Part B

Parramatta metro station

8

8.0 Parramatta metro station

This chapter provides a description of Parramatta metro station and its precinct during operation and construction of this proposal. The chapter also provides an assessment of potential impacts during operation and construction that relate to Parramatta and identifies mitigation measures to address these impacts.

8.1 Overview

Parramatta metro station would be located in the heart of the Central River City (Parramatta CBD) between George Street to the north, Smith Street to the east, Macquarie Street to the south and Church Street to the west. 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 Parramatta metro station precinct is characterised by a diverse mix of commercial and retail with some residential apartments and community facilities. There are also a number of heritage listed buildings and potential archaeological resources in the vicinity of the site.

8.1.1 Operation

The vision for Parramatta metro station and its surrounds is for a high amenity and connected employment, living and cultural centre in the heart of Greater Sydney's Central River City.

The primary eastern station entry would be adjacent to the Civic Link, a pedestrianised link planned by the City of Parramatta Council that would provide a connection from Parramatta Square to River Square. A second station entry would be located to the west on Church Street.

When operational, Parramatta metro station would deliver extensive new public domain, including a section of the Civic Link that would connect Parramatta Square to the Parramatta River via a landscaped, pedestrianised public space and 'cultural spine'. It would provide an extensive expansion of the public domain network within the Parramatta CBD, greatly increasing pedestrian permeability and access, and present the opportunity for high-quality over and adjacent station development to activate the CBD public domain. New cycling and pedestrian facilities proposed would also enhance accessibility and connectivity to the Parramatta CBD and to key public transport interchanges, including bus services and Parramatta Light Rail Stage 1 (currently under construction).

A number of changes would be made to the local transport network to facilitate integration of the metro station, including realignment of Horwood Place to the west, new bus stops on Smith Street and new pedestrian crossings on George Street and Smith Street. The majority of intersections around Parramatta metro station would operate at the same level of service, both with and without this proposal.

This proposal would improve the landscape character and visual amenity of the area due to the new metro station and the associated accessibility and placemaking outcomes. These improvements would also result in social benefits associated with increased accessibility to jobs, education and services and improved amenity, and some opportunities for local businesses. Businesses in the Parramatta CBD would benefit from the improved connectivity with the Sydney CBD, supporting business investment and growth.

Key potential impacts anticipated during operation of Parramatta metro station include:

- operational noise levels from the station would generally comply with the applicable noise criteria. There are some marginal exceedances of the amenity target criteria at one education receiver and one place of worship, however these levels all achieve the amenity acceptance criteria
- potential impacts to the setting of adjacent heritage items would generally be neutral or negligible. The provision of new public domain around the locally listed Kia Ora would allow better public appreciation of this item, resulting in a positive outcome. There would be a moderate indirect impact to the Horse Parapet Façade associated with the scale of the station services building. The design of Parramatta metro station would consider setbacks from adjacent heritage items and opportunities to enhance the significant heritage elements of adjacent items
- potential flooding impacts at the station as the proposed station entry surface levels are below the flood protection level and would require active protection measures. There are also anticipated to be some residual flooding impacts associated with the station beyond the immediate vicinity of the site.

Potential impacts associated with other environmental matters such as Aboriginal heritage, groundwater, social and business would comply with the relevant criteria and/or be minor to negligible.

8.1.2 Construction

Major civil construction including station excavation and tunnelling work at Parramatta was assessed and approved under a previous Sydney Metro West planning application and does not form part of this proposal. This proposal includes the construction activities required to complete Parramatta metro station, and associated precinct work required for the operation of Sydney Metro West.

Construction of Parramatta metro station would require the continued use of the construction site established under the previous Sydney Metro West planning application. Some provisions for future over and adjacent station development, including additional excavation for basement structures would also be required. The proposed work is expected to have a total duration of about four years.

Construction transport impacts would generally be a continuation of those associated with the work carried out under the previous Sydney Metro West planning application. This includes the closure of Horwood Place between Macquarie and George Street, although a temporary pedestrian route through the site would be provided during the majority of construction.

The Pitt Street / Park Parade / Argyle Street intersection would see a temporary decline in performance during construction. Other nearby intersections would generally perform at the same level of service with or without construction traffic. Potential impacts would be managed in accordance with the measures in Sydney Metro's Construction Traffic Management Framework (CTMF).

Construction noise levels at the majority of receivers are predicted to comply with the noise management levels. No receivers are expected to be highly noise affected. 'Low' sleep disturbance impacts are predicted at one residential receiver as a result of heavy vehicle movements at night. The Sydney Metro Construction Noise and Vibration Standard (CNVS) would be implemented to manage these temporary impacts and further investigation of sleep disturbance would be completed during detailed construction planning when further information becomes available. Ground-borne noise associated with excavation of basement structures for future over and adjacent station development would result in 'high' ground-borne noise impacts for some receivers adjacent to the construction site. These exceedances are predicted to occur during the daytime only and this work is expected to last for around 20 weeks.

With respect to vibration intensive excavation during a worst-case situation, the cosmetic damage screening criteria are predicted to be exceeded at nine buildings in close proximity to the site including the heritage listed Roxy Theatre, Kia Ora, shop at 45 George Street and the Horse Parapet façade. The human comfort criteria are also predicted to be exceeded at some of the nearest buildings, meaning occupants of affected buildings may be able to perceive vibration impacts at times when vibration intensive equipment is in use. In reality, smaller equipment or alternative methodologies would likely be used, which would control the potential impacts. To protect these items, where vibration levels are predicted to exceed the cosmetic damage screening criteria, a more detailed assessment of the structure and attended vibration monitoring would be carried out so that vibration levels remain below appropriate limits for that structure.

Temporary impacts on built heritage items in the Parramatta metro station precinct would be neutral or negligible, with up to moderate impacts at items within the construction site. The world heritage listed Old Government House and Domain within Parramatta Park are located over 300 metres to the west of the construction site and is unlikely to be visible in key views to these items in Parramatta Park due to its scale, the distance and intervening built form. Excavation for basement structures has the potential to uncover Aboriginal and non-Aboriginal archaeology. This would be managed through the processes established under the previous Sydney Metro West planning application.

A portion of the convict drain heritage item is located within the south-eastern corner of the Parramatta metro station construction site. Excavation for this proposal would result in the potential removal of about 50 metres of the item where it is located within the Parramatta metro station construction site, resulting in a moderate direct impact. However, the excavation would not remove the whole of the item. Prior to the partial removal the convict drain, it would be archivally recorded.

The excavation for basement structures for future over and adjacent station development would also result in some additional groundwater inflow, however this is generally expected to be consistent with or reduced by comparison to the impacts from the work associated with the previous Sydney Metro West planning application. The basement excavations may also result in some additional ground movement; however, the assessment identified that the risk to buildings, including heritage buildings and structures, would be slight (possible superficial damage which is unlikely to have structural significance) to negligible (superficial damage unlikely).

Other key potential impacts during construction would include:

- temporary minor to moderate impacts to landscape character and visual amenity due to the scale and extent of the construction work
- temporary medium social impacts due to construction-related disruptions and potential amenity impacts
- temporary slight negative impacts to local businesses, mainly associated with temporary loss of private and on-street parking and potential amenity impacts. Access would be maintained to adjacent businesses
- temporary flooding impacts to the construction site and excavations during the Probable Maximum Flood (PMF) event, as well as potential minor to moderate localised flooding impacts to Horwood Place between Macquarie Street and George Street and the Macquarie Lane access to Smith Street from the obstruction of existing flow paths through the construction site.

Potential impacts associated with other environmental matters such as soils, contamination and biodiversity would be minor to negligible.

These impacts would be managed through the implementation of the Sydney Metro management frameworks and standard mitigation measures including the Construction Environmental Management Framework (CEMF), Overarching Community Communications Strategy (OCCS), CTMF and CNVS.

8.2 Station and precinct description

8.2.1 Design development

Development of the design has involved ongoing consultation with stakeholders and the Design Advisory Panel. This has included:

- feedback as part of submissions and consultation associated with the *Sydney Metro West Environmental Impact Statement - Westmead to The Bays and Sydney CBD* (Sydney Metro, 2020a)
- ongoing meetings and design workshops held with the City of Parramatta Council since exhibition of the previous Sydney Metro West planning application (Sydney Metro, 2020a)
- meetings and advice from the Design Advisory Panel.

Key features or changes to the design to avoid or minimise impacts, and respond to feedback from stakeholders and the Design Advisory Panel include:

- inclusion of a western entry to Church Street to facilitate efficient station access to the western part of Parramatta CBD. The need for multiple station entries was identified in feedback from the City of Parramatta Council
- retaining and minimising potential impacts to heritage-listed Kia Ora, shop (and potential archaeological site) at 43-47 George Street and the Roxy Theatre, by, for example, locating station infrastructure to avoid and minimise direct visual impacts
- incorporation of the eastern entry to the Civic Link into a future mixed-use building, responding to feedback from the Design Advisory Panel
- provision of enhanced civic-scaled public domain in the centre of the Parramatta CBD (based on feedback from the Design Advisory Panel), which also opens up space around and views to the heritage-listed Kia Ora
- delivery of part of the Civic Link and safeguarding an east-west connection between Smith Street and Church Street, consistent with the Draft Civic Link Precinct Development Control Plan and feedback from the City of Parramatta Council.

8.2.2 Station design

The indicative layout and key design elements of Parramatta metro station are shown in Figure 8-1, with a long-section and cross-section shown in Figure 8-2 and Figure 8-3, respectively. The design of the metro station is subject to further detailed design development.

The key features of Parramatta metro station are provided in Table 8-1.

Table 8-1 Key features – Parramatta metro station

Key features	Description
Proposed station entry	• entry on the future Civic Link • entry on Church Street.
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 other transport modes.
Primary station function	Origin, destination and interchange.
Catchment	Employment, residential, education, recreation and entertainment.
Transport interchange	• walk • cycle • suburban and intercity rail (indirect connection via the Civic Link) • bus • light rail (future) • point-to-point transport • kiss and ride.

Parramatta metro station would consist of an underground station with an island platform in an east-west orientation.

The primary eastern station entry is proposed adjacent to the eastern side of the Civic Link, which is a pedestrianised link planned by the City of Parramatta Council that would provide a connection from Parramatta Square to River Square. This proposal would involve delivery of the section of the Civic Link located within the station precinct footprint (between Macquarie and George Streets), as shown in Figure 8-1. A second station entry is proposed to the west on Church Street.

Areas for station services and utilities would be provided underground and within consolidated services buildings.

The aboveground station infrastructure on both Church Street and Macquarie Street (including the station services, concourse and space for non-station use) would extend approximately five to seven storeys above street level.

Parramatta metro station is being safeguarded for future connections to other rail lines as per *Future Transport 2056*.

