-	-	Source: CNVS Section 2.2.1 & AS2107 'maximum', assuming 20 dB(A) façade loss
Studio building (film or television studio)									50	50	50	50	50	-	-	Source: AS2107 'maximum', assuming 20 dB(A) façade loss
Theatre/ Auditorium									50	50	50	50	50	-	-	Source: CNVS Section 2.2.1 & AS2107 'maximum', assuming 20 dB(A) façade 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 timetable/ activities/ management

C.1 Construction timetable/activities/equipment

PYRMONT STATION (NOZZLE EXCAVATION) - EAST WORKSITE

Table C1: Construction timetable/ activities/ equipment

Activity/ Work Area	Aspect	Plant/ Equipment (as provided by client)	Day	Evening	Night	Timing of Activity		Sound Power Level (Lw re: 1pW) in Noise Model, dB(A)			High noise plant	Vibration intensive plant	Notes
			7am - 6pm	6pm - 10pm	10pm - 7am	Start Date	Duration	L_{Aeq}	Penalty	L_{Amax}			
Pre-TBM	Cavern excavation & support	Road Header 1,000V Electric	1	1	1	Mar-25	1 month	104	-	108	-	X	Roadheader #4. Located at nozzel, eastern end of PYR-E shaft
Stage 3A:	- Adits/cavern – 3 x roadheader spoil	Bolting rig Robodrill 525	1	1	1			106	-	116	-	X	Located at eastern end of PYR-E shaft.
Mined tunnelling	(see Pymont DNVIS Table C1 SW-MTS)	Shotcrete rig (Normat Spraymec)	1	1	1			104	-	107	-	-	Located at eastern end of PYR-E shaft.
(Cavern, Adits +	assessment ref: SW-MTS)	Dust Scrubber #3 with silencer	1	1	1			106	-	109	-	-	Located at eastern end of PYR-E shaft (under office deck) See Table C4b.
Nozzle Excavation)	- Nozzle excavation	Substation 1500 kVA	1	1	1			70	5	-	-	-	To support RH#4, located in Temporary Switchyard on Union Street
	Assessment ref: **SW-MTS4**												

NOTE: Black text indicates works included in Pyrmont DNVIS. Blue text indicates update from DNVIS, assessed in this Addendum.

