Glenn Snow
Director, Transport Assessments
Department of Planning and Environment

Sydney Metro West – Stage 2 – Modification 1: Response to Submissions

Sydney Metro is seeking a modification to the approved Major civil construction work between The Bays and Sydney CBD (SSI-19238057) (Stage 2 of the Sydney Metro West project), as it relates to Condition D23(d)(i) of the Conditions of Approval.

The Modification Report to support this proposed modification was placed on public exhibition from 1 to 15 February 2023. During this time 11 submissions were received from 10 unique submitters, as follows:

- Seven relating to a design change to relocate the crossover cavern from The Bays to Pyrmont
- Four relating to the proposed modification to Condition D23(d)(i)
- Out of the 11 submissions, two were in support of the proposed modification, seven were in objection and two provided general comments.

No objection was received by City of Sydney Council.

In addition to the 11 submissions, advice was provided to the Department of Planning and Environment from the NSW Environment Protection Authority.

Sydney Metro has considered and prepared responses to the issues raised in the 11 submissions in accordance with section 5.17(6)(a) of the *Environmental Planning and Assessment Act 1979*. Sydney Metro has also prepared a response to the agency advice received from the NSW Environmental Protection Authority.

Responses to the submissions and agency advice can be found in the following attachments:

- Attachment A: Summary of stakeholder and community engagement
- Attachment B: Response to submissions
- Attachment C: Response to agency advice

Should you have any questions, please contact
todd.brookes2@transport.nsw.gov.au@transport.nsw.gov.au

Regards
Carolyn Riley
Executive Director, Environment, Sustainability & Planning
Sydney Metro

Sydney Metro
Level 43, 680 George Street, Sydney NSW 2000
PO Box K659, Haymarket NSW 1240
(02) 8265 9400
sydneymetro.info
ABN 12 354 063 515

Attachment A – Summary of stakeholder and community engagement

Introduction – community and stakeholder engagement background

Sydney Metro has been engaging with the community, stakeholders, and industry about Sydney Metro West since 2017. Feedback gathered has helped shape the project, including station locations. Since the announcement of Sydney Metro West, consultation and engagement with key stakeholders, local councils and key government agencies has been ongoing. At each stage of engagement, Sydney Metro has sought feedback to understand the views and needs of the Pyrmont community and stakeholders.

In 2019, Sydney Metro invited feedback from stakeholders and the community about Pyrmont as a strategic station option on Sydney Metro West via an online survey. In addition, briefings were also offered to key stakeholders, state government agencies and local councils. Feedback received was considered in assessing strategic options for a station located at Pyrmont, which was subsequently confirmed as part of the Sydney Metro West project in December 2020. In May 2021 a Scoping Report for the Stage 2 Critical State Significant Infrastructure (CSSI) Application was lodged with the DPE which included the location of Pyrmont Station. Between November and December 2021 the EIS for the Stage 2 CSSI Application was exhibited for public comment, including proposed major civil construction at Pyrmont Station and Hunter Street Station, and tunnelling between The Bays and Sydney CBD. Between March and May 2022 the EIS for the Stage 3 CSSI Application was exhibited for public comment, including the proposed station building and precinct design for Pyrmont Station and Hunter Street Station.

Consultation during exhibition

The proposed modification (SSI-19238057-Mod-1) to Condition D23(d)(i) of the Approved Project was exhibited by the Department of Planning and Environment (DPE) from 1 February 2023 to 15 February 2023. During this exhibition period, Sydney Metro undertook stakeholder and community engagement on the proposed modification to Condition D23(d)(i) through different forums and channels.

The following were developed to engage with stakeholders and support the exhibition of the modification:

- A notification letterbox dropped
- Doorknocking affected residents and businesses
- Newspaper advertisement
- E-newsletter alerts to the project mailing list
- Sydney Metro website and interactive portal updates.

About 13,500 printed notifications were delivered to residents and businesses in the project area and about 2,500 stakeholders who have previously registered for project updates were sent an email notification communicating the exhibition.

The community were also able to contact Sydney Metro West through a range of platforms during the exhibition period as outlined in Table A-1.

Table A-1 Community contact and information points

Activity	Details
Community information line (toll free)	1800 612 173
Community email address	sydneymetrowest@transport.nsw.gov.au
Sydney Metro website	sydneymetro.info
Sydney Metro West interactive portal	sydneymetrowest.info/metrowest
Postal address	Sydney Metro West, PO Box K659, Haymarket NSW 1240
Direct contact	Sydney Metro West place managers via phone, email or doorknocking
Facebook page	facebook.com/sydneymetro

Pyrmont community drop-in session

A community drop-in session was held at The Novotel, Darling Harbour on Monday 13 February 2023. The session was tailored to further facilitate discussion and questions, with project subject matter experts, on multiple key planning and construction related changes specifically in the Pyrmont area. This included:

- the proposed modification to Condition D23(d)
- Consistency Assessment for the crossover cavern relocation to Pyrmont and tunnel alignment optimisation
- substratum acquisition.

Common relevant themes raised in feedback given at the session are summarised in Table A-2.

Members of the Pyrmont community were invited to attend the session, to meet expert members of the Sydney Metro West team and have any questions answered. Visitors were not required to make a booking and were able to drop in anytime within the advertised period. This event was attended by about 30 individuals.

Table A-2 Key issues raised during consultation

Theme	Summary
Sub-surface infrastructure	Depths, dimensions, construction processes and operations
Construction	Understanding noise and vibration impacts and types of machinery
Planning	Content of the modification, background on the planning processes to date, approved Consistency Assessment for the crossover cavern relocation to Pyrmont and tunnel alignment optimisation
Substratum acquisition	Specific property questions, substratum acquisition process enquiries

People were made aware of the drop-in session through ongoing engagement processes via place managers, including phone calls and emails. An email invitation was distributed to 1600 people in the Pyrmont community.

