NSW GOVERNMENT | sydney METRO

West

Scoping Report

Rail infrastructure, stations, precincts and operations

Request for Secretary's Environmental Assessment Requirements

Cover: An artist's impression of Sydney Olympic Park metro 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 North West Metro 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.

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.

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 Hunter Street (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) was approved on 11 March 2021. The Scoping Report for *Sydney Metro West – major civil construction work between The Bays and Sydney CBD* (Stage 2 of the planning approval for Sydney Metro West) was lodged on 12 May 2021. Stage 3 of the planning approval process (this proposal) includes tunnel fit-out, construction of stations, ancillary facilities and station precincts, and operation and maintenance of the Sydney Metro West line.

Rail infrastructure, stations, precincts and operations

This proposal would involve:

- Fit-out of tunnels including systems for metro train operations
- Construction, fit-out and operation of metro station buildings and the surrounding metro precincts
- Construction, fit-out and operation of services facilities and traction substations
- Construction, fit-out and operation of a control centre, test track and stabling and maintenance facility at Clyde
- Provisions for integrated station and/or precinct developments at relevant stations
- Rail interchange support works, including work to the existing T1 Western Line at Westmead and T9 Northern Line at North Strathfield
- Transport network modifications, such as new interchange facilities and changes to public transport networks to serve metro stations
- Subdivision of station sites

- Operation and maintenance of the Sydney Metro West line.

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, the 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 under section 5.15 of the EP&A Act – with the first step to obtain the Secretary's Environmental Assessment Requirements for the Environmental Impact Statement for tunnel fit-out, construction of stations, ancillary facilities and station precincts, and operation and maintenance of the Sydney Metro West line.

Key environmental issues

A preliminary environmental assessment and risk analysis has identified the following key environmental issues:

- Construction transport and traffic
- Construction noise and vibration
- Non-Aboriginal heritage
- Landscape character and visual amenity
- Hydrology, flooding and water quality
- Social impacts and community infrastructure
- Business impacts
- Cumulative impacts.

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

- Operational transport and traffic
- Operational noise and vibration
- Aboriginal heritage
- Property and land use
- Soils, contamination and groundwater
- Biodiversity
- Air quality
- Greenhouse gas and energy

- Climate change risk and 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, and operation of the Sydney Metro West line
- An overview of the relevant existing environment and an assessment of potential direct and indirect impacts on key and other potential environmental issues during construction and operation
- 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

Appendices

1 Introduction

This chapter provides an overview of this proposal, for the tunnel fit-out, construction of stations, ancillary facilities and station precincts, and operation and maintenance of the Sydney Metro West line, including the strategic planning context and key features. The purpose and structure of this report is also provided.

1.1 Overview of the Sydney Metro network

The Sydney Metro West 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 Hunter Street (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.

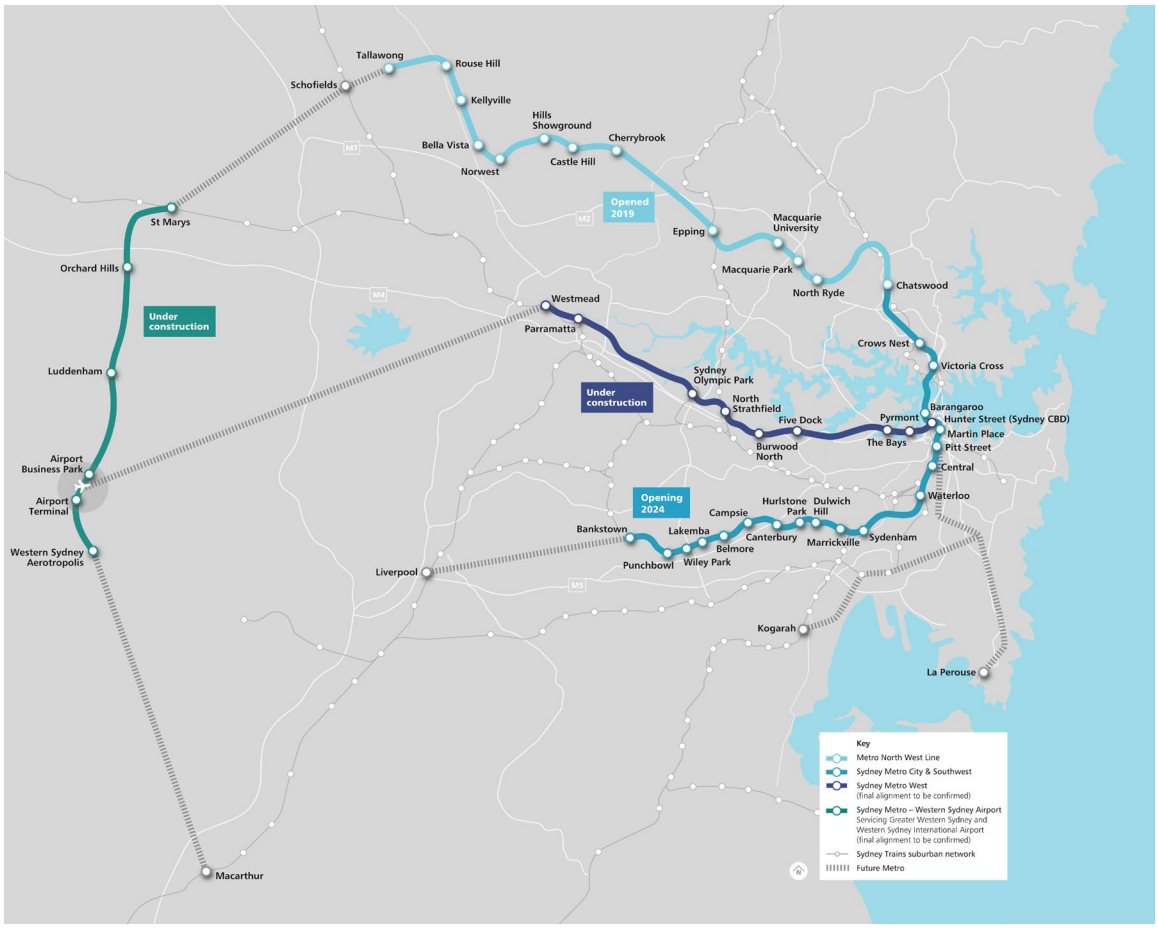

Figure 1-1 Sydney Metro network

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 Hunter Street (Sydney CBD). The main elements of Sydney Metro West are shown in Figure 1-2.

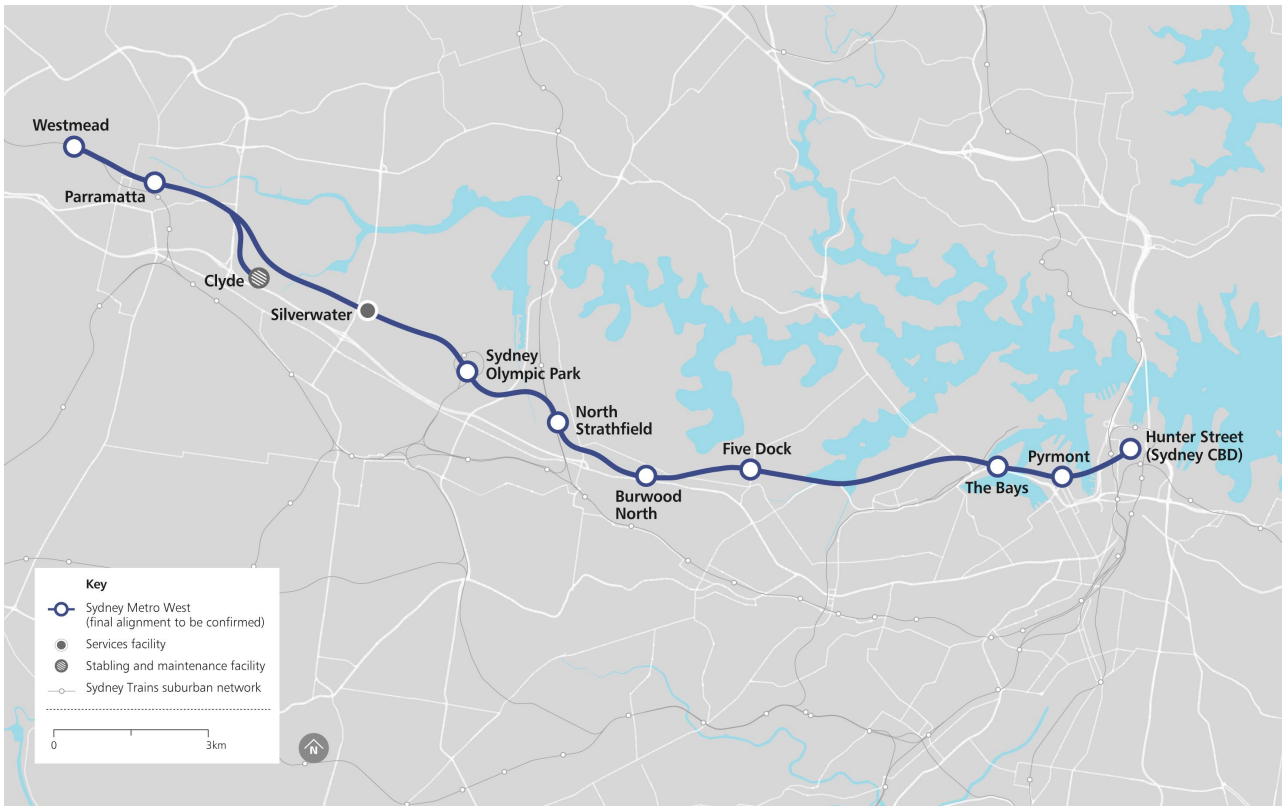

Figure 1-2 Sydney Metro West

1.2.1 Strategic context and key benefits

The Sydney Metro West Concept (the approved Concept) included consideration of a number of key strategic planning and transport infrastructure strategies and policies including:

- 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, and 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, 2018b)
- 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)
- Provide the high capacity transport link along the city-shaping corridor between Greater Parramatta and the Sydney CBD, connected via Sydney Olympic Park and The Bays, which is identified and listed as a committed initiative in *Future Transport 2056* (Transport for NSW, 2018).

This proposal is seeking planning approval to enable the approved Concept to be realised by undertaking the tunnel fit-out, construction of stations, ancillary facilities, and station precincts, and operation and maintenance of the Sydney Metro West line. As this proposal is a subsequent stage within the approved Concept, it would continue to be consistent with the key strategic planning and transport infrastructure strategies and policies, and contribute to providing the identified benefits of the approved Concept.

The key benefits of Sydney Metro West as they relate to this proposal include:

- City-shaping – including supporting planned growth, expanding the 30-minute cities, increasing all day accessibility, reduced public infrastructure provision and household energy consumption, improving housing affordability and supply and benefits to social equity, sustainability, health and amenity
- Transport benefits – namely increasing transport network capacity, reduced train and station crowding, increase accessibility to key centres, increased public transport network reach and use, improved travel times, improved resilience to incidents on the network, opportunities to optimise the bus network and road user and community benefits
- Productivity benefits – particularly enhancing international competitiveness, creation of productive jobs in knowledge-based industries and connectivity benefits by reduction in travel times between businesses in the corridor.

1.2.2 Project development and alternatives

The Sydney Metro West development process was driven by the identified strategic need to improve connectivity between Greater Parramatta and the Sydney CBD. As part of the development process for Sydney Metro West, a range of potential alternatives to the approved Concept were considered including:

- Strategic alternatives (including do nothing, better-use reforms, improvements to other parts of the transport network, including road, bus, light rail and ferry and improvements to other parts of the Sydney Trains network)
- Optimisation of travel times between Parramatta and the Sydney CBD
- Alignment alternatives
- Station location options
- Stabling and maintenance facility alternatives
- Technical design and construction alternatives.

An analysis of these potential alternatives is detailed in Chapter 3 of *Sydney Metro West Environmental Impact Statement – Westmead to The Bays and Sydney CBD* (Sydney Metro, 2020a). The option selection process took into account issues raised during consultation with key stakeholders, including government agencies and the community. Options were assessed against a range of criteria, including customer outcomes, constructability, operation, environmental impacts, accessibility, heritage and placemaking considerations, risk and cost effectiveness.

Since approval of the Sydney Metro West Concept, a Scoping Report for *Sydney Metro West - major civil construction work between The Bays and Sydney CBD* (Sydney Metro, 2021) has been lodged with the Department of Planning, Industry and Environment. This report provides an overview of project development and alternatives for the Pyrmont and Hunter Street (Sydney CBD) station locations.

With respect to specific operational requirements, ongoing design development for this proposal will include:

- Integration of road, bus, and active transport networks surrounding station precincts
- Station access such as walkways, access roads, road modifications and other ancillary facilities
- Provision for future land uses such as retail, commercial and community facilities to activate each station precinct.

Further detail on the design development and construction planning for rail infrastructure, stations, precincts and operational requirements would be included in the Environmental Impact Statement for this proposal.

1.2.3 Placemaking

The delivery of Sydney Metro West offers the opportunity to transform areas with new places, or to reinforce and enhance existing places. The approach to placemaking for Sydney Metro West is based on a multifaceted approach to the planning, design, and management of public spaces, which aims to create inclusive public spaces that promote people's health and wellbeing.

The approach to placemaking at each locality would be contextual, taking into consideration that metro stations would:

- Function as 'places' in their own right, creating focal points in the communities each station serves. The stations would attract a range of benefits and potential future land uses, such as reducing dependence on private vehicles, providing public places for gathering and human interaction supported by retail, commercial and community facilities, as well as encouraging exercise by promoting walking and cycling to and from the stations
- Have a role in contributing to their surrounding environment or 'place' in which they are located by supporting planned growth and renewal, and acting as a catalyst for transit-oriented development within their catchments.

The approach to placemaking is detailed in Chapter 7 of the *Sydney Metro West Environmental Impact Statement – Westmead to the Bays and Sydney CBD* (Sydney Metro, 2020a). This will be used to further develop station place and design principles at both a corridor and precinct-specific level to identify station place and design outcomes for the proposed metro stations. This is further discussed in Chapter 2 (Description of the proposal). Further development and refinement to the placemaking strategy and design principles for Sydney Metro West would also be provided in the Environmental Impact Statement for this proposal.

1.2.4 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 *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 this proposal.

1.2.5 Sydney Metro West planning approval process

Sydney Metro West is being assessed as a staged infrastructure application under section 5.20 of the EP&A Act.

The approved 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 approved 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).

Approved major civil construction work for Sydney Metro West between Westmead and The Bays (Stage 1 of the planning approval process) 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.

Stages of the planning approval process for Sydney Metro West currently underway include:

- All major civil construction works including station excavation and tunnelling between The Bays and Sydney CBD (Stage 2 of the planning approval process)
- Tunnel fit-out, construction of stations, ancillary facilities and station precincts, and operation and maintenance of the Sydney Metro West line (this proposal).

1.3 Overview of this proposal

This proposal would involve:

- Fit-out of tunnels including systems for metro train operations
- Construction, fit-out and operation of metro station buildings and the surrounding metro precincts
- Construction, fit-out and operation of services facilities and traction substations
- Construction, fit-out and operation of a control centre, test track and stabling and maintenance facility at Clyde
- Provisions for integrated station and/or precinct developments at relevant stations
- Rail interchange support works, including work to the existing T1 Western Line at Westmead and T9 Northern Line at North Strathfield

- Transport network modifications such as new interchange facilities and changes to public transport networks to serve metro stations
- Subdivision of station sites
- Operation and maintenance of the Sydney Metro West line.

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

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 (This Chapter)	Outlines key elements of Sydney Metro West and this proposal, including options and strategic context, as well as the purpose of this report.
Chapter 2 Description of the proposal	Provides a description of this proposal, including the location and function of the main construction sites, and the operational components of the Sydney Metro West line.
Chapter 3 Statutory context	Provides an outline of the statutory approvals framework, including applicable legislation and planning policies.
Chapter 4 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 5 Preliminary environmental assessment	Provides a preliminary description of the existing environment of the study area, and an initial consideration of the potential direct and indirect impacts that may result from this proposal.
Chapter 6 Preliminary environmental risk analysis	Provides a preliminary environmental risk analysis for this proposal taking into account the current scope and the receiving environment.
Chapter 7 Conclusion	Provides a conclusion to the report and identifies the next steps following receipt of the Secretary's Environmental Assessment Requirements.

2 Description of the proposal

This chapter describes what is covered by this proposal, including key features such as tunnel fit-out and systems works, station and precinct works, and operational infrastructure.

2.1 Overview and key components

The proposal would involve:

- Fit-out of tunnels including systems for metro train operations
- Construction, fit-out and operation of metro station buildings and the surrounding metro precincts
- Construction, fit-out and operation of services facilities and traction substations
- Construction, fit-out and operation of a control centre, test track and stabling and maintenance facility at Clyde
- Provisions for integrated station and/or precinct developments at relevant stations
- Rail interchange support works, including work to the existing T1 Western Line at Westmead and T9 Northern Line at North Strathfield
- Transport network modifications such as new interchange facilities and changes to public transport networks to serve metro stations
- Subdivision of station sites
- Operation and maintenance of the Sydney Metro West line.

Components covered by this proposal are subject to further design development and construction planning which would take into account the outcomes of community and stakeholder engagement and environmental investigations. The locations of the alignment, stations and the main elements of operational ancillary infrastructure are shown in Figure 1-2.