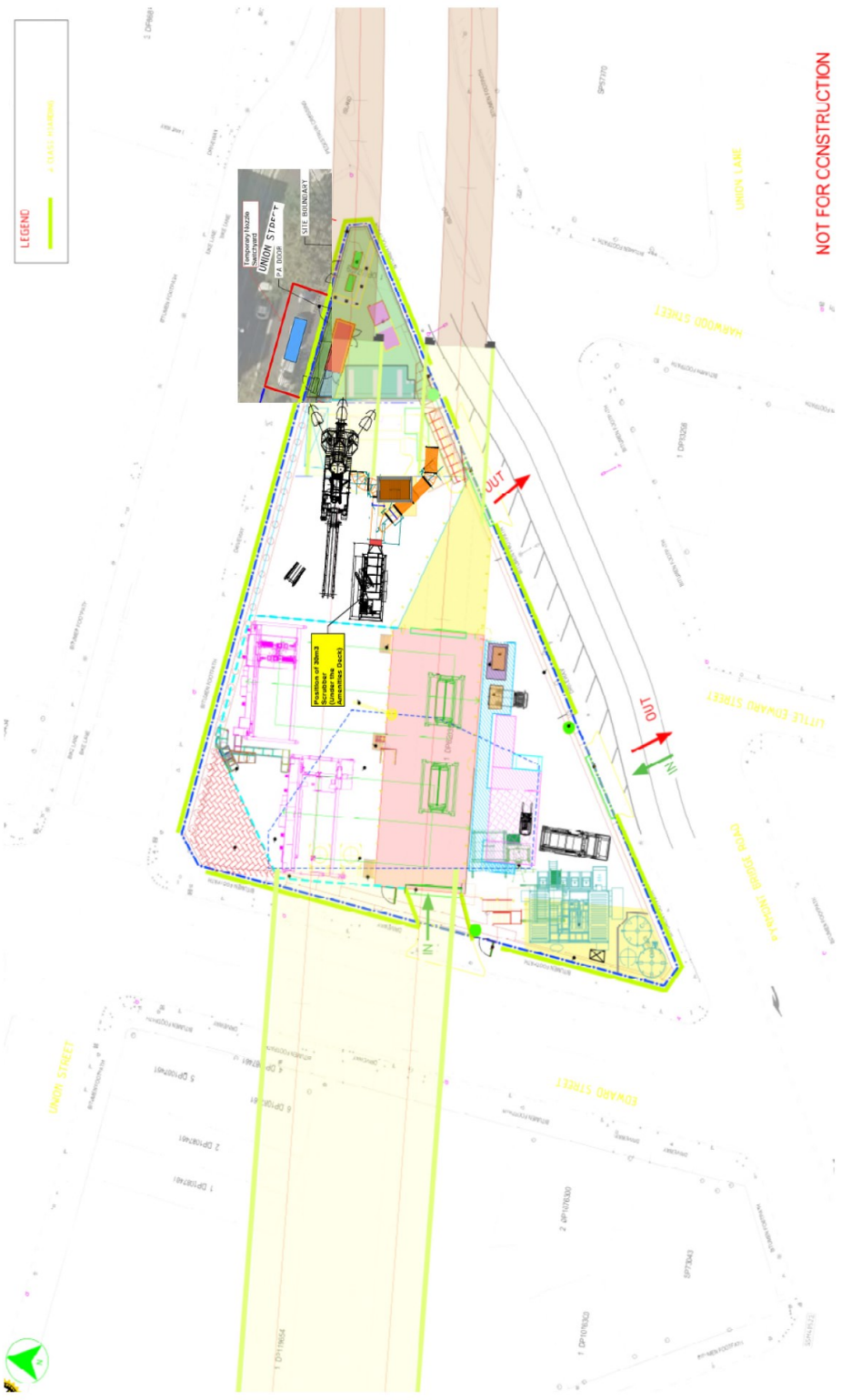


Figure C1: Site Layout and Hoardings (Pre TBM - Nozzle Excavation)

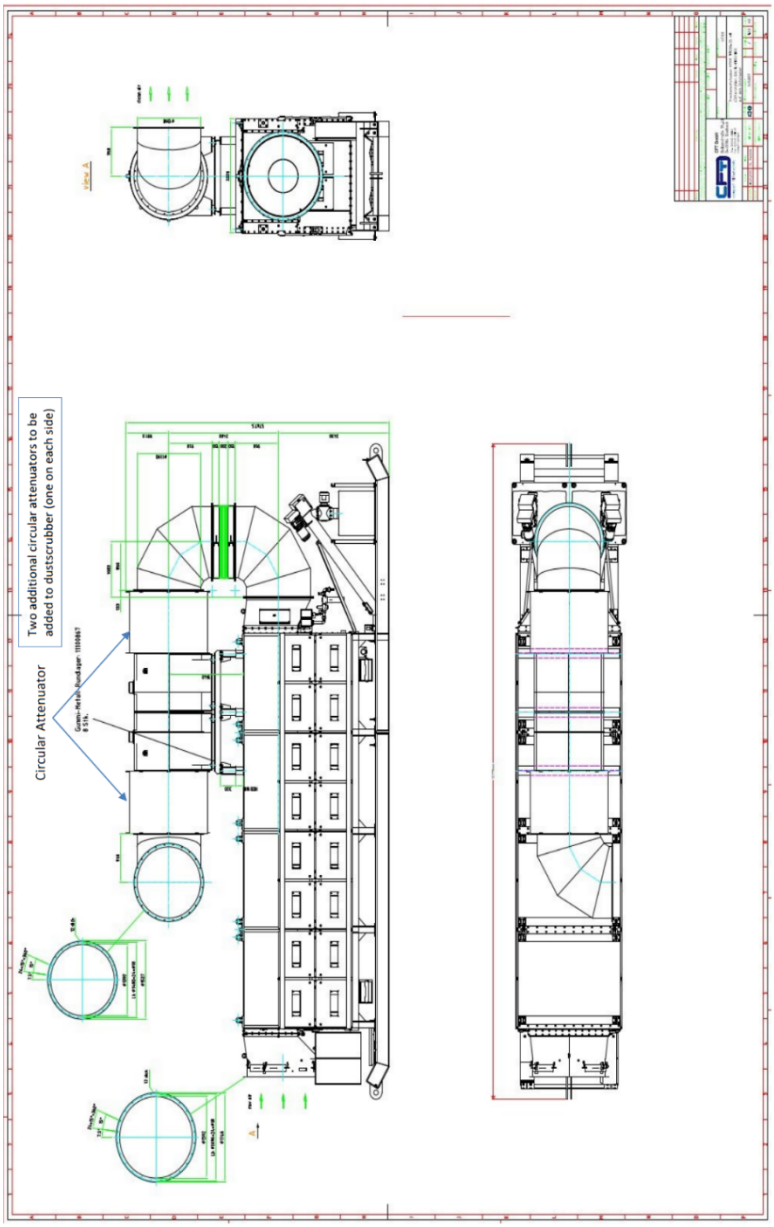
C.2 Construction mitigation and management measures

