NSW GOVERNMENT | sydney METRO

West

Scoping Report

Major civil construction work between The Bays and Sydney CBD

Request for Secretary's Environmental Assessment Requirements

Cover: An artist's impression of Pyrmont Station.

Executive summary

Overview and need

Greater Sydney is expanding and the NSW Government is working hard to deliver an integrated transport system that meets the needs of customers now and in the future.

Sydney Metro is Australia's biggest public transport program. Services on the Metro North West Line between Rouse Hill and Chatswood started in May 2019 on this new stand-alone metro railway system, which is revolutionising the way Greater Sydney travels. The delivery of Sydney Metro West is critical to keeping Greater Sydney moving.

Sydney Metro West

Sydney Metro West will double rail capacity between Greater Parramatta and the Sydney CBD, transforming Sydney for generations to come.

This once in a century infrastructure investment will have a target travel time of about 20 minutes between Parramatta and the Sydney CBD, link new communities to rail services and support employment growth and housing supply.

Sydney Metro West will comprise a new 24-kilometre metro line with stations confirmed at Westmead, Parramatta, Sydney Olympic Park, North Strathfield, Burwood North, Five Dock, The Bays, Pyrmont and the Sydney CBD.

The Sydney Metro West Concept and major civil construction work for Sydney Metro West between Westmead and The Bays (Stage 1 of the planning approval for Sydney Metro West) were approved on 11 March 2021. Stage 2 of the planning approval process (this proposal) includes all major civil construction work including station excavation and tunnelling between The Bays and Sydney CBD.

Major civil construction work between The Bays and Sydney CBD

This proposal would involve major civil construction works between The Bays and Sydney CBD including:

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

Components of this proposal are subject to further design, and changes may be made during the ongoing design which take into account the outcomes of community and stakeholder engagement and environmental field investigations.

Planning and assessment process

Sydney Metro West was declared as State significant infrastructure and critical State significant infrastructure under sections 5.12(4) and 5.13 of the *Environmental Planning and Assessment Act 1979* (EP&A Act) respectively on 23 September 2020.

Therefore, this proposal is subject to assessment and approval by the Minister for Planning and Public Spaces under Part 5, Division 5.2 of the EP&A Act.

Purpose of this document

The purpose of this document is to support Sydney Metro's application to the Minister for Planning and Public Spaces for planning approval under section 5.15 of the EP&A Act – with the first step to obtain Secretary's Environmental Assessment Requirements for the Environmental Impact Statement for major civil construction work between The Bays and Sydney CBD.

Key environmental issues

A preliminary environmental assessment and risk analysis has identified the following key environmental issues that are relevant to assessment of this proposal:

- Construction transport and traffic
- Construction noise and vibration
- Non-Aboriginal heritage
- Aboriginal heritage
- Property and land use
- Landscape character and visual amenity
- Business impacts
- Social impacts and community infrastructure.

Detailed assessment of these issues and the other environmental issues identified will be carried out as part of the Environmental Impact Statement for this proposal. Other issues that will be included in the assessment are:

- Groundwater and geology
- Soils and surface water quality
- Contamination
- Hydrology and flooding
- Biodiversity
- Air quality
- Greenhouse gas and energy
- Climate change adaptation

- Waste management and resource use
- Hazard and risk.

Next steps

Following receipt of the Secretary's Environmental Assessment Requirements, Sydney Metro will prepare and publicly exhibit an Environmental Impact Statement for this proposal. The Environmental Impact Statement will be developed in accordance with the requirements of Division 5.2 of the EP&A Act and will include:

- A description of the components and construction activities for this proposal
- A description of the existing environment and an assessment of potential direct and indirect impacts on key and other potential environmental issues during construction
- Identification of measures to be implemented to avoid, minimise, manage, mitigate, offset and/or monitor potential impacts
- Identification and consideration of issues raised by stakeholders and the community during preparation of the Environmental Impact Statement for this proposal.

During public exhibition of the Environmental Impact Statement for this proposal, the community will be encouraged to have their say and make a formal submission.

Contents

1 Introduction

This chapter provides an overview of this proposal, for the major civil construction work between The Bays and Sydney CBD, including the strategic planning context and key features. The purpose and structure of this report are also provided.

1.1 Overview of Sydney Metro

The project forms part of the broader Sydney Metro network which includes:

- The Metro North West Line – Opened in May 2019 with driverless trains running every four minutes in the peak in each direction between Tallawong Station in Rouse Hill and Chatswood
- Sydney Metro City & Southwest – A new 30-kilometre metro line extending the new metro network from the end of the Metro North West Line at Chatswood, under Sydney Harbour, through the Sydney CBD and south-west to Bankstown. It is due to open in 2024 with capacity to run a metro train every two minutes each way under the centre of Sydney
- Sydney Metro West (this project) – A new 24-kilometre metro line that will connect Greater Parramatta with the Sydney CBD. Confirmed stations include Westmead, Parramatta, Sydney Olympic Park, North Strathfield, Burwood North, Five Dock, The Bays, Pyrmont and Sydney CBD. This infrastructure investment will double the rail capacity of the Greater Parramatta to Sydney CBD corridor with a travel time target between the two centres of about 20 minutes
- Sydney Metro – Western Sydney Airport – A new metro rail line that will service Greater Western Sydney and the new Western Sydney International (Nancy-Bird Walton) Airport forming the transport spine of the Western Parkland City.

The Sydney Metro program of work is shown on Figure 1-1.

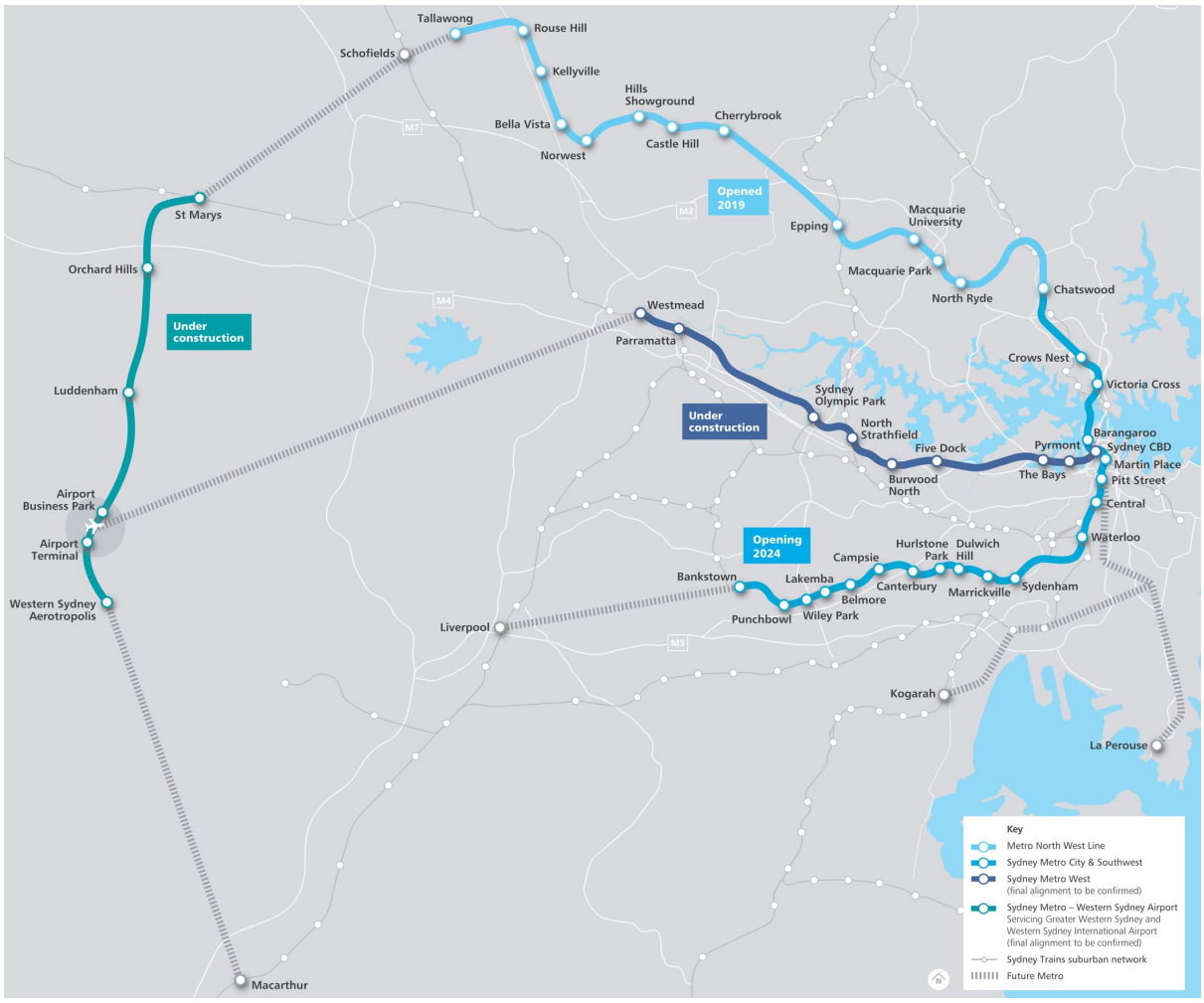

Figure 1-1 Sydney Metro network

1.2 Background to Sydney Metro West

Sydney Metro West will double rail capacity between Greater Parramatta and the Sydney CBD, transforming Sydney for generations to come.

The once-in-a-century infrastructure investment will have a target travel time of about 20 minutes between Parramatta and the Sydney CBD, link new communities to rail services and support employment growth and housing supply.

Stations have been confirmed at Westmead, Parramatta, Sydney Olympic Park, North Strathfield, Burwood North, Five Dock, The Bays, Pyrmont and the Sydney CBD. The main elements of Sydney Metro West are shown in Figure 1-2.

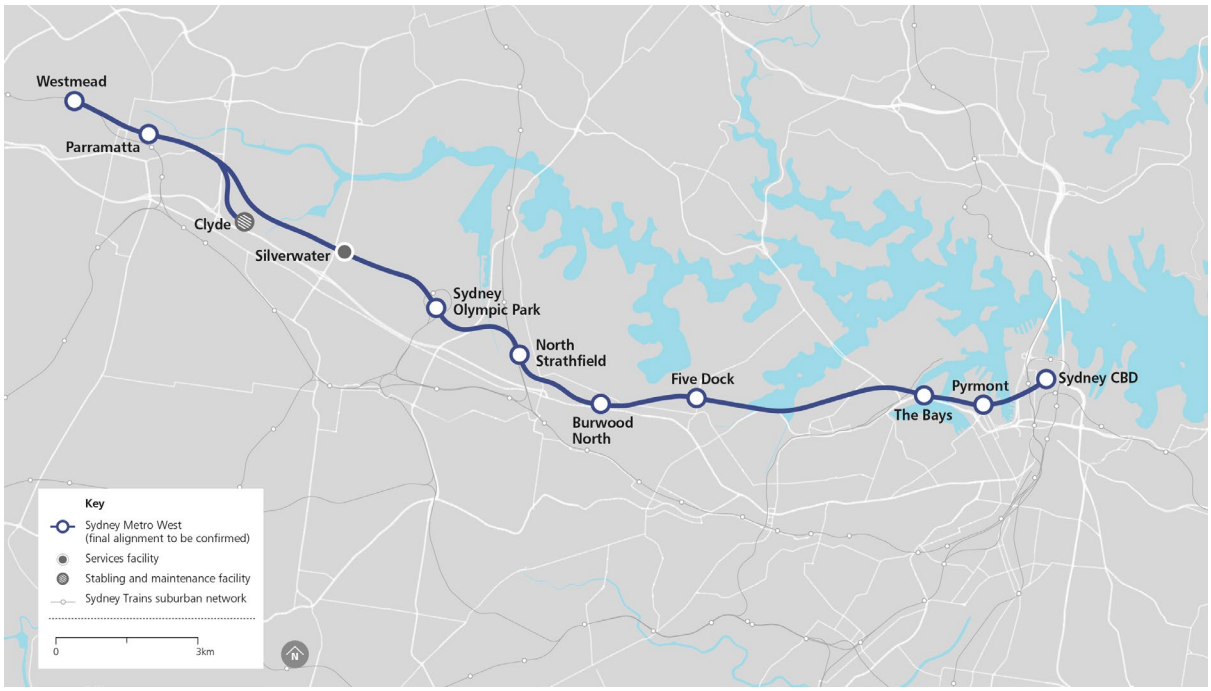

Figure 1-2 Sydney Metro West

1.2.1 Objectives of Sydney Metro West

Sydney Metro West's objectives are separated into network and corridor objectives and are set out in Section 2.7 of the *Sydney Metro West Environmental Impact Statement – Westmead to The Bays and Sydney CBD* (Sydney Metro, 2020a). The network objectives represent the outcomes to be achieved by Sydney Metro West in its full configuration, including potential western and eastern extensions. The corridor objectives include the specific plans and needs of the geographic area between Greater Parramatta and the Sydney CBD. These objectives are unchanged and apply to the proposal.

1.2.2 Sydney Metro West planning process

The planning process for Sydney Metro West is being assessed as a staged infrastructure application under section 5.20 of the *Environment Planning and Assessment Act 1979* (EP&A Act).

The Sydney Metro West Concept and major civil construction work for Sydney Metro West between Westmead and The Bays (Stage 1 of the planning approval process for Sydney Metro West), application number SSI-10038, were approved on 11 March 2021.

The Concept includes:

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

- Modification of existing rail infrastructure (including stations and surrounding areas)
- Ancillary development.

Major civil construction work for Sydney Metro West between Westmead and The Bays includes:

- Tunnel excavation including tunnel support activities between Westmead and The Bays
- Station excavation for new metro stations at Westmead, Parramatta, Sydney Olympic Park, North Strathfield, Burwood North, Five Dock and The Bays
- Shaft excavation for services facilities
- Civil work for the stabling and maintenance facility at Clyde.

Stage 2 of the planning approval process (this proposal) includes all major civil construction work including station excavation and tunnelling between The Bays and Sydney CBD.

Future planning applications for Sydney Metro West will include tunnel fit-out, station building and fit-out and operation of the line between Westmead and Sydney CBD.

1.3 Overview of this proposal

This proposal would involve major civil construction work between The Bays and Sydney CBD including:

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

Components of this proposal are subject to further design, and changes may be made during the ongoing design which take into account the outcomes of community and stakeholder engagement and environmental field investigations.

1.4 Purpose and structure of this report

The purpose of this document is to support Sydney Metro's application to the Minister for Planning and Public Spaces for planning approval under section 5.15 of the EP&A Act – with the first step to obtain Secretary's Environmental Assessment Requirements for the Environmental Impact Statement for major civil construction work between The Bays and Sydney CBD.

The structure and content of this report are outlined in Table 1-1.

Table 1-1 Structure and content of this report

Chapter	Description
Chapter 1 Introduction	Outlines key elements of Sydney Metro West and this proposal, as well as the purpose of this report.
Chapter 2 Strategic context and development options	Provides an outline of the justification and need for Sydney Metro West and this proposal, as well as an overview of the development process and options considered to date.
Chapter 3 Description of major civil construction work between The Bays and Sydney CBD	Provides a description of this proposal including likely construction techniques and identifies the location and function of the main construction sites.
Chapter 4 Statutory context	Provides an outline of the statutory approvals framework, including applicable legislation and planning policies.
Chapter 5 Stakeholder and community engagement	Outlines the stakeholder and community engagement carried out to date and the consultation that will occur during the environmental impact assessment process.
Chapter 6 Preliminary environmental assessment	Provides a preliminary description of the existing environment and an initial consideration of the potential direct and indirect impacts that may result from this proposal.
Chapter 7 Preliminary environmental risk analysis	Provides a preliminary environmental risk analysis for this proposal taking into account the current scope and the existing environment.
Chapter 8 Conclusion	Provides a conclusion to the report and identifies the next steps following receipt of the Secretary's Environmental Assessment Requirements.

2 Strategic context and development alternatives

This chapter summarises the strategic context for Sydney Metro West and the proposal, taking into account the transport and land use challenges that Sydney faces now and into the future. It also provides an overview of the development process and the station options that were evaluated.

2.1 Background

The *Greater Sydney Region Plan: A Metropolis of Three Cities* (Greater Sydney Commission, 2018a) sets out the 40-year vision to 2056 and 20-year implementation plan for Greater Sydney to become a global metropolis of three unique and connected cities. To enable and support this growth, Sydney's mass transit network must be enhanced to better connect economic centres, and to connect people to jobs, as well as to schools, services and attractions. Sydney Metro West would provide an important connection between the Parramatta CBD and the Sydney CBD, which are two of the three cities comprising the envisioned metropolis.

The *Sydney Metro West Environmental Impact Statement – Westmead to The Bays and Sydney CBD* (Sydney Metro, 2020a) provided an outline of the key benefits of the Sydney Metro West Concept and detailed how the Concept aligns with this and other key strategic planning and transport infrastructure policies. This proposal (major civil construction work between The Bays and Sydney CBD) is a subsequent stage within the approved Concept, and as such would continue to be consistent with the policies and contribute to providing the identified benefits of the Sydney Metro West Concept.

2.2 Key benefits of Sydney Metro West

The key benefits of Sydney Metro West are detailed in Section 2.4 of the *Sydney Metro West Environmental Impact Statement – Westmead to The Bays and Sydney CBD* (Sydney Metro, 2020a). The key benefits where they relate to this proposal include:

- Transport benefits – namely increasing transport network capacity, which would increase accessibility to key centres, the reach and use of the public transport network and improve travel times
- Productivity benefits – particularly job growth through job creation within the corridor, enhancing international competitiveness
- City-shaping – supporting planned growth and expanding 30-minute cities to deliver associated benefits to social equity, sustainability and health.

2.3 Consistency of Sydney Metro West with strategic planning and policy

The approved Sydney Metro West Concept is consistent with strategic planning and policy as detailed in Section 2.5 of the *Sydney Metro West Environmental Impact Statement – Westmead to The Bays and Sydney CBD* (Sydney Metro, 2020a). This includes:

- Supporting the development of a three-city metropolis for Greater Sydney as per the *Building Momentum: NSW State Infrastructure Strategy 2018-2038* (Infrastructure NSW, 2018) by connecting two of the three cities
- Enhancing the intercity linkage between the Central River City of Greater Parramatta and the Eastern Harbour City of the Sydney CBD
- Supporting the key directions outlined in the *Greater Sydney Region Plan: A Metropolis of Three Cities* (Greater Sydney Commission, 2018a)
- Supporting the city by aligning infrastructure and land use planning; growing a stronger internationally competitive Sydney CBD; delivering integrated land use and transport planning; and a 30-minute city, as per the *Eastern City District Plan* (Greater Sydney Commission, 2018c)
- Providing support for 30-minute cities and improved connections to key destinations, including major health and education precincts, diverse employment centres and residential precincts; as well as embracing new transport technology that would deliver fast, safe and reliable journeys for customers with high performance standards and good customer amenities, consistent with the *Smart Cities Plan* (Australian Government, 2016).

2.4 Consistency with NSW strategic transport infrastructure policy

The approved Sydney Metro West Concept is consistent with the NSW strategic transport infrastructure policy, including *Future Transport 2056* strategy and the Greater Sydney Commission's vision of a metropolis of three cities as detailed in Section 2.5 of the *Sydney Metro West Environmental Impact Statement – Westmead to The Bays and Sydney CBD* (Sydney Metro, 2020a). The major civil construction work between The Bays and Sydney CBD falls under the approved Sydney Metro West Concept and is therefore also consistent with these policies.

2.5 Project development and alternatives

2.5.1 Overview of Sydney Metro West development process

The design process for this proposal has specifically included:

- Consideration of potential alignment options between The Bays and Sydney CBD, and the number of stations to enable people to access metro services
- Analysis of options for station locations at Pyrmont and Sydney CBD
- Investigations into safeguarding measures for potential future metro lines that could connect with Sydney Metro West, subject to the NSW Government's future consideration and endorsement.

The approach to placemaking as detailed in Chapter 7 of the *Sydney Metro West Environmental Impact Statement – Westmead to the Bays and Sydney CBD* (Sydney Metro, 2020a) will be used to develop station place and design principles at both a corridor and precinct-specific level for both the future Pyrmont Station and Sydney CBD metro station.

Sydney Metro West stations, including the future Pyrmont and Sydney CBD metro stations, will include provisions for integrated station developments, such as design and construction of structural support elements as well as space for future building foyers and entrances, lift wells, and building services.

Integrated station developments will be subject to a separate planning approvals process that will include community and stakeholder engagement in accordance with the provisions of the EP&A Act.

2.5.2 Pyrmont Station

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 (DPIE) *Pyrmont Peninsula Place Strategy* (2020a) that positions Pyrmont as an attractor for global investment driven by connectivity to the Sydney CBD.

The station options analysis for Pyrmont Station considered a number of factors including:

- Customer outcomes and transport – This considered how many station entries would be possible in the configuration and the distance to key attractions and commercial activities in the catchment, to maximise customer convenience. Distance to key attractors including Pyrmont Bridge and Darling Harbour was also considered
- Additional tunnel length – Station options that were further away from the tunnel alignment would increase the length of tunnel and, hence, impact on the comparative cost
- Deliverability and value – This includes consideration of risks such as constructability, below ground constraints such as existing basements, heritage constraints in the area, potential land requirements and cost
- Alignment with key government priorities and project objectives – including strategic alignment to land use and planning frameworks, transport and customer outcomes, support for integration with the transport network alignment and value for money.

The assessment found a central station location with an eastern station entrance and an additional station entry in close proximity to Union Street was preferred and would:

- Provide good strong transport customer outcomes, with station entries located comparatively close to Pyrmont Bridge and Darling Harbour and to the current and future Sydney Fish Market sites
- Provide an effective interchange including with the existing Light Rail (L1 Dulwich Hill Line) stop

- Have comparatively shorter alignment
- Have no significant foreseeable constructability risks
- Provide value for money.

On 11 December 2020, the NSW Government announced that a new metro railway station would be built at Pyrmont as part of Sydney Metro West.

Section 3.2.1 includes the station strategy and key features of Pyrmont Station.

2.5.3 Sydney CBD metro station

The *Sydney Metro West Environmental Impact Statement – Westmead to The Bays and Sydney CBD* (Sydney Metro, 2020a) 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.