At the information sessions the following were made available for visitors to view:

- Information boards
- Current planning documents
- Project newsletters and factsheets
- Previous Environmental Impact Statement information
- Project information portal

Contact cards and Sydney Metro Connect App information was also available for people to take away.

Stakeholder briefings

Sydney Metro engaged with DPE and the NSW Environment Protection Authority (EPA) on 27 January 2023. The briefing was designed to ensure both stakeholders were appropriately informed about the modification scope and were able to ask questions. An offer was made to City of Sydney Council to be briefed on the proposed modification.

Consultation and complaints during construction

Sydney Metro has an Overarching Community Communications Strategy (OCCS) that guides consultation and engagement processes and systems across the project life cycle of Sydney Metro West. The Eastern Tunnelling Package (ETP) contract was awarded to John Holland CPB Contractors Ghella Joint Venture (JCG JV) in November 2022. In accordance with the requirements of the OCCS, a contract-specific Community Communications Strategy will be developed by appointed project delivery communication teams to address contract and site-specific needs of the community, stakeholders and businesses during construction. The contract-specific Community Communications Strategies will also adhere to all requirements in the conditions of the planning approval.

Contractors are required to adhere to a Construction Complaints Management System which outlines the framework for managing complaints, enquiries, and escalation processes throughout the project lifecycle.

Attachment B – Response to submissions

Eleven submissions, from 10 unique submitters, were received during the public exhibition of the modification raising 14 issues including:

Main issue	Sub-issue
Noise and vibration impacts – construction	• Noise disturbances • Tunnel depth • Property impacts
Noise and vibration impacts – operation	• Noise disturbances • Design
Heritage impacts	• Potential damage risk • Assessment methodology
Transport and traffic	• Pedestrian mobility and safety • Construction vehicles • Cumulative traffic and transport issues
Public amenity and visual impacts	• Street trees and vegetation
Station location	• Construction site location • Place making
Design	• Construction costs

The Modification Report to support this proposed modification was placed on public exhibition from 1 to 15 February 2023. During this time 11 submissions were received from 10 unique submitters including City of Sydney Council. Out of all of the submissions received, seven related to a design change to relocate the crossover cavern from The Bays to Pyrmont and four were specific to the proposed modification to Condition D23(d)(i). City of Sydney Council did not provide an objection to the proposed modification.

Several submissions raised issues which aligned with more than one category or were outside the scope of the modification and specific to the approved Consistency Assessment for the relocation of The Bays crossover cavern to Pyrmont, which was publicly released on the same day as the Modification Report commenced public exhibition.

Each issue identified in this report is presented as a summary of the issues raised by individual submissions with careful consideration given to the intent of each submission. Table B-1 provides a response to the issues raised in the submissions received. Each submission was allocated a unique identification number which is represented in Table B-1 alongside the respective key issues that were raised in the submission.

Table B-1 Response to issues raised in submissions

Item	Issue	Response
Community submissions		
Noise and vibration impacts – construction		
1.1	Noise disturbances • Concerns that undertaking construction 24-hours, seven days per week in Pyrmont would result in the generation of high levels of noise • Concerns that 24-hour tunnelling in Pyrmont will result in sleep disturbances and impacts to the operations of at-home businesses. *Submitter identification numbers: S-55049236, S-55053708, S-55036207, S-54832961, S-54549492, S-54825456*	The impacts of 24-hour excavation using tunnel boring machines (TBMs) and non-TBM methods (such as roadheaders and rock breakers) were assessed in the Environmental Impact Statement (EIS) for the Approved Project (Major civil construction work between The Bays and Sydney CBD (Stage 2 of the planning approval process)) (SSI-19238057). The conditions of approval for this project currently enable 24-hour tunnelling by TBM. The purpose of the modification is to seek 24-hour tunnelling by non-TBM methods, such as roadheaders. The Modification Report therefore provides an assessment of potential noise impacts as a result of 24-hour tunnelling by non-TBM methods, which would include the excavation of the station cavern and the relocated Pyrmont crossover cavern. The Modification Report identified that the duration of potential impacts to receivers above the Pyrmont crossover cavern and Pyrmont Station cavern would be around six to 12 weeks. However, receivers would not experience worst-case impacts during the entirety of this period as this relates to the total duration of the top heading excavation of the cavern which may impact any one receiver. In reality, the worst-case impact levels would only occur during the period that roadheaders are operating at the closest slant distance (the very top of the top heading) to each individual receiver. When excavation of the top heading is occurring at greater slant distances, the ground-borne noise levels would be lower. Further information on the likely duration of worst-case impacts are provided in the response to the EPA advice in Attachment C. In summary, the potential worst-case ground-borne noise impact to receivers from non-TBM methods outside of standard construction hours is likely to be up to around one week. The Modification Report concluded that, at some locations, ground-borne noise from tunnelling may result in an exceedance of the noise management levels (NMLs) for the daytime period outside of standard hours (i.e. between 8am and 6pm on Sundays and on public holidays), evening and night time periods. Some community stakeholders may experience a temporary incidence of sleep disturbance. The main noise characteristics that influence sleep disturbance are the number of noisy events heard distinctly above the background level, the emergence of these events and the highest noise level. Ground-borne noise generated from roadheader excavation works is not anticipated to result in maximum noise events and, as such, is not expected to result in sleep disturbance impacts.

