Metro Body of Knowledge

Planning Approval Consistency Assessment Form

SM-17-00000111

Sydney Metro – Metro Body of Knowledge (MBoK)

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1. Existing Approved Project

Planning approval reference details (Application/Document No. (including modifications)):			
SSI-192380057: Sydney Metro West – Major civil construction between The Bays to Sydney CBD (Stage 2 of the planning approval process for Sydney Metro West)			
Date of determination:	Stage 2 – 24 August 2022	Type of planning approval:	Stage 2 – Critical State Significant Infrastructure (CSSI) (Division 5.2)

Relevant background information (including EA, REF, Submissions Report, Director General's Report, MCoA):

Sydney Metro West is a staged infrastructure application under Section 5.20 of the *Environmental Planning and Assessment Act 1979* (EP&A Act). This Consistency Assessment (JCG12) is relevant to the major civil construction between The Bays and Sydney CBD (Stage 2 of the planning approval process for Sydney Metro West – the Approved Project) which includes the following planning approval documentation:

- Sydney Metro West Environmental Impact Statement – Major civil construction between The Bays and Sydney CBD (Sydney Metro, November 2021) (referred to throughout this document as 'the EIS')
- Sydney Metro West Stage 2 Submissions Report – Major civil construction work between The Bays and Sydney CBD (Sydney Metro, April 2022) (referred to throughout this document as 'the RtS')
- Sydney Metro West Stage 2 – Assessment Report (SSI 19238057) (24 August 2022)
- Administrative Modification (SSI 19238057- MOD 1) determined on 19 April 2023
- Administrative Modification (SSI 19238057 – MOD 2) determined on 9 October 2023
- Administrative Modification (SSI 19238057 – MOD 3) determined on 6 November 2024.

All proposed works identified in this Consistency Assessment (CA) would be carried out in accordance with the mitigation measures identified in the approval documentation and the Conditions of Approval (CoA) for the Approved Project.

Description of existing approved project you are assessing for consistency:

Sydney Metro West (the Concept)

Sydney Metro West (the Concept) involve the construction and operation of a metro rail line around 24 kilometres long between Westmead and Hunter Street in the Sydney central business district (CBD). As described in Chapter 6 of the EIS, the Concept key components include:

- Construction and operation of new passenger rail infrastructure between Westmead and the CBD of Sydney, including:
    - Tunnels, stations (including surrounding areas) and associated rail facilities
    - Stabling and maintenance facilities (including associated underground and overground connections to tunnels)
- Modification of existing rail infrastructure (including stations and surrounding areas)

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- Ancillary development.

Sydney Metro West – all major civil construction work between Westmead and The Bays (Stage 1)

Sydney Metro West – Concept and Stage 1 (major civil construction between Westmead and The Bays), including station excavation and tunnelling, was determined on 11 March 2021.

It is noted that this CA does not relate to any aspects of Stage 1.

Sydney Metro West – all major civil construction work and tunnelling between The Bays and Sydney CBD (Stage 2 – the Approved Project)

The major civil construction work between The Bays and Sydney CBD was determined on 24 August 2022. The Approved Project scope of works is described in Chapter 5 of the EIS and includes:

- Enabling works such as demolition, utility supply to construction sites, utility adjustments, and modifications to the existing transport network
- Tunnel excavation including tunnel support activities
- Station excavation for new metro stations at Pyrmont and at Hunter Street, in the Sydney CBD.

Tunnel alignment for the Approved Project

The total tunnel length between The Bays and Sydney CBD is about 3.5 Kilometres, of which approximately 2.3 Kilometres would be excavated by tunnel boring machines (TBM's). The tunnels would be lined with precast concrete segments (TBM segments) to ensure long term life of the asset and minimise groundwater inflow into the tunnel.

In accordance with Section 5.4 of the EIS, five construction sites are required for the Approved Project activities, including:

- The Bays tunnel launch and support site
- Pyrmont Station western construction site
- Pyrmont Station eastern construction site
- Hunter Street Station (Sydney CBD) western construction site
- Hunter Street Station (Sydney CBD) eastern construction site.

Tunnel segments and lining

Tunnels would be lined with precast concrete segments which are erected by the tunnel boring machines as it moves forward. Underground vehicles may be required within the tunnels to transport materials, concrete lining segments and the workforce to the cutting face. The precast concrete segments would be manufactured at the approved dedicated precast facility at the Sydney Metro West Eastern Creek Precast Facilities site with storage of precast concrete segments at The Bays tunnel launch and support site. Tunnelling launch and supporting activities would occur from The Bays tunnel launch and support site .

The TBM support services would include high voltage power supply, spoil storage and removal, fresh air ventilation, grout batching plant, water supply, water treatment and disposal, material storage as well as office facilities, worker amenities and parking, and storage and installation of precast concrete lining elements.

Tunnels would be lined with precast concrete segments which are erected by the tunnel boring machines as it moves forward.

Pyrmont (PYR) Station Eastern construction site

Excavation of Pyrmont Station would be coordinated with the arrival of the TBM from The Bays, which would transit through the stations before continuing towards Hunter Street Station (Sydney CBD).

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2. Description of proposed change which is the subject of this assessment

The original construction program considered that the excavation of the Pyrmont Cavern would be complete, prior to the TBMs traversing through the cavern. It assumed that TBM segments and consumables would be delivered via the tunnels, from The Bays construction site to the TBMs. However, as the TBMs are likely to arrive at Pyrmont before the excavation of the cavern is complete, there is an opportunity to traverse the TBMs through the cavern to continue tunnelling toward Hunter Street, whilst the invert section of the cavern can be excavated and lined. This change requires the TBM segments and consumables to be delivered by the aboveground road network to the shaft (where they will then be delivered via the tunnel to the TBM), as opposed to being delivered through the tunnels from The Bays. Therefore, the purpose of this Consistency Assessment (CA) is to assess the following proposed change to the Approved Project:

- Delivery of TBM precast segments, via the road network, from The Bays storage facility to Pyrmont East site. The segments will be unloaded within the acoustic shed; lifted into the shaft and transported by Multi Service Vehicle (MSV) to enable the tunnel lining to be constructed as the TBM progresses towards Hunter Street.
- Delivery of TBM consumables, via the road network, to enable tunnelling from Pyrmont to Hunter Street. Consumables (pipe work, grease, oil etc) are required to connect critical services (water, slurry, grout) between The Bays and the operating TBMs. The deliveries would be to the Pyrmont East site upper deck where the consumables would be lifted into the shaft via an electric (davit) crane. Within the shaft, the consumables would be transported within the tunnels.

The proposed change will remove interface with multiple work crews in the Pyrmont caverns and tunnels between Pyrmont and The Bays. This will enable the remaining Pyrmont construction activities (e.g. excavation of the cavern invert, installation of lining etc) to be completed whilst TBM works continue towards Hunter Street.

The proposed change would not result in additional activities associated with the Approved Project as a whole. However, due to the constrained nature of the site, minor changes (e.g. moving/reconfiguring of storage containers etc) to the Pyrmont East construction site layout would be required to facilitate deliveries and unloading of consumables to the upper deck area to a temporary storage area. No change to the project boundary is required or ancillary facilities. There would be no change to waste generated, hazardous substances used or heavy vehicle access routes. Changes to the site layout would be updated in the Construction Environmental Management Plan (CEMP) as required under the Conditions of Approval.

The proposed change requires the delivery of TBM segments to Pyrmont East on a 24 hour basis. Access to the acoustic shed would be via Edward Street and egress onto Pyrmont Bridge Road. Traffic controllers would be placed on Edward Street and Pyrmont Bridge Road, during both day and night periods. The delivery and storage of TBM consumables would be undertaken from 7am to 10pm, seven days a week. Both access and egress to the upper deck would be via Pyrmont Bridge Road.

Both activities would take up to five months, noting that the progress of the TBMs in the initial launch phase will be at a reduced speed until the TBM is fully buried. The delivery of segments during this phase is unlikely to be required on a 24hr basis. Once the TBMs are operating at full capacity, it is anticipated that 24 hour delivery of segments would be required for approximately 12 weeks. When the TBMs are operating at full capacity, a maximum of 18 heavy vehicle movements per hour would be required, refer to Appendix B Pyrmont East Construction Traffic Management Plan Stage 3 Tunnelling and Lining (CTMP). This would not result in an overall increase of heavy vehicle movements required for the site when compared to the Construction Traffic Management Plan for the Approved Project.

Figure 1 and Table 1 provide an overview of the proposed change.

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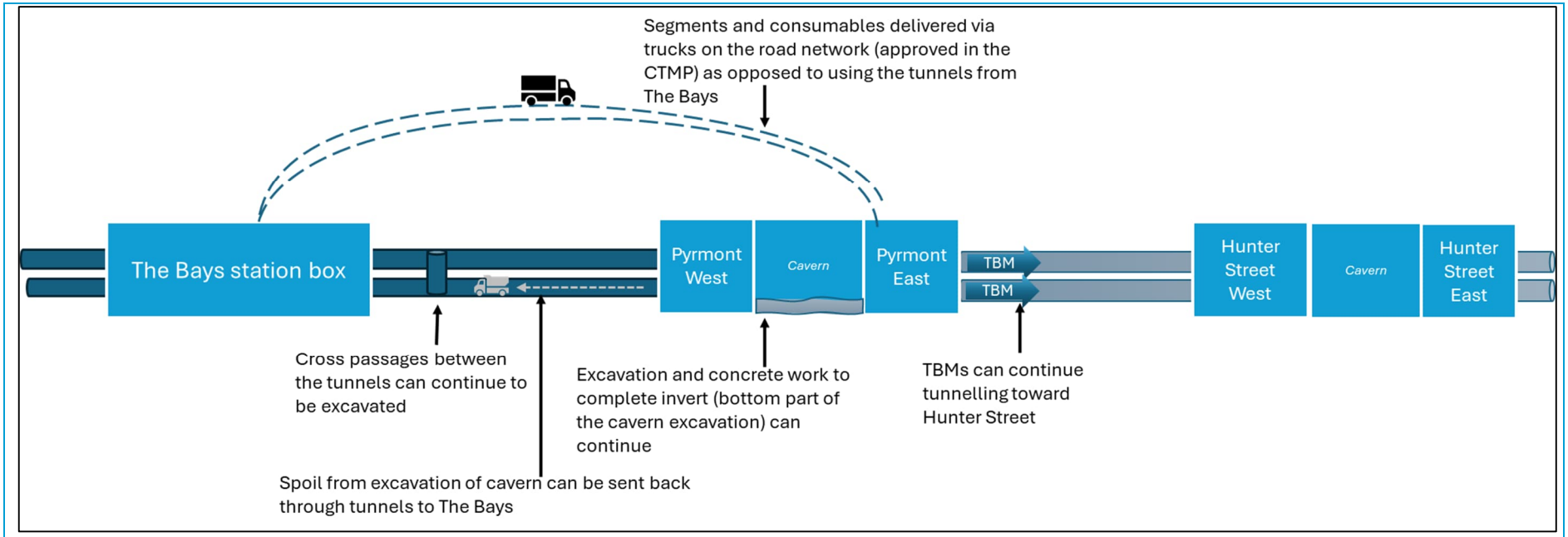

Figure 1: Indicative graphic showing overview of proposed change

Table 1 - Comparison of the proposed change with relevant elements of the Approved Project

Relevant elements of the Approved Project	Proposed change
TBM segment deliveries were assessed in the EIS as being transported from the precast yard at Eastern Creek to The Bays. The segments would be lifted by gantry crane which would lower the segments into the station box where the segments would be loaded onto the MSV and transported to the gantry on the TBM. The TBM segment deliveries would occur 24/7 and the delivery may occur underground	TBM segments would be stored at The Bays and delivered to Pyrmont East as required/on demand using approved haul routes as identified in the Pyrmont East Construction Traffic Management Plan (CTMP) refer Appendix B. The delivery and unloading would occur within the acoustic shed. The gantry crane would lower the segments into the existing shaft where the segments would be loaded onto the MSV and transported to the gantry on the TBM. Due to space constraints TBM segments will not be stored on site and are required to be delivered on an 'as needs/demand' basis to enable 24hr tunnelling. The TBM segment deliveries would occur on a 24hr basis within the acoustic shed. Trucks would be used for TBM segment deliveries from The Bays to Pyrmont East.
TBM consumable delivery and storage was assessed in the EIS as occurring from The Bays. Delivery would occur via	Delivery trucks would deliver TBM consumables to Pyrmont East to the upper deck adjacent to the acoustic shed. An electric davit crane would be used to lift the consumables into the shaft.