The station options analysis for the Sydney CBD metro station considered a number of factors including:

- Meeting customer needs – Customer research highlighted key considerations for Sydney CBD customers as being connectivity within the Sydney CBD whereby new services would be integrated with existing transport; multiple entry points to provide increased access and flexibility; maintaining perceived safety through the Sydney CBD; overcoming overcrowding at other Sydney CBD stations
- Geology – The existing geotechnical conditions along areas of this section of the Sydney Metro West corridor can impact on construction methodologies. A detailed analysis of geotechnical conditions was carried out during the options analysis at selected locations to ensure the preferred site would be suitable for construction
- Engineering – Given the lack of available space within the Sydney CBD, the Sydney CBD metro station would need to be of mined construction, rather than a cut and cover construction. The ground below the Sydney CBD is comparatively congested with existing infrastructure that the alignment of the metro rail tunnels would need to navigate through.

Detailed assessment of shortlisted stations was undertaken through assessment against two of the network objectives:

- Customer benefits which considers journey time, personal safety and security, connectivity to other modes, access for all and special events management
- Deliverability and value which includes alignment, site conditions, constructability, community impacts, heritage, flora and fauna, existing transport network impacts, safety and reliability and costs.

The performance of each of the shortlisted station options was assessed in detail against the categories within the Sydney Metro West objectives and scored as ‘strong alignment’ (green), ‘some or neutral alignment’ (orange) or ‘no or negative alignment’ (red). The results are summarised at the objective level in Table 2-1 and discussed further below.

Table 2-1 Evaluation of shortlisted station locations against the Sydney Metro West Objectives

Shortlisted station location option	Customer benefits	Deliverability and value
Circular Quay Station		
Hunter Street Station		
Martin Place Station		
Elizabeth Street Station		
Museum Station		

The detailed assessment of station locations in the Sydney CBD found:

- Several Sydney CBD station options are likely to present significant challenges with respect to constructability, operations and/or functionality and are therefore unlikely to be feasible. These include station options at Martin Place, Elizabeth Street and Museum
- Of the Sydney CBD station options, stations at Hunter Street and Circular Quay are considered feasible and generally perform well against the evaluation criteria. However, the Hunter Street station option connects closely with the T1 North Shore & Western Line and the T9 Northern Line at Wynyard, as well as the Sydney Metro City & Southwest and the T4 Eastern Suburbs & Illawarra Line at Martin Place
- The Hunter Street station option was found to be 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.

Section 3.2.2 includes the station strategy and key features of the Sydney CBD metro station.

2.5.4 Potential future extensions of Sydney Metro West

The design development process for this proposal has considered potential future extensions of Sydney Metro West. Therefore, this proposal includes a stub tunnel at the end of the proposed turnback, to the east of the proposed Sydney CBD metro station, to safeguard any future potential extensions towards the south-east.

2.6 Justification for this proposal

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 and Sydney CBD.

3 Description of major civil construction work between The Bays and Sydney CBD

This chapter describes what is covered by this proposal of Sydney Metro West, including key features such as excavation and construction work proposed for the tunnel and stations.

3.1 Overview and key components

This proposal covers the major civil construction work between The Bays and Sydney CBD, including the following key components:

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

Components covered by this proposal are subject to further design which would take into account the outcomes of community and stakeholder engagement and environmental field investigations. The locations of components covered by this proposal, including the underground tunnel and construction sites for the stations are shown on Figure 3-1, with more detail on the construction sites' locations provided Figure 3-2 and Figure 3-3.

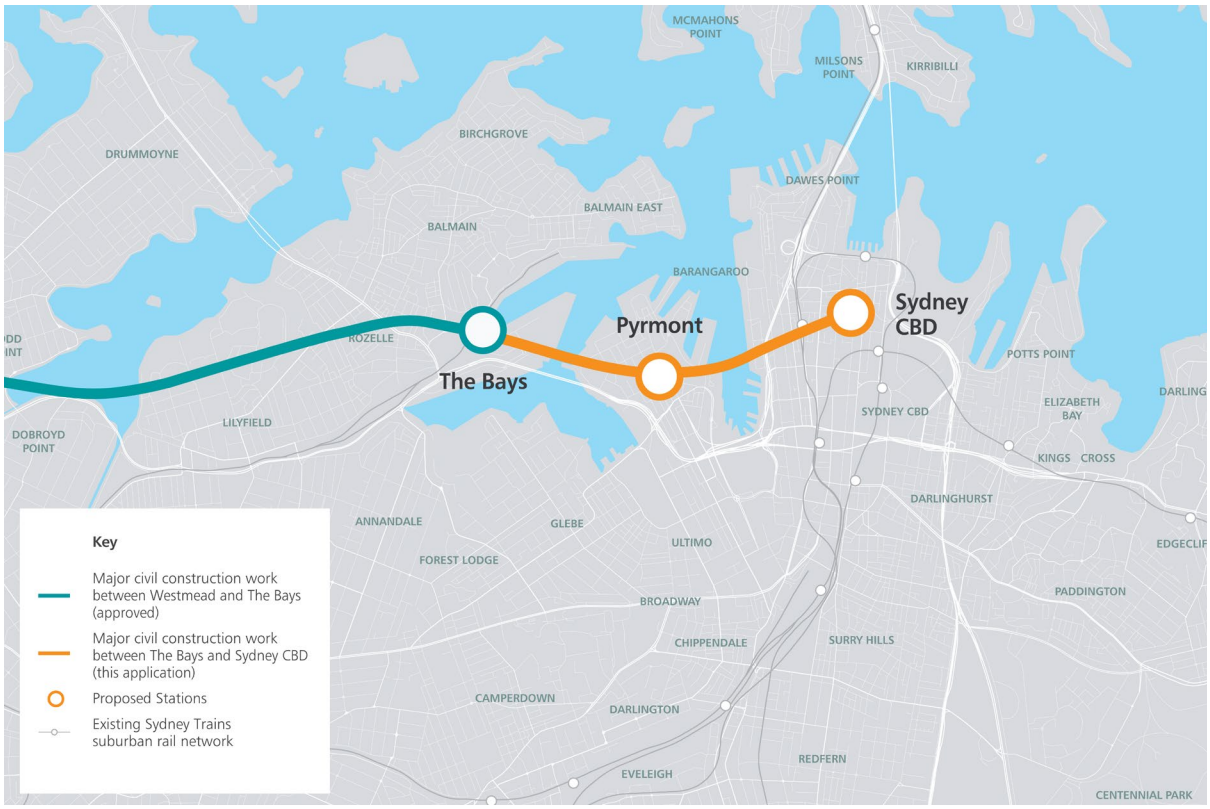

Figure 3-1 Overview of Sydney Metro West between The Bays and Sydney CBD

Figure 3-2 Pyrmont Station construction sites

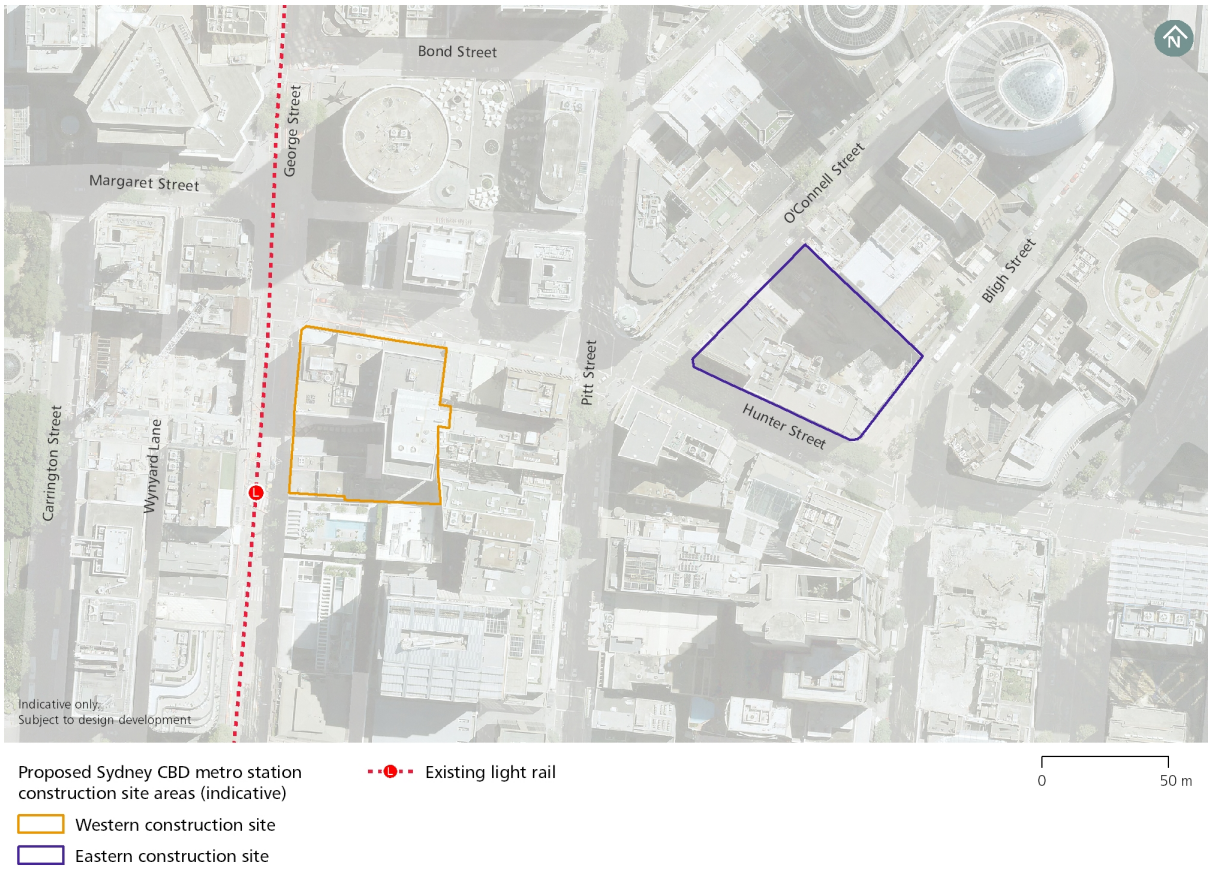

Figure 3-3 Sydney CBD metro station construction sites

The proposed indicative underground corridor alignment from The Bays to Sydney CBD is shown on Figure 3-4. The tunnel alignment would sit within this proposed indicative underground corridor alignment.

Sydney Metro is also seeking interim corridor protection through provisions in the *State Environmental Planning Policy (Infrastructure) 2007*.

Figure 3-4 Proposed indicative underground corridor alignment from The Bays to Sydney CBD

3.2 Station strategies and key features

3.2.1 Pyrmont Station

Pyrmont Station would be located in the block bound by Pyrmont Bridge Road, Union Street and Edward Street with an additional station entrance in the block bound by Pyrmont Bridge Road, Paternoster Row and Pyrmont Street (refer to Figure 3-2). Pyrmont Bridge Road is the primary east-west spine through the Pyrmont peninsula leading from south CBD and Darling Harbour through Pyrmont and Glebe to Parramatta Road. Light rail services loop around the Pyrmont peninsula to the east and west of the proposed Pyrmont Station.

Station Strategy

Pyrmont Station would improve connections between The Bays, Pyrmont, and Sydney CBD, to support the creation of an expanded and connected Sydney CBD, and act as an anchor in the NSW Government's innovation corridor. A station at Pyrmont would provide improved accessibility to the commercial, entertainment and mixed-use core of Pyrmont, as well as to Darling Harbour to the east and the proposed Bays Market District to the west. The proposed station is located close to a number of cultural and entertainment attractors, many of which are of regional and national significance including the Australian National Maritime Museum, and the Sydney International Convention, Exhibition and Entertainment Precinct.

The station strategy for Pyrmont Station would:

- Serve and support existing land uses and catalyse future growth
- Serve major events and entertainment activities, including those around Darling Harbour and the International Convention Centre
- Improve connections between Sydney, Pyrmont and The Bays to support the creation of an expanded and connected Sydney CBD
- Support Pyrmont as a diverse, desirable, vibrant and accessible inner urban precinct, connected via easy, efficient and accessible interchange to the Light Rail (L1 Dulwich Hill Line) and local buses
- Provide a direct rail service to a catchment not currently serviced by rail
- Reduce pressure on Sydney CBD stations and reduce private vehicles on the road network.

The station at Pyrmont would support the aims of the *Pyrmont Peninsula Place Strategy* (Department of Planning, Industry and Environment, 2020a), which include a transition to a place where people walk and use public transport to connect to other places.

The key features of Pyrmont Station are provided in Table 3-1.

Table 3-1 Pyrmont Station key features

Elements	Key feature
Proposed station entry	One entry on Pyrmont Bridge Road and one on Union Street
Customers	• Residents within walking and cycling distance • Employees travelling to and from nearby employment and commercial areas • Visitors to local entertainment, retail, dining, or recreational attractions
Primary station function	Destination, origin
Catchment	Residential, employment, recreational

Elements	Key feature
Transport interchange	• Walk • Cycle • Light Rail • Bus • Point to point transport • Kiss and ride (for accessible use only)
Provision for future integrated station and precinct development (subject to separate future approvals)	Yes, including consideration of relevant planning controls, the *Pyrmont Peninsula Place Strategy* (Department of Planning, Industry and Environment, 2020a) and local character.

3.2.2 Sydney CBD metro station

The Sydney CBD metro station would be located at Hunter Street between George Street to the west and Bligh Street to the east (refer to Figure 3-3). The western entry is within a block bordered by Hunter Street and George Street and including De Mestre Place. The eastern entry for Sydney CBD metro station is at the corner of Hunter and O'Connell streets.

Station Strategy

The Sydney CBD metro station would provide connections and interchange with:

- Sydney Metro City & Southwest at Martin Place Station as well as the T4 Eastern Suburbs & Illawarra Line
- T1 North Shore & Western Line, T2 Inner West & Leppington Line, T8 Airport & South Line, and T9 Northern Line at Wynyard Station
- Light Rail network at the Wynyard Light Rail Stop.

As a result, the proposed Sydney CBD metro station would significantly improve the connection between the Central River City and the Eastern Harbour City and foster fast and frequent business-to-business connections.

The station strategy for Sydney CBD metro station would:

- Provide new and direct access to the commercial core of the Sydney CBD and provide congestion relief to Wynyard and Town Hall stations
- Provide an easy, efficient and accessible interchange with T1 North Shore & Western Line, T2 Inner West & Leppington Line, T8 Airport & South Line and T9 Northern Line (at Wynyard Station) and Metro City & Southwest and T4 Eastern Suburbs & Illawarra Line (at Martin Place), and connection to Light Rail (L2 Randwick Line and L3 Kingsford Line) on George Street and city bus services
- Serve the financial and commercial core, civic precincts, and key recreational and tourist destinations / events within the Sydney CBD.

The key features of Sydney CBD metro station are provided in Table 3-2.

Table 3-2 Sydney CBD metro station key features

Elements	Key feature
Proposed station entry	• One entry on George Street • One entry at the corner of Hunter and O'Connell streets • One entry on Bligh Street • Connections to Wynyard Station and the Sydney Metro City & Southwest station at Martin Place
Customers	• Employees and visitors travelling to and from the CBD • Visitors to retail, commercial, dining, and recreational attractions
Primary station function	Destination, interchange
Catchment	Employment, recreational
Transport interchange	• Walk • Cycle • Sydney Metro City & Southwest • Sydney Trains • Light Rail • Bus via Wynyard Bus Interchange, through Wynyard Station • Point to point transport • Kiss and ride (for accessible use only)
Provision for future integrated station and precinct development (subject to separate future approvals)	Yes, including consideration of relevant planning controls and local character.

3.3 Enabling work

Enabling work are those activities that would typically be carried out before the start of substantial construction in order to make ready the key construction sites and to provide protection to the public. Enabling work may include activities such as:

- Demolition of buildings and structures within the proposed construction footprint
- Utility supply to the construction sites including power and water
- Utility adjustments and protection
- Construction site establishment

- 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.

The Environmental Impact Statement for work covered by this proposal will identify in more detail the activities proposed to be carried out as enabling work.

3.4 Tunnelling method

3.4.1 Tunnel excavation

Tunnel excavation for this proposal, between The Bays and Sydney CBD, would require the use of tunnel boring machines to excavate the majority of the twin underground running tunnels. The tunnelling methodology would be consistent with the approved major civil construction work between Westmead and The Bays of Sydney Metro West.

The tunnel boring machines for this proposal would be launched from The Bays tunnel launch and support site (refer Section 3.4.2) and head east to the Sydney CBD metro station.

Underground vehicles may be used within the tunnels to transport materials, concrete lining segments and the workforce to the cutting face. Alternatively, material may be transported with conveyor systems and special purpose rubber tyred vehicles.

Permanent tunnel lining associated with the tunnel boring machines would be assembled from precast concrete segments as the tunnel boring machines move forward. The precast concrete segments would be manufactured at dedicated precast facilities (approved on 11 March 2021 as part of a separate approvals process) and transported and stored at The Bays tunnel launch and support site (refer Section 3.4.2).

Roadheaders and rock hammers are likely to be used to construct:

- Two stub tunnels and a turnback cavern to the east of the Sydney CBD metro station
- A crossover cavern east of the approved station construction site at The Bays
- Cross passages and niches within the tunnels.

Tunnel support for roadheader sections would consist of a primary lining (such as pattern rock bolting and shotcreting) and a final cast in-situ or sprayed concrete lining. Alternatively, sections may be cast into the final lining of tunnels.

Recovery of the tunnel boring machines from the Sydney CBD metro station cavern would be via the Sydney CBD metro station eastern construction site.

Depending on the geology encountered, or to minimise ground-borne noise impacts, drill and blast or penetrating cone fracture techniques may also be used as part of tunnel excavation.

3.4.2 Tunnel launch and support

The Bays Station construction site has been approved as part of the *Sydney Metro West Environmental Impact Statement – Westmead to The Bays and Sydney CBD* (Sydney Metro, 2020a). This included the use of the site to:

- Carry out the excavation of The Bays Station
- Launch and support two tunnel boring machines for the drive west to the Sydney Olympic Park metro station construction site.

The Bays Station construction site would be established under the existing approval.

This proposal includes the use of the eastern and southern part of The Bays Station construction site to launch and support two tunnel boring machines for the drive east to the proposed Sydney CBD metro station construction sites. There would be minimal surface ground disturbance associated with these works, as this would already have been an established construction site under the existing approval.

The area, as shown on Figure 3-5, would primarily be a tunnel launch and support site within the approved station construction site at The Bays and is referred to as The Bays tunnel launch and support site. This site would initially be occupied by the Contractor undertaking construction works (tunnelling westbound) under the existing approval. This part of the site would be vacated by the tunnelling contractor (for the tunnelling westbound) at approximately the end of the first quarter 2023. This site would then become available for the Contractor tunnelling eastbound (as per this proposal) to occupy The Bays tunnel launch and support site to undertake enabling work, crossover excavations and prepare for the tunnel boring machine launch. Therefore, there would be minimal additional surface disturbance at the proposed site, with the main change from the existing approval, being some different activities occurring at the site from end of the first quarter 2023 to approximately end of the fourth quarter, 2025.

Work at the tunnel launch and support site in this proposal would occur concurrently for a period of approximately six months, with the approved tunnelling work westwards from The Bays to Sydney Olympic Park, being supported at the approved construction site at The Bays.

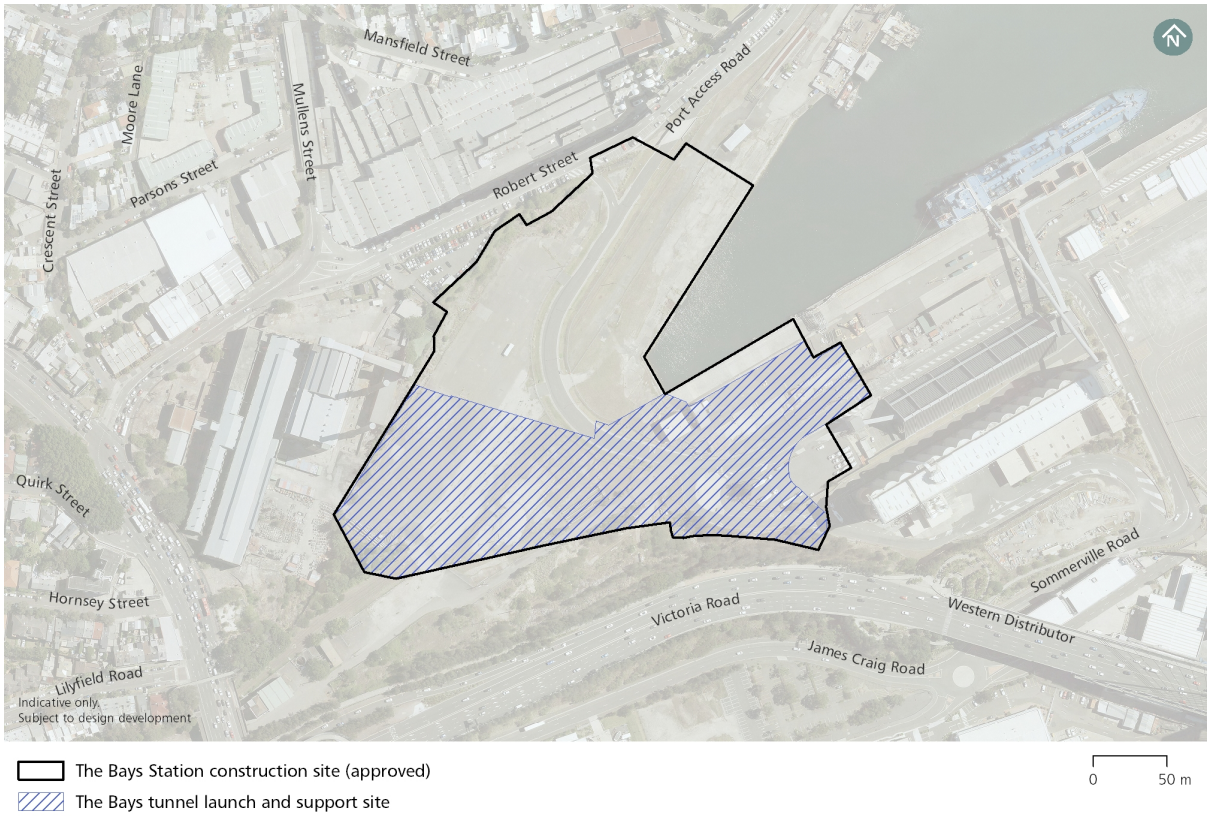

Figure 3-5 The Bays tunnel launch and support site

The Bays tunnel launch and support site would provide the necessary support for the tunnelling operation including spoil storage and removal, power supply to the tunnel boring machines, fresh air ventilation, grout batching, water treatment and disposal, material storage as well as office facilities, worker amenities and parking. Additionally, some spoil associated with turnback excavation would be removed through the Sydney CBD metro station eastern construction site. Indicative spoil generation for tunnelling activities is provided in Table 3-3.