2.2 Sydney Metro West operations

The fully automated Sydney Metro West would double the rail capacity between Greater Parramatta and the Sydney CBD providing a turn-up-and-go service stopping at all stations along Sydney Metro West. Sydney Metro West would form part of the standalone Sydney Metro rail network separate from the existing suburban and intercity rail network.

Demand for the service would be managed through increased service frequency. The ultimate operational frequency would be for 30 trains per hour in each direction – a train every two minutes each way. Operations would be tailored to cater for planned special events, for example major events at Sydney Olympic Park or New Year's Eve.

2.2.1 Hours of operation

Sydney Metro West hours of operation would be aligned to the Sydney Trains suburban rail network and the Sydney Metro network. To accommodate for planned special events, operating hours could be extended as required.

Final operating hours would be determined as part of the development of service schedules for the metro line, taking into account maintenance access requirements, customer requirements and broader network considerations.

2.2.2 Train types

All trains would be new, single-deck, fully automated and driverless metro trains. They would deliver a fast, safe and reliable journey for customers with high performance standards and good customer amenities including:

- At least three doors per side per carriage and no doors between carriages, allowing fast boarding and alighting
- Air conditioning
- Emergency help points
- Accessible priority seating for mobility impaired, the elderly and people with a disability or using a wheelchair or mobility device
- A mix of seating and standing arrangements for efficient boarding and alighting the metro
- Level access between the platform and train
- Clear customer information while on board the metro.

2.3 Tunnel alignment and configuration

The twin underground metro rail tunnels would be around 24 kilometres in length between Westmead to the Sydney CBD. The tunnel alignment, along with the contributing functional requirements and constraints, has been defined in the approved Concept. The alignment is shown in Figure 1-2.

2.3.1 Key tunnel and underground track features

The metro rail tunnels would have a circular cross-section with a clear internal lined diameter of about six metres to accommodate the typical metro train, rail systems and infrastructure. The tunnels would be lined with precast concrete segments (as part of the construction works covered by preceding Sydney Metro West planning applications) to ensure the long term life of the tunnels and to minimise groundwater ingress. The tunnels would provide space for the trains and tracks, and for other equipment and services including rail signalling, controls and communication, overhead traction power, fresh air ventilation, fire and life safety systems, maintenance access, lighting and drainage.

An indicative cross-section of the underground tunnel is shown in Figure 2-1. Cross passages for emergency evacuation would link the tunnels along the alignment. Stub tunnels would be located at the western and eastern extents of the tunnels to safeguard for potential future extensions.

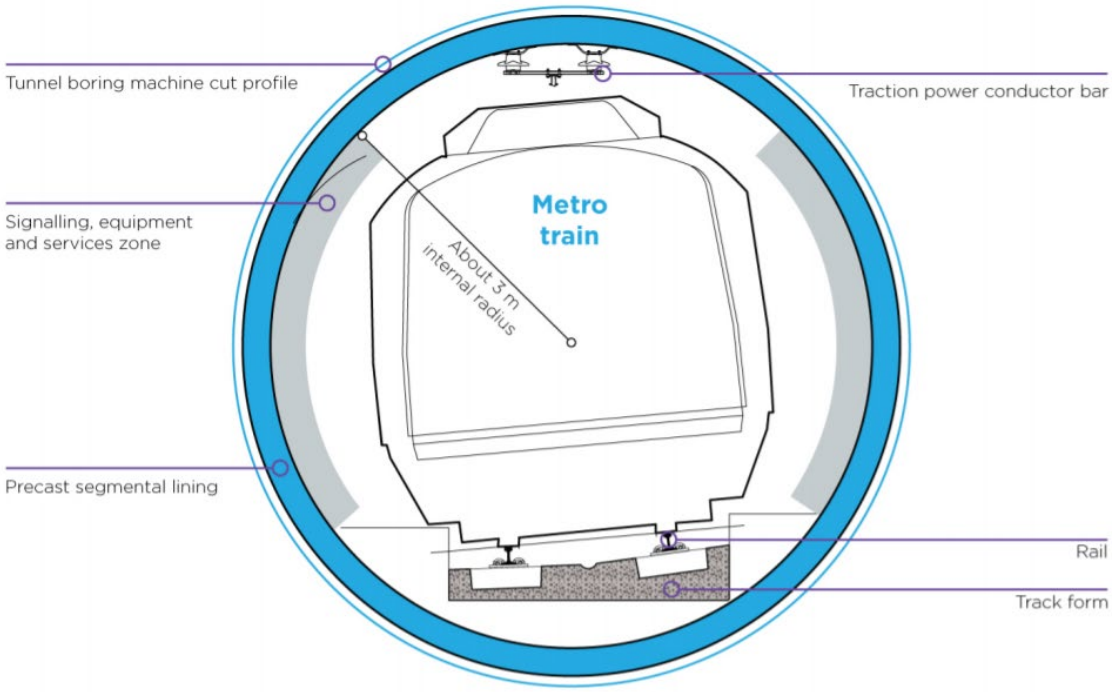

Figure 2-1 Indicative cross-section of a metro tunnel

2.4 Stations

Metro stations would be located at Westmead, Parramatta, Sydney Olympic Park, North Strathfield, Burwood North, Five Dock, The Bays, Pyrmont and Hunter Street (Sydney CBD). All stations would be located underground. A description of each station and ancillary infrastructure between Westmead and The Bays is provided in Chapter 6 of the *Sydney Metro West Environmental Impact Statement – Westmead to The Bays and Sydney CBD* (Sydney Metro, 2020a).

The Scoping Report for the proposed *Sydney Metro West - Major civil construction work between The Bays and Sydney CBD* (Sydney Metro, 2021) includes details on key features of the Pyrmont and Hunter Street (Sydney CBD) metro stations.

The precincts for each of the stations would include:

- Station transport interchanges, such as kiss and ride, bus stops and Transit Way (T-way) interfaces, taxi ranks and cycle storage areas
- Station access walkways, access roads, road modifications and intersection treatments, stormwater infrastructure, and other ancillary facilities
- Provision for future land uses such as retail, commercial and community facilities to activate each station precinct
- Landscaping and urban design features.

This proposal would include subdivision of the relevant station sites to support integrated station and/or precinct development and ancillary facilities.

2.4.1 Placemaking and design

The approach to placemaking and design for the approved Concept, as well as site-specific place and design principles for each metro station, the Clyde stabling and maintenance facility and major ancillary facilities are provided in Chapter 7 of *Sydney Metro West Environmental Impact Statement – Westmead to The Bays and Sydney CBD* (Sydney Metro, 2020a). The design of Sydney Metro would be generally consistent with these design principles, in accordance with Condition C-B1 of the Minister's Conditions of Approval for the Sydney Metro West approved Concept (referred to as the Minister's Conditions of Approval in this proposal). These design principles would be further developed and identified in the Environmental Impact Statement for the proposal and would demonstrate how the placemaking objectives have been applied at the precinct, interchange, and station level.

Placemaking objectives would be further developed to address such aspects as:

- Transport integration and connectivity – including pedestrian and cyclist access, connectivity with metro, Sydney Trains suburban rail, light rail and intercity rail networks, access to the bus network, short-term private vehicle access such as kiss and ride, and point to point spaces
- Aboriginal cultural design – the design will respect and respond to the culture and stories embedded in the land through which it passes
- Non-Aboriginal heritage – stations designed to be sympathetic to heritage items and opportunities for heritage conservation and interpretation to contribute to the celebration of local identity
- Public art – opportunities to integrate public art into the customer environment, and a process for its curation and production in accordance with the Sydney Metro Art Masterplan (Sydney Metro, 2020e)
- Crime prevention through environmental design (CPTED) – the safety of customers, staff and areas surrounding stations would be considered in station design in accordance with CPTED principles
- Safety and security characteristics including platform screen doors, security fencing, well-designed and efficiently controlled lighting systems, trackside intruder detection system, CCTV cameras, emergency help points and passenger information signage
- Sustainability in design – consistent with the Sydney Metro West Sustainability Plan (under development)
- Specific precinct considerations – including local council Strategic Planning Statements, relevant precinct master plans and other precinct planning documents
- Public spaces– including consideration of the use of residual land at the Clyde stabling and maintenance facility, in accordance with Condition C-B2 of the Minister's Conditions of Approval
- Re-naturalisation and rehabilitation areas – including parts of Duck Creek and A'Becketts Creek and the rehabilitation of the riparian corridor at the Clyde stabling and maintenance facility, in accordance with Condition C-B2 of the Minister's Conditions of Approval.

The design of the station and associated precincts would be informed by these placemaking objectives, place and design principles as well as feedback from community and stakeholders.

Placemaking objectives and design principles, along with community and stakeholder engagement and the establishment of a Design Advisory Panel to provide independent design review, will allow for high quality standards throughout the design process. These outcomes will be further detailed in the Environmental Impact Statement for the proposal.

2.4.2 Sustainability outcomes

The identified sustainability outcomes for Sydney Metro West support the objectives and principles of the overarching Sydney Metro Sustainability Framework, including the following:

- Demonstrate leadership – deliver a world class metro that is environmentally and socially conscious; share knowledge and demonstrate innovation in sustainability
- Tackle climate change – integrate a comprehensive climate change response, and drive excellence in low carbon solutions
- Manage resources efficiently – achieve whole-of-life value through efficient use and management of resources
- Drive supply chain best practice – collaborate with key stakeholders to drive a lasting legacy in workforce development, industry participation and sustainable procurement
- Value community and customers – respond to community and customer needs, promote heritage, liveable places and wellbeing for current and future generations
- Respect the environment – minimise impacts and take opportunities to provide environmental improvements.

Sustainability initiatives are being incorporated into the planning, detailed design and construction of Sydney Metro West and would achieve a Infrastructure Sustainability Council of Australia (ISCA) Infrastructure Sustainability rating of at least 75 (Version 1.2) (or equivalent level of performance using a demonstrated equivalent rating tool) or a 5-Star Green Star rating (or equivalent level of performance using a demonstrated equivalent rating tool), in accordance with Condition C-B7 of the Minister's Conditions of Approval.

2.4.3 Integrated station and precinct development

Provision for integrated station and/or precinct developments would be made at relevant stations.

The metro stations would be designed to take into account, and make physical provision for, any design or other requirements associated with future integrated station and/or precinct development. In general, these provisions would include:

- Structural elements (steel and/or concrete), building grids, column loadings and building infrastructure to enable the construction of future integrated station and/or precinct development
- Space for future lift cores, access, parking and building services for future integrated station and/or precinct development
- Subdivision of the station sites.

Design integration would ensure future developments can be built efficiently and effectively.

Further details regarding elements incorporated into the station design for the purposes of making provision for future integrated station and/or precinct development will be identified and assessed as part of the Environmental Impact Statement for this proposal. This would also include refinement of the existing placemaking strategy outlined in the approved Concept so that the Sydney Metro West place and design principles are achieved.

2.4.4 Rail interchange support works

Interchange support works at Westmead and North Strathfield Stations would be required to provide direct interchange between the metro and suburban rail networks. Interchange support works would likely involve the construction of new aerial concourses with new lifts, escalators and/or stairs to the existing platforms, modification to existing rail infrastructure (including platforms, track, overhead wiring, signalling, access tracks/paths and rail corridor fencing) and potential demolition of existing station elements.

2.5 Operational ancillary infrastructure

2.5.1 Services facilities

Services facilities would be located at Rosehill (within the Clyde stabling and maintenance facility), and Silverwater. Services facilities would include an above ground building for mechanical, electrical and ventilation equipment, with a vertical shaft to connect to the tunnels below. Construction of the vertical shafts will be completed as part of the approved major civil constructions works for Sydney Metro West – Westmead to The Bays.

The need for a services facility between Five Dock and The Bays stations was identified in the *Sydney Metro West Environmental Impact Statement – Westmead to The Bays and Sydney CBD* (Sydney Metro, 2020).

Following further detailed design work, Sydney Metro determined that ventilation can be adequately provided through enhancement of the existing ventilation system along the alignment and Sydney Metro West can be safely delivered without a services facility between Five Dock and The Bays stations.

2.5.2 Traction substations

Traction power supply would be provided through dedicated traction substations. These would be co-located with other station infrastructure where possible, with the final locations to be identified within the Environmental Impact Statement for the proposal.

2.6 Stabling and maintenance

2.6.1 Infrastructure maintenance

Maintenance planning would generally allow for routine and major periodic maintenance of infrastructure with a view to maximising service availability and minimising impacts on customers. Scheduled maintenance would generally occur between the last and first train services, or during planned weekend maintenance periods, when train services would not be in operation on parts of the line.

Rail maintenance vehicles would be able to use the network and provide access for maintenance crews. The following types of maintenance activities would be required:

- Scheduled maintenance – involving routine inspections and repairs to enable operations at prescribed levels of safety, reliability and service frequency. This type of maintenance would be performed on a regular and recurring basis at specified intervals
- Non-scheduled maintenance – involving emergency repairs, vandalism and breakage that would impact on prescribed levels of safety, reliability and/or service frequency. This type of maintenance would be performed as needed
- Overhaul and repairs – involving the repair, replacement and testing of infrastructure that has been removed from its working location.

2.6.2 Clyde stabling and maintenance facility

A stabling and maintenance facility would be located in the Clyde industrial area. Civil works for the formation of the stabling and maintenance facility will be undertaken as part of the approved major civil constructions works for Sydney Metro West – Westmead to The Bays. The operational components of the stabling and maintenance facility would be delivered as part of this proposal and would include:

- Stabling roads to store trains
- Maintenance facility
- Train wash/graffiti removal facility
- Wheel lathe
- Infrastructure maintenance sidings, depot and buildings
- Operations control centre
- A traction substation to provide power to the rail line and stations
- Operational water treatment plant to treat wastewater pumped from the tunnels, stations and other underground facilities
- Workshops for the maintenance of railway infrastructure components
- Offices, car parks, storage and vehicular and pedestrian roads
- Test track for commissioning and maintenance.

The Clyde stabling and maintenance facility would be connected to the mainline tunnels via a section of above ground track, a dive structure and tunnel portal located in Rosehill and underground connecting tunnels. The facility would operate 24 hours per day, seven days per week.

2.7 Construction

Tunnelling and station excavation construction activities for Sydney Metro West are addressed in the following:

- *Sydney Metro West Environmental Impact Statement – Westmead to The Bays and Sydney CBD* (Sydney Metro, 2020a)
- *Sydney Metro West Westmead to The Bays and Sydney CBD – Amendment Report* (Sydney Metro, 2020b)
- The future Environmental Impact Statement for major civil construction work between The Bays and Sydney CBD, for which a Scoping Report was lodged with the Department of Planning, Industry and Environment on 12 May 2021.

This proposal includes the balance of the construction activities for Sydney Metro West, largely being construction of stations, ancillary facilities and station precincts, provision for integrated station and/or precinct developments, tunnel fit-out, rail system works and transport network modifications. In general, these construction activities would be carried out predominantly within the same construction footprint as required for construction works subject to preceding Sydney Metro West planning applications, with the potential for some minor additional and/or changes to construction footprint areas required.

2.7.1 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:

- Utility adjustments and protection, if required
- Construction site establishment to support tunnel fit-out, station and ancillary building works
- Transport network modifications to roads, public transport, and pedestrian and cyclist facilities
- Additional geotechnical and contamination investigations, and remediation where required.

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

2.7.2 Station construction

Station works would include construction of:

- Permanent station structures including respective fit-out and finishes
- Permanent structures for ancillary services buildings
- Interchange facilities, pedestrian and vehicle access
- All mechanical and electrical systems which are incorporated into the stations
- Station precincts including landscape works, public art, furniture, fitments, and wayfinding signage
- Temporary or permanent traffic diversions

- Physical provision and structural elements to support potential future integrated station development
- Surface and groundwater drainage systems and water treatment plant
- Areas within the station infrastructure to accommodate system-wide electrical and mechanical systems.

2.7.3 Tunnel fit-out and rail system works

Tunnel fit-out and rail system works would include:

- Fresh air tunnel ventilation fit out
- Track slab and rail fastening
- Rail installation, fixing and welding
- Cable and equipment installation including signalling, communications and electricity systems
- Overhead traction power supply for rolling stock
- Installation of other equipment including lighting (including emergency lighting), drainage works, fire and life safety systems (including walkways connecting to emergency egress and fire hydrant systems), and security systems (including fencing and CCTV systems)
- Overhead line conductor systems including at Clyde maintenance and stabling facility and within tunnels and stations
- Station systems including lifts, escalators, passenger information systems, help points, passenger evacuation and public address systems, platform screen doors, gate line and ticketing and building control systems.

2.7.4 Construction sites

The location and footprint of the proposed construction sites between Westmead to The Bays would generally be consistent with the locations described in Chapter 9 of *Sydney Metro West Environmental Impact Statement – Westmead to The Bays and Sydney CBD* (Sydney Metro, 2020a) and the *Sydney Metro West Westmead to The Bays and Sydney CBD – Amendment Report* (Sydney Metro, 2020b).

The location and footprint of the proposed construction sites from Pyrmont to Sydney CBD would be generally consistent with the locations described in Section 3 of the Scoping Report for the proposed *Sydney Metro West – major civil construction work between The Bays and Sydney CBD* (Sydney Metro, 2021).

Additional and/or changes to construction sites may be required to support construction works associated with this proposal. Changes would be identified and assessed within the Environmental Impact Statement for this proposal.

