10 June 2025
TM372-02-1-02F20 SMW-ETP_ADD-DNVIS-PYR_TBM Support(r6)

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Sydney Metro West Eastern Tunnelling Project - Addendum DNVIS - Pyrmont Station - TBM Support from Pyrmont East

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 – TBM Support from Pyrmont East (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 commencement of the TBM support activities, including segment deliveries, from Pyrmont East. This has resulted in some changes to construction activity at Pyrmont East associated with tunnelling and tunnelling support.

Table 2-1 summarises the proposed changes to works, and where the changes result in a change in the works assessed in the Pyrmont DNVIS and/ or the Tunnelling DNVIS requiring reassessment.

Table 2-1: Changes to construction works addressed in this DNVIS Addendum

Site	Change to construction works	Change to DNVIS?		Comment
		Pyrmont	Tunnelling	
Pyrmont West	No change to activities at Pyrmont West.	No	No	Pyrmont DNVIS Table C1 assumptions remain unchanged. No change to Tunnelling DNVIS.
Pyrmont East	Construction methodology revised so that TBM is partly support from Pyrmont East, including: - Segments delivered to Pyrmont East acoustic shed - Deliveries of other tunnelling materials to Pyrmont East Upper deck - Opening in Upper Deck to allow other tunnelling materials to be lifted into shaft (7am to 10pm only)	Yes	No	Ventilation as per Pyrmont DNVIS Pyrmont DNVIS Table C1 assumption updates for Pyrmont East in blue text (see Table C1). Changes to construction works do not affect the ground-borne noise and vibration impacts from TBM tunnelling assessed in the Tunnelling DNVIS. No change to Tunnelling DNVIS.

Due to Project handover requirements at The Bays, the delivery of segments to the TBM will be relocated from The Bays to Pyrmont East. Segments will be delivered to the Pyrmont East shed by truck from the precast facility during the standard hours and from The Bays outside standard hours. Other tunnelling materials will be delivered to the upper deck, then moved into the Pyrmont East shaft via an opening in the deck. The opening will be covered between 10:00 pm and 7:00 am.

Table C.1 in APPENDIX C presents the list of plant proposed to be used for these works and their assumed sound power levels. There are no vibration intensive plant identified in Table C.1. The proposed site layout for each set of works is presented in Figure C-1 and Figure C-2 in APPENDIX C.

2.1.1 Construction traffic noise

Based on the proposed activities summarised in Table 2-1 and detailed in Table C.1 in APPENDIX C, the construction traffic is consistent with construction traffic generated in the Pyrmont DNVIS. In Table C1 in APPENDIX C of the Pyrmont DNVIS during scenario "SW-MTS Mined tunnelling and associated activities" the number of heavy vehicle movements per day are assumed to be 10-19 per hour during the day/ evening (7am to 10pm) and 6 per hour at night (10pm to 7am) under the EPL trial. From Table C1 of this report, during scenario "SW-MTS-TBM Post-TBM TBM Support from PYR-E - Tunnel Lining (segments)" the number of heavy vehicle movements per day are assumed to be 6 per hour during the day/ evening (7am to 10pm) and 2 per hour at night (10pm to 7am).

The traffic generated by construction assessed in the Addendum report is less than the traffic generated by construction assessed in the Pyrmont DNVIS.

No further assessment is required.

2.1.2 Ground-borne noise and vibration

There are no vibration intensive activities required for these works. Ground-borne noise and vibration impacts from TBM tunnelling are assessed in the Tunnelling DNVIS (ref: TM372-02-1-04F01 SMW-ETP_DNVIS-TUN (rev06)). No further assessment is required.

2.2 Construction Hours

Construction hours are as reported in the DNVIS Section 2.2. TBM Support activities from Pyrmont East are the delivery of materials to directly support tunnelling activities and are a prescribed activity permitted 24 hours a day under condition D23(d)(ii).

2.2.1 Justification for OOHW

TBM Support activities at the Pyrmont eastern shaft involve the delivery of materials to directly support tunnelling activities and are a prescribed activity permitted 24 hours a day under condition D23(d)(ii).