Item	Issue	Response
		Notwithstanding, the potential for sleep disturbance will be further considered during the preparation of detailed noise and vibration impact statements. At-home businesses would not be expected to be impacted during standard daytime hours. The Modification Report included an assessment on the impact of daytime NML exceedances during standard daytime hours. For the Pyrmont crossover cavern, ground-borne noise levels are anticipated to comply with the relevant NML during the daytime period. Based on the depth of the Pyrmont Station cavern, it is also expected that ground-borne noise levels would comply with the NML during the daytime period. The Sydney Metro Construction Noise and Vibration Standard (CNVS) identifies mitigation measures that may be implemented to manage noise impacts experienced by residents and other stakeholders. This includes options for respite or alternative accommodation for residents living near construction work that are likely to experience high impacts over an extended period of time. Mitigation measures such as alternative accommodation would be determined on a case-by-case basis. Noise monitoring will be completed at the commencement of new activities to verify predicted levels. Where monitoring identifies noise or vibration levels greater than the predicted, the activities are reviewed and modified where possible, to minimise impacts on receivers. The Sydney Metro CNVS and the conditions of approval (including Condition D29) also establish the process for the development of detailed noise and vibration impact statements. These documents would be prepared by the construction contractor and provide a more accurate prediction of noise levels based on the actual construction equipment, methodology and program. The detailed noise and vibration impact statements would identify all feasible and reasonable mitigation measures to be implemented for the work identified through consultation with potentially affected receivers and would be endorsed by the independent Acoustic Advisor (as required by condition of approval A37(e)).
1.2	Tunnel depth • Comment that the tunnel depth at Pyrmont (Pyrmont Street, Union Square and Paternoster Row) has been reduced from 38 metres to 23 metres. • Comment that reduction in tunnel depth will cause increase risk of damage to residential	The crossover cavern relocation to Pyrmont is outside the scope of the proposed modification. There has been no substantial change to the tunnel depth at Pyrmont since exhibition of the EIS. Figure 5-2 of the EIS outlines the approximate tunnel depths to track level. Recent information provided to the community included: • tunnel depth available on the Sydney Metro tunnel viewer tool which presented depth of the top of the tunnel (tunnel crown) • indicative substratum acquisition zone which is around seven to 10 metres above the tunnel crown.

Item	Issue	Response
	dwellings during construction and disruption during operations. *Submitter identification numbers:* S-54825456, S-55030956	The relocation of the crossover cavern to Pyrmont does result in the tunnel crown being closer to the surface in this localised area (as the crossover cavern is larger than the running tunnels). The noise and vibration assessment for the crossover cavern at Pyrmont identified that ground-borne noise levels in this location would be lower than that predicted in the EIS, and ground-borne vibration impacts would be below the screening criteria for cosmetic damage and well below levels at which structural damage may begin to occur. The risk of structural damage to residential dwellings from tunnelling and cavern excavation is considered low, however as a precaution and in accordance with Condition D44, properties located around the station and construction sites and above the tunnel alignment would be offered a property condition survey to identify any pre-existing conditions prior to construction or tunnelling works.
1.3	Property impacts • Concerns relating to the use of rock breakers and roadheaders at Pyrmont and potential for damage to adjacent structures. • Comment that the relocation of the crossover cavern to Pyrmont would bring elements of the structure closer to the foundations of other buildings, resulting in increased noise and vibration risk to buildings during excavation and construction *Submitter identification numbers:* *S-55049236, S-55053708, S-55036207, S-55030956, S-54832961*	The EIS for the Approved Project predicted ground-borne vibration levels from tunnelling excavation by both TBM and non-TBM means. The assessment found that ground-borne vibration impacts would be below the screening criteria for cosmetic damage and well below levels at which structural damage may begin to occur. This assessment outcome was also supported in the noise and vibration assessment for the relocated crossover cavern at Pyrmont. The risk of structural damage from tunnelling and cavern excavation is considered low, however as a precaution and in accordance with Condition D44, properties located around the station and construction sites and above the tunnel alignment would be offered a property condition survey to identify any pre-existing conditions prior to construction or tunnelling works commencing. Any damage found to be the result of Sydney Metro works would be rectified by Sydney Metro at no cost to the property owner. The crossover cavern relocation to Pyrmont is outside the scope of the proposed modification Based on the current design, the shallowest point of the Pyrmont crossover cavern from ground level to the tunnel crown is around 22 metres deep. As outlined in item 1.2 of this Response to Submissions Report (RTS), the relocation of the crossover cavern to Pyrmont does result in the tunnel crown being closer to the surface in this localised area. The noise and vibration assessment for the relocated crossover cavern at Pyrmont assessed that, at this depth, the ground borne noise levels would be about 40dB, equating to a night-time criteria exceedance of about 5dB (noting this also conservatively includes a 3dB uncertainty factor). This represents a reduction on potential noise level compared to excavation in this location using TBMs (as assessed in the EIS).

Item	Issue	Response
		The noise and vibration technical assessment confirms that vibration levels from the excavation of the crossover cavern are predicted to be below the human comfort criteria and below the cosmetic damage screening level at receivers in the vicinity of the crossover cavern. The risk of damage to buildings occurring as a result of the relocation of the crossover cavern to Pyrmont is considered to be low, however as a precaution and in accordance with Condition D44, properties located around the station and construction sites and above the tunnel alignment would be offered a property condition survey to identify any pre-existing conditions prior to construction or tunnelling works. Any damage found to be the result of Sydney Metro works would be rectified by the project at no cost to the property owner.
Noise and vibration impacts – operation		
2.1	Noise disturbances Comment that submission is opposed to 24/7 operating of Metro services *Submitter identification numbers: S-54549492*	The proposed modification to Condition D23(d)(i) relates to construction activities occurring under Stage 2 of the planning approval, for Sydney Metro West (*Major civil construction work between The Bays and Sydney CBD* (SSI-19238057)) and does not change potential operational noise impacts. Operations of Sydney Metro West were assessed in Stage 3 of the planning approval (*Sydney Metro West - Rail infrastructure, stations, precincts and operations* (SSI-22765520)), which was approved on 25 January 2023. As outlined in Section 5.6.2 of the EIS for Stage 3, it is anticipated that Sydney Metro West would generally operate from early morning to late at night however final operating hours would be determined as part of the development of service schedules for the metro line. Ground-borne noise levels from the operation of Sydney Metro West would comply with the noise criteria outlined in the Rail Infrastructure Noise Guidelines (EPA, 2013).
2.2	Design • Comment that the relocation of the crossover cavern to Pyrmont would bring elements of the structure closer to the foundations of other buildings, resulting in increased noise and vibration risk to buildings during operations. • Comment that project information has previously shown a crossover cavern to be located east of The Bays Station.	As the proposed modification to Condition D23(d)(i) is related to construction only, there would be no operational impacts as a result of the proposed modification. The crossover cavern relocation to Pyrmont is outside the scope of the proposed modification. The relocation of the crossover cavern from The Bays to Pyrmont is not expected to result in operational noise and vibration impacts that would risk the integrity of buildings. Operations of Sydney Metro West were assessed in Stage 3 of the planning approval (*Sydney Metro West - Rail infrastructure, stations, precincts and operations* (SSI-22765520)), which was approved on 25 January 2023. The environmental assessment process found that airborne and ground-borne noise, as well as ground-borne vibration during operations would be able to be effectively managed through design measures including appropriate track form, and that no cosmetic damage to buildings would occur as a result of rail operations. The metro rail tunnels are designed to achieve a ground-borne noise level of 35dBA and vibration levels that

