6 Concept description

This chapter describes the Sydney Metro West Concept including metro operations, key features of the alignment, the proposed stations and other ancillary infrastructure. An outline of the construction work is also provided. The Concept components are subject to further design and changes or clarifications which may be made during the ongoing design development and stakeholder and community engagement processes.

6.1 Secretary's Environmental Assessment Requirements

The Secretary's Environmental Assessment Requirements relating to the Concept description, and where these requirements are addressed in this Environmental Impact Statement, are outlined in Table 6-1.

Table 6-1: Secretary's Environmental Assessment Requirements – Concept description

Reference	Secretary's Environmental Assessment Requirements	Where addressed
2. Environmental Impact Statement		
2.1	b. a description of the Concept, including key components and activities including: • project overview; • station and ancillary facility locations and the proposed route (including use of plans);	Section 6.2 Sections 6.7 to 6.9
	c. a description of the staged approach to obtaining approval for the project	Section 6.11
	e. a description of associated strategic investigations (such as Pyrmont and Rydalmere stations) that do not comprise part of the Concept	Section 6.7.9

6.2 Overview

6.2.1 Key features

Sydney Metro West (the Concept) involves the construction and operation of about 24 kilometres of underground metro rail between Westmead and the Sydney CBD.

The indicative alignment and proposed station locations are shown on Figure 6-1. The key components of the Concept include:

- About 24 kilometres of twin tunnels between Westmead and the Sydney CBD
- New metro stations at Westmead, Parramatta, Sydney Olympic Park, North Strathfield, Burwood North, Five Dock, The Bays and Sydney CBD. The location of the Sydney CBD station will be determined following further investigations and community and stakeholder engagement. Strategic station locations at Rydalmere and Pyrmont are also under investigation
- A turn-up-and-go metro service operating early morning to late at night, between Westmead and the Sydney CBD
- Pedestrian links and connections to other modes of transport (such as the existing suburban rail network and other parts of the metro network) and surrounding land uses
- Modification to existing suburban stations and associated rail infrastructure (including overhead wiring, signalling, access tracks/paths and rail corridor fencing) at Westmead and North Strathfield
- Services within each of the metro stations, including mechanical and fresh air ventilation equipment and electrical power substations to supply power for operation
- A stabling and maintenance facility at Clyde, and associated aboveground and belowground tracks to connect to the mainline tunnels and other operational ancillary infrastructure
- Services facilities at Rosehill (within the Clyde stabling and maintenance facility construction site), Silverwater and between Five Dock and The Bays for fresh air ventilation and emergency evacuation
- Alterations to pedestrian and traffic arrangements, cycling and public transport (e.g. bus) infrastructure around the metro stations
- Subdivision of station sites to support integrated station and precinct development and ancillary facilities
- Ancillary facilities to support construction.

Components of the Concept are subject to ongoing design development and outcomes of stakeholder and community engagement.

The Concept does not include the following components:

- Integrated station and precinct developments
- Opportunities for strategic station locations at Rydalmere and Pyrmont, which are currently being investigated
- Road realignment works at The Bays. The impacts of this are assessed in the Review of Environmental Factors 'The Bays Road Relocation Works' April 2020
- Relocation of the Sydney Speedway to an alternative site. A proposed site has been identified within the Western Sydney Parklands. The preliminary impacts of development of a speedway facility at that site are identified in the scoping report 'Sydney International Speedway' March 2020
- Surveys, test drilling, test excavations, geotechnical or contamination investigations or other tests, surveys, sampling or investigation for the purposes of the design or assessment of Sydney Metro West.