Table 3-3 Indicative spoil generation from tunnelling activities

Construction site for spoil removal	Excavation activity	Indicative spoil generation (m^3)
The Bays tunnel launch and support site	Tunnelling between The Bays and Sydney CBD	250,000
	The Bays crossover cavern excavation	75,000
Sydney CBD metro station eastern construction site	CBD turnback cavern excavation using either TBM or roadheaders	100,000

3.5 Station excavation

Excavation of the Pyrmont Station and Sydney CBD metro station (station box and shafts) would be carried out as part of this proposal. The anticipated excavation types and details for each station are provided in Table 3-4.

An access shaft would be constructed within the footprint of the future station entries. Excavation machinery, including roadheaders would be lowered through the shaft to excavate the station cavern.

Table 3-4 Indicative station excavation details

Station	Excavation activity	Tanked/ untanked[1]	Depth (metres)	Indicative spoil generation (m^3)
Pyrmont	Mined station cavern and access shaft excavation using roadheaders	Tanked	36-39	220,000
Sydney CBD	Mined station cavern and access shaft excavation using roadheaders	Tanked	26-31	405,000

Note 1: Tanked structures are designed to inhibit the inflow of groundwater, typically using concrete lining and waterproofing membrane.

Excavation of the stations would generally be carried out in the following sequence:

- Enabling work including protection or diversion of utilities and establishment of site access points
- Demolition of structures on the site and clearance of landscaped vegetation
- Excavation and temporary structural work for station boxes and underground pedestrian passages.

3.6 Construction sites

Construction sites required for this proposal would be contained within the future operational station footprints for Pyrmont Station and Sydney CBD metro station. These footprints include the land that would be occupied permanently by the future station buildings and associated infrastructure/work, which would be subject to a separate assessment and approval. Additional areas may be temporarily required to support excavation work and to provide staff facilities and parking. These additional areas would be determined as part of further design development.

There would be two construction sites associated with each proposed station for the major civil construction work between The Bays and Sydney CBD:

- Pyrmont Station western construction site
- Pyrmont Station eastern construction site
- Sydney CBD metro station western construction site
- Sydney CBD metro station eastern construction site.

The location and indicative footprint of the proposed construction sites are shown in Figure 3-2 and Figure 3-3.

As described in Section 3.4.2, The Bays tunnel launch and support site would operate within the approved station construction site at The Bays.

Table 3-5 provides a summary of the main activities to be carried out at each construction or tunnel launch and support site and their associated uses.

Table 3-5 Construction sites and main activities

Construction / tunnel launch and support site	Tunnel boring machine launch and support	Tunnel boring machine retrieval	Roadheader works 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			•	•	•	•	
Sydney CBD metro station western construction site			•	•	•	•	
Sydney CBD metro station eastern construction site		•	•	•	•	•	

3.7 Other construction aspects

3.7.1 Transport network modifications

Transport network modifications as a result of establishing short and long-term work zones to facilitate this proposal may include:

- Temporary closure of some sections of roadways and parking areas
- Temporary alterations to pedestrian and cyclist facilities (i.e. footpath closures and diversions)
- Temporary alterations to existing public transport infrastructure or timetables.

Other minor modifications may be required near construction sites to facilitate access and exit arrangements, and parking management during construction. These modifications would be detailed in the Environmental Impact Statement for major civil construction work between The Bays and Sydney CBD.

3.8 Construction hours

Tunnel excavation, underground station excavation and supporting activities (including spoil haulage) are anticipated to be carried out up to 24 hours per day and seven days per week to help reduce the construction timeframe. Mitigation measures for noise and dust would be implemented and may include:

- Temporary acoustic sheds
- Noise barriers
- Providing respite periods
- Changes to the construction methodology and machinery to be used (refer to Section 6.4).

Aboveground construction activities including demolition of buildings and structures at the proposed Pyrmont construction sites and initial excavation of access shafts, would be carried out during standard construction hours, as follows:

- 7am–6pm Monday to Friday
- 8am–1pm Saturdays
- No work on Sundays or Public Holidays.

Given the largely commercial receiver environment of the Sydney CBD construction sites, it is anticipated that extended construction hours for aboveground construction activities at the Sydney CBD construction sites would occur on Saturdays and Sundays, including the removal of spoil which would also be proposed during night-time hours.

Other activities at the proposed Pyrmont and Sydney CBD construction sites that would be carried out outside of the standard daytime construction hours would include:

- Construction works, including utilities works, that would require the temporary possession of roads
- Work determined to comply with the relevant noise management level at the nearest sensitive receiver

- The delivery of materials outside approved hours as required by the NSW Police or other authorities for safety reasons
- Emergency situations where it is required to avoid the loss of lives and property and/or to prevent environmental harm
- Situations where agreement is reached with the affected community receivers.

3.9 Construction program

Enabling work (preliminary construction activities required to facilitate the start of substantial construction) would be likely to begin before the start of major construction work. The total construction period for this proposal (major civil construction work between The Bays and Sydney CBD) would be around three years. The indicative durations and anticipated timing of major construction activities are summarised in Figure 3-6.

The contractor that would be undertaking works within The Bays Station construction site (for tunnelling westbound from The Bays), would vacate The Bays tunnel launch and support site for the proposal in first quarter 2023. This would enable the contractor for the tunnelling in this proposal to occupy The Bays tunnel launch and support site in quarter two 2023, to undertake enabling work and prepare for the tunnel boring machine launch and undertake the crossover excavations. The tunnelling work covered by this proposal is proposed to occur from early 2024 to early 2025, though some construction work may take place within The Bays tunnel launch and support site until late 2025.

The tunnelling work in this proposal would overlap with the approved tunnelling work westwards from The Bays to Sydney Olympic Park, supported at the approved station construction site at The Bays, for a period of approximately six months, to approximately mid-2024, followed by demobilisation activities.

Figure 3-6 Indicative construction program

3.10 Related development

The following approved projects are related to the proposal:

- The Bays road relocation works
- Sydney Metro West Eastern Creek Precast Facilities.

A summary of these projects and their respective potential impacts are provided in Chapter 3 of the *Sydney Metro West - Westmead to The Bays and Sydney CBD – Submissions Report* (Sydney Metro, 2020d) which also refers to the determination of The Bays road relocation works.

Sydney Metro determined on 11 March 2021 the Sydney Metro West Eastern Creek Precast Facilities may be carried out. The precast concrete segments for the permanent tunnel lining for the tunnel excavation would be manufactured at the approved Eastern Creek Precast Facilities. The Determination Report is available at **www.sydneymetro.info/metrowest**.

4 Statutory context

This chapter describes the statutory planning process for major civil construction work between The Bays and Sydney CBD and identifies other NSW and Commonwealth legislation and approvals which may apply.

4.1 Sydney Metro West Concept approval

Sydney Metro West was declared as State significant infrastructure and critical State significant infrastructure under sections 5.12(4) and 5.13 of the EP&A Act respectively on 23 September 2020.

Accordingly, the Sydney Metro West Concept was approved on 11 March 2021, under Part 5, Division 5.2 of the EP&A Act as a staged State significant infrastructure application. The approved Sydney Metro West Concept includes:

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

The proposal was envisaged in the Sydney Metro West Concept, being primarily for the construction of new passenger rail infrastructure between The Bays and the Sydney CBD. Detailed proposals for other additional and separate stages of the Sydney Metro West Concept would be subject to separate future subsequent applications.

4.2 NSW environmental planning approvals

4.2.1 Planning approval process under Division 5.2 of the EP&A Act

The assessment and approval process for this staged State significant infrastructure application is established under Part 5, Division 5.2 of the EP&A Act. The assessment and approval process for Sydney Metro West as State significant infrastructure is detailed in Chapter 4 (Planning and assessment process) of *Sydney Metro West Environmental Impact Statement – Westmead to The Bays and Sydney CBD* (Sydney Metro, 2020a). The assessment and approval process for the major civil construction work between The Bays and Sydney CBD is summarised in Figure 4-1. The requirements of Clause 192 of the EP&A Regulation for applications seeking approval of the Minister for Planning and Public Spaces to carry out State significant infrastructure are addressed in Section 4.3.

Figure 4-1 The assessment and approvals process for major civil construction work between The Bays and Sydney CBD

4.2.2 NSW environmental planning instruments

Section 5.22 of the EP&A Act provides that environmental planning instruments (such as local environmental plans and State Environmental Planning Policies) do not, with some exceptions, apply to State significant infrastructure projects. Notwithstanding, the environmental planning instruments that have been considered for consistency are summarised in Table 4-1.

Table 4-1 Environmental planning instruments

Environmental planning instrument	Discussion
State Environmental Planning Policy (State and Regional Development) 2011	State Environmental Planning Policy (State and Regional Development) 2011 identifies development that is State significant development, State significant infrastructure and critical State significant infrastructure. Schedule 5 of this SEPP includes Sydney Metro West as critical State significant infrastructure and State significant infrastructure. The approvals process for future integrated station and precinct development is separately discussed in Section 4.4.
State Environmental Planning Policy (Infrastructure) 2007	State Environmental Planning Policy (Infrastructure) 2007 includes provisions for the protection of interim rail corridors from development that may affect the design, cost, and delivery of the proposed infrastructure. Sydney Metro is seeking Interim Corridor Protection for the tunnelling alignment between The Bays and Sydney CBD.
Sydney Regional Environment Plan (Sydney Harbour Catchment) 2005	Some elements of this proposal may be within the defined boundary of the Sydney Regional Environmental Plan (Sydney Harbour Catchment) 2005. This plan aims to (amongst other things) protect, enhance, and maintain the catchment, foreshores, waterways, and islands of Sydney Harbour for existing and future generations. Consistency with these aims would be considered during preparation of the environmental impact assessment.
State Environmental Planning Policy No. 55 – Remediation of Land	The State Environmental Planning Policy No. 55 – Remediation of Land provides a State-wide approach to the remediation of contaminated land for the purpose of minimising the risk of harm to the health of humans and the environment. In accordance with Clause 7(1), a consent authority must not consent to the carrying out of development on any land unless: • It has considered whether the land is contaminated • If the land is contaminated, it is satisfied that the land is suitable in its contaminated state (or would be suitable, after remediation) for the purpose for which the development is proposed to be carried out • If the land requires remediation to be made suitable for the purpose for which the development is proposed to be carried out, it is satisfied the land would be remediated before the land is used for that purpose. A contamination assessment will be carried out in accordance with the *Managing Land Contamination Planning Guidelines SEPP 55–Remediation of Land* (Department of Urban Affairs and Planning and Environment Protection Authority, 1998) to inform the design and Environmental Impact Statement for work covered by this proposal.
Sydney Regional Environmental Plan No. 26 – City West	Sydney Regional Environmental Plan No. 26 – City West is relevant to The Bays. The plan repeals local environmental plans and other planning instruments that would otherwise apply. The plan sets land use, urban design, and public domain principles. Consistency with these principles would be considered during future environmental impact assessments.

Environmental planning instrument	Discussion
State Environmental Planning Policy (Coastal Management) 2018	State Environmental Planning Policy (Coastal Management) 2018 gives effect to the objectives of the *Coastal Management Act 2016* from a land use planning perspective, by specifying how development proposals are to be assessed if they fall within the coastal zone. Some elements of this proposal are within the defined boundary of the Policy (within land defined as Coastal Environmental Area). The management objectives for this area are: • To protect and enhance the coastal environmental values and natural processes of coastal waters, estuaries, coastal lakes, and coastal lagoons, and enhance natural character, scenic value, biological diversity, and ecosystem integrity • To reduce threats to and improve the resilience of coastal waters, estuaries, coastal lakes, and coastal lagoons, including in response to climate change • To maintain and improve water quality and estuary health • To support the social and cultural values of coastal waters, estuaries, coastal lakes, and coastal lagoons • To maintain the presence of beaches, dunes, and the natural features of foreshores, taking into account the beach system operating at the relevant place • To maintain and, where practicable, improve public access, amenity and use of beaches, foreshores, headlands, and rock platform. Consistency with these objectives, and potential impacts on mapped coastal wetlands, would be considered during future environmental impact assessments.
State Environmental Planning Policy No. 19 Bushland in Urban Areas	State Environmental Planning Policy 19 – Bushland in Urban Areas applies to bushland within the urban areas identified in Schedule 1 of the Policy. Of relevance to this proposal is the City of Sydney local government area. The aim of the Policy is to protect and preserve bushland for its natural heritage aesthetic, recreational, educational, and scientific resource values. The aims of the Policy would be considered during future environmental impact assessments.

4.3 Other NSW legislation

In accordance with sections 5.23 and 5.24 of the EP&A Act, some environmental and planning legislation does not apply to approved State significant infrastructure or must be applied consistently with an approval for State significant infrastructure (refer to Section 4.2.1).

4.3.1 Approvals or authorisations that are not required or cannot be refused

The approvals or authorisations that would not be required or cannot be refused for this proposal are consistent with those of the Sydney Metro Concept and the major civil construction work between Westmead and The Bays for Sydney Metro West, and include:

- Approvals under Part 4 or excavation permits under section 139 of the *Heritage Act 1977*
- Aboriginal heritage impact permits under section 90 of the *National Parks and Wildlife Act 1974*

- Various approvals under the *Water Management Act 2000*, including water use approvals under section 89, water management work approvals under section 90 and activity approvals (other than aquifer interference approvals) under section 91.

In addition, Division 8 of Part 6 of the *Heritage Act 1977* does not apply to prevent or interfere with the carrying out of the State significant infrastructure.

Similarly, section 5.23 of the EP&A Act specifies directions, orders or notices that cannot be made or given so as to prevent or interfere with the carrying out of approved critical State significant infrastructure. Of potential relevance to this proposal would be:

- An interim protection order (within the meaning of *National Parks and Wildlife Act 1974*)
- An order under Division 1 (Stop work orders) of Part 6A of the *National Parks and Wildlife Act 1974*
- A remediation direction under Division 3 (Remediation directions) of Part 6A of the *National Parks and Wildlife Act 1974*
- An order or direction under Part 11 (Regulatory compliance mechanisms) of the *Biodiversity Conservation Act 2016*
- An environment protection notice under Chapter 4 of the *Protection of the Environment Operations Act 1997*
- Order under section 124 of the *Local Government Act 1993*.

Section 5.24 of the EP&A Act identifies approvals or authorisations that cannot be refused if they are necessary for carrying out approved State significant infrastructure and must be substantially consistent with the Part 5, Division 5.2 approval. Statutory approvals or authorisations of potential relevance to this proposal include:

- An Environment Protection Licence under Chapter 3 of the *Protection of the Environment Operations Act 1997*
- A consent under section 138 of the *Roads Act 1993*.

4.3.2 NSW legislation and regulations that may still be applicable

Environmental planning related legislation and regulations that may still be applicable to approved critical State significant infrastructure and, based on the current scope covered by this proposal, may be relevant are identified in Table 4-2.

Table 4-2 NSW legislation and regulations of potential relevance

Legislation	Requirement
Aboriginal Land Rights Act 1983	This Act establishes the NSW Aboriginal Land Council and local Aboriginal land councils and requires these bodies to: • Take action to protect the culture and heritage of Aboriginal persons in the council's area, subject to any other law • Promote awareness in the community of the culture and heritage of Aboriginal persons in the council's area. Under this Act, Aboriginal land councils can claim Crown land which, if granted, is transferred as freehold title. 'Claimable Crown lands' includes Crown lands that are not lawfully used or occupied and that are not needed, nor likely to be needed, for an essential public purpose. The work covered by this proposal would pass underneath a number of parcels of Crown land.
Biosecurity Act 2015	Under this Act, all plants are regulated with a general biosecurity duty to prevent, eliminate or minimise any biosecurity risk they may pose. Any person who deals with any plant, who knows (or ought to know) of any biosecurity risk, has a duty to ensure the risk is prevented, eliminated or minimised, so far as is reasonably practicable. While minimal, some vegetation would be present within the construction footprint covered by this proposal. A preliminary environmental assessment of potential impacts to biodiversity is provided in Section 6.15.
Contaminated Land Management Act 1997	This Act outlines the circumstances in which notification to the Environment Protection Authority is required in relation to the contamination of land. This may be relevant for this proposal. Contamination is further discussed in Section 6.13.
Crown Land Management Act 2016	This Act sets out the requirements for the management of Crown land in NSW, including where councils and other organisations can deal with Crown land. The work covered by this proposal would pass underneath a number of parcels of Crown land. Land would be managed in accordance with the objectives of this Act as relevant.
Greater Sydney Commission Act 2015	This Act establishes the Greater Sydney Commission which has a principal objective of leading metropolitan planning for the Greater Sydney Region. The Greater Sydney Commission will not have a formal statutory role for the work covered by this proposal but will be consulted with respect to its core functions.
Heritage Act 1977 (Section 146)	This Act sets out that if a relic is discovered or located, the Heritage Council must be notified 'of the location of the relic, unless he or she believes on reasonable grounds that the Heritage Council is aware of the location of the relic'. The work covered by this proposal has the potential to discovered unknown relics due to its location and extensive excavation.
Land Acquisition (Just Terms Compensation) Act 1991	This Act would apply to the acquisition of land required for the work covered by this proposal.
Marine Pollution Act 2012	This Act includes provisions to protect the sea and waters from pollution by oil and other noxious substances discharged from vessels. Any construction activities requiring the use of a vessel (e.g. a barge) must comply with the requirements of this Act and the *Marine Pollution Regulation 2014*. Barges may be used to transport materials to and from The Bays tunnel launch and support site.

Legislation	Requirement
Native Title (NSW) Act 1994	This Act provides for native title in relation to land or waters. This proposal would not affect land which is subject to native title claim or determination, or land to which an Indigenous Land Use Agreement applies.
Protection of the Environment Operations Act 1997	An environment protection licence is required for scheduled activities or development work listed by the Act. Schedule 1 lists activities that require a licence and those that would be relevant to this proposal include: • Part 1 clause 33 Railway activities – railway infrastructure construction, meaning the construction of railway infrastructure and any related tunnels, earthworks and cuttings, and the extraction of materials necessary for that construction. Although the railway infrastructure in this proposal would be less than three kilometres in length, the construction would likely include the extraction of over 150,000 tonnes of material, which would trigger requirements for an Environmental Protection Licence (EPL) under the Act. Other parts of the Act that could be relevant include: • Section 120 of the Act prohibits the pollution of waters • Air pollution-related sections 124 to 126 (Chapter 5, Part 5.4, Division 1) of the Act require activities to be conducted in a proper and efficient manner, while section 128 (Chapter 5, Part 5.4, Division 1) of the Act requires that all necessary practicable means are used to prevent or minimise air pollution • Pollution of land and waste is covered by Part 5.6 of the Act. It defines offences relating to waste and sets penalties and establishes the ability to set various waste management requirements via the Protection of the Environment Operations (Waste) Regulation 2014.
Protection of the Environment Operations (Waste) Regulation 2014	This Regulation provides for exemptions from environment protection licencing for certain resource recovery activities and establishes tracking and reporting requirements for the transport of waste. Any waste generated as a result of work covered by this proposal must be tracked and recorded in accordance with the requirements of the Regulation.
Roads Act 1993	Section 138 of this Act states: • A person must not (a) erect a structure or carry out a work in, on or over a public road, or (b) dig up or disturb the surface of a public road, or (c) remove or interfere with a structure, work or tree on a public road, or (d) pump water into a public road from any land adjoining the road, or (e) connect a road (whether public or private) to a classified road, otherwise than with the consent of the appropriate roads authority • Under Section 38N of the *Transport Administration Act 1988*, Section 138 of the *Roads Act 1993* does not apply to Sydney Metro activities in relation to classified roads for which a council is the roads authority. However, consent from Transport for New South Wales is still required under Section 38N (2) of the *Transport Administration Act 1988* for those activities described in Section 138(1) of the *Roads Act 1993*, when carried out in relation to a classified road.
Transport Administration Act 1988	This Act also applies to compulsory acquisitions for the purpose of underground rail facilities and therefore applies to the acquisition of land required for this proposal.

Legislation	Requirement
Waste Avoidance and Resource Recovery Act 2001	This Act encourages the most efficient use of resources in order to reduce environmental harm and would be applied to this proposal.
Water Management Act 2000	Temporary dewatering and construction activities that interfere with aquifers are generally identified as aquifer interference activities in accordance with the *Water Management Act 2000* and the *NSW Aquifer Interference Policy* (Department of Primary Industries, 2012). Dewatering activities will be required as part of this proposal (refer to Section 6.11 for potential impacts on aquifers).

4.4 Commonwealth legislation

4.4.1 Environment Protection and Biodiversity Conservation Act 1999

The Commonwealth Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act) establishes the Commonwealth's role in environmental assessment, biodiversity conservation and the management of protected areas.

Matters of national environmental significance

Under the EPBC Act, a referral to the Commonwealth Department of Agriculture, Water and the Environment is required for proposed 'actions' that have the potential to significantly impact on any matter of national environmental significance or the environment of Commonwealth land (including leased land).

Issues with respect to matters of national environmental significance are discussed in Section 6.5 (Non-Aboriginal heritage) and Section 6.15 (Biodiversity).

4.4.2 Native Title Act 1993

An objective of the Commonwealth *Native Title Act 1993* is to recognise and protect native title. Section 8 states that the *Native Title Act 1993* is not intended to affect the operation of any law of a State or a Territory that is capable of operating concurrently with the Act. Searches of the registers maintained by the National Native Title Tribunal indicate there are no native title claims or any indigenous land use agreements that apply to land within the area covered by this proposal.

4.5 Planning approvals for integrated station development

Sydney Metro West stations, including the future Pyrmont and Sydney CBD stations, would be designed with provisions for integrated station development. Typical examples include structural elements and space provisioning for building foyers and entrances, lift wells, and building services.

All future integrated station developments will be subject to a separate planning approvals process including community and stakeholder engagement in accordance with the provisions of the EP&A Act.

5 Stakeholder and community engagement

This chapter outlines the community and stakeholder engagement undertaken to date and the future consultation proposed for Sydney Metro West.

5.1 Overview

Sydney Metro has been engaging with the community, stakeholders and industry on the planned Sydney Metro West since 2017. Feedback gathered has helped shape the project, including station locations. Sydney Metro will continue to work with the community and stakeholders as the project progresses.

Early engagement with the community and stakeholders began in June 2017 and continued into 2018. Further engagement for the project followed the announcement of confirmed station locations between Westmead and The Bays in October 2019. From 30 April to 28 June 2020, Sydney Metro exhibited the *Sydney Metro West Environmental Impact Statement – Westmead to The Bays and Sydney CBD* (Sydney Metro, 2020a) and asked for the community to provide feedback.

Consultation has proactively sought feedback and comments on Sydney Metro West through different forums and channels to inform the development phase and the scope of issues to be assessed as part of the environmental assessment process.

