

Chapter 23

Synthesis of the Environmental Impact Statement

23 Synthesis of the Environmental Impact Statement

This chapter provides a synthesis of the findings of the Environmental Impact Statement.

23.1 Overview

Sydney Metro West would provide a new metro line around 24 kilometres long between Westmead and the Sydney CBD. This infrastructure investment would double the rail capacity of the Parramatta to Sydney CBD corridor with a travel time target between the two centres of about 20 minutes.

The planning approvals and environmental impact assessment for Sydney Metro West has been broken down into a number of stages recognising the size of the project. This includes:

- *Sydney Metro West at a Concept level* – Approved
- All major civil construction work between Westmead and The Bays including station excavation and tunnelling (Stage 1 of the planning approval process) – Approved
- Major civil construction work between The Bays and Sydney CBD (this proposal) (Stage 2 of the planning approval process)
- Rail infrastructure, stations, precincts and operations (Stage 3 of the planning approval process).

While the content of these stages may be varied, this Environmental Impact Statement covers major civil construction work between The Bays and Sydney CBD only. Future stage/s, including the operation of Sydney Metro West, would be assessed in future applications.

23.2 Major civil construction work between The Bays and Sydney CBD (this proposal)

23.2.1 Key features

The proposal is shown in Figure 23-1 and would involve the major civil work between The Bays and Sydney CBD, including:

- Enabling work 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.



Figure 23-1 Overview of the proposal

Tunnel location

The proposed tunnel alignment (refer to Figure 23-1) is indicative and has been used for the purposes of the environmental impact assessment, including for specialist investigations. The alignment may be refined during detailed design. Any changes to the alignment would be reviewed for consistency with the assessment contained in this Environmental Impact Statement, including any relevant mitigation measures, performance outcomes and any future conditions of approval.

Construction sites and associated activities

Five construction sites would be required for this proposal:

- The Bays tunnel launch and support site (which would be sited within the approved The Bays Station construction site approved under the Stage 1 project approval)
- Pymont Station western construction site
- Pymont Station eastern construction site
- Hunter Street Station (Sydney CBD) western construction site
- Hunter Street Station (Sydney CBD) eastern construction site.

This proposal would use the following established construction sites to commence construction work:

- The Bays Station construction site, which is approved under Stage 1 of the planning approval process for Sydney Metro West, would have The Bays tunnel launch and support site located within a part of this site
- 33 Bligh Street, which was established under the Sydney Metro City & Southwest project, would form part of the Hunter Street Station (Sydney CBD) eastern construction site.

Table 23-1 shows the proposed construction sites and their uses. All construction sites would provide staff facilities such as offices, lunch rooms and amenities.

Table 23-1 Construction sites and their main activities

Construction / tunnel launch and support site	Tunnel boring machine launch and support	Tunnel boring machine retrieval	Roadheader work and support	Spoil removal	Station excavation	Construction staff facilities	Concrete segment storage
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		●	●	●	●	●	

23.2.2 Construction methods

Table 23-2 provides an overview of the key construction methods for the proposal.

Table 23-2 Key construction methods

Construction activity	Construction methods
Enabling work	<p>Enabling work is activities that would typically be carried out before the start of substantial construction at a given construction site in order to prepare the site and to ensure safety measures are in place to provide protection to the public. Enabling work may include activities such as:</p> <ul style="list-style-type: none"> • Construction site establishment • Utility adjustments and protection • Utility supply to the construction sites, including power and water • Transport network modifications to roads, public transport, and pedestrian and cyclist facilities • Heritage investigations, protection and archival recordings • Additional geotechnical and contamination investigations and remediation, where required.
Demolition	<p>It is anticipated that 13 buildings would be demolished as part of this proposal. Typically, building demolition would involve:</p> <ul style="list-style-type: none"> • Establishment of hoarding, scaffolding and protection barriers around the perimeter of the site • All services into the buildings would be decommissioned and made safe and redundant • A hazardous materials assessment would be carried out prior to stripping and demolition of the main structure • Soft stripping internal building materials • Demolition of the building using an excavator, bobcat, cranes or other conventional methods following a top-down approach • Temporary propping and/or waterproofing would be provided for structural integrity of adjacent structures as required during the demolition work.
Acoustic shed establishment	<p>An acoustic shed is proposed at The Bays tunnel launch and support site. Acoustic sheds are proposed at both the western and eastern Pyrmont Station construction sites. The existing acoustic shed at the Hunter Street eastern construction site (as part of the Sydney Metro City & Southwest construction site) would remain in place for the initial excavation phase. This would need to be dismantled, however, once cavern excavation is complete to allow shaft excavation, as it is currently only over part of the Hunter Street Station eastern construction site. It is anticipated that shaft excavation would then be completed without acoustic sheds at both Hunter Street (Sydney CBD) construction sites. This is consistent with excavation work completed at the Sydney Metro City & Southwest construction sites within the Sydney CBD, given the higher existing background levels.</p>

23.3 Uncertainties and resolution

The design presented in this Environmental Impact Statement is subject to further design development and construction planning. The design as presented serves to:

- Confirm that the proposed performance and technical requirements can be achieved
- Validate the feasibility and methodology of the required construction
- Identify key risks/constraints and anticipated environmental impacts.

The construction sites for this proposal have been developed taking into account expected future requirements for the stations, as well as considering the key construction requirements. This process is described further in Chapter 2 (Development and alternatives). There is a high level of certainty regarding the location and extent of construction sites.

The construction methodology for this proposal has been developed to a level where environmental impacts can be appropriately identified. Aspects of the construction methodology that may be subject to further refinement (but which would be unlikely to substantially alter the predicted environmental impacts) include:

- Specific location of facilities within construction sites
- Alternative to proposed power supply routes
- Alternative haulage routes, construction site access and/or traffic management arrangements to provide improved traffic safety and reduce potential impacts at these locations
- Sequence of construction activities.

All aspects of the construction methodology would be confirmed during the design development and construction planning processes.

23.4 Summary of impacts that have not been avoided

23.4.1 Outline of strategies to avoid impacts

Many potential impacts have been avoided through the project development process, which included input from key stakeholders and the community (refer to Chapter 4 (Stakeholder and community engagement)). Locating the proposal largely underground would substantially reduce most major environmental impacts, including:

- Traffic and transport
- Noise
- Property and land use
- Non-Aboriginal heritage
- Aboriginal heritage
- Business impacts
- Social impacts
- Biodiversity.

Further discussion of how the proposal has avoided or minimised impacts is presented throughout Chapter 6 to Chapter 22.

Residual environmental and social impacts have been minimised through the specific design and the construction methods chosen, as well as application of comprehensive mitigation and management measures that have been proven to be effective on previous construction projects. Design development and refinements would continue to further minimise any residual impacts.

Despite this, it is not unexpected that a project of this scale and nature being constructed in a highly urbanised environment would still have potential residual impacts that are unavoidable. The following section provides a summary of these unavoidable impacts.

23.4.2 Impacts that have not been avoided

Chapter 6 to 22 provide an assessment of the potential impacts of the proposal. The key potential impacts requiring mitigation and management are summarised in Table 23-3.

Potential impacts would be mitigated by implementing comprehensive environmental management procedures and plans. These are described in Section 23.5.

Table 23-3 Summary of potential impacts

Issue	Potential impact
Transport and traffic	<ul style="list-style-type: none"> • Temporary removal of parking spaces in Pyrmont and the Sydney CBD during construction. Opportunities to mitigate impacts to on-street car parking would be explored in consultation with City of Sydney during construction planning. • Temporary diversion and closure of footpaths in Pyrmont and temporary closure of the existing underground pedestrian walkway between Wynyard Station and Pitt Street for the proposal. The community would be notified in advance of proposed road and pedestrian network changes through appropriate forms of community liaison. • Temporary decommissioning of a bus stop in Pyrmont in consultation with Transport for NSW. Wayfinding and customer information would be provided to notify customers of relocated bus stops. • Potential deterioration of intersection performance around construction sites however modelled performance indicates that most intersections forming part of the construction vehicle route would perform at the same Level of Service compared to the scenario without construction traffic. • Potential minor increase in delays to bus services on routes around construction sites. Impacts to buses would be limited to a potential minor increase in travel time due to the additional construction vehicles on the road network. No impacts are anticipated on the operation of bus stops. • Potential safety implications for pedestrians, cyclists and motorists, especially around construction access and egress points and during special events. Vehicle access to and from construction sites would be managed to maintain pedestrian, cyclist and motorist safety. Depending on the location, this may require manual supervision, physical barriers, temporary traffic signals and modifications to existing signals or, on occasions, police presence.
Noise and vibration	<ul style="list-style-type: none"> • Given the nature and duration of works and the close proximity of receivers, temporary 'high' airborne noise impacts are predicted at the nearest receivers to the Pyrmont Station and Hunter Street Station (Sydney CBD) construction sites during some of the noisiest scenarios. Acoustic sheds would be used to mitigate the noise impacts, where feasible. • A number of sensitive receivers near the Pyrmont Station construction sites would have the potential to be highly noise affected (subject to noise levels of 75 dBA or greater) during daytime work and eleven receivers would be highly noise affected during evening (6 pm - 10 pm) and night work (10 pm - 7 am) during Excavation (in sheds) scenario and two receivers would be highly noise affected during evening (6 pm - 10 pm) and night work (10 pm - 7 am) during Mined cavern (in sheds) scenario. • The worst-case potential impacts are generally predicted to occur in the early stages of the work which would be completed at surface level and would require noise intensive equipment to be used prior to the construction of acoustic sheds. This work would only be completed during the daytime. • Sleep disturbance screening criteria has the potential to be exceeded for some sensitive receivers at all construction sites including 'moderate' disturbances at receivers near the Pyrmont Station construction sites. Perimeter site hoarding would be designed with consideration of on-site heavy vehicle movements with the aim of minimising sleep disturbance impacts. • The worst-case potential ground-borne noise impacts during station shaft excavation is predicted to be 'moderate' or 'high' at receivers adjacent to the excavation work at the Pyrmont Station and Hunter Street Station (Sydney CBD) construction sites and above the tunnel alignment where the tunnel depth is shallowest. Feasible and reasonable measures would be implemented to minimise ground-borne noise where exceedances are predicted. This may require implementation of less ground-borne noise and less vibration intensive alternative construction methodologies. Further, relocation of cross passages to be further away from sensitive receivers would be considered, where feasible and reasonable.

Issue	Potential impact
<p>Noise and vibration cont.</p>	<ul style="list-style-type: none"> • Potential exceedances of the human comfort vibration criteria is also predicted at the nearest receivers to the construction sites, meaning occupants of affected buildings may be able to perceive impacts at times when vibration intensive equipment is in use nearby. Where vibration levels are predicted to exceed the screening criteria, a more detailed assessment of the structure and attended vibration monitoring would be carried out to ensure vibration levels remain below appropriate limits for that structure. • Potential exceedances of the cosmetic damage vibration screening criteria is predicted at vibration sensitive buildings or structures being adjacent to Pyrmont Station and Hunter Street Station (Sydney CBD) construction sites. Condition surveys of buildings and structures near to the tunnel and excavations would be carried out prior to the commencement of excavation at each site, where appropriate. For heritage items, the more detailed assessment would specifically consider the heritage values of the structure in consultation with a heritage specialist to ensure sensitive heritage fabric is adequately monitored and managed. • Potential minor construction traffic noise impacts to receivers near Pyrmont Bridge Road and Hunter Street, opposite the construction sites. Further assessment of construction traffic would be completed during detailed design and measures would be implemented to minimise temporary traffic noise impacts.
<p>Non-Aboriginal heritage</p>	<ul style="list-style-type: none"> • Potential impacts to local heritage items near the Pyrmont Station construction sites and the Hunter Street Station (Sydney CBD) construction sites. • Excavation work at the Hunter Street Station (Sydney CBD) construction sites has been designed to retain and protect the State listed heritage item, the Skinners Family Hotel. Potential moderate direct physical impact and potential indirect vibration impacts to the State significant Skinners Family Hotel. A detailed methodology for the protection of this heritage item would be carried out prior to construction. Archival recording and reporting would also be carried out prior to the commencement of construction works. • Potential major impact within the Hunter Street Station (Sydney CBD) western construction site to State significant archaeological remains relating to De Mestre’s counting house and residence and locally significant archaeological remains relating to the former road surfaces of the original carriage lane of De Mestre Place. Where heritage items would be impacted by the proposal, archival recording and reporting would be prepared for the heritage item, demolition methodologies would be prepared and consideration would be given to the inclusion of heritage items in the Heritage Interpretation Plan for future stages. • Potential major direct impact and demolition of Gilbey’s Distillery and moderate direct impact to Pangas House, both of which are unlisted potential heritage items. Archival recording and reporting would be carried out for these two heritage items prior to the commencement of construction works. Further, prior to commencement of demolition of Gilbey’s Distillery, significant heritage fabric which has a reuse in the project or elsewhere would be identified and considered for salvage. • Total removal of all archaeological resources within the Pyrmont Station construction sites, resulting in a major impact to non-Aboriginal archaeological resources of local significance. An Archaeological Research Design would be prepared to identify the excavation methodology for predicted locally significant non-Aboriginal archaeological resources. Archaeological mitigation measures recommended in the Archaeological Research Design would be carried out in accordance with Heritage NSW guidelines, and where appropriate, supervised by a suitably qualified Excavation Director with experience in managing State significant archaeology. • Potential moderate vibration impact to the Tank Stream. Investigations would be carried out for the Tank Stream to confirm and record the location, depth, and ascertain the current integrity, extent and condition of the heritage item. Surveys are to be carried out under the supervision of a heritage consultant in consultation with Sydney Water. • Potential settlement impacts to State and locally listed heritage items. 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. Other listed heritage infrastructure would also be subject to such further assessment of ground movement where identified as being required in Technical Paper 3 (Non-Aboriginal heritage).