Item	Issue	Response
	Submitter identification numbers: S-55053708, S-55030956, S-5483296, S-54825456, S-54980714	meet the criteria for human comfort, in line with the *Rail Infrastructure Noise Guideline* (NSW EPA, 2013) and *Assessing Vibration: a technical guideline* (Department of Environment, Climate Change, 2006). Potential airborne and ground-borne noise from rail operations would be managed under mitigation measure EIS-NV4 and Condition E49 which would include the preparation of an Operational Noise and Vibration Review during design development.
Heritage impacts		
3.1	Potential damage risk Concerns relating to the use of rock breakers and roadheaders at Pyrmont and potential for damage to heritage structures neighbouring the station site and corridor (including several sandstone terrace houses) during construction and operation. *Submitter identification numbers: S-54825456, S-55049236, S-55053708, S-55036207, S-55030956, S-54832961, S-55053708*	The crossover cavern relocation to Pyrmont is outside the scope of the proposed modification. The EIS of the Approved Project predicted ground-borne vibration levels from tunnelling excavation at structures above the tunnels (including heritage structures) by both TBM and non-TBM methods would be below the screening criteria for cosmetic damage and well below levels at which structural damage may begin to occur. The risk of structural damage from tunnelling and cavern excavation is considered low, however as a precaution and in accordance with Condition D44, properties located around the station and construction sites and above the tunnel alignment would be offered a property condition survey to identify any pre-existing conditions prior to construction or tunnelling works. In the unlikely event that accidental damage does occur to any property or structure, this would be rectified by the project at no cost to the owner.

3.2	Assessment methodology
	
	• Comment regarding the assessment of impacts on non-Aboriginal heritage items. Suggestion that assessment of impacts should be expanded to include additional items:
	  ○ The Pyrmont Bridge (SH 01618)
	  ○ The Pyrmont Bridge Road Hotel (SLEP 2012 Item no. I1277)
	  ○ Adjacent terraces
		The crossover cavern relocation to Pyrmont is outside the scope of the proposed modification. The proposed modification is related to the timing of construction works and would not result in any changes to potential non-Aboriginal heritage impacts.
		
		The Pyrmont Bridge (SH 01618) is located further east along the project corridor, in between Pyrmont Station and Hunter Street Station. The EIS identified that, during main tunnelling work, ground-borne vibration associated with tunnel boring machine use would be much lower than the 7.5 millimetres per second peak particle velocity cosmetic damage screening level. As such, the study area for assessment of potential vibration impacts to heritage items does not extend to areas above the tunnel alignment that are outside the nominated study area for each construction site.
		
		The Pyrmont Bridge Road Hotel (SLEP 2012 Item no. I1277) was assessed for potential impacts in the EIS where the assessment concluded that it was unlikely for the item to experience structural damage.

Item	Issue	Response
	• Comment that the additional sites should be monitored for impacts during construction. *Submitter identification number: S-54832961*	The noise and vibration technical assessment for the relocated crossover cavern at Pyrmont identified that the predicted maximum ground-borne vibration peak particle velocity (PPV) would be below 0.28mm/s. This is well below the threshold for potential damage and as such it is expected that no damage would occur to any heritage items above the tunnel or caverns. Sydney Metro would continue to monitor ground movement and settlement during tunnelling and construction in accordance with mitigation measure NAH8. Where required, further assessments at later design stages and during detailed construction planning would be carried out to check the preliminary findings of the ground movement assessment in relation to listed heritage buildings.
Transport and traffic		
4.1	Pedestrian mobility and safety • Comment that construction haulage routes should not impact the movements of pedestrians in Pyrmont • Comment that Pyrmont has a high level of pedestrianisation. Concern that pedestrians may experience additional safety risks and reduced mobility due to additional traffic caused by construction. *Submitter identification numbers: S-54832961, S-55036207*	The crossover cavern relocation to Pyrmont is outside the scope of the proposed modification.. There is no change to the construction vehicle numbers as a result of the proposed modification to Condition D23(d)(i). Haulage routes from the Pyrmont construction sites were assessed in Section 2.4.1 of the RTS for the Approved Project. The approved routes prioritise heavy vehicle movements on Classified and State roads over local roads to reduce impacts on local traffic and pedestrians. The assessment found that there would be minimal impacts to the existing active transport network at Pyrmont throughout the duration of the construction period. These haulage routes have not changed as a result of the proposed Modification or the relocation of the crossover cavern from The Bays to Pyrmont. Construction vehicles would continue to be required to adhere to the Sydney Metro Construction Traffic Management Framework (CTMF). Section 9.4 of the CTMF relates to pedestrian safety and specifies the requirements of which safety and security issues for pedestrians will be considered at all construction sites, including at Pyrmont. Sydney Metro would continue to safely manage the movements of construction vehicles in accordance with mitigation measure TT5, where additional enhancements for pedestrian, cyclist and motorist safety near the construction sites would be implemented during construction. This would include measures such as assessing suitability of construction haulage routes, specific construction driver training and road safety audits.
4.2	Construction vehicles Comment that relocation of the crossover cavern and proposed modification to Condition D23(d)(i) will cause an increase of heavy vehicle movements and consequential congestion on the road network at Pyrmont.	The crossover cavern relocation to Pyrmont is outside the scope of the proposed modification.. There is no change to the construction vehicle numbers as a result of the proposed modification to Condition D23(d)(i). A maximum of 16 heavy vehicle movements per hour would be required during the daytime for Phase 3 works from the western construction site, which would include crossover cavern