Key stakeholders for Sydney Metro West include (but are not necessarily limited to):

- Nearby communities
- State government agencies (including but not limited to Department of Planning, Industry and Environment, Greater Sydney Commission, other sections of Transport for NSW, NSW Environment Protection Authority and the former Office of Environment and Heritage)
- Local government (Blacktown City Council, Cumberland City Council, City of Parramatta Council, Burwood Council, Strathfield Council, City of Canada Bay, Inner West Council and the City of Sydney Council)
- Public utilities and business and industry groups near the work covered by this proposal
- Special interest groups including Local Aboriginal Land Councils, Aboriginal stakeholders, and sporting associations and groups
- The broader community.

5.2 Consultation during the Sydney Metro West Concept approval process

The *Sydney Metro West Environmental Impact Statement – Westmead to The Bays and Sydney CBD* (Sydney Metro, 2020a) was placed on public exhibition by the Department of Planning, Industry and Environment from 30 April 2020 to 26 June 2020. The following consultation activities were undertaken to support the exhibition period:

- Virtual community engagement including an interactive portal and virtual information room
- Virtual stakeholder briefings
- Phone calls and emails.

A total of 188 submissions were received by the Department of Planning, Industry and Environment during the exhibition period. Of these submissions, 34 were from NSW Government departments/agencies, local councils, and other key stakeholders. The most frequently raised issues by government agencies and key stakeholders included:

- Development and alternatives
- Need for ongoing community and stakeholder engagement
- Construction noise and vibration.

Of the 188 submissions, a total of 154 submissions were received from community members/residents, businesses, social infrastructure, community and interest groups, and Members of Parliament. These submissions were grouped together as community submissions. Key issues of most concern to the community included:

- Development and alternatives
- Need for ongoing community and stakeholder engagement
- Placemaking strategies and principles
- Transport and traffic, noise and vibration, Aboriginal heritage, non-Aboriginal heritage, visual, surface water, groundwater, contamination, flooding, air quality and biodiversity impacts
- Sustainability
- Cumulative impacts.

Further analysis of the issues raised in submissions and corresponding responses is provided in *Sydney Metro West - Westmead to The Bays and Sydney CBD – Submissions Report* (Sydney Metro, 2020d).

5.3 Stakeholder Engagement

Since the announcement of Sydney Metro West, key stakeholders have been briefed via meetings, presentations and phone calls. The objectives of the briefings are to:

- Ensure stakeholders are consulted, where applicable
- Ensure issues and concerns are understood, captured and addressed in the development of Sydney Metro West
- Receive feedback.

The stakeholders Sydney Metro has engaged with since 2017 are identified in Table 5-1.

Table 5-1 Stakeholders that have been engaged with since 2017

Agency group/type	Stakeholders briefed/contacted

NSW Government	• Transport for NSW
	  - Greater Sydney Division
	  - Customer Strategy & Technology Division
	  - Parramatta Light Rail
	  - Rozelle Interchange
	  - Western Harbour Tunnel
	  - Sydney Trains
	• NSW Environment Protection Authority
	• Heritage Council of NSW
	• Port Authority NSW
	• Schools Infrastructure NSW
	• NSW Ambulance
	• NSW Police
	• NSW Fire and Rescue
	• Health Infrastructure NSW

Local government	• Blacktown City Council • Cumberland Council • City of Parramatta Council • City of Canada Bay Council • Strathfield Council • Burwood Council • Inner West Council • City of Sydney Council
Local stakeholders	• Parramatta Chamber of Commerce – Economic Planning Committee • Urban Taskforce • Western Sydney Regional Organisation of Councils • Western Sydney Business Chamber • Lucas Gardens Public School • Arthur Philip High School • Parramatta Public School • Five Dock Public School • Rosehill Public School • Newington Public School • Westmead Public School
Major landholders/tenants	• Sydney Olympic Park Business Association • Australian Turf Club

5.3.1 Industry engagement

Sydney Metro works with industry on Sydney Metro West to foster innovation and to help shape development, maximising industry input at the early stages.

Industry engagement has been carried out since 2017 to first build awareness of the project, obtain market information to shape its scope, definition and delivery strategy so that the desired transport and land use outcomes are met.

5.3.2 Pyrmont strategic station option feedback

In 2019 Sydney Metro invited feedback from community and stakeholders on including Pyrmont as a strategic station option as part of the Sydney Metro West project.

Community and stakeholders were provided an opportunity to provide feedback by way of an online survey or in writing via email. This was advertised through website updates, letterbox drops and emails to local community members and stakeholders. Briefings were also offered to key stakeholders, state government agencies and local councils.

The survey results indicated strong support for more public transport options in the area, support for increased development density around public transport, and support for the opportunities a metro station could bring to Pyrmont in terms of urban growth and renewal.

Written feedback highlighted the benefits a metro station could bring to Pyrmont, including urban renewal, employment growth, development and tourism.

Feedback further underlined the importance of Pyrmont as a major employment hub connecting The Bays, Ultimo and the Sydney CBD, and that a metro station could draw further companies and organisations to the suburb and encourage investment and development.

5.4 Ongoing engagement

5.4.1 Place managers

Sydney Metro West's place managers play a vital role in building and maintaining strong relationships with local communities and businesses during the planning and delivery of the project. Their key role is to engage with the community, address concerns and provide accurate and transparent information to ensure the community's understanding of the project and any potential impacts.

Place managers would continue to play a vital role in maintaining close and ongoing contact with local communities and stakeholders during the design and delivery of Sydney Metro West. Place managers can be contacted via the community information line (1800 612 173) or project email (sydneymetrowest@transport.nsw.gov.au).

5.4.2 Other engagement methods

Sydney Metro will continue to work with the community and all stakeholders as the project progresses through the planned ongoing and future engagement outlined in Table 5-2.

Table 5-2 Ongoing and future engagement

Activity	Timing
Awareness and marketing campaign to engage future customers	Ongoing
Community events (pending public health order restrictions)	Ongoing
Community information sessions (in person (pending public health order restrictions) and virtually)	As required
Community Communications Strategy	Prior to construction
Construction complaints management system	Prior to construction
Construction notifications	Seven days prior to construction starting
Door knocking	As required
Email updates/e-newsletters	Relevant milestones
Enquiries and complaints hotline	Ongoing
Fact sheets	As required
Engagement with stakeholders including government, peak bodies and local businesses	As required; relevant milestones
Interactive portal	Ongoing
Media releases	Relevant milestones
Newsletter	Relevant milestones
Newspaper advertising	Relevant milestones
Online webinars, meetings and forums	As required
Place Managers	Ongoing
Project briefings and presentations (in person (pending public health order restrictions) and virtually)	Relevant milestones
Project overview document	Relevant milestones
Site signage	Prior to construction
Social media updates	As required; relevant milestones
Virtual information room	Relevant milestones
Website and online forums	Ongoing

5.4.3 Community contact and information

The community contact and information channels established for Sydney Metro West (outlined in Table 5-3) will remain in place during the preparation of the Environmental Impact Statement for this proposal and for the remainder of the planning approval process.

Table 5-3: Community contact and information points

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

5.5 Future engagement

5.5.1 Engagement activities during future planning

Sydney Metro would continue to work with stakeholders and the community to ensure they are informed and have opportunities to provide feedback to the Sydney Metro West team during future planning phases. Sydney Metro recognises the diverse engagement and information needs of the community and stakeholders and is committed to a robust and transparent engagement processes that is inclusive in nature.

Future communications plans will be developed to ensure the community is aware and engaged at subsequent assessment and approval stages of the project.

6 Preliminary environmental assessment

This chapter provides a preliminary assessment of the potential impacts identified for the proposal, along with the proposed scope of investigations and assessment to be carried out as part of the Environmental Impact Statement.

6.1 Overview

A high-level desktop assessment has been carried out to identify potential environmental impacts for this proposal. The assessment provided in this chapter is preliminary, and the potential impacts may change through the design and environmental impact assessment process as more information becomes available. Any changes to environmental impacts will be assessed as part of the Environmental Impact Statement for this proposal. A summary of the proposed scope of this Environmental Impact Statement, including the relevant legislation, policies and guidelines for each environmental issue, is provided in Appendix A of this Scoping Report.

6.2 Existing environment

6.2.1 The proposed corridor between The Bays and Sydney CBD

A summary of the key features of the existing environment of the proposed corridor between The Bays and Sydney CBD is provided in Table 6-1. Given the underground location of the tunnel, not all of the environmental issues are appropriate, and this has been noted where relevant in the table.

Table 6-1 Summary of existing environment for the proposed corridor between The Bays and Sydney CBD

Environmental issue	Summary of existing environment
General context	
Surrounding land use and sensitive receivers	The proposed corridor for the tunnelling alignment between The Bays and Sydney CBD passes underneath urban areas comprising a variety of land uses including commercial, residential, recreational and mixed use. Sensitive receivers above the proposed corridor include residential and commercial properties, listed heritage items and social infrastructure such as hotels and medical facilities.
Transport and traffic	
Road network	The road network above the proposed corridor alignment includes strategic roads such as the A4 Western Distributor and the M1 Motorway, as well as the grid pattern associated with urban centres. These road networks are used by suburban and express bus services, as well as providing active transport opportunities including footpaths and cycleways.

Environmental issue	Summary of existing environment
Sydney Trains network	The alignment would cross the following Sydney Trains rail lines: • T1 North Shore & Western Line • T2 Inner West & Leppington Line • T3 Bankstown Line • T4 Eastern Suburbs & Illawarra Line • T8 Airport & South Line • T9 Northern Line.
Light Rail	The alignment would pass beneath the following Light Rail lines: • L1 Dulwich Hill Line in Pyrmont • L2 Randwick Line and L3 Kingsford Line along George Street.
Sydney Metro	Sydney Metro City & Southwest is currently under construction and will extend metro services beneath Sydney Harbour and onto Bankstown through the upgrade of the existing T3 Bankstown Line. It is anticipated to commence operations in 2024. The alignment would cross Sydney Metro City & Southwest just north of the Martin Place metro station.
Ferry	The proposed corridor passes beneath Darling Harbour and King Street Wharf, and associated ferry routes connecting to Circular Quay, Balmain and McMahons Point.
Noise and vibration	
Potential vibration receivers	The alignment passes beneath a large number of existing buildings and structures comprising commercial and residential receivers, and heritage items that are described further in subsequent sections of this table.
Non-Aboriginal heritage	
Listed items of non-Aboriginal heritage significance above the proposed corridor	There are 40 non-Aboriginal heritage listings identified as being located above the proposed corridor comprising: • 1 item on the National Heritage List (Governors' Domain and Civic Precinct) • 14 State listed heritage items • 24 locally listed heritage items • Pyrmont heritage conservation area.
Aboriginal heritage	
Known Aboriginal sites above the proposed corridor	There are four previously recorded Aboriginal sites located above the proposed corridor.
Landscape character and visual amenity	
The existing landscape character and visual amenity is not considered relevant for the proposed corridor, given it is underground.	

Environmental issue	Summary of existing environment
Business impacts	
Business context	The proposed alignment passes underneath a variety of business types and sizes, from smaller, local businesses to larger, international companies. There are a wide range of businesses located above the proposed alignment including retail, commercial, entertainment and events, education, cafes and restaurants.
Social impacts and community infrastructure	
Social infrastructure above the proposed alignment	Social infrastructure located above the proposed alignment includes emergency services, open space and recreation facilities, pharmacies and medical facilities, a library, childcare centres, educational facilities and civic facilities.
Groundwater and ground movement	
Geology	The *Sydney 1:100,000 Geological Map* (Geological Survey of NSW, 1983) shows the proposed corridor is mainly located within Hawkesbury Sandstone.
Groundwater quality	The expected groundwater quality derived from Hawkesbury Sandstone is fresh to brackish groundwater, with salinity ranging from 500 to 10,000 milligrams per litre and a neutral pH. The concentration of trace ions (such as iron and manganese) and dissolved metals and nutrients is expected to be low. Organic compounds are not naturally associated with this geological unit.
Groundwater users	A review of the *WaterNSW Groundwater Bore Database* (WaterNSW, 2019a) and the *Register of Water Approvals* (WaterNSW, 2019b) did not identify any groundwater users along the proposed corridor.
Soils and surface water quality	
Soil landscapes	The *Soil Landscapes of Sydney 1:100,000 Sheet* (Tille et al., 2009) identify the main soil types located above the proposed corridor are Gymea and disturbed terrain.
Acid sulfate soils	The proposed corridor passes beneath areas of Sydney Harbour including Johnstons Bay and Darling Harbour. These areas are identified as having a high probability of acid sulfate soils occurring within the bottom sediments.
Catchments and water courses	The proposed corridor is located beneath the Sydney Metropolitan catchment (Port Jackson) which includes Sydney Harbour. The catchment is highly urbanised and altered from its natural state.
Surface water quality	Watercourses above the proposed corridor include Sydney Harbour, specifically Circular Quay, Pyrmont Bay and Cockle Bay, which is heavily urbanised. Water quality is largely influenced by 'point source' water pollution such as stormwater drainage outlets and diffuse water pollution such as urban runoff that does not enter stormwater drains. Water quality is anticipated to be average to generally poor, typical of a heavily urbanised environment.
Contamination	
Contaminated sites	There are no known contaminated sites present within the footprint of the proposed corridor.

Environmental issue	Summary of existing environment
Hydrology and flooding	
The existing environment for hydrology and flooding is not considered relevant for the proposed corridor, given it is underground.	
Biodiversity	
Surface biodiversity aspects are not considered relevant for the proposed corridor, given it is underground.	
Groundwater dependent ecosystems	A search of the *National Atlas of Groundwater Dependent Ecosystems* (Bureau of Meteorology, 2018) identified that there are no groundwater dependent ecosystems above the proposed corridor.
Air quality	
The existing environment for air quality is not considered relevant for the proposed corridor, given it is underground.	
Hazard and risk	
Utilities	Existing utilities located above the proposed corridor include high voltage cables, sewer, water main, stormwater, communications and gas.
Major hazard facilities	There are no active major hazard facilities within two kilometres of the proposed corridor.
Building basements and ground support structures	The highly urbanised nature of the land above the proposed corridor means that building basements and ground support structures will be located in close proximity.

6.2.2 Station construction sites

Key features of the future Pyrmont Station and Sydney CBD metro station are shown on Figure 6-1 and Figure 6-2, respectively, and the existing environments are summarised in Table 6-2. The proposed Bays tunnel launch and support site is within the footprint of The Bays Station construction site, which was approved as part of the *Sydney Metro West Environmental Impact Statement – Westmead to The Bays and Sydney CBD* (Sydney Metro, 2020a). Therefore, the *Sydney Metro West Environmental Impact Statement – Westmead to The Bays and Sydney CBD* (Sydney Metro, 2020a) provides information on the existing environment of The Bays Station construction site.

Figure 6-1 Existing environment - Pyrmont Station construction sites

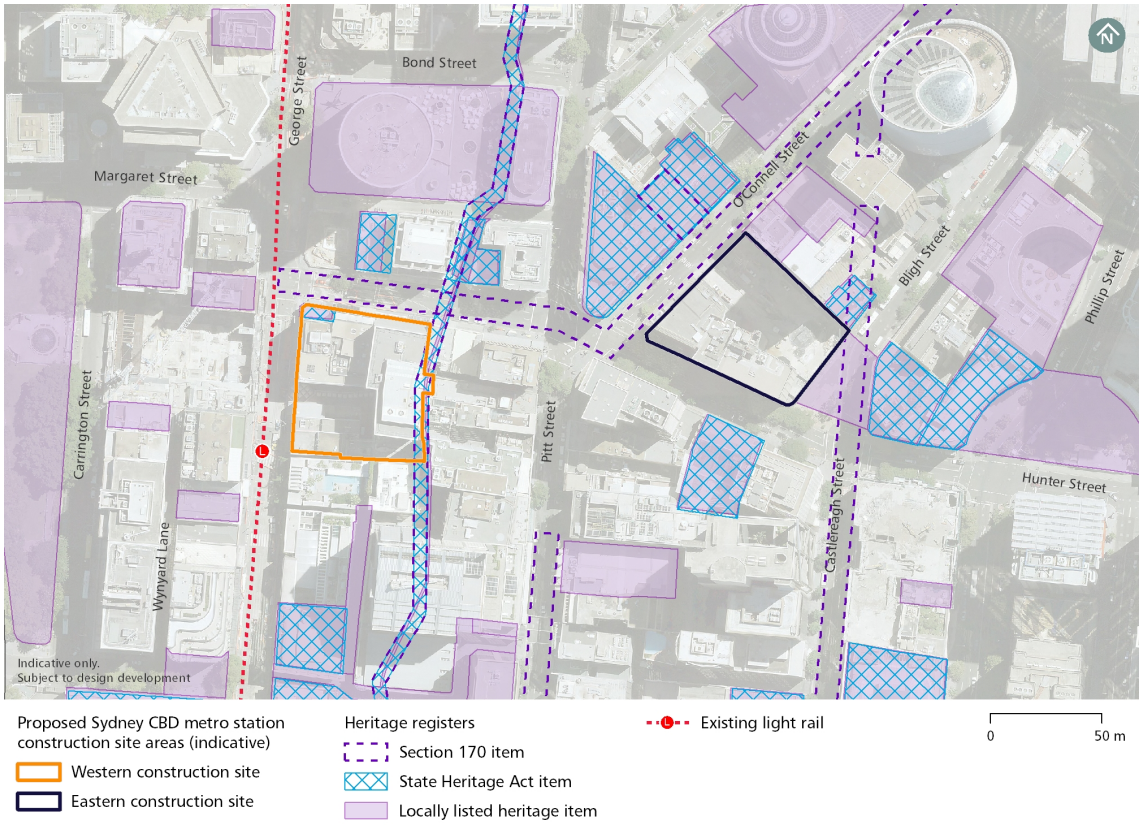

Figure 6-2 Existing environment - Sydney CBD metro station construction sites

Table 6-2 Summary of existing environment for Pyrmont Station and Sydney CBD metro station

Environmental issue	Summary of existing environment	
	Pyrmont Station	Sydney CBD metro station
General context		
Immediately surrounding land use and sensitive receivers	The Pyrmont area contains mainly residential, hospitality, tourism and retail uses, with large numbers of receivers. Potential sensitive receivers around the Pyrmont Station construction sites include residences, hotels, offices, shops, cafes and restaurants, and a small pocket park located on the other side of Pyrmont Bridge Road.	The CBD area is dominated by commercial, retail, hotel and hospitality uses, and multi-level high density residential buildings with large numbers of receivers. Potential sensitive receivers around the Sydney CBD metro station construction sites include hotels, residences, offices, shops, cafes and restaurants, medical centres and educational facilities.
Transport and traffic		
Road network	The road network within Pyrmont is dominated by access towards the south and the A4 Western Distributor. Wattle Street, Harris Street and Darling Drive act as the main north–south thoroughfares through the peninsular.	Within the Sydney CBD, the arterial road network generally forms a grid pattern. Many roads within the Sydney CBD are one-way and experience high traffic volumes and congestion, especially during peak periods. The nearest connection to the arterial road network is located about 270 metres to the east, where Bent Street and Macquarie Street connect to the M1 Pacific Motorway. The M1 Pacific Motorway connects the CBD to the Sydney's north and south, and beyond.
Sydney Trains network	There are no existing rail lines within Pyrmont.	The Sydney CBD includes the convergence of most of the Sydney Trains suburban rail lines, enabling passengers to alight and change rail lines, or interface with other modes of transport accessible within the Sydney CBD. The nearest Sydney Trains stations to the Sydney CBD metro station construction sites are Wynyard Station, which is a major interchange between rail lines and Martin Place Station.

Environmental issue	Summary of existing environment	
	Pyrmont Station	Sydney CBD metro station
Light Rail	Pyrmont Bay Light Rail Stop is part of the L1 Dulwich Hill Line that connects Dulwich Hill and Central via Lilyfield and Pyrmont. The Pyrmont Bay Light Rail Stop is located about 50 metres north of the proposed Pyrmont Station eastern construction site.	The L2 Randwick Line and L3 Kingsford Line travel past the proposed Sydney CBD metro station western construction site along George Street. The nearest light rail stop to the proposed Sydney CBD metro station is Wynyard, which is located about 60 metres to the south-west.
Sydney Metro	There are no other metro stations proposed within Pyrmont as part of the Sydney Metro network.	The nearest Sydney Metro City & Southwest station to the proposed Sydney Metro West CBD station would be at Martin Place, about 50 metres to the south-east.
Ferry	Ferry services connect Pyrmont Bay Wharf to Circular Quay via Barangaroo, Balmain, McMahons Point and Milsons Point.	Circular Quay is a key ferry terminal connecting the Sydney CBD to many other areas of Sydney via the Sydney Harbour and Parramatta River.
Bus network	Bus services connect Pyrmont to the Eastern Suburbs, Inner West, Central and Parramatta.	A key bus interchange for suburban and express bus services is located at Wynyard, connecting Sydney CBD to residential areas across Sydney. The bus interchange at Martin Place also provides opportunities to connect customers from the Eastern Suburbs and south-eastern Sydney. The bus layover area in O'Connell Street that is used during special events is located adjacent to the Sydney CBD metro station eastern construction site.
Active transport network	Pedestrians are generally catered for locally through footpaths and dedicated road crossings. The surrounding roads include provisions for cyclists such as separated off-road cycleways and bike lanes to connect Pyrmont to Sydney CBD via Pyrmont Bridge over Darling Harbour.	The key cycle routes within the Sydney CBD are Castlereagh (south of King Street), Kent, Liverpool, King, Park, Pitt (north of King Street) and George (north of Hunter Street) streets. Pedestrians are generally catered for locally through footpaths and dedicated road crossings. There is a high volume of pedestrians within the Sydney CBD area.

Environmental issue	Summary of existing environment	
	Pyrmont Station	Sydney CBD metro station
Noise and vibration		
Ambient noise environment	The proposed Pyrmont Station is located within a mixed-use area, which has a generally high ambient noise environment, especially during weekdays, dominated by transport and traffic noise.	The proposed Sydney CBD metro station is located within a CBD setting, which has a generally high ambient noise environment, especially during weekdays. The noise environment is dominated by transport and traffic noise, along with noise from other construction activities.
Non-Aboriginal heritage		
Archaeological context	The Pyrmont and Sydney CBD areas contain representations of early convict settlement, civic development, and the development of transportation routes such as the railway. Local and State significant heritage items are present, along with a number of National, Commonwealth and World heritage items within Sydney CBD. Sydney CBD is considered to have areas of State significant archaeological potential including low-moderate potential for archaeological remains relating to the Tank Stream, contact archaeology, convict huts, yards and gardens. State significant remains within Pyrmont and the Sydney CBD are likely to relate to early European settlement, convict occupation and labour, early residential and commercial development, early infrastructure (including waterfront infrastructure and industries) and the development of transport modes and routes.	
Listed items of non-Aboriginal heritage significance within 200 metres of construction site	Locally listed sites are located opposite the Pyrmont Station construction sites to the north, south and west. The Pyrmont Station western construction site falls within the Pyrmont Conservation Area, listed as an example of 19th Century development.	The State heritage listed Tank Stream passes through the Sydney CBD metro station western construction site, along the eastern edge. There are numerous heritage listings located in the area surrounding the proposed Sydney CBD metro station, including: • State heritage listed items • Locally listed items • Items listed on the Sydney Water Section 170 register.