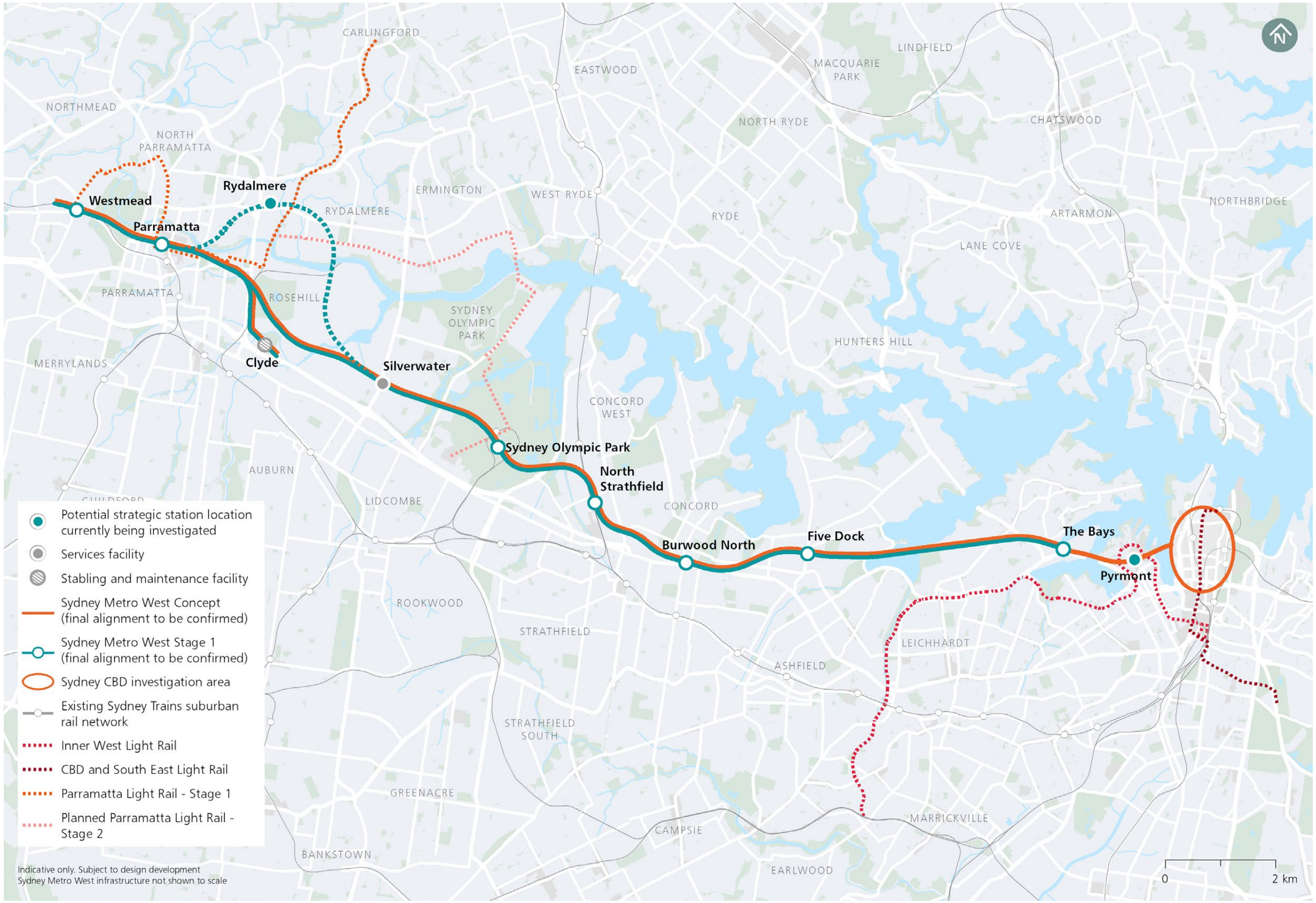

Figure 6-1: Overview of the Concept

6.2.2 Key metro characteristics

Customer experience underpins how Sydney Metro is being planned and designed and incorporates all aspects of travel associated with the transport network, service and Concept including:

- The decision on how to travel – new metro services would be integrated with other transport modes, including interchanges with the existing suburban rail network as well as buses, light rail and ferries
- The travel information available – state-of-the-art technology is proposed to keep customers connected at all stages of their journey, from smart phone travel apps on the way to stations to real time journey information at metro stations and on board trains
- The speed and comfort of the journey
- The range and quantity of services available at stations, interchanges and within station precincts – Sydney Metro West would help customers achieve their daily tasks, whether it's getting to work or getting home, for school or education, sport, a day out or running errands.

A high quality door-to-door transport product is critical to attract and retain customers and also to meet broader transport and land use objectives. This includes providing a system that is inherently safe for customers on trains, at stations and at the interface with the public domain; providing direct, comfortable, legible and safe routes for customers between transport modes; and providing a clean, pleasant and comfortable environment for customers at stations and on trains.

Making it easy for customers at each stage of their journey is integral to the successful delivery of Sydney Metro. Key characteristics of Sydney Metro that would be delivered by the Concept are outlined in Table 6-2.

Table 6-2: Key metro characteristics – Sydney Metro West Concept

Product characteristic	Description
Fast and reliable service	• Delivering fast journeys between stations with new generation single deck trains • Ensuring easy boarding and alighting to reduce dwell times at stations • Creating a highly reliable service.
Ability to move more people	• Designing infrastructure, trains and systems to be able to run 30 trains per hour at ultimate capacity • Ability to move more than 40,000 customers per hour in each direction at ultimate capacity.
Modern trains and technology	• Trains operate safely closer together with communications-based train control that allows automated train operations and driverless operation • On-board real time travel information and live electronic route maps.
Accessible system	• Fully accessible stations and single deck trains • At least three double doors per side per carriage for faster loading and unloading • Level access and reduced gaps between the platform and train - providing access for all • Designing for bicycles on trains • Delivering modern customer information systems.
Highly legible	• 'Turn-up-and-go' frequencies means there is no need for a timetable • Consistent stopping patterns that mean metro would stop at all stations.
Safe and secure	• Improving customer experience with customer service assistants at every station, and customer service assistants moving through the network during the day and night • Ensuring customers can see all the way along the train and move easily between carriages, including wide, open walkways between carriages • Providing platform screen doors at stations which keep people and objects away from the edge, improving customer safety and allowing trains to get in and out of stations much faster.
Comfortable service	• Air-conditioned trains with large windows, warm lighting and open walkways • Seating and standing room designed to maximise personal space • Easy boarding and alighting at stations.