Issue	Potential impact
Aboriginal heritage	<ul style="list-style-type: none"> • There is low potential for impact to Aboriginal objects, and any Aboriginal objects that might be located within the study area are likely to be within a disturbed context and would therefore be considered to be of low archaeological significance. • The survivability of archaeological contexts at the Pyrmont Station construction sites and the Hunter Street Station (Sydney CBD) eastern construction site is considered very low and no Aboriginal testing or salvage excavation is proposed for these construction sites. The Hunter Street Station (Sydney CBD) western construction site has been assessed as having potential to contain intact deposits with the potential to contain Aboriginal objects and as such, site and stage specific Archaeological Method Statements would be prepared prior to works commencing at this construction site. • Potential for impact to unexpected Aboriginal objects. If unexpected Aboriginal objects are identified during construction work, the unexpected finds procedure would be implemented.
Property and land use	<ul style="list-style-type: none"> • The proposal would result in the acquisition of 13 properties (including four commercial strata properties which may contain multiple titles). The design of the proposal has sought to avoid and/or minimise potential impacts on property and land use, including minimising the extent of construction sites and the need for private property acquisition. Property acquisition is being managed in accordance with the Land Acquisition (Just Terms Compensation) Act 1991 (NSW) and the NSW Government's property acquisition process. • There would be a change from commercial, retail and business land uses to transport infrastructure construction sites. At Pyrmont, the land use change would be minor given the relatively low rise form of existing development, and in the context of the existing nature of retail, commercial and residential development in the surrounding area. Within the Sydney CBD, while the change in land use would affect a significant amount of commercial and retail floor space, any loss would be relatively minor in the context of the existing scale and extent of retail, commercial and business development throughout the CBD. At the completion of construction, the land would be used for purposes related to the operational transport infrastructure associated with the future Hunter Street Station (Sydney CBD), which will be assessed in a future planning application (Stage 3 of the planning approval process). There is also potential for integrated station development, which would be subject to separate future planning applications.
Landscape and visual amenity	<ul style="list-style-type: none"> • The Bays Station tunnel launch and support site would not require any additional vegetation removal and landscape impacts would be contained and localised with no perceived reduction in landscape quality. The acoustic shed would obstruct a number of views during day-time conditions between surrounding suburbs and the harbour and would intensify the industrial character resulting in a minor visual impact. • Pyrmont Station construction sites would require the demolition of all buildings within the construction sites and the removal of some mature street trees resulting in a minor reduction in landscape quality. These changes along with the establishment of acoustic sheds would also result in minor to moderate visual impacts during day-time conditions. Night time visual impacts would be a noticeable reduction in visual amenity resulting in a minor impact. • Hunter Street Station (Sydney CBD) construction sites would require demolition of existing buildings, retention of an acoustic shed for a period of construction on the eastern construction site and site hoarding, removal of some mature existing street trees and introduction of general construction activities. This would detract from existing views within the CBD and change the landscape character during day-time conditions, particularly in places like Richard Johnson Square. Landscape character and visual impacts would range from minor to moderate.
Landscape and visual amenity cont.	<ul style="list-style-type: none"> • Construction mitigation measures to manage potential landscape and visual impacts of the proposal include addressing matters such as tree retention, appearance of acoustic sheds and site hoarding during construction, minimising lighting impacts and removal of graffiti. Options would be investigated for the retention or protection of street trees identified for removal during detailed construction planning.

Issue	Potential impact
<p>Business impacts</p>	<ul style="list-style-type: none"> • Potential temporary reduction in passing trade for pedestrian traffic due to footpath closures or hoarding potentially restricting visibility of businesses that are reliant on passing trade (e.g. cafes). Clear pathways and signage would be implemented around construction sites to maximise visibility of retained businesses, including sufficient lighting along pedestrian footpaths during night-time where relevant. • Temporary changes to the road network, including temporary parking loss has the potential to affect deliveries and convenience for business employees and customers. Opportunities to mitigate impacts to on-street car parking would be explored in consultation with City of Sydney during construction planning. • Slight to moderate potential impacts to businesses from property and land acquisition and temporary environmental impacts. Small business owner engagement would be carried out to assist small business owners adjacent to major construction sites that are adversely impacted by construction.
<p>Social impacts</p>	<ul style="list-style-type: none"> • Temporary changes to local amenity and access for local social infrastructure and services, potentially resulting in negative community perception, community interactions and connectedness. Consultation would be carried out with managers of social infrastructure located near construction sites about the timing and duration of construction works and management of potential impacts, with the aim of minimising potential disruption to the use of the social infrastructure from construction activity. • The community’s enjoyment of nearby community facilities may potentially be temporarily reduced where they are located close to construction sites. • Potential changes to community character, such as changes to streetscape, access, businesses, increased number of workers and visitors in the area due to construction activities resulting in changes to connections to the surrounding area and belonging. Consultation would be carried out with stakeholders to identify opportunities for public art to reflect community values, culture and identity of the local community. • Potential wellbeing impacts associated with construction activities, including sensitivity to noise and vibration, dust and air quality, and visual impacts. Management measures would be implemented during construction and operation to manage impacts on local amenity. • Increased employment opportunities in the Greater Sydney construction sector associated with increased construction related jobs. Sydney Metro will continue to implement its Workforce Development, Aboriginal and Industry Participations plans to drive jobs, skills, diversity across the workforce and supply chain. This will support the Infrastructure Skills Legacy program to increase and extend the benefits of the government’s infrastructure program to build a legacy of skills and jobs in communities across the state. The Workforce Development, Aboriginal and Industry Participation plan includes requirements for delivery partners to implement targets related to skills, diversity, inspiring future talent and small business/Recognised Aboriginal business engagement.
<p>Groundwater and ground movement</p>	<ul style="list-style-type: none"> • Groundwater levels would experience limited changes as the proposal tunnels, cross passages and station structures would be tanked to prevent the inflow of groundwater, typically using concrete lining and waterproofing membranes. This would limit the potential for groundwater inflows and groundwater drawdown. • Potential for groundwater drawdown at locations with drained excavations, including Pyrmont Station and Hunter Street Station (Sydney CBD) construction sites. These excavations would result in groundwater ingress, lowering groundwater levels in nearby soils and bedrock. Water level disruptions at locations which would be drained during construction would be temporary, and water levels would return to normal following the end of construction work.

Issue	Potential impact
Groundwater and ground movement cont.	<ul style="list-style-type: none"> Groundwater collected within site excavations and within the tunnels during construction would be discharged to the local stormwater system at each construction site. Temporary water treatment plants would treat collected groundwater so that the discharged water quality meets the requirements of any relevant environment protection licence or the requirements of the <i>Protection of the Environment Operations Act 1997</i>. Existing buildings, infrastructure and utilities currently fall within risk category 1 or 2 where the predicted damage is negligible or slight. Further assessments at later design stages and during detailed construction planning would be carried out to check the preliminary findings and are likely to include more sophisticated methods of assessing ground movement, investigating the existing structural condition of the asset, calculating building and infrastructure strain, undertaking structural assessments, and developing mitigation measures to address potential impacts supported by detailed instrumentation and monitoring.
Soils and water quality	<ul style="list-style-type: none"> Potential impacts on Sydney Harbour associated with construction activities which may disturb and/or spread sources of pollutants, generate soils and waste materials, soil erosion and discharge of concrete dust/slurries. Mitigation measures would manage these potential pollutant sources to minimise the potential for these to be conveyed to nearby water bodies. The water treatment plants would be designed with the aim of treating wastewater to a level as close as practicable to relevant surface water criteria to either maintain or improve the water quality of the surface waterways and marine environment.
Contamination	<ul style="list-style-type: none"> Several known and potential contamination sources or areas of specific geological conditions have been identified as areas of environmental interest (AEIs) within and/or adjacent to the proposal. Most of these AEIs would represent a very low or low potential contamination risk to receivers as a result of the proposal. Potential groundwater contamination in the vicinity of the Pymont Station eastern construction site is considered to have a moderate risk of potential impacts to receivers during construction. In addition, potential acid sulfate soils and saline soils have been identified as representing a moderate potential risk for the Pymont Station eastern construction site. Where contamination is identified to present a moderate or higher risk to receivers, a Remediation Action Plan or other management plan will be implemented as required.
Hydrology and flooding	<ul style="list-style-type: none"> While the Hunter Street Station (Sydney CBD) construction sites and The Bays tunnel launch and support site, and to a lesser extent Pymont Station construction sites, are affected by major overland flow paths, the proposed changes to those sites would not significantly alter flooding impacts on neighbouring sites. Potential localised changes to overland flows would be limited in their scale to the immediate vicinity of the construction sites, and are considered minor due to the temporary nature of the impacts. Flood mitigation measures would be implemented to manage potential flood impacts including ensuring local overland flow paths at The Bays tunnel launch and support site and maintaining a consistent approach to emergency evacuation throughout the construction period at all construction sites.
Biodiversity	<ul style="list-style-type: none"> Direct removal of about 16 trees (seven planted native trees and nine exotic trees) which includes six trees within the construction sites and ten street trees. Options would be investigated for the retention or protection of street trees identified for removal during detailed construction planning. The removal of trees is considered unlikely to significantly impact threatened fauna species that may use trees for foraging however vegetation removal would be carried out in line with relevant guidelines and an unexpected finds protocol for threatened flora or fauna would be implemented.
Air quality	<ul style="list-style-type: none"> Some unavoidable risks of temporary nuisance impacts from dust are expected at some locations. Best-practice dust management measures would be implemented during all construction work and additional measures would be implemented if required subject to outcomes of monitoring.

Issue	Potential impact
Spoil and waste management	<ul style="list-style-type: none"> • The proposal would generate about 1.1 million cubic metres of spoil. Sydney Metro would target beneficial reuse of 100 per cent of the usable spoil generated during construction. • Generation of about 50,000 tonnes of demolition materials, some of which may not be able to be recycled or reused. Sydney Metro West would adopt a construction waste recycling target of 95 per cent, and existing metropolitan waste management facilities are anticipated to have capacity to receive the anticipated waste streams generated by this proposal. • All waste would be assessed, classified, managed, transported and disposed of in accordance with the Waste Classification Guidelines and the Protection of the Environment Operations (Waste) Regulation 2014.
Hazards	<ul style="list-style-type: none"> • Temporary environmental hazards and risks associated with on-site handling of contaminated soil and hazardous waste. As described above, wastes that contain hazardous, special or otherwise contaminated, materials would be treated and disposed off-site at a licensed facility in accordance with the relevant guidelines. • Potential impacts to utilities, including power lines, a high pressure gas main at the Hunter Street Station (Sydney CBD) eastern construction site, sewer, water mains, stormwater systems and communications lines. Ongoing consultation would be carried out with utility providers for high pressure gas pipelines to identify appropriate construction methodologies to be implemented.
Sustainability, climate change and greenhouse gas	<ul style="list-style-type: none"> • Climate change risks would be associated with severe weather events, such as the increased frequency and severity of rainfall events, which could place increased pressure on erosion and sediment control measures and/or resulting in the flooding of tunnels and construction sites. Increased heatwave events may also have an impact on construction personnel, systems and equipment. • The construction of the proposal has been estimated to generate approximately 110,000 tonnes of carbon dioxide equivalent, which is approximately 0.08 per cent of total NSW emissions. Twenty-five per cent of the greenhouse gas emissions associated with consumption of electricity during construction would be offset.

23.4.3 Cumulative impacts

A detailed assessment of cumulative impacts is provided in Chapter 6 to 22, and the cumulative impacts assessment methodology is provided in Appendix G.

Potential temporary cumulative impacts during construction have been an important consideration given the potential overlap with a number of large projects. Potential temporary cumulative impacts have been identified with the following main projects:

- Major civil construction work for Sydney Metro West between Westmead and The Bays
- Sydney Metro City & Southwest (Chatswood to Sydenham)
- WestConnex M4-M5 Link
- Western Harbour Tunnel & Warringah Freeway Upgrade
- The new Sydney Fish Market.