An EPL variation has previously been approved to permit tunnel deliveries past 10pm. This will be varied to include the TBM segments delivery to directly support tunnelling activities 24/7, as sleep disturbance has been identified for these works.

There will be no sleep disturbance associated with TBM consumables deliveries, as the works will stop between 10pm and 7am..

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 TBM support 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 4-1: 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 and Table 4-3 presents a summary of the number of residential receivers and 'other sensitive receivers' (in use) likely to be noise affected by the additional activity associated with the revised 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 4-1. Predicted noise levels are presented in APPENDIX D.

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, 3]	Day (standard hours)[2]				Day (outside standard hours)[2]				Evening[2]				Night[2]				Sleep disturbance[3]	
			L_{Aeq}	L_{Aeq}				L_{Aeq}				L_{Aeq}				L_{Aeq}				L_{Aeq}	L_{Amax}
			> 75 dB(A)	1-2 dB(A)	3-10 dB(A)	11-20 dB(A)	> 20 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	SW-MTS	0	1	0	0	0	7	2	0	0	4	8	2	0	6	7	1	0	14	5 (18)[3]
	Mined tunnel lining, inc. concrete delivery	SW-MTL	0	0	0	0	0	0	0	0	0	3	1	0	0	8	4	0	0	12	5 (18)[3]
	Post TBM: TBM Support PYR-E	SW-MTS-TBM		1				5	3	1		4	8	4		5	9	1		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. Number in brackets (X) for sleep disturbance total properties (from PYR-E and PYR-W activity at night) potentially exposed to L_{max} noise levels above sleep disturbance screening level. Number outside brackets is from PYR-E only.

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[1,2]				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	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 tunnel lining, inc. concrete delivery	SW-MTL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
	Post TBM: TBM Support PYR-E	SW-MTS-TBM	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. Recording studios assume facade attenuation 30 dB. For more detail on specific impacts to receivers refer to Appendix D (Table D.1)
2. Impacts only applicable when facility is in use.

Grey text indicates predicted impacts from DNVIS

4.1.1 Standard hours

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

Reasonable and feasible physical noise mitigation measures in addition to the measures identified in the Pyrmont DNVIS (refer to Section 4.2) are being implemented to reduce noise towards the NML. The identified noise affected receivers above are expected to be within 5 dB or below NML, with physical mitigation measures in place.

4.1.2 Out of hours work

The predicted noise levels for the TBM Support from Pyrmont East outside standard hours indicate there will be a marginal (up to 1 dB) increase in noise from the Pyrmont East site during the evening, mostly from tunnel material deliveries to the upper deck. This activity ceases at 10 pm, so there is minimal change to the predicted impacts after 10 pm. From Table C1 in APPENDIX C, after 10 pm there will be fewer heavy vehicle deliveries to the shed, compared with deliveries and spoil handling considered for mined tunnelling support (i.e. 2 per hour, compared to 2 to 6 per hour under the EPL trial). Predicted impacts are similar to the predicted impacts in the Pyrmont DNVIS, however the likely number of events that potentially exceed the sleep disturbance screening level after 10 pm is significantly less.

There are no additional noise affected receivers.

Physical noise mitigation measures in addition to the measures identified in the Pyrmont DNVIS (refer to Section 4.2) are being implemented to reduce noise towards the NML. The identified noise affected receivers above are expected to be within 10 dB or below NML, with physical mitigation measures in place.