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heavy vehicles on a 24/7 basis to a storage location at The Bays prior to being lifted into the station box as required.	TBM consumables deliveries would occur between 7am and 10pm. Upper deck shaft access would be closed with a roller door outside these hours.
EIS Technical Paper 1 assessed out of hours (OOH) truck movements at the Pyrmont Station construction site as likely to be restricted to between 7 am and 10 am due to the proximity of night-time sensitive receivers. Infrequent heavy vehicles may, however, would be required during the night-time at Pyrmont to support concrete delivery during cavern lining pours for safety reasons. The RtS Section 2.4.2 considers noise associated with deliveries required to support work which is required to be carried out 24/7 for safety reasons.	The TBM segment deliveries would occur on a 24hr basis within the acoustic shed. Trucks will transport TBM segments from The Bays to Pyrmont East. The EPL includes a trial period of 12-weeks which permits the delivery of segments, approx.. 2 trucks per hour, during the night period (ie. 10pm – 7am). Should 24 hour delivery of segments be required for longer than a 12 week period, this would be subject to a further change of the EPL. Delivery of segments during standard hours and evening periods may extend over a longer period between July and December 2025 based on the progress of the TBMs.

3. Timeframe

The proposed works are expected to take place between August 2025 and December 2025, which would fit within the indicative construction program described in the approval documentation for the Approved Project. Within this timeframe, the delivery of segments during the night period (ie. 10pm – 7am) is expected to take a total of 12 weeks. Delivery of segments during standard hours and evening periods may extend over a longer period between July and December 2025 based on the progress of the TBMs.

An indicative construction program for the proposed change includes:

- TBM segment deliveries to Pyrmont East during day time / evening hours is anticipated to commence in August 2025
- TBM segment deliveries to Pyrmont East over a 24 hour period (when the TBMs are operating at full capacity) is expected to commence around September 2025 and be required for an approximate 12 week period
- TBM segment deliveries to Pyrmont East will then only be required during the day time / evening hours as the operation of the TBMs approach Hunter Street. It is anticipated that segment deliveries to Pyrmont East will be required until December 2025 when the TBM tunnelling from Pyrmont to Hunter Street is complete.

4. Site description

The Pyrmont East construction site covers about 1,250 square metres and is located between Edward Street, Union Street and Pyrmont Bridge Road.

The construction site is bounded by Darling Harbour to the east, the Australian National Maritime Museum and the International Convention Centre Sydney. North of the construction site is The Star Sydney, which is a major entertainment complex comprising of a casino, the Sydney Lyric and Event Centre, multiple restaurants and bars. South of the construction site land uses predominantly comprise of low, medium and high-density residential typologies, including a mix of terraces and apartment buildings. West of the construction site is a mix of residential properties, with businesses and commercial premises.

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5. Site Environmental Characteristics

Pyrmont is a highly diverse suburb that features a mix of medium and high-density housing, historical buildings, a major entertainment and tourism precinct, numerous hotels and serviced apartment facilities and commercial offices.

The Pyrmont East construction site is zoned as B4 Mixed Use under the *Sydney Local Environmental Plan 2012* (LEP 2012). The site is located within a highly urbanised landscape where fauna habitat has been largely cleared. It is unlikely that any threatened flora is present within 1.5 kilometres of the station.

The site is surrounded by Blackwattle Bay, Cockle Bay and Pyrmont Bay. There are no groundwater dependent ecosystems located within 500 metres of the construction site.

Heritage listed items within a 25-metre buffer of the Pyrmont East construction site include:

- Former New York Hotel (SLEP2012 Item no. I1275, SREP 2005 (City West) Item no. 67)
- Former Warehouse 'Bank of NSW Stores' (SLEP 2012 Item no. I1256, SREP 2005 (City West) Item no.53)
- Corner Shop and Residence 'Charmelu' (SLEP 2012 Item no. I1213, SREP 2005 (City West) Item no. 68)
- Terrace Group (SLEP 2012 Item no. I1274, SREP 2005 (City West) Item no. 122)
- Pyrmont Bridge Road Hotel (SLEP 2012 Item no. I1255, SREP 2005 (City West) Item no. 52).

The location of the tunnel from Pyrmont to the Hunter Street site is as described in the EIS and "*SMW07 – Consistency Assessment – Relocation of a crossover cavern to Pyrmont and tunnel alignment optimisation".*

6. Justification for the proposed change

As discussed in Section 2, the original construction program considered that the excavation of the Pyrmont Cavern would be complete, prior to the TBMs traversing through the cavern. It assumed that TBM segments and consumables would be delivered via the tunnels, from The Bays construction site to the TBMs. However, as the TBMs are likely to arrive at Pyrmont before the excavation of the cavern is complete, there is an opportunity to traverse the TBMs through the cavern to continue tunnelling toward Hunter Street, whilst the invert section of the cavern can be excavated and lined. This change requires the TBM segments and consumables to be delivered by the aboveground road network to the shaft (where they will then be delivered via the tunnel to the TBM), as opposed to being delivered from The Bays through the tunnels.

The proposed change is required for the following reasons (refer to Figure 1):

- The proposed change will enable both TBM excavation toward Hunter Street and the remaining Pyrmont construction activities (e.g. cavern excavation, waterproofing, lining etc) to progress concurrently. This is because the segments and consumables would be able to reach the TBMs as they approach Hunter Street (via the Pyrmont East shaft) without having to interface with the cavern works at Pyrmont as there is no longer a reliance on the tunnels to transfer between The Bays and Pyrmont
- The proposed change would provide a continuous 'on demand' supply of segments to the TBMs to allow segment installation following the TBM excavation works, which would ensure the long-term life of the asset and minimise groundwater inflow into the tunnel
- The proposed change would allow other works to be undertaken concurrently in the tunnels between The Bays construction site and Pyrmont construction sites, (such as cross passage excavation) as the interface of TBM deliveries occurring within the tunnels would be removed

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- The proposed change would allow for the concurrent excavation of the Pyrmont cavern invert, waterproofing, lining etc to occur without interfacing with the TBM deliveries resulting in safer and more efficient works.

The delivery of segments from The Bays to Pyrmont is required to occur 24 hours a day as the TBM operation/tunnelling activities are undertaken 24 hours a day. An Environmental Protection Licence (EPL) 21784 variation was approved for a 12-week trial for deliveries to extend from 10pm to 7am at Pyrmont. The trial requires noise to be monitored and reported to EPA on a monthly basis over 12-weeks. The variation is required due to the need to supply segments to the TBM on-demand as the Pyrmont East site does not have storage capacity for TBM segments in the Pyrmont East shaft. It is anticipated that segment delivery will be completed within the 12-week trial period as 24hr delivery is only required once the TBM is fully buried after relaunching. A shortage of TBM segments would result in the TBM stopping or slowing down which may introduce critical safety risks, particularly during the under-harbour crossing where there is potential to encounter unconsolidated ground conditions.

7. Environmental Benefit

Key benefits of the proposed change would include the following:

- Ensure safe tunnelling by avoiding congestion in the Pyrmont cavern and running tunnels between Pyrmont and The Bays as segments and consumables would be delivered directly to Pyrmont East. This would avoid any delays in supplying the TBM with segments to establish the tunnel lining
- TBM spoil and cavern invert excavation spoil would be transferred via the running tunnels, which would reduce spoil truck movements on the surface, traffic congestion and associated community impacts associated with spoil haulage. It would also reduce greenhouse gas emissions
- Noise levels from the TBM segment and consumable deliveries are consistent with the predicted noise levels from the existing activities being undertaken at Pyrmont.

8. Control Measures

Will a project and site specific EMP be prepared?	☐ Yes ☒ No	Are appropriate control measures already identified in an existing EMP?	☒ Yes ☐ No

9. Conditions of approval / Environmental mitigation measures

Number	Condition of Approval/ Environmental mitigation measure	Discussion on relevance and consistency for proposed change
Conditions of Approval		

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A1	The Proponent must carry out the CSSI in accordance with the conditions of this approval and generally in accordance with the: (a) *Sydney Metro West – Major civil construction between The Bays and Sydney CBD Environmental Impact Statement dated 25 October 2021;* (b) *Sydney Metro West – Major civil construction between The Bays and Sydney CBD Submissions Report dated April 2022;* (c) *Sydney Metro West – Archaeological Research Design and Excavation Methodology – Pyrmont Station dated April 2022;* (d) *Sydney Metro West – Aboriginal and Historical Archaeological Research Design - Hunter Street Station (Sydney CBD) dated May 2022;* (e) *Sydney Metro West – Major civil construction between The Bays and Sydney CBD – Modification Request (Mod 1) dated February 2023;* (f) *Sydney Metro West – Stage 2 – Modification 1: Response to Submissions (correspondence) undated; and* (g) Correspondence dated 15 August 2023 requesting modification to Conditions A9, D12, D15, D16 and D17 of SSI 19238057.	The proposed change is being undertaken generally in accordance with the EIS and documents listed in Condition A1, specifically: Section 5.4.4 states: *These construction sites would include spoil storage and removal, water supply, water treatment and disposal, temporary ventilation plant, material storage and office facilities, worker amenities and parking.* The inclusion of material storage in this description is general and covers TBM segments and TBM consumables. Figure 5-10 in the EIS also indicates 'material storage' and 'storage' areas at Pyrmont East that are generally consistent with the proposed storage areas associated with the areas identified for temporary storage of TBM consumables. Section 5.5.3 states: *..The precast concrete segments would be manufactured at the approved dedicated precast facility at the Sydney Metro West Eastern Creek Precast Facilities site with storage of precast concrete segments at The Bays tunnel launch and support site.* The proposed change is generally consistent with this description as TBM segments will continue to be transported from the Eastern Creek Precast Facility and stored at The Bays site prior to being transferred to the Pyrmont East Site. Tunnelling support activities including slurry treatment, water treatment and spoil haulage will continue to be undertaken from The Bays site. Section 5.6.2 states: *Construction traffic would be managed in accordance with the Construction Traffic Management Framework (Appendix D). Construction traffic management plans for each site would be submitted to the relevant roads authority for review before work starts.* A Construction Traffic Management Plan (CTMP) that includes heavy vehicle movements for TBM segment and consumable deliveries has been prepared and approved by the relevant authorities (refer Appendix B). Section 5.6.4 states: *Proposed construction hours are shown in Table 5-8. These hours have been developed based on a balanced consideration of the construction program and the need to minimise noise and traffic related impacts. As the tunnel boring machines would operate continuously, the tunnelling and associated support activities would need to be carried out up to 24 hours per day and seven days per week.* This section outlines the requirement to undertake associated tunnel support activities (which includes TBM segment deliveries) on a continuous 24hr basis. Table 5-8 further identifies the '*Need to install ground support systems immediately following excavation'.* This statement identifies the requirement to deliver TBM segments, which are a ground support system, immediately following excavation and therefore on a 24 hour basis. Table 5-8 identifies proposed working hours for '*construction traffic for material supply to…construction sites'* and notes at *Pyrmont this would be between 7am to 10pm (with a minor number of truck*