2.7.5 Transport network modifications

Transport network modifications as a result of establishing short- and long- term work zones to facilitate the proposed construction works may include:

- Temporary closure of some sections of roadways and parking areas
- Temporary modifications to pedestrian and cyclist facilities (i.e. footpath closures and diversions)
- Temporary modifications to existing public transport infrastructure or timetables
- Other permanent road network and active transport changes.

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 the proposal.

2.8 Construction hours

The majority of the above ground construction activities 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 and industrial environment around some of the construction sites (such as the Clyde stabling and maintenance facility and Hunter Street Station (Sydney CBD) construction sites), it is anticipated that extended construction hours for above ground construction activities at some construction sites would occur on Saturdays and Sundays.

Tunnel and station fit-out activities are anticipated to be carried out up to 24 hours per day and seven days per week to help reduce the construction timeframe. Given the nature of the work, the potential noise impacts from tunnel and station fit-out activities are anticipated to be minimal.

Other activities that would likely be carried out outside of the standard daytime construction hours would include:

- Construction works, including utilities works, that would require temporary road closures
- Work determined to comply with the relevant noise management level at the nearest sensitive receiver
- Work required to be carried out during rail possessions
- 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.

2.9 Construction program

The total construction period for this proposal would be around four years, followed by testing and commissioning. The indicative durations and anticipated timing of construction activities are summarised in Figure 2-2.

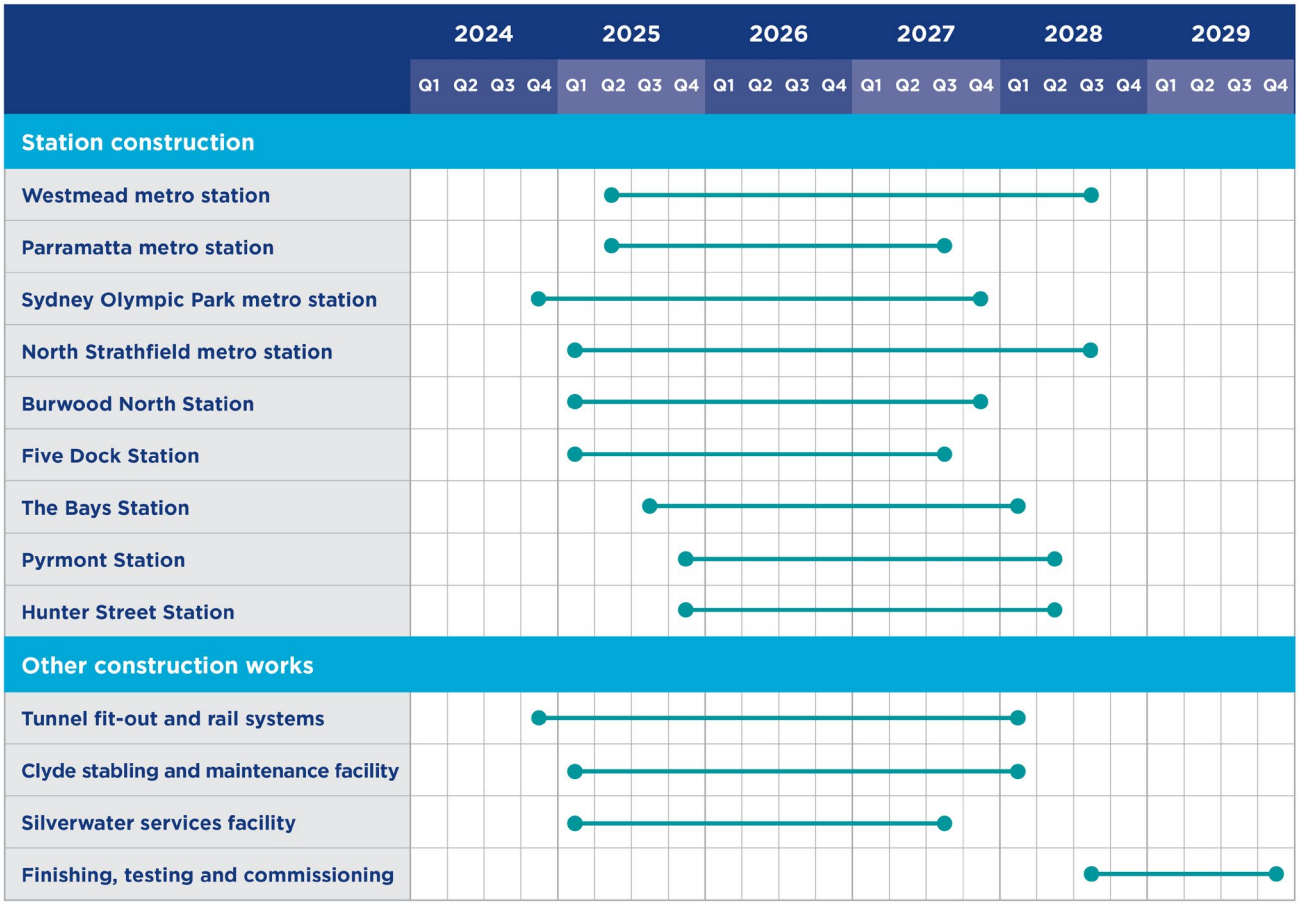

Figure 2-2 Indicative construction program

3 Statutory context

This chapter describes the statutory planning process for the proposal and identifies other NSW and Commonwealth legislation and approvals which may apply.

3.1 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.

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 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.

This proposal would deliver the final components of the approved Concept, comprising tunnel fit-out, construction of stations, ancillary facilities and station precincts, and operation and maintenance of the Sydney Metro West line.

The Minister's Conditions of Approval for the Sydney Metro West Concept and Stage 1 included specific conditions of approval to be considered in future applications. Conditions of approval relevant to this proposal are discussed in Chapter 5 (Preliminary environmental assessment).

3.2 NSW environmental planning approvals

3.2.1 Planning approval process for this application under 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 this proposal is summarised in Figure 3-1. The requirements of Clause 192 of the Environmental Planning and Assessment Regulation 2000 for applications seeking approval of the Minister for Planning and Public Spaces to carry out State significant infrastructure are addressed in Section 3.3.

Figure 3-1 Assessment and approvals process for the proposal

3.2.2 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 Policy's (SEPPs)) 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 3-1.

Table 3-1 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/or precinct development is separately discussed in Section 3.5.
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 within the Environmental Impact Statement.
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 this proposal.
Sydney Regional Environmental Plan No. 26 – City West	Sydney Regional Environmental Plan No. 26 – City West is relevant to The Bays Precinct. 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 preparation of the Environmental Impact Statement for this proposal.

Environmental planning instrument	Discussion
Sydney Regional Environmental Plan No. 24 – Homebush Bay Area	Some elements of the proposal, including the Sydney Olympic Park station, would be within the defined boundary of the Sydney Regional Environmental Plan No. 24 – Homebush Bay Area. The main aims of this plan are to: • Define objectives for the Homebush Bay Area which encourage co-ordinated and environmentally sensitive development of the Homebush Bay Area • Guide and co-ordinate the development of the Homebush Bay Area • Replace planning instruments previously applying to the Homebush Bay Area with a simplified planning framework • Provide flexible development controls by allowing a wide mix of uses in the Homebush Bay Area • Provide for the preparation of detailed planning controls to complement the flexible controls in this plan • Facilitate the development and management of Sydney Olympic Park by the Sydney Olympic Park Authority based on: – masterplans (whether adopted by the Minister under this Plan or approved by the Minister under section 18 of the *Sydney Olympic Park Authority Act 2001*) – other guidelines and management strategies adopted by the Sydney Olympic Park Authority for the management of Sydney Olympic Park • Provide for public consultation in the planning and development of the Homebush Bay Area. The proposal would take into consideration the masterplan development for the Homebush Bay Area and Sydney Metro has been consulting with Sydney Olympic Park Authority.
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 preparation of the Environmental Impact Statement.

Environmental planning instrument	Discussion
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 are the Parramatta, Strathfield, Concord, Burwood, Leichhardt and 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 preparation of the Environmental Impact Statement for this proposal.

3.3 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 3.2.1).

3.3.1 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 for the approved Concept, 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 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*.

3.3.2 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 scope of this proposal, may be relevant are identified in Table 3-2.

Table 3-2 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 operation of the Sydney Metro West line would pass underneath a number of parcels of Crown land.
Biodiversity Conservation Act 2016	This Act provides for the protection of threatened species, populations and ecological communities in NSW. The Act requires that a State significant infrastructure application must be accompanied by a Biodiversity Development Assessment Report (BDAR) unless the Planning Agency Head (or delegate) and the Environment Agency Head (or delegate) determine that the proposed development is not likely to have any significant impact on biodiversity values. This determination is referred to here as a BDAR waiver. The potential for biodiversity impacts is anticipated to be limited such that Sydney Metro will seek a BDAR waiver under Section 7.9(2) of the *Biodiversity Conservation Act 2016*. Further detail is provided in Section 5.13.

Legislation	Requirement
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 the proposed construction footprint would be predominantly cleared of all vegetation as part of works covered by preceding Sydney Metro West planning applications, a preliminary environmental assessment of potential impacts to biodiversity is provided in Section 5.13.
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 5.9.
Crown Land Management Act 2016 (NSW)	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 operation of the Sydney Metro West line 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 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 proposed construction works and operation of the Sydney Metro West line is unlikely to discover unknown relics due to the main excavation of the construction footprint occurring as part of the works covered by preceding Sydney Metro West planning applications.
Land Acquisition (Just Terms Compensation) Act 1991	The majority of land acquisition would be undertaken as part of works covered by preceding Sydney Metro West planning applications. This Act would apply to any additional land that requires acquisition for the 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 and large plant and equipment to and from The Bays Station construction site.
Native Title (NSW) Act 1994	This Act provides for native title in relation to land or waters. The proposal does not affect land which is subject to native title claim or determination, or land to which an Indigenous Land Use Agreement applies.

Legislation	Requirement
Parramatta Park (Old Government House) Act 1967	The purpose of this Act is to provide for the care, control and management of that land and to appoint the National Trust of Australia (New South Wales) as trustee of the land. The National Trust is appointed as a trustee of the land under the *Crown Lands Act 1989* and may use the land for such purposes as the responsible Minister may from time to time approve.
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, the extraction of materials necessary for that construction, and any onsite processing of any extracted materials or other materials used in that construction. The proposed construction works would involve the construction of railway infrastructure including, railway tracks, sleepers and ballasts, over track structures, and signalling equipment for a new railway track that is more three kilometres in length inside the metropolitan area, which would trigger requirements for an environment protection licence under the Act • Part 1 clause 33A Railway activities – railway infrastructure operations, meaning the operation or the on-site repair, maintenance or replacement of existing railway infrastructure. The activity to which this clause applies is declared to be a scheduled activity if it involves a continuous or connected length of track greater than 30 kilometres that is operated by the same person. Operation of the 24 kilometre track length of Sydney Metro West would not trigger requirements for an environment protection licence under Schedule 1 of the Act • Part 1 clause 33B Railway activities – rolling stock operations, meaning the operation of rolling stock. The activity to which this clause applies is declared to be a scheduled activity if it is carried out on railway infrastructure, the operation of which is a scheduled activity by virtue of clause 33A. As the operation of Sydney Metro West does not trigger the requirement for an environment protection licence under clause 33A (refer above), the operation of rolling stock as part of Sydney Metro West would also not require an environment protection licence under Schedule 1 of the Act. Other parts of the Act that may 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.

Legislation	Requirement
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 the proposed construction works and operation of the Sydney Metro West line 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 NSW 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.
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 would be required as part of this proposal (refer to Section 5.9 for potential impacts on aquifers).

3.4 Commonwealth legislation

3.4.1 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 5.5 (Non-Aboriginal heritage) and Section 5.13 (Biodiversity).

No significant impacts in relation to these matters have been identified during the preliminary environmental impact assessment. Based on the nature of the proposal and the type of Commonwealth Land identified within the study area, there are not anticipated to be any

significant impacts on the environment of Commonwealth land. Accordingly, a referral to the Department of Agriculture, Water and the Environment has not been undertaken.

3.4.2 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.

3.4.3 Disability Discrimination Act 1992

The *Disability Discrimination Act 1992* aims to eliminate as far as possible discrimination against persons on the ground of disability in areas including access to premises and the provision of facilities, services and land. Sydney Metro West would be designed to be independently accessible and in compliance with the objectives and requirements of the Act.

3.4.4 Disability Standards for Accessible Public Transport 2002

Section 33.1 of the Disability Standards for Accessible Public Transport 2002 requires all new public transport premises, infrastructure and conveyances to be compliant with the requirements of the standard and referenced to the Australian Standards and Design Rules therein, unless unjustifiable hardship is incurred by implementation. Sydney Metro West would be designed to be compliant with the requirements of the Disability Standards for Accessible Public Transport 2002.

3.5 Planning approvals for integrated station and precinct development

Provision for integrated station and/or precinct developments would be made at relevant stations. Further detail on what these provisions may include is provided in Section 2.4.3.

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

4 Stakeholder and community engagement

This chapter outlines the community and stakeholder engagement carried out to date and the future consultation proposed for the proposal.

4.1 Overview

Sydney Metro has been engaging with the community, stakeholders and industry on 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. A summary of feedback from this consultation, and how it has been considered in the development of Sydney Metro West, is included in Appendix B of the *Sydney Metro West Scoping Report – Westmead to The Bays and Sydney CBD* (Sydney Metro, 2019). 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. The Scoping Report for the proposed *Sydney Metro West - Major civil construction work between The Bays and Sydney CBD* (Sydney Metro, 2021) includes an overview of consultation in relation to the work subject to that proposal.

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, Heritage NSW, Port Authority of NSW and Schools Infrastructure NSW)
- Local government (Cumberland City Council, City of Parramatta, Burwood Council, Strathfield Council, City of Canada Bay, Inner West Council and the City of Sydney)
- Public utilities and business and industry groups near the project
- Special interest groups including Local Aboriginal Land Councils, Aboriginal stakeholders, and sporting associations and groups
- The broader community.

4.2 Consultation during the Sydney Metro West Concept planning 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 for an extended period, 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. 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.

In relation to the scope of this proposal, the key issues and comments raised in these submissions were related to:

- Station design and placemaking
- Transport integration and interchange
- Property and land use, specifically related to future development around stations
- Operational ground-borne noise and vibration
- Operational traffic.

Some submissions also made suggestions regarding the scope of assessment for future planning approval stages. Issues and comments raised in these submissions that are relevant to the scope of this proposal have been considered as part of the preliminary environmental assessment and the preliminary environmental risk analysis in this Scoping Report.

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, 2020c).

4.3 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 4-1.

Table 4-1 Stakeholders that have been engaged with since 2017

Agency group/type	Stakeholders briefed/contacted
NSW Government	• Sydney Olympic Park Authority • Department of Planning, Industry and Environment • 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 of NSW • Schools Infrastructure NSW • NSW Ambulance • NSW Police • NSW Fire and Rescue • Health Infrastructure NSW
Local government	• Cumberland Council • City of Parramatta Council • City of Canada Bay Council • Strathfield Council • Burwood Council • Inner West Council • City of Sydney Council

Agency group/type	Stakeholders briefed/contacted
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

4.3.1 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, and obtain market information to shape its scope, definition and delivery strategy so that the desired transport and land use outcomes are met.

4.4 Ongoing engagement

4.4.1 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).

4.4.2 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 4-2.

Table 4-2 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

4.4.3 Community contact and information

The community contact and information channels established for Sydney Metro West (outlined in Table 4-3) will remain in place during the preparation of the Environmental Impact Statement and for the remainder of the planning approval process.

Table 4-3 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

4.5 Future engagement

Sydney Metro will continue to work with stakeholders and the community to ensure they are informed and have opportunities to provide feedback on Sydney Metro West during future planning phases, including during public exhibition of the Environmental Impact Statement for this proposal. 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.

5 Preliminary environmental assessment

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

5.1 Overview

The Environmental Impact Statement for the approved Concept included an assessment of the potential impacts associated with construction and operation of Sydney Metro West. This assessment identified matters to be assessed in staged applications, while the Minister's Conditions of Approval for the Sydney Metro West approved Concept also included specific conditions of approval to be considered in future applications. These conditions are considered where relevant in the following sections.

Taking these items into consideration, 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 design development 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. A summary of the relevant plans, policies and guidelines for each environmental matter is provided in Appendix A of this Scoping Report.

5.2 Existing environment

The existing environment for the approved Concept is described in Chapter 8 in the *Sydney Metro West Environmental Impact Statement – Westmead to The Bays and Sydney CBD* (Sydney Metro, 2020a).

The Scoping Report for the proposed *Sydney Metro West – major civil construction work between The Bays and Sydney CBD* (Sydney Metro, 2021) provides a further summary of the existing environment specific to Pyrmont Station and Hunter Street (Sydney CBD) Station.

In general, construction activities for this proposal would be carried out predominantly within the same construction footprint as required for these preceding planning stages of Sydney Metro West, with the potential for some minor additional and/or changes to construction footprint areas required. While the existing environment would in most cases be largely the same as described in the two preceding planning applications, this proposal would also need to take into account the changes as a result of the major civil construction works between Westmead and the Sydney CBD which would be largely completed by the time that construction works for this proposal commence. Accordingly, the baseline environment for this proposal, as relevant to each environmental aspect would be described and considered further in the Environmental Impact Statement.