6.3 Regional context

The Sydney Metro West corridor is highly urbanised and extends through densely populated and culturally and linguistically diverse regions. The Concept extends from Westmead and passes through a number of suburbs in Western Sydney and the Inner West of Sydney before reaching the Sydney CBD. Sydney Metro West spans seven local government areas – Cumberland City Council, the City of Parramatta, Strathfield Municipal Council, Burwood Council, the City of Canada Bay, Inner West Council and the City of Sydney. Figure 6-2 provides an overview of the local government areas within the corridor.

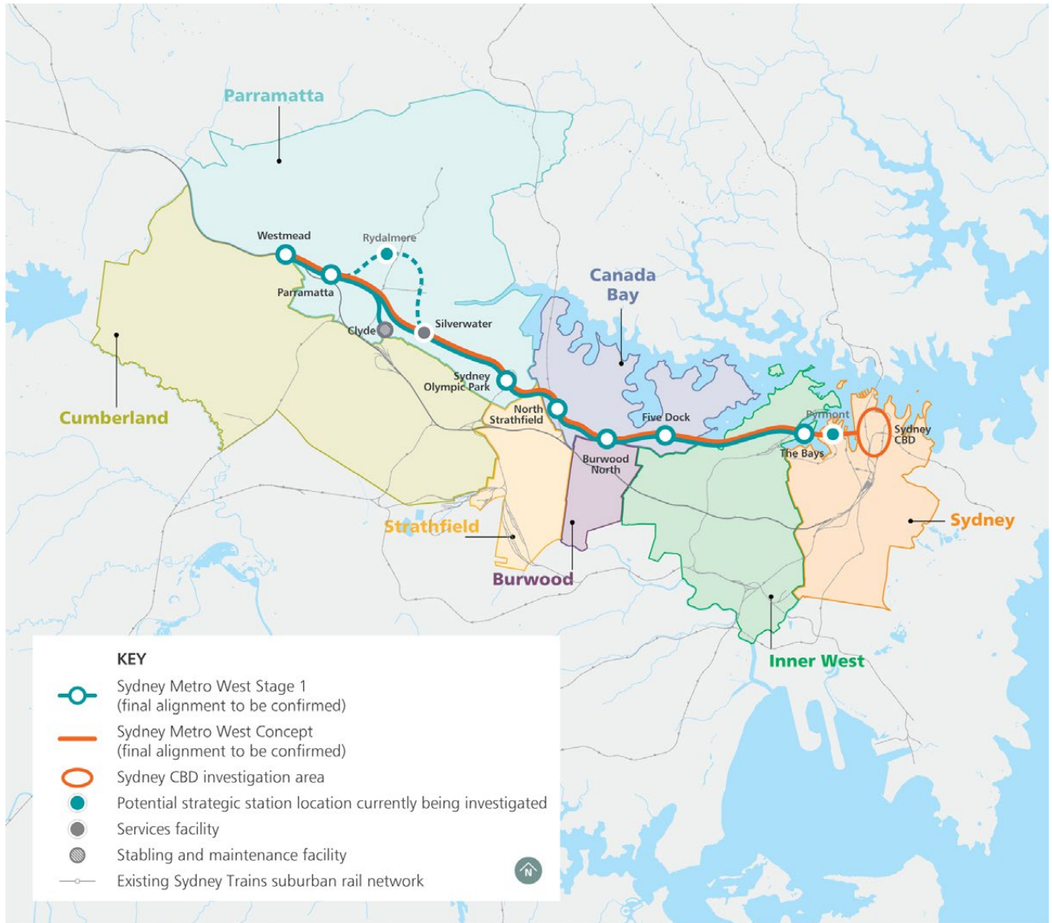

Figure 6-2: Local government areas across the Sydney Metro West corridor

The local government areas in which Sydney Metro West is located have a total population of about one million people and contain a number of sites of national and international importance including:

- Five out of nine major office markets in Sydney, including the Parramatta and Sydney CBDs
- One of Australia's largest health and education precincts at Westmead
- More than 10 sports, events and convention facilities and one of the largest urban parklands in Australia at Sydney Olympic Park, which attracts 10 million visitors each year and 5,600 business and entertainment events each year
- The Bays, which includes almost 100 hectares of largely government-owned land and 5.5 kilometres of harbour foreshore located two kilometres from Sydney CBD
- Significant heritage sites in Parramatta and the Sydney CBD including Old Government House and the former Parramatta Government Domain in Parramatta Park and the World Heritage-listed Sydney Opera House.

6.4 Sydney Metro West operations

The fully automated Sydney Metro delivers a significant improvement in the capacity and customer experience of Sydney's existing transport network, with a high capacity, turn-up-and-go service that would stop at all stations along the metro line. The Concept would operate as a standalone railway line separate from the existing suburban and intercity rail network and separate from the Metro North West Line (currently operating), Sydney Metro City & Southwest (opening 2024) and Sydney Metro Greater West (working towards opening at the same time as the airport).

Demand for the service would be managed through increased service frequency. The ultimate operational capacity of the Concept would be for 30 trains per hour in each direction – a train every two minutes each way.