A full list of projects considered is provided in Appendix G (Cumulative impacts assessment methodology).

Key potential construction stage cumulative issues are generally expected to be relatively minor and would include:

- Temporary local traffic impacts
- Temporary noise and vibration impacts
- Temporary visual impact and amenity impacts from of construction sites and associated activities
- Temporary social impacts.

These impacts would be managed in accordance with the measures as outlined in Section 23.5. In particular, Sydney Metro will coordinate and consult with the following stakeholders where required to manage the interface of projects under construction at the same time:

- Other parts of Transport for NSW
- Department of Planning, Industry and Environment
- Port Authority of NSW
- Local government
- Emergency service providers
- Utility providers
- Construction contractors.

Co-ordination and consultation with these stakeholders would include:

- Provision of regular updates to the detailed construction program, construction sites and haul routes
- Identification of key potential conflict points with other construction projects
- Developing mitigation strategies in order to manage conflicts. Depending on the nature of the conflict, this could involve:
 - Adjustments to the Sydney Metro construction program, work activities or haul routes; or adjustments to the program, activities or haul routes of other construction projects
 - Co-ordination of traffic management arrangements between projects.

Construction fatigue can potentially occur where nearby residents experience or have experienced extended periods of construction from concurrent or consecutive construction projects. This often includes where project construction activities overlap with other projects, or where there is little or no break between the activities of multiple adjacent projects. Coordination and engagement with other projects has been carried out and would continue through construction to further manage fatigue impacts where possible.

Further opportunities to more effectively manage construction fatigue would also be considered during detailed design and construction. Any potential residual cumulative adverse impacts would be more than offset by the many and significant benefits of Sydney Metro West.

As discussed in Chapter 4 (Stakeholder and community engagement), ongoing community consultation and stakeholder engagement would also be carried out so that potential cumulative impacts are better understood and reduced where possible.

23.5 Proposed measures to avoid or minimise impacts

This Environmental Impact Statement describes measures to avoid or minimise the impacts of the major civil construction work between The Bays and Sydney CBD, which involves construction only. Measures applicable to other stages, including operation, would be developed when planning approval applications are made for future stages.

23.5.1 Overall approach to environmental management

The overall approach to environmental management during construction is shown in Figure 23-3 and involves:

- **Project design** – Measures incorporated in the design and construction planning to avoid and minimise impacts; further information is provided in Chapter 5 (Project description)
- **Mitigation measures** – Identified as an outcome of the environmental impact assessment detailed in Chapter 6 to 22 and consolidated in Table 23-4
- **Construction Environmental Management Framework** – Details the approach to environmental management and monitoring during construction; further details are provided in Section 23.5.2
- **Overarching Community Communications Strategy** – Guides Sydney Metro's approach to stakeholder and community liaison; further details are provided below
- **Construction Traffic Management Framework** – Provides the overall strategy and approach for construction traffic management for Sydney Metro West; further details are provided below
- **Construction Noise and Vibration Standard** – Defines how construction noise and vibration will be managed for Sydney Metro West as a whole; further details are provided below

- **Design quality framework** – Provides a high level process of how Sydney Metro ensures design quality throughout the project lifecycle, regardless of how the project is procured and delivered
- **Environmental performance outcomes** – Future construction planning would be considered against the environmental performance outcomes provided in Section 23.6
- **Concept Conditions of Approval** – Relevant Concept Conditions of Approval have been considered in Section 8.10.1, Section 9.11.1, Section 11.9.1, Section 18.11.1, and Section 22.5.1.

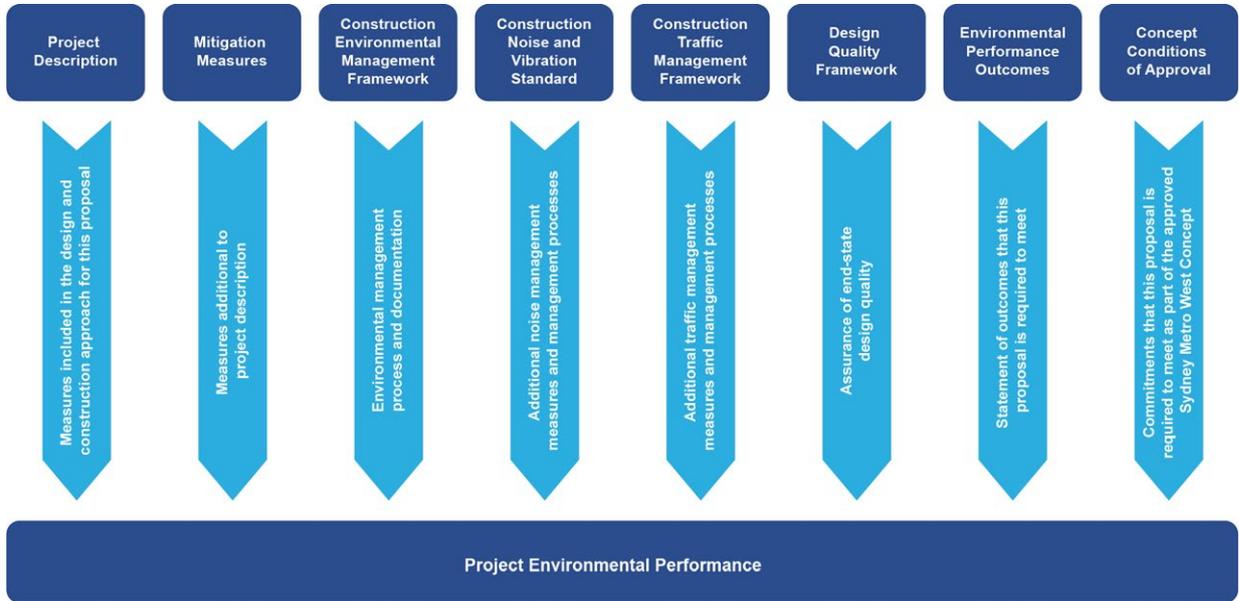


Figure 23-3 Approach to environmental mitigation and management

23.5.2 Overarching Community Communications Strategy

The Overarching Community Communications Strategy (OCCS) (Appendix B) has been prepared to guide Sydney Metro’s approach to stakeholder and community liaison including engagement with communities, stakeholders and businesses. This plan is intended to be used as a framework for community engagement across all Sydney Metro projects and contracts. The OCCS considers all work activities and packages for Sydney Metro and its projects for the duration of work, and 12 months following the completion of construction. The OCCS is further considered in Chapter 4 (Stakeholder and community engagement).

23.5.3 Construction Environmental Management Framework

The Sydney Metro Construction Environmental Management Framework (Appendix C) was developed and successfully implemented as part of the Sydney Metro Northwest and Sydney Metro City & Southwest projects. This framework has been reviewed and amended to be applicable to Sydney Metro West.

The Construction Environmental Management Framework details environmental management systems and processes that would be applied to the major civil construction work between The Bays and Sydney CBD. Specifically, it details the requirements in relation to the content of the construction environmental management plan, sub-plans and other supporting documentation for each specific environmental aspect.

23.5.4 Construction Traffic Management Framework

The Construction Traffic Management Framework (CTMF) (Appendix D) sets out the approach to managing traffic impacts during the construction of the Sydney Metro projects, including this proposal. The CTMF also outlines contractor requirements, with reference to third party agreements. The CTMF provides the overall strategy and approach for construction traffic management for this proposal, and an outline of the traffic management requirements and processes that will be common to each of the proposed construction sites. It establishes the traffic management processes and acceptable criteria to be considered and followed in managing roads and footpaths adjacent to construction sites.

A site specific Construction Traffic Management Plan, along with Traffic Control Plans (TCPs) as required, will also be prepared based on the CTMF. The CTMF is further considered in Chapter 6 (Transport and traffic) and Technical Paper 1 (Transport and traffic).

23.5.5 Construction Noise and Vibration Standard

The Construction Noise and Vibration Standard (CNVS) (Appendix E) establishes a consistent strategy for the assessment, mitigation and monitoring of noise and vibration generated by construction activities across Sydney Metro, including this proposal. It defines a minimum standard for managing noise and vibration impacts that considers currently best practice guidelines and other regulatory requirements, and adopts strategic objectives to understand and manage potential noise and vibration impacts.

Where work would cause significant noise and vibration impacts upon sensitive receivers, a Construction Noise and Vibration Management Plan would be prepared. The CNVS is further considered in Chapter 7 (Noise and vibration) and Technical Paper 2 (Noise and vibration).

23.5.6 Management and mitigation measures

Table 23-4 provides a compilation of the measures to avoid, mitigate and/or manage the potential impacts of the proposal, as identified in Chapter 6 to 22. The measures described in the chapters and compiled in this table were developed to take into account the findings of all the assessments carried out for this Environmental Impact Statement.

The mitigation measures may be revised in response to submissions raised during public exhibition and/or any design changes made following exhibition. A revised list of mitigation measures would be provided in the Submissions Report and, if required, the Amendment Report / Preferred Infrastructure Report.

The conditions of approval for the Concept have been considered throughout this proposal where relevant. In addition, the management and mitigation measures developed for Stage 1 of the planning approval process were considered as relevant throughout the preparation of this Environmental Impact Statement. If the proposal is approved, the conditions of approval for this proposal, which would include references to the final mitigation measures, would guide subsequent stages of Sydney Metro West. The proposal would be carried out in accordance with the conditions of approval and the revised list of mitigation measures.

Table 23-4 Summary of management and mitigation measures

Reference	Impact/issue	Mitigation measure	Applicable location(s)
Transport and traffic			
TT1	Changes to the network	The community would be notified in advance of proposed road and pedestrian network changes through appropriate forms of community liaison.	All
TT2	Traffic incidents	In the event of a traffic related incident, coordination would be carried out with Transport for NSW.	All
TT3	Emergency vehicles access	Access to properties for emergency vehicles would be provided at all times.	All
TT4	Road safety	Vehicle access to and from construction sites would be managed to maintain pedestrian, cyclist and motorist safety. Depending on the location, this may require manual supervision, physical barriers, temporary traffic signals and modifications to existing signals or, on occasions, police presence.	All

Reference	Impact/issue	Mitigation measure	Applicable location(s)
TT5	Road safety	<p>Additional enhancements for pedestrian, cyclist and motorist safety near the construction sites would be implemented during construction. This would include measures such as:</p> <ul style="list-style-type: none"> Assessing the suitability of construction haulage routes through sensitive land use areas with respect to road safety Deployment of speed awareness signs in conjunction with variable message signs near construction sites to provide alerts to drivers Providing community education and awareness about sharing the road safely with heavy vehicles Specific construction driver training to understand route constraints, safety and environmental considerations such as sharing the road safely with other road users and limiting the use of compression braking Road safety audits will be carried out on Traffic Control Plans in line with the requirements of the Construction Traffic Management Framework, and identified road safety risks will be removed or reduced so far as is reasonably practicable. Requiring technology and equipment to improve vehicle safety, eliminate heavy vehicle blind spots, and monitor vehicle location and driver behaviour. 	All
TT6	Road safety	All trucks would enter and exit construction sites in a forward direction, where feasible and reasonable.	All
TT7	Congestion	Construction site traffic would be managed to minimise movements during peak periods.	All
TT8	Congestion	Construction site traffic would be managed to minimise vehicle movements through school zones during pick up and drop off times.	All
TT9	Loss of parking	<p>Construction sites would be managed to minimise the number of construction workers parking on surrounding streets by:</p> <ul style="list-style-type: none"> Encouraging workers to use public or active transport Encouraging ride sharing Provision of alternative parking locations and shuttle bus transfers where feasible and reasonable. 	All
TT10	Change of bus stop locations	Any temporary closure or relocation of bus stops would be carried out in consultation with Transport for NSW, the relevant local council and bus operators. Wayfinding and customer information would be provided to notify customers of relocated bus stops.	All
TT11	Taxi relocation	Any relocation of taxi ranks would be carried out in consultation with Transport for NSW, the relevant local council and taxi operators. Wayfinding and customer information would be provided to notify customers of relocated taxi ranks.	Hunter Street Station (Sydney CBD) construction sites
TT12	Property access	Access to existing properties and buildings not required or demolished by the proposal would be maintained in consultation with property owners.	All
TT13	Construction vehicle impacts	Adjustments to site access arrangements and the local road network would be explored during detailed design to minimise conflicts with heavy vehicle movements.	<p>Pymont Station construction sites</p> <p>Hunter Street Station (Sydney CBD) construction sites</p>