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		movements during the night-time period for safety reasons). This change includes 2 trucks per hour post 10pm (‘*a minor number’)* for the purposes of TBM segment deliveries. The proposed change is consistent with the Project Approval, specifically: Condition D23(c) *By Approval, including: (i) where different construction hours are permitted or required under an EPL in force in respect of the CSSI.* An EPL variation based on a 12-week trial basis has been issued by the EPA to enable TBM segment deliveries to occur on a 24 hour basis to the Pyrmont East Site. The 12-week trial will commence once the TBM is relaunched. Prior to this occurring, segments will be delivered to Pyrmont between 7am -10pm in accordance with Condition D23 and the EPL. It is anticipated the 12-week trial period will be a sufficient duration to complete the required TBM deliveries from 10pm – 7am to enable tunnelling to occur on a 24 hour basis and an extension of the trial will not be required.
A2	The CSSI must only be carried out in accordance with all procedures, commitments, preventative actions, performance criteria and mitigation measures set out in the documents listed in Condition A1 unless otherwise specified in, or required under, this approval.	The proposed change will be carried out in accordance with these requirements including implementation of all mitigation measures as outlined throughout this document. Refer to Section 10 for an overview of mitigation measures.
D1	All reasonably practicable measures must be implemented to minimise the emission of dust and other air pollutants during construction.	The proposed change is consistent with this condition of approval. Any potential impacts associated with air quality would be managed in accordance with the Air Quality Management Plan including the implementation of all reasonably practicable measures to minimise the emission of dust and other air pollutants.

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D23	Notwithstanding Conditions D21 and D22 work may be undertaken outside the hours specified in the following circumstances: (a) … (b) … (c) **By Approval**, including: (i) Where different construction hours are permitted or required under an EPL in force in respect of the CSSI; or (ii) Works which are not subject to an EPL that are approved under an **Out-of-Hours Work Protocol** as required by **Condition D24**; or (iii) Negotiated agreements with directly affected residents and sensitive land use(s). (d) **By Prescribed Activity**, including: (i) Tunnelling by tunnel boring machine (excluding cut and cover tunnelling and surface works) are permitted 24 hours a day, seven days a week; or (ii) delivery of material that is required to be delivered outside of standard construction hours in Condition D21 to directly support tunnelling activities, except between the hours 10:00 pm and 7:00 am to / from the Pyrmont construction site which could result in a sleep disturbance event for receivers in the proximity of Pyrmont Street, Edward	The proposed change is consistent with this condition of approval. The proposed change comprises TBM segment delivery and TBM consumables deliveries at Pyrmont East construction site. The delivery of TBM segments would be undertaken 24 hours a day, seven days a week. As per Condition D23(c)(i) tunnel deliveries outside the hours stipulated in D23(d)(ii) would be undertaken through the Project's EPL 21784. An EPL variation based on a 12-week trial basis has been issued by the EPA to enable TBM segment deliveries to occur on a 24 hour basis to the Pyrmont East Site. The 12-week trial will commence once the TBM is relaunched. Prior to this occurring, segments will be delivered to Pyrmont between 7am -10pm in accordance with Condition D23 and the EPL. It is anticipated the 12-week trial period will be a sufficient duration to complete the required TBM deliveries from 10pm – 7am to enable tunnelling to occur on a 24 hour basis and an extension of the trial is not likely to be required. If an extension is required to enable deliveries to occur between 10pm and 7am a further variation of the EPL would be obtained in accordance with this condition. An Addendum to Pyrmont's Detailed Noise and Vibration Impact Statement (DNVIS) has been prepared for the proposed change and is attached to this CA (Appendix A). The DNVIS assesses the Pyrmont TBM segment deliveries and considers the cumulative impacts associated with the Approved Project. The DNVIS has been endorsed by the Acoustic Advisor and outlines mitigation measures associated with the proposed change.

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		Street, Union Street, Paternoster Row and Pyrmont Bridge Road; or	
	(iii)	…	
	(iv)	work within an acoustic shed where there is no exceedance of noise levels under Low Impact Noise Work circumstances identified in (b) above, unless otherwise agreed by the Planning Secretary	

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D25	All reasonable and feasible mitigation measures must be implemented with the aim of achieving the following construction noise management levels and vibration criteria: (a) construction 'Noise affected' noise management levels established using the Interim Construction Noise Guideline (DECC, 2009); (b) vibration criteria established using the Assessing vibration: a technical guideline (DEC, 2006) (for human exposure); (c) Australian Standard AS 2187.2 - 2006 "Explosives - Storage and Use - Use of Explosives" (for human exposure); (d) BS 7385 Part 2-1993 "Evaluation and measurement for vibration in buildings Part 2" as they are "applicable to Australian conditions"; and (e) the vibration limits set out in the German Standard DIN 4150-3: Structural Vibration- effects of vibration on structures (for structural damage for structurally unsound heritage items). Any work identified as exceeding the noise management levels and / or vibration criteria must be managed in accordance with the Noise and Vibration CEMP Sub-plan. *Note: The ICNG identifies 'particularly annoying' activities that require the addition of 5 dB(A) to the predicted level before comparing to the construction Noise Management Level.*	The proposed change is consistent with this condition of approval. An updated DNVIS has been prepared for the proposed change and has been endorsed by the Acoustic Advisor (refer to Appendix A). The DNVIS describes all reasonable and feasible mitigation measures taking into consideration the best practice methods, which will be implemented with the aim of achieving the criteria in D25, including: • The delivery of segments would occur within the acoustic shed and lifted into the shaft by the gantry crane. • The access gates and acoustic shed roller doors would be closed except to allow vehicles access and egress • Use of an appropriately sized electric davit arm crane to manage consumable deliveries • Access driveways to the worksites would be maintained with a smooth surface to minimise the occurrence of clangs or bangs as trucks enter the worksite • Any plant not in use for an extended period including delivery trucks would be switched off and not left idling on site • All plant and equipment would be appropriately maintained to ensure optimum running conditions • Toolbox talks would be regularly provided to all personnel involved in the OOHW, specifically targeted to ensure the noise impacts associated with the activities subject to this CA. The toolbox talks would also encompass good behavioural practices such as no swearing, shouting or using loud radios, no dropping of material from height, slamming of doors, and no excessive revving of plant and vehicle engines. Noise impacts associated with the proposed change would be managed through the DNVIS and Noise and Vibration Management Plan. Attended noise monitoring would be undertaken to verify that noise levels resulting from the TBM support activities are consistent with the levels predicted in the DNVIS and confirm that all reasonable and feasible mitigation measures have been implemented.

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D27	Noise generating work in the vicinity of potentially-affected community, religious, educational institutions and noise and vibration-sensitive businesses and critical working areas (such as theatres, laboratories and operating theatres) resulting in noise levels above the NMLs must not be timetabled within sensitive periods, unless other reasonable arrangements with the affected institutions are made at no cost to the affected institution.	The proposed change is consistent with this condition of approval. An updated DNVIS has been prepared for the proposed change and has been endorsed by the Acoustic Advisor (refer to Appendix A). The DNVIS describes any potentially affected groups described in condition D27. Where noise is predicted to be above the noise management levels (NMLs) at these receivers, work will be timetabled to be outside of sensitive periods (where feasible). The requirements of condition D27 would be managed in accordance with the Community Communications Strategy (CCS) and through the updated DNVIS and Noise and Vibration Management Plan The DVNIS Addendum has not identified any new sensitive receivers. The predicted impacts are consistent with the existing activities occurring at the Pyrmont East site.
D28	Industry best practice construction methods must be implemented where reasonably practicable to ensure that noise levels are minimised around sensitive land user(s). Practices must include, but are not limited to: (a) use of regularly serviced low sound power equipment; (b) temporary noise barriers (including the arrangement of plant and equipment) around noisy equipment and activities such as rock hammering and concrete cutting; and (c) use of alternative construction and demolition techniques.	The proposed change is consistent with this condition of approval. An updated DNVIS has been and is attached to this CA (Appendix A). The DNVIS includes detail on the industry best practice construction methods to be implemented to minimise noise around sensitive land users. In addition to the practices listed in the condition, the following will be implemented: • The delivery of segments would occur within the acoustic shed and lifted into the shaft by the gantry crane. Use of an appropriately sized electric davit arm crane to manage consumable deliveries from the upper deck into the shaft • The access gates and acoustic shed roller doors would be closed except to allow vehicles access and egress • Access driveways to the worksites would be maintained smooth to minimise the occurrence of clangs or bangs as trucks enter the worksite • Any plant not in use for an extended period including delivery trucks would be switched off and not left idling on site • All plant and equipment would be appropriately maintained to ensure optimum running conditions • Toolbox talks would be regularly provided to all personnel involved in the OOHW, specifically targeted to ensure the noise impacts associated with the activities subject to this CA. The toolbox talks would also encompass good behavioural practices such as no swearing, shouting or using loud radios, no dropping of material from height, slamming of doors, and no excessive revving of plant and vehicle engines. Noise impacts associated with the proposed change would be managed through the updated DNVIS and Noise and Vibration Management Plan. Attended noise monitoring would be undertaken to verify that noise levels resulting from the TBM support activities are consistent with the levels predicted in the DNVIS and confirm that all reasonable and feasible mitigation measures have been implemented.

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D29	Detailed Noise and Vibration Impact Statements (DNVIS) must be prepared for work that may exceed the NMLs, vibration criteria and / or ground-borne noise levels specified in Conditions D25 and D26 at any residence outside construction hours identified in Condition D21, or where receivers will be highly noise affected. The DNVIS must include specific mitigation measures identified through consultation with affected sensitive land user(s) and the mitigation measures must be implemented for the duration of the works. A copy of the DNVIS must be provided to the AA and ER before the commencement of the associated works. The Planning Secretary and the EPA may request a copy (ies) of the DNVIS.	The proposed change is consistent with this condition of approval. An Addendum to the Pyrmont DNVIS has been prepared for the proposed change and has been endorsed by the Acoustic Advisor (refer to Appendix A). The predicted noise levels for the TBM deliveries to 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 are being implemented to reduce noise towards the NML. This will bring the noise levels to within 5 dB or below NML, with physical mitigation measures in place, refer Appendix A Table 4.4. The predicted noise levels for the TBM deliveries to Pyrmont East during the evening and night period indicate there could be a marginal (up to 1 dB) increase in noise, mostly from deliveries to the upper deck which cease by 10pm. 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 as deliveries are limited to two trucks per hour associated with segment deliveries. There are no additional noise affected receivers. Appendix A DNVIS Addendum Section 4.2.3 details the consultation completed and proposed with noise affected receivers.
D30	DNVIS must be prepared for each construction site before construction noise and vibration impacts commence and include specific mitigation measures identified through consultation with affected sensitive land users and updated as required if site conditions or activities change.	An Addendum to the Pyrmont DNVIS has been prepared for the proposed change and has been endorsed by the Acoustic Advisor (refer to Appendix A). Appendix A DNVIS Addendum Section 4.2.3 details the consultation completed and proposed with noise affected receivers.