PYRMONT STATION (NOZZLE EXCAVATION)

Table C4b: Fan & Silencer Design Specifications

Fan location	Model	Fan details			Fan Duty Point			Sound Power Level - Octave Band dB								Overall		Notes
		No. fans	Diameter	Power	Air flow	Total pressure	Fan speed	63	125	250	500	1000	2000	4000	8000	dB	dB(A)	
FANS		-	mm	kW	m^3/s	Pa	rpm											
Dust Scrubber #4 (Pyrmont East Nozzle)	GRYDALE JMS-30-MDT - 30m3 /s @ 3kPa	1	870	130	25.7	-0	2800	118	115	116	110	103	100	98	92	122	112	GRYDALE JMS-30-MDT - 30m3 /s @ 3kPa (reference number MA870 A-1 Bare Shaft) attached to Mobile, Diesel, Track Dust Collector. Fans located on at bottom of PYR-E shaft, east side near nozzles.

Fan	Model	Attenuator details			Duct/ plenum details		Insertion Loss - Octave Band dB								Overall loss		Notes
		Length	Width	Open	Area	Length	63	125	250	500	1000	2000	4000	8000	dB	dB(A)	
		mm	mm		m^2	m											
CIRCULAR ATTENUATORS																	
Dust Scrubber #4 (Pyrmont East Nozzle)	Fanquip Circular Silencer (Dimensions: 810mm I/D x 962mm O/D x 810mm Face to Face; Outer Body 1mm thick)(or equiv.)	810	810	-	1.0	-	3	4	9	15	14	9	8	7	9		Located on either side of dustscrubber fan (i.e. 2 x attenuators in total)



APPENDIX D Construction airborne noise impacts

D.1 Predicted noise levels

The detailed predicted levels have been provided to JCG in a spreadsheet table to more adequately mitigate and manage potential noise impacts.

D.2 Number of receivers above NMLs

The number of exceedances has been provided to JCG in a spreadsheet table.

D.3 Additional management measures

The additional management measures have been provided to JCG in a spreadsheet table to more adequately mitigate and manage potential noise impacts.

ACOUSTICS ADVISOR ENDORSEMENT

SYDNEY METRO WEST (SSI 19238057)

Review of	**Eastern Tunnelling Package:** Detailed Noise and Vibration Impact Statement (DNVIS) – Pyrmont Station – addendum for nozzle excavation	**Reviewed document reference:**	TM372-02-1-02F19 SMW-ETP_ADD-DNVIS-PYR_Nozzle(r2) Rev 2 dated 7 April 2025
Prepared by:	Dave Anderson, Acoustics Advisor		
Date of issue:	10 April 2025		

As approved Acoustics Advisor for the Sydney Metro West project, I endorsed Revision 6 of the Detailed Noise and Vibration Impact Statement (DNVIS) for Pyrmont Station Works in February 2025. JCG has prepared this addendum to the DNVIS which covers the nozzle excavation at the Pyrmont East site.

I reviewed and commented on Revision 1 of this addendum, and I'm satisfied that Revision 2 has addressed my comments. I note that the additional dust scrubber unit required for this work will be located entirely within the acoustic shed (including the treated air discharge, which can be a significant source of noise).

I also note that the addendum commits to verification monitoring during daytime to confirm noise levels from plant items are at or below the levels prescribed in Table C1 before commencing use during OOH evening periods. The same principle applies to verifying plant noise levels during day and evening periods, before commencing use during night time periods.

I endorse this addendum for implementation.

DCAnderson

Dave Anderson, Metro West Acoustics Advisor