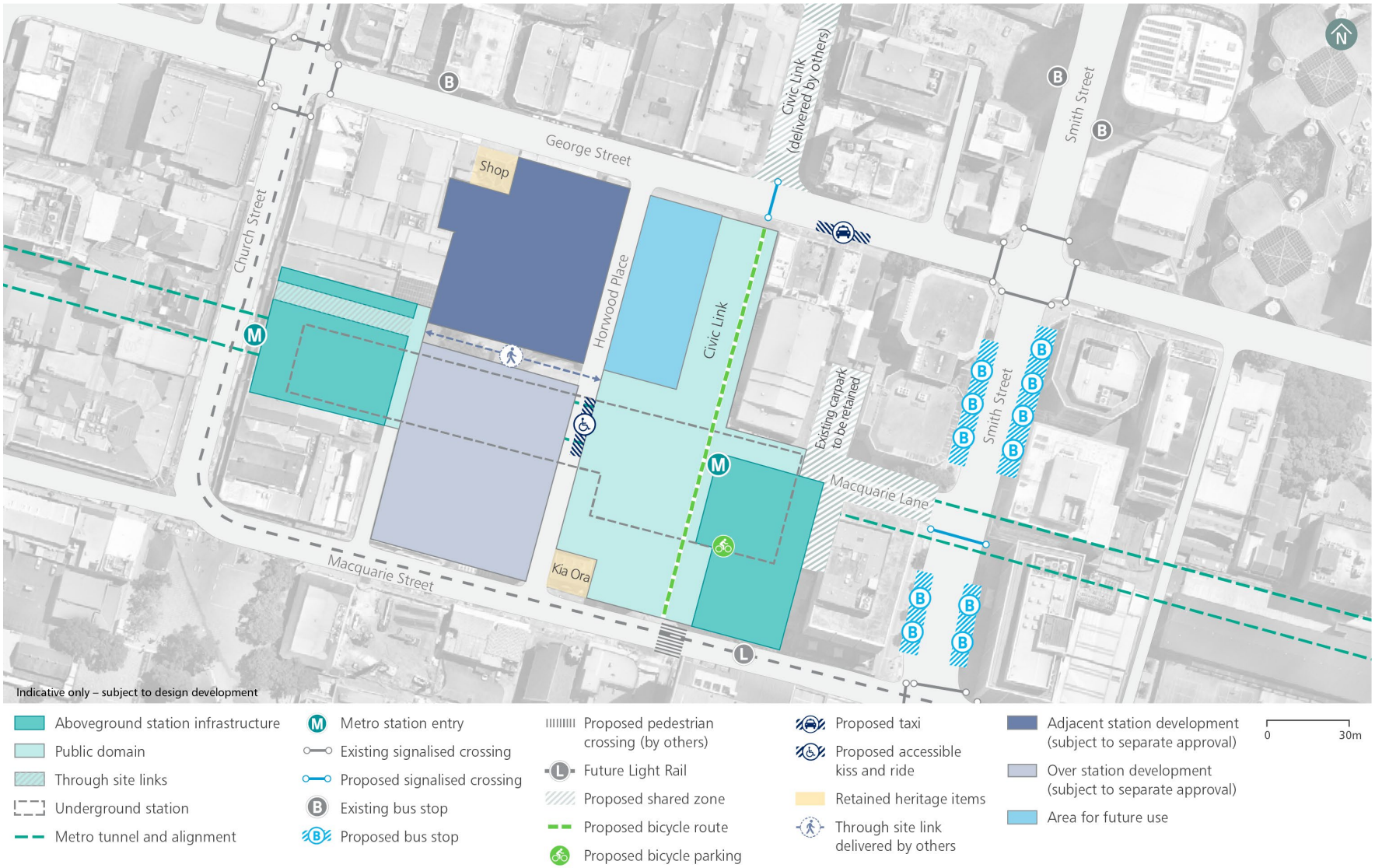

Figure 8-1 Indicative layout and key design elements – Parramatta metro station

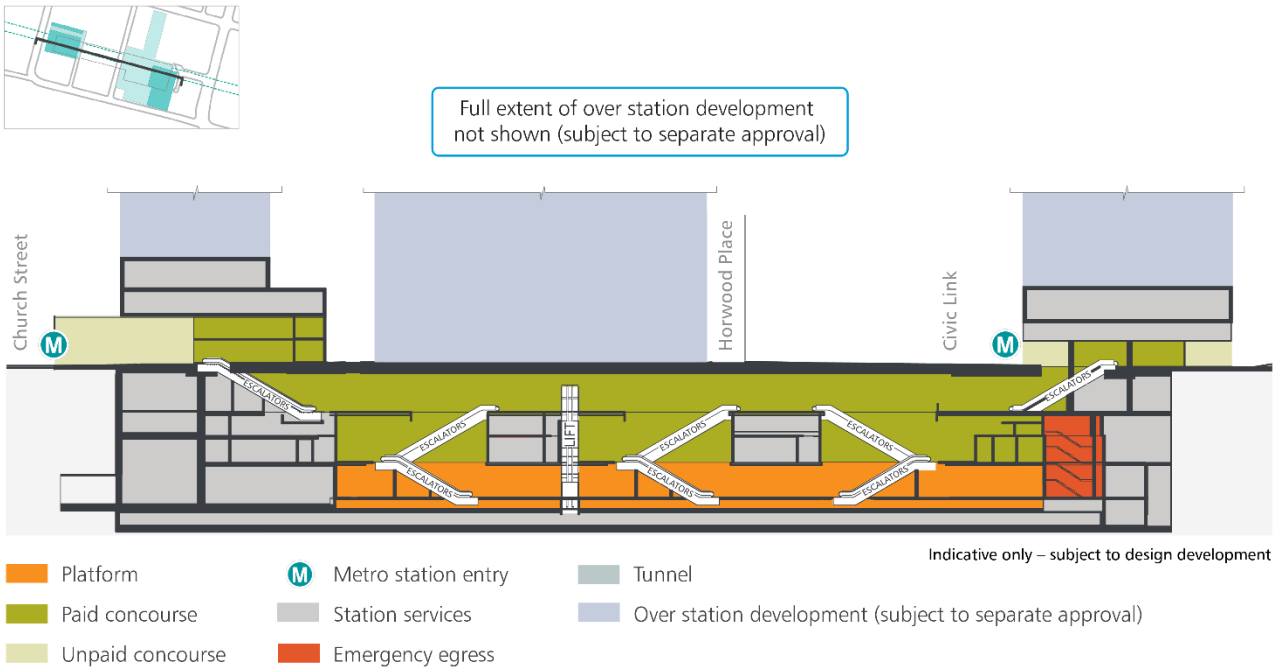

Figure 8-2 Indicative long-section – Parramatta metro station

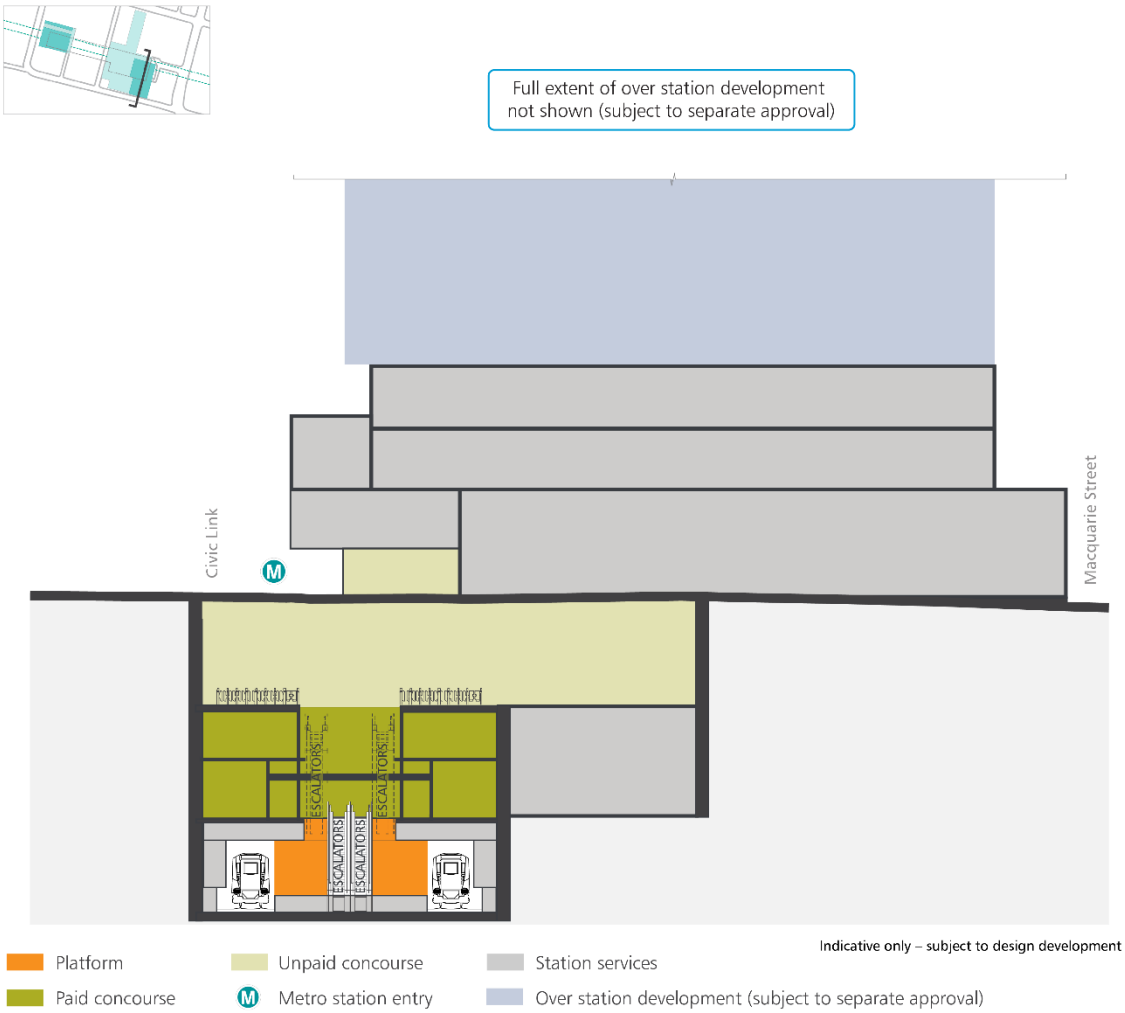

Figure 8-3 Indicative cross-section – Parramatta metro station

8.2.3 Station precinct and interchange facilities

Parramatta metro station would include a series of precinct and interchange elements such as:

- bicycle parking
- delivery of the section of the Civic Link between Macquarie and George Streets
- bus interchange located on Smith Street
- provision of direct interchange with Parramatta Square Light Rail stop (via the Civic Link)
- accessible kiss and ride and point-to-point vehicle facilities
- reconfigured on-street parking
- a new signalised pedestrian crossing of George Street at the Civic Link
- a new mid-block crossing of Smith Street north of Macquarie Lane
- realignment of Horwood Place between Macquarie and George Streets
- creation of new public domain areas
- an area for future use to the west of the Civic Link, which may be temporarily fenced with appropriate hoarding
- the structural elements for the space for non-station uses within the aboveground station infrastructure (e.g. retail, commercial and/or community facilities). Fit-out and use of these spaces would be subject to separate approval, where required. Refer to Section 5.4.3 (Structures and spaces for non-station uses) for further detail.

Parramatta metro station would also include provision for potential additional underground connections to future train/metro services (as per Future Transport 2056) or adjacent developments.

8.2.4 Provisioning for over station and adjacent station development

As shown in Figure 8-1, Figure 8-2 and Figure 8-3, over station developments are proposed above the station. Adjacent station development is also proposed on the residual land required for construction, to the north of the metro station. The over station and adjacent station development proposed at Parramatta would be subject to separate assessment and approval.

This proposal would include and has assessed the following to support the future over station and adjacent station development:

- structural elements up to a podium level to enable the construction of future over station development
- space for future lobbies, lift cores, access, parking, loading docks, and building services for future over station development
- utility connections to support future developments, where required
- subdivision.

As part of this proposal, basement structures would be provided to support the future over and adjacent station developments, including provision of space for future car parking. The construction of the basement structures is included as part of this proposal as this work could not be readily undertaken following the construction of the station and provision of the aboveground station infrastructure (including the services building). The fit-out and use of the basements would form part of the separate assessment and approval required for the future over and adjacent station developments. The extent of the basement structures is provided on Figure 8-4.

The potential extent of the proposed over station development subject to separate assessment and approval is provided on Figure 8-5 and discussed further in Section 5.4.5 (Related development) of this Environmental Impact Statement.

Delivery of the over station and adjacent station development does not form part of this proposal and would be subject to separate assessment and approval (with the exception of the provisioning elements listed above). Access to the metro station would be maintained through these spaces and may be temporarily activated to provide public spaces and local community facilities.