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D37	In order to undertake out-of-hours work outside the hours specified under Condition D21, appropriate respite periods for the out-of-hours work must be identified in consultation with the community at each affected location on a regular basis. This consultation must include (but not be limited to) providing the community with: (a) a progressive schedule for periods no less than three (3) months of likely out-of-hours work; (b) a description of the potential work, location and duration of the out-of-hours work; (c) the noise characteristics and likely noise levels of the work; and (d) likely mitigation and management measures which aim to achieve the relevant NMLs under Condition D26 (including the circumstances of when respite or relocation offers will be available and details about how the affected community can access these offers). The outcomes of the community consultation, the identified respite periods and the scheduling of the likely out-of-hour work must be provided to the ER and AA, before the out of hours works commences, and to the EPA and the Planning Secretary on request. *Note: Respite periods can be any combination of days or hours where out-of-hours work would not be more than 5 dB(A) above the RBL at any residence.*	The proposed change is consistent with this condition of approval. Appendix A DNVIS Addendum Section 4.2.3 details the consultation completed and proposed with noise affected receivers. Ongoing community notifications will be completed in accordance with the Community Communications Strategy and address the requirements of D37(a) to (d).

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D69	During construction of the CSSI, all reasonably practicable measures must be implemented to maintain pedestrian, cyclist and vehicular access to, and parking in the vicinity of affected businesses / traders. Disruptions are to be avoided, and where avoidance is not possible, minimised. Where disruption cannot be minimised, alternative pedestrian and vehicular access, and parking arrangements must be developed in consultation with affected businesses / traders and relevant Councils and implemented prior to the disruption. Adequate signage and directions to businesses must be provided before, and for the duration of, any disruption.	The proposed change is consistent with this condition of approval. No changes to pedestrian, cyclist and vehicular access or parking are required as part of the proposed change.
D72	Construction Traffic Management Plans (CTMPs) must be prepared in accordance with the Construction Traffic Management Framework. A copy of the CTMPs must be submitted to the Planning Secretary for information before the commencement of any construction in the area identified and managed within the relevant CTMP.	The Construction Traffic Management Plan (CTMP) Pyrmont East – Stage 3 – Tunnelling and Lining (Rev 05) (refer Appendix B) has been updated and approved by the relevant authorities. The CTMP Section 5 includes the scope of work and access arrangement for the proposed change. The access and traffic management at Pyrmont East are consistent with the approved project.
D73	Local roads proposed to be used by heavy vehicles to directly access construction sites that are not identified in the documents listed in Condition A1 must be approved by the Planning Secretary and be included in the CTMPs.	The proposed change is consistent with this condition of approval. There are no additional local roads proposed to be used by heavy vehicles as a result of the proposed change.

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D77	All vehicles associated with the CSSI (including light vehicles and heavy vehicles) must be managed to: (a) minimise parking on public roads; (b) minimise idling and queueing on state and regional roads; (c) not carry out marshalling of construction vehicles near sensitive land user(s); (d) not block or disrupt access across pedestrian or shared user paths at any time unless alternative access is provided; and (e) ensure spoil haulage vehicles adhere to the nominated haulage routes identified in the CTMPs.	The proposed change is consistent with this condition of approval. Refer Appendix B CTMP Section 7, Table 11 – Traffic Management Measures; and Construction Parking and Access Strategy (Stage 1) – Pyrmont and Hunter Street Worksites (Appendix C) Section 6 Mitigation Measures.
REMMS		
TT6	Road Safety – All trucks would enter and exit construction sites in a forward direction, where feasible and reasonable.	The proposed change is consistent with this REMM. All truck movements will enter and exit Pyrmont East in a forward direction. Any impacts to traffic and access would be managed via the CTMP.
TT7	Congestion – Construction site traffic to be managed to minimise movements during peak periods.	The proposed change is consistent with this REMM, refer to Appendix B CTMP Section 7. Any impacts to traffic and access would be managed via the updated CTMP.
NV05	Night-time noise impacts - Where practicable, air brake silencers would be used on heavy vehicles that access construction sites multiple times per night or over multiple nights.	The proposed change is consistent with this REMM. Noise impacts associated with the proposed change would be managed through the DNVIS, CTMP and Noise and Vibration Management Plan.

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NV12	Construction traffic noise – Further assessment of construction traffic would be completed during detailed design, including consideration of the potential for exceedances of the NSW Road Noise Policy base criteria (where greater than two dB increases are predicted). The potential impacts would be managed using the following approaches, where feasible and reasonable: • On-site spoil storage capacity would be maximised to reduce the need for truck movements during sensitive times • Vehicle movements would be redirected away from sensitive receiver areas and scheduled during less sensitive times • The speed of vehicles would be limited, and the use of engine compression brakes would be avoided • Heavy vehicles would not be permitted to idle near sensitive receivers.	The proposed change is consistent with this REMM. An DNVIS Addendum has been prepared for the proposed change and has been endorsed by the Acoustic Advisor (refer to Appendix A). The DNVIS Section 2.1.1 describes the construction traffic noise and notes the traffic generated by construction assessed in the Addendum is less than the traffic generated by construction assessed in the Pyrmont DNVIS. The potential impacts from construction traffic noise will be managed using the following approaches: • deliveries will use the approved haul routes identified in the CTMP (refer to Appendix B) • Access ways to be maintained to minimise additional noise from trucks entering/exiting • Switching off plant/equipment when not in use • Traffic controllers to manage truck entry and exit efficiently to prevent excessive braking • Toolbox truck drivers on behaviours, haulage route compliance, use of compression breaking etc.

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AQ1	The following best-practice dust management measures would be implemented during all construction work: • Regularly wet-down exposed and disturbed areas including stockpiles, especially during dry weather • Adjust the intensity of activities based on measured and observed dust levels and weather forecasts • Minimise the amount of materials stockpiled and position stockpiles away from surrounding receivers • Regularly water haul roads and exposed areas and ensure that all loads are covered • Regularly inspect and as necessary, remove any loose materials tracked along haulage routes • Regularly inspect dust emissions and apply additional controls as required • Implement all relevant measures listed in the UK IAQM corresponding to the highest level of risk determined around each construction site. At locations where there is an acoustic shed established, dust filtering systems will be installed on the acoustic shed exhaust	The proposed change is consistent with this REMM. Any potential impacts associated air quality would be managed in accordance with the Air Quality Management Plan, including the implementation of all reasonably practicable measures to minimise the emission of dust and other air pollutants.

Will the proposed change be consistent with the conditions of approval?	☒ Yes
	☐ No

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10. Impact Assessment – Construction

Aspect	Nature and extent of impacts (negative and positive) during construction (if control measures implemented) of the proposed change, relative to the relevant impact in the Approved Project	Proposed Control Measures in addition to project CoA and REMMs	Consistent Impact Y/N	Do any CoA need to be changed? Y/N	Endorsed	
					Y/N	Comments
Biodiversity	No construction biodiversity impacts are anticipated as a result of the proposed change.	No additional measures required.	Y	N	Y	
Water	Surface water quality impacts associated with the proposed change would be negligible. Any surface water runoff would be managed via the existing Erosion and Sediment Control Plan and the Soil and Water Management Plan. Hydrology and flooding impacts as a result of the proposed change would be negligible. Due to the highly urbanised drainage catchment surrounding Pyrmont East construction site, flooding behaviour is expected to be largely controlled by the capacity of stormwater drainage systems and roadways that form overland flow paths. There would be no changes on site with potential to affect flooding aspects. All tunnel process water would be transported via the running tunnels to The Bays construction site for treatment. The Bays construction site WTP has appropriate capacity to manage tunnel process water. No groundwater impacts are anticipated as a result of the proposed change.	No additional measures required. Existing management measures identified in the Soil and Water Management Subplan will be implemented.	Y	N	Y	
Soils and contamination	No change from Approved Project.	No additional measures required. Existing management measures identified in the Soil and Water	Y	N	Y	

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Aspect	Nature and extent of impacts (negative and positive) during construction (if control measures implemented) of the proposed change, relative to the relevant impact in the Approved Project	Proposed Control Measures in addition to project CoA and REMMs	Consistent Impact Y/N	Do any CoA need to be changed? Y/N	Endorsed	
					Y/N	Comments
		Management Subplan will be implemented.				
Air quality	Air quality impacts would be less than currently occurring at Pyrmont East as shaft excavation is complete and therefore the potential for mud/sediment tracking is minimised from haulage vehicles. Pyrmont Cavern invert spoil will be transported via the running tunnels to the Bays.	No additional measures required. Air quality impacts would be managed through the Air Quality Management Plan. Management measures such as the use of a street sweeper are considered appropriate for the proposed change.	Y	N	Y	
Noise and vibration	**Detailed noise and vibration impact statement** Technical Paper 2- Construction Noise and Vibration from the EIS for the approved project discusses that the majority of vehicle movements at Pyrmont would likely be restricted to between 7am and 10pm due to proximity of night-time sensitive receivers, however up to five trucks would be expected at this construction site during the night-time (i.e. to support concrete delivery during cavern lining pours). The EIS assessment also discusses that further investigation of awakenings would be completed during the next stages of the proposal when detailed construction planning information becomes available. A DNVIS has been prepared to assess the noise and vibration impacts using the preferred construction methodologies for cavern excavation and tunnelling. This DNVIS therefore contains a more refined assessment of the predicted noise	Noise and vibration impacts associated with the proposed change would be managed in accordance with the Addendum DNVIS (Appendix A) (Table 4-4) and the Noise and Vibration Management Plan. The DNVIS Table 4-4 describes the specific mitigation measures to be implemented, and summarised as follows: • Works after 10pm to be contained within the acoustic shed • Acoustic shed doors and openings to be closed when not in use • Access ways to be maintained to minimise additional noise from trucks entering/exiting • Switching off plant/equipment when not in use	Y	N	Y	

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Aspect	Nature and extent of impacts (negative and positive) during construction (if control measures implemented) of the proposed change, relative to the relevant impact in the Approved Project	Proposed Control Measures in addition to project CoA and REMMs	Consistent Impact Y/N	Do any CoA need to be changed? Y/N	Endorsed	
					Y/N	Comments
	and vibration levels when compared to the more conservative assumptions in the EIS. The construction program for Sydney Metro West considers tunnelling to be undertaken 24 hours a day. The proposed change requires heavy vehicles for the delivery of precast segments to the Pyrmont East construction site on a 24 hour basis as there is insufficient storage capacity at the site for segments. 24 hour delivery of segments as the TBMs progresses will therefore enable the TBMs to continue to operate continuously (without having to cease tunnelling overnight). TBM consumables (consisting of pipes, oil and grease) would be required to be delivered between 7am and 10pm to maintain TBM operation. **Construction noise impacts** The DNVIS addendum in Appendix A includes the detailed assessment of the relevant construction activities at both Pyrmont construction sites, being: • the mined tunnelling activities (which are currently being undertaken), • the TBM segment and consumable deliveries to Pyrmont East (the proposed change, which would occur concurrently with construction activities at Pyrmont West),	• Traffic controllers to manage truck entry and exit efficiently to prevent excessive braking etc. • Alternate audible movement alarms fitted to vehicles and plant • Toolbox talks would be regularly provided to all personnel involved in the OOHW, specifically targeted to ensure the noise impacts associated with the activities subject to this CA. The toolbox talks would also encompass good behavioural practices such as no swearing, shouting or using loud radios, no dropping of material from height, slamming of doors, and no excessive revving of plant and vehicle engines • Community consultation/notification prior to works commencing • Attended noise monitoring would be undertaken to verify noise levels resulting from the works, including during out of hour works (e.g. TBM segment deliveries).				