Environmental issue	Summary of existing environment	
	Pyrmont Station	Sydney CBD metro station
Aboriginal heritage		
Archaeological and cultural heritage context	Sites within Pyrmont and the Sydney CBD are largely comprised of subsurface artefact sites and areas of archaeological potential. Areas of the Sydney Harbour foreshore exhibit archaeological sensitivity associated with the presence of Hawkesbury Sandstone outcrops and the presence of subsistence resources such as shellfish within the intertidal zones. It is considered that archaeologically sensitive foreshore contexts may exist below layers of reclamation fills. Several environmental features have been identified as containing Aboriginal archaeological sensitivity. These include areas within 200 metres of water sources, foreshore areas, areas adjacent to the Tank Stream, and areas containing outcropping Hawkesbury Sandstone. Pyrmont and the Sydney CBD contain these landscape features. Areas associated with this proposal may also contain cultural significance associated with the spiritual, traditional, historic or contemporary associations and attachments the place or area has for Aboriginal people. Consultation carried out with Aboriginal stakeholders during future assessment may identify cultural heritage values or areas of cultural heritage significance within or in the immediate vicinity of the station sites.	
Known Aboriginal sites	There are no known Aboriginal sites within the proposed Pyrmont Station construction sites.	A previously recorded Potential Archaeological Deposit (PAD) Aboriginal heritage site is shown as located within the Sydney CBD metro station western construction site on the AHIMS register mapping. However the site card and previous Aboriginal assessment relating to this Aboriginal site records the location as within the lot immediately to the south of the construction site. This existing information also describes the condition of the site as heavily disturbed. The Tank Stream has the potential to have associated Aboriginal heritage items, including contact sites.
Property and land use		
Land use context	Pyrmont has a local centre character, comprising buildings generally of mixed use (retail, commercial and residential), entertainment venues and areas of public open space.	A dominant commercial character but also including retail, high density residential, civic buildings and major public open space areas. The Sydney CBD is a major cultural, social and leisure destination and is also the hub of Sydney's existing public transport network.

Environmental issue	Summary of existing environment	
	Pyrmont Station	Sydney CBD metro station
Landscape character and visual amenity		
Landscape character	Pyrmont is characterised by a mix of low to medium rise retail, commercial, light industrial and residential uses, along with recreational and open space uses. These uses are generally the focal point of the local neighbourhood. Views from existing heritage structures and street planting/landscaping may be considered sensitive, along with views from nearby residential receivers.	Sydney CBD forms a regional focal point for commerce, trade, employment, retail and recreation. It generally consists of medium to high density commercial, retail and residential, with a mix of contemporary urban and historic character built form. Typically, street planting or other landscaping is limited. Heritage features reflect European settlement and historical development; and are important visual features. Sydney CBD also contains recreational and open space features which are often of national significance, such as Hyde Park and the Royal Botanic Gardens.
Visual environment	Landscape elements and views within suburban areas generally range from neighbourhood to local sensitivity.	Landscape elements and views within the Sydney CBD range from local to national level sensitivity.
Business impacts		
Business context	Pyrmont has a local centre comprising a range of businesses including cafes and restaurants, retail, commercial and entertainment.	Sydney CBD is Sydney's primary business district, and a global city, with important commercial, financial, retail and government centres. Businesses range from domestic to large international companies. There are a wide range of businesses within the Sydney CBD including retail, commercial, entertainment and events, education, cafes and restaurants.
Local business characteristics	The business environment is characterised largely by retail uses. Local businesses such as cafes, restaurants, and shops immediately surround the Pyrmont Station construction sites. Hotels, rental apartments, and office buildings are also present within the immediate vicinity of the Pyrmont Station construction sites. A shopping mall is located immediately to the north of the Pyrmont Station eastern construction site and a local seafood market is located to the south of the Pyrmont station western construction site.	The business environment within the Sydney CBD area is dominated by commercial, retail and hotel/hospitality uses. This includes local businesses such as shops, restaurants, cafes, pubs, clubs, function centres and other services, including medical and dental centres and office buildings. Banks are also located in close proximity to the Sydney CBD metro station western construction site.

Environmental issue	Summary of existing environment	
	Pyrmont Station	Sydney CBD metro station
Social impacts and community infrastructure		
Community profile	Pyrmont includes a growing number of residential developments and a relatively high proportion of high income, older workers, empty nesters, and retirees. Residents tend to be relatively culturally and linguistically diverse.	There are increasing residential populations within the Sydney CBD, where residents tend to be relatively young and culturally and linguistically diverse.
Social infrastructure within 400 metres of construction sites	Community infrastructure local to the construction site includes emergency services, open space and recreation facilities, pharmacies, a library, a child care centre, and a community centre.	Community infrastructure local to the construction site includes emergency services, civic facilities, open space and recreation facilities, public space, educational facilities, medical centres, a library, heritage and cultural facilities, child care centres, and local community facilities. Sydney CBD is often the focus of large regional events, recreation and tourism.
Groundwater and ground movement		
Geology	The *Sydney 1:100,000 Geological Map* (Geological Survey of NSW, 1983) shows the Pyrmont Station and Sydney CBD metro station construction sites are mainly situated over Hawkesbury Sandstone.	
Groundwater quality	The expected groundwater quality derived from Hawkesbury Sandstone is fresh to brackish groundwater, with salinity ranging from 500 to 10,000 milligrams per litre and a neutral pH. The concentration of trace ions (such as iron and manganese) and dissolved metals and nutrients is expected to be low. Organic compounds are not naturally associated with this geological unit.	
Groundwater users	A review of the *WaterNSW Groundwater Bore Database* (WaterNSW, 2019a) and the *Register of Water Approvals* (WaterNSW, 2019b) identified one functional and active supply bore near the Sydney CBD. This bore is located about 1.5 kilometres east of the proposed CBD metro station construction sites. Another supply bore was identified near the Sydney CBD, however, the status of the bore is unknown. This bore is located about two kilometres south of the Sydney CBD metro station construction sites.	
Soils and surface water quality		
Soil landscapes	The *Soil Landscapes of Sydney 1:100,000 Sheet* (Tille et al., 2009) identify the main soil types located at all of the proposed construction sites are Gymea and disturbed terrain.	
Acid sulfate soils	Acid sulfate soils are likely to be present in the north-east portion of the proposed Pyrmont Station eastern construction site.	Acid sulfate soils are unlikely to be present within or nearby the proposed construction sites.
Catchments and water courses	The construction sites are located within the Sydney Metropolitan catchment (Port Jackson) which includes Sydney Harbour. The catchment is highly urbanised and altered from its natural state.	

Environmental issue	Summary of existing environment	
	Pyrmont Station	Sydney CBD metro station
Surface water quality	Watercourses near the construction sites include Sydney Harbour, specifically Circular Quay, Pyrmont Bay and Cockle Bay, which is heavily urbanised. Water quality is largely influenced by 'point source' water pollution such as stormwater drainage outlets and diffuse water pollution such as urban runoff that does not enter stormwater drains. Water quality is anticipated to be average to generally poor, typical of a heavily urbanised environment.	
Contamination		
Contaminated sites	There are no known contaminated sites present within the footprint of the proposed construction sites, or within the immediate surrounds. There are laundrettes and dry cleaners located within the area surrounding the proposed Pyrmont Station construction sites that could be potential sources of contamination.	
Hydrology and flooding		
Hydrology	All aboveground components would be located within areas which ultimately drain to Sydney Harbour. All drainage catchments are highly urbanised, with large impervious surfaces created by roads, footpaths and buildings. Surface water is generally collected by developed stormwater networks that consist of road kerb and guttering, lined and unlined drainage channels, and subsurface pit and pipe networks.	
Flooding	The Union Street road reserve is subject to ponding during intense rainfall.	The proposed Sydney CBD metro station construction sites are potentially within the one per cent Annual Exceedance Probability.
Biodiversity		
Vegetation communities	The proposed construction sites consist of urban and industrial development. Due to previous development, the sites identified for the proposed stations have generally been subject to previous disturbance and clearing. Most of the remaining vegetation typically consists of planted street trees, shrubs and other ground cover plants.	
Threatened flora and fauna	No threatened flora or fauna species have been previously recorded within or adjacent to the construction sites.	
Groundwater dependent ecosystems	A search of the *National Atlas of Groundwater Dependent Ecosystems* (Bureau of Meteorology, 2018) identified that there are no groundwater dependent ecosystems close to the construction sites.	
Air quality		
Climate and meteorology	At Sydney Observatory Hill, data indicates that average maximum summer temperatures are around 26 degrees Celsius. Summers are wet, although June has the highest average mean rainfall (133 millimetres) of all months. July is the coldest month and September has the lowest mean monthly rainfall (68 millimetres). Unfavourable weather conditions most associated with dust dispersion (i.e. above average temperature conditions and average or below average rainfall) were measured in spring. In the mornings (9am), winds blowing from the east and south-east are prevalent. In the afternoons (3pm), winds from the east are most common.	

Environmental issue	Summary of existing environment	
	Pyrmont Station	Sydney CBD metro station
Existing emissions sources	The air quality in the Greater Sydney region is influenced by a variety of different man-made and natural sources. The *Air Emissions Inventory for the Greater Metropolitan Region in New South Wales* (Environment Protection Authority, 2012) recorded the relative contribution of air pollutants in the Sydney region from different human sources. These included on-road mobile, off-road mobile, domestic, commercial and industrial sources. The following key pollutants were reported: • Fine particulate matter, comprising PM_{10} and $PM_{2.5}$ • Oxides of nitrogen • Carbon monoxide • Volatile organic compounds.	
Background air quality	Air quality data from the Rozelle monitoring station shows that concentrations of air pollutants were generally below the applicable air quality criteria during 2020 (NSW Office of Environment and Heritage, 2021). On some occasions: • Maximum 24-hour average concentration levels of particulate matter with a diameter less than 10 microns (PM_{10}) exceeded the applicable criterion of 50 micrograms per cubic metre • Annual average and maximum 24-hour average concentration levels of particulate matter with a diameter less than 2.5 microns ($PM_{2.5}$) exceeded the applicable criterion of eight and 25 micrograms per cubic metre respectively.	
Hazard and risk		
Utilities	Existing utilities at the proposed construction sites include high voltage cables, sewer, water main, stormwater, communications and gas.	
Major hazard facilities	There are no active major hazard facilities within two kilometres of the station sites.	
Building basements and ground support structures	The highly urbanised nature of the land within the proposed construction sites means that building basements and ground support structures will be located in close proximity.	
Bushfire prone land	A search of bushfire prone land mapping developed and published by the relevant local councils found the station sites are not within bushfire prone land.	

6.3 Transport and traffic

6.3.1 Potential impacts

Sydney Metro would aim to provide access and egress to and from the proposed construction sites directly from arterial roads wherever possible and would minimise construction transport and traffic impacts through implementation of the *Sydney Metro Construction Traffic Management Framework* (Sydney Metro, 2020b). However, potential traffic, transport and access impacts anticipated to occur during the construction of this proposal include:

- Potential for temporary impacts on the traffic performance on the surrounding road network due to construction vehicles

- Potential for temporary traffic impacts due to interim road or lane closures
- Potential for temporary removal of some parking or loading zones, where unavoidable, potentially affecting accessibility to transport, services and/or businesses
- Potential temporary change on kerb side allocation (such as taxi zones, kiss and ride facilities, no stopping zones, and clearways) on the surrounding network due to construction activities
- Potential temporary relocation of existing bus stops to nearby locations, with the community to be adequately notified
- Potential temporary adjustments to existing scheduled bus services due to potential diversions of services (with the community to be adequately notified), an increase in heavy vehicle movements on the road network, and heavy vehicles entering and exiting construction sites
- Potential temporary reduced pedestrian and cyclist access or flows due to construction traffic and temporary pedestrian diversions around construction sites. Temporary alterations to pedestrian and cyclist facilities may also be required
- Potential temporary impacts on access to private (commercial and/or residential) property.

A coordinated approach to the management of potential construction related transport and traffic impacts would be developed. Sydney Metro is consulting with other sections of Transport for NSW and other relevant agencies and Councils to minimise potential temporary cumulative transport and traffic impacts.

6.3.2 Proposed investigations and assessment

A transport and traffic impact assessment will be carried out as part of the Environmental Impact Statement for this proposal to determine any potential impacts to traffic, transport and access.

The assessment will include the construction transport and traffic impacts of work covered by this proposal on the local and, to a lesser extent, the regional traffic network. The assessment will also cover public transport, cyclists and pedestrians and will include:

- Identification of the existing transport and traffic environment including consideration of peak traffic times and sensitive road users and parking arrangements
- Identification of haulage routes, construction site access and egress points
- Daily and peak traffic movements likely to be generated and the potential temporary impacts on the local and regional traffic network
- Potential for temporary service adjustments required to rail and bus services to allow for construction activities to safely occur
- Potential for temporary adjustments to vehicular, pedestrian, cyclist, emergency services and public transport access and duration of these changes
- Potential for temporary adjustments to parking supply, loading zones, servicing access and taxi zones
- Potential for temporary altered access to private property

- Measures to minimise or mitigate identified potential impacts, including an assessment of available options taking into consideration the implementation of the *Sydney Metro Construction Traffic Management Framework* (Sydney Metro, 2020b), and the expected effect of the measures proposed, in accordance with relevant best practice guidelines.

Consultation will be carried out with other sections of Transport for NSW, other Government agencies (such as Port Authority of NSW), and relevant local councils as part of the transport and traffic impact assessment.

6.4 Noise and vibration

6.4.1 Potential impacts

This proposal covers work that would include construction activities at multiple sites potentially resulting in temporary noise and vibration impacts on surrounding land uses and sensitive receivers. Measures to reduce potential noise and vibration impacts during work covered by this proposal may include acoustic sheds and barriers, alterations to the proposed construction methods and consideration to the time of day of certain construction work.

Construction activities with the greatest potential to result in temporary construction noise and vibration impacts would include:

- Activities occurring at The Bays tunnel launch and support site only:
  - Fresh air tunnel ventilation and high voltage power supply
  - Grout batching plants
  - Delivery and storage of construction materials (such as concrete tunnel segments)
  - The extraction, stockpiling and removal of spoil via road trucks
- Excavation of tunnels and associated aboveground support activities, which are likely to be carried out 24 hours per day, seven days per week with mitigation measures implemented to minimise impacts
- Demolition of buildings and structures at the Pyrmont Station construction sites and Sydney CBD metro station construction sites and initial excavation of access shafts, which are likely to be carried out during standard construction hours and may also include extended construction hours in Sydney CBD construction locations where largely commercial receivers are present
- Main excavation of Pyrmont Station and Sydney CBD metro station, and associated aboveground support activities, which are likely to be carried out 24 hours per day, seven days per week following the establishment of acoustic sheds
- Construction road traffic associated with the delivery of plant, equipment and materials, including concrete segments and for spoil removal
- Utilities adjustment, relocation or protection works, which may need to be undertaken out of hours.

Sensitive receivers that have the potential to be impacted by the proposal would be identified in the Environmental Impact Statement. Generally, the following would be anticipated:

- Sensitive receivers located close to key construction sites are anticipated to experience the greatest temporary construction noise and vibration impacts due to their proximity to the sites and consistent nature and duration of the activities
- Sensitive receivers located above the proposed tunnels are anticipated to be less adversely affected by temporary construction noise and vibration impacts due to the depth of the tunnels and the overall transient nature of the proposed work.

The extent of temporary construction noise and vibration impacts on any individual receiver would be dependent on the construction sequencing adopted, plant and equipment used, working hours (components of work would be required to be carried out outside of standard daytime construction hours), duration of construction works and the distance to surrounding receivers.

Given the nature of the proposed work and the proximity of sensitive receivers, the following impacts may occur:

- Potential construction noise and vibration impacts associated with temporary exceedances of the noise management levels derived from the *Interim Construction Noise Guideline* (Department of Environment and Climate Change, 2009) at some locations. Measures to reduce potential noise and vibration impacts may include acoustic sheds and barriers, alterations to the proposed construction methods and consideration of the time of day for certain construction works
- Potential temporary vibration impacts on receivers, buildings and structures along the route (including listed heritage buildings, performance venues and those buildings containing sensitive equipment or spaces). 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 how to mitigate impacts on the heritage values of the structure in consultation with a structural engineer.

6.4.2 Proposed investigations and assessment

A construction noise and vibration impact assessment will be carried out as part of the Environmental Impact Statement for this proposal to determine potential impacts on receivers. The construction noise and vibration impact assessment will include:

- Identification of the nature of construction activities and related noise characteristics
- The intensity and duration of temporary construction noise and vibration impacts. This will include a ‘typical level’ or ‘typical range’ in noise levels which would be expected as construction works move around the site as well as a realistic ‘peak’ noise level from each activity
- The correlation between the likely noise impacts and the anticipated duration and timing of the activity
- The nature, sensitivity and impact on potentially affected receivers, including consideration of particularly sensitive receivers if present within the vicinity (such as schools, hospitals, aged care facilities) and sensitive structures (particularly heritage structures and key utilities/infrastructure)

- Identification of possible locations where out-of-hours works would be carried out, the activities that would be carried out, the estimated duration of those activities and justification for these activities
- Potential temporary impacts associated with any works proposed to be carried out outside standard daytime construction hours
- The potential impacts associated with long term construction noise
- Explanation of how the extent of potential impacts on sensitive receivers have been balanced against the duration of impacts
- Other factors that may influence the timing and duration of construction activities (such as traffic management)
- Identification and assessment of feasible and reasonable mitigation and management measures to address potential temporary construction noise and vibration impacts, taking into consideration the implementation of the *Sydney Metro Construction Noise and Vibration Standard* (Sydney Metro, 2020c)
- Consistent with the philosophy described in Case Study D5 of the EPA's *draft Construction Noise Guideline*, an alternate methodology to the ICNG approach to assessing and managing construction noise may be proposed.

6.5 Non-Aboriginal heritage

6.5.1 Potential impacts

This proposal will continue to be designed to minimise potential impacts on non-Aboriginal heritage. Notwithstanding, the proposed construction of the proposal has the potential to directly impact non-Aboriginal heritage due to proposed construction activities.

The approved *Sydney Metro West Environmental Impact Statement – Westmead to The Bays and Sydney CBD* (Sydney Metro, 2020a) included an assessment of potential direct (physical) heritage impacts at The Bays Station construction site associated with the encroachment into the curtilage of the State listed White Bay Power Station.

Other potential direct (physical) impacts from this proposal may result from:

- Construction activities occurring within the curtilage of the locally listed Pyrmont heritage conservation area and other waterfront infrastructure
- Excavation within the Sydney CBD metro station western construction site that is within the curtilage of the Tank Stream, which is listed on the State Heritage Register and Sydney Water section 170 register
- Construction activities near to the State listed Former Skinners Family Hotel, which is proposed to be retained within the proposed Sydney CBD western construction site.

In addition, the following work has the potential to impact non-Aboriginal heritage:

- Excavations and other land-disturbing work in areas of potential archaeological significance, which could result in unearthing areas of archaeological potential as well as previously unrecorded archaeological relics, including archaeological material and deposits. This would be managed under an archaeological research design and method statement(s)

- Potential vibration and settlement impacts from construction work near heritage listed items above or adjacent to the tunnel alignment
- Potential indirect impacts (such as visual impacts) to heritage items adjacent to construction work.

Consultation with heritage specialists within Heritage NSW and relevant local councils regarding non-Aboriginal heritage issues will occur during the assessment process.

6.5.2 Proposed investigations and assessment

A non-Aboriginal heritage assessment will be carried out as part of the Environmental Impact Statement for this proposal to determine potential construction impacts on non-Aboriginal heritage and will:

- Identify items and areas of heritage significance that would be materially affected by this proposal, by field survey and research, including any buildings, works, relics, gardens, landscapes, views, trees or places of heritage significance
- Consider the potential impacts on the values, settings and integrity of heritage areas and items and archaeological resources located near this proposal, including items both above and below ground and, where such potential exists, the likely significance of those impacts
- Outline the proposed mitigation and management measures (including measures to avoid significant impacts and an evaluation of the effectiveness of the mitigation measures) in accordance with relevant best practice guidelines and Conservation Management Plans, where relevant.

6.6 Aboriginal heritage

6.6.1 Potential impacts

An AHIMS search identified a previously recorded Potential Archaeological Deposit (PAD) Aboriginal heritage site as located within the vicinity of the Sydney CBD metro station western construction site. However, the site card and Aboriginal assessment relating to this Aboriginal site describes the location as being to the south of the Sydney CBD metro station western construction site. Based on the location of the PAD as per the site card and previous assessment, the site is unlikely to be directly impacted by the proposal. There are also a number of other previously recorded AHIMS sites located above the tunnel alignment.

There is potential for previously unrecorded items of Aboriginal heritage significance to be present within the corridor and/or construction sites for this proposal, including sites, artefact scatters, objects, remains, values, features or places.

The overall guiding principle for cultural heritage management would be to conserve Aboriginal sites in-situ, where possible. In situations where the conservation of an Aboriginal heritage site is not possible/feasible, management measures will be developed during the preparation of the Environmental Impact Statement for this proposal and implemented to reduce the Aboriginal heritage impacts. It is anticipated that such management measures would reduce the risk of impacting on previously unrecorded items of Aboriginal heritage significance and/or areas of Aboriginal cultural sensitivity.

6.6.2 Proposed investigations and assessment

An Aboriginal heritage assessment will be prepared as part of the Environmental Impact Statement for this proposal and documented in an Aboriginal Cultural Heritage Assessment Report. The Aboriginal Cultural Heritage Assessment Report will further consider the cultural and archaeological potential of the proposed construction sites for this proposal. It will also document environmental management measures that would be implemented.