6.4.1 Hours of operation

Sydney Metro West would operate from early morning to late at night, similar to the Sydney Trains suburban rail network and the Sydney Metro North West Line. To accommodate for planned special events, operating hours could be extended.

6.4.2 Train types

All trains would be new, single-deck 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, 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 transport information whilst on board the metro.

6.5 Design

6.5.1 Preliminary design considerations for metro stations

The detailed design of Sydney Metro West stations would take into account a wide range of considerations, provided in Table 6-3.

The approach to design and placemaking for the Sydney Metro West Concept, as well as site-specific place and design principles for each metro station and facility, are provided in Chapter 7 (Placemaking).

Table 6-3: Preliminary station design considerations

Station aspect	Design considerations
Customer experience	• Escalators, platforms, passageways, mezzanines and concourses would be designed to accommodate peak customer flows and ensure stations are easy to navigate • The station and public access areas would be designed as attractive spaces and include public art and landscaping (where appropriate) and would also maximise the use of natural daylight. The design would also protect customers from weather (covered access paths, waiting shelters etc.) at stations and also at interchange areas • Furniture on station platforms would be provided to cater for a range of customers including seating and standing spaces.
Customer information and wayfinding	• Real-time information would be delivered to customers through multiple media • An easy, intuitive and consistent wayfinding system would be developed that facilitates efficient customer movements to, from and through stations.
Operations and system requirements	Stations would be designed in accordance with the operations and system requirements, including: • Maintaining customer flows at an acceptable and safe level of service standard • Securing platforms and critical infrastructure spaces from public access when services are not operating.
Safety and security	• The safety of customers, staff and areas surrounding stations would be considered in station design in accordance with crime prevention through environmental design principles • Well-designed and efficiently controlled lighting systems and visible closed circuit television surveillance would contribute to safe station environments. Passive station design elements that promote safety would include clear visibility lines in and around stations, the use of natural daylight and adequately wide paths to avoid blind spots.
Accessibility and functionality	• Efficient transfer between metro and other types of transport (such as suburban network trains, walking, cycling, light rail and buses) is important to station design and supporting an integrated transport network approach • The Sydney Metro network would be integrated into the Opal ticketing system • Station design would be guided by an 'access for all' philosophy using 'priority of access' principles, with pedestrians and cyclists first, followed by buses, point to point transport services and kiss and ride customers • Station design would include emergency exit and access facilities, such as fire stairs to allow for customer evacuation and emergency services access.
Sustainability	• Sustainability measures at stations would include (where feasible) natural light, solar panels, reuse of rainwater, passive ventilation and shading, use of durable and low maintenance materials, and energy-efficient lighting.
Placemaking and activation	• Sydney Metro West stations and precincts would provide a new public domain as well as integration with the existing public realm and adjoining lands to develop and promote vibrant retail, community and other spaces, as appropriate to the context and locality • Each station location would include space for retail outlets that meet customer needs (e.g. café, newsagents, etc.), as well as providing spaces for temporary activation and public art where appropriate. Station entries would be designed to make a positive contribution to the local area.

6.5.2 Integrated station and precinct development

New metro stations create opportunities for integrated station and precinct developments that provide for community needs and include consideration of relevant planning controls and local character. An integrated station and precinct development refers to the proposed building(s) above and/or around the station that could deliver a range of uses such as community facilities, new homes, shops, restaurants and commercial office space.

Provision for integrated station and precinct developments would be made at Westmead, Parramatta, Sydney Olympic Park, Burwood North, Five Dock, The Bays and Sydney CBD.

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 precinct development. In general, relevant metro stations would include:

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

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 precinct development will be identified and assessed as part of future stage Environmental Impact Statements.

Integrated station and precinct developments do not form part of the State significant infrastructure application, and would be subject to separate environmental assessments and planning approvals processes.

6.6 Tunnel alignment and configuration

The twin underground metro rail tunnels would be around 24 kilometres in length from Westmead to the Sydney CBD. The alignment is shown on Figure 6-1.

The tunnel alignment within the corridor would be refined by the functional requirements of a metro network and the specific constraints of station design, namely:

- The location, depth and platform configurations of preferred metro stations
- Having a maximum vertical grade of 4.5 per cent
- Locating station platforms along a straight and level section of track (that is, a zero per cent grade)
- Providing a tunnel depth with suitable competent rock cover above the tunnel crown (the top surface of the tunnel structure), where possible, to minimise the requirement for ground support
- Requiring appropriate curvature to accommodate proposed operating speeds, while having regard to subsurface constraints such as building basements and foundations.

The alignment has also been influenced by a number of environmental factors including (but not limited to) avoiding known built form constraints including existing buildings, basements, utilities, infrastructure (including other rail and road infrastructure), and minimising potential impacts on environmental and social features.

6.6.1 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 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, lighting and drainage.

An indicative cross-section of the underground tunnel is shown in Figure 6-3.

Cross passages for emergency evacuation would link the tunnels along the alignment. Cross passages may be modified or the spacing increased in some locations such as to avoid poor ground conditions, or where the alignment passes beneath water bodies.