Reference	Impact/issue	Mitigation measure	Applicable location(s)
TT14	Cumulative construction traffic impacts	Co-ordination of traffic management arrangements between major construction projects would occur in consultation with Transport for NSW.	The Bays tunnel launch and support site Hunter Street Station construction sites
TT15	Impacts on special events	During major special events, impacts to the transport and traffic network would be reduced by (as necessary): <ul style="list-style-type: none"> • Minimising the level of construction activity, and if necessary, ceasing all construction activity • Maintaining appropriate access to all areas within the event precinct • Erection of hoardings, site fencing and gates at key locations within the construction site boundary to permit pedestrian movements adjacent to the construction site and separate pedestrians from construction vehicles • Scheduling deliveries to the construction site outside of event periods. 	Pyrmont Station construction sites Hunter Street Station (Sydney CBD) construction sites
TT16	Mitigating light rail and bus precinct impacts	In consultation with Transport for NSW and the City of Sydney, options will be considered to mitigate light rail and bus precinct impacts. This would include consideration of road space reallocation on the western part of Hunter Street to manage through traffic into Hunter Street from George Street / Margaret Street.	Hunter Street Station (Sydney CBD) construction sites
Noise and vibration			
NV01	Community preference for noise mitigation and management	Where justified by the application of the Construction Noise and Vibration Standard, further engagement and consultation would be carried out in accordance with the Sydney Metro Overarching Community Communications Strategy with: <ul style="list-style-type: none"> • The affected communities to understand their preferences for mitigation and management measures • 'Other sensitive' receivers such as schools, medical facilities, theatres, or places of worship to understand periods in which they are more sensitive to impacts. • Based on this consultation, appropriate mitigation and management options would be considered and implemented where feasible and reasonable to minimise the impacts. 	All

Reference	Impact/issue	Mitigation measure	Applicable location(s)
NV02	Alternative construction methodologies	<p>Alternative construction methodologies and measures that minimise noise and vibration levels during noise intensive work would be investigated and implemented where feasible and reasonable. This would include consideration of:</p> <ul style="list-style-type: none"> • The use of hydraulic concrete shears in lieu of hammers/rock breakers • Sequencing work to shield noise sensitive receivers by retaining building wall elements • Locating demolition load out areas away from the nearby noise sensitive receivers • Providing respite periods to minimise impacts from prolonged periods of noise intensive work • Minimising structural-borne noise to adjacent buildings including separating the structural connection prior to demolition through saw-cutting and propping, using hand held splitters and pulverisers or hand demolition • Installing sound barrier screening to scaffolding facing noise sensitive neighbours • Using portable noise barriers around particularly noisy equipment, such as concrete saws • Modifying demolition work sequencing/hours to minimise impacts during peak pedestrian times and/or adjoining neighbour outdoor activity periods. 	All
NV03	Construction noise – respite periods	<p>Appropriate respite would be provided to affected receivers in accordance with the Sydney Metro Construction Noise and Vibration Standard. This would include consideration of impacts from utility and power supply work when determining appropriate respite periods for affected receivers.</p> <p>When determining appropriate respite, the need to efficiently undertake construction would be balanced against the communities' preferred noise and vibration management approach.</p>	All
NV04	Construction noise – out of hours work	The use of noise intensive equipment at construction sites with 'moderate' and 'high' out-of-hours noise management level exceedances would be scheduled for standard construction hours, where feasible and reasonable. Where this is not feasible and reasonable, the work would be undertaken as early as possible in each work shift.	All
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.	All
NV06	Night-time noise impacts	Perimeter site hoarding would be designed with consideration of on-site heavy vehicle movements with the aim of minimising sleep disturbance impacts.	All
NV07	Noise emissions from equipment	<p>Long term construction site support equipment and machinery would be low noise emitting and suitable for use in residential areas, where feasible and reasonable. Examples include:</p> <ul style="list-style-type: none"> • Low noise water pumps for use in water treatment facilities • Low noise generators and compressors • Low noise air conditioner units for use of amenities buildings. 	All

Reference	Impact/issue	Mitigation measure	Applicable location(s)
NV08	Acoustic sheds	<ul style="list-style-type: none"> Where acoustic sheds are installed, the internal lining and construction materials would be determined during later design stages to ensure appropriate attenuation is provided. This design of sheds would likely include the following considerations: All significant noise producing equipment that would be used during the night-time would be inside the shed, where feasible and reasonable Noise generating ventilation systems such as compressors, scrubbers, etc, would also be inside the shed and external air intake/discharge ports would be appropriately acoustically treated Acoustic shed doors would be kept closed during the night-time period, where feasible and reasonable. Where night-time vehicle access is required, the doors would be designed and constructed to minimise noise breakout. 	All
NV09	Ground-borne noise	Feasible and reasonable measures would be implemented to minimise ground-borne noise where exceedances are predicted. This may require implementation of less ground-borne noise and less vibration intensive alternative construction methodologies.	All
NV10	Ground-borne noise – cross passages	The proximity of cross passages to nearby receivers and the corresponding construction ground-borne noise and vibration impacts during the excavation work would be considered when determining locations. Relocation of cross passages to be further away from sensitive receivers to mitigate potential construction impacts would be considered, where feasible and reasonable.	Metro rail tunnels
NV11	Ground-borne noise – underground rockbreaking	Activity specific Detailed and/or General Noise and Vibration Impact Statement (in accordance with the requirements of the Construction Noise and Vibration Standard) would be developed for rockbreaking in the tunnel and at cross passages, specifically addressing the activity where it is required between 10 pm - 7 am.	Metro rail tunnels
NV12	Construction traffic noise	Further assessment of construction traffic would be completed during detailed design, including consideration of the potential for exceedances of the <i>NSW Road Noise Policy</i> base criteria (where greater than two dB increases are predicted). The potential impacts would be managed using the following approaches, where feasible and reasonable: <ul style="list-style-type: none"> 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. 	All
NV13	Construction vibration	Where vibration levels are predicted to exceed the screening criteria, a more detailed assessment of the structure (in consultation with a structural engineer) and vibration monitoring would be carried out to ensure vibration levels remain below appropriate limits for that structure. For heritage items, the more detailed assessment would specifically consider the heritage values of the structure in consultation with a heritage specialist to ensure sensitive heritage fabric is adequately monitored and managed.	All

Reference	Impact/issue	Mitigation measure	Applicable location(s)
NV14	Building condition surveys – construction vibration	Condition surveys of buildings and structures near to the tunnel and excavations would be undertaken prior to the commencement of excavation at each site, where appropriate. For heritage buildings and structures the surveys would consider the heritage values of the structure in consultation with a heritage specialist.	All
NV15	Cumulative construction noise impacts	The likelihood of cumulative construction noise impacts would be reviewed during detailed design when detailed construction schedules are available. Co-ordination would occur between potentially interacting projects to minimise concurrent or consecutive work in the same areas, where possible. Specific mitigation strategies would be developed to manage impacts. Depending on the nature of the impact, this could involve adjustments to construction program or activities of Sydney Metro West or of other construction projects.	All
Non-Aboriginal heritage			
NAH1	Archival recording	Archival recording and reporting of the following heritage items would be carried out in accordance with the NSW Heritage Office's <i>How to Prepare Archival Records of Heritage Items</i> (1998), and <i>Photographic Recording of Heritage Items Using Film or Digital Capture</i> (2006): <ul style="list-style-type: none"> • Former Skinners Family Hotel (SHR item no. 00584) • NSW Club House Building (SHR item no. 00145) • Former Bank – Delfin House (SLEP 2012 item no. 11903) • Richard Johnson Square (SLEP 2012 item no. 11673). Archival recording should be carried out at the following sites as potential heritage items of local significance prior to the commencement of work for the following items: <ul style="list-style-type: none"> • Gilbey's Distillery, 26-32 Pyrmont Bridge Road, Pyrmont (potential archaeological site and local heritage item) • Pangas House, 15-17 Hunter Street, Sydney (potential local heritage item). 	Pyrmont Station western construction site Hunter Street Station (Sydney CBD) construction sites
NAH2	Investigations	Investigations would be carried out for the Tank Stream (SHR item no. 00636) and Bennelong Stormwater Channel No 29A (Sydney Water s170 item no. 4570854) to confirm and record the location, depth, and ascertain the current integrity, extent and condition of the heritage items. Surveys are to be carried out under the supervision of a heritage consultant in consultation with Sydney Water.	Hunter Street Station (Sydney CBD) construction sites
NAH3	Demolition	A method for the demolition of existing buildings and/or structures at specified construction site would be developed to minimise direct and indirect impacts to adjacent and/or adjoining heritage items. A structural engineering investigation would be carried out to heritage items, prior to demolition of adjacent existing buildings and/or structures to ensure the conservation of the items fabric and significance. A detailed methodology for the protection of the Former Skinners Family Hotel, Tank Stream and Bennelong Stormwater Channel No.29A would be developed by suitably qualified heritage engineers and consultants.	Hunter Street Station (Sydney CBD) construction sites

Reference	Impact/issue	Mitigation measure	Applicable location(s)
NAH4	Salvage	Prior to commencement of demolition of Gilbey's Distillery, significant heritage fabric which has a reuse in the project or elsewhere would be identified and considered for salvage.	Pymont Station western construction site
NAH5	Heritage interpretation	Heritage Interpretation Plans would be prepared in accordance with the line-wide Heritage Interpretation Strategy being prepared for Sydney Metro West.	Pymont Station construction sites Hunter Street Station (Sydney CBD) construction sites
NAH6	Archaeology	An Archaeological Research Design would be prepared to identify the excavation methodology for predicted locally significant non-Aboriginal archaeological resources at the Pymont Station and Hunter Street Station (Sydney CBD) construction sites. Archaeological mitigation measures recommended in the Archaeological Research Design would be carried out in accordance with Heritage NSW guidelines, and where appropriate, supervised by a suitably qualified Excavation Director with experience in managing State significant archaeology.	Pymont Station construction sites Hunter Street Station (Sydney CBD) construction sites
NAH7	Archaeology	An Archaeological Excavation Report would be prepared by the Excavation Director and be provided to the Heritage NSW within 12 months of the completion of archaeological excavations specified in the Archaeological Research Design.	Pymont Station construction sites Hunter Street Station (Sydney CBD) construction sites
NAH8	Ground movement and settlement assessment	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. Other listed heritage infrastructure would also be subject to such further assessment of ground movement where identified as being required in Technical Paper 3 (Non-Aboriginal heritage).	Pymont Station construction sites Hunter Street Station (Sydney CBD) construction sites Tunnel alignment
NAH9	Monitoring	Where required, heritage items identified by NAH8 as requiring further assessment should undergo instrumentation and monitoring as part of further assessments and during the work.	Pymont Station construction sites Hunter Street Station (Sydney CBD) construction sites

Reference	Impact/issue	Mitigation measure	Applicable location(s)
Aboriginal heritage			
AH1	Consultation	Aboriginal stakeholder consultation for this proposal should continue based on initial consultation originally commenced on major construction work between Westmead and The Bays (Stage 1 of the planning approval process for Sydney Metro West) in accordance with the NSW Office of Environment and Heritage's Aboriginal Cultural Heritage Consultation Requirements for Proponents 2010. Additional consultation with knowledge holders about the project would be undertaken where possible.	All
AH2	Unexpected finds	If suspected human skeletal remains are uncovered at any time during the proposed work, procedures outlined in the Sydney Metro Exhumation Management Plan, the Sydney Metro Unexpected Heritage Finds Procedure and Heritage Management Plan would be implemented.	All
AH3	Unexpected finds	If unexpected Aboriginal objects are identified during construction work, the Sydney Metro Unexpected Finds Procedure would be implemented.	All
AH4	Cultural values	In recognition of potential impacts to the Aboriginal cultural values of the project area, the line-wide Heritage Interpretation Strategy for Sydney Metro West would address Aboriginal cultural values and be prepared in consultation with the local Aboriginal community, knowledge holders and with reference to the Connecting with Country framework.	All
AH5	Intact deposits or Aboriginal objects in Method Area 2	As the Hunter Street Station (Sydney CBD) western construction site has been assessed as having the potential for intact deposits, a stage specific Archaeological Method Statement would be prepared prior to works commencing. The Archaeological Method Statement would adhere to the archaeological management measures for Method Area 2 as outlined in Technical Paper 4 (Aboriginal Cultural Heritage Assessment Report).	Hunter Street Station (Sydney CBD) western construction site
Property and land use			
LU1	Temporary use	Except where required for subsequent construction activities associated with future stages of the Concept, temporary use areas for construction purposes would be stabilised and appropriately rehabilitated as soon as feasible and reasonable following completion of construction. This would be carried out in consultation with the relevant landowner.	All
Landscape and visual amenity			
LV1	Visual impacts	Where feasible and reasonable, the elements within construction sites would be located to minimise visual impacts, for example materials and machinery would be stored behind fencing.	All
LV2	Trees	Opportunities for the retention and protection of existing street trees would be identified during detailed construction planning.	All
LV3	Trees	Existing trees to be retained would be protected prior to the commencement of construction in accordance with Australian Standard AS4970 the Australian Standard for Protection of Trees on Development Sites and Adjoining Properties.	All
LV4	Lighting impacts	Lighting of construction sites would be oriented to minimise glare and light spill impacts on adjacent receivers.	All
LV5	Visual impacts	The design and maintenance of construction site hoardings would aim to minimise visual amenity and landscape impacts.	All