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Aspect	Nature and extent of impacts (negative and positive) during construction (if control measures implemented) of the proposed change, relative to the relevant impact in the Approved Project	Proposed Control Measures in addition to project CoA and REMMs	Consistent Impact Y/N	Do any CoA need to be changed? Y/N	Endorsed	
					Y/N	Comments
	• the concrete pouring activities along Union Street (cumulative worst case assessment which assumes all activities being undertaken). When comparing the proposed change to the mined tunnelling activities currently being undertaken: • During standard day time hours: compared to the mined tunnelling works which have been occurring at the site, the DNVIS predicts that the TBM deliveries would not impact any additional residential receivers • Outside standard hours: The predicted noise levels 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 10pm, so there is minimal change to the predicted impacts after 10pm as the segment deliveries will occur within the acoustic shed o In the day (outside standard hours): there are predicted to be an additional two residential receivers with a predicted (noise management level) NML exceedance of 3-10dB(A) when compared to the mined tunnelling works only					

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Aspect	Nature and extent of impacts (negative and positive) during construction (if control measures implemented) of the proposed change, relative to the relevant impact in the Approved Project	Proposed Control Measures in addition to project CoA and REMMs	Consistent Impact Y/N	Do any CoA need to be changed? Y/N	Endorsed	
					Y/N	Comments
	○ In the evening, there are predicted to be an additional two residential receivers with a predicted NML exceedance of 5-10dB(A) when compared to the mined tunnelling works only ○ In the night, there are predicted to be an additional two residential receivers with a predicted NML exceedance of 2-5dB(A) when compared to the mined tunnelling works only • Sleep disturbance: There will be no additional sleep disturbance impacts associated with the proposed change, as the TBM consumable deliveries will stop between 10pm and 7am. There is no change in the predicted LAmax noise levels from the TBM delivery activities. • the worst-case potential noise impacts to any receiver (from activities associated with the proposed change) are expected to last for around 12 weeks, as 24 hour delivery of segments would not be required until the TBMs are fully buried • implementing reasonable and feasible physical mitigation measures in addition to the measures identified in the Pyrmont DNVIS will reduce noise towards the NML. During out of hours works, noise mitigation would include					

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Aspect	Nature and extent of impacts (negative and positive) during construction (if control measures implemented) of the proposed change, relative to the relevant impact in the Approved Project	Proposed Control Measures in addition to project CoA and REMMs	Consistent Impact Y/N	Do any CoA need to be changed? Y/N	Endorsed	
					Y/N	Comments
	limiting out of hours works activities, containing support works within the acoustic shed and shaft out of hours, and closing the upper deck with an acoustic cover. The DNVIS also assesses the worst case cumulative impacts at the Pyrmont East construction site from all activities: • The other activities that could occur simultaneously at the Pyrmont East site include concrete pours for the crossover and station cavern inverts, outside the acoustic shed on Union Street, generally between 7am and 10pm (which would take around nine weeks). On four occasions (subject to EPL approval), this would also require concrete pours past 10pm, when the pours take around 24 hours each. Extended hours of concrete deliveries for the concrete pours are required to ensure concrete quality requirements and design specifications can be achieved. At night time when the invert concrete pours are occurring, (as well as the TBM segments are being delivered), up to 63 receiver buildings may be noise affected, however this is reduced to 27 receivers with mitigation (all 1 to 10dB(A) above NML). Note: when these concrete pours are not occurring and only the TBM segment and consumable deliveries (subject of the proposed					

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Aspect	Nature and extent of impacts (negative and positive) during construction (if control measures implemented) of the proposed change, relative to the relevant impact in the Approved Project	Proposed Control Measures in addition to project CoA and REMMs	Consistent Impact Y/N	Do any CoA need to be changed? Y/N	Endorsed	
					Y/N	Comments
	change) and mined tunnelling are occurring, this is reduced to 15 potential residential receiver properties being noise affected at night time. **Construction traffic noise impacts** The DNVIS also includes an assessment of construction traffic noise along the haulage route. The DNVIS for Pyrmont anticipated that construction generated traffic impacts will be consistent with the EIS predicted road traffic noise levels, that is less than 2dB(A) increase on all proposed heavy vehicle routes. When compared to the DNVIS for mined tunnelling activities, the proposed change would not result in any additional hourly heavy vehicle movements at night time. The proposed change (TBM segment and material deliveries) would require a maximum of 18 heavy vehicle movements per hour would be required, refer to Appendix B CTMP. These out of hours deliveries required for the segments are subject to an EPL, in accordance with Condition D23, to support 24 hour tunnelling by TBM. The EPL trial requires additional attended monitoring and reporting of the truck deliveries throughout the night to ensure that noise impacts are adequately managed. In addition, a truck management system would be used to ensure the trucks are directed into the acoustic shed with minimal delay and limited opening of the acoustic shed doors.					

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Aspect	Nature and extent of impacts (negative and positive) during construction (if control measures implemented) of the proposed change, relative to the relevant impact in the Approved Project	Proposed Control Measures in addition to project CoA and REMMs	Consistent Impact Y/N	Do any CoA need to be changed? Y/N	Endorsed	
					Y/N	Comments
	Ground-borne noise and vibration There are no vibration intensive activities associated with the proposed change. The proposed change therefore does not affect the ground-borne noise and vibration impacts					
Aboriginal Culture and Heritage	No change from Approved Project.	No additional measures required.	Y	N	Y	
Historic Heritage	No change from Approved Project.	No additional measures required.	Y	N	Y	
Community and socio-economic	Consistent with the EIS, worst case potential noise impacts associated with the proposed change would be minor and short duration with the expected duration approx. 12 weeks over a 5-6 month period (as 24/7 segment deliveries would only be required when the TBMs are fully buried). These impacts will be managed as detailed in the DNVIS Addendum. As per the existing Pyrmont DNVIS, up to 18 residential receivers may be exposed to noise levels above the sleep disturbance screening level for the Pyrmont works as whole, including Pyrmont East and Pyrmont West. The Addendum DNVIS identifies that only 5 receivers would be impacted by truck movements at Pyrmont East construction site (TBM segment deliveries from 10pm to 7am). Consistent with the EIS, an increase in heavy vehicles was assessed. CTMP Section 5 includes	No additional measures required.	Y	N	Y	

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Aspect	Nature and extent of impacts (negative and positive) during construction (if control measures implemented) of the proposed change, relative to the relevant impact in the Approved Project	Proposed Control Measures in addition to project CoA and REMMs	Consistent Impact Y/N	Do any CoA need to be changed? Y/N	Endorsed	
					Y/N	Comments
	the scope of work and access arrangement for the proposed change. The truck numbers associated with the change remain consistent with the volume modelled in the EIS (and associated documents) as spoil haulage from shaft excavation is complete at Pyrmont East. Any remaining spoil excavation for the caverns and cross passages will be transferred to The Bays via the running tunnels. There would also be no substantial changes to land use and property; landscape and visual amenity; and air quality as a result of the proposed change.					
Traffic and transport	In accordance Section 3.5.2 of the EIS Technical Paper 1 (Transport and traffic), tunnel boring machine launch and support would be carried out 24 hours a day, 7 days a week, including aboveground works supporting underground construction work, where noise mitigation measures are in place. The proposed change would result in: - No changes to the maximum heavy vehicle movements than assessed in the RtS Report for the Approved Project, therefore no change to the CTMP is required. - No change to the site access arrangement detailed in the RtS Report. - While the number of heavy vehicles for TBM deliveries will increase, the number of spoil trucks will correspondingly decrease. The frequency of these deliveries is expected to	To enable the delivery of segments to continue from 10pm to 7am; an EPL variation was obtained in accordance with Condition D23 (c). EPA approved the variation for a 12 week trail enabling deliveries of segments to continue on a 24 hour basis. The duration of the trial is sufficient to enable the supply of segments once the TBM is fully buried post relaunch at Pyrmont. Management measures for traffic and transport identified in the approval documentation are considered appropriate for the proposed change. Any impacts to	Y	N	Y	

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Aspect	Nature and extent of impacts (negative and positive) during construction (if control measures implemented) of the proposed change, relative to the relevant impact in the Approved Project	Proposed Control Measures in addition to project CoA and REMMs	Consistent Impact Y/N	Do any CoA need to be changed? Y/N	Endorsed	
					Y/N	Comments
	reach up to with a maximum of 18 truck movements per hour over a period of approximately four months. The other activities that would occur concurrently at the site would include the concrete pours for the cavern invert, however when this activity is underway, there would not be any further increase in heavy vehicles for the site as a whole, required. Distributing segment deliveries over a 24 hour period; and consumable deliveries up to 10pm, will reduce the overall number of trucks on the road during peak periods. - The vehicles would continue to enter and exit the site in a forward direction. - EPL variation to enable heavy vehicle movements between 10pm and 7am at Pyrmont to supply TBM segments on as-needs basis to the TBM for a 12 week period.	traffic and access would be managed via the CTMP.				
Waste and resource management	All waste associated with the proposed change would be appropriately disposed of and managed in accordance with the *Protection of the Environment Operations Act 1997* (POEO Act) and Waste Regulation. Waste impacts would be minor in nature and temporary. TBM spoil and cavern invert excavation spoil would be transferred via the running tunnels, to The Bays construction site which would reduce spoil truck movements on the surface, traffic	No additional measures required.	Y	N	Y	

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Aspect	Nature and extent of impacts (negative and positive) during construction (if control measures implemented) of the proposed change, relative to the relevant impact in the Approved Project	Proposed Control Measures in addition to project CoA and REMMs	Consistent Impact Y/N	Do any CoA need to be changed? Y/N	Endorsed	
					Y/N	Comments
	congestion and associated community temporary nuisances associated with noise.					
Visual	Visual impacts associated with the proposed change would be negligible and consistent with impacts assessed in both EIS and RtS. Given Pyrmont East construction site is surrounded by a construction hoarding and most of the works would be undertaken within an acoustic shed, visual impacts would be minor and managed through existing mitigation measures. The area currently occupied by the WTP would be used for materials storage.	Any impacts as result of changes to the site layout would be included in the CEMP.	Y	N	Y	
Land use and property	No change from Approved Project.	No additional measures required.	Y	N	Y	
Hazard and risk	No change from Approved Project.	No additional measures required.	Y	N	Y	

11. Impact Assessment – Operation

The proposed change would be limited to the construction phase of the project. There would no operational impacts associated with the proposed change.