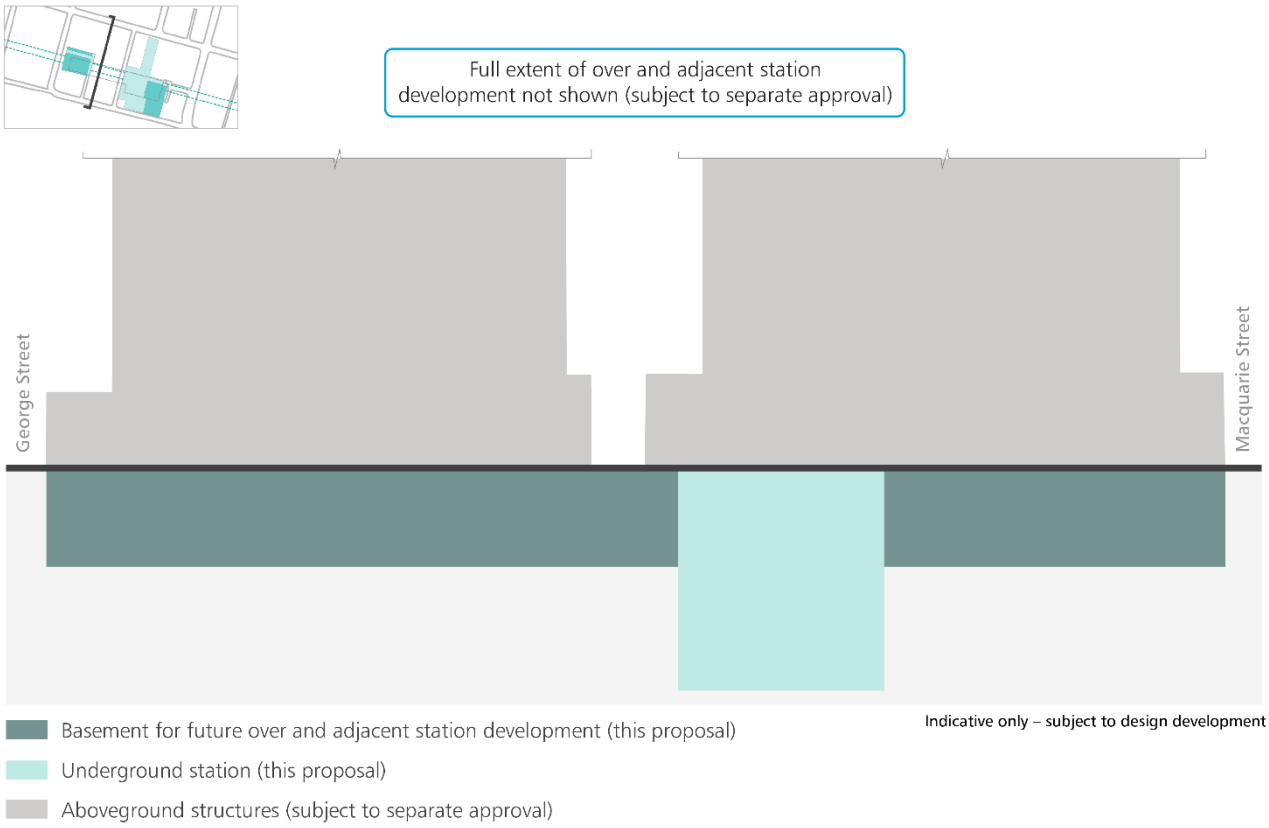

Figure 8-4 Indicative basement extent – Parramatta metro station

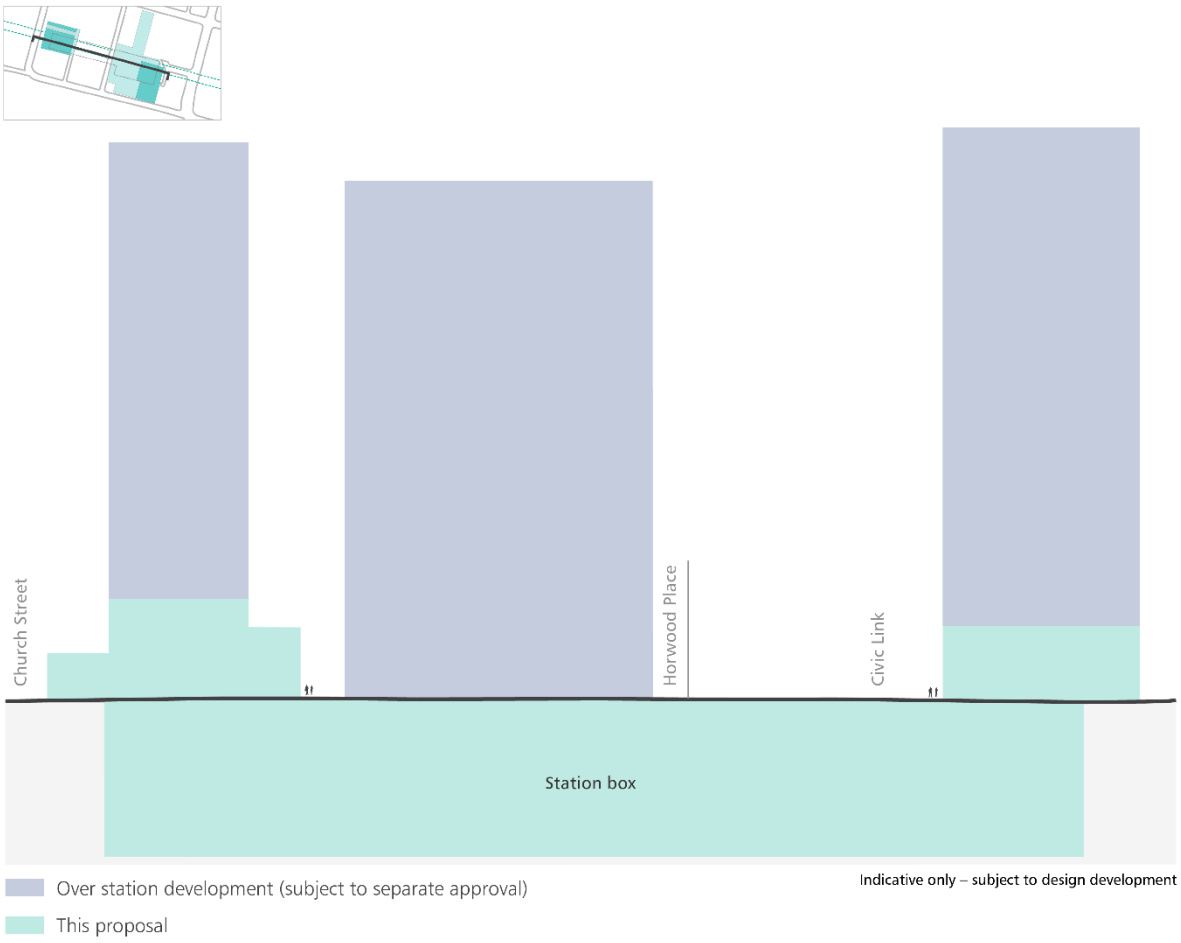

Figure 8-5 Potential over station development extent – Parramatta metro station

8.3 Placemaking

The vision for Parramatta metro station and its surrounds is for:

Sydney's Central River City – a high amenity and connected employment, living and cultural centre in the heart of Sydney.

8.3.1 Integration with strategic planning

As a priority in the *Central City District Plan* (Greater Sydney Commission, 2018c), Parramatta CBD has the potential to be transformed into one of Australia's most important business hubs. To capitalise on this plan, a number of plans and strategies have been developed that have informed the development of Parramatta metro station and would guide future design.

This proposal has considered the objectives of *Better Placed* (Government Architect NSW, 2017) as outlined in Section 5.2 (Placemaking and design) of this Environmental Impact Statement. An overview of how this proposal meets the relevant transport and connectivity outcomes of the *Healthy Built Environment Checklist* (NSW Government, 2020a) is also provided in Appendix I (Healthy Built Environment Checklist).

City of Parramatta Local Strategic Planning Statement: City Plan 2036

The relationship of the Concept to the *City of Parramatta Local Strategic Planning Statement City Plan 2036* (City of Parramatta, 2036) is discussed in Section 7.10.2 of the *Sydney Metro West Environmental Impact Statement – Westmead to The Bays and Sydney CBD* (Sydney Metro, 2020a).

The Local Strategic Planning Statement vision is "for Parramatta to transition in the next 20 years to a bustling, cosmopolitan and vibrant metropolis, the Central City for Greater Sydney". Several of Council's planning priorities are enhanced by a metro station as a city-shaping influence on the Parramatta CBD. Priorities include:

- building the access capacity of the CBD, recognising the constraints of the existing T1 Western Line
- improving the integrated transport network to enable and expand Parramatta's economic role as the Central City of Greater Parramatta, maximising connectivity and choice for customers
- improving the amenity, walking and cycling infrastructure of the CBD and enhancing Parramatta's heritage and cultural assets
- supporting the growth of Parramatta's night-time economy.

The proposed Sydney Metro West station in Parramatta would provide a second mass transit hub relieving the T1 Western Line, greatly enhancing access, connectivity into and out of the CBD, and deliver amenity enhancements with extensive new public domain focused on the Civic Link.

Civic Link Framework Plan

The *Civic Link Framework Plan* (City of Parramatta Council, 2017) establishes an aspiration for a new Civic Link to support the liveability, sustainability and productivity of the Parramatta CBD. The Civic Link would connect Parramatta Square to the Parramatta River at River Square via a green, pedestrianised public space and 'cultural spine'. Parramatta metro station would provide an entry directly to the Civic Link and would deliver the section of the link between George Street and Macquarie Street.

Sydney Green Grid

The Parramatta River foreshore has been identified as a Green Grid priority project, which aims to create and connect a network of open spaces on both sides of the river. Sydney Metro West would improve connectivity to the foreshore via the future Civic Link at Parramatta, supporting its activation.

8.3.2 Place and design principles

Place and design principles for Parramatta metro station were identified in Section 7.10.2 of the *Sydney Metro West Environmental Impact Statement – Westmead to The Bays and Sydney CBD* (Sydney Metro, 2020a). The principles build on the five Sydney Metro-wide design objectives and have considered relevant local council strategies and *Better Placed* design objectives (refer to Section 5.2 (Placemaking and design) of this Environmental Impact Statement). Table 8-2 outlines how these principles have been achieved in the Parramatta metro station design.

Table 8-2 Design responses to Parramatta metro station place and design principles

Place and design principle	Design response
Support the transformation, expansion and economic growth of the Parramatta CBD by facilitating a well-designed high-quality station, public domain and development	• centrally focused in the Parramatta CBD, the station would connect to the new Civic Link, Parramatta Square and Church Street, serving the planned expansion of the commercial core and greatly increasing pedestrian permeability and public domain amenity around the station entrances • the station would provide an extensive expansion of the public domain network within the Parramatta CBD, greatly increasing pedestrian permeability and access • the station presents great opportunities for high-quality over and adjacent station development to activate the CBD public domain.
Strengthen the connectivity of the city centre between Parramatta Square and the Parramatta River by supporting realisation of the Civic Link	• the metro station would deliver the section of the proposed Civic Link between Macquarie Street and George Street, satisfying Concept condition of approval C-B3 • the main station entry directly faces the Civic Link, connecting directly with Parramatta Square and safeguarding for the further expansion of the Civic Link north to the Parramatta River.
Facilitate activation of the ground plane at the station and its surrounds, encouraging pedestrian movement in the area	• centrally located in the Civic Link, the main station entry would draw people through the block, complemented by a future east-west link. This fine-grain pedestrian network would support new and diverse ground floor activation.
Enhance permeability by introducing fine-grain pedestrian links between the station and surrounding streets, breaking down the large city block	• delivery of the proposed Civic Link between Macquarie and George Street would enhance pedestrian permeability between Macquarie Street and George Street • modification and realignment of Horwood Lane would provide local traffic between Macquarie Street and George Street separated from the main pedestrian activity area along the Civic Link • a future east-west pedestrian connection would be safeguarded to enable connection from Church Street through to the Civic Link and onto Smith Street.
Facilitate intuitive interchange with pedestrian and cycle transport, the future Parramatta Light Rail Stage 1, and bus services with legible, safe and direct connections from the station entry	• the station entry is located to provide for direct and easy interchange with light rail on Macquarie Street (via the Civic Link) and buses on Smith Street • the pedestrianised and cycle-friendly Civic Link would provide a safe and high amenity space and connect with the future CBD cycle connections on George Street (planned by City of Parramatta Council).

The key urban design principles to support the implementation of the place and design principles are illustrated in Figure 8-6, Figure 8-7 and Figure 8-8.