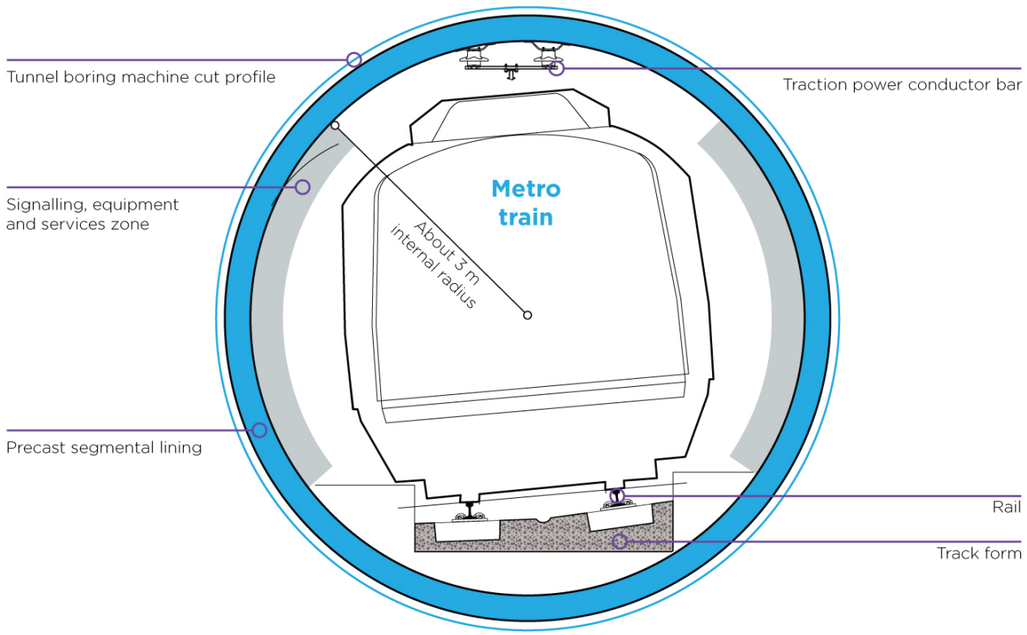

Figure 6-3: Indicative cross-section of a metro tunnel

6.6.2 Safeguarding for future extensions

The ability to extend Sydney Metro West, including beyond Westmead, would be future-proofed. The provision of stub tunnels would allow for minimal disruption of the operating line during the construction of future extensions, and also allow for overnight stabling and storage of trains during operations.

6.7 Stations

New metro stations would be located at Westmead, Parramatta, Sydney Olympic Park, North Strathfield, Burwood North, Five Dock, The Bays and Sydney CBD. The location of the Sydney CBD station will be determined following further investigations and community and stakeholder engagement. The potential for additional stations at Rydalmere and Pyrmont is currently being investigated.

The locations of the proposed new stations are identified below. The locations of the proposed stations between Westmead and The Bays are described in further detail in Chapter 9 (Stage 1 description).

6.7.1 Westmead metro station

Westmead metro station would be located immediately south of the existing Westmead Station to provide a direct interchange with the T1 Western Line and the T5 Cumberland Line, providing connectivity to the hospital precinct (through interchange with Parramatta Light Rail Stage 1).

Westmead metro station would provide increased accessibility to the Westmead employment, health and education hub, as well as residential areas experiencing growth and renewal.

Key features of Westmead metro station are provided in Table 6-4. A detailed description of Stage 1 at Westmead metro station is provided in Chapter 9 (Stage 1 description).

Table 6-4: Westmead metro station key features

Key features	Description
Proposed station entry	One entry on Hawkesbury Road
Customers	• Residents within walking and cycling distance • Employees and visitors to and from the Westmead health precinct • University students, employees and visitors to the education precinct • Customers transferring between rail and bus services.
Primary station function	Origin, destination and interchange
Catchment	Employment, residential, health and education
Transport interchange	• Suburban and intercity rail • Walk • Cycle • Bus • Light rail • Taxi/point to point transport • Kiss and ride.
Provision for future integrated station and precinct development (subject to separate future approvals)	Yes, including consideration of relevant planning controls and local character

6.7.2 Parramatta metro station

Parramatta metro station would be located within the block bounded by George, Macquarie, Church and Smith streets. Parramatta metro station would be located to the north of the existing Parramatta Station, within the commercial core of Parramatta CBD.

Parramatta metro station would serve and support the growth of Parramatta as Sydney's second CBD, including boosting jobs and improving connections to recreational and tourist attractions. The new metro station would improve customer experience at the existing Parramatta Station by relieving demand in peak times.

The key features of Parramatta metro station are provided in Table 6-5. A detailed description of Stage 1 at Parramatta metro station is provided in Chapter 9 (Stage 1 description).