4.1.3 Sleep disturbance

There is no change in the predicted L_{Amax} noise levels from the TBM Support activities from Pyrmont East. 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 2.1	OOH works would be limited to the plant and activities nominated in Table C.1, 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.	TBM support works will mostly be 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 rapid roller door openings.	During works, the rapid 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
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
Opening in upper deck closed at night	Opening in upper deck for tunnelling deliveries is to be closed between 10pm and 7am by covering with an acoustic cover to limit noise emission from works within the acoustic shed and at the bottom of the shaft.	This measure could be feasibly and reasonably be implemented.	Yes
Deliveries to upper deck limited at night	No tunnel materials deliveries to upper deck between 10pm and 7am.	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
Traffic control to manage traffic on Edward Street	Use traffic control to manage traffic on Edward Street so that delivery trucks can directly access the Pyrmont East shed from Edward Street and egress onto Pyrmont Bridge Road without coming to a stop.	This measure could be feasibly and reasonably be implemented.	Yes
Traffic control to manage traffic on Pyrmont Bridge Road	Use traffic control to manage traffic on Pyrmont Bridge Road so that delivery trucks can directly exit from the Pyrmont East onto Pyrmont Bridge Road without coming to a stop.	This measure could be feasibly and reasonably be implemented.	Yes
Alternative audible alarms, such as 'quackers'	All plant would be fitted with non-tonal audible alarms as a minimum.	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), specifically targeted to manage the noise impacts from tunnelling support deliveries. 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 unnecessary revving of plant and vehicle engines. - No unnecessary use of compression engine braking unless required for safety	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 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 D.3.

4.2.3 Consultation with noise affected receivers

The following proposed actions will be completed by the Communications Team prior to the TBM support activities from Pyrmont East. 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
April 25	Monthly update	Ongoing
April 25	Install flyers in building foyers	Completed
One week prior	Work notification	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 the TBM support activities from Pyrmont East 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

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 feasible 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 predicted noise levels summarised in Section 4.1 indicate there is minimal change in noise impact. There is no change in ground-borne noise, vibration or traffic noise impact as a result of the works. Impacted receivers are consistent with those identified as construction noise impacted in the DNVIS. The duration of the TBM support works, 4 months from July 2025 (as noted in Table C1 in APPENDIX C of this Addendum) is within the duration of Mined tunnelling and associated activities (Caverns) – Cavern excavation and support (SW-MTS) assessed in the DNVIS, 19 months from July 2024 (as noted in Table C1-2 in APPENDIX C of the DNVIS).

Impact classification should also consider potential construction fatigue in relation to receivers impacted by the works assessed in this Addendum, compared with the DNVIS. As there is no significant change to the overall duration and extent of impact from mined tunnelling support activities assessed in the DNVIS, the new TBM support activities are unlikely to increase construction fatigue.

The impact classification for these works is **low** to **moderate**, consistent with the classification in the DNVIS.

Whilst predicted noise levels from the OOHW were found to exceed the NMLs at ten locations, the 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 suitable community notification regarding the works and noise monitoring to verify noise levels.

6 Conclusion

In conclusion, works associated with the commencement of the TBM support activities, including segment deliveries, from Pyrmont East 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 during TBM support activities were found to be consistent with the predicted noise levels in the DNVIS, with 1 dB increase at some receivers during the day (standard hours) and evening, mostly from tunnel material deliveries to the upper deck. This change in impact is unlikely to be noticeable.

Deliveries to Pyrmont East after 10 pm are anticipated to be less than what was assessed in the Pyrmont DNVIS (i.e. 2 per hour, compared to 2 to 6 per hour under the EPL trial assessed in the Pyrmont DNVIS). Predicted impacts are similar to the predicted impacts in the Pyrmont DNVIS, however the likely number of events that potentially exceed the sleep disturbance screening level after 10 pm is significantly less.

There are no other additional noise affected receivers.

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. 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
11.04.2025	Initial issue	0,1	2	T. Gowen	-	M. Tabacchi
19.05.2025	Updated following SM/AA/ER review	3 (redacted)	4	T. Gowen	-	M. Tabacchi
30.05.2025	Updated to address SM/AA comments	-	5	T. Gowen	-	M. Tabacchi
10.06.2025	Minor edits to address AA comments	-	6	T. Gowen	-	M. Tabacchi

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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.

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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:\AssocSyd\Projects\TM351-TNM400\TM372 mt SMW - Eastern Tunnelling Page 5 Calcs t00 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.