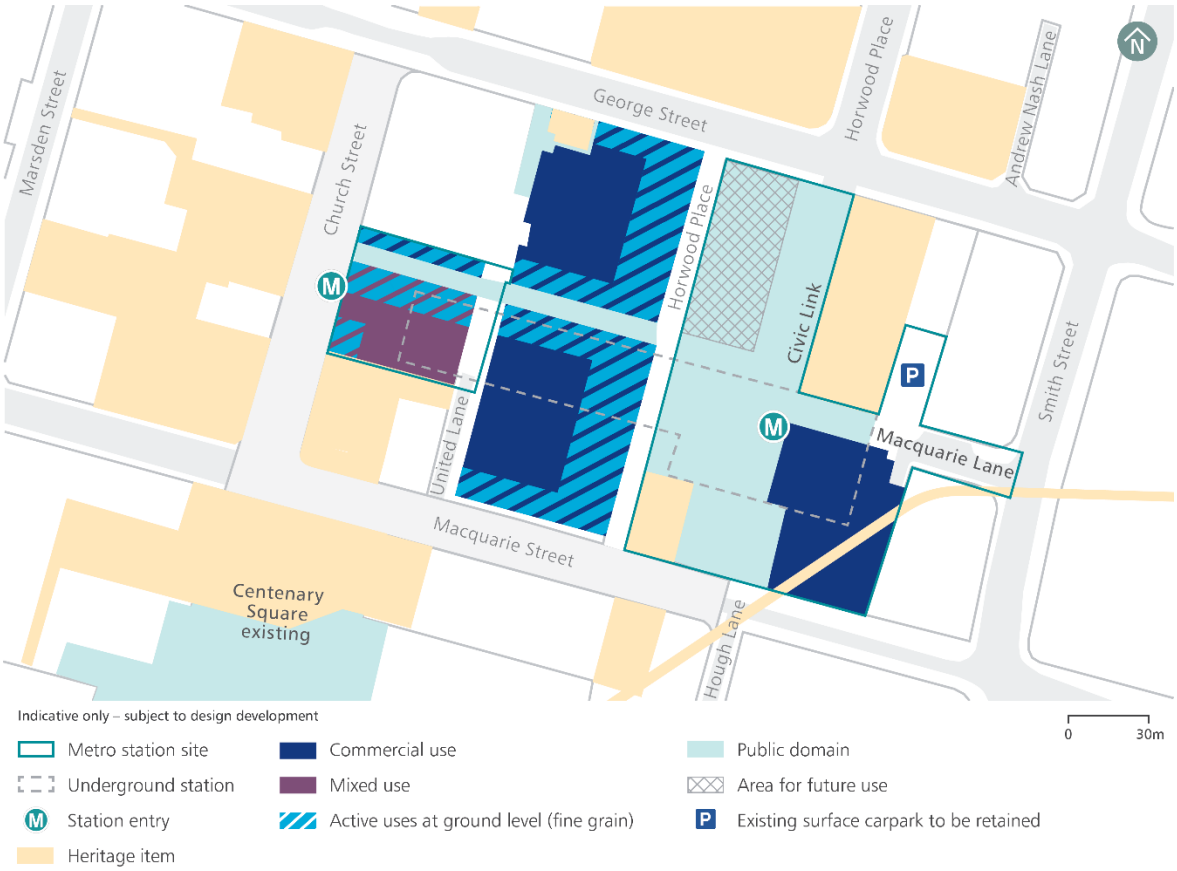

Figure 8-6 Land use and function urban design strategies – Parramatta metro station

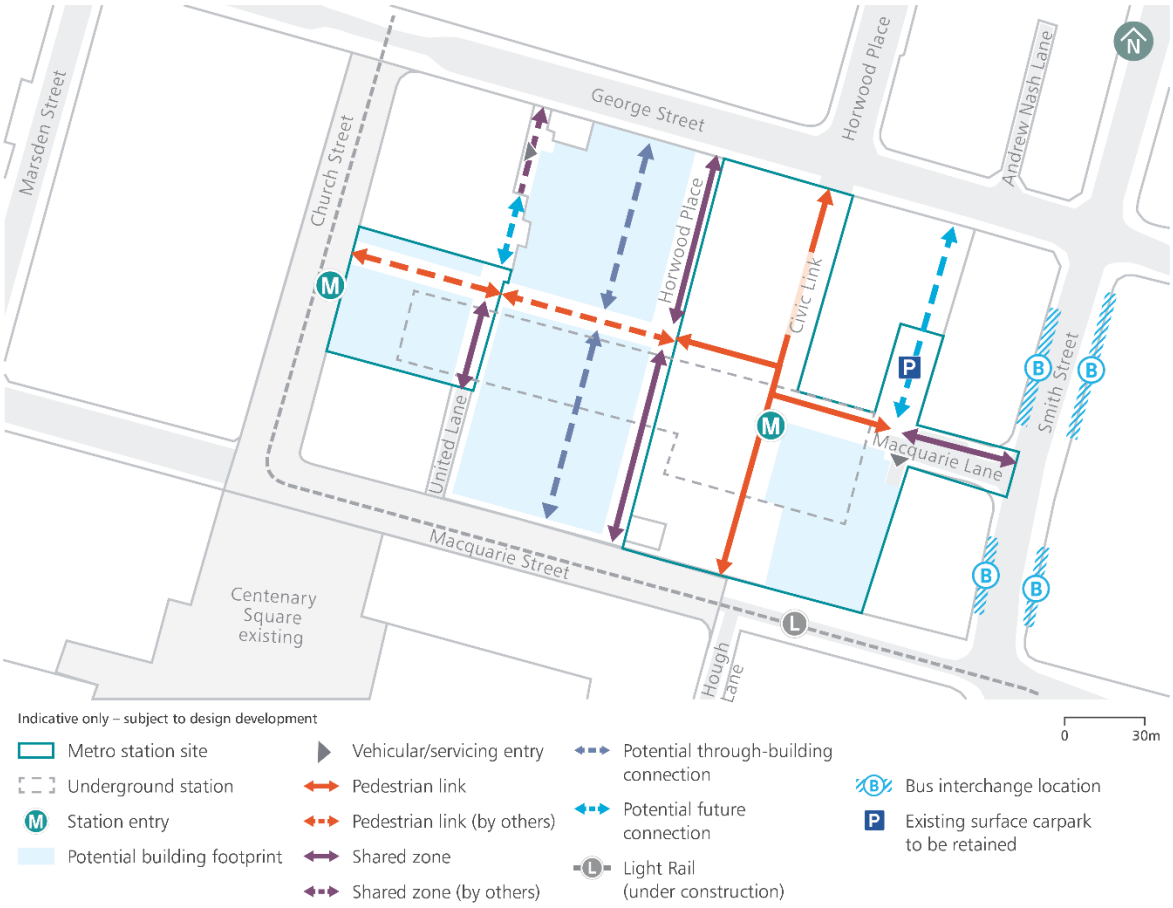

Figure 8-7 Access and connectivity urban design strategies – Parramatta metro station

Figure 8-8 Built form urban design strategies – Parramatta metro station

The Parramatta metro station design includes the following key movement and place features:

- providing station entries focused on the pedestrianised Civic Link and Church Street, and away from the key vehicle movement corridors along George Street and Smith Street
- extensive new public domain space, including the north-south pedestrian-focused Civic Link between Macquarie Street and George Street satisfying Concept condition of approval C-B3
- safeguarding for a future east-west connection through to Church Street to increase permeability and activation
- an upgraded and modified alignment for Horwood Place, providing local vehicular access between Macquarie Street and George Street
- an enhanced setting for the integration of heritage assets including Kia Ora and the adjacent Roxy Theatre
- recognising the key vehicle movement corridor along George Street while providing a safe pedestrian crossing at the end of the Civic Link.

8.3.3 Transport interchange, access and connectivity

Integration with other transport modes, including active transport, is fundamental to improving access to the public spaces and local community facilities surrounding or delivered as part of the Parramatta metro station design. The delivery of a metro station at Parramatta provides a second mass transit hub right in the heart of the Parramatta CBD. Parramatta metro station would deliver extensive new public domain, including the Civic Link and new street between George Street and Macquarie Street. East-west connections would be enhanced to Smith Street and safeguarded for a future connection through to Church Street. These initiatives would greatly enhance the connectivity and access to the large city block bounded by George Street, Church Street, Macquarie Street and Smith Street.

Examples of how the Parramatta metro station design would integrate with other transport modes and improve access for customers and the community include:

- creation of a high amenity, pedestrian dominated environment on the Civic Link that provides activation and access for the community
- direct access to the Parramatta Light Rail stop on Macquarie Street, via the Civic Link
- provision of, and direct access to, new bus stops and services on Smith Street through an east-west connection from the Civic Link
- easy connection through to the existing Parramatta station and additional bus services (on Argyle Street) via a short walk along the Civic Link and through Parramatta Square
- active transport connections via the Civic Link (which would ultimately connect to Parramatta River cycleway) and the Parramatta CBD on-street cycle network
- opportunity for connections to Parramatta River and the ferry terminal (via the future Civic Link).

8.4 Construction description

This section provides a description of the construction activities required to complete Parramatta metro station, and associated precinct work required for the operation of Sydney Metro West.

Major civil construction including station excavation and tunnelling work at Parramatta was assessed and approved under *Sydney Metro West Environmental Impact Statement – Westmead to The Bays and Sydney CBD* (Sydney Metro, 2020a) and does not form part of this proposal.

8.4.1 Overview

Construction of Parramatta metro station would require the continued use of a construction site established under the previous Sydney Metro West planning application. The land for this construction site will be consistent with the site described in the *Sydney Metro West Environmental Impact Statement – Westmead to The Bays and Sydney CBD* (Sydney Metro, 2020a).

The Parramatta metro station construction site will be located between George Street to the north, Smith Street to the east, Macquarie Street to the south and Church Street to the west.

The Parramatta metro station construction site will be demolished and excavated as a result of the work carried out under the previous Sydney Metro West planning application prior to the commencement of this proposal. This excludes the heritage buildings within the Parramatta metro station construction site that would be retained, which would also be retained for the construction of this proposal. The realignment of Macquarie Lane would be delivered as part of the work carried out under the previous Sydney Metro West planning application.

The location and indicative layout of the Parramatta metro station construction site are shown in Figure 8-9. Some activities would occur outside this construction site, such as delivery of construction equipment, and station precinct and interchange work.

This proposal would include additional excavation for the construction of basement structures for future over station and adjacent station development that would require the removal of about 145,000 cubic metres of spoil (refer Figure 8-2). Construction of the basement structures as part of this proposal is required to facilitate construction of the aboveground station infrastructure, Civic Link, and public domain, which are required to be delivered prior to operation of this proposal. Fit-out and use of the basement structures would be subject to separate approval.

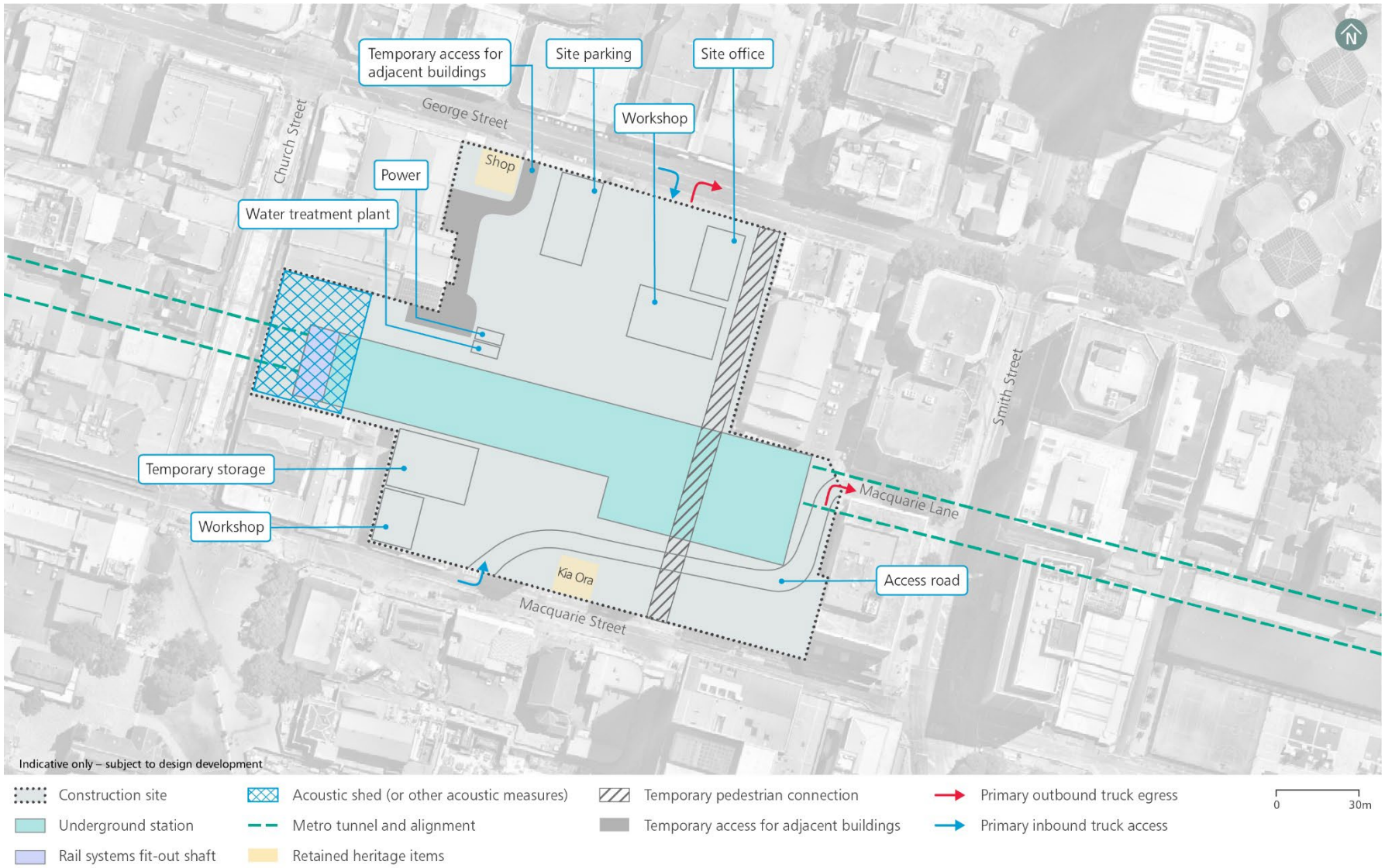

Figure 8-9 Indicative construction site layout – Parramatta metro station

Figure 8-10 Indicative basement extent – Parramatta metro station

8.4.2 Construction work

Key construction work at the Parramatta metro station construction site would include:

- enabling and site establishment work, including:
  - installation of an acoustic shed (or other acoustic measures) over the rail systems fit-out shaft at the western end of the station box (refer to Figure 8-9)
  - installation or retention of protection around heritage structures including Kia Ora, Roxy Theatre and heritage-listed shop at 45 George Street
- construction of the station and structures for non-station use
- station fit-out
- excavation for basement structures for over station and adjacent station development
- construction of station precinct and interchange facilities, including:
  - public domain works including the for the Civic Link within the footprint of the construction site
  - provisioning for adjacent and over station development
- access for tunnel fit-out and rail systems work
- finishing work, testing and commissioning.

The indicative construction program for Parramatta metro station is shown in Figure 8-11.

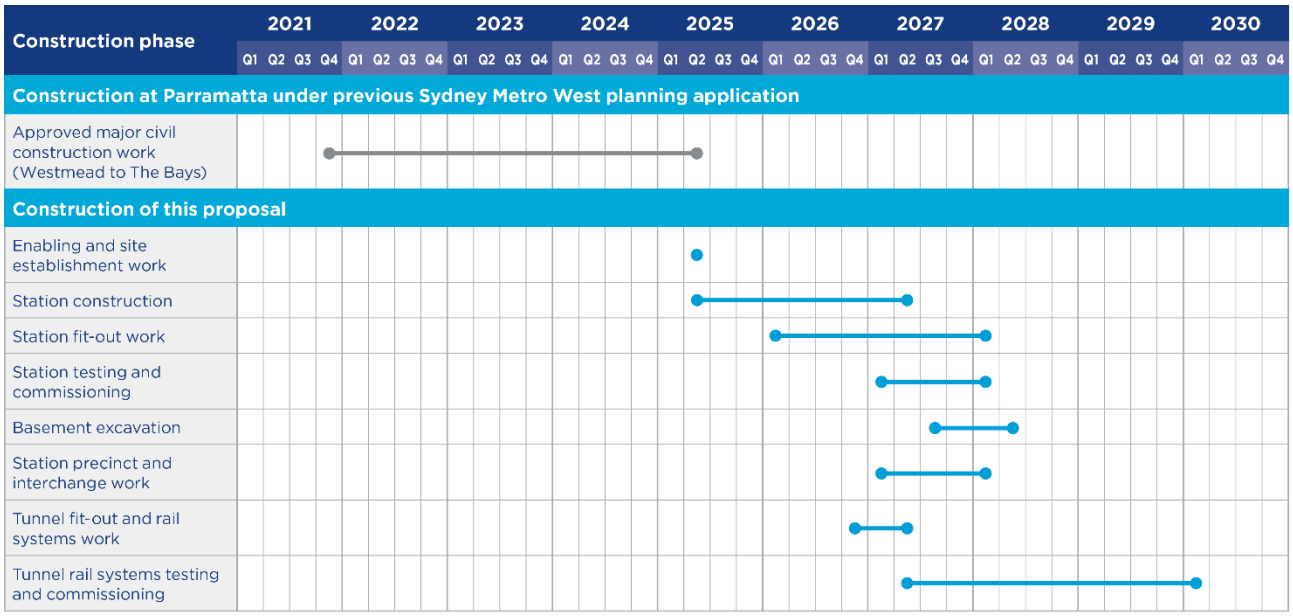

Figure 8-11 Indicative construction program – Parramatta metro station

Other construction elements specific to Parramatta metro station are shown in Table 8-3. Indicative construction hours, plant and equipment and workforce for Parramatta metro station construction site are provided in Section 6.5 (Other construction elements) of this Environmental Impact Statement.

Key elements specific to Parramatta metro station as described in the table below, are also depicted on Figure 8-9.

Table 8-3 Other construction elements – Parramatta metro station

Construction element	Description
Construction traffic access and egress	Continued access and egress arrangements established under the previous Sydney Metro West planning application that would likely be maintained during construction include: • access to the north of the construction site via right-in from George Street at a temporary signalised intersection.
	Additional and/or new access and egress arrangements likely to be required for construction of this proposal include: • egress from the north of the construction site via right-out onto George Street at the temporary signalised intersection • access to the south of the construction site via left-in from Macquarie Street and the realigned Macquarie Lane • egress from the south of the construction site via left-out onto the realigned Macquarie Lane then left-out onto Smith Street.
Peak daily traffic movements	• about 292 daily heavy vehicle movements • about 300 daily light vehicle movements. Note: Movement refers to a one-way movement. A vehicle entering and then leaving a construction site represents two movements.
Transport network modifications	Continued transport network modifications established under the previous Sydney Metro West planning application that would be maintained during construction include: • permanent closure of Horwood Place to allow construction of the new Civic Link • realignment of Macquarie Lane (and kept open to public) between Macquarie Street and Smith Street • permanent loss of on-street parking along Horwood Place and off-street parking accessed from Horwood Place • temporary construction phase signals at George Street for site access/egress (although these would become permanent for pedestrian crossing of George Street at the Civic Link) • temporary access arrangements to adjacent properties.
	As part of this proposal, provision would be made for ongoing pedestrian access between George Street and Macquarie Street through the construction site.

8.5 Transport

Further details of the operational and construction transport assessment, including the approach and methodology, is provided in Technical Paper 1 (Operational transport) and Technical Paper 2 (Construction transport).

Potential impacts (including benefits) at a regional level or where impacts are common across precincts are assessed in Chapter 18 (Proposal-wide) of this Environmental Impact Statement. This includes strategic transport benefits during operation, and potential impacts in relation to road user safety, construction worker parking, emergency vehicles and road condition during construction.

8.5.1 Baseline environment

The baseline transport environment described for Parramatta metro station includes the existing transport environment, as well as adjustments made as a result of the work carried out under the previous Sydney Metro West planning application.

Active transport network

The pedestrian network surrounding Parramatta metro station is well developed. Key pedestrian facilities include:

- footpaths along all roads, including Macquarie Street and George Street
- controlled crossings at all signalised intersections, including a scramble crossing at the George Street / Smith Street intersection
- signposted high pedestrian activity areas along Phillip Street (between Marsden Street and Charles Street) and Charles Street (between Phillip Street and George Street)
- shared paths along O'Connell Street, Elizabeth Street, Macarthur Street and Harris Street that provide connectivity to Parramatta River and Parramatta Park.

As part of the work carried out under the previous Sydney Metro West planning application, Horwood Place between George Street and Macquarie Street will be closed to pedestrians, Batman Walk will be closed, and new traffic signals with pedestrian crossings will be in operation at the site access on George Street.

There are currently temporary alterations to the active transport network, particularly along Church Street and Macquarie Street, including road closures, minor pedestrian detours and reduced footpath widths as a result of construction of Parramatta Light Rail Stage 1.

The cycle network surrounding Parramatta metro station includes:

- on-road cycle routes on Phillip Street, George Street, Macquarie Street, O'Connell Street, Elizabeth Street, Smith Street and Church Street
- crossing of Parramatta River at Noller Bridge, O'Connell Street, Elizabeth Street, Charles Street Weir and Macarthur Street
- bicycle lockers near the existing Parramatta Station on Wentworth Street and at the corner of Darcy Street and Station Street East, and a bicycle shed at the corner of Hassall Street and Station Street East.

As part of the work carried out under the previous Sydney Metro West planning application, the on-road cycle route on Horwood Place between George and Macquarie Streets will be closed.

The existing active transport network will also be modified as part of Parramatta Light Rail Stage 1 and implemented by 2023 to include new pedestrian zones on Church Street and Macquarie Street, modifications of pedestrian crossings surrounding Parramatta metro station on Church Street, Macquarie Street, George Street and Smith Street, and adjustments to cycle routes on Macquarie Street.

Public transport network

A summary of the public transport services around Parramatta metro station is provided in Table 8-4.

Table 8-4 Public transport services – Parramatta metro station

Mode	Description
Rail	• T1 Western Line, T2 Inner West and Leppington Line and T5 Cumberland Line on the Sydney Trains network via the existing Parramatta Station • Blue Mountains and Western NSW Lines on the NSW TrainLink network via the existing Parramatta Station • future Parramatta Light Rail Stage 1 along Church Street, Macquarie Street and Harris Street (from 2023).
Bus	• 46 bus routes including 4 NightRide bus routes • 2 bus rapid transit routes • 41 school bus routes • 3 shuttle bus services.
Ferry	• F3 Parramatta River Line via Parramatta Wharf about 600 metres north-east.

Parking, loading, servicing and pick-up arrangements

On-street parking in Parramatta consists of unticketed and ticketed parking. Immediately surrounding Parramatta metro station there are ticketed on-street parking spaces along George Street. Parking spaces on Horwood Place will be permanently removed as part of the work carried out under the previous Sydney Metro West planning application.

Kiss and ride bays and loading zones are located throughout the Parramatta CBD and point-to-point zones are located close to the existing Parramatta Station on Fitzwilliam Street and Valentine Avenue.

Traffic volumes and patterns

Approximate peak-hour midblock volumes on key access roads surrounding Parramatta metro station are shown in Table 8-5. The key access roads carry traffic volumes generally commensurate with their function.

Table 8-5 Existing peak hour traffic volumes (mid-block) by direction – Parramatta metro station (2021)

Road	Direction	AM peak hour volume (vehicles per hour)	PM peak hour volume (vehicles per hour)
Great Western Highway west of Pitt Street	Eastbound	1,750	1,310
	Westbound	1,010	1,700
Macquarie Street west of O'Connell Street	Eastbound	1,880	1,510
	Westbound	–	–
George Street east of Church Street	Eastbound	440	310
	Westbound	200	410
Parkes Street east of Harris Street	Eastbound	710	920
	Westbound	740	490
Harris Street south of George Street	Northbound	–	–
	Southbound	540	660
Pitt Street north of Great Western Highway	Northbound	1,270	870
	Southbound	20	30
O'Connell Street south of George Street	Northbound	1,720	1,370
	Southbound	1,540	1,450

Intersection performance

Modelled intersection performance during the AM and PM peak hours for key intersections in the vicinity of Parramatta metro station is shown in Table 8-6. This modelling considers:

- the continued road network arrangements made under the previous Sydney Metro West planning application including:
  - closure of Horwood Place
  - new traffic signals at the site access on George Street
  - realignment of Macquarie Lane (to remain open to the public) providing a vehicular connection between Macquarie Street and Smith Street
- road closures for construction of the Parramatta Light Rail Stage 1, including full or partial closure of sections of Church Street, Macquarie Street, Harris Street and George Street.