Item	Issue	Response
	Submitter identification numbers: S-54832961, S-55036207	excavation. The RTS for the Approved Project assessed an hourly maximum scenario of 16 heavy vehicle movements per hour. Additional generation of heavy vehicle movements due to the relocation of the crossover cavern to Pyrmont are consistent with the daily and hourly maximum vehicles assessed for the Approved Project. There would be no change to the Level of Service (LoS) of the local road network from what was assessed in the RTS for the Approved Project. It is therefore not expected to result to impact the performance of the road network at Pyrmont. Sydney Metro would continue to manage transport and traffic impacts related to the project in accordance with the Sydney Metro Construction Traffic Management Framework (CTMF).
4.3	Cumulative traffic and transport issues • Cumulative impacts on traffic and transport from nearby State Significant projects in Pyrmont, Ultimo, Darling Harbour and Blackwattle Bay are not adequately mitigated and addressed. • Comment that the community should be given detailed information on the cumulative impacts and delivery timeframes associated with multiple nearby State Significant Developments (Fish Market, Blackwattle Bay, Darling Harbour, Star Casino, UTS and Powerhouse Museum) *Submitter identification numbers: S-55036207, S-54832961*	The crossover cavern relocation to Pyrmont is outside the scope of the proposed modification. Cumulative impacts associated with other State significant projects in the Pyrmont locality were considered during the assessment of environmental impacts for the approved project. The proposed Modification to Condition D23(d)(i) would not change the cumulative impacts that were assessed in the Approved Project. Interface with Government agencies and key stakeholders would continue to occur throughout the lifespan of the project in accordance with Mitigation Measure CI1.

Item	Issue	Response
Public amenity and visual impacts		
5.1	Street trees and vegetation Comment that removal of trees and vegetation around the Pyrmont station site would have a negative effect on the public amenity of the neighbourhood and would result in creating a poor micro-climate for pedestrians. *Submitter identification number: S-55036207*	Removal of trees and other vegetation are outside the scope of the proposed modification and were assessed in the EIS. Sydney Metro West would provide landscaping and tree replacement to achieve a 2:1 replacement ratio and an increase in urban tree canopy as required by the Concept (SSI-10038) conditions of approval C-B8 and C-B9, and Stage 3 (SSI- 22765520) condition of approval E54.
Station location		
6.1	Construction site location Objection to the location of the Pyrmont Station construction sites. *Submitter identification number: S-54549492*	The location of Pyrmont Station and construction sites have been assessed and approved for the project. The proposed modification to Condition D23(d)(i) does not change the approved station location.
6.2	Place making Comment in support for infrastructure investment in Pyrmont that supports a liveable precinct for generations *Submitter identification number: S-54995976*	Sydney Metro notes the support for infrastructure investment in Pyrmont.
Design		
7.1	Construction costs Comment that the decision to relocate the crossover cavern from The Bays Station to Pyrmont Station is to achieve a cost saving.	The crossover cavern relocation to Pyrmont is outside the scope of the proposed modification. The tunnel alignment and features assessed in the EIS were indicative and subject to design development and construction planning. The decision to relocate the crossover cavern from The Bays to Pyrmont has resulted from ongoing design development work which identified several benefits from relocating the crossover cavern. These benefits include:

Item	Issue	Response
	Submitter identification number: S-55030956, S-55049236, S-55053708, S-54825456	• The Pyrmont location would provide a more suitable disembarkment location for customers in the event of degraded mode operations or an emergency evacuation, as the site is better connected to other transport modes including bus and light rail services and closer to the Sydney CBD • Environmental and sustainability benefits from a reduction to the length of the crossover cavern structure, resulting in a reduction in construction waste (spoil generation) by around 15,000m3 and permanent materials use such as concrete for permanent works by over 5,000m3 (compared to the crossover cavern at The Bays in the Approved Project) • Removal of the crossover from The Bays would enable more efficient tunnel boring machine assembly activities at the Bays and reduce program risk at this location.
City of Sydney Council submission		
8.1	Comment that City of Sydney Council have no objections to the proposed modification subject to there being no additional vehicle movements for spoil removal as a result of this change to the proposed modification.	Sydney Metro notes the comments received from the City of Sydney Council and would continue to engage with City of Sydney Council throughout the lifespan of the project. There is no change to the construction vehicle numbers as a result of the proposed modification.
8.2	City of Sydney acknowledges that any noise and vibration impacts and transport and traffic impacts would be managed under the approved mitigation methods.	Sydney Metro notes the comments received from the City of Sydney Council and would continue to engage with City of Sydney Council throughout the lifespan of the project and undertake works in accordance with the conditions of approval and mitigation measures.

Attachment C – Response to EPA agency advice

Advice was provided by the NSW Environment Protection Authority which related to the following issues:

- Providing a further breakdown of the non-TBM tunnelling components
- Requesting further details regarding feasible and reasonable mitigation where works do not meet noise management levels
- Clarity regarding potential impact at the Pyrmont crossover cavern and Pyrmont Station interface
- The frequency and duration of potential ground-borne noise impact at Pyrmont
- The depth of Hunter Street Station
- Detailed noise and vibration impact statements for Pyrmont Station and Hunter Street Station
- The policy approach to construction noise management and the Interim Construction Nosie Guidelines.

Table C-1 provides a response to the issues raised in the NSW Environment Protection Authority agency advice.