CLIENT
SYDNEY METRO WEST
JOHN HOLLAND CPB Ghella

ACOUSTIC CONSULTANT
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SYDNEY METRO WEST – EASTERN TUNNELLING PACKAGE
Hunter Street Station Site

Landuse, Worksites and NCAs

B.2 NCAs and noise management levels

PYRMONT STATION

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

NCA	Receiver Type	Reference	Existing Noise Levels, dB(A)						Airborne NMLs based on ICNG (external)				Sleep Dist. L_{Amax}		Comments
		RBL	RBL Day	RBL Evening	RBL Night	LAeq_D	LAeq_E	LAeq_N	NML(S)	NML(O)	NMLE	NMLN	NMLMS	$L_{Aeq(15min)}$	L_{AFmax}	
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) 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 timetable/ activities/ management

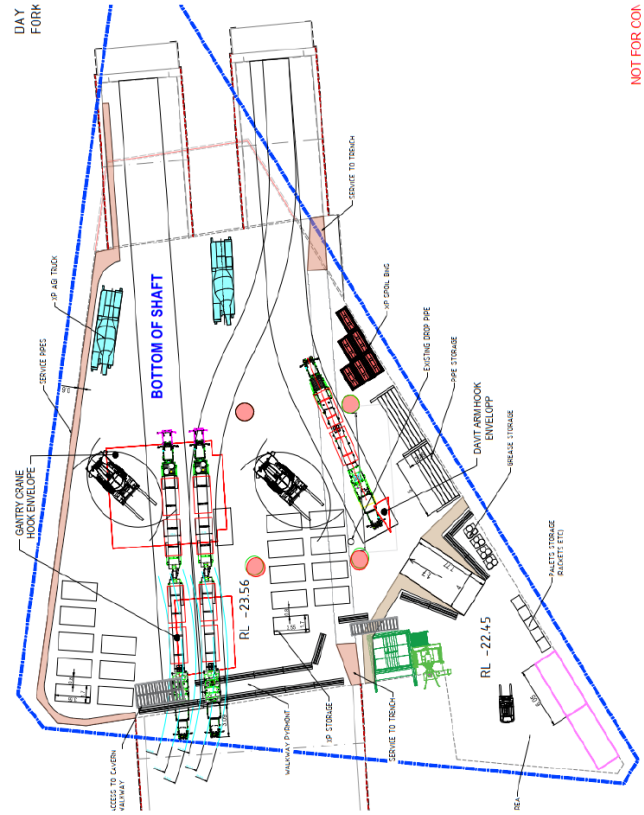
C.1 Construction timetable/activities/equipment

Table C1: Construction timetable/ activities/ equipment

PYRMONT STATION (TBM SUPPORT FROM PYRMONT EAST

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}			
Post-TBM TBM Support from PYR-E	Tunnel Lining (segments)	Delivery truck	4 p.h.	4 p.h.	2 p.h.	Jul-25	4 months	100	-	109	-	-	Semi-trailers delivering segments to PYR-E Shed (No additional trucks to DNVIS)
	INSIDE SHED/ SHAFT	Gantry Crane	2	2	2			106	-	110	-	-	Located in PYR-E shed (no change to DNVIS)
	Assessment ref: **SW-MTS-TBM**	Forklift (Diesel) 16t	1	1	1			99	-	103	-	-	Located at bottom of PYR-E shaft for east shaft logistics
	[Site wide (East & West sites, with shed) tunnelling and associated activities of rockbolting, shotcreting and mucking out; spoil haulage; delivery of material to directly	EWP (Diesel)	2	2	2			96	-	99	-	-	Underground in tunnels (tunnel maintenance on day shift and night shift)
		Tunnel buggy	2	2	2			100	-	105	-	-	Running in the PYR-E Shaft and TBM tunnels 24/7
		Crane 40t Franna	1	1	1			100	-	104	-	-	Located within Cavern and PYR-E Shaft
		Crane 40t (electric, slewing)	1	1	1			104	-	111	-	-	Located within PYR-E Shaft during TBM launch
		Truck Movement (MSVs)	2 p.h.	2 p.h.	2 p.h.			102	-	109	-	-	Located within PYR-E Shaft and TBM tunnels
		MSV/Truck Horn		minimise	minimise			-	-	120	-	-	Broadband horn - e.g. BBS-tek. Within PYR-E shaft
	Other tunnelling materials/ consumables [Outside shed. Deliveries via opening in upper deck to be covered 10 PM - 7AM.]	Delivery truck (medium rigid)	2 p.h.	2 p.h.	-			100	-	109	-	-	Deliver to upper deck. No deliveries between 10pm and 7am.
		Crane 2.5t (Electric, Davit Arm)	1	1	-			90	-	111	-	-	Located adjacent to opening in upper deck. Used to unload trucks/ load material into shaft via opening
		Forklift 2t	1	1	-			90	-	96	-	-	Located on upper deck to unload trucks