Modelled intersection performance indicates that the following intersections currently perform at level of service E or F:

- Great Western Highway / Pitt Street during the AM and PM peak hours, which is due to high traffic volumes on Great Western Highway in the peak direction
- Pitt Street / Park Parade / Argyle Street during the AM peak hour, which is due to high traffic volumes on Pitt Street and Park Parade, resulting in increased congestion.

Table 8-6 Modelled peak hour baseline intersection performance – Parramatta metro station (2021)

Intersection and peak hour	Demand flow (vehicles per hour)	Average delay (seconds per vehicle)	Level of service	Maximum queue length by directional approaches (metres)	
Great Western Highway / Pitt Street (signalised)					
AM peak	4,383	63	E	NB	165
				EB	450
				SB	20
				WB	355
PM peak	4,185	96	F	NB	120
				EB	210
				SB	45
				WB	>500
Pitt Street / Park Parade / Argyle Street (signalised)					
AM peak	2,660	65	E	NB	335
				EB	450
				SB	-
				WB	105
PM peak	2,354	35	C	NB	170
				EB	115
				SB	-
				WB	240
Macquarie Street / O'Connell Street (signalised)					
AM peak	3,857	22	B	NB	-
				EB	230
				SB	215
				WB	35
PM peak	3,601	14	A	NB	-
				EB	115
				SB	75
				WB	80
Macquarie Street / Marsden Street (signalised)					
AM peak	1,518	7	A	NB	70
				EB	-
				SB	55
				WB	<5
PM peak	1,722	7	A	NB	60
				EB	-
				SB	100
				WB	<5
George Street / O'Connell Street (signalised)					
AM peak	3,739	49	D	NB	120
				EB	-
				SB	>500
				WB	25
PM peak	3,252	16	B	NB	95
				EB	-
				SB	165
				WB	60

Intersection and peak hour	Demand flow (vehicles per hour)	Average delay (seconds per vehicle)	Level of service	Maximum queue length by directional approaches (metres)	
George Street / Marsden Street (signalised)					
AM peak	1,753	23	B	NB	85
				EB	65
				SB	105
				WB	45
PM peak	2,091	23	B	NB	75
				EB	35
				SB	145
				WB	80
George Street / Church Street (signalised)					
AM peak	685	6	A	NB	-
				EB	85
				SB	-
				WB	5
PM peak	775	6	A	NB	-
				EB	60
				SB	-
				WB	25
George Street / Horwood Place (priority controlled)					
AM peak	838	6	A	NB	<5
				EB	<5
				SB	<5
				WB	<5
PM peak	876	6	A	NB	<5
				EB	<5
				SB	<5
				WB	<5
George Street / Smith Street (signalised)					
AM peak	1,408	39	C	NB	40
				EB	90
				SB	90
				WB	30
PM peak	1,528	36	C	NB	60
				EB	70
				SB	60
				WB	40
George Street / Charles Street (signalised)					
AM peak	1,427	25	B	NB	85
				EB	75
				SB	50
				WB	30
PM peak	1,379	25	B	NB	75
				EB	90
				SB	35
				WB	25

Intersection and peak hour	Demand flow (vehicles per hour)	Average delay (seconds per vehicle)	Level of service	Maximum queue length by directional approaches (metres)	
George Street / Macarthur Street / Harris Street (signalised)					
AM peak	1,365	28	B	NB	-
				EB	115
				SB	215
				WB	-
PM peak	1,758	32	C	NB	-
				EB	155
				SB	240
				WB	-
Harris Street / Macquarie Street (signalised)					
AM peak	576	<5	A	NB	-
				EB	-
				SB	10
				WB	-
PM peak	695	<5	A	NB	-
				EB	-
				SB	95
				WB	-
Harris Street / Parkes Street (signalised)					
AM peak	2,389	48	D	NB	125
				EB	140
				SB	170
				WB	180
PM peak	2,351	47	D	NB	105
				EB	155
				SB	190
				WB	115
Harris Street / Hassall Street (priority controlled)					
AM peak	1,059	<5	A	NB	<5
				EB	-
				SB	<5
				WB	-
PM peak	1,011	<5	A	NB	<5
				EB	-
				SB	<5
				WB	-

8.5.2 Operational impact assessment

This section outlines the transport interchange provisions proposed at Parramatta metro station as shown in Figure 8-1.

The transport interchange provisions have been designed to maximise the seamless travel experience for all customer groups transferring between this proposal and other transport modes. Stations have been designed for ease of interchange from the different modes, including pedestrian and cycle facilities and to minimise disruptions to public transport users and the surrounding road network.

This section also discusses the potential impact of the transport interchange provisions on the transport network during operation.

Passenger demand

Station passenger demand forecast for the 2036 AM peak hour (8am to 9am) indicates about 4,700 customers accessing Parramatta metro station and 3,100 customers egressing Parramatta metro station during the AM peak hour. This indicates this station would be used as an origin and destination station.

The 2036 modal breakdown of access and egress during the AM peak hour is presented in Table 8-7. The key observations from this analysis indicate that the majority of access and egress trips would be by walking, with almost all departures via walking trips to local commercial land uses, with some transfer to bus and light rail.

Table 8-7 2036 forecast mode of access and egress – Parramatta metro station

Mode	Walk	Cycle	Bus	Kiss and ride	Light rail
Access	42%	2%	21%	1%	34%
Egress	88%	2%	6%	0%	4%

Integration with other transport modes

A description of how Parramatta metro station would integrate with existing transport modes during operation is provided in Table 8-8. Appropriate signage and wayfinding would be provided within the precinct to provide easy customer transfer and access to the station.

Table 8-8 Network integration – Parramatta metro station

Network	Description
Pedestrian network	Two station entries are proposed at Parramatta metro station – an eastern entry from the Civic Link and a western entry from Church Street. The existing and proposed pedestrian network around the proposed Parramatta metro station would allow for good connectivity and would create safe, walkable streets, designed for people. New pedestrian facilities proposed to be provided as part of the station and precinct include: • the section of the Civic Link between Macquarie and George Streets to facilitate pedestrian access to the eastern entry • a new signalised mid-block crossing of George Street at the Civic Link (through conversion of the construction phase traffic signals) • a mid-block crossing of Church Street in the vicinity of the proposed bus stops • a shared zone on Macquarie Lane to provide pedestrian safety and prioritisation between Smith Street and the Civic Link. Existing pedestrian facilities that would also assist with providing access to the station include: • signalised pedestrian crossings at Macquarie Street / Smith Street, George Street / Smith Street, Church Street / George Street, and Church Street / Macquarie Street intersections • the proposed pedestrian crossing of Macquarie Street at the Civic Link to be delivered as part of Parramatta Light Rail • the pedestrianised Macquarie Street and Church Street by Parramatta Light Rail. The proposed Civic Link (by the City of Parramatta Council) extending from Parramatta Square to River Square would enhance pedestrian connectivity to the station from the broader Parramatta CBD. 2036 pedestrian modelling indicates that surrounding footpaths in the area would continue to operate satisfactorily at a level of service A in both the AM and PM peak periods.
Cycle network	New cycling facilities proposed to be provided as part of Parramatta metro station and precinct include: • dedicated cycle provision along the section of the Civic Link between Macquarie and George Streets • cycle crossing at the proposed signalised mid-block crossing on George Street at the Civic Link • bicycle parking facilities near the eastern station entry.

Network	Description
	Existing cycle facilities that would also assist with providing access to the station include crossing points for cyclists at the existing George Street / Church Street, George Street / Smith Street, Macquarie Street / Smith Street, and Macquarie Street / Church Street intersections. The planned cycle link on George Street (by City of Parramatta Council as part of the Parramatta Bike Plan) would provide enhanced cycle connectivity to the station and would link to the proposed cycle route on the Civic Link.
Public transport network	Public transport integration at Parramatta metro station would include: • interchange with the future light rail stop on Macquarie Street. This would be facilitated by the delivery of the Civic Link connecting Macquarie Street to the station entry, and by the pedestrianisation of Macquarie Street between Horwood Place and Smith Street by Parramatta Light Rail • interchange with bus services, including new bus stops on Smith Street between Macquarie Street and George Street, and the existing bus stops on Smith Street north of George Street. To provide improved pedestrian connectivity from these bus stops to the metro station, a new mid-block signalised pedestrian crossing of Smith Street would be provided in the vicinity of the bus stops. Customers could also make an indirect connection to the existing Parramatta Station via a short walk along the Civic Link and through Parramatta Square.
Road network	A number of changes are anticipated to be made to the surrounding road network as a result of Parramatta Light Rail. This includes pedestrianisation of Church Street, and of Macquarie Street between Horwood Place and Smith Street. Road network changes that would be implemented as part of the station precinct include: • realignment of Horwood Place to the west, providing a one-way northbound connection between Macquarie Street and George Street • a new signalised mid-block crossing of George Street at the Civic Link (through conversion of the construction phase traffic signals) • a new mid-block signalised pedestrian crossing of Smith Street in the vicinity of the bus stops • a shared zone on Macquarie Lane to provide pedestrian safety and prioritisation between Smith Street and the Civic Link. Based on the low volumes of customers expected to access the station by car, these trips would not impact road network and intersection performance. The following facilities would be provided for these customers: • two accessible kiss and ride spaces on the realigned Horwood Place • a point-to-point zone on George Street east of Horwood Place.

Road network performance

Intersection performance results for the ‘2036 without proposal’ and ‘2036 with proposal’ scenarios during the AM and PM peak hours for key intersections in the vicinity of Parramatta metro station are shown in Figure 8-12.

The majority of intersections around Parramatta metro station would operate at the same level of service both with and without this proposal. The exceptions are:

- George Street / Church Street in the AM peak and Macquarie Street / Marsden Street in the PM peak, which would reduce from level of service A to B with this proposal. These intersections would still operate at an acceptable level with spare capacity
- George Street / Smith Street which would reduce from level of service C to D in the AM peak, however the average delay would only increase by around one second.

Figure 8-12 Operational intersection performance – Parramatta metro station (2036)

Parking and property access

Around seven on-street parking spaces would be removed from George Street as a result of the new Horwood Place alignment.

Vehicular access to/from properties located to the southern side of Macquarie Street would be maintained via Macquarie Street (provided as part of Parramatta Light Rail Stage 1). Similarly, vehicular access to existing properties at the corner of Church Street and Macquarie Street would be maintained via United Lane. Ongoing access to the existing properties on the corner of Church Street and George Street would also be provided.

8.5.3 Construction impact assessment

Construction haul routes

The primary construction haul routes for Parramatta metro station are shown in Figure 8-13. Secondary haul routes may also involve the use of George Street, and O'Connell Street north to Victoria Road; and Smith Street, Station Street East to Parkes Street. Construction site access and egress locations, as well as the number of daily traffic movements anticipated at the Parramatta metro station construction site, are outlined in Section 8.4.