5.3 Transport and traffic

5.3.1 Potential impacts

Construction

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, 2020d). Most of the potential construction transport and traffic impacts would represent a continuation of those impacts as assessed within the *Sydney Metro West Environmental Impact Statement – Westmead to The Bays and Sydney CBD* (Sydney Metro, 2020a) and the *Sydney Metro West Westmead to The Bays and Sydney CBD – Amendment Report* (Sydney Metro, 2020b); as well as impacts to be assessed for *Sydney Metro West – major civil construction between The Bays and Sydney CBD*. This would include:

- Temporary changes to traffic performance on the road network in some locations around construction sites including a potential reduction in the level of service at some intersections due to construction vehicle access and egress from site, delivery of construction materials, construction traffic routes and temporary road or lane closures
- Temporary changes to on-street parking or removal or relocation of loading zones, servicing access, taxi ranks, and/or kiss and ride areas
- Temporary relocation of existing bus stops
- Temporary delays or other impacts to existing bus services including the potential diversions of bus services and/or the need to change bus timetables
- Temporary changes to pedestrian and cyclist access or flows including potential diversions. This would also include potential temporary altered access to and from the existing Westmead and North Strathfield stations
- Temporary access changes to private properties
- Increased construction vehicles on roads around construction sites and potential conflicts with motorists, pedestrians and cyclists, particularly in the Parramatta and Sydney CBDs
- Temporary changes to emergency access arrangements
- Temporary access changes during special events
- Temporary changes to the availability of rail services to allow works to occur safely within the rail corridor. These works would occur during planned rail possessions, generally at night or on the weekend, although some extended rail possessions may be required.

Impacts to regional road networks and public transport routes are not expected during construction. If construction is required within the existing rail corridor, or where work in the vicinity of existing railway stations cannot be undertaken safely with trains operating, these activities would be undertaken during scheduled rail possessions to minimise disruption to suburban and intercity rail services.

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 local councils to minimise potential temporary cumulative transport and traffic impacts.

Operation

The design of the Sydney Metro West stations and precincts would aim to avoid or reduce impacts associated with operational transport and traffic. Operation of Sydney Metro West would deliver a number of significant transport and traffic benefits. These benefits include:

- Increased capacity and reliability of Sydney's rail network
- Improved travel times and customer comfort between key destinations within the Greater Parramatta to Sydney CBD corridor
- Reduced crowding on trains and at some stations on the existing Sydney rail network
- Opportunity for a mode shift from road use to use of Sydney Metro West, resulting in potential improvements to journey times for bus customers and other remaining road users
- Improved connectivity and transfer opportunities between public transport modes.

Notwithstanding, transport impacts that could occur during operation include changes to:

- Traffic arrangements on the surrounding road network due to required changes to local roads or traffic light phasing
- Availability, location or number of loading zones and/or parking spaces
- Pedestrian and cyclist arrangements, which are expected to be primarily positive
- Property access arrangements
- Bus stop locations, routes and timetables
- Special event access arrangements
- Emergency vehicle access arrangements.

5.3.2 Proposed investigations and assessment

A transport and traffic impact assessment will be carried out as part of the Environmental Impact Statement for this proposal. The assessment will include construction and operational transport and traffic impacts 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:

- Assessment of construction traffic including number, frequency and size of construction-related vehicles, potential routes for construction traffic and spoil haulage, and potential impact on existing traffic conditions
- Assessment of potential access constraints and impacts on public transport, pedestrians, cyclists and road network performance arising from construction
- Assessment of potential cumulative traffic impacts
- Consideration of operational maintenance access requirements
- Assessment of how the transport network supports placemaking outcomes
- Assessment of potential impacts and benefits on other transport modes and interchange opportunities during operation (including during event mode at Sydney Olympic Park)
- Assessment of intersection performance during operation at locations where changes are required to facilitate access to new stations

- Consideration of opportunities to improve public transport links to stations
- Consideration of opportunities to integrate cycling and pedestrian elements with surrounding networks during operation including:
  - Integrating with the publicly-accessible active transport corridors surrounding the Clyde stabling and maintenance facility site (as per the requirements of Condition C-B2 of the Minister's Conditions of Approval for the Sydney Metro West approved Concept)
  - Facilitating the section of the Parramatta Civic Link within Parramatta metro station prior to operation of this proposal (as per the requirements of Condition C-B3 of the Minister's Conditions of Approval for the Sydney Metro West approved Concept).

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.

5.4 Noise and vibration

5.4.1 Potential impacts

Construction

Potential construction noise and vibration impacts would be temporary and appropriately managed in accordance with the performance outcomes as outlined in Chapter 8 in the *Sydney Metro West Environmental Impact Statement – Westmead to The Bays and Sydney CBD* (Sydney Metro, 2020a) and in the Minister's Conditions of Approval for the Sydney Metro West approved Concept. Specific mitigation measures would be developed and identified in the Environmental Impact Statement prepared for this proposal.

This proposal 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 the proposed construction works may include noise barriers, alterations to the proposed construction methods, and consideration to the time of day of certain construction work.

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

- Above ground support activities associated with tunnel fit-out. Support activities are likely to be undertaken 24 hours per day, seven days per week
- Construction and fit-out of stations
- Construction of operational ancillary infrastructure
- Construction of the Clyde stabling and maintenance facility, including the connecting track work
- Interchange support work at Westmead and North Strathfield stations
- Construction road traffic associated with the delivery of construction plant, equipment, and materials
- Utilities adjustment, relocation or protection works, which may need to be undertaken out of hours.

Sensitive receivers that have the potential to be impacted 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 the consistent nature and duration of the activities
- Sensitive receivers located above the proposed tunnels are anticipated to experience minimal temporary construction noise and vibration impacts during tunnel fit-out activities 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 during and outside of standard construction hours. Measures to reduce potential noise and vibration impacts may include noise barriers, alterations to the proposed construction methods and consideration of the time of day for certain construction works
- Potential temporary construction traffic potentially resulting in an increase in traffic noise greater than two decibels (dB)
- Potential temporary vibration impacts on receivers, buildings and structures immediately surrounding the metro stations (including listed heritage buildings, performance venues and those buildings containing sensitive equipment or spaces). Condition surveys of buildings and structures near the proposed construction sites would be undertaken prior to the commencement of vibration intensive works, 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.

Operation

It is expected that this proposal can be designed to meet relevant operational noise and vibration guidelines with mitigation measures implemented. Impacts are generally manageable through the design process, through the implementation of certain trackform, orientation of equipment and acoustic louvres. The specific need and location of these measures would be determined during further design and identified within the Environmental Impact Statement.

Operation has the potential to increase noise and vibration levels at surrounding receivers and land uses due to the generation of:

- Airborne noise from metro trains operating on the above ground track associated with the Clyde stabling and maintenance facility
- Airborne noise from the stabling and maintenance facility (for example, from wheel lathe and washing) which would operate 24 hours per day
- Airborne noise from stations

- Airborne noise from tunnel and station fresh air ventilation systems and mechanical services
- Airborne noise from traction substations and other ancillary facilities
- Ground-borne, structure-borne noise and vibration from trains operating within the tunnels.

5.4.2 Proposed investigations and assessment

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

- Description of the existing noise environment
- Explanation of the applicable standards, guidelines and environmental planning requirements
- Explanation of the construction methodology, design and operational procedures relevant to noise and vibration emissions
- Description of the methodology used to predict and assess the potential impacts
- Consistent with the philosophy described in Case Study D5 of the NSW Environment Protection Authority's draft Construction Noise Guideline, an alternate methodology to the Interim Construction Noise Guideline (ICNG) (DECC, 2009) approach to assessing and managing construction noise may be proposed
- Assessment of potential construction noise and vibration impacts, including consideration of:
  - 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
- Assessment of the potential cumulative impacts with other major projects
- Assessment of potential operational noise and vibration impacts
- Identification of feasible and reasonable construction and operational mitigation measures.

Further consultation would be undertaken with the NSW Environment Protection Authority in preparing the noise and vibration assessment.

5.5 Non-Aboriginal heritage

5.5.1 Potential impacts

Construction

The proposal will continue to be developed to minimise potential impacts on non-Aboriginal heritage. Direct impacts to non-Aboriginal heritage items located within the construction footprint are subject to assessment under the preceding planning applications for Sydney Metro West (refer to Sydney Metro 2020a, Sydney Metro 2020b, Sydney Metro 2021).

Notwithstanding, the proposed construction works have the potential to impact non-Aboriginal heritage through:

- Direct impact to heritage listed items or conservation areas in locations where additional construction footprint areas may be required
- Visual impacts to heritage items including impacts to setting and views
- Impacts to significant archaeological remains as a result of subsurface excavation
- Impacts to heritage items from vibration and settlement as a result of construction works.

As widespread ground disturbance/excavation would be undertaken as part of works covered by preceding Sydney Metro West planning applications, it is anticipated there would be low potential for unrecorded archaeological relics to be discovered. Similarly, it is anticipated that the potential for impacts to significant archaeological remains as a result of subsurface excavation would be relatively minor. However, minor additional construction footprint areas required for this proposal may have the potential to impact non-Aboriginal heritage items.

No impacts to matters of national environmental significance (such as Commonwealth and National heritage items and conservation areas) are anticipated as part of this proposal.

Operation

The operation and use of Sydney Metro West provides an opportunity to acknowledge and incorporate heritage values into station design through heritage interpretation.

Where heritage items are located close to metro stations or other infrastructure, the design would be sympathetic to, and reflect the heritage context and values of, these heritage items. This would effectively mitigate the potential impacts associated with changes to the setting and views of heritage items during operation.

The potential for vibration impacts from train operations would be assessed as part of the noise and vibration assessment. However, given the depth of the tunnels, any impacts are expected to be minimal and would be managed in accordance with relevant vibration guidelines and criteria, including the Rail Infrastructure Noise Guideline (Environment Protection Authority, 2019).

5.5.2 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 impacts on non-Aboriginal heritage. The non-Aboriginal heritage assessment will include:

- Identification of known heritage items or areas of archaeological potential that may be directly or indirectly impacted by this proposal, including in and adjacent to the proposal area
- Identification of any requirements for further analysis, such as archival recording or sub-surface investigation
- Assessment of the likely level of impact and/or risk to heritage items and archaeological remains
- Identification of measures required to avoid or mitigate potential impacts to heritage items including significant archaeological remains and identifying opportunities for heritage interpretation.

Consultation with the Sydney Metro Heritage Working Group, NSW Heritage Council and local councils would occur during preparation of the Environmental Impact Statement.

Heritage Interpretation Strategy

In accordance with Condition C-B4 of the Minister's Conditions of Approval for the Sydney Metro West approved Concept, a Heritage Interpretation Strategy will be prepared for the proposal, which outlines how key Aboriginal and non-Aboriginal heritage values and stories of heritage items would be interpreted in the project design, including station and precinct urban design. The Heritage Interpretation Strategy will include procedures for how to include results of archaeological findings (historical and Aboriginal archaeological results) when they become available.

In accordance with Condition C-B5, the Heritage Interpretation Strategy will be prepared in consultation with Heritage NSW and in accordance with the NSW Heritage Manual (Heritage Office and Department of Urban Affairs & Planning, 1996), the NSW Heritage Office's Interpreting Heritage Places and Items: Guidelines (August 2005), and the NSW Heritage Council's Heritage Interpretation Policy. The Strategy will address the requirements included in Condition C-B6.

5.6 Aboriginal heritage

5.6.1 Potential impacts

Construction

Development of Sydney Metro West has aimed to avoid and minimise interface with known Aboriginal sites and areas of high Aboriginal archaeological potential.

The proposed construction works may potentially impact on previously recorded Aboriginal heritage sites, specifically around the concentration of identified Aboriginal Heritage Information Management System sites at Parramatta. An AHIMS search identified a recorded Potential Archaeological Deposit Aboriginal heritage site located within the vicinity of the Hunter Street (Sydney CBD) 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 Hunter Street (Sydney CBD) Station western construction site. Based on the location of the Potential Archaeological Deposit as per the site card and previous assessment, the site is unlikely to be directly impacted by this proposal.

Given the highly urbanised areas in which these heritage items are recorded, and the major civil construction and excavation works that would occur in these areas as part of works covered by preceding Sydney Metro West planning applications, it is likely these previously recorded Aboriginal heritage items would have been either subject to previous disturbance and/or salvage.

The potential for previously unrecorded items of Aboriginal heritage significance to be present within the construction sites is anticipated to be low due to the major civil construction and excavation works which would occur as part of construction works covered by preceding Sydney Metro West planning applications. Minor additional construction footprint areas required for this proposal may also have the potential to impact Aboriginal heritage items. The proposal may also impact upon Aboriginal cultural values that may exist within the construction footprint and surrounds.

The potential to unearth and unintentionally impact on unrecorded Aboriginal heritage items and/or areas of Aboriginal cultural sensitivity would generally be managed through the implementation of an unexpected finds procedure.

Operation

Impacts to Aboriginal sites or areas of Aboriginal archaeological potential during operation are not expected.

Opportunities for Sydney Metro West to acknowledge and incorporate Aboriginal heritage values through heritage interpretation in the design would be investigated, as detailed in Condition C-B4 of the Minister's Conditions of Approval for the Sydney Metro West approved Concept. The key aim of heritage interpretation would be to connect the contemporary experience of the commuters and staff with the Aboriginal cultural and heritage values associated with the proposal corridor. Heritage interpretation elements would be developed in consultation with Aboriginal communities and may include but not be limited to:

- Stories told by Aboriginal communities about particular places or localities
- Engaging Aboriginal artists in accordance with the Sydney Metro Art Masterplan (Sydney Metro, 2020e) to develop designs/artworks that could be incorporated into the built form of the stations
- Incorporating local Aboriginal language words into naming conventions
- Incorporating native plant species into landscaping elements
- Providing interpretive information regarding the Aboriginal history of the site(s) developed in consultation with Aboriginal stakeholders.

Heritage interpretation would aim to partially offset any potential impact to Aboriginal heritage that may occur as part of construction.

5.6.2 Proposed investigations and assessment

An Aboriginal heritage assessment will be carried out as part of the Environmental Impact Statement for this proposal. The Aboriginal heritage assessment will further consider the cultural and archaeological potential of the proposed construction works for this proposal. It will also document environmental management measures that would be implemented.

The Aboriginal heritage assessment will include:

- Identification of the potential to disturb Aboriginal heritage (sites, objects, remains, values, features or places)
- Determination, in consultation with relevant stakeholders, of the significance of any identified heritage resources
- Determination of the extent and significance of impacts to any identified resources and values
- Identification of the potential for in situ conservation of items and/or areas and the need for further archaeological testing and/or excavations

- Identification of appropriate measures to avoid, minimise and/or mitigate potential impacts, including opportunities for heritage interpretation
- Consultation with Sydney Metro Heritage Working Group, local Councils and registered Aboriginal parties if required.

Heritage Interpretation Strategy

As outlined in the Section 5.5.3 (Non-Aboriginal Heritage), a Heritage Interpretation Strategy will be prepared for the proposal (as per Conditions C-B4, C-B5 and C-B6 of the Minister's Conditions of Approval for the Sydney Metro West approved Concept), which outlines how key Aboriginal and non-Aboriginal heritage values and stories of heritage items would be interpreted in the project design, including station and precinct urban design.

5.7 Property and land use

5.7.1 Potential impacts

Construction

The majority of property acquisition required to support the construction of the proposal are covered by preceding Sydney Metro West planning applications and would be undertaken prior to works covered by this proposal commencing.

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 support construction work, if required
- Temporary service adjustments for utilities and other transport assets/infrastructure to enable construction
- Temporary loss of public open space.

Operation

Sydney Metro West would support planned growth and improve transport accessibility in a number of precincts across the corridor, including Westmead, Sydney Olympic Park, the Parramatta Road Corridor, The Bays Precinct and Pyrmont. Sydney Metro West would provide services which connects residents, workers and visitors. Potential land use changes and indirect positive impacts associated with opportunities for urban renewal may also occur around other station precincts.

In most cases, the permanent operational footprint would be located within the construction sites. However, in some instances there may be residual land at the completion of construction that is not required for operational infrastructure. Opportunities may arise in relation to the use of residual land to support the strategic land use objectives for precincts around new metro stations. Strategies to assist in the realisation of strategic land use benefits would be further developed in consultation with relevant authorities including the Department of Planning, Industry and Environment, the Greater Sydney Commission, local councils and local communities.

The proposal corridor is not anticipated to impact on any Commonwealth owned land. However, there may be Commonwealth leased land within the footprint of some sites. This is likely to comprise offices and other facilities for Commonwealth Government departments.

These facilities are likely to re-establish in another location nearby and the impact would be negligible.

In addition to supporting planned growth, potential property and land use impacts anticipated to occur during operation include:

- Potential land use changes and indirect positive impacts associated with opportunities for urban renewal near the metro stations
- Potential restrictions on future development in some locations to protect subsurface tunnels or above ground rail infrastructure.