Reference	Impact/issue	Mitigation measure	Applicable location(s)
LV6	Visual impacts	Construction site hoardings would be designed in accordance with Sydney Metro Brand Design Guidelines and opportunities for public art on hoardings would be considered in high pedestrian locations.	All
LV7	Visual impacts	Graffiti would be removed promptly from hoardings and any other aspects of construction sites.	All
LV8	Visual impacts	All structures (including acoustic sheds or other acoustic measures, site offices and workshop sheds) would be finished in a colour which aims to minimise their visual impacts, if visible from areas external to the construction site. This finish is to be applied to all visible fixtures and fittings (including exposed downpipes).	All
LV9	Trees	Trees removed by the major civil construction work between The Bays and Sydney CBD would be replaced to provide a net increase in the number of mature trees at a ratio of 2:1 across the entire Sydney Metro west project (as part of future approval stages of Sydney Metro West).	All
LV10	Visual impacts	Any new temporary structures on the construction site boundary facing Richard Johnson Square would consider urban design or landscape treatment (in consultation with City of Sydney) to minimise visual amenity and landscape impact where feasible and reasonable.	Hunter Street Station (Sydney CBD) eastern construction site
Business impacts			
B11	General business impacts	Small business owner engagement would be undertaken to assist small business owners adjacent to major construction sites that are adversely impacted by construction.	All
B12	Power and utility interruptions	Planned power and utility interruptions would be scheduled to occur before or after typical business hours where feasible and reasonable. Prior notice would be provided to all affected business owners of the interruptions. Given several businesses operate on a 24 hour a day, seven days a week basis and outside of normal business hours, these businesses would need to be consulted prior to any disruption. In addition, businesses operating financial market infrastructure would be consulted to ensure sufficient backup arrangement can be put in place to minimise any disruptions to their services.	All
B13	Business visibility and accessibility	Hoarding and screening impacting the visibility of business would be minimised where feasible and reasonable, without compromising public safety or the effective management of construction airborne noise. Clear pathways and signage would be implemented around construction sites to maximise visibility of retained businesses, including sufficient lighting along pedestrian footpaths during the night, where relevant.	All
Social impacts			
S1	Impacts on social infrastructure	Consultation would be carried out with managers of social infrastructure located near construction sites about the timing and duration of construction work and management of potential impacts, with the aim of minimising potential disruption to the use of the social infrastructure from construction activity.	All

Reference	Impact/issue	Mitigation measure	Applicable location(s)
S2	Social impacts	The Sydney Metro West Community Benefit Plan for major civil construction between Westmead and The Bays would be updated to include the proposal area. The plan guides the development of community benefit initiatives (by Principal Contractors) during construction to make a positive contribution to the potentially affected community. The key objectives of the plan would include: <ul style="list-style-type: none"> Identify opportunities to create environmental and community benefits and provide positive social outcomes Respond to community priorities and needs in the locality of each relevant construction site. 	All
S3	Impacts on events or festivals	Consultation would be carried out with festival and event organisers and operational teams within Transport for NSW in proximity to construction sites to mitigate potential impacts on the operation of the festival or event.	Pyrmont Station construction sites Hunter Street Station (Sydney CBD) construction sites
S4	Promote local culture and identity	Consultation would be carried out with stakeholders to identify opportunities for design on construction site hoarding to reflect community values, culture and identity of the local community. Construction site hoarding would be designed in accordance with Sydney Metro Brand Design Guidelines and opportunities for public art on hoardings would be considered in locations of high pedestrian use.	All sites
Groundwater and ground movement			
GW1	Ground movement and settlement	A detailed geotechnical model for the proposal would be developed and progressively updated during design and construction. The detailed geotechnical model would include: <ul style="list-style-type: none"> Assessment of the potential for damage to structures, services, basements and other subsurface elements through settlement or strain Predicted changes to groundwater levels, including at nearby water supply works. Where building damage risk is rated as moderate or higher, a structural assessment of the affected buildings/structures would be carried out and specific measures implemented to address the risk of damage. Where a significant exceedance of target changes to groundwater levels are predicted at surrounding land uses and nearby water supply works, an appropriate groundwater monitoring program would be developed and implemented. The program would aim to confirm no adverse impacts on groundwater levels or to appropriately manage any impacts. Monitoring at any specific location would be subject to the status of the water supply work and agreement with the landowner. 	Where required
GW2	Ground movement and settlement	Condition surveys of buildings and structures in the vicinity of the tunnel and excavations would be carried out prior to the commencement of excavation at each site.	Where required

Reference	Impact/issue	Mitigation measure	Applicable location(s)
Soils and surface water quality			
SSWQ1	Acid sulfate soils	Prior to ground disturbance in areas of potential acid sulfate soil occurrence, testing would be carried out to determine the presence of actual and/or potential acid sulfate soils. If acid sulfate soils are encountered, they would be managed in accordance with the Acid Sulfate Soil Manual (ASSMAC, 1998).	The Bays tunnel launch and support site Pyrmont Station construction sites
SSWQ2	Soil salinity	Prior to ground disturbance in high probability salinity areas, testing would be carried out to determine the presence of saline soils. If salinity is encountered, excavated soils would not be reused or would be managed in accordance with Book 4 Dryland Salinity: Productive Use of Saline Land and Water (NSW DECC, 2008). Erosion controls would be implemented in accordance with the 'Blue Book' (Landcom, 2004).	The Bays tunnel launch and support site Pyrmont Station construction sites
SSWQ3	Erosion and sedimentation	Erosion and sediment measures would be implemented at all construction sites in accordance with the principles and requirements in Managing Urban Stormwater – Soils and Construction, Volume 1 (Landcom, 2004) and Volume 2D (NSW Department of Environment, Climate Change and Water 2008), commonly referred to as the 'Blue Book', to ensure water quality is not adversely affected at receiving waters to a minimum set by the 80th percentile five day rainfall event. Additionally, any water collected from construction sites would be appropriately treated and discharged to avoid any potential contamination or local stormwater impacts. Temporary sediment basins would be designed in accordance with Managing Urban Stormwater: Soils and Construction and Managing Urban Stormwater, Volume 2D: Main Road Construction (DECC, 2008).	All
SSWQ4	Working in low lying areas	Work in waterbodies and surrounding low lying areas would be carried out in accordance with progressive erosion and sediment control plans.	The Bays tunnel launch and support site
SSWQ5	Wastewater discharge	The water treatment plants would be designed with the aim of treating wastewater to a level as close as practicable to the ANZECC/ARMCANZ (2000), ANZG (2018) and draft ANZG (2020) default guidelines for 95 per cent species protection and 99 per cent species protection for toxicants that bioaccumulate, unless other discharge criteria are agreed with relevant authorities.	All
SSWQ6	Water quality monitoring	A surface water monitoring program would be implemented to observe any changes in surface water quality that may be attributable to construction and inform appropriate management responses. The program would be developed in consultation with the EPA and relevant councils. The program would consider monitoring being carried out as part of other infrastructure projects. Monitoring would occur during pre-construction and during construction at all waterways with the potential to be impacted. Monitoring would include sampling for key indicators of concern.	All

Reference	Impact/issue	Mitigation measure	Applicable location(s)
SSWQ7	Local stormwater capacity	Further design development would confirm the local stormwater system capacity to receive construction water treatment plant inflows. In the event there is a stormwater infrastructure capacity issue with existing infrastructure, mitigation measures such as storage detention to control water outflow during wet weather events would be implemented.	All
Contamination			
C1	Low risk contamination	For sites where potential contamination risk is moderate, high or very high, a further review of data (if available), including a detailed site inspection, would be carried out. Where this Environmental Impact Statement or the additional data review provides sufficient information to confirm that contamination conditions are likely to have a very low or low impact to receivers at a construction site, the site would then be managed as part of construction and in accordance with the relevant subplan in the Construction Environmental Management Framework (the Soil and Water Management Plan). This would typically occur where there is minor, isolated contamination that can be readily remediated through standard construction practices such as excavation and off-site disposal.	All
C2	Unknown risk of contamination	Where data from the additional data review (mitigation measure C1) is insufficient to understand the risk of contamination, a Detailed Site Investigation would be carried out in accordance with the National Environment Protection Measure (2013) and other guidelines made or endorsed by the NSW EPA. The sites requiring a Detailed Site Investigation would be confirmed following the additional data review (mitigation measure C1) however based on the impact assessment, it is anticipated that a Detailed Site Investigation would be required at the applicable location.	Pyrmont Station eastern construction site
C3	Moderate, High or Very High risk of contamination	Where data from the additional data review (mitigation measure C1) or the Detailed Site Investigation (mitigation measure C2) confirms that contamination would have a moderate, high or very high risk and remediation is required to make the site suitable for its proposed use, a Remediation Action Plan would be developed for the relevant area of the construction site/s. Each Remediation Action Plan would detail the remediation or management work required to mitigate risks from contamination in order to make the site suitable for its proposed use. The Remediation Action Plan would be prepared in accordance with relevant NSW EPA guidelines and where applicable, detail remediation methodologies in accordance with Australian Standards and other relevant government guidelines and codes of practice. Remediation would be performed as an integrated component of construction and to a standard commensurate with the proposed end use of the land. The sites requiring Remediation Action Plans would be confirmed following the additional data review (mitigation measure C1) and Detailed Site Investigation (mitigation measure C2).	As applicable

Reference	Impact/issue	Mitigation measure	Applicable location(s)
C4	Impacts to receivers occurring from highly complex contamination	Where contamination is highly complex, such as significant groundwater contamination; contamination associated with vapour; contamination that requires specialised remediation techniques; or contamination that requires ongoing active management during and beyond construction, an accredited Site Auditor would review and approve the Remediation Action Plan, and would develop a Site Audit Statement and Site Audit Report upon completion of remediation. The sites requiring Site Audit Statements would be confirmed following the preparation of Remediation Action Plans (mitigation measure C3).	As applicable
C5	Residual contamination following construction	Ongoing management and monitoring measures would be documented in an appropriate form and implemented for any areas where minor, residual contamination remains following construction.	As applicable
C6	Migration of contaminated groundwater	Where off-site sources of groundwater contamination have been identified, development and implementation of controls to manage the potential impacts of contamination due to drawdown and resulting migration of contaminated groundwater into the construction footprint would be implemented. A review of available groundwater data would be completed to inform the relevant subplan in the Construction Environmental Management Framework (the Groundwater Management Plan). Where insufficient data is available to understand groundwater conditions and the potential for contamination to migrate as a result of the proposal, further investigation would be carried out if considered necessary and if not already undertaken under mitigation measure C2.	All
Hydrology and flooding			
HF1	Flooding behaviour impacts	Detailed construction planning would consider flood risk at construction sites. This would include: <ul style="list-style-type: none"> • Identification of measures to not worsen flood impacts on the community and on other property and infrastructure during construction up to and including the 1% AEP flood event • Provide flood-proofing to excavations at risk of flooding or coastal inundation during construction, where reasonable and feasible, such as raised entry into shafts and/or pump-out facilities to minimise ingress of floodwaters into shafts and the dive structure • Review of site layout and staging of construction activities to avoid or minimise obstruction of overland flow paths, address loss of flood plain storage and limit the extent of flow diversion required. This includes design of site hoardings to minimise disruption to flow paths (if possible). • Not worsen is defined as: <ul style="list-style-type: none"> • A maximum increase in flood levels of 50 millimetres in a 1% AEP flood event • A maximum increase in time of inundation on one hour in a 1% AEP flood event • No increase in potential soil erosion and scouring from any increase inflow velocity in a 1% AEP flood event. 	All
HF2	Flooding behaviour impacts	Drainage at construction sites would be designed, where feasible and reasonable, to mitigate potential alterations to local runoff conditions due to construction sites.	All

Reference	Impact/issue	Mitigation measure	Applicable location(s)
HF3	Flooding behaviour impacts	Detailed construction planning for The Bays tunnel launch and support site construction would aim to minimise changes to existing levels in relation to potential impacts on flood behaviour, along the north-western side of site adjacent to low-lying property, to minimise reduction in floodplain storage and blockage to local overland flow path.	The Bays tunnel launch and support site
HF4	Flooding emergency management	Construction planning regarding flooding matters would be carried out in consultation with the NSW State Emergency Service and the relevant local council.	All
HF5	Impacts to flood mitigation works	Detailed construction planning for The Bays tunnel launch and support site would aim to avoid conflicts with the potential construction of flood mitigation work in Robert Street, in consultation with Inner West Council.	The Bays tunnel launch and support site
HF6	Potential cumulative impacts	To ensure flood protection on the bottom of the adit between Hunter Street station construction site and the Sydney Metro – City & Southwest Martin Place metro station site, appropriate flood protection would be implemented.	Hunter Street Station (Sydney CBD) construction sites
Biodiversity			
B1	Unexpected microbat finds procedure	If any threatened microbats are identified prior to or during any part of the demolition works then the unexpected microbats finds procedure would be implemented.	Pyrmont Station construction sites Hunter Street Station (Sydney CBD) construction sites
Air quality			
AQ1	Dust impacts during all construction phases	<p>The following best-practice dust management measures would be implemented during all construction works:</p> <ul style="list-style-type: none"> • 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. <p>At locations where there is an acoustic shed established, dust filtering systems will be installed on the acoustic shed exhaust.</p>	All