Table C-1 Response to issues raised in agency advice from EPA

Issue	Response
Breakdown of non-TBM tunnelling components	
The Modification Report states that 24-hour tunnelling is required for safety and stability reasons and that tunnelling by roadheader is not conducive to starting and stopping, as excavations by roadheader must be immediately followed by temporary support in the form of shotcrete, steel sets, rockbolts and grouting. The report has not provided a breakdown of these support activities and their noise levels. Such details would identify whether there is an opportunity to schedule noise-generating works during more suitable hours – particularly outside of night-time – thus avoiding the potential need to relocate households. The EPA requests additional detail on what reasonable and feasible mitigation measures can be implemented for non-TBM tunnelling, including consideration of scheduling noise-generating activities during less sensitive times (e.g. until 9	As outlined in the Modification Report, roadheader excavation work does not occur continuously for the full cavern excavation period with other supporting activities generally producing lower levels of ground-borne noise (typically around 5dB lower). The excavation sequence for a cavern typically involves: • Excavating the advance by roadheader • Rock bolting and shotcreting to provide immediate ground support following roadheader excavation. For a typical cavern excavation in Hawkesbury Sandstone (the geology encountered at Pyrmont and the Sydney CBD), it is expected that roadheader excavation would occur for around 55 to 60 per cent of the total time, rock bolting for 10 to 15 per cent and shotcreting for 10 to 15 per cent. The remainder of the time (10 to 25 per cent) involves mucking out, maintenance works and other downtime. Tunnelling incorporates all activities including excavation and ground support work. Depending on the geometry of the cavern, the length of the advance and the local ground conditions; excavating the advance by roadheader may take between eight and 18 hours. While opportunities to limit works exceeding noise management levels to daytime and

Issue	Response
pm at night) to enable the less intrusive activities to be done during sensitive times (e.g. between 9 pm and 7 am) – particularly where ground noise impacts exceed noise management levels (NMLs).	evening periods or provide respite would be explored during detailed construction planning, the ability to continue roadheader works outside of standard and evening hours is required to ensure excavation advances can be safely completed. The Modification Report identified the relevant mitigation measures for managing non-TBM tunnelling. The Modification Report also outlined the role of the Sydney Metro Construction Noise and Vibration Standard (CNVS) in managing construction noise and vibration, including the identification of standard mitigation measures, additional mitigation measures and the process for the development of detailed noise and vibration impact statements. The potential ground-borne noise level has been reduced as far as feasible and reasonable through the construction method and equipment selection. Roadheaders have been selected as they produce lower levels of ground-borne noise than alternative methods for cavern excavation such as rock breaking. For example, at a 30 metre slant distance, noise levels from a roadheader are anticipated to be around 35dB compared to around 48dB for a light rock breaker and around 53dB for a heavy rock breaker. The remaining available mitigation measures mainly involve reducing or removing exposure to the noise impacts through scheduling of work, provision of respite periods or alternative accommodation. The exact nature of feasible and reasonable mitigation measures for each non-TBM tunnelling location, including the opportunity to schedule the noise-generating components of the non-TBM tunnelling activities during less sensitive times, would be determined during preparation of detailed noise and vibration impact statements. These are appropriately developed by construction contractors post-planning approval when more detail is known regarding the exact construction methodology and program (which will be informed by detailed ground investigations and design). The process for the preparation of the detailed noise and vibration impact statements, including the identification of feasible and reasonable mitigation measures is outlined in the CNVS and condition of approval D29. The detailed noise and vibration impact statements can be provided to the EPA on request and are made publicly available. These documents are also reviewed and endorsed by the independent by the Acoustic Advisor. The independent Acoustic Advisor is also responsible for regularly monitoring the implementation of noise and vibration

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	documents (including the CNVS and detailed noise and vibration impact statements), recommending improvements that may be made to avoid or minimise noise impacts, and preparing a monthly noise and vibration report. This process has been successfully adopted on previous Sydney Metro projects including Sydney Metro Northwest, Sydney Metro City & Southwest and previous stages of Sydney Metro West.
Outcomes of Detailed Noise and Vibration Impact Statements (DNVIS)	
The Modification Report states that the modelling in the EIS included a number of conservative assumptions that would be adjusted as part of the DNVIS. It draws on two examples for Sydney Metro West Stage 1 where the DNVIS indicated that ground borne noise levels would be below the noise level identified in the EIS and would comply with the NMLs. The Modification Report also includes a summary of the DNVIS for the relocated crossover cavern at Pyrmont. The summary states: "*No receivers are predicted to experience an exceedance of the NML by greater than 10 dB during construction of the Pyrmont crossover tunnel during any time period. However, the duration of construction by non-TBM tunnelling would mean the noise impacts would likely be experienced for a longer duration when compared to tunnelling by TBM."* EPA note that 1-10 dB above NMLs equals 6-15 dB above background noise levels. The Modification Report also states: *"These worst-case potential impacts to any receiver above the cavern are expected to last for around six to 12 weeks.*" The DNVIS summary for the crossover cavern has not identified the reasonable and feasible mitigation measures that would be implemented to reduce construction noise that does not meet NMLs.	The Modification Report draws on information contained in the noise and vibration assessment undertaken to assess the relocation of the crossover cavern to Pyrmont. This noise and vibration assessment was more detailed and based on more accurate assumptions than the EIS assessment, however this assessment was not intended to be a detailed noise and vibration impact statement which met the requirements of the Sydney Metro CNVS or Condition D29 and D30, such as including the specific mitigation measures identified through consultation with affected receivers. Notwithstanding, the assessment did identify a range of ground-borne noise control measures aimed at minimising potential impacts. A detailed noise and vibration impact statement which meets the requirements of the Sydney Metro CNVS and Conditions D29 and D30 would be prepared prior to the works commencing, and would identify all feasible and reasonable mitigation measures for the crossover cavern excavation. The same process would be followed for other non-TBM excavation locations. The detailed noise and vibration impact statements can be provided to the EPA on request and are required to be made publicly available. These documents are also reviewed and endorsed by the independent Acoustic Advisor. In addition, Condition D52 requires that the Community Communications Strategy identify 'specific and proportionate measures and mitigations to manage potential social impacts' and is 'informed by engagement with directly affected communities and stakeholders'. This provides a robust process for mitigation measures to be identified and implemented proportionate to the level of impact which will be identified in the relevant detailed noise and vibration impact statement. Condition D52 also provides for the adaptive management of potential social impacts through regular reviews and consideration of the appropriateness of mitigation measures and lessons learnt.