5.7.2 Proposed investigations and assessment

A property and land use impact assessment will be carried out as part of the Environmental Impact Statement for this proposal. The property and land use impact assessment will include:

- Description of land use and planning context for each site along the corridor relevant to the stage
- Identification of planning controls analysis for each site along the corridor relevant to the stage
- Identification of the potential acquisition and leasing (if required), including processes and procedures for acquisition. However, the majority of property acquisition required to support the construction of the proposal are covered by preceding Sydney Metro West planning applications and would be undertaken prior to works covered by this proposal commencing
- Identification of potential land use impacts and opportunities (for example integration with strategic planning at Clyde stabling and maintenance facility in accordance with Condition C-B2 of the Minister's Conditions of Approval for the Sydney Metro West approved Concept)
- Identification of mitigation measures to address the property and land use impacts.

Further consultation would be undertaken with the Department of Planning, Industry and Environment (including Sydney Olympic Park Authority), local councils and other relevant stakeholders.

5.8 Landscape character and visual amenity

5.8.1 Potential impacts

Construction

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

- Continued use of construction sites and ancillary infrastructure sites including the Clyde stabling and maintenance facility established as part of works covered by preceding Sydney Metro West planning applications
- Continued use of temporary fencing, barricades, gates and security lighting to provide safe and secure construction sites established as part of works covered by preceding Sydney Metro West planning applications

- Continued use of hoarding established as part of construction works covered by preceding Sydney Metro West planning applications to mitigate construction noise impacts
- Temporary light spill from construction sites during out of hours construction
- Temporary use of construction plant and equipment
- Temporary adjustments associated with traffic management measures (road diversions/interim closures) and/ or construction traffic.

The potential temporary impact 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.

Operation

The introduction of new metro stations would provide improved local visual amenity and landscape character through:

- High quality architecture and urban design that reflects the Sydney Metro Design Objectives and the place and design principles (outlined in Chapter 7 of the *Sydney Metro West Environmental Impact Statement – Westmead to The Bays and Sydney CBD* (Sydney Metro, 2020a))
- Upgrades to public realm areas and streetscapes providing and improved pedestrian environment and accessibility
- Integration of the station with future development and reflecting the existing or desired future scale and character of local areas
- Tree plantings and landscaping to ensure no net loss of tree numbers and tree canopy.

Potential landscape character and visual amenity impacts that could occur during the operation would include:

- Potential changes to local visual character associated with the establishment of new stations, ancillary infrastructure, and the stabling and maintenance facility
- Potential changes to landscape character associated with the establishment of new stations, ancillary infrastructure, and the stabling and maintenance facility
- Light spill from stations, ancillary infrastructure, and the stabling and maintenance facility.

The Environmental Impact Statement for this proposal would consider long-term landscape and visual amenity measures to reduce impacts on nearby receivers.

5.8.2 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 landscape character and visual amenity impact assessment will include:

- Description of the existing landscape character and visual sensitivity and the receivers which could be impacted
- Assessment of the potential landscape character impacts on:
  - Key sites and buildings
  - Areas of open space and impacts on trees
  - Streetscapes
  - Limited vegetation within the construction footprints (where it has not already been removed as part of work subject to assessment by preceding Sydney Metro West planning applications)
- Assessment of the potential visual amenity impacts on:
  - Key views and vistas
  - Streetscapes, recreation and open space areas
  - Heritage items including Aboriginal places and environmental heritage
  - The local community.
- Identification of mitigation measures to avoid, minimise and or mitigate potential temporary construction and operational landscape character and visual amenity impacts.

5.9 Soils, contamination and groundwater

5.9.1 Potential impacts

Construction

Soils and contamination

The majority of ground disturbance and excavations would occur as part of construction works covered by preceding Sydney Metro West planning applications (refer to Sydney Metro 2020a, Sydney Metro 2020b and Sydney Metro 2021). However, development of construction sites would expose some areas of the natural ground surface and subsurface through 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 sand and other aggregates) could be transported from the construction sites into surrounding waterways via stormwater runoff.

Given the relatively small areas of additional 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 described as part of the Environmental Impact Statement).

Contamination is largely expected to be encountered and remediated, where required, during the major civil construction works that would occur as part of construction works covered by preceding Sydney Metro West planning applications. Notwithstanding, potential risks associated with encountering contaminated soils and groundwater will be considered as part of the Environmental Impact Statement. These potential risks are anticipated to be readily manageable through standard management measures. An unexpected finds procedure would be implemented during construction works should contamination be encountered.

Proposed construction works also have 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.

Given the relatively small areas of additional surface disturbance anticipated during construction the likelihood of encountering acid sulfate soils and saline soils is anticipated to be low. 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). Any potential salinity impacts would be managed in accordance with *Book 4 Dryland Salinity: Productive Use of Saline Land and Water* (NSW DECC 2008).

Groundwater

As part of the major civil construction works that would occur as part of works covered by preceding Sydney Metro West planning applications, tunnel boring machines would install a pre-cast segmental tunnel lining as excavation progresses. Therefore, the tunnels would be tanked (designed to prevent the inflow of groundwater, typically using concrete lining and waterproofing membrane) almost immediately following the tunnel boring, preventing groundwater from entering the tunnels. This would minimise any potential impact on groundwater levels when undertaking tunnel fit-out and rail system works.

Some of the station excavations that would occur as part of works covered by preceding Sydney Metro West planning applications would similarly be tanked (sealed), which would prevent groundwater from the surrounding rock and soil flowing into the excavation and impacting groundwater levels during the station building works that would be undertaken as part of the proposed construction works.

Where station excavations are not tanked, the potential groundwater drawdown during station construction would depend on site-specific conditions, and the interaction of recharge sources and drainage measures installed during station excavation works. The generally low hydraulic conductivity of the Mittagong Formation, Hawkesbury Sandstone and Ashfield Shale geological units indicates the extent of groundwater drawdown may be limited by relatively low discharge rates compared to recharge sources. Potential groundwater impacts may include:

- Potential groundwater drawdown/lowering of the water table due to dewatering station excavations during station construction
- Impacts on groundwater users due to reduced groundwater yields, reduced groundwater quality and/or direct impacts and damage to existing groundwater bores.

These potential impacts would be consistent with (or less than) those experienced during the major civil construction works that would occur as part of construction works covered by preceding Sydney Metro West planning applications. The potential impacts that may occur during construction would be a continuation of the groundwater and ground movement impacts identified and assessed as part of the *Sydney Metro West Environmental Impact Statement – Westmead to The Bays and Sydney CBD* (Sydney Metro, 2020a) and to be further assessed

under the planning application Sydney Metro West – *Major civil construction works between The Bays and Sydney CBD* (Sydney Metro, 2021).

Impacts to ground movement and settlement are not anticipated during the proposed construction works, as major civil construction works, including tunnelling and station excavation, would occur as part of the works covered by preceding Sydney Metro West planning applications.

Operation

Soils and contamination

The presence of acid sulfate soils near drained structures and facilities has the potential to impact on groundwater quality and therefore surface water quality during operation. The highest potential risk of this is at Clyde, Silverwater and Burwood North. Where required, any captured groundwater would be appropriately treated prior to discharge to the surface water systems to avoid impacts to the receiving environment.

As the tunnels would be lined and most stations would be tanked, the potential for contaminated groundwater, vapour and gas ingress is low. However, there could be an ongoing requirement to ensure that where existing contamination may pose risks, whether in soil, groundwater or vapour, it is appropriately managed to protect human and ecological receivers during operation.

Operation has the potential to result in contamination of soils and/or groundwater due to spills and leaks of fuel, oils and other hazardous materials from trains, maintenance vehicles and other infrastructure, particularly activities undertaken at the Clyde stabling and maintenance facility.

Groundwater

To limit potential groundwater inflows and groundwater drawdown, the metro tunnels would be tanked (designed to prevent the inflow of groundwater, typically using concrete lining and waterproofing membrane). Similarly, the cross passages and some of the station caverns would be tanked. As a result, limited change is expected to groundwater levels.

Interaction between groundwater and surface water along the alignment during operation would likely be limited to:

- Likely surface water infiltration that percolates through the soil and/or rock and contributes to groundwater
- Discharge from groundwater to surface watercourses and waterbodies
- Leakage from surface watercourses to groundwater.

The main impacts from operation could occur where untanked stations are proposed (i.e. groundwater could flow into the station excavation across both soil and rock) and could include:

- Ongoing groundwater drawdown, that is, lowering of the water table due to station excavations, until a steady state is reached
- Impacts on groundwater users (if present) due to reduced groundwater yields in existing bores as a result of groundwater drawdown
- Potential for ground settlement at sites where alluvial/fluvial soils are present below the groundwater table in the vicinity of drained structures.

5.9.2 Proposed investigations and assessment

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

- Consideration of the relevant regulatory framework and guidelines, and publicly available data
- Identification of the existing soil landscapes and a review of previous contamination assessments and publicly available data (web-based information searches)
- An assessment of potential contamination risks based on the previous contamination assessments undertaken, potential impacts to existing contamination and exposure risks to environmental and human health receptors. This would take into account any remediation carried out which is subject to preceding Sydney Metro West planning applications
- Identification of low, medium, and high risk sites including recommendations for additional investigations and/or management based on the site risk rating and with consideration to the intended land use/future exposure scenarios at the relevant location
- Identification of the potential to disturb acid sulfate soils and the associated impacts during construction
- Consideration of the potential impacts associated with erosion and sedimentation during construction.

The groundwater assessment will include:

- Characterisation of the existing environment including climate, topography, geology, groundwater occurrence, quality and use, existing groundwater users and groundwater dependent ecosystems, which would include review of preceding Sydney Metro West planning applications
- Assessment of the potential groundwater inflows to proposed untanked structures/elements during construction and operation, taking into consideration the assessment carried out in preceding Sydney Metro West planning applications
- Assessment of potential groundwater-related impacts due to estimated groundwater level drawdown associated with operation and cumulative impacts, taking into consideration the assessment carried out in preceding Sydney Metro West planning applications
- Consideration of potential impacts including those related to groundwater dependent ecosystems, acid sulfate soils, groundwater contamination, groundwater quality and ground settlement (including associated potential damage to infrastructure/sensitive assets)
- Assessment of the requirements for treatment of collected groundwater at each drained structures/elements during operation, including consideration of discharge locations and relevant criteria
- Identification of monitoring and management measures to address potential impacts.

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 Land Management Act 1997* and the *Protection of the Environment Operations Act 1997*.

5.10 Hydrology, flooding and water quality

5.10.1 Potential impacts

Construction

The construction works covered by this proposal have the potential to alter existing stormwater flows and the existing stormwater drainage infrastructure due to the continued use of erosion and sediment control measures at construction sites (such as continuing to redirect stormwater runoff around the work site). Best practice stormwater management measures would be identified during preparation of the Environmental Impact Statement to minimise the potential impacts on downstream receiving environments. These management measures would be based on the measures identified and established as part of the works covered by preceding Sydney Metro West planning applications.

Potential flooding of construction sites could result in stockpiles of construction materials (such as aggregate, fuels and other hazardous materials) being washed into nearby waterways, or floodwater entering the tunnels and excavations. Key risk areas for potential flooding during construction include Parramatta, Clyde, Silverwater and The Bays.

Construction has the potential to locally alter existing flood behaviour due to the loss of floodplain storage (due to stockpiling construction materials 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 to 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. Mitigation measures identified in *Sydney Metro West Environmental Impact Statement – Westmead to The Bays and Sydney CBD* (Sydney Metro, 2020a) are considered suitable to continue to manage any potential hydrology and flooding impacts during construction however, where appropriate, additional management measures would be identified in the Environmental Impact Statement.

Construction also has the potential to adversely affect surface water quality in nearby watercourses and receiving catchments through the pollution of stormwater runoff with sediments, fuel, saline soils 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).

Operation

Above ground infrastructure would be generally located in areas of existing development and is expected to have a negligible impact on the existing surface hydrology. At most sites, the runoff volume and flow rate would likely be similar to existing conditions with minimal impact to the capacity of the existing downstream stormwater infrastructure.

There is a potential for alteration to existing stormwater catchment flows and the operation of existing stormwater drainage networks due to rerouting of drainage infrastructure (such as in situations where such infrastructure needs to be relocated and/or augmented). As identified above, Parramatta metro station, the Clyde stabling and maintenance facility, Silverwater services facility, and The Bays metro station are anticipated to be at risk of flooding. Station entries and tunnel portals would be designed to protect the tunnels from the probable maximum flood level. The Clyde stabling and maintenance facility would also be designed to

be above a certain flood level and would be raised to that level as part of the approved major civil construction work between Westmead and The Bays.

Due to the establishment of infrastructure within flood-prone areas and the need to protect this infrastructure from certain flood events, there is the potential to affect flood behaviour surrounding the sites due to the loss of floodplain storage and alteration of local catchment boundaries (which could change the distribution of stormwater between drainage networks).

Operation of Sydney Metro West is not anticipated to result in significant adverse impacts on surface water quality. All groundwater and surface water runoff from the tunnels would be captured and pumped to a water treatment plant prior to reuse and/or disposal.

Runoff from above ground elements (particularly the Clyde stabling and maintenance facility) have the potential to be contaminated with sediments, fuel/oils (for example, from maintenance activities) and/or other pollutants (such as litter), which could enter the surrounding stormwater system.

During operation, there may also be the generation of turbid, saline or contaminated groundwater collected from within the tunnels and station excavations, which would be treated and discharged via the operational water treatment plant.

Such water quality risks would be relatively minor and would be adequately managed with standard management measures.

5.10.2 Proposed investigations and assessment

A hydrology, flooding and water quality impact assessment will be carried out as part of the Environmental Impact Statement for this proposal. The hydrology and flooding impact assessment will include:

- Review of relevant existing flood study reports and description of flood behaviour for the existing conditions
- Identification of the existing water quality conditions and the hydrological regime for surface water, including surface catchments and watercourses
- Identification and assessment of potential impacts on stormwater quantity during construction and operation
- Identification of potential impacts on surface water quality during construction and operation, including an indicative water balance
- Broad assessment of the potential change in stormwater runoff (increase or decrease) during construction and operation, 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 during construction and operation, 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) during construction and operation, including 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. This assessment will take into consideration the assessment carried out in preceding Sydney Metro West planning applications

- A review of consistency with the applicable Council Floodplain Risk Management Study
- A review of compatibility with the flood hazard and hydraulic functions of the land
- Identification of appropriate mitigation and management measures.

5.11 Social impacts and community infrastructure

5.11.1 Potential impacts

Construction

The preliminary assessment of potential social impacts, both positive and negative, has been informed by feedback from the community during consultation and engagement carried out to date for Sydney Metro West, experience from similar projects, and research and analysis of the areas surrounding the proposal.

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 continue to occur during construction include:

- Concerns in the community regarding construction fatigue related to the number of major projects being constructed across this part of Sydney, potentially impacting on the community's health and wellbeing
- 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
- Potential temporary impacts on the social amenity, health or way of life for 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
- Potential temporary health and wellbeing impacts on residents who are located close to construction sites, if the construction phase is prolonged (for example due to cumulative construction impacts with other projects)
- 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 disruption to way of life caused by temporary changes to access arrangements to and from properties, public transport or community facilities - changes to pedestrian access could potentially be more challenging for people with a disability
- Potential community concern and disruption to people from temporary or permanent acquisition or leasing of existing residential or commercial properties.

Operation

The operation of Sydney Metro West is expected to result in a number of long-term positive social and community impacts. This is due to the social benefits associated with the provision of a new rail line and transit oriented development. Positive impacts would include:

- Increased walking and cycling trips could cause a rise in the percentage of the population achieving sufficient physical activity level to maintain health
- Potential to reduce travel related stress for people who switch modes in peak hours by reducing the time spent in congested conditions
- Amenity and placemaking benefits from enhanced pedestrian environments, such as active transport links, improved surface and lighting
- Increased access to jobs, universities, services and social facilities can help to improve social cohesion and reduce social health related issues
- Improvements to local air quality due to less motor vehicle trips, improving physical health
- Improved amenity associated with the upgrade to public spaces.

The following potential social and community impacts may also arise:

- Community wellbeing and amenity impacts – community facilities are potentially more sensitive to amenity impacts such as noise, vibration, air quality and visual changes. The ability of certain community facilities to function, or the community's enjoyment of them, may be reduced where they are located close to operational infrastructure
- Changes to community character and the way of life caused by permanent physical changes to neighbourhoods and public spaces – some of these impacts may be positive or negative.

5.11.2 Proposed investigations and assessment

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

- A review of the social baseline analysis conducted in the approved Concept and other preceding planning applications of Sydney Metro West to:
  - Define the Area of Social Influence for the area covered by this proposal
  - Develop a demographic profile of the study area's communities that may be influenced by the proposed construction works and operation of the Sydney Metro West line
  - 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 proposed metro station site to identify community values and aspirations along the corridor
- Assessment of potential social impacts of the proposed construction works and operation of the Sydney Metro West line which will:
  - Assess the significance and likelihood of potential social impacts, both positive and negative, during construction and operation

- Recommend measures to mitigate potential negative social impacts and enhance the positive impacts
- Assess residual potential social impacts including identification of the significance and likelihood of residual social impacts
- Develop a framework for managing predicted impacts.

5.12 Business impacts

5.12.1 Potential impacts

Construction

Some businesses located around the proposed construction sites may experience continued positive impacts during the proposed construction works, 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, could benefit from increased construction activity.

Potential business impacts that could continue to occur during the proposed construction works may 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. While 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). Temporary reduced amenity could be minimised through implementation of mitigation measures such as hoarding, respite periods and changing the timing or staging of specific construction activities where possible. Consultation with local communities and stakeholders, including through Place Managers, would also help manage potential impacts and address community concerns.