Aspect	Nature and extent of impacts (negative and positive) during construction (if control measures implemented) of the proposed change, relative to the relevant impact in the Approved Project	Proposed Control Measures in addition to project CoA and REMMs	Consistent Impact Y/N	Do any CoA need to be changed? Y/N	Endorsed	
					Y/N	Comments
Biodiversity			N/A			
Water			N/A			
Soils and contamination			N/A			

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Aspect	Nature and extent of impacts (negative and positive) during construction (if control measures implemented) of the proposed change, relative to the relevant impact in the Approved Project	Proposed Control Measures in addition to project CoA and REMMs	Consistent Impact Y/N	Do any CoA need to be changed? Y/N	Endorsed	
					Y/N	Comments
Air quality			N/A			
Noise and vibration			N/A			
Aboriginal Culture and Heritage			N/A			
Historic Heritage			N/A			
Community and socio-economic			N/A			
Traffic and transport			N/A			
Waste and resource management			N/A			
Visual			N/A			
Land use and property			N/A			
Hazard and risk			N/A			
Other			N/A			

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12. Consistency with the Approved Project

Question	Response
Is the project (including the proposed changes) consistent with the conditions of approval?	Yes, the proposed change would be consistent with the conditions of approval.
Is the project (including the proposed changes) consistent with the objectives and functions of elements of the Approved Project?	Yes, the proposed change would be consistent with the objectives and functions of elements of the Approved Project.
Are the environmental impacts of the proposed change consistent with the impacts of the approved project?	Yes, the environmental impacts associated with the proposed change are minor, short term in duration and consistent with the impacts assessed in both the EIS and RtS for the Approved Project as a whole. Potential noise and traffic impacts to receivers would be adequately addressed through the application of the mitigation measures detailed Section .10 above.
Are there any new environmental impacts as a result of the proposed works/project changes?	The proposed works would not result in any new environmental impacts beyond those considered in the Approved Project. The proposed changes would be negligible or minor environmental impacts relative to the impact of the Approved Project. All impacts identified for the proposed change would be adequately mitigated through the application of the mitigation measures provided in the EIS, RtS and Conditions of Approval.
Are the impacts of the proposed activity/works known and understood?	Yes, the impacts of the proposed works are understood and will be accounted for by implementing the control measures within the DNVIS Addendum, CTMP, CEMP and sub-plans. Existing mitigation measures described in the approval documentation are considered appropriate.
Are the impacts of the proposed activity/works able to be managed so as not to have an adverse impact?	Yes, the impacts of the proposed works can be managed so as to avoid an adverse impact. This includes routine monitoring and ongoing community engagement in accordance with the Community Communications Strategy to manage any potential noise and traffic related impacts..
Would any Conditions of Approval be required to be changed as a result of the proposed change (having regard to the above assessment)?	☐ Yes ☒ No
Is the proposed change/s consistent with the approval (having regard to the above assessment)?	☒ Yes ☐ No

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13. Other Environmental Approvals

Identify all other approvals required for the proposed works:	A variation to the Environment Protection Licence (EPL) no. 21784 has been obtained for the TBM segment deliveries to occur from 10pm to 7am for a 12-week trial period. If a longer time period is required, a variation will be submitted to EPA for consideration and approval. No additional environmental approvals or permits are required for the proposed change.

14. Recommendation

Based on the above impact assessment, and with reference to the EIS and RtS, including the conditions of approval, it is recommended that:

	Tick relevant box
The proposed change has negligible or more than negligible impacts on the environment or community however is consistent with the Approval, including the conditions of approval. The proposed impacts are consistent with those assessed for the Approved Project (i.e., does not trigger a change to the conditions of approval).	X
The proposed change is not consistent with the Approved Project including the conditions of approval and would be subject to a separate modification application.	
The proposed change is not substantially the same as the Approved Project and is considered a radical transformation. A new planning pathway should be considered.	

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Author certification

To be completed by person preparing checklist.

I certify that to the best of my knowledge this Consistency Checklist: • Examines and takes into account the fullest extent possible all matters affecting or likely to affect the environment as a result of activities associated with the proposed change; and • Examines the consistency of the proposed change with the Approved Project; is accurate in all material respects and does not omit any material information.			
Name:	Sally Reynolds	Signature:	
Title:	ESS Director		
Company:	JCG JV	Date:	30/07/2025

Assessment Supporting Signature

This section is for Sydney Metro only.

Application supported and submitted by			
Name:	Jessie Strange	Date:	4/8/25
Title:	Snr Manager Planning Approvals	Comments:	
Signature:			

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Assessment Endorsement

Based on the above assessment, are the impacts and scope of the proposed change consistent with the existing Approved Project?

Yes ☑ The proposed change is consistent with the Approved Project and no further assessment is required.

No ☐ The proposed change is not consistent with the Approved Project.

A modification or a new activity approval/ consent is required. Advise Senior Project Manager of appropriate alternative planning approvals pathway to be undertaken.

Endorsed by			
Name:	Ryan Butler	Date:	8/8/2025
Title:	A/Director Project ESP	Comments:	
Signature:			

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Appendix A –

Addendum DNVIS – Pyrmont Station – TBM Support from Pyrmont East

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25 July 2025
TM372-02-1-02F20 SMW-ETP_ADD-DNVIS-PYR_TBM Support(r7)

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 - 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.

1.1 Changes to DNVIS assessed in this Addendum

This Addendum assesses changes in noise and vibration impact associated with the following two activities:

- Commencement of the TBM segment deliveries (on a 24 hour basis) and consumables (7am-10pm) to Pyrmont East, referred to as TBM support activities. The segments will be unloaded within the acoustic shed; lifted into the shaft and transported by Multi Service Vehicle (MSV) to enable the tunnel lining to be constructed as the TBM progresses towards Hunter Street. Consumables (pipe work, grease, oil etc) are required to connect critical services (water, slurry, grout) between The Bays and the operating TBMs. The deliveries would be to the Pyrmont East site upper deck where the consumables would be lifted into the shaft via an electric (davit) crane.

- Concrete pours for the crossover and station cavern inverts are required to occur outside the acoustic shed on Union Street. This is required as there is insufficient space within the Pyrmont East site/acoustic shed to set up two concrete pumping facilities and associated testing and washout areas. The concrete pours will generally occur between 7am and 10pm over a 9 week period. On four occasions (subject to EPL approval), this would also require concrete pours past 10pm, when the pours take around 24 hours each. Extended hours of concrete deliveries for the concrete pours are required to ensure concrete quality requirements and design specifications can be achieved.

Table 1-1 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 1-1: 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.
	Revised Invert concrete pours from PYR-E Tunnel Lining (concreting) without shed, i.e. delivery of concrete to Union Street	Yes	No	Pyrmont DNVIS Table C1 assumption updates for Pyrmont East in blue text (see Table C1). No change to Tunnelling DNVIS.

2 Construction works and hours

2.1 Construction works addressed in this Addendum DNVIS

The additional works assessed in this addendum to the Pyrmont DNVIS will be undertaken during and outside standard the construction hours defined in Section 2.2 of the DNVIS. The works are summarised in Table 2-1.

Table 2-1: Summary of construction works under this Addendum DNVIS

Activity/ work area	Aspect	Construction hours	Applicable CoA/ EPL Condition	Timing of activity	Duration
Post-TBM: TBM Support from Pyrmont East (Assessment ref: SW-MTS-TBM)	Tunnel Lining (segments) and other tunnelling materials/ consumables	Standard hours + OOHW (D/E/N)*	CoA D23(d)(ii) EPL L5.10(b) and L5.19	Jul-25	4 months
Post-TBM: Revised Invert concrete pours from Union Street due to TBM support (Assessment ref: SW-MTL-TBM)	Invert concrete pours - Tunnel Lining (concreting) without shed, including delivery of concrete	Standard hours + OOHW (D/E/N)*	CoA D23(c)(i);	Oct 25 (setup in standard hours from Sep-25)	9 weeks

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

'OOHW(D)' is the OOH 'Day' period; 8am to 6pm Sunday

'OOHW(E)' is the 'Evening' period, 6pm to 10pm Monday to Sunday

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

*Justification of OOHW presented in Section 2.2.1 of this report

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

The construction haulage route (including all deliveries) for Pyrmont East is as per Figure 2.3 in the DNVIS. Based on the proposed activities summarised in Table 1-1 and detailed in Table C.1 in APPENDIX C, the construction traffic is consistent with construction traffic generated in the Pyrmont DNVIS, with the exception of night time concrete deliveries during the invert concrete pours. 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)" and "SW-MTL-TBM Post-TBM Revised Invert concrete pours from PYR-E" the number of heavy vehicle movements per day are assumed to be a total of 9 heavy vehicles per hour during the day, 7 heavy vehicles per hour during the evening (7am to 10pm) and 5 per hour at night.

The traffic generated by construction assessed in the Addendum report is consistent with the traffic generated by construction assessed in the Pyrmont DNVIS, except on the four long pour nights.

The truck access route to and from the Pyrmont East site will not change from the DNVIS (i.e. site access via Pyrmont Bridge Road, left onto Edward Street, right onto Union Street; site egress left off Union Street onto Pyrmont Bridge Road). The additional vehicles on Pyrmont Bridge Road over the 4 long pour nights are unlikely to have a significant impact to residential receivers on Pyrmont Bridge Road due to the existing traffic volumes on this major arterial road.

There are likely to be traffic noise impacts to residential receivers on Edward Street and Union Street on the four nights where there are long pours. However, these receivers will also be noise affected by the concrete lining works on Union Street. Noise mitigation and management measures are described in Section 4.2 to mitigate both construction noise and construction traffic noise.

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) and EPL Conditions L5.10(b) and L5.19.

Invert concrete pours from Pyrmont East (Union Street) will be undertaken under an EPL variation in accordance with condition D23(c)(i).

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 been approved to permit out of hours deliveries to Pyrmont East (EPL L5.16) and concrete segment deliveries to Pyrmont East (EPL L5.19) past 10pm.

JCG require extended hours of concrete deliveries at the Pyrmont East site to ensure concrete quality requirements and design specifications can be achieved. Concrete pumping for the crossover and station cavern inverts has been relocated from the Pyrmont East shed to Union Street adjacent to the Pyrmont East site due to space requirements associated with the concrete pumping equipment required to achieve the pumping rate. The pours will be completed over 9 weeks, instead of 19 weeks as outlined in the Pyrmont DNVIS.

The pours associated with the crossover and station cavern inverts are planned to be completed within 10 to 15 hours, between 7 am and 10 pm. On four occasions (compared to 3 occasions identified in the Pyrmont DNVIS) there will be a need for concrete pours to occur during the night period.

Updated details of the concrete pours associated with the crossover and station cavern inverts and likely OOHW requirements are summarised in Table 2-2.

Table 2-2: Large concrete pour out-of-hours work requirements

Concrete pour location	Approx Start Date (duration)	Frequency	Working hours*	Construction hours
Crossover & Station Cavern Inverts	October 2025 (9 weeks)	24 pours in 9 weeks = 2-5 pours/week	12no. x 14 hours pour	Standard hours + OOHW (D/E)
			8no. x 15 hours pour	Standard hours + OOHW (D/E)
			2no. x 23 hours pour	Standard hours + OOHW (D/E/N)
			2no. x 25 hour pour	Standard hours + OOHW (D/E/N)

Note: * Standard construction hours = 11 hours (7am to 6pm, weekdays); Evening (E) = 4 hours (6pm to 10pm); Night (N) = 9 hours (10pm to 7am, weekdays)

Text in blue represents revised details from Pyrmont DNVIS

EPL L5.16 has been approved by the EPA (6/6/2025) for delivery of materials to support tunnelling between 10:00 pm and 7:00 am provided deliveries are unloaded inside the acoustic shed. This will include the delivery of concrete for large concrete pours as described above, subject to variation to allow the delivery to occur outside the shed on Union Street.

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 works towards (or below) the NMLs.

4 Construction airborne noise impacts

The airborne noise prediction methodology is consistent with the DNVIS (Section 5.1). The assessed construction scenarios are presented in Table 4-1. Assumptions regarding construction activities, plant and equipment and hours of operation for works assessed in this Addendum are presented in APPENDIX C, including limitations on plant operating beyond 10:00 PM.