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Crossover and Pyrmont Station cavern interface	
Regarding the interface between the Pyrmont Station cavern and crossover cavern excavation works, the Modification Report states: "*Some receivers in proximity to the Pyrmont crossover cavern adjacent to the station cavern may experience longer duration as a result of additional non-TBM tunnelling, however the impacts are similarly expected to remain for around six to 12 weeks.*" The EPA requests more information is provided to explain what is meant by this statement, to identify impacts to receivers that may fall into the Venn diagram of the station cavern and crossover cavern work areas, and to outline the reasonable and feasible mitigation measures that would be applied to reduce construction noise impacts below NMLs.	This statement in the Modification Report was to identify that some receivers around the interface point between the Pyrmont Station cavern and the crossover cavern would experience a longer duration of impact compared to if the crossover was not relocated to Pyrmont. However, the duration of impact to these receivers would be within the six to 12 week duration identified in the Modification Report. That is, there is no 'cumulative' impact or extended duration of impact to any one receiver beyond what is identified in the Modification Report. As outlined in the response below, the actual duration of worst-case impacts is likely to be substantially less than the six to 12 weeks identified in the Modification Report. Information on feasible and reasonable mitigation measures that have been applied, and the process for consideration of further measures is outlined in the response above.
Excavation by non-TBM methods at Pyrmont Station	
Regarding the station cavern excavations, the Modification Report states: "*the proposed depth of Pyrmont Station cavern ranges from around 36-39 metres. Applying the ground-borne noise level graph in Figure 3… noise levels would be expected to comply with noise management levels in most cases with some potential for marginal exceedances in the 1-5dB range.*" Figure 3 illustrates the sliding scale of ground borne noise levels in relation to distance from the receiver and shows that "*the residential night-time noise management level of 35 dBA would only be exceeded when works are within a 30 metre slant distance from receivers.*" This additional information regarding tunnel depth at Pyrmont, coupled with indicative roadheader noise levels in Figure 3, provides the EPA with increased confidence that ground-borne noise impacts at Pyrmont may be kept below NMLs. However, the Modification Report states that exceedances could be in the 1-5 dB range (6-10 dB above background). The report does not identify how frequently or for how long these "marginal exceedances" would occur.	The Modification Report presented the potential worst-case ground-borne noise impact to receivers from the top heading excavation and identified that this impact could occur for between six to 12 weeks. This period relates to the total duration of the top heading excavation which may impact any one receiver. In reality, the worst-case impact levels would only occur during the period that roadheaders are operating at the closest slant distance (the very top of the top heading) to each individual receiver. When excavation of the top heading is occurring at greater slant distances, the ground-borne noise levels would be lower. The below provides an example of the range of noise levels and anticipated duration for the Pyrmont crossover cavern with indicative depth to different elements of the cavern shown in the following figure. The height of the top heading (the distance from the tunnel crown to bench 1) would depend on the specific ground conditions but would typically be around eight metres. Based on the current design, the shallowest point of the Pyrmont crossover cavern from ground level to the tunnel crown is around 22 metres deep. Based on the ground-borne noise curve presented in the Modification Report, at this depth, ground-borne noise levels would be about 40dB, equating to a night-time criteria exceedance of about 5dB (noting this also conservatively includes a 3dB uncertainty factor). Based on an eight metre height

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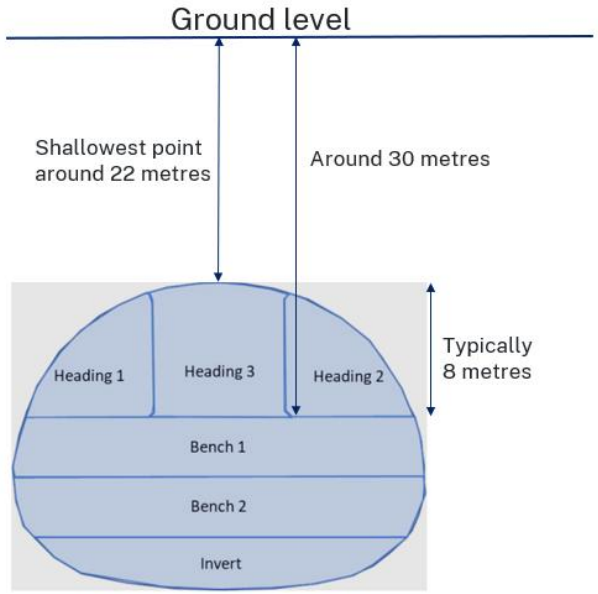
	of the top heading, the bottom of the top heading would be about 30 metres below the closest receiver. At this depth the expected ground-borne noise level would be about 36-37dB (a 1-2dB exceedance of the night-time criteria), noting this also includes the conservative 3dB uncertainty factor. At deeper points along the crossover cavern, it is therefore likely that noise levels would be at or below the night-time criteria of 35dB at the bottom of the top heading.  **Figure 1 Indicative depth to cavern elements** As identified in the noise and vibration assessment for the relocation of the crossover cavern to Pyrmont, the average advance rate for the top heading excavation would be around 20 metres per day. Based on this advance rate, any one receiver would likely be impacted for a duration of one to two days per top heading (or three to six days for the three top headings). Although the bench excavation would progress at a slower rate of around five metres per day, ground-borne noise levels are likely to comply with criteria due to the depth of the benches.