Operation

Operation of Sydney Metro West is anticipated to support the businesses and the economy associated with improved public transport facilities, improved travel times and greater connectivity between key centres. These include:

- Increased business activity
- Increased trade generation
- Improved amenity related benefits around station precincts
- Increased residential development opportunities
- Improved staff access, recruitment and retention
- Improved business viability.

The operation of Sydney Metro West would support future economic development within the station precincts by being a key enabler for renewal and redevelopment. It would also provide opportunity for urban renewal at many station locations, appropriate to its local character, address current shortcomings in the functionality of some stations and improve linkages to the surrounding precinct.

There are also potential adverse business impacts that could occur during operation. These include:

- Changed behaviour during construction which continues to the operational stage – a forced change in consumer behaviour (such as travel route or diversion) may have longer term effects. For example, an alternative pedestrian route provided during construction (which moves passing trade away from a given business) may result in a permanent change in behaviour or travel direction even when no longer enforced. This can negatively affect businesses from which trade was diverted and conversely may benefit others
- Altered traffic, access and parking conditions – changed traffic arrangements could collectively restrict and hinder servicing, delivery and customer access opportunities, resulting in time and vehicle related costs
- Operational noise and vibration – it is expected that this proposal can be designed to meet relevant operational noise and vibration guidelines with mitigation measures implemented.

5.12.2 Proposed investigations and assessment

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

- Identification of businesses that could potentially be directly impacted during construction and operation
- Identification of nearby local businesses that may potentially be indirectly impacted during construction and operation
- Assessment of the potential impacts (positive and negative) during construction and operation
- Identification of measures to avoid or mitigate the potential impacts.

Consultation with local government, businesses and industry groups would occur during preparation of the Environmental Impact Statement.

5.13 Biodiversity

5.13.1 Potential impacts

Construction

As part of the major civil construction works that would occur as part of construction works covered by preceding Sydney Metro West planning applications, the proposed station and ancillary infrastructure construction sites would have been previously disturbed and cleared of vegetation. As such, the potential for biodiversity impacts during the proposed construction works is anticipated to be limited. Notwithstanding, construction works may result in the following potential minor impacts:

- Potential removal of vegetation in locations where additional construction footprint areas may be required
- Injury and mortality of fauna species – fauna injury or mortality could occur as a result of collisions with construction plant and vehicles
- Indirect impacts such as light and noise, sedimentation and spread of weeds.

Operation

Biodiversity impacts during operation would primarily be restricted to:

- The injury/mortality of fauna species, which could result from collisions with trains and/or maintenance vehicles, although the alignment is mostly underground
- Disturbance of fauna species due to indirect impacts such as light and noise.

As Sydney Metro West would be predominantly located underground, within an urban environment, the potential for the above impacts to occur would be relatively minor. Furthermore, it is anticipated that fauna species likely to be occupying the area would be accustomed to noise and light impacts that are already occurring in urban environments.

No impacts to matters of national environmental significance (such as threatened ecological communities listed under the EPBC Act) are anticipated as part of this proposal.

5.13.2 Proposed investigations and assessment

The potential for biodiversity impacts is anticipated to be limited such that Sydney Metro will seek 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.

While it is anticipated that a Biodiversity Development Assessment Report would not be required for the proposed construction works covered by this proposal, a biodiversity impact assessment will be carried out 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. The biodiversity assessment will include:

- Identification and description of the flora and fauna species, habitat, populations and ecological communities (including groundwater dependent ecosystems) that occur or are considered likely to occur

- Assessment of any potential direct and indirect impacts on terrestrial flora and fauna species, populations, ecological communities and their habitats, and groundwater dependent ecosystems
- Assessment of the significance of any potential impacts 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
- Identification of mitigation measures using the principles of 'avoid, minimise, mitigate', and propose offsets where residual impacts would occur
- Identification of relevant mitigation measures and/or performance outcomes to support the following Minister's Conditions of Approval for the approved concept:
  - Retaining as many mature trees as practicable and ensuring a net increase in the number of mature trees at a ratio of 2:1 within 10 years of the date of approval for the Concept or no later than the commencement of operations (in accordance with Condition C-B8 of the Minister's Conditions of Approval)
  - Increasing tree canopy coverage (in accordance with Condition C-B9 of the Minister's Conditions of Approval)
  - Identification of parts of Duck Creek and A'Becketts Creek that would remain open channels within the Clyde Stabling and Maintenance Facility site, which would require rehabilitation or renaturalisation (in accordance with Condition C-B10 of the Minister's Conditions of Approval).

5.14 Air quality

5.14.1 Potential impacts

Construction

During construction 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.

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

- Demolition of buildings and/or structures in locations where additional construction footprint areas may be required
- Transport, loading/unloading, stockpiling and handling of imported construction materials
- Creation of exposed surfaces through the 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.

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.

Operation

The operation of Sydney Metro West, depending on the mode shift from road to rail, could benefit local air quality by delivering an attractive alternative mode of public transport. This has the potential to reduce air pollution emissions from road transport and congestion within the corridor (when compared to the emissions that would otherwise occur if Sydney Metro West was not constructed).

Overall potential air quality impacts would present a low level of risk, would occur infrequently and would be manageable with negligible impacts on air quality.

Sydney Metro West would include fresh air ventilation systems to circulate fresh air through the tunnels and underground stations and to prevent the build-up of heat. Fresh air would be drawn into the tunnels and air would be extracted and discharged from the tunnels by mechanical ventilation at the stations and services facilities. The stations would also provide separate fresh air ventilation systems to draw fresh air in and extract air from the station environment. Air discharged from the tunnels and stations would be well diluted and dispersed into the outdoor air environment.

Activities with the potential to impact air quality during operation include:

- Trains operating in underground tunnels (i.e. from brake wear, metal vaporisation resulting from sparking, wearing of steel componentry and re-entrainment) – potential release of particulate matter from fresh air ventilation shafts in very low concentrations
- Routine maintenance activities – potential release of exhaust emissions from fresh air ventilation shafts in very low concentrations
- Emergency conditions (e.g. in-tunnel fire) – potential release of smoke (i.e. particulate matter) via emergency ventilation systems.

5.14.2 Proposed investigations and assessment

An air quality impact assessment will be carried out as part of the Environmental Impact Statement for this proposal. The air quality impact assessment will include:

- Consideration of the relevant regulatory framework and guidelines
- Desktop review and identification of the types of activities that may generate potential air quality related impacts during construction and operation

- Estimation of the potential for dust-related impacts during construction using the risk-based assessment approach presented in Guidance on the assessment of dust from demolition and construction Version 1.1 (United Kingdom Institute of Air Quality Management, 2014). Other impacts during construction and operation would also be qualitatively assessed
- Identification of mitigation measures to avoid or minimise air quality impacts and risks.

5.15 Greenhouse gas and energy

5.15.1 Potential impacts

Construction

Construction 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. Activities that are anticipated to result in the largest quantities of greenhouse gas emissions include:

- Combustion of fuel in construction plant, equipment and vehicles – these would be Scope 1 emissions (direct emissions occurring on-site)
- Electricity used at construction sites – these would be Scope 2 emissions (occurring off-site at power stations)
- Embodied emissions in key construction materials, including cement and steel – these would be Scope 3 emissions (energy and resources of construction materials consumed to produce a particular construction material)
- Emissions from construction waste – these would be Scope 1 emissions but would be very low to negligible.

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 through sourcing such materials from local suppliers and disposing of waste materials 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 through the generation or purchase of ‘green power’
- Sustainability initiatives would be incorporated into the detailed design and construction planning 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.

Operation

The operation of Sydney Metro West, depending on the mode shift from road to rail, would have the potential to reduce greenhouse gas emissions associated with road transport when compared to the emissions that would otherwise occur if Sydney Metro West was not constructed.

Operational greenhouse gas emissions would predominantly be associated with electrical consumption to power the following:

- Metro trains
- Station facilities
- Signalling and communications
- Tunnel ventilation
- Stabling and maintenance facility
- Water treatment plant.

5.15.2 Proposed investigations and assessment

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

- Identification of the potential greenhouse gas emissions from construction and operation
- Identification of mitigation and management measures to reduce potential emissions of greenhouse gas.

5.16 Climate change risk and adaptation

5.16.1 Potential impacts

Construction

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.

Operation

Climate change risks during operation are anticipated to include:

- Increased average temperatures and the frequency of heatwaves, which may cause critical equipment failure or affect the integrity of infrastructure (this could include sagging of overhead wires, overheating of trains, etc.) and affect train operations and customer and staff comfort (due to the difficulty in regulating temperatures in tunnels, at stations and in outdoor environments at the Clyde stabling and maintenance facility)
- Increased frequency and severity of extreme rainfall events, which may exceed the design capacity of the drainage system and lead to flooding of infrastructure, particularly the tunnels, stations, and the Clyde stabling and maintenance facility

- Sea level rise, which may result in further exposure of low-lying infrastructure (such as at The Bays Station) to inundation from higher tides combined with storm surge
- Changes in seasonality and the amount of precipitation, which may affect infrastructure (due to changes in soil moisture content and groundwater flows), landscaping (such as the viability of plantings at stations) and limit opportunities to capture, treat and reuse stormwater or groundwater as an alternative water source (such as for station toilets).

Possible adaptation measures to address the effects of climate change during operation would be considered during design and could include designing infrastructure to be resilient to the predicted changes in extreme weather events and sea level rise, based on the latest industry standards.

5.16.2 Proposed investigations and assessment

A climate change adaptation assessment will be carried out as part of the Environmental Impact Statement for this proposal. The climate change adaptation assessment will include:

- Identification of possible climate related impacts with an emphasis on any that are projected to undergo a substantial change
- Identification of components of Sydney Metro West that may be vulnerable to the climate change impacts during operation
- Identification of possible current and future controls that may increase the resilience of particular components to climate impacts
- Identification of relevant mitigation measures and/or performance outcomes to meet Condition C-B11 of the Ministers Conditions of Approval, for the proposal design to withstand known impacts associated with climate change to the year 2100
- Recommendations as to what should be considered, and how to establish if further information is needed, to adequately assess climate change risk.

5.17 Waste management and resource use

5.17.1 Potential impacts

Construction

Waste

A variety of solid and liquid wastes would be generated during construction. The quantity of waste would be comparable to similar infrastructure projects and would be adequately managed with standard waste management measures.

The main construction activities anticipated to generate waste are outlined in Table 5-1, along with the likely waste materials produced. The vast majority of building, demolition and vegetation and spoil removal would have primarily occurred as part of works included in preceding Sydney Metro planning applications. These works are anticipated to be largely complete prior to construction for this proposal.

Table 5-1 Construction waste generation

Activity	Waste material produced
Demolition of buildings and other structures as part of rail interchange works	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)

Activity	Waste material produced
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 untanked 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

Resource use

While construction 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 during construction would include:

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

Operation

Waste from operation of Sydney Metro West would be adequately managed through the application of standard mitigation measures and the waste hierarchy outlined in the *Waste Avoidance and Resource Recovery Act 2001*.

The main types of activities anticipated to generate waste during operation are outlined in Table 5-2 along with the likely waste materials produced.

Table 5-2 Operational waste generation

Activity	Waste material produced
Disposal of general litter in station bins and cleaning activities associated with trains, stations and other infrastructure	General non-recyclable and putrescible waste (such as food waste from station rubbish bins), recyclable wastes such as plastics and aluminium cans, office waste including paper and plastics
Infrastructure maintenance	Cable and conduit off-cuts from maintenance of track electrical infrastructure, solvents, paints, adhesives, cleaning fluids, greases, acids and alkali materials, and spent spill kit absorbent materials used to clean up accidental spills during maintenance

Activity	Waste material produced
Groundwater and stormwater ingress into tunnel and stations	Sediment-laden and/or potentially contaminated wastewater
Use of station customer facilities (such as toilets)	Sewage and grey water

Resource use

The resource requirements for the operation of Sydney Metro West are likely to be typical for an infrastructure project of this scale and similar to other operational rail lines including the Metro North West Line.

The resources that would be required during operation include:

- Electricity
- Water
- Materials for ongoing maintenance activities.

Opportunities to minimise resource consumption and maximise resource efficiency would be considered during design development and construction planning.

5.17.2 Proposed investigations and assessment

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

- A review of the likely waste streams and volumes generated during construction and operation
- A review of the likely resources required during construction and operation, including energy, fuel and steel
- Identification of environmental impacts associated with resource use and the generation (and subsequent disposal) of waste materials
- Development of management strategies to adequately address waste during construction and operation that would likely include:
  - Measures for managing construction and operational 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 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.

5.18 Hazard and risk

5.18.1 Potential impacts

Construction

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

- 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 on-site handling and transport of contaminated soil and hazardous waste, such as potential for asbestos containing materials to be disturbed as part of demolition of existing buildings and structures associated with rail integration works
- 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 health impacts from noise, air pollution and social and economic impacts during construction
- Construction works resulting in an uncontrolled interaction with a major hazard facility
- Potential risks to public safety during construction in proximity to construction sites.

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

Operation

Potential hazards and associated risks during operation would be low and manageable using standard measures. The potential types of hazards and associated risks that may be encountered during operation include:

- 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)
- Potential for hazards to customer and public safety and security – Sydney Metro West would incorporate measures to eliminate security and public safety risks as much as practicable, including implementation of the principles from CPTED. Key safety characteristics would include CCTV cameras, emergency help points and passenger information signage
- Unauthorised access to the rail corridor – the risk would be minimised by measures such as the installation of platform screen doors, security fencing, and a trackside intruder detection system, including closed circuit television
- Emergency situation – derailment, fire or deliberate sabotage. While the risk of an emergency situation is very low, Sydney Metro emergency response procedures would be implemented as required

- General worker health and safety issues for drivers and maintenance staff. Maintenance activities and other works within the rail corridor would be undertaken in accordance with Sydney Metro standard operating procedures, reducing the potential for impacts to the health and safety of workers, visitors, and customers
- Potential exposure to electric and magnetic fields, however substations will be designed to meet the limits for exposure set out in the International Commission for Non-Ionising Radiation Protection Guidelines for Limiting Exposure to Time Varying Electric and Magnetic Fields (1HZ – 100 kHZ) (ICNIRP, 2010).

5.18.2 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 hazard and risk assessment will include:

- Desktop review of the relevant regulatory framework and guidelines
- Identification of the types of activities during construction and operation 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.

5.19 Cumulative impacts

5.19.1 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).

The proposed construction works have the possibility of interacting with a number of other projects along the corridor or at proposed construction sites. This includes Sydney Metro West between Westmead and The Bays, and The Bays and Sydney CBD (works associated with preceding planning applications for Sydney Metro West, including major civil construction works). There are also a range of proposed projects and/or strategic plans along the project corridor which have the potential to interact with construction of the proposal.

The list of projects and strategic plans to be considered in the cumulative impact assessment would be confirmed during preparation of the Environmental Impact Statement having regard to criteria including spatial relevance, temporal relevance, scale of development and the public availability of information regarding each 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 construction traffic routes and a coordinated approach to community consultation.

5.19.2 Potential impacts

Construction

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
- Potential temporary cumulative impacts associated with disruptions or changes 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 the proposed construction works
- Potential temporary cumulative soils, contamination and groundwater impacts as a result of nearby construction sites operating either simultaneously with or before or after the proposed construction works
- Potential temporary social and business impacts as a result of the cumulative impacts identified above.

There may also be cumulative impacts with works covered by preceding Sydney Metro West planning applications. As this would be dependent on the relative timing of delivery, the potential for cumulative impacts would be addressed in the Environmental Impact Statement.

Operation

Sydney Metro West has been planned and developed as part of the integrated transport network. Working with other projects, this would provide cumulative transport benefits where other public transport projects complement the operation of Sydney Metro West such as by increasing the number of people located within a station's catchment and improving travel times for customers.

Similarly, other transport and urban renewal projects in the vicinity of Sydney Metro West would provide cumulative placemaking benefits.

A summary of the potential types of cumulative benefits and impacts that could occur during operation include:

- Potential placemaking benefits – additional opportunities for urban renewal due to the combined operation of multiple projects, incorporating additional amenity and placemaking benefits from enhanced pedestrian environments
- Potential transport and traffic benefits where additional public transport services from other projects complement the operation of Sydney Metro West

- Potential transport and traffic impacts due to changes in the distribution of traffic and access arrangements, and associated changes in amenity, including noise, due to the combined operation of multiple projects
- Potential non-Aboriginal and Aboriginal heritage benefits and/or impacts to the setting or significance of heritage listed items and/or conservation areas due to changed views, access or functionality of an area as a result of multiple projects
- Potential improvement to landscape character and visual amenity due to changes to the visual and landscape context of the Sydney Metro West corridor where other urban renewal projects are developed
- Potential social benefits through extension of public transport catchments (as described above), such as reducing travel related stress by reducing time spent in congested conditions; and improving social cohesion from increased access to jobs, universities, services and social facilities
- Potential hydrology, flooding and water quality impacts due to changes to existing stormwater catchment flows as a result of the operation of multiple projects, including potential changes in flooding behaviour if the loss of floodplain storage from multiple projects occurs.

5.19.3 Proposed investigations and assessment

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

- Identification of projects with the potential to generate cumulative impacts through consultation with stakeholders and review of the Department of Planning, Industry and Environment's Major Projects planning portal, government agency databases and local council development application registers
- Application of a screening criteria – including location, timeframe, scale and status to determine which of these projects are likely to generate cumulative impacts
- Identification of potential cumulative impacts
- Identification of mitigation measures and management strategies to address the potential cumulative impacts.