The Aboriginal heritage assessment will:

- Identify the potential for this proposal to cause direct or indirect impacts to Aboriginal heritage (sites, objects, remains, values, features, intangible values or places), including the potential for cumulative impacts, and, where this is the case, to:
  - Determine, in consultation with relevant stakeholders, including the Registered Aboriginal Parties, the significance of the heritage resources to the Aboriginal community
  - Determine the extent and significance of impact to those values
- Identify any requirements for in-situ conservation of items and/or areas (as appropriate), and the need for further archaeological testing and/or detailed archaeological excavations
- Identify appropriate measures to avoid, minimise and/or mitigate potential impacts. Such measures would be developed as appropriate to the assessment of significance and potential impact, and may include:
  - Consultation with the relevant Aboriginal stakeholders, including the Metropolitan Local Aboriginal Land Council, in accordance with *Aboriginal Cultural Heritage Consultation Requirements for Proponents* (Department of Environment, Climate Change and Water, 2010)
  - Archaeological test excavation
  - Preparation and implementation of an Aboriginal heritage management plan as part of the construction environmental management plan.

6.7 Property and land use

6.7.1 Potential impacts

Potential property and land use impacts associated with work covered by this proposal would include:

- Temporary or permanent acquisition or leasing of property to enable construction sites and/or construction work
- Temporary service adjustments for utilities and other transport assets/infrastructure to enable construction
- Possible referral of future development applications within a defined corridor due to subsurface rail infrastructure.

6.7.2 Proposed investigations and assessment

The Environmental Impact Statement for this proposal will identify potential impacts on property and land use, including the following:

- Direct impacts on property and land use, including acquisition and leasing
- Potential impacts on Crown land and Commonwealth land.

6.8 Landscape character and visual amenity

6.8.1 Potential impacts

The construction work associated with this proposal may cause temporary impacts on landscape character and visual amenity for those who work, study, reside, visit, or access businesses, residences or community services within the area. These impacts may result from:

- The establishment of temporary construction sites, ancillary facilities, and stockpiles at the proposed station locations (and tunnel support site)
- The potential removal of some street trees
- The erection of temporary fencing, barricades, gates and security lighting to provide safe and secure construction sites
- The erection of temporary acoustic sheds and hoarding to mitigate construction noise impacts
- Temporary light spill from construction sites during out-of-hours construction
- Temporary aboveground construction work (e.g. demolition) at the station sites
- The temporary parking and use of construction plant and equipment
- Temporary construction vehicle movements within construction sites and along haulage routes
- Temporary adjustments associated with traffic management measures (road diversions/interim closures) and/ or construction traffic.

The potential temporary impact of work covered by this proposal on individual sensitive receivers would depend on the stage of construction, their location and the severity of the impact. Temporary visual amenity impacts during construction would be greatest where residential/sensitive receivers have unscreened views of the construction site.

Mitigation measures, such as screening, would be considered to reduce potential temporary impacts on nearby receivers. Future Sydney Metro West scope of work (to be assessed in subsequent Environmental Impact Statements) would include long-term landscape and visual amenity measures.

6.8.2 Proposed investigations and assessment

A landscape character and visual amenity impact assessment will be carried out as part of the Environmental Impact Statement for this proposal. The assessment will:

- Describe the visual character and unique qualities of the area around the proposed work, including streetscapes, key sites and buildings, existing landscape works, greenspace and tree canopy
- Consider the heritage and other social values of the site to establish the potential sensitivity of receivers and visual absorption capacity
- Identify the potential temporary visual impacts of work covered by this proposal during daytime and night-time conditions (including lighting)
- Assess the potential temporary impacts of work covered by this proposal on trees, including an assessment of the number of street trees to be cleared and loss of canopy cover
- Identify measures to avoid, minimise and/or mitigate potential temporary landscape character and visual impacts.

6.9 Business impacts

6.9.1 Potential impacts

Some nearby businesses may experience positive impacts during construction, including:

- Depending on their location, some businesses may benefit from a net gain in passing trade during construction owing to changes to pedestrian traffic and vehicle access
- Trade could increase for businesses located close to construction sites or en route to construction sites, which sell goods to construction workers. Related industries, such as service stations, takeaway food shops and hotels, could also benefit
- Construction related businesses, such as construction recruitment agencies, construction companies and resource suppliers that provide goods and services for construction projects.

Potential business impacts that could occur during work covered by this proposal include:

- Temporary adjustments to servicing, deliveries and access due to temporary street closures, the relocation/removal of car parking along the street frontage and the location of construction sites
- Temporary increased traffic congestion and/or travel times – impacts on businesses as a result of traffic delays and congestion may be both direct and indirect:
  - Businesses may be directly affected by delayed or hindered access to workplaces or servicing areas owing to local traffic constraints and congestion
  - Businesses may be indirectly affected by increased traffic and therefore travel times for staff or deliveries on major thoroughfares owing to construction work
- Temporary loss of power and utilities – businesses may be disrupted by accidental or planned shutdowns of electricity or other utilities to enable construction work. Whilst significant advance notice would be given to all businesses of a power or utility shutdown, accidental events would be more difficult to manage
- Temporary reduced visibility – the presence of construction work, hoardings and other structures may reduce the visibility of certain businesses

- Temporary reduced amenity – deterioration of amenity (particularly due to noise, vibration, visual and air quality impacts) may result in a reduction in customers which could be minimised through implementation of mitigation measures such as acoustic sheds, hoarding, respite periods and changing the timing or staging of specific construction activities where possible
- Property acquisition – some businesses may find relocation more difficult than others.

The key characteristics of local businesses around each of the construction sites are provided in Table 6-2.

6.9.2 Proposed investigations and assessment

A business impact assessment will be prepared as part of the Environmental Impact Statement for this proposal. The assessment will:

- Identify businesses that could potentially be directly impacted
- Identify nearby local businesses that may potentially be indirectly impacted
- Assess the potential impacts on local businesses
- Identify measures to avoid or mitigate the potential impacts.

6.10 Social impacts and community infrastructure

6.10.1 Potential impacts

The preliminary assessment of potential social impacts has been informed by feedback from the community during consultation and engagement carried out to date for Sydney Metro West and from experience from similar projects. Potential social and community impacts would be managed through the implementation of measures for other aspects such as transport and traffic, noise and vibration, visual amenity and air quality, and through active community consultation.

Potential social and community impacts that could occur during work covered by this proposal include:

- Concerns from the community regarding construction fatigue related to the number of major projects being constructed across Sydney
- Community concerns around property acquisition required for construction and operation
- Potential temporary changes to the character of local areas including the sense of place
- Potential temporary changes to the way of life for people living, working, or accessing services, institutions or businesses near construction zones
- Temporary impacts on the amenity of local residents from construction sites – including noise, visual intrusion in the landscape including associated plant and equipment, air quality impacts, disruptions to traffic and access
- Temporary wellbeing impacts on residents who are located close to construction sites, if the building phase is prolonged

- Potential to temporarily impact traffic conditions for road users (including motorists, pedestrians and cyclists) on existing road networks – particularly if there is congested traffic and parking in the area already
- Temporary amenity impacts to community facilities which are potentially more sensitive to such impacts and may not be able to function, or be properly enjoyed by the community, where they are located close to a construction site
- Potential temporary impacts if access to the natural environment or public open space changes
- Potential temporary altered access to and from properties, public transport or community facilities – changes to pedestrian access could potentially be more challenging for people with a disability.

6.10.2 Proposed investigations and assessment

An assessment of potential social and community facility impacts will be carried out as part of the Environmental Impact Statement for this proposal. The assessment will include:

- A social baseline analysis, which will:
  - Define the Area of Social Influence for work covered by this proposal
  - Develop a demographic profile of the study area's communities that may be influenced by work covered by this proposal
  - Identify stakeholders, including communities and socially sensitive receivers, that may be affected
  - Identify tangible (social infrastructure) and intangible (human and social capital, community cohesion, community values and connection to place) community assets and provide a general understanding of the local social environment within the study area
  - Review community strategic plans and social plans relevant to each construction site to identify community values and aspirations along the corridor of this proposal
- An assessment of potential social impacts for work covered by this proposal which will:
  - Assess the significance and likelihood of potential social impacts, both positive and negative
  - Recommend measures to mitigate potential social impacts
  - Assess residual potential social impacts including identification of the significance and likelihood of residual social impacts.

6.11 Groundwater and ground movement

6.11.1 Potential impacts

Potential groundwater and ground movement impacts that could arise from work covered by this proposal include:

- Potential groundwater drawdown/lowering of the water table – due to dewatering during tunnel and station excavations and/or drawdown incurred by bed cracking or interference with geological features beneath surface-water bodies and drainage lines
- Potential ground movement and settlement – due to tunnelling, excavation and/or groundwater drawdown including associated potential impacts to existing buildings, infrastructure or utilities
- Potential impacts on groundwater users – due to reduced groundwater yields, reduced groundwater quality and/or direct impacts and damage to existing groundwater bores
- Potential impact on groundwater quality – associated with the generation of turbid, saline or contaminated water collected from within the tunnels and station excavations, which would require disposal; and potential contaminants such as oils and chemicals from construction activities leaking to the water table.

The tunnels and the station caverns at Pyrmont and Sydney CBD would be tanked to prevent significant volumes of groundwater ingress. Therefore, tunnel and station excavation is anticipated to cause only a short-term disruption to groundwater levels as the system should adjust back to its natural state once excavation has been completed and the permanent lining is installed.

6.11.2 Proposed investigations and assessment

A hydrogeological assessment will be carried out as part of the Environmental Impact Statement for this proposal. The hydrogeological assessment will:

- Describe the existing hydrogeological environment and groundwater resources, including:
  - Groundwater levels and quality along the alignment and near the stations
  - Existing groundwater users, including registered groundwater bores, groundwater dependent ecosystems and watercourses that may receive groundwater baseflow
- Discuss the nature and extent of potential impacts on groundwater associated with construction and the ongoing presence of infrastructure including tunnels and station excavations, taking into account:
  - Existing groundwater levels
  - Geological context
  - Extent to which the infrastructure is ‘tanked’ (designed to inhibit the inflow of groundwater)
  - Experience on other projects (including groundwater inflow rates)
- Identify potential impacts on groundwater quality

- Assess potential for ground movement during work covered by this proposal (due to groundwater level drawdown and the potential impact of ground movement on assets (including potential damage/impacts to buildings, services/utilities, and heritage structures)
- Provide estimates of expected water takes (direct or passive) from groundwater and surface water sources with estimates of annual volumes during construction and operation
- Assess compliance with groundwater licencing, the Minimal Impact Considerations of the *NSW Aquifer Interference Policy* and the Rules of the relevant Water Sharing Plan(s)
- Propose monitoring and management measures to address potential impacts.

A ground movement and impact assessment will also be carried out for the proposal. Ground movement would potentially result from groundwater considerations but also from underground activities such as tunnelling, whether from tunnel boring machine or mined operations and from major surface excavations for shafts. The ground movement and impact assessment would include:

- Estimating preliminary ground movement effects at the existing ground surface
- Identify susceptible existing buildings, infrastructure (e.g. roads, railways, bridges, etc) and utilities where estimated ground movements may potentially impact on these assets
- Undertake a comparison of estimated ground movement effects against adopted assessment criteria
- Where possible, provide an initial indication of potential risk to that asset
- Document further works, assessment and mitigation strategies required to reduce the potential impacts.

6.12 Soils and surface water quality

6.12.1 Potential impacts

Potential soil and surface water impacts associated with work covered by this proposal are identified in Table 6-3.

Table 6-3 Potential soil and surface water impacts

Aspect	Potential impact
Soil erosion	Development of construction sites would expose the natural ground surface and subsurface through the removal of vegetation (if present), overlying structures (such as buildings and footpaths) and excavation of construction footprints for station, structures and foundations. The exposure of soil to water runoff and wind could increase soil erosion potential. There is the potential that exposed soils and other unconsolidated materials (such as spoil, sand and other aggregates) could be transported from the construction sites into surrounding waterways via stormwater runoff. Given the relatively small areas of surface disturbance anticipated during construction and the overall topography of those areas (generally flat or slightly undulating), soil erosion would be adequately managed with standard management measures (which would be developed as part of the Environmental Impact Statement for work covered by this proposal).

Aspect	Potential impact
Acid sulfate soils	The exposure of acid sulfate soils during excavation could result in the release of acid sulfates, which would damage surrounding vegetation and drainage lines. Acid sulfate soils, if present, would be adequately managed with standard management measures in accordance with the *Acid Sulfate Soil Manual* (Acid Sulfate Soil Management Advisory Committee, 1998). Acid sulfate soils are unlikely to be present within or nearby the Sydney CBD metro station construction sites. There is the potential to encounter acid sulfate soils at the Pyrmont Station eastern construction site.
Surface water quality	Construction has the potential to adversely affect surface water quality in nearby watercourses and receiving catchments through the pollution of stormwater runoff with sediments, fuel and other hazardous materials from construction sites. These impacts would be adequately managed with standard environmental management measures. These measures would be consistent with the principles and practices detailed in *Managing Urban Stormwater: Soils and Construction* (Landcom, 2004).

6.12.2 Proposed investigations and assessment

An assessment of the potential impacts on soil and water quality will be carried out as part of the Environmental Impact Statement for this proposal. The soil and water quality assessment will:

- Identify the existing hydrological regime for surface water
- Identify potential impacts on surface water quality
- Identify the potential to disturb acid sulfate soils and the associated impacts
- Consider the potential impacts associated with erosion and sedimentation
- Propose monitoring and management measures to address potential impacts.

6.13 Contamination

6.13.1 Potential impacts

Contamination is expected to be encountered during work covered by this proposal. These impacts are anticipated to be readily manageable through standard management measures. Potential risks associated with encountering contaminated soils and groundwater will be considered as part of the Environmental Impact Statement.

There are no known contaminated sites present at or nearby the Pyrmont or Sydney CBD metro station construction sites, however there is potential for some minor contamination in fill or existing construction materials across the sites. An unexpected finds procedure would be implemented during civil construction works should contamination be encountered.

The exposure of any contaminated materials (including asbestos containing materials) during construction may increase the potential for contaminant mobilisation including airborne asbestos particles. This may create additional exposure pathways to sensitive receivers (including environmental receptors), surface water bodies and groundwater bodies.

The work covered by this proposal also has the potential to result in contamination of soils and/or groundwater due to spills and leaks of fuel, oils and other hazardous materials which are considered to be manageable through standard management measures.

6.13.2 Proposed investigations and assessment

A contamination assessment will be carried out as part of the Environmental Impact Statement for this proposal and will include:

- A review of previous contamination assessments (where available)
- A review of historical aerial photography and plans to identify potential contamination sources along and/or adjacent to the proposed construction sites
- A review of publicly available data (web-based information searches)
- A site inspection to identify potential contamination sources and verify those potential areas of concern identified in the review of historical and available information
- An assessment of potential contamination risk based on the potential impacts to the construction of the project and also risks via exposure to environmental and human health receptors
- Identification of low, medium, high and very high-risk sites including recommendations for additional investigations and/or management based on the site risk rating.

Management of contamination and any resulting remediation would be carried out on the basis of risk, in accordance with the relevant legislation, standards and guidelines, including but not limited to the *National Environmental Protection (Assessment of Contamination) Measure 1999, as amended 2013*, and all relevant guidelines made or approved under the *Contaminated Lands Management Act 1997* and the *Protection of the Environment Operations Act 1997*.

6.14 Hydrology and flooding

6.14.1 Potential impacts

Construction has the potential to alter existing stormwater flows and the existing stormwater drainage infrastructure due to the establishment of erosion and sediment control measures (such as redirecting stormwater runoff around the work site). Best practice stormwater management measures would be developed during preparation of the Environmental Impact Statement for work covered by this proposal to minimise the potential impacts on downstream receiving environments.

Potential flooding of construction sites could result in stockpiles of construction materials (such as aggregate, fuels and other hazardous materials) and spoil being washed into nearby waterways, or floodwater entering the tunnels and excavations.

The approved *Sydney Metro West Environmental Impact Statement – Westmead to The Bays and Sydney CBD* (Sydney Metro, 2020a) included an assessment of The Bays Station construction site flood risk and flood risk management and mitigation measures identified would be implemented as part of establishing The Bays Station construction site (approved).

The proposed construction sites have the following flood risks:

- Pyrmont Station construction sites – subject to local overland flow and ponding within Union Street road reserve
- Sydney CBD metro station construction sites – anticipated to be at a low risk of flooding.

Construction also has the potential to locally alter existing flood behaviour due to the loss of floodplain storage (due to stockpiling construction materials and spoil etc.) and in places where existing stormwater drainage infrastructure needs to be altered.

Drainage would be designed, where feasible and reasonable, to avoid or minimise obstruction of overland flow paths and limit the extent of flow diversions in order to reduce the likelihood of adverse impacts to local runoff conditions. Detailed construction planning would also consider flood risk at and around the construction sites to reduce the potential consequence and likelihood of flooding impacts both at the construction sites and off-site. Additional appropriate mitigation measures would be identified in the Environmental Impact Statement.

6.14.2 Proposed investigations and assessment

An assessment of potential hydrology and flooding impacts will be included in the Environmental Impact Statement for this proposal and will include:

- Review of relevant existing flood study reports and description of flood behaviour for the existing conditions
- Identification and assessment of potential impacts on stormwater quantity
- Broad assessment of the potential change in stormwater runoff (increase or decrease) including consideration of changes to flooding behaviour in response to climate change (sea level rise and rainfall intensity)
- Identification of potential impacts as a result of changes in surface water quantity, with respect to increases or decreases in stormwater runoff and the sensitivity of the downstream waters
- Identification of any potential changes to flood levels (including flood affectation of other properties, assets and infrastructure), discharges, velocities, duration of flood inundation and flood hazards for the five per cent and one per cent Annual Exceedance Probability flood events, and the probable maximum flood
- A review of consistency with applicable Council Floodplain Risk Management Study
- A review of compatibility with flood hazard and hydraulic functions of the land
- Identification of appropriate mitigation and management measures.

6.15 Biodiversity

6.15.1 Potential impacts

Given the urban nature of the location of work covered by this proposal, the potential for biodiversity impacts is anticipated to be limited. Notwithstanding, construction works may result in the following potential impacts:

- Loss of terrestrial fauna habitat and impacts on species due to clearing of terrestrial vegetation and demolition of existing buildings and structures

- Injury and mortality of fauna species during vegetation clearing and/or as a result of collisions with construction plant and vehicles
- Indirect impacts from light and noise, sedimentation and spread of weeds.

6.15.2 Proposed investigations and assessment

The potential for biodiversity impacts is anticipated to be limited such that Sydney Metro is seeking a Biodiversity Development Assessment Report (BDAR) waiver under Section 7.9(2) of the *Biodiversity Conservation Act 2016*. A BDAR waiver request will be prepared, which will include an assessment of impacts on biodiversity values and tests of significance for potentially impacted threatened species. The BDAR waiver request will be submitted to the Department of Planning, Industry and Environment for consideration and approval.

A biodiversity assessment will be included as part of the Environmental Impact Statement for this proposal. The biodiversity assessment will be based on a desktop review of database searches, regional biodiversity mapping and any relevant existing site-specific reports, as well as site inspection, if necessary. The biodiversity assessment will:

- Identify and describe the flora and fauna species, habitat, populations and ecological communities (including groundwater dependent ecosystems) that occur or are considered likely to occur
- Assess any potential direct and indirect impacts of this proposal on terrestrial flora and fauna species, populations, ecological communities and their habitats, and groundwater dependent ecosystems
- Assess the significance of any potential impacts of this proposal on species, ecological communities and populations, and groundwater dependent ecosystems listed under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*, the *Biodiversity Conservation Act 2016* and the *Fisheries Management Act 1994* that occur or are considered likely to occur
- Identify and describe mitigation measures using the principles of 'avoid, minimise, mitigate', and propose offsets where residual impacts would occur.

6.16 Air quality

6.16.1 Potential impacts

During work covered by this proposal, local air quality may be temporarily affected by the generation of dust and gaseous emissions (such as emissions from the combustion of fuels and storage of volatile organic compounds).

Dust

Management measures would be implemented to minimise dust emissions from construction activities that could result in reduced local air quality and dust deposition at the nearest potentially affected receivers.

The main potential air quality impacts during construction would be associated with the generation of dust, which would include pollutants such as deposited dust, total suspended solids and particulate matter with an aerodynamic diameter less than 10 microns (PM_{10}) and 2.5 microns ($PM_{2.5}$). Owing to the urban setting and the potential to encounter contamination at the construction sites, there is also potential for dust emissions to contain contaminants

(mobilised through the disturbance of contaminated soils) and other hazardous materials (such as asbestos fibres mobilised through the demolition of buildings and other structures).

Construction activities with the greatest potential to generate dust would include:

- Excavation, handling, stockpiling, loading/unloading and transport of spoil
- Demolition of buildings and other structures, and the handling, stockpiling and transport of demolition material
- Transport, loading/unloading, stockpiling and handling of imported construction materials such as imported fill
- Creation of exposed surfaces through the clearing of vegetation, stripping of topsoil and other overlying structures (such as road and footpath pavements), which would increase the potential for dust emissions to be generated by wind erosion
- Movement of construction plant, vehicles and equipment along unsealed haulage routes and surfaces.

Management measures would be implemented to minimise dust emissions from the above activities that could result in reduced local air quality and dust deposition at the nearest potentially affected receivers.

The volume of dust generated during a typical work day would vary depending on the types of activities occurring at each construction site and prevailing weather conditions (for example, dry windy conditions increase the potential for wind erosion). However, the overall volume of dust emissions would be comparable to volumes generated by other similar infrastructure projects and the impacts would be readily manageable through standard environmental management measures, such as wetting stockpiles and exposed surfaces and minimising dust-generating work during adverse weather conditions.

Gaseous emissions

Gaseous emissions would generally be restricted to minor localised emissions of carbon monoxide, oxides of nitrogen, sulfur dioxide and volatile organic compounds. These pollutants would be generated during the combustion of fuel in construction plant, machinery and equipment, as well as from the handling and/or onsite storage of fuel and other chemicals. These gaseous emissions during construction would be relatively minor and would be adequately managed with standard environmental management measures.

6.16.2 Proposed investigations and assessment

The Environmental Impact Statement for this proposal will include an air quality impact assessment, which will:

- Identify and describe the background air quality environment based on a desktop assessment
- Identify potential sources of air emissions
- Identify potential sensitive receivers likely to be impacted by emissions to air
- Identify and describe mitigation measures using the principles of ‘avoid, minimise, and mitigate’.