Table 4-1: Assessed construction scenarios

Construction activity	Scenario ID	High impact item	Vibration significant item
Western worksite			
Post TBM: TBM Support PYR-E (activities as per Pyrmont DNVIS	SW-MTS-TBM	-	-

Construction activity	Scenario ID	High impact item	Vibration significant item
Eastern worksite			
Post TBM: TBM Support PYR-E	SW-MTS-TBM	-	-
Post-TBM: Revised Invert concrete pours from Union St (no mitigation)*	SW-MTL-TBM	-	-
Post-TBM: Revised Invert concrete pours from Union St (mitigated)*	SW-MTL-TBM-M	-	-

NOTE: * Tunnelling support at Pyrmont West and East (assessment ref: SW-MTS-TBM) occurs concurrently with invert concrete pours.

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: 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 4-3 and Table 4-4 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 4-2. Predicted noise levels are presented in APPENDIX D.

Table 4-3: 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)	3- 10 dB(A)	10-20 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)	> 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	0	1	0	0	0	5	4	0	0	4	8	4	0	5	9	1	0	15	5 (18)[3]
	Post-TBM: Revised Invert concrete pours from Union St (no mitigation)	SW-MTL-TBM	6	8	1	0	0	10	22	4	5	12	15	17	14	7	19	23	14	63	9 (22)[3]
	Post-TBM: Revised Invert concrete pours from Union St (mitigated)	SW-MTL-TBM-M	0	9	1	0	0	6	9	5	0	4	8	6	8	8	8	3	9	27	9 (22)[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. Grey text indicates predicted impacts from DNVIS.

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.

Table 4-4: 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
	Post-TBM: Revised Invert concrete pours from Union St (no mitigation)	SW-MTL-TBM	4	3	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	2	0	0	0
	Post-TBM: Revised Invert concrete pours from Union St (mitigated)	SW-MTL-TBM-M	3	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	0	0	0

Note: Highly noise affected does not apply to OSRs, as per the ICNG. Grey text indicates predicted impacts from DNVIS

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.

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.

The invert concrete pours in Union Street will result in up to 15 construction noise affected residential receiver buildings if no mitigation measures are implemented. All reasonable and feasible mitigation measures have been considered (refer to Section 4.2). By implementing all reasonable and feasible mitigation measures, predicted noise levels are significantly reduced, by up to 15 dB. Up to 10 residential receiver buildings would be construction noise affected during standard construction hours, with 9 of those residential receivers predicted to be within 2 dB of the NML.

Up to four commercial receivers, one hotel (The Sebel) and one recording studio are predicted to be construction noise affected should they be occupied during the Invert concrete pours.

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.

The cavern invert pour in Union Street will result in up to 63 construction noise affected residential receiver buildings if no mitigation measures are implemented. All reasonable and feasible mitigation measures have been considered (refer to Section 4.2). By implementing all reasonable and feasible mitigation measures, predicted noise levels are significantly reduced, by up to 15 dB. Up to 28 residential receiver buildings would be construction noise affected outside standard construction hours, with 8 of those residential receivers predicted to be within 2 dB of the NML.

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

The cavern invert pour in Union Street will result in an additional four residential receiver buildings (compared to TBM Support activities) potentially exposed to noise levels above the sleep disturbance screening level. These receivers are also exposed to noise from the activity on site. It is noted that over the 9 week concrete pour work period, concrete pours occur on a total of four nights.

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 4-5: Specific mitigation measures

Control measure	Description of the control measure	Feasible/ reasonable test	Adopted?
Post TBM: TBM Support PYR-E (SW-MTS-TBM)			
Limit OOHW activities identified in Table 2.1	OOH works would be limited to manage noise emission from site to the plant and activities nominated in Table C.1A: PYRMONT STATION (Post TBM – TBM support from PYR-E shed)	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 (see Pyrmont DNVIS Table C4) and shaft during OOHW, as noted in Table C1A.	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 (see Pyrmont DNVIS Table C4) 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 (see Table C4A in APPENDIX C) 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

Control measure	Description of the control measure	Feasible/ reasonable test	Adopted?
Deliveries to upper deck limited at night	No tunnel materials deliveries to upper deck between 10pm and 7am (see Table C1A in APPENDIX C).	This measure could be feasibly and reasonably be implemented.	Yes
Post-TBM: Revised Invert concrete pours from Union St (mitigated) (SW-MTL-TBM-M)			
Limit OOHW activities identified in Table 2.1	OOH works would be limited to manage noise emission from site to the plant and activities nominated in Table C.1B: PYRMONT STATION (Post TBM - Invert concrete pours outside PYR-E shed).	This measure could be feasibly and reasonably implemented.	Yes
Replace diesel concrete line pumps with electric	Noise from the line pump is mostly generated by the swing tube pushing the concrete through the pump, not the diesel engine, so no noise benefit from electric pump. In addition, the electric pump would require a large diesel generator with a similar engine size as the pump.	This measure is not reasonable as there is not sufficient noise benefit from the alternative pump.	No
Acoustic shed for Union Street worksite	Acoustic shed to cover entire Union Street worksite, enclosing all plant items with sound insulation/absorption specifications designed by Renzo Tonin & Associates.	Not feasible to construct an acoustic shed on the site large enough to house all plant items.	No
Acoustic enclosure for concrete line pumps	Temporary acoustic enclosure to completely enclose concrete line pumps (see Figure C1B and Table C4A in APPENDIX C).	This measure could be feasibly and reasonably be implemented.	Yes
Acoustic enclosure for concrete truck discharge point and washout stations	Expand temporary acoustic enclosure for concrete line pumps to completely enclose pump and concrete agitator truck during discharge to pump. Similar enclosure for wash out station and concrete agitator truck.	This measure is not feasible as there is insufficient space on site to accommodate the larger enclosures, whilst maintaining access to site	No
Temporary noise barrier (4m) at western end of Union Street worksite	Temporary noise barrier 4 metres high located at western end of Union Street worksite to shield noise to sensitive receivers to the west on Unions Street and Edward Street (see Figure C1B and Table C3A in APPENDIX C).	This measure could be feasibly and reasonably be implemented.	Yes
Relocate concrete testing to Pyrmont West acoustic shed	Concrete testing must be completed immediately prior to the concrete being poured on site for quality control. This creates an additional concrete discharge point within the Union Street worksite. Relocation of the test facility to inside the Pyrmont West acoustic shed would reduce this noise.	This measure is not feasible as there is insufficient space within the Pyrmont West acoustic shed during the day/ evening period. For the night pours, this measure would increase the number of residential receivers potentially exposed to sleep disturbance impacts.	No
Location of concrete test facility	The concrete test facility and discharge point should be located as close as practicable to the temporary noise barrier (4m) at western end of Union Street worksite to maximise to noise shielding benefit of the noise barrier.	This measure could be feasibly and reasonably be implemented.	Yes
During night pours spin to agitator bowls on slow rotation during concrete wash out	Limit noise emission from concrete washout during four long pours that extend to the night period. After 10:00 PM concrete wash out will be undertaken with the agitator bowls on slow rotation only (i.e. no high speed rotation) with a hose. Drivers will complete a thorough wash out back at the concrete supply yard (if necessary).	This measure could be feasibly and reasonably be implemented.	Yes

Control measure	Description of the control measure	Feasible/ reasonable test	Adopted?
Low pressure hose for concrete washout	All concrete washouts will be undertaken using a low pressure hose only.	This measure could be feasibly and reasonably be implemented.	Yes
Provide respite from concrete pours at night	Provide a minimum of 2 nights respite following each 24 hour pour.	This measure could be feasibly and reasonably be implemented.	Yes
Limit segment deliveries at night during long pour	There are four planned long invert concrete pours, where works will extend into the night period (i.e. after 10:00 PM). On these four nights, segment deliveries will be to the Pyrmont East shed will be stopped prior to 10:00 PM to reduce the total number of heavy vehicle movements on Edward Street during the night period	This measure is not feasible. Ceasing segment deliveries at 10pm would result in the TBM operation ceasing operation dure to the limited storage space for TBM segments in the Pyrmont shaft.	No
Sitewide			
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 and Pyrmont Bridge Road	Use traffic control to manage traffic on Edward Street so that delivery trucks can directly access - the Pyrmont East shed - Union Street worksite (concrete deliveries). from Edward Street and egress 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 and the revised invert concrete pours in Union Street. JCG JV will start proactively engaging with stakeholders prior to the activities occurring and in accordance with the CNVS. Further details regarding consultation completed to date are provided in APPENDIX E.

Table 4-6: 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	Ongoing
One week prior	Weekly email update	Ongoing
One week prior	Direct email to residents and businesses	Ongoing
One day prior (and as required)	Text message	Ongoing
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 4-7: 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	NCA04	63 EDWARD STREET PYRMONT, NSW
Attended	NCA04	33 UNION STREET PYRMONT, NSW
Attended	NCA05	1-5 HARWOOD STREET, PYRMONT, NSW
Attended	NCA05	1-9 PYRMONT BRIDGE ROAD, 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 C1A and C1B in APPENDIX C. Noise monitoring would be conducted during the daytime to confirm noise levels from plant items are at or below the levels prescribed in Table C1A and C1B before commencing use during the OOHW period. If measured noise levels are above the levels reported in Table C1, additional mitigation measures will be considered (where reasonable and feasible) to reduce noise levels from the identified source prior to its operation during the OOHW period or manage impacts as described in Section 4.2.2.

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 the TBM support works from Pyrmont East is **low** to **moderate** for the consistent with the classification in the DNVIS. The impact classification for the Revised Invert concrete pours from Union St (mitigated) is **low** to **moderate** during the standard hours and evening period consistent with the classification in the DNVIS. During the four long concrete pours the impact classification is considered **moderate** as the number of nights have been limited to four in total, and there will be 2 nights of respite (or more) between each long pour that extends into the night period.

Whilst predicted noise levels from the OOHW were found to exceed the NMLs, 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 and additional mitigation measures (as noted in table D3 in APPENDIX D) regarding the works and noise monitoring to verify noise levels.

6 Conclusion

In conclusion, works associated with the following construction activities have been described in this Addendum DNVIS to identify potential environmental risks associated with construction noise and vibration:

- commencement of the TBM support activities, including segment deliveries and consumables to Pyrmont East; and
- Invert concrete pours to be facilitated from the Union Street worksite (including delivery of concrete to Union Street).

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.

The predicted airborne noise levels during **invert concrete pours in Union Street** were found to be higher than the predicted noise levels in the DNVIS, as the works will be undertaken outside the acoustic shed. Reasonable and feasible physical noise mitigation measures in addition to the measures identified in the Pyrmont DNVIS (refer to Section 4.2) will be implemented to reduce noise towards the NML. The identified noise affected receivers above are mostly within 10 dB or below NML, with physical mitigation measures in place. There are nine residential receiver buildings and 1 hotel where predicted noise levels (with mitigation) are more than 10 dB above the NML. There is 1 receiver where predicted noise levels (with mitigation) are more than 20 dB above the NML. Additional mitigation measures are identified in Table D.3 (APPENDIX D).

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
27.06.2025	Update to include revised invert concrete pours on Union Street	6.1	7	T. Gowen	-	M. Tabacchi
25.07.2025	Respond to SM/ER/AA comments	7.1	8	T. Gowen	-	M. Tabacchi

File Path: R:\AssocSydProjects\TM351-TM400\TM372 mt SMW - Eastern Tunnelling Pkge\1 Docs\02 PYRMONT\TM372-02-1-02F20 SMW-ETP_ADD-DNVIS-PYR_TBM Support(r7).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.