Table 6-5: Parramatta metro station key features

Key features	Description
Proposed station entry	• One station entry on the future Civic Link (Horwood Place) • Potential additional entry to be determined.
Customers	• Residents within walking and cycling distance • Employees travelling to and from work in the Parramatta CBD • Visitors travelling to and from nearby education, retail, residential areas and recreational activities • Customers transferring to and from light rail and bus.
Primary station function	Origin, destination and interchange
Catchment	Employment, residential, education, recreation and entertainment
Transport interchange	• Suburban and intercity rail (indirect connection via Civic Link) • Walk • Cycle • Bus • Light rail • Taxi/point to point transport • Kiss and ride.
Provision for future integrated station and precinct development (subject to separate future approvals)	Yes, including consideration of relevant planning controls and local character

6.7.3 Sydney Olympic Park metro station

Sydney Olympic Park metro station would be located to the south of the existing Olympic Park Station in the growing Sydney Olympic Park town centre and central precinct. The metro station would be located to the east of Olympic Boulevard between Herb Elliott Avenue and Figtree Drive. The Sydney Olympic Park Master Plan identifies this precinct as a higher density, mixed-use neighbourhood with commercial offices, retail and residential uses. The broader precinct also caters for major sports and entertainment events and includes hotel accommodation.

Sydney Olympic Park metro station would support commercial, residential, retail, hotel, education, sports, recreation, parklands and entertainment uses. This location would offer easy transfer with a future Parramatta Light Rail Stage 2 and buses.

The key features of Sydney Olympic Park metro station are provided in Table 6-6. A detailed description of Stage 1 at Sydney Olympic Park metro station is provided in Chapter 9 (Stage 1 description).

Table 6-6: Sydney Olympic Park metro station key features

Key features	Description
Proposed station entry	• Main station entry between Herb Elliot Avenue and Figtree Drive • Second entry off Dawn Fraser Avenue.
Customers	• Residents within walking and cycling distance • Employees or visitors travelling to and from nearby residential and employment areas • Visitors to events, venues, recreational facilities and parklands • Customers transferring to and from light rail and bus.
Primary station functions	Origin, destination and interchange
Catchment	Residential, employment, events and recreation
Transport interchange	• Suburban rail (indirect connection) • Walk • Cycle • Bus • Light rail (planned) • Taxi/point to point transport • Kiss and ride.
Provision for future integrated station and precinct development (subject to separate future approvals)	Yes, subject to the Sydney Olympic Park Master Plan

6.7.4 North Strathfield metro station

North Strathfield metro station would be located adjacent to the existing North Strathfield Station and would provide direct interchange between the metro and suburban rail networks. The station would be positioned with an entrance on the eastern side of the existing rail line fronting Queen Street.

North Strathfield metro station would provide customers travelling on the busy T9 Northern Line an attractive interchange option to access key centres more quickly, as well as access to new centres.

The key features of North Strathfield metro station are provided in Table 6-7. A detailed description of Stage 1 at North Strathfield metro station is provided in Chapter 9 (Stage 1 description).

Table 6-7: North Strathfield metro station key features

Key features	Description
Proposed station entry	One new entry on Queen Street
Customers	• Residents within walking and cycling distance • Visitors travelling to and from nearby residential and education areas • Visitors to local entertainment, retail or dining attractions • Customer transferring between rail and bus services.
Primary station functions	Origin and interchange
Catchment	Residential, education and entertainment
Transport interchange	• Suburban rail, and potentially intercity services • Walk • Cycle • Bus • Taxi/point to point transport • Kiss and ride.
Provision for future integrated station and precinct development (subject to separate future approvals)	No

6.7.5 Burwood North Station

Burwood North Station would be located at the corner of Parramatta Road and Burwood Road with access from both the north and south sides of Parramatta Road. The site would be bound to the north by Burton Street and to the east by Loftus Street.

Burwood North Station would support new residential housing and employment growth in the surrounding catchment.

The key features of Burwood North Station are provided in Table 6-8. A detailed description of Stage 1 at Burwood North Station is provided in Chapter 9 (Stage 1 description).

Table 6-8: Burwood North Station key features

Key features	Description
Proposed station entry	Two entries with one on the north-east corner of Burwood Road and Parramatta Road, and one on the south-corner of Burwood Road and Parramatta Road
Customers	• Residents within walking and cycling distance • Students, staff and visitors travelling to and from nearby schools • Residents or employees travelling to and from nearby residential and employment areas.
Primary station functions	Origin and interchange
Catchment	Residential, education and employment
Transport interchange	• Walk • Cycle • Bus • Taxi/point to point transport • Kiss and ride.
Provision for future integrated station and precinct development (subject to separate future approvals)	Yes, including consideration of relevant planning controls and local character.

6.7.6 Five Dock Station

Five Dock Station would be located in the core of the Five Dock local centre off Great North Road with an entrance on Fred Kelly Place. Great North Road is the primary north-south spine through the locality leading from Parramatta Road to the peninsula suburbs of Abbotsford and Drummoyne.

Five Dock Station would support the local village centre and placemaking outcomes presented in the Five Dock Urban Design Study (City of Canada Bay Council, 2014) by providing rail services to the area for the first time. Five Dock also offers opportunity for a new bus interchange.

The key features of Five Dock Station are provided in Table 6-9. A detailed description of Stage 1 at Five Dock Station is provided in Chapter 9 (Stage 1 description).