6.17 Greenhouse gas and energy

6.17.1 Potential impacts

Work covered by this proposal would result in the generation of greenhouse gas emissions. The volume of greenhouse gas emissions generated would largely depend on the type and quantity of construction materials used, construction methodologies and equipment used, and the overall design (for example, station and tunnel depths). Activities that are anticipated to result in the largest quantities of greenhouse gas emissions include:

- Use of electricity for the tunnel boring machines and roadheaders
- Combustion of fuel in construction plant, equipment and vehicles
- Disposal of construction waste (indirect emissions would be generated by the decomposition of the waste material at waste handling facilities)
- Use of construction materials with a high embodied energy. For example, construction materials (such as steel and concrete) require a considerable amount of energy to manufacture and transport.

It would not be possible to completely avoid the generation of greenhouse gas emissions during construction. However, opportunities to reduce the volume of greenhouse gas emissions would be explored and could include:

- Minimising the quantity of fuel and electricity used by construction plant and equipment through the use of biofuels, electricity derived from renewable sources, and energy-efficient work practices (such as using fuel-efficient equipment and avoiding unnecessary idling of construction plant and equipment)
- Minimising the quantity of fuel used in the transport of construction material and spoil through sourcing such materials from local suppliers and disposing of soil at nearby facilities
- Minimising the embodied energy of materials used by substituting materials with high embodied energy for a suitable material with a lower embodied energy (for example, using recycled concrete to reduce the volume of 'new' concrete required)
- Minimising onsite electricity consumption by using electricity derived from renewable sources
- Offsetting a proportion of the electricity needs for work covered by this proposal through the generation or purchase of 'green power'
- Sustainability initiatives would be incorporated into the detailed design and construction to minimise demand for electricity.

Overall, the emission of greenhouse gas during construction is expected to be similar to other infrastructure projects of a similar nature and scale.

6.17.2 Proposed investigations and assessment

A greenhouse gas and energy assessment will be included in the Environmental Impact Statement for this proposal. The assessment will:

- Identify the potential greenhouse gas emissions
- Identify mitigation and management measures to reduce potential emissions of greenhouse gas.

6.18 Climate change adaptation

6.18.1 Potential impacts

Climate change risks during construction would primarily be associated with the occurrence of severe weather events, such as the increased frequency and severity of rainfall events placing increased pressure on erosion and sediment control measures and/or resulting in the flooding of the tunnels and/or construction sites.

These risks are anticipated to be adequately managed with standard management measures, such as increasing the capacity of erosion and sediment controls and minimising construction impacts on the capacity of existing stormwater drainage systems.

6.18.2 Proposed investigations and assessment

The Environmental Impact Statement for work covered by this proposal will include a climate change adaptation assessment. The climate change adaptation assessment will:

- Identify possible climate related impacts with an emphasis on any that are projected to undergo a substantial change
- Identify components of work covered by this proposal that may be vulnerable to the climate change impacts
- Identify possible current and future controls that may increase the resilience of particular components to climate impacts
- Recommend what should be considered, and how to establish if further information is needed, to adequately assess climate change risk.

6.19 Waste management and resource use

6.19.1 Potential impacts

Waste

A variety of solid and liquid wastes would be generated during work covered by this proposal. The quantity of waste would be comparable to similar infrastructure projects (including other Sydney Metro projects and road tunnel projects) and would be adequately managed with standard waste management measures.

The main construction activities anticipated to generate waste are outlined in Table 6-4, along with the likely waste materials produced.

Table 6-4 Construction waste generation

Activity	Waste material produced
Tunnelling, station excavations and general earthworks	Spoil comprising virgin excavated natural material, tunnel boring machine cutter heads and associated equipment replacement (conveyor belts etc), tunnel boring machine lubricants (bentonite slurry or similar); contaminated materials and potential acid sulfate soils
Demolition of buildings and other structures	Concrete, bricks, tiles, timber (treated and untreated), metals, plasterboard, carpets, electrical and plumbing fittings and furnishings (such as doors and windows), hazardous waste (including asbestos)
Dust suppression, wash down of plant and equipment, and staff amenities at construction compounds (such as toilets)	Sediment-laden and/or potentially contaminated wastewater, sewage and grey water, including groundwater inflows to tunnels and station excavations
General construction activities and resource use	Concrete waste, timber formwork, scrap metal, steel, concrete, plasterboards, cable and packaging materials
Maintenance of construction plant, vehicles and equipment	Adhesives, lubricants, waste fuels and oils, engine coolant, batteries, hoses and tyres
Activities at offices and crib rooms	Putrescibles, paper, cardboard, plastics, glass and printer cartridges
Clearing and grubbing of vegetation, landscaped and/or turfed areas	Green waste

The largest volumes of construction waste would be generated during the excavation of tunnels and underground stations (spoil and wastewater) and the demolition of buildings and other structures (general construction wastes such as steel and concrete). In total, work covered by this proposal is expected to generate around 1.05 million cubic of metres of spoil from tunnelling and station excavations.

Resource use

While work covered by this proposal would increase demand on local and regional resources, it is unlikely that it would result in any resource becoming scarce or in short supply. The main resources used would include:

- Electricity
- Fuel
- Lubricating oil
- Concrete
- Steel
- Water
- Timber.

6.19.2 Proposed investigations and assessment

A waste and resource assessment will be carried out as part of the Environmental Impact Statement for this proposal. This assessment will include:

- A review of the likely waste streams and volumes including spoil, wastewater and demolition materials
- A review of the likely resources required, including energy, fuel and steel
- Development of management strategies to adequately address waste that would likely include:
  - Measures for managing construction waste through the waste hierarchy established under the *Waste Avoidance and Resource Recovery Act 2001* (i.e. avoidance of waste, resource recovery, disposal of waste)
  - Targets for the beneficial reuse of spoil, wastewater and other construction wastes in accordance with a future Sydney Metro West sustainability plan
  - An approach for the assessment, handling, stockpiling and disposal of potentially contaminated materials and wastewater, in accordance with the *Waste Classification Guidelines* (Environment Protection Authority, 2014)
  - Identification of opportunities to reduce the demand on electricity and other resources
  - Identification of how spoil would be managed, including likely volumes, likely nature and classification of excavated material, opportunities for recycling, potential disposal sites, stockpile management, and method(s) and route of transportation.

6.20 Hazard and risk

6.20.1 Potential impacts

Potential construction hazards and risks would be adequately managed with standard management measures. The following hazards have the potential to occur during work covered by this proposal:

- The onsite storage, use, and transport of chemicals, fuels and materials. To manage this risk, all hazardous substances that may be required for construction would be stored and managed in accordance with the *Work Health and Safety Act 2011* and the *Storage and Handling of Dangerous Goods Code of Practice* (WorkCover NSW, 2005)
- The rupture of, or interference with, underground services. To manage this risk, dial before you dig searches would be carried out and non-destructive digging used to identify the presence of services at the start of construction
- Potential for asbestos containing materials to be disturbed as part of demolition of existing buildings and structures
- Tunnel collapse. To manage this risk, best-practice tunnelling methods and processes would be employed to ensure the structural integrity of the tunnels and excavations.

Construction hazards and risks would be adequately managed with standard management measures.

6.20.2 Proposed investigations and assessment

A high-level hazard and risk assessment will be carried out as part of the Environmental Impact Statement for this proposal. The assessment will include:

- Consideration of the relevant regulatory framework and guidelines
- Identification of the types of activities that may generate potential hazards
- Identification of the potential environmental impacts associated with the potential hazards
- Identification of mitigation measures to address potential hazards, where appropriate.

6.21 Cumulative impacts

6.21.1 Approach

Cumulative impacts are impacts that result from the successive, incremental, or combined effects of an activity or project when added to other past, current, planned, or reasonably anticipated future impacts (Department of Planning and Environment, 2017). Work covered by this proposal has the possibility of interacting with a number of other projects along the planned corridor or at proposed construction sites. An initial review has identified the following projects as having the potential to generate cumulative impacts and would be considered further in the Environmental Impact Statement:

- Major civil construction of Sydney Metro West between Westmead and The Bays
- WestConnex Stage 3a tunnel alignment section
- WestConnex Stage 3b Rozelle interchange
- Bays West Place Strategy
- Pyrmont Peninsula Place Strategy
- Western Harbour Tunnel
- Sydney Trains future Lower Main North Quadruplication Project
- Glebe Island multiuser facility
- Sydney Metro City & Southwest
- Existing port operations at The Bays
- Construction of developments included within master plans
- Ausgrid CityGrid Project.

Sydney Metro has commenced consultation with other sections of Transport for NSW and proponents of other major projects, to identify processes and measures to mitigate potential cumulative impacts. This may include coordination or adjustments to construction programs, activities, traffic management arrangements or haul routes and a coordinated approach to community consultation.

6.21.2 Potential impacts

Potential cumulative impacts could arise in situations where construction occurs concurrently or consecutively with other known developments or nearby major projects. Cumulative impacts could include:

- Potential temporary cumulative construction traffic impacts. Increased traffic congestion may occur where multiple construction projects use the same construction traffic routes at the same time, or where construction traffic impacts occur not long after construction traffic impacts have ceased from another project
- Potential temporary cumulative impacts associated with the temporary loss of on-street parking and/or other kerbside uses (such as loading zones) – parking availability could be further affected by the construction of other projects which would also intend to affect the availability of parking
- Potential temporary cumulative impacts associated with disruptions to public transport – multiple construction sites could result in longer commuter travel times due to disruptions to bus and/or rail services
- Potential temporary cumulative noise, vibration and visual amenity impacts, such as construction fatigue, increased overall noise levels, additional out of hours work, and increased extent and/or duration of impacts as a result of other nearby construction sites operating either simultaneously with or before or after work covered by this proposal
- Potential temporary social and business impacts as a result of the cumulative impacts identified above
- Concurrent tunnelling projects particularly the major civil construction work between Westmead and The Bays, WestConnex, and Western Harbour Tunnel and Beaches Link will increase the volume of spoil being generated within the Sydney metropolitan region, which has the potential to generate cumulative impacts and affect spoil reuse opportunities. This may influence spoil management for work covered by this proposal.

There may also be cumulative impacts with other scope of work for Sydney Metro West. As this would be dependent on the relative timing of the other future staged applications, with the potential for cumulative impacts to be addressed in the relevant environmental impact assessments.

6.21.3 Proposed investigations and assessment

Details of known surrounding developments and major projects with the potential to interact with the construction work covered by this proposal will be identified through consultation with stakeholders and a review of relevant local environmental plans, the Department of Planning, Industry and Environment's Major Projects database, and local council development application registers. Potential cumulative impacts arising from the interaction of these projects will be identified and assessed in a qualitative manner. Management and mitigation measures will be proposed, where appropriate.

7 Preliminary environmental risk analysis

This chapter provides a preliminary environmental risk analysis in order to identify the key and other issues for the Environmental Impact Statement for major civil construction work between The Bays and Sydney CBD.

7.1 Overview

The purpose of this chapter is to:

- Identify potential environmental and social constraints and opportunities associated with work covered by this proposal
- Undertake a preliminary environmental risk analysis
- Assist in minimising environmental and social impacts during future project and design development.

7.2 Methodology

Consistent with the *Sydney Metro West Environmental Impact Statement – Westmead to The Bays and Sydney CBD* (Sydney Metro, 2020a), the environmental risk analysis was carried out in accordance with the principles of the *Australian and New Zealand standard AS/NZS ISO 31000:2018 Risk Management – Principles and Guidelines*. This involved ranking the risks by identifying the consequence of the impact and the likelihood of each impact occurring. The following rules guided the risk process:

- Risk ratings were considered at the broader issue level only (for example construction noise and vibration)
- Industry standard practice was considered in determining risk ratings, however project‑specific mitigation (which would depend on the outcomes of future environmental assessments) was not applied.

The first step in the risk analysis involved the identification of the consequence, should an impact occur, followed by identification of the likelihood of the impact occurring. The definitions of the consequences used are provided in Table 7-1 and the definitions of likelihood are provided in Table 7-2. The risk rating was then determined by combining the consequence and likelihood to identify the level of risk as shown in the matrix in Table 7-3.

Table 7-1: Consequence definitions

Consequence level	Definition
Catastrophic	• Long-term (greater than 12 months) and irreversible large-scale environmental, social or economic impacts • Extended substantial disruptions and impacts to stakeholder(s) or customers.
Severe	• Long-term (6 to 12 months) and potentially irreversible impacts • Extensive remediation required • Severe disruptions or long-term impacts to stakeholder(s) or customers.
Major	• Medium-term (between 3 and 6 months) and potentially irreversible impacts • Considerable remediation required • Major impacts or disruptions to stakeholder(s) or customers.
Moderate	• Medium-term (between 1 and 3 months), reversible and/or well-contained impacts • Minor remedial actions required • Moderate impacts or disruptions to stakeholder(s) or customers.
Minor	• Short-term (less than 1 month), reversible or minor impacts that are within environmental regulatory limits and within site boundaries • Minor or short-term impacts on stakeholder(s) or customers.
Insignificant	• No appreciable or noticeable changes to the environment • Negligible impact on environment, stakeholder(s) or customers.

Table 7-2: Likelihood definitions

Likelihood	Definition	Probability
Almost certain	Expected to occur frequently during time of activity or project (10 or more times per year)	>90%
Likely	Expected to occur occasionally during time of activity or project (1 to 10 times per year)	75% to 90%
Possible	More likely to occur than not occur during time of activity or project (once per year)	50% to 75%
Unlikely	More likely not to occur than occur during time of activity or project (once every 1 to 10 years)	25% to 50%
Rare	Not expected to occur during the time of activity or project (once every 10 to 100 years)	10% to 25%
Almost unprecedented	Not expected to ever occur during time of activity or project (less than once every 100 years)	<10%

Table 7-3: Risk matrix

Likelihood	Consequence					
	Insignificant	Minor	Moderate	Major	Severe	Catastrophic
Almost unprecedented	Low	Low	Low	Low	Medium	Medium
Rare	Low	Low	Low	Medium	Medium	High
Unlikely	Low	Low	Medium	Medium	High	High
Possible	Low	Medium	Medium	High	High	Very high
Likely	Medium	Medium	High	High	Very high	Very high
Almost certain	Medium	High	High	Very high	Very high	Very high

7.3 Risk analysis

Using the framework described above, a preliminary environmental risk analysis for the Concept and major civil construction work between Westmead and The Bays was carried out and is presented in Table 10-4 of the *Sydney Metro West Environmental Impact Statement – Westmead to The Bays and Sydney CBD* (Sydney Metro, 2020a). The risk analysis identifies an initial risk rating for the potential unmitigated impacts of each of the environmental issues and provides a description of how the risk ratings were derived.

This risk analysis for major civil construction work between Westmead and The Bays has been reviewed and considered as part of the preparation of the preliminary risk analysis for this proposal. The preliminary risk analysis for this proposal is presented in Table 7-4. Further details regarding the existing environment and potential impacts associated with each environmental issue are provided in Chapter 6 (Preliminary environmental assessment) of this Scoping Report.

Table 7-4 Preliminary risk analysis

Potential impact	Risk analysis (without mitigation)	Discussion
Transport and traffic		
• Potential temporary deterioration of traffic performance on surrounding road network to an unacceptable level of service due to construction vehicles and temporary road or lane closures • Temporary loss of parking spaces or loading zones substantially undermining accessibility to transport, services and/or businesses • Potential temporary change of kerb side allocation during construction • Temporary reduced pedestrian and cyclist access or flows due to construction • Potential temporary impacts on access to private property • Potential for temporary reduced safety and amenity for traffic, pedestrians and cyclists due to construction activities, including within existing stations, and due to potential conflicts with construction vehicles.	Consequence: *Moderate* Likelihood: *Almost certain* Risk rating: *High*	Heavy vehicles would be required to transport material to and from construction sites. Additionally, construction activities may require: • The temporary or permanent closure or realignment of some sections of roadway • Alterations to pedestrian and cyclist facilities • Alterations to existing public transport infrastructure or timetables. The *Sydney Metro Construction Traffic Management Framework* (Sydney Metro, 2020b) would be implemented to manage potential traffic impacts.

Potential impact	Risk analysis (without mitigation)	Discussion
Noise and vibration		
• Potential temporary exceedances of noise management levels from tunnelling and surface construction sites during standard construction hours • Potential temporary exceedances of noise management levels from tunnelling and surface construction sites outside standard construction hours • Construction traffic potentially resulting in temporary increase in traffic noise greater than 2 dB • Potential temporary vibration from tunnelling or surface activities exceeding human comfort or damage levels • Potential temporary ground-borne noise from tunnelling exceed the criteria.	Consequence: *Major* Likelihood: *Almost certain* Risk rating: *Very high*	Construction activities would involve the use of multiple construction sites. Pyrmont Station construction sites would be directly adjacent to residential properties. Construction activities would likely exceed the relevant noise management levels for at least some locations and for some of the time. Additionally, activities outside of standard daytime construction hours are expected to be required. The *Sydney Metro Construction Noise and Vibration Standard* (Sydney Metro, 2020c) would be implemented to manage noise and vibration impacts.

Potential impact	Risk analysis (without mitigation)	Discussion
Non-Aboriginal heritage		
• Potential direct impacts on State Heritage Register listed items • Potential direct impacts on local and s170 register listed items • Potential damage to heritage items from vibration and settlement during tunnelling, construction • Potential change to the values of a heritage conservation area • Potential temporary construction impacts of activities within the curtilage of listed items, but with no direct impacts on the significant components • Potential temporary visual impacts on listed items during construction works • Potential impacts on unknown heritage items (e.g. archaeological items).	Consequence: *Moderate* Likelihood: *Almost certain* Risk rating: *High*	Construction activities would be designed to: • Avoid direct impacts on Commonwealth, National and World Heritage items • Minimise impacts from vibration on State and locally listed heritage items which are above the tunnel alignment Construction activities would: • Potentially have direct or indirect impacts on a small number of local and s170 listed items • Potentially have indirect impacts on a small number of State heritage listed items • Ensure that any archaeological items of State and local significance (potentially in Sydney CBD) would be appropriately treated. This proposal will continue to be designed to minimise potential impacts on non-Aboriginal heritage.
Aboriginal heritage		
• Potential impacts on areas of known Aboriginal cultural sensitivity • Potential impacts on unidentified Aboriginal heritage items.	Consequence: *Major* Likelihood: *Possible* Risk rating: *High*	There is Aboriginal archaeological sensitivity contained in areas around the Tank Stream, which is located within the Sydney CBD metro station western construction site. It is possible that previously unrecorded objects may be present within the corridor for work covered by this proposal.

Potential impact	Risk analysis (without mitigation)	Discussion
Property and land use		
• Potential incompatibility between project infrastructure and facilities and intended future surrounding land use • Property acquisition for construction • Potential direct impacts on other infrastructure including utilities.	Consequence: *Major* Likelihood: *Likely* Risk rating: *High*	Acquisition and demolition of properties would be required for the proposed Pyrmont Station and Sydney CBD metro station construction sites. Property acquisition will be managed in accordance with the *Land Acquisition (Just Terms Compensation) Act 1991* and the land acquisition reforms announced by the NSW Government, which can be viewed online at (**www.propertyacquisition.nsw.gov.au/**).
Landscape character and visual amenity		
• Potential temporary adverse impacts on landscape character during construction activities associated with compounds for new stations (e.g. potential loss of street trees, parking/use of plant and equipment etc) • Potential temporary impacts on visual amenity from private/public places as a result of acoustic sheds and hoardings associated with construction compounds • Potential temporary light spill from construction sites at night • Potential temporary cumulative impacts on amenity generated as a result of other construction projects in the locality.	Consequence: *Major* Likelihood: *Likely* Risk rating: *High*	Work covered by this proposal would include demolition of buildings for surface infrastructure resulting in a change to the current visual environment. The introduction of construction sites and use of acoustic sheds would result in a change in the visual landscape for several years. Landscape character and visual amenity impacts would be managed in accordance withthe *Sydney Metro Construction Environmental Management Framework* (Sydney Metro, 2020e).

Potential impact	Risk analysis (without mitigation)	Discussion
Business impacts		
• Potential disruptions to servicing, deliveries and access (including from traffic congestion) • Potential temporary loss of power and utilities by planned or accidental shutdowns • Potential temporary reduced visibility through the presence of construction activities, hoardings and other structures • Potential temporary deterioration of amenity (particularly due to noise, vibration, visual and air quality impacts) • Property acquisition or termination of existing leases, and associated business displacement or loss.	Consequence: *Major* Likelihood: *Likely* Risk rating: *High*	Acquisition of business premises would be required for the proposed station sites and construction areas. Businesses adjacent to the construction sites may also be temporarily impacted by changes to amenity, access and visibility of the business. Increased business activity would be facilitated for businesses that supply to construction and certain business types near construction sites.
Social impacts and community infrastructure		
• Potential community concern and disruption to people from property acquisition and/or termination of existing commercial leases • Potential community concern with proposed changes to the character of local areas • Potential social impact on broader community from construction activities.	Consequence: *Moderate* Likelihood: *Likely* Risk rating: *High*	Acquisition of commercial properties would be required for the proposed station sites and construction areas. Construction activities may result in some social impacts, at the individual and community level at various sites along the corridor.

Potential impact	Risk analysis (without mitigation)	Discussion
Groundwater and ground movement		
• Potential groundwater drawdown/lowering of the water table due to dewatering during tunnel and station excavations and/or drawdown incurred by bed cracking or interference with geological features beneath surface water bodies and drainage lines • Potential temporary impacts on groundwater users due to reduced groundwater yields, reduced groundwater quality and/or direct impacts and damage to existing groundwater bores • Potential ground movement/ settlement due to tunnelling and other excavations • Potential contamination of groundwater due to spills and leaks.	Consequence: *Moderate* Likelihood: *Possible* Risk rating: *Medium*	The excavation of the proposed tunnels and underground stations may result in localised changes to the hydrogeological environment associated with groundwater drawdown. The tunnels and the stations are proposed to be tanked, which would limit the potential groundwater and geology-related impacts of the project. Based on previous experience, ground movement and settlement is expected to be negligible.

Potential impact	Risk analysis (without mitigation)	Discussion
Soils and surface water quality		
• Potential erosion of soils resulting in offsite sedimentation of waterways resulting in exceedances of water quality criteria • Potential exposure of acid sulfate soils resulting in offsite discharge of acidic water • Potential exposure of soil salinity/saline soils resulting in offsite discharge of saline water resulting in exceedances of water quality trigger levels • Potential temporary water quality impacts on nearby watercourses due to discharge of treated groundwater, contaminated water, or spills • Potential contamination of land due to spills and leaks.	Consequence: *Minor* Likelihood: *Unlikely* Risk rating: *Low*	Potential impacts such as erosion and sedimentation, and spill or leaks are anticipated to be manageable through the implementation of standard environmental management measures. Groundwater captured from the tunnel excavation would be treated prior to discharge. There is the potential to encounter acid sulfate soils at Pyrmont Station eastern construction site. If acid sulfate soils are encountered at this construction site, they would need to be managed in accordance with appropriate environmental management plans.
Contamination		
• Potential disturbance of contaminated land causing impact on human health or receiving environments • Potential disturbance of contamination (soil or groundwater) potentially exacerbating existing contamination risks by mobilising otherwise stable contamination in groundwater.	Consequence: *Major* Likelihood: *Unlikely* Risk rating: Medium	Localised contaminated soils could be encountered at the construction sites. Appropriate management approaches would be developed to manage contamination in accordance with the requirements of the *Contaminated Land Management Act 1997*.