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



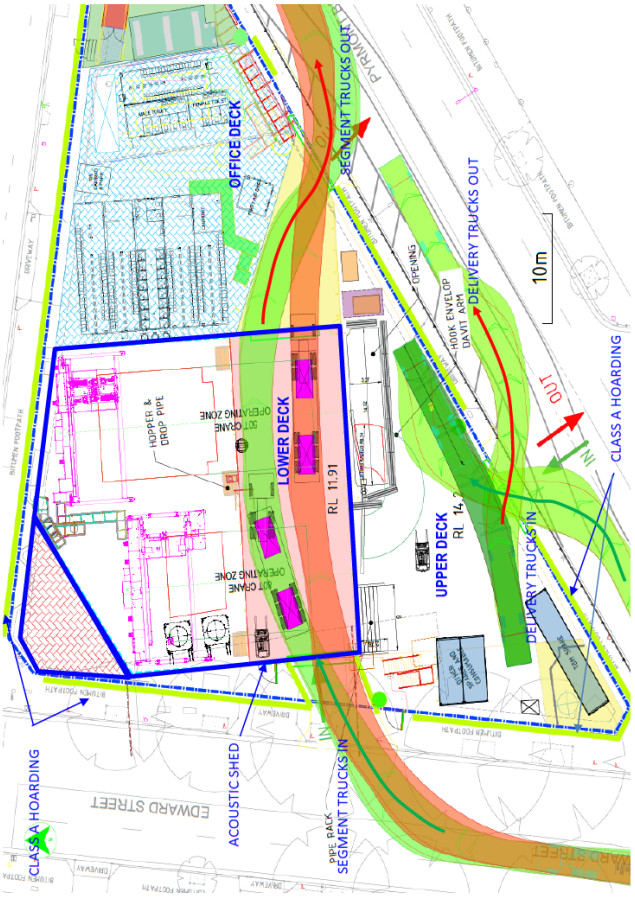


Figure C-1: Site Layout and Hoardings (Post TBM - TBM support from PYR-E)

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) addendum – Pyrmont Station – TBM Support from Pyrmont East	**Reviewed document reference:**	TM372-02-1-02F20 SMW-ETP ADD DNVIS PYR_TBM Support (r6) Rev 6 Dated 10 June 2025
Prepared by:	[redacted], Alternate Acoustics Advisor		
Date of issue:	13 June 2025		

As approved Alternate Acoustics Advisor for the Sydney Metro West project, I reviewed and commented on previous revisions of this DNVIS Addendum.

JCG has prepared this addendum to assess changes in the delivery of the scope of works assessed in the Pyrmont DNVIS and the Tunnelling DNVIS:

- Pyrmont West: No change to activities at Pyrmont West.
- Pyrmont East: Construction methodology revised so that TBM is partly support from Pyrmont East, including:
    - Segments delivered to Pyrmont East acoustic shed
    - Deliveries of other tunnelling materials to Pyrmont East Upper deck
    - Opening in Upper Deck to allow other tunnelling materials to be lifted into shaft (7am to 10pm only)

I'm satisfied that my comments have been adequately addressed in Revision 6, and I endorse this Addendum.

[redacted]

[redacted], Metro West Alternate Acoustics Advisor