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	Based on this, the worst-case impact to any one receiver is not expected to occur for the full six to 12 week period identified in the Modification Report. During this period, noise levels at any individual receiver would be below the worst-case level identified in the Modification Report for the majority of the time and would range down to compliance (or close to compliance) with the ground-borne noise criteria. In addition (and as identified in the response above), roadheader excavation work would occur for around 55-60 per cent of the total excavation with other supporting activities (which generally producing lower levels of ground-borne noise) occurring for the remaining period. From the above, it can be seen that the worst-case impacts presented in the Modification Report would be experienced by any one receiver for a small portion of the six to 12 weeks, likely in the order of days to around one week. During this worst-case impact period, actual roadheader works are likely to occur for up to around 60 per cent of the total period. This information can be extrapolated to Pyrmont Station. The depth of Pyrmont Station cavern is slightly shallower than the crossover cavern with the shallowest point from ground level to the tunnel crown around 19 metres deep. Ground-borne noise levels would be marginally higher with an expected worst-case noise management exceedance of around 6-7dB although the duration of worst-case impacts would be similar at around one week.
Tunnel depths at Hunter Street have not been discussed. The EPA requests this information be provided.	The depth of Hunter Street Station is shallower than the crossover cavern at Pyrmont with the shallowest point from ground level to the tunnel crown around 11 metres deep (although due to topography the depth to the tunnel crown ranges up to around 32 metres deep). As a result, ground-borne noise levels may be higher (by around 5dB) although the duration of worst-case impacts would be similar at around one week. However, the majority of receivers in this location are commercial which have a higher noise management level and are unlikely to be impacted at night. Potential impact to hotels around Hunter Street would be managed through further consultation and identification of appropriate mitigation measures (such as work scheduling and respite periods) as outlined in the Modification Report. The depth of the turnback tunnels to the east of Hunter Street Station is generally greater than the crossover cavern. As outlined in the Modification Report, receivers in this area are generally expected to comply with the noise management levels.

Issue	Response
In addition, the EPA would like the DNVIS for Pyrmont and Hunter Street to be provided as part of the Response to Submissions (RTS), so that it can be assured that all reasonable and feasible measures, including the scheduling of high-impact noise works, have been adopted to keep noise levels below the NMLs as far as practicable.	The potential ground-borne noise level from non-TBM tunnelling has been reduced as far as feasible and reasonable through the construction method and equipment selection. Roadheaders have been selected as they produce lower levels of ground-borne noise than alternative methods for cavern excavation such as rock breaking. For example, at a 30 metre slant distance, noise levels from a roadheader are anticipated to be around 35dB compared to around 48dB for a light rock breaker and around 53dB for a heavy rock breaker. The remaining available mitigation measures mainly involve reducing or removing exposure to the noise impacts through scheduling of work, provision of respite periods or alternative accommodation. The Modification Report outlined the role of the Sydney Metro CNVS in managing construction noise and vibration, including the identification of standard mitigation measures, additional mitigation measures and the process for the development of detailed noise and vibration impact statements. The exact nature of feasible and reasonable mitigation measures for each non-TBM tunnelling location would be determined during preparation of detailed noise and vibration impact statements. These are appropriately developed by construction contractors post-planning approval when more detail is known regarding the exact construction methodology and program (which will be informed by detailed ground investigations and design). The process for the preparation of the detailed noise and vibration impact statements, including the identification of feasible and reasonable mitigation measures is outlined in the CNVS and condition of approval D29. Condition of approval D29 also requires the detailed noise and vibration impact statements to be provided to the independent Acoustic Advisor and the independent Environmental Representative before the commencement of the associated works. The detailed noise and vibration impact statements will also be provided to the Planning Secretary and the EPA on request. The independent Acoustic Advisor's role includes reviewing and endorsing all noise and vibration documents required to be prepared under the conditions of approval (refer to condition of approval A37(e)). This process provides assurance that all feasible and reasonable mitigation measures are implemented.

Issue	Response
	This process has been successfully adopted on previous Sydney Metro projects including Sydney Metro Northwest, Sydney Metro City & Southwest and previous stages of Sydney Metro West.
Other EPA considerations	
While the EPA understands the nature of conservative assumptions, the lack of detail in the EIS about what reasonable and feasible measures would be applied, and how effective they would be, underpinned recommendations to limit non-TBM tunnelling to standard construction hours – unless within the limits for low noise impact works identified in condition D23(b). The EPA's policy approach to noise management outlined in its construction noise guidelines requires proponents to firstly consider whether noise-generating works outside of construction hours are necessary, and if they are what reasonable and feasible mitigation measures would be put in place to reduce construction noise impacts as far as possible.	Sydney Metro's approach meets the intent of the EPA's Interim Construction Noise Guidelines. The need to undertake non-TBM tunnelling works outside of standard construction hours has been justified in the Modification Report. In summary roadheader excavation advances can take up to 18 hours to safely complete and out of hours work is required to ensure the stability of the excavation, minimise potential ground movement and settlement and make the excavation safe for construction workers. Non-TBM works being restricted to daytime would also result in a substantial program delay to Sydney Metro West, including to the opening of the line to passenger services. This would have flow on impacts including prolonged construction impacts and disruption for receivers across the whole Sydney Metro West alignment and the later realisation of the substantial operational benefits of Sydney Metro West The selection of equipment to undertake non-TBM tunnelling has aimed to reduce potential noise and vibration impacts. Roadheaders were selected as the preferred equipment for these locations as they produce less ground-borne noise and vibration than the alternatives such as rock breakers. As outlined above, implementation of the Sydney Metro CNVS, mitigation measures and the conditions of approval establish a robust process for the ongoing consideration and identification of feasible and reasonable mitigation measures to manage noise impacts. The feasible and reasonable mitigation measures are identified through consultation with affected receivers as part of the development of detailed noise and vibration impact statements and are reviewed and endorsed by the independent Acoustic Advisor. The independent Acoustic Advisor is also responsible for regularly monitoring the implementation of noise and vibration documents (including the CNVS and detailed noise and vibration impact statements), recommending improvements that may be made to avoid or minimise noise impacts, and preparing a monthly noise and vibration report. The Community Communications Strategy also provides a process for the adaptive management of potential social impacts including the review and implementation of additional measures based on lessons learnt.