Reference	Impact/issue	Mitigation measure	Applicable location(s)
AQ2	Exhaust emissions from the combustion of fossil fuels during construction	<ul style="list-style-type: none"> Maintaining plant and equipment in a proper and efficient manner Conducting visual inspections of emissions from plant as part of pre-acceptance checks Switching off plant and equipment when not in-use Avoiding diesel or petrol-powered generator use wherever possible with mains electricity or battery powered equipment used wherever practicable 	All
AQ3	Odour emissions during construction	<ul style="list-style-type: none"> The following best-practice odour management measures would be implemented during relevant construction works: The extent of opened and disturbed contaminated soil at any given time would be minimised Temporary coverings or odour suppressing agents would be applied to excavated areas where appropriate Regular monitoring would be conducted during excavation to verify that no offensive odours are being detected beyond the site boundary. 	All
Spoil, waste management and resource use			
WR1	Compliance with legislative and policy requirements	All waste would be assessed, classified, managed, transported and disposed of in accordance with the <i>Waste Classification Guidelines</i> and the Protection of the Environment Operations (Waste) Regulation 2014.	All
WR2	Disposal of hazardous materials	A hazardous material survey would be completed for those buildings and structures suspected of containing hazardous or special waste materials (particularly asbestos) prior to their demolition. If hazardous waste or special waste (e.g. asbestos) is encountered, it would be handled and managed in accordance with relevant legislation, codes of practice and Australian standards.	All
WR3	Waste minimisation	Construction waste would be minimised by accurately calculating materials brought to the site and limiting materials packaging.	All
WR4	Reuse and recycling	Waste streams would be segregated to avoid cross-contamination of materials and maximise reuse and recycling opportunities.	All
WR5	Reuse on Sydney Metro West sites	A materials tracking system would be implemented for material transferred between Sydney Metro West sites and to offsite locations such as licensed waste management facilities.	All
Hazards			
HA1	Impacts on underground utilities	Dial before you dig searches and non-destructive digging would be carried out to identify the presence of underground utilities.	All
HA2	Impacts on underground utilities	Ongoing consultation would be carried out with utility providers for high pressure gas pipelines to identify appropriate construction methodologies to be implemented. Any interaction with high pressure gas pipelines would comply with the relevant standards, including AS 2885 Pipelines – Gas and Liquid Petroleum.	All
Sustainability, climate change and greenhouse gas			
SCC1	Sustainability implementation	Sustainability initiatives would be incorporated into the detailed design and construction to support the achievement of the Sydney Metro West sustainability objectives.	All
SCC2	Sustainability implementation	Best practice level of performance would be achieved using market leading sustainability rating tools during design and construction.	All

Reference	Impact/issue	Mitigation measure	Applicable location(s)
SCC3	Climate change risks	Climate change risk treatments would be confirmed and incorporated into the detailed design.	All
SCC4	Greenhouse gas emissions	An iterative process of greenhouse gas assessments and design refinements would be carried out during detailed design and construction to identify opportunities to minimise greenhouse gas emissions. Performance would be measured in terms of a percentage reduction in greenhouse gas emissions from a baseline inventory calculated at the detailed design stage.	All
SCC5	Greenhouse gas emissions	25 per cent of the greenhouse gas emissions associated with consumption of electricity during construction would be offset.	All
Cumulative impacts			
CII	Occurrence of Cumulative impacts	Coordination and consultation with the following stakeholders would occur where required to manage the interface of projects under construction at the same time: <ul style="list-style-type: none"> • Other parts of Transport for NSW • Department of Planning, Industry and Environment • Port Authority of NSW • Local government • Emergency service providers • Utility providers • Construction contractors. • Co-ordination and consultation with these stakeholders would include: <ul style="list-style-type: none"> • Provision of regular updates to the detailed construction program, construction sites and haul routes • Identification of key potential conflict points with other construction projects • Developing mitigation strategies in order to manage conflicts. Depending on the nature of the conflict, this could involve: <ul style="list-style-type: none"> • Adjustments to the Sydney Metro construction program, work activities or haul routes; or adjustments to the program, activities or haul routes of other construction projects • Co-ordination of traffic management arrangements between projects. 	

23.6 Performance outcomes

The Secretary's Environmental Assessment Requirements for the proposal identified a number of desired performance outcomes. These outline the broader objectives to be achieved during design and construction of the project.

Table 23-5 identifies the Sydney Metro West performance outcomes, which have been generated from *Sydney Metro West Environmental Impact Statement – Westmead to The Bays and Sydney CBD* (Sydney Metro, 2020a) and outlines how this proposal addresses these outcomes. Future design development and any design changes would also be considered against these environmental performance outcomes. Appendix A (Environmental assessment requirements) outlines where the Planning Secretary's Environmental Assessment Requirements, including the desired performance outcomes, are addressed in this Environmental Impact Statement.

Table 23-5 Desired performance outcomes and project outcome

Key issue and desired performance outcome	Sydney Metro West performance outcomes (Construction)	How the proposal addresses performance outcomes
Business		
<ul style="list-style-type: none"> The proposal minimises impacts to business function and property including maintenance of appropriate access to businesses. 	<ul style="list-style-type: none"> Potential impacts to businesses are minimised Affected businesses are communicated with in a clear and timely manner to reduce disruption and address concerns Access to businesses for employees and customers is maintained Assistance is provided to businesses that are adversely impacted 	<p>The design development of the proposal has aimed to avoid or minimise potential business impacts by minimising the amount of privately owned land to be acquired or leases for construction sites to reduce direct impacts on businesses (where possible). Small business owner engagement would be carried out to assist small business owners adjacent to major construction sites that may be adversely impacted by construction.</p> <p>Further details on business impacts and mitigation are provided in Chapter 12 (Business impacts).</p>
Design, place and movement		
<ul style="list-style-type: none"> The proposal minimises adverse impacts on accessibility and connectivity for communities and public spaces. The proposal contributes to greener places by facilitating the enhancement and provision of green infrastructure. The proposal minimises adverse impacts on the visual amenity of the built and natural environment (including public open space). 	<ul style="list-style-type: none"> The design reflects the Sydney Metro Design Objectives and the place and design principles The Sydney Metro Design Quality Framework is implemented Metro stations contribute positively to the surrounding urban environment and provide a sense of place No net loss of tree numbers and tree canopy. 	<p>The proposal has aimed to avoid or minimise potential landscape and visual amenity impacts where practicable. The construction sites would be located within highly modified urban environments.</p> <p>The design of the proposal reflects the Sydney Metro Design Objectives and the place and design principles and has implemented the Sydney Metro Design Quality Framework is implemented.</p> <p>Once constructed, Metro stations contribute positively to the surrounding urban environment and provide a sense of place.</p> <p>The Concept Approval conditions for Sydney Metro West include requirements for the project to replace trees at a ratio of 2:1 across the entire Sydney Metro West project (as part of future approval stages of Sydney Metro West) to achieve a higher performance outcome than the required no net loss.</p> <p>Construction mitigation measures to manage potential landscape and visual impacts of the proposal include addressing matters such as tree retention, appearance of acoustic sheds and site hoarding during construction, minimising lighting impacts and removal of graffiti.</p> <p>Further details on visual amenity impacts and mitigation is provided in Chapter 11 (Landscape and visual amenity).</p>

Key issue and desired performance outcome	Sydney Metro West performance outcomes (Construction)	How the proposal addresses performance outcomes
Flooding		
<ul style="list-style-type: none"> The proposal minimises adverse impacts on existing flooding characteristics. Construction of the proposal avoids or minimises the risk of, and adverse impacts from, infrastructure flooding or flooding hazards. 	<ul style="list-style-type: none"> Dedicated evacuation routes are not impacted in flood events up to and including the probable maximum flood. 	<p>The design of the proposal has aimed to avoid or minimise the potential for adverse flooding impacts, through staging of work and the implementation of mitigation measures. Excavations for stations would be protected from floodwater inflows. Where feasible the protection level would be above the probable maximum flood or at least 0.5 metres above the 1% AEP flood level, whichever is the greater. Where this is not possible, additional controls would be required to manage any potential inflows. Measures would be identified to not worsen increases in flood levels on other property and infrastructure during flood events up to and including the 1% AEP.</p> <p>Existing emergency evacuation plan and construction mitigation measures would be reviewed to maintain a consistent approach to emergency evacuation through the construction period Detailed construction flood risk management planning for the Construction Environmental Management Plan is to review any existing emergency evacuation plan and construction mitigation measures to maintain a consistent approach to emergency evacuation through the construction period.</p>
Heritage		
<ul style="list-style-type: none"> The design and construction of the proposal, to the greatest extent possible, the long term protection, conservation and management of the heritage significance of items of environmental heritage and Aboriginal objects and places. The design and construction of the proposal avoids or minimises impacts, to the greatest extent possible, on the heritage significance of environmental heritage and Aboriginal objects and places. 	<p>Non-Aboriginal heritage</p> <ul style="list-style-type: none"> Direct impacts on World Heritage and National Heritage List items are avoided Impacts on State Heritage Register items are avoided or minimised so that the overall heritage value of the item is maintained Impacts to non-Aboriginal heritage items and archaeology are avoided or minimised where feasible and reasonable Accidental impacts to heritage items are avoided 	<p>The design of the proposal has aimed to avoid and minimise impacts to heritage where practicable.</p> <p>The construction sites were selected to avoid or minimise direct impacts to State and local heritage items where possible, including Pyrmont heritage conservation area, NSW Club House Building, City Mutual Life Assurance Building, Perpetual Trustee Company, Public Trust Office, Little Hunter and Hamilton Street Precinct, NSW Sports Club and Former Wales House.</p> <p>The Hunter Street (Sydney CBD) construction sites have been designed to minimise potential impacts to the Skinner Family Hotel, Tank Stream and Bennelong Drain. Structural engineers would carry out an investigation prior to demolition of the adjacent buildings to ensure the conservation of the heritage items fabric and significance. Similarly, non-invasive investigations of the Tank Stream would be carried out to accurately confirm its location and inspect and confirm the fabric and condition of the item and to prevent accidental damage.</p>

Key issue and desired performance outcome	Sydney Metro West performance outcomes (Construction)	How the proposal addresses performance outcomes
Heritage cont.		
		<p>Opportunities would be considered for the adaptive reuse of elements of the Skinners Family Hotel within the future Hunter Street Station.</p> <p>Prior to the start of demolition of Gilbey's Distillery, significant heritage fabric which has a reuse in the project or elsewhere would be identified for salvage and reuse opportunities for salvaged fabric considered.</p> <p>The design and mitigation strategies are reviewed by the Sydney Metro Design Review Panel.</p> <p>Further details on non-Aboriginal heritage impacts and mitigation are provided in Chapter 8 (Non-Aboriginal heritage).</p>
	<p>Aboriginal heritage</p> <ul style="list-style-type: none"> Impacts on areas of moderate or higher archaeological potential and significance are avoided or minimised, where feasible and reasonable Accidental impacts to heritage items are avoided 	<p>Due to the landscape context and largely modified nature of the construction sites and surrounding area, the likelihood of intact artefact bearing archaeological deposits is considered to be low.</p> <p>If unexpected Aboriginal objects are identified during construction work, the unexpected finds procedure or appropriate archaeological management approach would be implemented.</p> <p>Further details on Aboriginal heritage impacts and mitigation are provided in Chapter 9 (Aboriginal heritage).</p>
Noise and vibration		
<ul style="list-style-type: none"> Construction noise and vibration (including airborne noise, ground-borne noise and blasting) are effectively managed to minimise adverse impacts on acoustic amenity, and adverse impacts on the structural integrity of buildings and items including Aboriginal places and environmental heritage. 	<ul style="list-style-type: none"> Construction noise and vibration impacts on local communities are minimised by controlling noise and vibration at the source, on the source to receiver path and at the receiver Structural damage to buildings and heritage items from construction vibration is avoided. Local communities are engaged during construction, including on noise mitigation in areas predicted to be affected by high noise impacts. 	<p>The design of the proposal has aimed to avoid or minimise potential construction noise and vibration impacts. During construction, the proposal would minimise impacts on the local community by:</p> <ul style="list-style-type: none"> Controlling noise and vibration at the source Controlling noise and vibration on the source to receiver transmission path Implementing practicable and reasonable measures to minimise the noise and vibration impacts of construction activities on local sensitive receivers. This includes provision of acoustic sheds (or other acoustic measures) where night work is proposed. <p>The proposal would minimise impacts to structures by:</p> <ul style="list-style-type: none"> Controlling vibration at the source Controlling vibration on the source to receiver transmission path Implementing practicable and reasonable measures to minimise vibration impacts of construction activities on structures. <p>The proposal would also carry out any community consultation (where justified) to inform appropriate mitigation and management options where feasible and reasonable. Further details on noise and vibration impacts and mitigation is provided in Chapter 7 (Noise and vibration).</p>