Table 6-9: Five Dock Station key features

Key features	Description
Proposed station entry	One entry at Fred Kelly Place off Great North Road
Customers	• Residents within walking and cycling distance • Visitors to retail, commercial and recreational areas.
Primary station functions	Origin and interchange
Catchment	Residential
Transport interchange	• Walk • Cycle • Bus • Taxi/point to point transport • Kiss and ride.
Provision for future integrated station and precinct development (subject to separate future approvals)	Yes, including consideration of relevant planning controls and local character

6.7.7 The Bays Station

The Bays Station would be located at the apex of White Bay between Glebe Island and the White Bay Power Station. The station would have direct access to the future Bays Waterfront Promenade, which would run north and south along White Bay.

The station would support the renewal and development of The Bays and provide access to the established areas of Balmain and Rozelle.

The key features of The Bays Station are provided in Table 6-10. A detailed description of Stage 1 at The Bays Station is provided in Chapter 9 (Stage 1 description).

Table 6-10: The Bays Station key features

Key features	Description
Proposed station entry	One entry to the south of White Bay, near the future Bays Waterfront Promenade
Customers	• New residents within the precinct • Existing residents within walking and cycling distance • Employees and visitors to and from business, education, districts within The Bays • Visitors to and from retail, commercial and recreational attractions.
Primary station functions	Origin and destination
Catchment	Employment, residential and recreation
Transport interchange	• Walk • Cycle • Bus • Taxi/point to point transport • Kiss and ride.
Provision for future integrated station and precinct development (subject to separate future approvals)	Yes, subject to the finalisation of the NSW Government's Bays Precinct Transformation Plan

6.7.8 Sydney CBD Station

The preferred location for a Sydney CBD Station is being investigated. The metro station would enable interchange with existing public transport networks, including Sydney Metro City & Southwest, the existing Sydney Trains suburban rail network, the light rail and bus networks. The station strategy and key features for the Sydney CBD would be developed once the location is determined.

6.7.9 Strategic opportunities for optional stations

Potential strategic station locations at Rydalmere and Pyrmont are currently being investigated, however at this stage do not form part of the Concept.

If progressed, the location of stations at Rydalmere and Pyrmont would be refined during ongoing design development and an assessment of the station would be undertaken in accordance with the *Environmental Planning and Assessment Act 1979*, which may include a modification or as part of a future stage of the Concept.

Rydalmere

A metro station at Rydalmere would provide increased accessibility to employment and education destinations, as well as residential areas experiencing growth and renewal. It would also support the Greater Parramatta Olympic Peninsula vision, including supporting the concept of 30-minute cities, and the provision of high quality public spaces to enhance liveability.

Pyrmont

A metro station at Pyrmont would support existing residential, employment, entertainment and event land uses in the area and provide direct connections between Sydney CBD and The Bays. It would also provide interchange connections with existing light rail and bus services.

6.8 Operational ancillary facilities

6.8.1 Service facilities

Fresh air tunnel ventilation and emergency egress would generally be provided at the proposed stations. Additional facilities would also be required at Rosehill (within the Clyde stabling and maintenance facility construction site), Silverwater and between Five Dock and The Bays.

Service facilities would generally be located directly above the tunnel alignment. An aboveground building for mechanical, electrical and ventilation equipment would be provided at each location, with a shaft to connect to the tunnels below.

6.8.2 Traction substations

Traction power supply would be provided through dedicated traction substations. These would be co-located with other infrastructure where possible.

6.9 Stabling and maintenance

6.9.1 Infrastructure maintenance

Maintenance planning would generally allow routine and major periodic maintenance of infrastructure to be carried out 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 the Concept has been developed to allow 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 to address unexpected defects (such as signal failure), 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.

6.9.2 Clyde stabling and maintenance facility

Operating trains would be stabled and maintained at a dedicated facility in Clyde. The Clyde stabling and maintenance facility would provide:

- Stabling roads to store trains
- Maintenance facility
- Train wash facility
- Wheel grinding and graffiti/train wash facilities
- Infrastructure maintenance sidings, depot and buildings
- Operations control centre
- A traction substation to provide power to the rail line and stations (described in Section 6.8.2)
- 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.

Connecting track would be provided from the Clyde stabling and maintenance facility to the mainline tunnels. This would include a dive structure and tunnel portal, and underground tunnels.

6.10 Construction

Key construction elements of the Concept would include:

- Enabling works
- Tunnel excavation and associated tunnelling support activities such as segment production, segment storage and spoil management
- Station construction including excavation, fit-out and aboveground building construction
- Rail interchange support works at Westmead and North Strathfield stations
- Operational ancillary infrastructure construction including excavation of shafts, fit-out and aboveground building construction
- Construction of a stabling and maintenance facility, including the dive structure and tunnel portal
- Tunnel and rail systems fit-out.

Table 6-11 provides an overview of construction activities for the Concept. Further details on construction activities which form Stage 1 are provided in Chapter 9 (Stage 1 description).