Potential impact	Risk analysis (without mitigation)	Discussion
Hydrology and flooding		
• Potential alterations to existing stormwater flows and the existing stormwater drainage infrastructure • Potential temporary impacts on construction activities due to flooding • Potential impacts on flood-prone areas (e.g. increase in flood risk outside the proposed construction sites) • Potential flooding of the tunnels or other infrastructure.	Consequence: *Minor* Likelihood: *Unlikely* Risk rating: *Low*	The Pyrmont Station construction sites are subject to local overland flow and ponding within the Union Street road reserve. The Bays tunnel launch and support site and Sydney CBD metro station construction sites are generally at low risk of flooding. The protection of the infrastructure from floods and any potential impacts on offsite flood behaviour are anticipated to be manageable through appropriate project design.
Biodiversity		
• Potential impact on native vegetation • Potential impacts on threatened flora species • Potential impacts on threatened fauna species, migratory and endangered populations due to clearing of habitat, demolition of existing buildings and structures and/or as a result of collisions with construction plant and vehicles • Potential indirect impacts on biodiversity values such as from light and noise impacts, sedimentation, spread of weeds.	Consequence: *Minor* Likelihood: *Unlikely* Risk rating: *Low*	The potential for biodiversity impacts is anticipated to be limited. While sites proposed for construction may provide suitable habitat for some threatened fauna species and endangered populations, the potential removal of this habitat (developed structures and isolated trees) is considered to be minor and these species are likely to be highly mobile and would be able to re-locate to other areas. Any species present would likely be accustomed to existing urban impacts such as noise and light spill which are already occurring.

Potential impact	Risk analysis (without mitigation)	Discussion
Air quality		
• Potential temporary impacts on local air quality due to gaseous emissions from construction plant and equipment and increase in vehicle movements • Potential temporary impacts on local air quality due to dust generation from exposed surfaces, spoil stockpiles or spoil haulage.	Consequence: *Minor* Likelihood: *Unlikely* Risk rating: *Low*	Potential air quality impacts are anticipated to be similar to other infrastructure construction projects of this nature and scale. These impacts would be manageable through the implementation of standard environmental management measures.
Greenhouse gas and energy		
• Potential emissions of greenhouse gases from embodied energy in materials • Potential emissions of greenhouse gases from construction activities including energy use for tunnel boring machines over and above emissions for similar projects of a comparable scale.	Consequence: *Minor* Likelihood: *Unlikely* Risk rating: *Low*	The generation of greenhouse gas emissions would be similar to other infrastructure construction projects of this nature and scale. These impacts would be manageable through the implementation of standard environmental management measures. Options to reduce greenhouse gas emissions and energy use would be investigated.
Climate change adaptation		
• Potential impact of climate change on tunnels or construction sites.	Consequence: *Moderate* Likelihood: *Rare* Risk rating: *Low*	Impacts are anticipated to be minimal given the relatively short construction timeframe (in relation to climate change).

Potential impact	Risk analysis (without mitigation)	Discussion
Waste management and resource use		
• Potential impacts associated with inappropriate management of waste • Potential impacts associated with the management and disposal of excess spoil from tunnel construction • Potential temporary increased demand on electricity and water supply • Potential temporary increased demand on local and regional resources including sand and aggregate • Potential increased diesel use associated with construction plant and equipment.	Consequence: *Minor* Likelihood: *Unlikely* Risk rating: *Low*	The generation of waste and the anticipated resource consumption during construction would be similar to other infrastructure projects of this nature and scale. These impacts would be manageable through the implementation of standard environmental management measures (such as application of the waste management hierarchy). Existing strategies for spoil management development for Sydney Metro West would be applied and future strategies would be developed if required. Construction activities would be unlikely to result in any resource becoming scarce or in short supply.
Hazard and risk		
• Potential incidents associated with transport and storage of hazardous substances and dangerous goods during construction • Potential for tunnel collapse during construction.	Consequence: *Moderate* Likelihood: *Rare* Risk rating: *Low*	Potential hazards and risks would be manageable through the implementation of appropriate design standards and construction methodologies.

7.4 Issue categorisation

The potential impacts (unmitigated) were categorised based on the consequence and likelihood definitions and risk ratings assigned in Table 7-4. 'Key' issues are identified as those with a risk rating of high or very high, and 'other' issues are those with a risk rating of low or medium. A summary of risk ratings and issues categorisation is included in Table 7-5.

Key issues are considered to warrant a more detailed assessment in the Environmental Impact Statement and may require specific mitigation to be developed to manage potential impacts. Other issues are not expected to raise major environmental risks and/or have well known and tested standard mitigation and management strategies.

Table 7-5: Summary of risk ratings and issue categorisation

Issue	Risk rating (unmitigated)	'Key' or 'other' issue
Construction transport and traffic	High	Key
Construction noise and vibration	Very high	Key
Non-Aboriginal heritage	High	Key
Aboriginal heritage	High	Key
Property and land use	High	Key
Landscape character and visual amenity	High	Key
Business impacts	High	Key
Social impacts and community infrastructure	High	Key
Groundwater and ground movement	Medium	Other
Soils and surface water quality	Low	Other
Contamination	Medium	Other
Hydrology and flooding	Low	Other
Biodiversity	Low	Other
Air quality	Low	Other
Greenhouse gas and energy	Low	Other
Climate change adaptation	Low	Other
Waste management and resource use	Low	Other
Hazard and risk	Low	Other

8 Conclusion

This chapter provides a conclusion to the report and identifies the next steps following receipt of the Secretary's Environmental Assessment Requirements.

Sydney Metro West was declared State significant infrastructure and critical State significant infrastructure under sections 5.12(4) and 5.13 of the EP&A Act, respectively, on 23 September 2020. Therefore, Sydney Metro West is subject to assessment and approval by the Minister for Planning and Public Spaces under Part 5, Division 5.2 of the EP&A Act.

Sydney Metro received approval on 11 March 2021 for the Sydney Metro West Concept, between Westmead and the Sydney CBD, and for major civil construction work between Westmead and The Bays, being the first stage of the staged planning approval process.

Sydney Metro is now seeking approval for work covered by this proposal, comprising the major civil construction work between The Bays and Sydney CBD, being the second stage of the planning approval process.

A preliminary environmental risk analysis has identified the following 'key' environmental issues that are relevant to the assessment of work covered by this proposal:

- Construction transport and traffic
- Construction noise and vibration
- Non-Aboriginal heritage
- Aboriginal heritage
- Property and land use
- Landscape character and visual amenity
- Business impacts
- Social impacts and community infrastructure.

Following the receipt of the Secretary's Environmental Assessment Requirements, Sydney Metro will prepare an Environmental Impact Statement for work covered by this proposal, in accordance with the requirements of the Secretary's Environmental Assessment Requirements and Division 5.2 of the EP&A Act. The Department of Planning, Industry and Environment will place this Environmental Impact Statement on public exhibition, at which time the community will be encouraged to have their say via a formal submission.

9 References

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WaterNSW 2019b, *Register of Water Approvals*

WorkCover 2005, *Storage and Handling of Dangerous Goods Code of Practice*

10 Glossary and abbreviations

Term / acronym	Definition
AS	Australian Standard
CBD	Central Business District
dB	Decibel
EP&A Act	NSW *Environmental Planning and Assessment Act 1979*
EP&A Regulation	NSW Environmental Planning and Assessment Regulation 2000
EPBC Act	Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*
Infrastructure SEPP	State Environmental Planning Policy (Infrastructure) 2007
ISO	International Organisation for Standardisation
PM	Particulate matter
The proponent	Sydney Metro
S170 register	Section 170 Register under the NSW *Heritage Act 1977*
SEPP	State Environmental Planning Policy
Stage 1 (of Sydney Metro West)	Stage 1 is the approved major civil construction work between Westmead and The Bays.
This proposal (of Sydney Metro West)	This proposal of Sydney Metro West would involve all major civil construction work including station excavation and tunnelling between The Bays and Sydney CBD, being the second stage of the planning approval process.
Sydney Metro West Concept (the Concept)	The Sydney Metro West Concept involves construction and operation of a 24-kilometre metro rail line between Westmead and the Sydney CBD.

Appendix A

Scoping issues summary sheet

Table A: Proposed Environmental Impact Statement assessment scope for this proposal

Matter	Cumulative Impact Assessment	Engagement	Relevant government plans, policies and guidelines	Scoping report reference
Construction transport and traffic	Yes	General	• *Guide to Traffic Management - Part 3 Traffic Studies and Analysis* (Austroads, 2017) • Cycling Aspects of Austroads Guides (Austroads, 2014) • *Guide to Traffic Generating Developments Version 2.2* (RTA, 2002) • RMS *Traffic Modelling Guidelines* (version 1.0, February 2013) • RMS *Traffic Signals in Microsimulation Modelling* (TTD 2018/002, 22 November 2018) • RMS and Transport Coordination guidelines related to construction • *Construction Traffic Management Framework* (Sydney Metro, 2020b) • *Guide to Traffic Management – Part 3 Traffic Studies and Analysis* (Austroads, 2007) • *Planning Guidelines for Walking and Cycling* (DIPNR, 2004).	Section 6.3.2
Construction noise and vibration	Yes	General	• *Sydney Metro Construction Noise and Vibration Standard* (Sydney Metro, 2020c) • *Interim Construction Noise Guideline* (ICNG), Department of Environment and Climate Change (DECC, 2009) • *Draft Construction Noise Guidelines*, (Environment Protection Authority, 2021) • *BS 5228 Code of practice for noise and vibration control on construction and open sites – Part 1: Noise*	Section 6.4.2

Matter	Cumulative Impact Assessment	Engagement	Relevant government plans, policies and guidelines	Scoping report reference
			• *Assessing Vibration: a technical guideline* (Department of Environment and Conservation, 2006) • *AS2107:2016 Acoustics – Recommended design sound levels and reverberation times for building interiors* • *Road Noise Policy* (Department of Environment, Climate Change and Water, 2011) • *BS 7385 Part 2-1993 Evaluation and measurement for vibration in buildings Part 2* (British Standards Institution, 1993) • *DIN 4150: Part 3-2016 Structural vibration – Effects of vibration on structures*, (Deutsches Institute fur Normung, 1999) • *Sydney Metro Construction Noise and Vibration Standard (CNVS)*, Sydney Metro, 2020 • *Noise Policy for Industry* (Environmental Protection Agency, 2017) • *Guideline for Child Care Centre Acoustic Assessment Version 2.0* (Association of Australasian Acoustical Consultants, 2013)	
Non-Aboriginal heritage	Yes	General	• *Commonwealth EPBC 1.1 Significant Impact Guidelines - Matters of National Environmental Significance* (Commonwealth of Australia, 2013) • *Commonwealth EPBC 1.2 Significant Impact Guidelines - Actions on, or Impacting upon, Commonwealth Land and Actions by Commonwealth Agencies* (Commonwealth of Australia, 2013) • *NSW Heritage Manual* (NSW Heritage Office and Department of Urban Affairs and Planning, 1996) • *Statements of Heritage Impacts* (NSW Heritage Office and Department of Urban Affairs and Planning, 1996) • *Assessing Heritage Significance* (NSW Heritage Office 2001) • *Levels of Heritage Significance* (NSW Heritage Office 2008)	Section 6.5.2

Matter	Cumulative Impact Assessment	Engagement	Relevant government plans, policies and guidelines	Scoping report reference
			• *Assessing Significance for Historical Archaeological Sites and Relics* (NSW Heritage Branch, Department of Planning 2009) • *Investigating Heritage Significance* (NSW Heritage Office 2001) • *NSW Government's Aboriginal Participation in Construction Guidelines* (2007) • *How to Prepare Archival Recording of Heritage Items* (Heritage Branch 1998) • *Photographic Recording of Heritage Items Using Film or Digital Capture* (Heritage Branch 2006) • *Guidelines for the Management of Human Skeletal Remains under the Heritage Act 1977* (NSW Heritage Office 1998)	
Aboriginal heritage	Yes	Specific engagement in line with relevant guidelines	• *Code of Practice for the archaeological investigation of Aboriginal objects in NSW* (NSW Office of Environment and Heritage 2010) • *Aboriginal cultural heritage consultation requirements for proponents 2010* (NSW Office of Environment and Heritage 2010) • *Due Diligence Code of practice for protection of Aboriginal objects in NSW* (NSW Office of Environment and Heritage 2010) • *Guide to investigating, assessing and reporting on Aboriginal cultural heritage in NSW* (Office of Environment and Heritage 2010) • *Guidelines for the Management of Human Skeletal Remains under the Heritage Act 1977* (NSW Heritage Officer 1998)	Section 6.6.2

Matter	Cumulative Impact Assessment	Engagement	Relevant government plans, policies and guidelines	Scoping report reference
Property and land use	Yes	General	• *Practitioner's Guide to Movement and Place* (NSW Government Architect and Transport for NSW, 2020) • *Environmental Planning and Impact Assessment Practice Note: Socio-economic Assessment* (Roads and Maritime Services, 2013) • *Draft Greener Places Design Guide* (NSW Government Architect, 2020) • *Local Character and Place Guideline (DPE, 2019)*	Section 6.7.2
Visual	Yes	General	• *Practitioner's Guide to Movement and Place* (NSW Government Architect and Transport for NSW, 2020) • *Better Placed – Design Guide for Heritage -Implementing the Better Placed policy for heritage buildings, sites, and precincts* (Government Architect of *NSW, 2019)* • *Sydney Green Grid – Spatial Framework and Project Opportunities (*Tyrrell Studio and Office of the Government Architect, *2017)* • *Guidance note EIA-N04 Guidelines for Landscape Character and Visual Impact Assessment* (Transport for NSW, 2020) • *The Guidance Note for Landscape and Visual Assessment* (Australian Institute of Landscape Architects, 2018) • *AS4282:2019 Control of the Obtrusive Effects of Outdoor Lighting* • *Draft Greener Places Design Guide* (NSW Government Architect, 2020) • *Local Character and Place Guideline* (Department of Planning and Environment, 2019)	Section 6.8.2
Local businesses	Yes	General	• *Australian Transport Assessment and Planning Guidelines* (Australian Transport Council, 2018) • *Environmental Impact Assessment Practice Note - Socio-economic assessment* (Roads and Maritime Services, 2013)	Section 6.9.2

Matter	Cumulative Impact Assessment	Engagement	Relevant government plans, policies and guidelines	Scoping report reference
Social impacts	Yes	General	• *Draft Social Impact Assessment Guideline* (NSW Department of Planning, Industry and Environment, 2020) • *Social Impact Assessment - Guideline for resource projects* (NSW Department of Planning, Industry and Environment, 2017) • *International principles for Social Impact Assessment* (International Association for Impact Assessment, 2003)	Section 6.10.2
Groundwater and ground movement	Yes	General	• NSW Aquifer Interference Policy *(DPI, 2012)* • Risk assessment Guidelines for Groundwater Dependent Ecosystems *(Office of Water, 2012)* • Australian Groundwater Modelling Guidelines *(National Water Commission, 2012)* • *Water Act 1912* • Water Management Act 2000 policies and guidelines including: – Groundwater and surface water sharing plans – Aquifer Interference Policy – NSW Water Quality Objectives	Section 6.11.2

Matter	Cumulative Impact Assessment	Engagement	Relevant government plans, policies and guidelines	Scoping report reference
Soils and surface water quality	Yes	General	• *Australian and New Zealand Guidelines for Fresh and Marine Water Quality* (Australian and New Zealand Governments and Australian state and territory governments, 2018) • *NSW Water Quality and River Flow Objectives.* (NSW Department of Environment, Climate Change and Water, 2006) • Guidelines for Managing Risk in Recreational Waters. (National Health and Medical Research Council, *2008)* • *Managing Urban Stormwater: Soils and Construction Volume 1* (Landcom, 2004) *and Volume 2 (A. Installation of Services; B. Waste Landfills; C. Unsealed Roads; D. Main Roads; E. Mines and Quarries) (*Department of Energy and Climate Change, 2008) • *Acid Sulfate Soils Assessment Guidelines* (Department of Planning, 2008).	Section 6.12.2
Contamination	No	General	• National Environment Protection (Assessment of Site Contamination) Measure 1999 (as revised 2013) • *Managing Land Contamination: Planning Guidelines SEPP 55 – Remediation of Land* (Department of Urban Affairs and Planning & Environment Protection Authority, 1998) • *Guidelines for Consultants Reporting on Contaminated Sites* (*NSW Office of Environment and Heritage, 2011*) • *Guidelines for the NSW Site Auditor Scheme* (Environment Protection Authority, 2017) • *Guidelines on the Duty to Report Contamination under the Contaminated Land Management Act 1997* (Environment Protection Authority, 2015) • *PFAS National Environmental Management Plan* (Heads of EPA, January 2020) • *Acid Sulfate Soils Assessment Guidelines* (Department of Planning, 2008)	Section 6.13.2

Matter	Cumulative Impact Assessment	Engagement	Relevant government plans, policies and guidelines	Scoping report reference
Hydrology and flooding	Yes	General	• *Australian Rainfall and Runoff: A Guide to Flood Estimation, Commonwealth of Australia* (Ball J, Babister M, Nathan R, Weeks W, Weinmann E, Retallick M, Testoni I, (Editors), 2016) • *Floodplain Development Manual, the management of flood liable land* (NSW Government (Department of Infrastructure, Planning and Natural Resources, 2005) • *Review of Australian Rainfall and Runoff Design Inputs for NSW* (NSW Office of Environment and Heritage, 2019) • *NSW Government, Floodplain Risk Management Guideline, Practical Considerations of Climate Change* (NSW Office of Environment and Heritage, 2006) • *NSW Coastal Planning Guideline: Adapting to Sea Level Rise (*NSW Department of Planning, 2010) • *Managing Urban Stormwater: Soils and Construction Volume 1* (Landcom 2004) *and Volume 2 (A. Installation of Services; B. Waste Landfills; C. Unsealed Roads; D. Main Roads; E. Mines and Quarries)* (Department of Environment and Climate Change, 2008) • *Flood Hazard Guideline 7-3 of the Australian Disaster Resilience Handbook 7 Managing the Floodplain: A Guide to Best Practice in Flood Risk Management in Australia* (Australian Institute Disaster Resilience, 2017)	Section 6.14.2

Matter	Cumulative Impact Assessment	Engagement	Relevant government plans, policies and guidelines	Scoping report reference
Biodiversity	Yes	General	• *Biodiversity Assessment Methodology (BAM)* (NSW Office of Environment and Heritage, 2017) • NSW Biodiversity Offsets Policy for Major Projects *(NSW Office of Environment and Heritage,2014)* • Relevant NSW and Commonwealth Species Survey Guidelines • *EPBC Act Significant Impact Guidelines* (Department of Sustainability, Environment, Water, Population and Communities, 2009) • *Fact Sheet: Biodiversity development assessment report waiver determinations for SSD and SSI applications* (Department of Planning and Environment, November 2018)	Section 6.15.2
Air quality	Yes	General	• *Guidance on the assessment of dust from demolition and construction Version 1.1* (UK Institute of Air Quality Management, 2014). • *Approved Methods for Modelling and Assessment of Air Pollutants in NSW (Approved Methods)* (NSW Environment Protection Authority, 2016)	Section 6.16.2

Matter	Cumulative Impact Assessment	Engagement	Relevant government plans, policies and guidelines	Scoping report reference
Greenhouse gas and energy	No	General	• Transport for NSW's Carbon Estimate and Reporting Tool (CERT) • Greenhouse Gas Protocol – World Business Council for Sustainable Development and World Resources Institute • ISO14064 Series – Greenhouse Gases • National Greenhouse Accounts (NGA) Factors (Australian Government Department of Industry, Science, Energy and Resources, 2020) • National Greenhouse and Energy Reporting Factors and Methods Workbook (CER) (Department of the Environment and Energy) • Greenhouse Gas Assessment Workbook for Road Projects (Transport Authorities Greenhouse Group, 2013) • Various sources for emissions factors including ISCA Materials calculator and National Greenhouse Accounts Factors. • Workbook for Road Projects (Carbon Gauge and the Transport Authorities Greenhouse Group)	Section 6.17.2
Climate change adaptation	No	General	• *Climate Risk Assessment Guideline* (Transport for NSW, 2018) • *AS5334 – Climate Change Adaptation for Assets and Infrastructure* • *AS31000 – Risk Assessment – Principles and Guidelines* • *Climate Change Impacts and Risk Management A Guide for Business and Government* (Australian Government Department of the Environment and Heritage Australian Greenhouse Office, 2006). • *AS 5334-2013 Climate change adaptation for settlements and infrastructure – a risk-based approach* • *AS/NZS 31000:2018 Risk Management – Principles and Guidelines*	Section 6.18.2

Matter	Cumulative Impact Assessment	Engagement	Relevant government plans, policies and guidelines	Scoping report reference
Waste management and resource use	Yes	General	• *Waste Classification Guidelines* (NSW Environment Protection Authority, 2014) • *NSW Sustainable Design Guidelines, Version 4.0* (Transport for NSW, 2019) • *Managing Urban Stormwater: Soils and Construction Volume 1* (Landcom, 2004).	Section 6.19.2
Hazards and risk	No	General	• *Hazardous and Offensive Development Application Guidelines: Applying SEPP 33* (Department of Planning, 2011) • *International Standard (ISO/IEC 31010:2009) Risk Management – Risk Assessment Techniques* • *Australian Code for the Transport of Dangerous Goods by Road and Rail (edition 7.6)* (National Transport Commission, 2018) • *Model Code of Practice: How to manage and control asbestos in the workplace* (Safework Australia, 2018) • *Code of Practice: How to Safely Remove Asbestos* (Safework NSW 2016) • *Storage and Handling of Dangerous Goods Code of Practice* (WorkCover NSW, 2005), noting this Code is a guide for processes and controls to manage risks and is not to be relied upon to ascertain requirements under *the Work Health and Safety Regulation 2011.* • *Australian Standard AS 2885 Pipelines – Gas and liquid petroleum* • *Hazardous Industry Planning Advisory Paper No. 6 - Guidelines for Hazard Analysis* (Department of Planning, 2011) • *Multi-Level Risk Assessment* (Department of Planning, 2011).	Section 6.20.2