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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: 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

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[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

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[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)

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

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[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
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

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	NMLD(S)	NMLD(O)	NMLE	NMLN	NMLMS	$L_{Aeq(15min)}$	L_{AFmax}	
Residential receivers																
NCA04	Predominantly Residential	B.04	50	47	45	56	50	47	60	55	52	50	53	50	60	Nearest worksite 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 C1A: Construction timetable/ activities/ equipment

PYRMONT STATION (Post TBM - TBM support from PYR-E shed)

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	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)
TBM Support from PYR-E	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)	EWP (Diesel)	2	2	2			96	-	99	-	-	Underground in tunnels (tunnel maintenance on day shift and night shift)
	tunnelling and associated activities of	Tunnel buggy	2	2	2			100	-	105	-	-	Running in the PYR-E Shaft and TBM tunnels 24/7
	rockbolting, shotcreting and mucking out;	Crane 40t Franna	1	1	1			100	-	104	-	-	Located within Cavern and PYR-E Shaft
	spoil haulage; delivery of material to directly	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	Delivery truck (medium, rigid)	≤ 2 p.h.	≤ 2 p.h.	-			100	-	109	-	-	Deliver to upper deck. No deliveries between 10pm and 7am.
	[Outside shed. Deliveries via opening in	Crane 2.5t (Electric, Davit Arm)	1	1	-			90	-	111	-	-	Located adjacent to opening in upper deck. Used to unload trucks/ load material into
	upper deck to be covered 10 PM - 7AM.]	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.

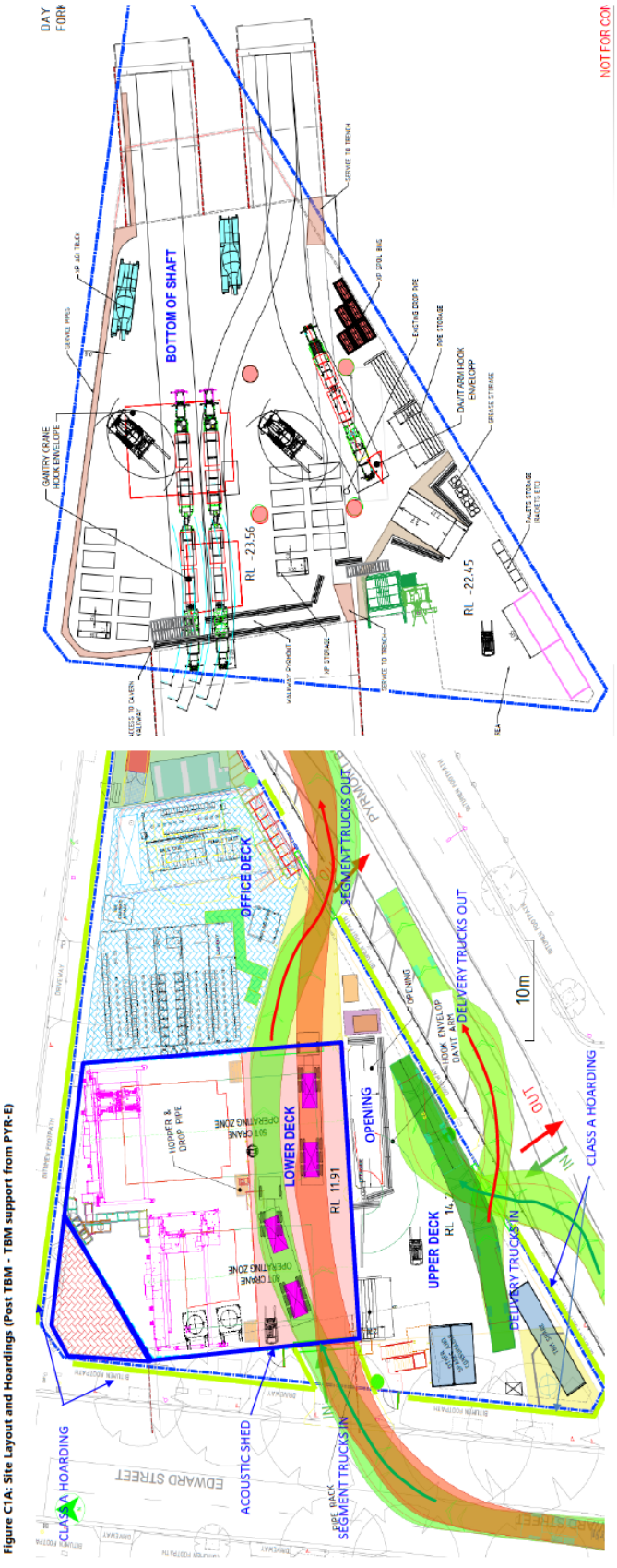

Figure C1A: Site Layout and Hoardings (Post TBM - TBM support from PYR-E)

Table C1B: Construction timetable/ activities/ equipment — **PYRMONT STATION (Post TBM - Invert lining outside PYR-E shed)**

Activity/ Work Area	Aspect	Plant/ Equipment	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	Cavern invert concrete pours	Stationary concrete pump 200 kW | 162 bar |	Stationary concrete pump 200 kW | 1	2	2	2**	Oct-26	9 weeks	123	-	125	-	-	Located on Union Street.
Revised invert concrete pours from Union Street	Assessment ref: **SW-MTL-TBM** (Site wide (East & West sites, with shed); Tunnel Lining (concreting) without shed, including delivery of concrete	Concrete vibrator	pneumatic vibrator	40	40	0			97	-	100	-	-	Underground, in cavern
		Concrete Agitator	Concrete road agitator	≤ 9 p.h.	≤ 7 p.h.	≤ 5 p.h.**			105	-	111	-	-	Enter via Union Street, discharge to line pump on Union Street.
		Forklift	Forklift	1	1	1**			99	-	103	-	-	Located on Union Street
		Concrete Agitator	Concrete wash out - high speed	2	2	-			105	-	111	-	-	Washout out with hose (not high pressure) on Union Street
		Concrete Agitator - low speed	Concrete wash out -slow rotation	-	-	2**			102	-	111	-	-	Washout out with hose (not high pressure) on Union Street. Full wash out completed back at batch plant during night period.

NOTE: Black text indicates works included in Pyrmont DNVIS. Blue text indicates update from DNVIS, assessed in this Addendum.
**** 10pm to 7am is for 4no. pours only.**

Figure C1B: Site Layout and Hoardings (Post TBM - Invert lining outside PYR-E shed)

PYRMONT STATION (Post TBM - Invert lining outside PYR-E shed)

Table C3A: Noise Wall / Hoarding Design Specifications

Noise wall reference	Location	Noise wall/ hoarding height	Proposed Construction	Acoustic Rating of Construction*	Building element key
TNB01	PYRMONT EAST Temporary noise barrier as shown in Addendum Figure C1	4 m	17 mm plywood hoarding OR RVT's Soundex Curtain - Lite Barrier	Rw24 Rw28	

Notes:

Noise barrier performance: Low - Rw 10-15; Medium - Rw 15-20; Medium-High - Rw 20-25; High - Rw 25; Very High - Rw 30

* estimated by calculations and/or reference to other similar barrier type data

GENERAL

- The specified 'required rating' must be achieved by the product selected.
- By way of explanation, the Sound Insulation Rating Rw is a measure of the noise reduction property of the assembly, a higher rating implying a higher sound reduction performance.
- Note that the Rw rating of systems measured as built on site (Rw Field Test) may be up to 5 points lower than the laboratory result.
- The sealing of all gaps is critical in a sound rated construction. Use only sealer approved by the acoustic consultant.
- Check design of all junction details with acoustic consultant prior to construction.
- Check the necessity for HOLD POINTS with the acoustic consultant to ensure that all building details have been correctly interpreted and constructed.
- The information provided in this table is subject to modification and review without notice.
- The advice provided here is in respect of acoustics only. Supplementary professional advice may need to be sought in respect of fire ratings, structural design, buildability, fitness for purpose and the like.

Table C4A: Noise Shed / Enclosure Design Specifications

PYRMONT STATION (Post TBM - TBM support from PYR-E shed & Invert lining outside PYR-E shed)

Area to be Mitigated	Construction component	Reference ID	Indicative element construction	Building element key
TBM Support: Opening in Upper Deck - Cover	Cover (OPTIONS)	F019 F026	Lining - 2x17mm Plywood with acoustic foam on inside Acoustic curtains such as sonic curtain 5kg/m2 - Flexshield or equivalent	
Invert lining: Concrete pump acoustic enclosure	Walls	F063	SOUNDEX® Maxi Enclosure or equivalent	
	Roof	F063	SOUNDEX® Maxi Enclosure or equivalent	
	Openings (enclosure access opening)	-	Openings should face away from neighbours or have direct line of sight to receivers broken by a noise barrier .	

Notes:

1. The final level of noise reduction required from an acoustic shed / enclosure is dependent on a number of factors, however one important factor is whether or not there are noisy plant on site which cannot be acoustically treated and operate outside the acoustic shed / enclosure. Depending on the number and noise emissions of such plant, it may be necessary to apply greater acoustic treatment to the acoustic shed / enclosure in order to keep its noise contributions down so that the total noise emissions from site meet the set environmental noise limits at neighbouring receptors.

LEGEND * estimated by calculations and/or reference to other similar wall type data. The client is advised not to commit to materials which have not been tested in an approved laboratory or for which an opinion only is available. Testing materials is a component of the quality control of the design process and should be viewed as a priority because there is no guarantee the forecast results will be achieved thereby necessitating the use of an alternative which may affect the cost and timing of the project. No responsibility is taken for use of or reliance upon untested materials, estimates or opinions.

GENERAL

- The underside of the roof and (where possible) internal walls should be lined with acoustic insulation to reduce the build-up of sound inside the shed
- The specified performances must be achieved by the product selected.
- The sealing of all gaps is critical in a sound rated construction. Use only sealer approved by the acoustic consultant.
- Check design of all junction details with acoustic consultant prior to construction.
- Check the necessity for HOLD POINTS with the acoustic consultant to ensure that all building details have been correctly interpreted and constructed.
- The information provided in this table is subject to modification and review without notice.
- The advice provided here is in respect of acoustics only. Supplementary professional advice may need to be sought in respect of fire ratings, structural design, buildability, fitness for purpose and the like.
- Only the buildings elements noted in Table C4 and Table C4a have been assessed. It is assumed that all other items will not impact the acoustic properties, or can be sufficiently acoustically treated.

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.

APPENDIX E Consultation Outcomes

Consultation details have been provided in a spreadsheet table.

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 (r7) Rev 8 Dated 25 July 2025
Prepared by:	Larry Clark, Alternate Acoustics Advisor		
Date of issue:	31 July 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)
    - Revised Invert concrete pours from Pyrmont East, which JCG has indicated are part of tunnelling
    - Tunnel Lining (concreting) without shed, i.e. delivery of concrete to Union Street

Approval for the works will require the Environment Protection Authority (EPA) to vary JCG's Environment Protection Licence.

I am satisfied that my comments, and those of Sydney Metro and the Environmental Representative (ER) have been adequately addressed in Revision 8, and I endorse this Addendum, subject of course to EPA's variation of JCG's EPL.

Larry Clark

Larry Clark, Metro West Alternate Acoustics Advisor

Appendix B

Pyrmont East - Construction Traffic Management Plan Stage 3 Tunnelling and Lining (Rev 5)

Refer JCG website:

Pyrmont East CTMP Stage 3

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