Table 6-11: Construction activities

Construction activity	Overview of activity
Enabling works	Enabling works are activities that would typically be carried out before the start of substantial construction in order to make ready the key construction sites and provide protection to the public. • Enabling works may include: • Demolition of buildings • Utility supply, including power and water • Utility adjustments and protection • Transport network modifications to roads, public transport, and pedestrian and cyclist facilities • Heritage investigations, salvage and clearance (if required), protection and archival recordings • Additional geotechnical and contamination investigations and remediation where required.
Tunnel excavation	Tunnel excavation would be carried out using tunnel boring machines, with roadheaders used for caverns, stub tunnels and connection tunnels from the stabling and maintenance facility to the mainline tunnels via the Rosehill dive structure. Tunnel boring machines would be used to excavate the majority of the twin tunnels as they operate at a quicker rate than roadheaders and excavate the desired circular tunnel profile. It is anticipated the tunnel boring machines would be launched and supported from two sites, being: • Westmead metro station construction site • The Bays Station construction site. These sites would provide the necessary support for the tunnelling operation including spoil storage and removal, power supply to the tunnel boring machines, fresh air ventilation, grout batching, water treatment and disposal, material storage, office facilities, worker amenities and parking. Retrieval and dismantling of the tunnel boring machines would be carried at Sydney Olympic Park metro station construction site. Tunnel boring machine launch, retrieval and support sites to the east of The Bays through to the Sydney CBD would be assessed in the Environmental Impact Statement(s) for future stage(s). A concrete segment facility would be constructed at Clyde as part of the Clyde stabling and maintenance facility construction site to provide concrete segments for the tunnel lining.

Construction activity	Overview of activity
Station construction	Excavation of stations would generally be carried out in the following sequence: • Enabling works including protection or diversion of utilities and establishment of site access points • Demolition of structures on the site and clearance of landscaped vegetation • Excavation and structural works for station boxes and underground pedestrian passages including piled walls • Station fit-out including mechanical, electrical, lighting and fresh air tunnel ventilation equipment, signage and wayfinding equipment and station furniture • Station precinct works, such as public plazas and landscaping.
Rail interchange support works at Westmead	Construction sites within the existing rail corridor would be located on land owned by the NSW Government. Interchange support works at Westmead would potentially involve: • Potential demolition of existing station elements • Minor widening and lengthening of existing station platforms • Minor track slewing, rail systems and overhead wiring works • Construction of a new aerial concourse with new lifts and stairs to the existing platforms • Adjustments to existing station entry points and the overhead concourse.
Rail interchange support at North Strathfield	Interchange support works would involve the construction of a new aerial concourse with new lifts and stairs to the existing platforms, and potential demolition of existing station elements. At the current stage of design, it is not expected that any below grade works would be required.
Operational ancillary infrastructure construction	The operational ancillary infrastructure would be generally constructed in the following sequence: • Excavation of a vertical shaft to the tunnels below. This may be carried out using excavators and rock hammers, however, drill and blast or penetrating cone fracture techniques may also be used • Lining and reinforcement of the shaft • Building works for aboveground components • Installation of electrical equipment including transformers and electrical switchboards • Landscaping works.
Stabling and maintenance facility construction	Construction of the stabling and maintenance facility would involve: • Enabling works including protection or diversion of utilities and establishment of site access points • Demolition of structures on the site and clearance of vegetation • Import and placement of fill material • Structural works for crossings of A'Becketts Creek and Duck Creek • Site drainage works • Track and rail systems fit-out • Construction of buildings including the operations control centre • Fencing and landscaping works.
Dive structure and tunnel portal construction	Dive structure and tunnel portal construction would generally involve: • Cast in-situ concrete piling along the edge of the dive structure to form the walls • Excavating below track level • Placing of precast and cast in-situ concrete for the cut-and-cover section and to form the tunnel portal.
Tunnel rail systems fit-out	Tunnel and tunnel rail systems fit-out 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 installation for rolling stock • Other equipment including lighting (including emergency lighting), drainage works, and fire and life safety systems (including walkways connecting to emergency egress and fire hydrant systems).

6.10.1 Construction sites

Most of the construction sites would be contained within the footprints of operational stations and ancillary infrastructure. Additional construction areas would also be required to support tunnel excavation and fit-out work.

The location and indicative footprint of the proposed main construction sites between Westmead and The Bays are shown in Chapter 9 (Stage 1 description). Construction components to the east of The Bays through to the Sydney CBD would be subject to further design and would be described and assessed in the Environmental Impact Statement(s) for future stage applications.

6.11 Staging of planning approvals

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

- Sydney Metro West at a Concept level
- Stage 1 – All major civil construction works between Westmead and The Bays including station excavation and tunnelling
- Stage 2 – All stations, depots and rail systems between Westmead and The Bays.
- Stage 3 – All major civil construction works including station excavation, tunnels, stations, depots and rail systems between The Bays and the Sydney CBD Station, and operation of the line.

Whilst the content of these stages may be varied, this Environmental Impact Statement covers the Concept and Stage 1 comprising all major civil construction works between Westmead and The Bays including station excavation and tunnelling.

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