Key issue and desired performance outcome	Sydney Metro West performance outcomes (Construction)	How the proposal addresses performance outcomes
Social		
<ul style="list-style-type: none"> • The proposal provides socially sustainable outcomes. • The proposal maximises the social and economic welfare of the community. • The proposal delivers better development outcomes by minimising negative social impacts and enhancing positive social impacts on affected communities. 	<ul style="list-style-type: none"> • Negative impacts on customers and the community (including transport services, amenity, noise and vibration, water management and air quality) are minimised • Impacts on the availability and quality of public open space and social infrastructure are avoided • Affected communities are communicated with in a clear and timely manner to enhance community benefits, reduce disruption and address community concerns. • Legacy projects are delivered to benefit local communities 	<p>The proposal aims to achieve positive outcomes for the surrounding community by maintaining neighbourhood amenity, access to local open space and social infrastructure networks, access to local facilities and services during construction, as well as ensuring community members are effectively communicated with throughout the construction process, and that communities and their connections to each other and to place are recognised, understood and ultimately strengthened for the future.</p> <p>The proposal would result in temporary impacts to local amenity and changes to access for local social infrastructure and services. There would be potential changes to community character, a sense of and connection to place and belonging, as well as potential wellbeing impacts associated with construction activities, such as sensitivity to noise and vibration. These impacts are anticipated to be temporary due to the temporary nature of construction.</p> <p>The Sydney Metro West Community Benefit Plan for major civil construction between Westmead and The Bays would be updated to include the proposal area. The plan guides the development of community benefit initiatives (by Principal Contractors) during construction to make a positive contribution to the potentially affected community.</p> <p>Increased employment opportunities in the Greater Sydney construction sector associated with increased construction related jobs. Sydney Metro will continue to implement its Workforce Development, Aboriginal and Industry Participations plans to drive jobs, skills, diversity across the workforce and supply chain. This will support the Infrastructure Skills Legacy program to increase and extend the benefits of the government's infrastructure program to build a legacy of skills and jobs in communities across the state.</p> <p>Consultation would be carried out with managers of social infrastructure and local event organisers to minimise potential impacts of the project. Consultation would also be carried out with stakeholders to identify opportunities for public art to reflect community values, culture and identity of the local community.</p> <p>Further details on social impacts and mitigation are provided in Chapter 13 (Social impacts). Community engagement activities carried out to date and the framework for future community engagement is detailed in Chapter 4 (Stakeholder and community engagement).</p>

Key issue and desired performance outcome	Sydney Metro West performance outcomes (Construction)	How the proposal addresses performance outcomes	
Soils and contamination			
<ul style="list-style-type: none"> The environmental values of land, including soils, subsoils and landforms, are protected. Risks arising from the disturbance and excavation of land and disposal of soil are minimised, including disturbance to acid sulfate soils and site contamination. 	Soils <ul style="list-style-type: none"> Impacts on aquatic environments from the disturbance of acid sulfate soils are avoided Pollution of surface water is minimised through the implementation of appropriate erosion and sediment controls. 	<p>The proposal would effectively manage acid sulfate soils in accordance with the <i>Acid Sulfate Soil Manual</i> (Acid Sulfate Soil Management Advisory Committee, 1998). The manual includes procedures for the investigation, handling, treatment and management of such soils.</p> <p>Erosion and sediment measures would be implemented at all construction sites in accordance with the principles and requirements in <i>Managing Urban Stormwater – Soils and Construction, Volume 1</i> (Landcom 2004) and <i>Volume 2D</i> (NSW Department of Environment, Climate Change and Water 2008), commonly referred to as the ‘Blue Book’.</p> <p>Further details on soil impacts and mitigation is provided in Chapter 15 (Soils and surface water quality).</p>	
	Contamination <ul style="list-style-type: none"> Contamination risks to human health and ecological receivers are minimised through effective management of existing contaminated land Contaminated land is remediated to be suitable for the intended future land use. 	<p>The design of the proposal has aimed to avoid or minimise potential interaction with known contaminated sites, and has included measures to better understand contaminated related risks and management/ remediation requirements.</p> <p>Further details on contamination impacts and mitigation are provided in Chapter 16 (Contamination).</p>	
	Spoil, waste management and resource use		
	<ul style="list-style-type: none"> Spoil generated during the construction is effectively stored, handled, treated (if necessary), reused, and/or disposed of lawfully and in a manner that protects environmental values. 	<ul style="list-style-type: none"> 100 per cent of useable spoil is reused in accordance with the spoil reuse hierarchy A minimum 95 per cent recycling target is achieved for construction and demolition waste Products made from recycled content are prioritised The use of potable water for non-potable purposes is avoided if non-potable water is available. The reuse of water is maximised, either on site or off site 	<p>The design of tunnels and station excavations and the preferred construction methodology has taken into consideration the waste hierarchy by aiming to reduce the volume spoil generated, as far as practical. Opportunities to further reduce the generation of spoil through tunnel and station optimisation would be considered during future design.</p> <p>Spoil would be classified in accordance with <i>Waste Classification Guidelines</i> (NSW Environment Protection Authority, 2014). Spoil that is classified as virgin excavated natural material, excavated natural material, subject to a resource recovery order/resource recovery exemption under the Protection of the Environment Operations (Waste) Regulation 2014 or is otherwise reusable would be reused.</p> <p>The proposal would adopt a construction waste recycling target of 95 per cent. Waste streams would be segregated to avoid cross-contamination of materials and maximise recycling opportunities. The proposal would minimise water use and use non-potable water where feasible consistent with adopted sustainability initiatives and targets.</p> <p>Further details on spoil, waste management and resource use impacts and mitigation are provided in Chapter 20 (Spoil, waste management and resource use).</p>

Key issue and desired performance outcome	Sydney Metro West performance outcomes (Construction)	How the proposal addresses performance outcomes
Transport and traffic		
<ul style="list-style-type: none"> • Network connectivity, safety and efficiency of the transport system in the vicinity of the proposal are managed to minimise impacts. • The safety of transport system customers is maintained, with a focus on vulnerable road users (people walking and cycling). • Access and connectivity for people walking and cycling or using public transport is maintained or improved relative to the existing situation. • Impacts on road network capacity and the level of service are acceptable and effectively managed. • Work is compatible with existing infrastructure and future transport corridors. 	<ul style="list-style-type: none"> • Construction traffic and transport impacts on special events are minimised • Safe routes for pedestrians and cyclists are provided around construction sites • Safe access to properties is maintained • Road occupancy is minimised, particularly in the Parramatta and Sydney CBDs • Changes to the travel paths of road users, including bus routes, are minimised • Affected emergency services and public transport operators are provided early communication on changes in traffic conditions • Loss of on-street parking and loading zones is minimised • Heavy vehicle routes are developed in consultation with Transport for NSW, including Transport Coordination • The use of local roads by heavy vehicles is minimised • Safe access and egress is provided to and from construction sites 	<p>The design of the proposal has included a focus on minimising the need for construction work to impact on the existing public transport network and avoiding direct impacts to major roads where possible.</p> <p>The proposal would include measures to maintain pedestrian cyclist and motorist safety around construction sites, including safe access to properties. This may include manual supervision, physical barriers or temporary traffic signals as required. Pedestrian impacts would be limited to the temporary diversion and closure of some footpaths near the Pyrmont Station construction site and closure of the existing underground pedestrian walkway between Wynyard Station and Pitt Street for the proposal. Safe alternative detours would be provided to mitigate these impacts. The proposal would not impact on any cycle routes.</p> <p>Appropriate controls would be established where vehicles are required to cross footpaths to access construction sites. Road safety audits would be carried out as part of construction traffic management planning for each of the construction sites.</p> <p>There is not anticipated to be any substantial change to emergency vehicle access. Construction sites would be arranged so that emergency vehicle access to nearby buildings and the surrounding area would be maintained.</p> <p>Impact on existing parking would be minimised by limiting the extent of construction sites, having dedicated access/egress points and by encouraging workers to use public transport. Where existing parking would temporarily be removed, such as at Pyrmont and Hunter Street Station (Sydney CBD) construction sites, consultation would occur with the City of Sydney to investigate opportunities to provide alternative parking facilities.</p> <p>There would be no impacts to private property access.</p> <p>Heavy vehicle routes for the proposal were developed in consultation with relevant sections of Transport for NSW to minimise the use of local roads and use the most efficient route to the arterial road network and minimising movements during existing network peak periods.</p> <p>In consultation with Transport for NSW and the City of Sydney, options will be considered to mitigate light rail and bus precinct impacts. This would include consideration of road space reallocation on the western part of Hunter Street to manage through traffic into Hunter Street from George Street / Margaret Street.</p>

Key issue and desired performance outcome	Sydney Metro West performance outcomes (Construction)	How the proposal addresses performance outcomes
Transport and traffic cont.		
		<p>Reductions in the performance of intersections near construction sites would be limited to four intersections which would see the performance of three of these intersections drop from good with acceptable delays and space capacity (B) to satisfactory (C), and the performance of one of these intersections drop from good operation (A) to good with acceptable delays and spare capacity (B).</p> <p>The proposal allows for future integration with existing and future local and regional transport infrastructure and planning strategies.</p> <p>Further details on transport and traffic impacts and mitigation is provided in Chapter 6 (Transport and traffic).</p>
Water - Hydrology		
<ul style="list-style-type: none"> • Long term impacts on surface water and groundwater hydrology (including drawdown, flow rates and volumes) are minimised. • The environmental values of nearby, connected and affected water sources, groundwater and dependent ecological systems including estuarine and marine water (if applicable) are maintained (where values are achieved) or improved and maintained (where values are not achieved). • Sustainable use of water resources. 	<ul style="list-style-type: none"> • Groundwater supply for licenced groundwater users is not significantly affected by groundwater drawdown • The groundwater accessible to groundwater dependent ecosystems is not significantly reduced • Structural damage to buildings from ground movement associated with excavation, tunnelling or groundwater drawdown is avoided. 	<p>The design development of the proposal has aimed to avoid or minimise potential groundwater impacts and ground movement. This has included designing the Pymont Station and Hunter Street Station (Sydney CBD) caverns to prevent the inflow of groundwater, typically using concrete lining and waterproofing membranes (referred to as 'tanking') to avoid ongoing groundwater inflow.</p> <p>There are no groundwater users located within the area of potential drawdown impacts for the proposal or groundwater dependent ecosystems within 500 metres of the tunnel alignment.</p> <p>The specific risk to most buildings and structures due to ground movement associated with the proposal would be negligible with superficial damage to buildings unlikely. Condition surveys of buildings and structures in the vicinity of the tunnel and excavations would be carried out prior to the commencement of excavation at each site.</p>

Key issue and desired performance outcome	Sydney Metro West performance outcomes (Construction)	How the proposal addresses performance outcomes
Water – quality		
<ul style="list-style-type: none"> The project is designed, constructed and operated to protect the NSW Water Quality Objectives (WQOs) where they are currently being achieved, and contribute towards achievement of the Water Quality Objectives over time where they are currently not being achieved, including downstream of the project to the extent of the project impact including estuarine and marine waters (if applicable). 	<ul style="list-style-type: none"> The discharge water quality requirements outlined in applicable environment protection licence(s) are met Existing water quality of receiving surface watercourses is maintained. 	<p>Wastewater from tunnelling activities would be treated, and standard erosion and sediment control measures would be implemented for all surface works areas to minimise pollutant loading to the downstream waterways during construction. Wastewater would be tested and treated to comply with the ANZECC/ARMCANZ (2000) and ANZG (2018) guidelines and runoff from construction work would be designed to meet the standards outlined in the Blue Book.</p> <p>With these management measures, pollutant loading to the receiving waterways would be low with the possibility of better quality where existing water quality does not meet the ANZECC/ARMCANZ (2000) and ANZG (2018) guidelines.</p> <p>Discharges from construction water treatment plants would be monitored for compliance with the discharge criteria in environmental protection licence(s) issued to the proposal.</p> <p>Further details on water quality impacts and mitigation, and an assessment of proposal against NSW water quality objectives, is provided in Chapter 15 (Soils and surface water quality).</p>
Other issues		
<p>No desired performance outcome from Secretary's Environmental Assessment Requirements</p>	<p>Biodiversity</p> <ul style="list-style-type: none"> Impacts on biodiversity are avoided (where possible) and minimised, including the clearing of native vegetation Significant impacts to flow regimes in receiving waterways are avoided Design of waterway modifications and crossings incorporates best practice principles The Concept does not contribute to key threatening processes associated with weeds and pathogens Biodiversity impacts are offset in accordance with the <i>Biodiversity Conservation Act 2016</i>. 	<p>The proposal would be located within a highly urbanised area that does not possess large expanses of intact native vegetation with high biodiversity value. As the majority of this proposal would be underground or in pre-existing developed areas, direct impacts to terrestrial biodiversity has been largely avoided and/or minimised.</p> <p>The proposal would not involve modifications to any waterways or any waterway crossings.</p> <p>Further details on biodiversity impacts and mitigation are provided in Chapter 18 (Biodiversity).</p>