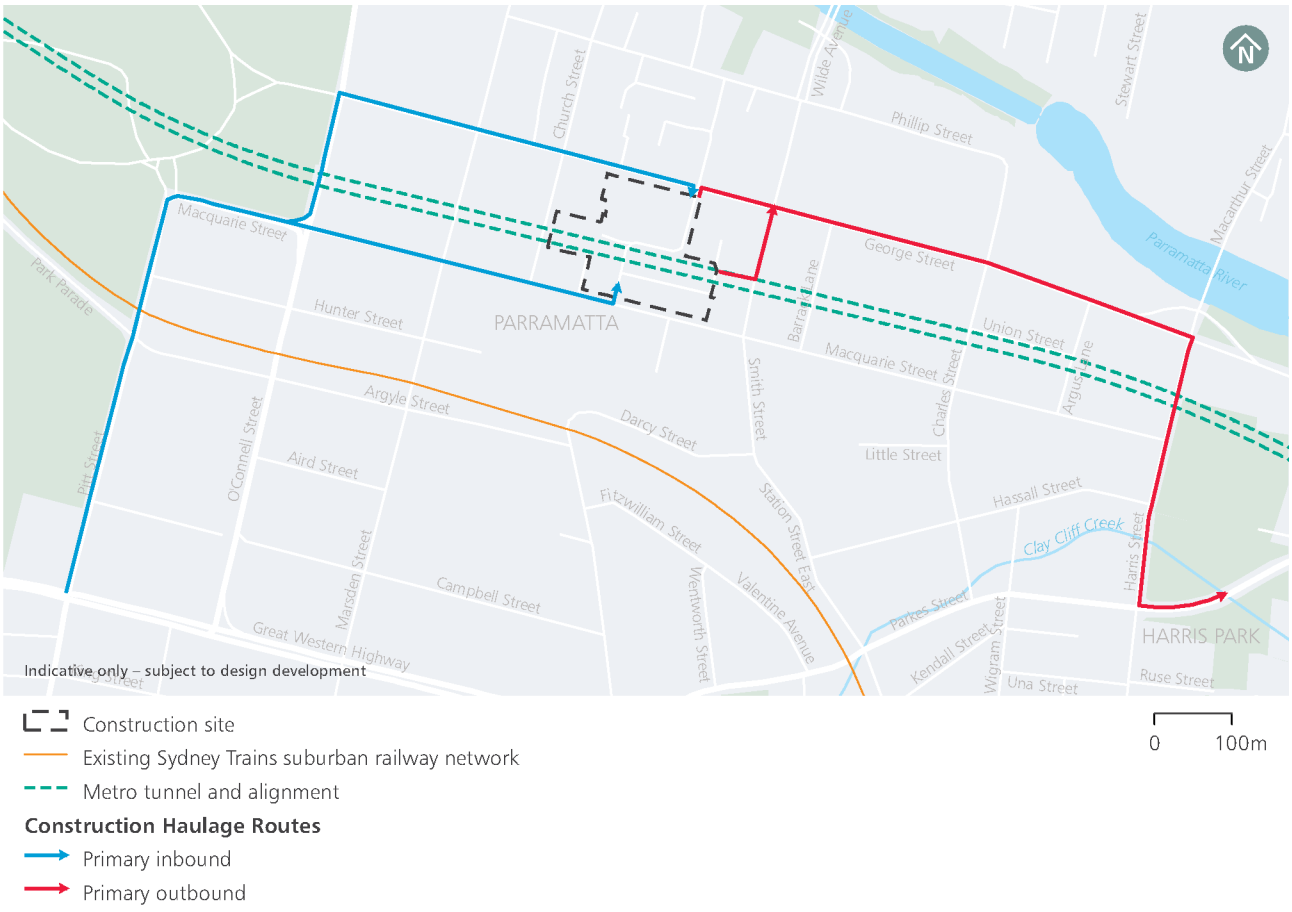

Figure 8-13 Primary construction haul routes – Parramatta metro station

Active transport network

The changes to the active transport network implemented under the previous Sydney Metro West planning application would continue during construction of this proposal. These include:

- closure of the north-south link along Horwood Place. A temporary pedestrian route would be provided between Macquarie Street and George Street, although some short-term closures (for around a few months) may be required
- closure of Batman Walk between Macquarie Street and Macquarie Lane.

Precinct construction work around the construction site for new point-to-point zones, bus stops and signalised pedestrian crossings may require some short-term closures (for around a few months) of sections of footpaths, which may result in some minor additional travel times for pedestrians. Appropriate diversions would be established to safely guide pedestrians around work zones.

O'Connell Street, George Street and Macquarie Street are designated on-road cycle routes that would also be used by construction vehicles travelling to and from the construction site. Construction vehicles would also travel adjacent to or across shared paths along Pitt Street, O'Connell Street, Macquarie Street, George Street, Charles Street and Harris Street. Impacts on cyclists on these roads would be minor given that cyclists would be interacting with a low number of additional heavy vehicles. To address potential conflicts, mitigation measures outlined in the CTMF would be implemented during construction.

Public transport network

Roads forming part of the construction haul route that are also used by buses include the Great Western Highway, Pitt Street, George Street, Smith Street and Parkes Street. Impacts on buses would be limited to a potential minor increase in travel time due to the additional construction vehicles on the road network. No impacts are anticipated on the operation of bus stops.

Light rail stops will be provided along Church Street and Macquarie Street as part of Parramatta Light Rail Stage 1. Construction vehicles would interface with the light rail network at the George Street / Church Street intersection and on Macquarie Street between Church Street and Macquarie Lane. Impacts on the light rail network would be minor and limited to a potential increase in travel time due to additional construction vehicles on the road network.

Parking and property access

During work carried out under the previous Sydney Metro West planning application, temporary alternative rear vehicular access will be provided for the properties fronting Church Street and George Street that currently have access from Horwood Place. This would also be maintained during construction of this proposal. Similarly, access from Macquarie Lane to properties fronting Smith Street that would remain during construction would be maintained via the realigned laneway. Vehicular access to the back-of-house service building and fire hydrant for the property located at 69 George Street would continue to be restricted during construction of this proposal.

No additional impacts on parking and property access are anticipated during construction.

Road network performance

Intersection performance results for the '2026 without proposal' (without construction vehicles) and '2026 with proposal' (with construction vehicles) scenarios are shown in Figure 8-14.

During the AM peak hour (8am to 9am) and PM peak hour (4.45pm to 5.45pm), it is anticipated that the Parramatta metro station construction site would generate a total of 38 light vehicle movements and 34 heavy vehicle movements during the peak construction activity.

These vehicle movement forecasts were assumed for the intersection performance modelling. Peak hours were selected to represent the times when background traffic demand is at its greatest.

Modelled intersection performance during construction indicates that the Pitt Street / Park Parade / Argyle Street intersection would deteriorate from level of service D to F in the PM peak hour. This is due to the additional construction vehicles travelling on Pitt Street in the northbound direction, resulting in increased congestion.

All other intersections would perform at the same level of service, both with and without construction traffic.

Figure 8-14 Construction site intersection performance – Parramatta metro station (2026)

Special events

A large number of special events are held at various locations in the Parramatta CBD (including at Centenary Square), such as New Year's Eve, Australia Day, Lunar New Year, Tropfest, Burramatta NAIDOC, Parramatta Lanes Festival and various sporting events.

Although Centenary Square is located adjacent to the Parramatta metro station construction site, construction work is not anticipated to directly impact the operation of special events scheduled there. Pedestrian access to and from special event venues, including Centenary Square and Parramatta interchange would be maintained during construction.

In recent years, the Parramatta Lanes Festival has used Centenary Square and other locations throughout Parramatta CBD. Event organisers would be consulted about the proposed construction works to allow sufficient time to consider the event's interaction with this proposal.

The CTMF outlines mitigation measures that would be implemented to minimise impacts during special events, which would be detailed in future Construction Traffic Management Plans.

8.5.4 Management and mitigation measures

Environmental management for this proposal would be undertaken through the environmental management approach as detailed in Chapter 20 (Synthesis) of this Environmental Impact Statement. This includes operational mitigation measures (where relevant) and performance outcomes for the operation and construction of this proposal.

The approach to transport and traffic management during the construction phase, including the process for the development of all construction traffic management plans is outlined in the CTMF provided in Appendix G.

The CTMF provides the overall strategy and approach for construction traffic management for Sydney Metro West, and an outline of the traffic management requirements, mitigation measures and processes that would be common to each of the proposed construction sites. It establishes the traffic management processes and acceptable criteria to be considered and followed in managing roads and footpaths adjacent to construction sites.

Mitigation measures that are specific to the operation and construction of Parramatta metro station are listed in Table 8-9.

Table 8-9 Transport mitigation measures – Parramatta metro station

Ref	Impact/issue	Mitigation measure	Timing
Transport			
EIS-TT18	Pedestrian access between Macquarie Street and George Street	A temporary north-south pedestrian route would be provided between Macquarie Street and George Street at the Parramatta metro station construction site, although some short-term closures may be required.	Construction

8.6 Noise and vibration

Further details on the operational and construction noise and vibration assessment, including the approach and methodology, are provided in Technical Paper 3 (Operational noise and vibration) and Technical Paper 4 (Construction noise and vibration).

8.6.1 Baseline environment

Existing noise levels around Parramatta metro station are controlled by road traffic noise and general urban noise associated with the Parramatta CBD. As with any CBD, existing noise levels and are relatively high during all periods. The area surrounding the construction site is mainly commercial – typically general office or retail use.

This precinct is covered by one noise catchment area (NCA) for the construction noise assessment – NCA03. The site and NCA are shown in Figure 8-15.

Figure 8-15 Location of sensitive receivers near Parramatta metro station and NCA

Unattended noise monitoring was carried out at sensitive receiver locations near Parramatta metro station between March and July 2019 as part of the *Sydney Metro West Environmental Impact Statement – Westmead to The Bays and Sydney CBD* (Sydney Metro, 2020a). This data represents the noise environment prior to the commencement of the work carried out under the previous Sydney Metro West planning application and was used to inform this assessment.

The results of the unattended noise monitoring are summarised in Table 8-10 and indicate that background noise levels generally reflect the commercial nature of the area.

Short-term attended noise monitoring was also carried out at Parramatta metro station between March and July 2019. The results were generally found to be consistent with the unattended noise monitoring. Detailed observations from the attended monitoring are provided in Technical Paper 4 (Construction noise and vibration).

Table 8-10 Summary of unattended noise monitoring – Parramatta metro station

Location ID	Noise logger location	Noise level (dBA)[1,2]					
		Background noise (RBL)			Average noise level (L_{Aeq})		
		Day	Evening	Night	Day	Evening	Night
B.01	Arthur Phillip High School, Parramatta	58	53	43	69	67	62

Notes:

1. The RBL and L_{Aeq} noise levels have been determined with reference to the procedures in the Noise Policy for Industry (NSW Environment Protection Authority, 2017)
2. Daytime is 7am to 6pm, evening is 6pm to 10pm, and night-time is 10pm to 7am

8.6.2 Operational impact assessment

The operational noise associated with Parramatta metro station has been assessed for the nearest and most noise-affected commercial and other sensitive receivers for each source type, as presented in Table 8-11.

The results indicate that the predicted noise levels would be compliant with the design noise criteria, with the exception of slight amenity criteria exceedances at educational receivers on Macquarie Street and the church on Macquarie Street. The assessment criteria for educational receivers assumes that windows can be opened, however the educational facilities on Macquarie Street have sealed façade systems, which would provide additional attenuation, so internal noise levels would be compliant with the amenity criteria. The Macquarie Street Church may choose to leave its door open during services. However, the exceedance is only marginal and it is likely measures, such as equipment placement and orientation, can be implemented during detailed design so that the internal noise amenity criteria is met.

Noise attenuation has been incorporated into the design to determine the predicted noise levels and includes consideration of the use of large fan attenuators, vent orientation, acoustic louvres and appropriate plant selection. These measures would be further developed throughout the detailed design phase so that compliance with the environmental noise criteria is achieved.

There would be no sources of vibration as part of the operation of the station that would impact nearby receivers. Potential operational vibration impacts from trains operating in the tunnels are addressed in Chapter 16 (Tunnels) of this Environmental Impact Statement.

Table 8-11 Operational noise levels – Parramatta metro station

Period/source	Criteria[1], dB(A)	Predicted noise level ($L_{Aeq,15min}$)
Adjacent – commercial		
Daytime	60	58
Evening	60	58
Night-time	60	55
Emergency mode	65	57
Macquarie Street church – place of worship		
Daytime	45 (50[2])	**48**
Evening	45 (50[2])	**48**
Night-time	45 (50[2])	**46**
Emergency mode	50	47
Macquarie Street – educational		
Daytime	40 (45[2])	**41**
Evening	40 (45[2])	**41**
Night-time	40	39
Emergency mode	45	40

Notes:
1. Criteria differs between operational noise source type (refer Technical Paper 3 (Operational noise and vibration))
2. Where the amenity target level is the controlling criterion and cannot reasonably be achieved, the lower of the intrusive or amenity acceptance noise level is used
3. Noise levels in bold identify predicted noise levels over the amenity target level

8.6.3 Construction impact assessment

The construction scenarios and anticipated working hours at the Parramatta metro station construction site are shown in Table 8-12. The estimated duration of each activity is also provided, noting that most activities would be intermittent and would not occur on a continual basis during every day of the activity.

The proposed work is anticipated to have a total duration of about four years. Refer to Figure 8-11 for the indicative construction program at Parramatta metro station construction site.

Temporary construction noise and vibration impacts would be managed through the implementation of standard and additional mitigation measures in accordance with the Sydney Metro CNVS.