6 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 tunnel fit-out, construction of station, ancillary facilities and station precincts, and operation of the metro line.

6.1 Overview

The purpose of this chapter is to:

- Identify potential environmental and social constraints and opportunities associated with the proposed construction works and operation of Sydney Metro West
- Undertake a preliminary environmental risk analysis
- Assist in minimising environmental and social impacts during future project design development and construction planning.

6.2 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 6-1 and the definitions of likelihood are provided in Table 6-2. 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 6-3.

Table 6-1 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 6-2 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 6-3 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

6.3 Risk analysis

Using the framework described above, a preliminary environmental risk analysis for the approved 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 impacts, assuming application of standard mitigation measures, 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, and between The Bays and Sydney CBD has been reviewed and considered as part of the preparation of the preliminary risk analysis for this proposal. The preliminary risk analysis has also considered issues raised in submissions to the *Sydney Metro West Environmental Impact Statement – Westmead to The Bays and Sydney CBD* (Sydney Metro, 2020a) and additional feedback as part of ongoing community and stakeholder consultation.

The preliminary risk assessment for this proposal is presented in Table 6-4. Further details regarding the existing environment and potential impacts associated with each environmental issue are provided in Chapter 5 (Preliminary environmental assessment) of this Scoping Report.

Table 6-4 Preliminary risk analysis

Potential impact	Risk rating (without mitigation)	Discussion
Operational transport and traffic		
• Increased capacity and reliability of Sydney's rail network • Improved travel times and customer comfort between key destinations • Reduced crowding on trains and at some stations on the existing Sydney rail network • Improved connectivity and transfer opportunities between public transport modes • Opportunity for a mode shift from road use to use of Sydney Metro West, resulting in potential improvements to journey times for bus customers and other remaining road users • Potential modifications to existing pedestrian and cyclist arrangements to enable safe and convenient access and egress to and from the new metro stations • Changes to bus stop locations, routes and timetables to provide transport integration with metro stations • Potential deterioration of traffic performance on surrounding road network due to permanent altered traffic arrangements, road or lane closures or traffic light phasing • Potential changes to availability, location and number of parking spaces or loading zones • Potential for permanent changes to property access, particularly adjacent commercial and retail properties • Potential impacts during special event and emergency vehicle arrangements • Potential changes to existing transport infrastructure at key interchanges with Sydney Metro West including an increase in the number of customers in some locations	Consequence: Minor Likelihood: Likely Risk rating: **Medium**	The proposal would improve the transport system by providing a stand-alone railway network with the ultimate capacity to operate 30 trains an hour in each direction. It would integrate with the existing transport network, help to relieve congestion on the existing rail network and stations, and reduce the number of cars on the surrounding road network. The station precincts for the proposal would also improve connectivity and transfer opportunities between public transport modes. Changes to the network would likely include alterations to bus stop locations or the provision of a small number of kiss-and-ride and/or taxi spaces around the stations to enhance transport interchange. The proposal would not involve the provision of any major traffic generating features such as park-and-ride.

Potential impact	Risk rating (without mitigation)	Discussion
Construction transport and traffic		
• Potential temporary deterioration of traffic performance on surrounding road network, due to construction vehicles and temporary road or lane closures • Temporary removal of parking spaces or loading zones potentially affecting accessibility to transport, services and/or businesses • Potential temporary reduced pedestrian and cyclist access or flows due to construction • Potential temporary impacts on access to private (commercial and/or residential) property • Potential temporary reduced safety, access and amenity for traffic, pedestrians and cyclists due to construction activities, including within existing stations, and due to potential conflicts with construction vehicles • Potential temporary impacts on reliability of bus services, including relocation of bus stops and diversions • Impacts on reliability of suburban and intercity rail services to allow for construction activities to occur safely within the rail corridor.	Consequence: Moderate Likelihood: Almost certain Risk rating: **High**	Heavy vehicles would be temporarily required to transport material to and from construction sites. Construction for this proposal includes construction of stations and ancillary facilities, station precincts, tunnel fit-out, rail system works and transport network modifications. This proposal does not include tunnelling activities. Additionally, construction activities may require: • The temporary or permanent closure of some sections of roadways • Temporary modifications to pedestrian and cyclist facilities • Temporary modifications to existing public transport infrastructure or timetables.

Potential impact	Risk rating (without mitigation)	Discussion
Operational noise and vibration		
• Potential exceedances of airborne noise criteria from the Clyde stabling and maintenance facility • Potential exceedances of airborne noise criteria from stations or other surface infrastructure for fresh air ventilation, mechanical and electrical equipment and substations • Potential exceedances of human comfort vibration levels and ground-borne noise criteria from train operations • Potential exceedances of building or structure damage vibration levels from train operations.	Consequence: Moderate Likelihood: Possible Risk rating: **Medium**	Operational noise and vibration levels are anticipated to comply with relevant guidelines with mitigation measures implemented for the proposal. Train operation would mainly occur underground within twin tunnels. Ground-borne noise and vibration levels from operating trains and infrastructure maintenance are anticipated to be minor with the implementation of standard environmental management measures. The Clyde stabling and maintenance facility would be located above ground, but within an industrial area with the Rosehill Gardens racecourse and stables and major roads located nearby. The closest sensitive residential receivers are located on the western side of James Ruse Drive.
Construction noise and vibration		
• Potential temporary exceedances of airborne noise management levels from surface construction and tunnel fit-out during standard construction hours • Potential temporary exceedances of airborne noise management levels from surface construction and tunnel fit-out outside standard construction hours • Potential temporary construction traffic potentially resulting in an increase in traffic noise greater than 2 dB • Potential temporary exceedances of human comfort or damage vibration levels from tunnel fit-out or surface activities.	Consequence: Major Likelihood: Almost certain Risk rating: **Very high**	Temporary construction activities would occur across multiple construction sites. Some construction sites would be directly adjacent to residential areas/properties – including at Westmead, North Strathfield, Burwood North, Five Dock and Pyrmont. Construction activities would likely temporarily exceed the relevant noise management levels for at least some locations and for some of the construction period. Additionally, activities outside of standard daytime construction hours would likely be required at some locations.

Potential impact	Risk rating (without mitigation)	Discussion
Non-Aboriginal heritage		
• Potential increased value to the community and/or awareness of heritage items as a result of non-Aboriginal heritage interpretation being incorporated into station design • Design of operational infrastructure that potentially impacts the visual setting and heritage significance of nearby heritage item(s) or conservation areas • Potential vibration and visual impacts of temporary construction activities within the curtilage of listed items, but with no direct impacts on the significant components • Potential vibration and visual impacts on local, State Heritage, Section 170 Register, Commonwealth and National heritage listed items during construction • Potential direct impacts to heritage listed items in locations where additional construction footprint areas are proposed • Potential impacts on unknown heritage items (e.g. archaeological items) during construction.	Consequence: Moderate Likelihood: Almost certain Risk rating: **High**	Components of this proposal may impact heritage listed items or conservation areas during construction and operation, but would be designed to minimise potential visual impacts. Station place and design principles have been identified for Sydney Metro West that will address how station precincts are designed to be sympathetic to, and reflect the heritage context and values of, adjacent listed heritage items. These design principles will be supported by the Sydney Metro Design Quality Framework, Design Advisory Panel and Design Guidelines. Opportunities for non-Aboriginal heritage interpretation would be investigated during design development.
Aboriginal heritage		
• Potential impacts on known Aboriginal heritage items • Potential impacts on areas of known Aboriginal cultural value and archaeological sensitivity • Potential impacts on unidentified Aboriginal heritage items.	Consequence: Minor Likelihood: Unlikely Risk rating: **Low**	Components of the proposal may impact on previously recorded Aboriginal heritage sites and/or unrecognised Aboriginal cultural values more generally in minor additional areas of construction footprint required for this proposal. Construction activities are generally expected to avoid or minimise impacts to known Aboriginal heritage items. Opportunities for Aboriginal heritage interpretation would be investigated during design development.

Potential impact	Risk rating (without mitigation)	Discussion
Property and land use		
• Potential for urban renewal and placemaking opportunities around station precincts • Support of planning growth and future land use changes in a number of precincts along the project corridor • Potential changes to existing land uses to enable construction, establishment and operation of metro rail infrastructure • Potential temporary or permanent acquisition or leasing of property to enable construction sites and/or support construction work, if required • Temporary service adjustments for utilities and other transport assets/infrastructure to enable construction (e.g. Sydney Trains) • Potential temporary loss of public open space during construction • Potential restrictions on future development in some locations to protect subsurface tunnels or above ground rail infrastructure.	Consequence: Minor Likelihood: Possible Risk rating: **Medium**	The majority of property acquisition required to support the construction of the proposal are covered by preceding Sydney Metro West planning applications and would be undertaken prior to works covered by this proposal commencing. The proposed stations would support planned growth and provide opportunities to integrate with existing or planned land use objectives. Several of the stations would be located within existing (or future) major commercial/strategic centres, and the proposed stations could potentially influence the development and delivery timeframes of surrounding precincts. Station place and design principles have been identified (refer to Chapter 7 of the Sydney Metro West *Environmental Impact Statement – Westmead to the Bays and Sydney CBD* (Sydney Metro, 2020a) that will be supported by the Sydney Metro Design Quality Framework, Design Advisory Panel and Design Guidelines.
Landscape character and visual amenity		
• Potential changes (potentially positive and negative) to visual setting and landscape character during operation associated with the introduction of new stations, new public spaces, and other surface infrastructure (stabling facility, fresh air tunnel ventilation facilities, etc.) • Potential temporary impacts on landscape character during construction due to construction activities associated with new stations, ancillary infrastructure, and the stabling and maintenance facility (e.g. loss of street trees, vehicle movements, traffic management measures, parking/use of plant and equipment etc.)	Consequence: Major Likelihood: Likely Risk rating: **High**	The proposal would require demolition of existing station elements during rail interchange support works, resulting in potential changes to the current visual environment. The potential continued use of acoustic sheds or other acoustic measures would result in a temporary change in the visual environment. The stations, stabling and maintenance facility and ancillary infrastructure would introduce new built elements into the surrounding environment. The introduction of a new metro stations is expected to result in a positive landscape character

Potential impact	Risk rating (without mitigation)	Discussion
• Potential temporary impacts on visual amenity from private/public places as a result of continued use of fencing, barricades, gates, acoustic sheds or other acoustic measures and hoardings associated with construction sites • Potential temporary continued light spill from construction sites at night • Potential light spill from station precincts, the stabling and maintenance facility and other operational infrastructure.		impact and improved visual amenity during operation for areas surrounding stations, particularly where new stations are replacing building stock with unsympathetic visual design or which is old and in poor condition.
Soils, contamination and groundwater		
• Disturbance of contaminated land or groundwater during construction potentially causing impact to human health or receiving environments • Potential temporary erosion of soils resulting in offsite sedimentation of waterways • Potential exposure of acid sulfate soils or saline soils during construction resulting in off-site discharge of acidic or saline water • Potential groundwater drawdown/lowering of water table due to dewatering station excavations (at untanked stations) during station construction • Potential minor groundwater drawdown or contamination impacts from construction areas that are additional to preceding stages of Sydney Metro West • Potential contamination of land or groundwater due to spills and leaks during construction • Potential contamination of land and groundwater due to the presence of contaminated soils, spills and leaks during operation • Potential ongoing operational changes to groundwater flows and levels from underground stations and other untanked structures • Potential impacts on groundwater users due to reduced groundwater yields, reduced groundwater quality and/or direct impacts and damage to existing groundwater bores.	Consequence: Moderate Likelihood: Possible Risk rating: **Medium**	In general, construction activities for this proposal would be carried out within the same construction footprint as required for construction works covered by the preceding Sydney Metro West planning applications and would not involve large-scale excavation or spoil handling. The majority of remediation works would also be carried out as part of the construction works covered by the preceding Sydney Metro West planning applications, however known contaminated sites could be encountered and disturbed at Clyde stabling and maintenance facility, Silverwater services facility, Sydney Olympic Park and The Bays construction sites. Localised contaminated soils could also be encountered at other locations. Appropriate management approaches would be developed to manage contamination. Potential impacts such as erosion and sedimentation, and spills or leaks are anticipated to be manageable through the implementation of standard environmental management measures. Groundwater captured during construction and operation would be treated prior to discharge.

Potential impact	Risk rating (without mitigation)	Discussion
		Acid sulfate soils are likely to occur, and would need to be managed at the Parramatta, Clyde stabling and maintenance facility, and The Bays construction sites. The tunnels and the majority of stations are proposed to be tanked, which would limit the potential groundwater impacts of this component of the project to the construction phase. Ground movement and settlement is expected to be negligible.
Hydrology, flooding and water quality		
• Potential alterations to existing stormwater flows and the stormwater drainage infrastructure during construction and operation • Potential impacts on flood-prone areas and to overland flows (e.g. increase in flood risk outside the construction sites) due to new structures or displacement of flood storage areas • Potential flooding impacts on construction activities due to changes to flooding regimes • Potential impacts to flood behaviour and floodplain storage during operation due to the establishment of infrastructure • Potential temporary flooding of the tunnels or other infrastructure during construction and operation • Potential exposure of soil salinity/saline soils during construction resulting in off-site discharge of saline water resulting in exceedances of water quality trigger levels • Potential water quality impacts on nearby watercourses due to runoff from construction sites containing sediments, fuels or hazardous materials, discharge of treated groundwater or contaminated water during construction and operation	Consequence: Moderate Likelihood: Likely Risk rating: **High**	Detailed construction planning would continue to consider flood risk and hydrology impacts at existing construction sites to reduce potential impacts. During construction, erosion and sedimentation control measures (such as redirecting stormwater runoff around the site) would continue to be in place from preceding stages of Sydney Metro West. A number of sites are located within flood prone land. The protection of the infrastructure from potential floods and any potential impacts on off-site flood behaviour are anticipated to be manageable during operation through appropriate project design. The potential for spill or leaks is anticipated to be manageable through the implementation of standard environmental management measures.

Potential impact	Risk rating (without mitigation)	Discussion
Social impacts and community infrastructure		
• Improved access to employment, education and entertainment opportunities during operation • Amenity, health and placemaking benefits from enhanced pedestrian movements and improved active transport links • Potential to reduce travel related stress for people who switch modes in peak hours by reducing the time spent in congested conditions • Improved amenity associated with the upgrade to public spaces at station locations • Potential community concern with proposed changes to the character of local areas, including the sense of place • Potential temporary and permanent changes to the way of life for residents close to the construction sites and station precincts • Temporary or permanent amenity impacts to local residents from nearby construction sites or operation of stations, including to receivers who are more sensitive to such impacts • Temporary wellbeing impacts on residents who are located close to construction sites • Potential temporary impacts to traffic and access conditions for road users, including for business deliveries • Potential temporary or permanent loss of community facilities/open space, and changes in access to community facilities • Potential community concern and disruption to people from temporary or permanent acquisition or leasing of existing residential or commercial properties.	Consequence: Major Likelihood: Likely Risk rating: **High**	The proposal would facilitate transit-oriented development through the generation of new rail catchment areas. Health and liveability benefits would primarily be associated with increased active transport opportunities around stations. Construction activities may result in some temporary social impacts, both for individuals and the community at various sites along the corridor. Construction activities may result in the temporary or permanent loss of community facilities and/or public open space. Opportunities to minimise these impacts (such as replacement of facilities within the local area) would be explored.

Potential impact	Risk rating (without mitigation)	Discussion
Business impacts		
• Potential increase in passing trade depending on the location of the business during construction • Increase in construction activity resulting in benefits for construction related businesses • Increased business activity, trade generation, staff access and business viability for businesses with improved public transport facilities and improved travel times • Potential continued alterations to access, visibility and amenity of business premises during operation • Potential temporary continued disruptions to servicing, deliveries and access during construction (including from traffic congestion) • Potential temporary continued loss of power and utilities by planned or accidental shutdowns during construction • Potential temporary continued reduced visibility during construction activities, due to hoardings and other structures • Potential temporary continued reduced amenity (particularly due to noise, vibration, visual and air quality impacts) during construction • Property temporary or permanent acquisition or leasing of existing residential or commercial properties • Adverse business impacts during operation could include increases in commercial rent, altered traffic and access arrangements, changed customer behaviour from construction continuing into operational stage	Consequence: Major Likelihood: Likely Risk rating: **High**	Operation of the proposal would provide benefits for some businesses located close to new metro stations. Benefits may include increased business activity, residential development opportunities, staff access, recruitment and retention, and improved business viability. Businesses adjacent to construction sites may also continue to be temporarily impacted by changes to amenity, access and visibility of the business. Businesses that supply to the construction sector and certain business types near construction sites may continue to experience increased business activity. Operational amenity impacts for businesses from noise and vibration are likely to be managed to comply with relevant guidelines through appropriate design of elements such as track form, mechanical and ventilation systems.