Key issue and desired performance outcome	Sydney Metro West performance outcomes (Construction)	How the proposal addresses performance outcomes
	Property and land use	
	<ul style="list-style-type: none"> Acquisition of privately owned land is minimised by limiting the extent of construction sites and using existing Government owned land where possible Residual land at the completion of construction is minimised The need for partial acquisitions is minimised 	<p>The construction sites for the proposal have been reduced as much as practicable to minimise the need for land acquisition and property impacts. Construction sites have also been located within existing property boundaries. This has eliminated the need for partial acquisitions.</p> <p>Station locations have been selected to link residential areas, jobs, education, health and other services during future stages of Sydney Metro West.</p> <p>Further details on property and land use impacts and mitigation is provided in Chapter 10 (Property and land use).</p>
	Air quality	
	<ul style="list-style-type: none"> Air quality impacts are minimised during construction and operation. 	<p>The proposal has committed to implementing best practice dust and odour management measures.</p> <p>Further details on air quality impacts and mitigation are provided in Chapter 19 (Air quality).</p>
	Hazards	
<ul style="list-style-type: none"> Dangerous goods are transported, stored and used so as to not cause a hazardous event. 	<p>Potential hazards associated with the on-site storage, use and transport of chemicals, fuels and materials used during the proposal would be managed in accordance with the <i>Construction Environmental Management Framework</i>, <i>Work Health and Safety Act 2011</i>, the <i>Work Health and Safety Regulation 2017</i>, the <i>Storage and Handling of Dangerous Goods Code of Practice</i> (WorkCover NSW, 2005) and <i>Applying SEPP 33</i> (Department of Planning, 2011).</p>	
Sustainability, climate change and greenhouse gas		
<ul style="list-style-type: none"> 25 per cent of the greenhouse gas emissions associated with consumption of electricity during construction are offset The construction of Sydney Metro West is consistent with the Sydney Metro Environment and Sustainability Statement of Commitment Sustainability initiatives are incorporated into the planning, detailed design and construction of the proposal Infrastructure Sustainability Council of Australia (ISCA) IS rating of 65 Gold – Version 2.0 (or equivalent) are achieved during design and construction for appropriate components 	<p>Climate change risk treatments would be confirmed and incorporated into the detailed design for the proposal.</p> <p>The proposal includes a commitment to offset 25 per cent of the greenhouse gas emissions associated with consumption of electricity during construction.</p> <p>The construction of the proposal would be consistent with the Sydney Metro Environment and Sustainability Statement of Commitment, and sustainability initiatives have been and would continue to be incorporated into the planning, detailed design and construction of the proposal.</p> <p>Sydney Metro West would achieve an equivalent or improved level of sustainability performance compared to previous Sydney Metro projects. This would include achieving a minimum Infrastructure Sustainability Council of Australia (ISCA) IS rating of 75 – Version 1.2 (or equivalent).</p>	

Key issue and desired performance outcome	Sydney Metro West performance outcomes (Construction)	How the proposal addresses performance outcomes
	<p>Cumulative impacts</p> <p>Cumulative impacts are minimised through co-ordination of construction activities and communication processes with nearby projects.</p>	<p>The proposal includes a commitment to coordinating and consulting with relevant stakeholders to manage the interface of projects under construction at the same time.</p>

23.7 Project justification

23.7.1 Addressing the need

The approved Sydney Metro West Concept included consideration of the justification of the project as a whole in the *Sydney Metro West Environmental Impact Statement – Westmead to The Bays and Sydney CBD* (Sydney Metro, 2020a). This proposal is seeking planning approval to enable the Sydney Metro West Concept to be realised by undertaking major civil construction work from The Bays to Sydney CBD.

Sydney is Australia’s financial and economic capital, housing half of the country’s globally competitive service sector jobs. The Greater Parramatta to Sydney CBD corridor is one of three key economic corridors nominated in the Greater Sydney Region Plan (Greater Sydney Commission, 2018a). The corridor is of national economic significance and contains nearly 620,000 high productivity jobs, which is around 20 per cent of the jobs in Greater Sydney and generates eight per cent of the nation’s Gross Domestic Product per year. Recognising the importance of the corridor, several land use planning and development initiatives have commenced in Westmead, Parramatta, Sydney Olympic Park, The Bays and the Sydney CBD. These initiatives are expected to account for more than 60 per cent of planned population growth and more than 80 per cent of planned jobs growth in the corridor by 2036.

Sydney’s growing population will continue to increase demand on the existing transport network and by 2056, NSW transport networks will need to accommodate 28 million trips per day. The existing rail network is congested, with customers on most rail lines often experiencing significant crowding on trains and station platforms during the morning and evening peaks. Despite planned upgrades and more services which will provide some short term relief, the T1 Western Line is expected to reach capacity in 2024 and the T9 Northern Line is expected to reach capacity in 2027. As train and station crowding reduces service reliability, this results in fewer services operating in a given time period and in turn leads to further crowding. Reliability impacts in the Sydney CBD cause network-wide impacts, reducing network capacity and increasing crowding on trains and platforms.

There is a strong link between public transport and land use change. Transport accessibility and amenity are critical to supporting employment, housing supply and urban renewal opportunities and ultimately to support Sydney’s economic and population growth. Transport accessibility and amenity issues, including crowding and capacity constraints within the Greater Parramatta to Sydney CBD corridor, as well as traffic congestion from high levels of car use, are limiting the achievement of planned growth because these areas are less attractive to households and developers.

Sydney Metro West, which includes this proposal, would address this substantial need by more than doubling rail capacity from Parramatta to the Sydney CBD. At ultimate capacity, Sydney Metro West would be able to move more than 40,000 people an hour in each direction and would complement the suburban and intercity services between Parramatta and the Sydney CBD. This proposal, as part of Sydney Metro West, would result in numerous transport benefits once the Sydney Metro West project becomes operational including:

- Substantially improving the public transport networks accessibility to key economic centres across the Greater Parramatta to Sydney CBD corridor
- Reducing crowding on trains and on station platforms
- Increasing the reach and use of Sydney’s public transport network by providing new station locations at The Bays, Pyrmont and Hunter Street (Sydney CBD)
- Improving travel times for commuters
- Providing an alternative to the suburban rail network with additional capacity to reduce the impacts of scheduled maintenance and major unavoidable incidents

- Providing the opportunity for mode shift from car to public transport, which could result in road user travel time savings.

By improving the connections between key economic centres, Sydney Metro West would foster significant growth in jobs, including directly supporting the creation of new jobs within the corridor particularly at key precincts, including those serviced by this proposal – The Bays, Pyrmont and the Sydney CBD.

Sydney Metro West would provide city-shaping benefits as the significant increase in transport connectivity, capacity and amenity in the Greater Parramatta to Sydney CBD corridor, would boost the economic productivity of Sydney and facilitate planned land use outcomes in the CBDs, planned precincts and urban renewal areas.

Sydney Metro West, including this proposal, would also provide a fast, reliable and frequent connection between Greater Parramatta and the Sydney CBD and would:

- Relieve the congested T1 Western Line, T9 Northern Line and T2 Inner West and Leppington Line
- Provide travel time savings for customers in Western Sydney and along the Greater Parramatta to Sydney CBD corridor
- Reduce station crowding at some stations
- Provide rail transport to areas where it is currently not available
- Connect Greater Parramatta and the Sydney CBD to support the vision for a metropolis of three cities
- Support delivery of the '30-minute city' as identified in *Future Transport Strategy 2056* (Transport for NSW, 2020)
- Reinforce the role of Greater Parramatta as the Central River City
- Improve connectivity to major attractions and key precincts located along the corridor, including The Bays, Pyrmont and the Sydney CBD
- Support urban renewal and increased housing supply
- Increase accessibility across Sydney and provide customers with a new world-class metro service.

The *Sydney Metro West Environmental Impact Statement – Westmead to The Bays and Sydney CBD* (Sydney Metro, 2020a) included a station in Pyrmont as a strategic station option to be further investigated. The subsequent evaluation of this station option confirmed that the inclusion of Pyrmont Station would support the vision for Pyrmont as the western gateway to the Sydney CBD, forming a continuous innovation corridor between The Bays and Eveleigh. This would also support the Department of Planning, Industry and Environment's *Pyrmont Peninsula Place Strategy* (2020) that positions Pyrmont as an attractor for global investment driven by connectivity to the Sydney CBD.

The *Sydney Metro West Environmental Impact Statement – Westmead to The Bays and Sydney CBD* (Sydney Metro, 2020a) also noted that the preferred location for a Sydney CBD Station was being investigated at the time of exhibition. It detailed that the metro station would enable interchange with existing public transport networks, including Sydney Metro City & Southwest, the existing Sydney Trains suburban rail network, Light Rail (L2 Randwick Line and L3 Kingsford Line) and bus networks. Detailed assessment of shortlisted station locations in the Sydney CBD found that the Hunter Street Station (Sydney CBD) option was the most favourable, providing a suitable station location in the mid to north of the Sydney CBD which would be critical to the success of the Sydney Metro West project and provide direct access to the commercial core of the Sydney CBD.

23.7.2 Biophysical, economic and social considerations including the principles of ecologically sustainable development

Comprehensive investigations have been carried out in the preparation of the Environmental Impact Statement to assess the biophysical, economic and social impacts of the proposal. The key potential impacts that cannot be avoided are summarised in Section 23.4. As described in Section 23.5, the proposal would incorporate environmental management and design features so that any unavoidable potential impacts are managed and mitigated as far as feasible and reasonable and to an acceptable level.

Biophysical, economic and social considerations have also been assessed in the context of the principles of ecologically sustainable development. The *Environmental Planning and Assessment Act 1979* adopts the definition of ecologically sustainable development contained in the *Protection of the Environment Administration Act 1997*. An assessment of the biophysical, economic and social impacts of Sydney Metro West in the context of the principles of ecologically sustainable development is provided below. On the basis of this assessment, the carrying out of the proposal in the manner proposed is justified for the reasons set out below.

Precautionary principle

The environmental risk analysis documented in Chapter 24 (Environmental risk analysis) addresses the potential impacts of the proposal. That analysis, together with the detail assessment carried out in preparing this Environmental Impact Statement indicates that there would be no threat of serious or irreversible damage to the environment.

In addition, the lack of full scientific certainty has not been used as a reason for postponing measures to prevent environmental degradation. As detailed in each impact assessment chapter, mitigation measures have been proposed to manage identified risks/threats of environmental damage.

The assessments carried out are consistent with accepted scientific and assessment methodologies and have considered relevant statutory and agency requirements. The assessments have applied a conservative approach with regard to proposed construction arrangements, and the modelling used has been carried out in collaboration with key stakeholders and relevant statutory and agency requirements as described in Chapter 4 (Stakeholder and community engagement).

Intergenerational equity

The objectives of Sydney Metro West are essentially around ensuring an efficient and reliable public transport network. This would benefit current and future generations. Once operational, Sydney Metro West would leave a positive legacy for future generations. It would provide long term benefits by strengthening connections and access across Sydney, providing improved connectivity on the rail network and improving the capacity, reliability and efficiency of the transport system.

In addition to the broader Sydney transport operational benefits, the 'door-to-door' experience provided by Sydney Metro West could also result in long-term health benefits with the creation of safer and more appealing conditions for pedestrians, cyclists and other transit users. These benefits would also flow through to future generations.

Conservation of biological diversity and ecological integrity

Conservation of biological diversity and ecological integrity has been considered throughout the project development and design stages. The design development of this proposal focussed on avoiding or minimising potential biodiversity impacts, resulting in a limited amount of vegetation being cleared for the proposal. The proposal would not result in impacts to any threatened flora species, Threatened Ecological Communities, Plant Community Types or Matters of National Environmental Significance and would not result in the loss of vegetation condition, composition, structure, or function as a result of the proposal.

The proposal is not anticipated to result in significant biodiversity impacts.

Improved valuation and pricing of environmental resources

Economic appraisal of Sydney Metro West draws on a number of established methodologies which provide for the valuation of externalities, including environmental externalities, and their inclusion in the appraisal process. Environmental parameters which can be valued include air pollution, greenhouse gas emissions, noise pollution, water run-off, nature and landscape and urban separation. Valuations typically adopt broad average values.

The value placed on the environment was inherent in the development of the design. In addition, the costs associated with the planning and design of measures to avoid/minimise adverse environmental impacts and the costs to implement them have been built into the overall project costs. Ongoing and detailed design together with specific issue-based management plans would represent further commitment to the recognition of the value of protecting environmental resources.

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