Potential impact	Risk rating (without mitigation)	Discussion
Biodiversity		
• Potential removal of vegetation in locations where additional construction footprint areas are proposed • Potential injury or mortality of fauna species as a result of collisions with construction plant and vehicles, or with trains and maintenance vehicles during operation • Indirect impacts to fauna and flora species during construction such as light and noise impacts, sedimentation, spread of weeds • Disturbance of fauna species due to indirect impacts such as light and noise during operation.	Consequence: Minor Likelihood: Unlikely Risk rating: **Low**	The potential for impacts to biodiversity is anticipated to be limited for this proposal. Construction activities would generally be carried out within the same construction footprint as required by preceding Sydney Metro West planning applications and would not involve significant direct impacts to biodiversity. The proposal may result in minor impacts to street trees, some minimal removal of vegetation and indirect flora and fauna impacts. While construction sites may have provided suitable habitat for some threatened fauna species and endangered populations, the continued use of these areas is considered to be minor and these species are likely to be highly mobile. Any species present are likely to be accustomed to impacts such as noise and light spill which are already occurring.

Potential impact	Risk rating (without mitigation)	Discussion
Air quality		
• Potential impacts on local air quality around stations, services facilities (release of exhaust emissions from fresh air ventilation shafts in very low concentrations) and at the stabling and maintenance facility from train operations (brake wear and metal wear), routine maintenance activities and emergency conditions (e.g. in-tunnel fire) • Potential temporary impacts on local air quality due to construction plant and equipment and increase in vehicle movements during construction • Potential minor temporary impacts on local air quality during construction due to dust generation from exposed surfaces, spoil stockpiles • Potential generation of relatively minor amounts of gaseous emissions during construction.	Consequence: Minor Likelihood: Unlikely Risk rating: **Low**	The operation of the proposal could contribute to long-term improvements in air quality associated with a potential mode shift by customers from road to rail. Potential temporary air quality impacts during construction and operation are anticipated to be minor and similar to other infrastructure projects of this nature and scale. These impacts would be manageable through the implementation of standard environmental management measures.
Greenhouse gas and energy		
• Mode shift from road to rail during operation resulting in reduced greenhouse gas emissions associated with road transport • Emissions of greenhouse gases from embodied energy in construction materials • Emissions of greenhouse gases from construction activities such as combustion of fuel in construction equipment and electricity used at construction sites. • Emissions associated with electricity consumption to power the project including metro trains, station facilities, tunnel ventilation, stabling and maintenance facility	Consequence: Minor Likelihood: Unlikely Risk rating: **Low**	The proposal could contribute to a long-term reduction in greenhouse gas emissions associated with a potential mode shift by customers from road to rail. The generation of greenhouse gas emissions 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. Options to reduce greenhouse gas emissions and energy use during construction and operation when compared to other metro projects would be investigated.

Potential impact	Risk rating (without mitigation)	Discussion
Climate change risk and adaptation		
• Climate change risks including increased intensity of rainfall events placing increased pressure on stormwater controls during construction • Impact of climate change, including increase in average temperatures, sea level rise and higher tides, and frequency of extreme weather events on rail operations and infrastructure • Impact of climate change on customer and staff comfort.	Consequence: Moderate Likelihood: Rare Risk rating: **Low**	Potential climate change impacts to be considered during detailed construction planning to ensure capacity of erosion and sediment controls are adequate and to minimise construction impacts on the capacity of existing stormwater drainage systems. Potential climate change impacts have been considered through design development and would be managed through the implementation of appropriate design standards and adaptation measures.
Waste management and resource use		
• Potential impacts associated with inappropriate management of waste during construction and operation • Potential increased demand on electricity, water supply or other materials (such as concrete, steel) during construction and operation • Potential temporary increased demand on local and regional resources including sand and aggregate during construction • Potential temporary increased diesel use during construction.	Consequence: Minor Likelihood: Unlikely Risk rating: **Low**	The generation of waste and the anticipated resource consumption (e.g. electricity and water) during construction would be similar to other infrastructure projects of this nature and scale. These impacts would be managed through the implementation of standard environmental management measures (such as application of the waste management hierarchy). Resource use during operation would be similar to other operational rail lines including the Metro North West Line and include electricity, water and materials for ongoing maintenance activities. Waste generated by the construction and operation of the project would be managed in accordance with the Sydney Metro West Sustainability Plan, and waste hierarchy outlined in the *Waste Avoidance and Resource Recovery Act 2001*. Construction activities and operational resource use would be unlikely to result in any resource becoming scarce or in short

Potential impact	Risk rating (without mitigation)	Discussion
		supply. Opportunities to minimise resource consumption and maximise resource efficiency would be considered during further design development and construction planning.
Hazard and risk		
• Potential incidents associated with transport and storage of hazardous substances and dangerous goods during construction • Potential rupture or interference with utilities • The on-site handling and transport of contaminated soil and hazardous waste, including asbestos • Potential health impacts from noise, air pollution and social and economic impacts during construction • Construction works resulting in an uncontrolled interaction with a major hazard facility • Potential hazards to customers and public safety and security during construction and operation • Potential unauthorised access to the rail corridor • Emergency situations such as derailment, fire or deliberate sabotage • Potential exposure to electric and magnetic fields, however noting that substations would be designed to meet the limits for exposure set out in the ICNIRP Guidelines for Limiting Exposure to Time Varying Electric and Magnetic Fields (1HZ – 100 kHZ) (ICNIRP, 2010).	Consequence: Major Likelihood: Almost unprecedented Risk rating: **Low**	Potential hazards and risks during construction and operation would be managed through the implementation of appropriate design standards and construction methodologies.

Potential impact	Risk rating (without mitigation)	Discussion
Cumulative impacts		
• Cumulative transport and urban renewal benefits during operation including increased capacity of the Sydney rail network, reduced congestion on existing services and the road network, improvements to landscape character and visual amenity and social benefits from creation of places • Potential temporary continued/prolonged cumulative construction noise, traffic and social and business impacts associated with this proposal and preceding Sydney Metro West planning applications • Potential temporary cumulative construction noise, traffic and social and business impacts associated with other major projects • Temporary construction fatigue of local communities affected by preceding stages of Sydney Metro West and other major projects either at the same time or occurring consecutively.	Consequence: Major Likelihood: Almost certain Risk rating: **Very high**	Construction activities may be carried out concurrently with, or consecutively to, a number of other major infrastructure projects in Sydney, as well other construction activities covered under preceding Sydney Metro West planning applications. This may result in temporary cumulative impacts associated with noise and traffic during construction, particularly around Parramatta and The Bays. Strategies for community engagement would consider coordination with other projects.

6.4 Issue categorisation

Based on the consequence and likelihood definitions, '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 6-5.

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 6-5 Summary of risk ratings and issue categorisation

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

7 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 (Stage 1 of the planning approval process).

The Scoping Report for *Sydney Metro West - Major civil construction work between The Bays and Sydney CBD* (Stage 2 of the planning approval process) was lodged on 12 May 2021.

Sydney Metro is now seeking approval for this proposal, comprising tunnel fit-out, construction of stations, ancillary facilities and station precincts, and operation and maintenance of the Sydney Metro West line.

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
- Landscape character and visual amenity
- Hydrology, flooding and water quality
- Social impacts and community infrastructure
- Business impacts
- Cumulative impacts.

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

The Department of Planning, Industry and Environment will place the Environmental Impact Statement on public exhibition, at which time the community will be encouraged to have their say via a formal submission.

8 References

Acid Sulfate Soil Management Advisory Committee 1998, *Acid Sulfate Soil Manual*

Australian and New Zealand Standard *AS/NZS ISO 31000:2018 Risk Management – Principles and Guidelines*

Australian Government 2016, *Smart Cities Plan*

Department of Environment, Climate Change and Water 2009, *Interim Construction Noise Guideline*

Department of Planning and Environment 2017, *Scoping an Environmental Impact Statement Draft Environmental Impact Assessment Guidance Series June 2017*

Department of Planning, Industry and Environment 2020, *Pyrmont Peninsula Place Strategy*

Department of Primary Industries 2012, *NSW Aquifer Interference Policy*

Department of Urban Affairs and Planning and Environment Protection Authority 1998, *Managing Land Contamination Planning Guidelines SEPP 55–Remediation of Land*

Environment Protection Authority 2014, *Waste Classification Guidelines*

Environment Protection Authority 2019, *Rail Infrastructure Noise Guideline*

Greater Sydney Commission 2018a, *Greater Sydney Region Plan: A Metropolis of Three Cities – connecting people*

Greater Sydney Commission 2018b, *Eastern City District Plan*

Heritage Office and Department of Urban Affairs & Planning 1996, *NSW Heritage Manual*

Infrastructure NSW 2018, *Building Momentum: State Infrastructure Strategy 2018-2038*

International Commission on Non-Ionizing Radiation Protection 2010, *Guidelines for Limiting Exposure to Time-Varying Electric and Magnetic Fields (1HZ – 100 kHZ)*

Landcom 2004, *Managing Urban Stormwater: Soils and Construction Volume 1*

NSW Heritage Office 2005, Interpreting Heritage Places and Items: Guidelines and Heritage Interpretation Policy

Sydney Metro 2019, *Sydney Metro West Scoping Report – Westmead to The Bays and Sydney CBD*

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

Sydney Metro 2020b, *Sydney Metro West Westmead to The Bays and Sydney CBD – Amendment Report*

Sydney Metro 2020c, *Sydney Metro West - Westmead to The Bays and Sydney CBD – Submissions Report*

Sydney Metro 2020d, *Construction Traffic Management Framework*

Sydney Metro 2020e, *Sydney Metro Art Masterplan*

Sydney Metro 2021, *Sydney Metro West – Major civil construction work between The Bays and Sydney CBD – Scoping Report*

Transport for NSW 2018, *Future Transport 2056 Strategy*

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

9 Glossary and abbreviations

Term / acronym	Definition
AS	Australian Standard
BDAR	Biodiversity Development Assessment Report
CPTED	Crime prevention through environmental design
dB	Decibel
EP&A Act	*NSW Environmental Planning and Assessment Act 1979*
EPBC Act	*Commonwealth Environment Protection and Biodiversity Conservation Act 1999*
ICNG	Interim Construction Noise Guideline (Department of Energy and Climate Change, 2009)
ISCA	Infrastructure Sustainability Council of Australia
ISO	International Organisation for Standardisation
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, being the first stage of the planning approval process.
Stage 2 (of Sydney Metro West)	Stage 2 is the proposed major civil construction work including station excavation and tunnelling between The Bays and Sydney CBD, being the second stage of the planning approval process.
TA Act 1988	*Transport Administration Act 1988*
This proposal (of Sydney Metro West)	This proposal of Sydney Metro West would involve tunnel fit-out, construction of stations, ancillary facilities and station precincts, and operation and maintenance of the Sydney Metro West line, being the third stage of the planning approval process.
Sydney Metro West Concept	The Sydney Metro West Concept involves construction and operation of a metro rail line, around 24-kilometres long, between Westmead and the Sydney CBD.

Appendix A Relevant plans, policies and guidelines

Table A-1 Relevant plans, policies and guidelines

Matter	Relevant plans, policies and guidelines	Scoping Report reference
Construction transport and traffic	• 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 (Roads and Traffic Authority, 2002) • RMS Traffic Modelling Guidelines Version 1.0 (Roads and Maritime Services, 2013) • RMS Traffic Signals in Microsimulation Modelling (TTD 2018/002, 22 November 2018) • Former Roads and Maritime Services and Transport Coordination guidelines related to construction • Construction Traffic Management Framework (Sydney Metro, 2020) • Guide to Traffic Management – Part 3 Traffic Studies and Analysis (Austroads, 2007) • Planning Guidelines for Walking and Cycling (Department of Infrastructure, Planning and Natural Resources, 2004).	Section 5.3
Operational transport and traffic	• Guide to Traffic Management – Part 3 Traffic Studies and Analysis (Austroads, 2007) • Guide to Traffic Generating Developments Version 2.2 (Roads and Traffic Authority, 2002) • Guide to Traffic Generating Developments, Updated Traffic Surveys, TDT 2013/04a (Roads and Maritime Services, 2013) • Cycling Aspects of Austroads Guides (Austroads, 2017) AP-G88-17 • NSW Bicycle Guidelines v 1.2 (Roads and Traffic Authorities, 2005) • Planning Guidelines for Walking and Cycling (Department of Infrastructure, Planning and Natural Resources, 2004) • Other relevant transport plans that include station precinct areas.	Section 5.3

Matter	Relevant plans, policies and guidelines	Scoping Report reference
Construction noise and vibration	• Sydney Metro Construction Noise and Vibration Standard (Sydney Metro, 2020) • 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 • 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) • Noise Policy for Industry (Environmental Protection Agency, 2017) • Guideline for Child Care Centre Acoustic Assessment Version 2.0 (Association of Australasian Acoustical Consultants, 2013).	Section 5.4
Operational noise and vibration	• Noise Policy for Industry (Environment Protection Authority, 2017) • Road Noise Policy (Department of Environment, Climate Change and Water, 2011) • Assessing Vibration: a technical guideline (Department of Environment and Conservation, 2006) • Development Near Rail Corridors and Busy Roads – Interim guideline (Department of Planning, 2008) • Rail Infrastructure Noise Guideline (Environment Protection Authority, 2013).	Section 5.4

Matter	Relevant plans, policies and guidelines	Scoping Report reference
Non-Aboriginal heritage	• 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) • Assessing Significance for Historical Archaeological Sites and Relics (NSW Heritage Branch, Department of Planning, 2009) • Investigating Heritage Significance (NSW Heritage Office, 2001) • 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) • Better Placed – Design Guide for Heritage – Implementing the Better Placed policy for heritage buildings, sites, and precincts (Government Architect of NSW, 2019).	Section 5.5

Matter	Relevant plans, policies and guidelines	Scoping Report reference
Aboriginal heritage	• 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 (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 Office, 1998).	Section 5.6
Property and land use	• 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 (Department of Planning and Environment, 2019).	Section 5.7

Matter	Relevant plans, policies and guidelines	Scoping Report reference
Landscape character and visual amenity	• Practitioner's Guide to Movement and Place (NSW Government Architect and Transport for NSW, 2020) • Better Placed – An integrated design policy for the built environment in NSW (Government Architect of NSW, 2017) • 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 5.8
Soils, contamination and groundwater	• 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) • *National Environment Protection (Assessment of Site Contamination) Measure 1999* (as revised 2013) • Managing Land Contamination: Planning Guidelines State Environmental Planning Policy 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 2.0 (Department of Agriculture, Water and the Environment, 2020)	Section 5.9

Matter	Relevant plans, policies and guidelines	Scoping Report reference
	• Acid Sulfate Soils Assessment Guidelines (Department of Planning, 2008) • Risk assessment Guidelines for Groundwater Dependent Ecosystems (Office of Water, 2012) • Groundwater and surface water sharing plans • NSW Aquifer Interference Policy (Department of Primary Industries, 2012) • NSW Water Quality and River Flow Objectives (NSW Department of Environment, Climate Change and Water, 2006).	
Hydrology, flooding and water quality	• 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 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) • 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) • 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).	Section 5.10

Matter	Relevant plans, policies and guidelines	Scoping Report reference
	• National Water Quality Management Strategy (ANZECC/ARMCANZ 2018) • PS 07-003 New guideline and changes to section 117 direction and EP&A Regulation on flood prone land Practical Consideration of Climate Change - Flood risk management guideline (Department of Energy and Climate Change, 2007) • Approved Methods for the Sampling and Analysis of Water Pollutants in NSW (Department of Energy and Climate Change, 2008) • Guidelines for controlled activities on waterfront land (Department of Industry, 2018) • Groundwater and surface water sharing plans • NSW Aquifer Interference Policy (Department of Primary Industries, 2012) • NSW Water Quality and River Flow Objectives (NSW Department of Environment, Climate Change and Water, 2006).	
Social impacts and community infrastructure	• 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 5.11
Business impacts	• Australian Transport Assessment and Planning Guidelines (Australian Transport Council, 2018) • Environmental Impact Assessment Practice Note - Socio-economic assessment (Roads and Maritime Services, 2013).	Section 5.12

Matter	Relevant plans, policies and guidelines	Scoping Report reference
Biodiversity	• EPBC Act Significant Impact Guidelines (Department of Sustainability, Environment, Water, Population and Communities, 2009) • How to apply for a biodiversity development assessment report waiver for a major project application (Department of Planning, Industry and Environment, 2019) • 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.	Section 5.13
Air quality	• 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 5.14
Greenhouse gas and energy	• Transport for NSW's Carbon Estimate and Reporting Tool (CERT) (Transport for NSW, 2018) • AS ISO 14064-1:2018: Specification with guidance at the organisation level for quantification and reporting of greenhouse gas emissions and removal (ISO, 2018) • National Greenhouse Gas Accounts Factors (Department of the Environment and Energy, 2020) • Greenhouse Gas Assessment Workbook for Road Projects (Transport Authorities Greenhouse Group, 2013) • Greenhouse Gas Protocol – World Business Council for Sustainable Development and World Resources Institute • Various sources for emissions factors including ISCA Materials calculator and National Greenhouse Accounts Factors.	Section 5.15

Matter	Relevant plans, policies and guidelines	Scoping Report reference
Climate change risk and adaptation	• Climate Risk Assessment Guidelines (Transport for NSW, 2019) • 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/NZS 31000:2018 Risk Management – Principles and Guidelines • AS5334 – Climate Change Adaptation for Assets and Infrastructure • AS 5334-2013 Climate change adaptation for settlements and infrastructure – a risk-based approach.	Section 5.16
Waste management and resource use	• 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 5.17
Hazard and risk	• 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 5.18