Table 8-12 Construction activities and working hours – Parramatta metro station

Scenario	Activity		Indicative duration (months)	Hours of work[1]			
				Std. day	Out of hours works		
					Day OOH	Evening	Night
Site establishment and public domain work	Typical	Deliveries and general work	18	✓	✓	-	-
	Peak	Construction/decommissioning of facilities and hoarding		✓	✓	-	-
Piling	Typical	Supporting work	6	✓	✓	-	-
	Peak	Bored piling with support plant		✓	✓	-	-
Station/facility construction	Typical	Internal construction and fit-out	27	✓	✓	✓	✓
	Peak 1	Installation of framing and structure		✓	✓	✓	-
	Peak 2	Concrete work		✓	✓	✓	-
Rail systems access shaft	Typical	Surface support	9	✓	✓	✓	✓
	Peak 1	Deliveries and tunnel access		✓	✓	✓	✓
	Peak 2	Noise intensive work		✓	-	-	-
Excavation	Typical	Mucking out	9	✓	✓	-	-
	Peak 1	Through soft soil/rock		✓	✓	-	-
	Peak 2	Through rock using a rockbreaker		✓	✓	-	-

Notes:
1. OOH = out-of-hours

Airborne construction noise

The predicted airborne NML exceedances from the Parramatta metro station construction site are summarised in Table 8-13 for all residential receivers and in Table 8-14 for commercial and other sensitive receivers. The predictions are representative of the highest noise levels that would be experienced when the works are nearest to the sensitive receiver.

The number of receivers predicted to experience exceedances of the NMLs are summarised in bands of 10 dB and are separated into day, evening and night-time periods, as appropriate.

During the daytime, the highest construction noise impacts are predicted during excavation and station/facility construction work, when noise intensive equipment such as rockbreakers or concrete saws would be in use. The highest impact work is expected to last for around 20 weeks while using a rockbreaker during excavation and around 27 months while using concrete saws during station/facility construction; however, concrete saws would only be used intermittently when concrete slabs are poured.

During the night-time, the highest construction noise impacts are predicted for surface support and deliveries and tunnel access during rail systems access shafts and internal construction and fit-out during station/facility construction. The highest impact work is expected to last for around 27 months; however, the majority of this work would occur inside an acoustic shed (or other acoustic measures) or the built station structure and does not require noise intensive equipment.

Table 8-13 Overview of NML exceedances (residential receivers) – Parramatta metro station construction site

Scenario	Activity	Indicative duration (months)	Number of receivers exceeding NML														
			Standard hours daytime			Out of hours											
						Daytime out of hours			Evening			Night time			Sleep disturbance		
			1 10 dB	10 20 dB	>20 dB	1 10 dB	10 20 dB	>20 dB	1 10 dB	10 20 dB	>20 dB	1 10 dB	10 20 dB	>20 dB	1 10 dB	10 20 dB	>20 dB
Site establishment and public domain work	Typical	18	-	-	-	-	-	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	Peak		-	-	-	-	-	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Piling	Typical	6	-	-	-	-	-	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	Peak		-	-	-	-	-	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Station/facility construction	Typical	27	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-
	Peak 1		-	-	-	-	-	-	-	-	-	n/a	n/a	n/a	n/a	n/a	n/a
	Peak 2		-	-	-	1	-	-	2	-	-	n/a	n/a	n/a	n/a	n/a	n/a
Rail systems access shaft	Typical	9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Peak		-	-	-	-	-	-	-	-	-	-	-	-	1	-	-
Excavation	Typical	9	-	-	-	-	-	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	Peak 1		-	-	-	-	-	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	Peak 2		1	-	-	2	-	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a

Table 8-14 Overview of NML exceedances (other sensitive receivers) – Parramatta metro station construction site

Scenario	Activity	Indicative duration (months)	Number of receivers exceeding NML																				
			Commercial			Café/bars			Child Care			Educational			Public Building			Place of Worship			Passive Recreation		
			1 10 dB	10 20 dB	>20 dB	1 10 dB	10 20 dB	>20 dB	1 10 dB	10 20 dB	>20 dB	1 10 dB	10 20 dB	>20 dB	1 10 dB	10 20 dB	>20 dB	1 10 dB	10 20 dB	>20 dB	1 10 dB	10 20 dB	>20 dB
Site establishment and public domain work	Typical	18	5	-	-	-	-	-	-	-	-	4	1	-	-	1	-	-	1	-	-	-	-
	Peak		11	3	-	5	-	-	2	-	-	5	5	-	1	1	-	2	1	-	1	-	-
Piling	Typical	6	4	-	-	-	-	-	-	-	-	5	1	-	-	1	-	-	1	-	-	-	-
	Peak		5	2	-	-	-	-	1	-	-	4	5	-	1	-	1	2	1	-	1	-	-
Station/facility construction	Typical	27	2	-	-	-	-	-	-	-	-	5	-	-	-	1	-	1	-	-	-	-	-
	Peak 1		5	-	-	-	-	-	-	-	-	4	2	-	-	1	-	-	1	-	-	-	-
	Peak 2		16	6	-	4	-	-	2	-	-	10	4	2	3	-	1	3	-	1	2	-	-
Rail systems access shafts	Typical	9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Peak		-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-
Excavation	Typical	9	6	3	-	1	-	-	1	-	-	6	3	-	-	1	-	1	1	-	-	-	-
	Peak 1		12	4	-	3	-	-	2	-	-	7	5	-	1	-	1	2	-	1	1	-	-
	Peak 2		20	12	4	4	3	-	-	2	-	15	7	5	4	1	1	2	2	1	1	1	-

The findings of the worst-case construction noise impact assessment at the Parramatta metro station construction site during the daytime indicate:

- residential receivers are not located in the immediate vicinity of the site and adjacent receivers generally comprise commercial and other sensitive receivers. Construction noise impacts are predicted to be 'moderate' to 'high' during outside work, particularly when noise-intensive equipment, such as rockbreakers or concrete saws, is being used as part of excavation and station/facility construction work. Concrete saws would be used infrequently over a 27-month construction period
- potential impacts during 'typical' work, which do not require noise-intensive equipment or are inside the station are predicted to substantially reduce, with noise levels predicted to result in 'moderate' or 'low' impacts at the nearest receivers
- noise levels during rail systems access shaft work are generally expected to comply with management levels
- the 'peak' scenarios would generate more noise and result in more exceedances than the 'typical' scenarios, which would result from the 'peak' scenarios using noise intensive (or noisier) equipment
- the nearest 'other sensitive' receivers are predicted to be impacted during some of the noisier outdoor work activities. The highest impacts at these receivers are predicted when rockbreakers or concrete saws are being used as part of excavation and station/facility construction work. 'High' or 'moderate' worst-case impacts are predicted at:
    - 'high' at University of New England Sydney, Leigh Memorial Church, Roxy Theatre (noting this receiver is not currently in use), Richmond School of Business, Australis Institute of Technology and Western Sydney University Parramatta Campus
    - 'moderate' at St John's Anglican Cathedral Church, Parramatta Town Hall, Lead College, Australian Institute of Fitness Parramatta, Duke College, Western Sydney University International College, Blue Bay College, Regio Emilia Early Learning Centre, Arthur Philip High School, Centenary Square and Parramatta Early Childhood Centre.

The findings of the worst-case construction noise impact assessment at the Parramatta metro station construction site during the evening and night-time indicate:

- noise levels at the majority of residential receivers are predicted to comply with the noise management levels. 'Low' impacts are predicted at one residential receiver during noisy internal station/facility construction activities
- noise levels during rail systems access shaft work inside the acoustic shed (or other acoustic measures) are predicted to comply with the noise management levels.

Based on current construction planning access points for tunnel fit-out and rail systems work would likely be via the Parramatta metro station, Clyde stabling and maintenance facility (including Rosehill services facility), Burwood North Station and The Bays Station construction sites. However, depending on construction staging, other construction sites would be used to access the tunnels to carry out tunnel fit-out and rail systems work.

The impacts presented above are based on all equipment working simultaneously in each assessed scenario. There would be periods when construction noise levels are much lower than the worst-case levels predicted and there would be times when no equipment is in use and no impacts occur.

Highly affected residential receivers

No receivers are expected to be highly noise affected around the Parramatta metro station construction site.

Sleep disturbance

A sleep disturbance screening assessment has been completed for the construction work and is summarised in Table 8-13.

'Low' sleep disturbance impacts are predicted at one residential receiver during rail system access shafts as a result of heavy vehicle movements to and from the site.

The number of potential sleep disturbances would depend on several factors, including the type of equipment being used and the duration of the noisy work.

During detailed construction planning, sleep disturbance would continue to be investigated to identify opportunities to minimise sleep disturbance impacts.

Vibration impacts

The predicted impacts during vibration intensive excavation indicate:

- the cosmetic damage screening criteria are predicted to be exceeded at the nine nearest buildings to the site including the Roxy Theatre, two heritage listed buildings being retained within the site, and one heritage listed structure (underground services) underneath the footprint for the excavation for basement structures
- the human comfort criteria are also predicted to be exceeded at some of the nearest buildings, meaning occupants of affected buildings may be able to perceive vibration impacts at times when vibration intensive equipment is in use nearby
- an exceedance of the vibration sensitive equipment screening criteria is predicted at the SunDoctors Skin Cancer Clinic, which is identified as potentially having vibration sensitive equipment.

These predictions represent a worst-case situation where a large rockbreaker is in use at the boundary of the site and is in close proximity to the affected buildings. In reality, smaller equipment or alternative methodologies would likely be used as the work gets near to adjacent structures, which would control the potential impacts.

Where vibration levels are predicted to exceed the cosmetic damage screening criteria, a more detailed assessment of the structure and attended vibration monitoring would be carried out so that vibration levels remain below appropriate limits for that structure.

Ground-borne noise

Excavation for basement structures for future over and adjacent station development at the Parramatta metro station construction site would be completed outdoors, meaning airborne noise levels at the nearest receivers would likely be higher than the corresponding internal ground-borne noise levels. The predicted ground-borne noise impacts during vibration intensive excavation indicate:

- receivers adjacent to the construction site where excavation is required are predicted to result in ‘high’ ground-borne noise impacts
- ‘low’ to ‘moderate’ exceedances are predicted at a small number of more distant receivers.

Vibration intensive excavation work is expected to last for around 20 weeks. The predictions assume the work is relatively near surface level. As progress is made further underground the impacts would be expected to reduce.

Construction traffic noise

Construction-related traffic has the potential to temporarily increase road traffic noise levels at receivers that are adjacent to the construction site and haul routes. The forecast construction traffic volumes outlined in Section 8.4 have been used to determine where potentially noticeable increases in road traffic noise (i.e. a greater than 2 dB increase above the existing noise level) is likely. Macquarie Street east of O'Connell Street is anticipated to have a 4 dB increase above the existing noise level. This is associated with the increased construction traffic and proportion of heavy vehicles during the night-time, although there are limited residential receivers along this road. The increase represents the worst-case predicted increase in any period.

Further assessment of construction traffic would be completed during detailed design for this proposal, including consideration of the potential for exceedances of the NSW Road Noise Policy base criteria (where greater than 2 dB increases are predicted). Measures outlined in the Sydney Metro CEMF would be implemented to manage potential impacts.

8.6.4 Management and mitigation measures

Environmental management for this proposal would be undertaken through the environmental management approach as detailed in Chapter 20 (Synthesis) of this Environmental Impact Statement. This includes operational mitigation measures (where relevant) and performance outcomes for the operation and construction of this proposal.

The approach to noise and vibration management during the construction phase, including the process for the development of all construction noise and vibration statements is outlined in the CNVS (Appendix H).

The CNVS provides the overall strategy and approach for construction noise and vibration management for Sydney Metro West, and an outline of the noise and vibration management requirements and processes that would be common to each of the proposed construction sites.

In addition, the Sydney Metro CEMF (Appendix F) outlines the construction noise and vibration mitigation measures to minimise impacts as relevant to this proposal as a whole.

The CNVS and CEMF are discussed further in Chapter 20 (Synthesis) of this Environmental Impact Statement.

8.7 Non-Aboriginal heritage

Further details on the non-Aboriginal heritage assessment, including the approach and methodology, are provided in Technical Paper 5 (Non-Aboriginal heritage).

8.7.1 Baseline environment

The assessment of non-Aboriginal heritage impacts in Chapter 12 of the *Sydney Metro West Environmental Impact Statement – Westmead to The Bays and Sydney CBD* (Sydney Metro, 2020a) included a description of the existing environment. The non-Aboriginal heritage assessment for this proposal has predominantly used the baseline environment that will be established following the completion of work carried out under the previous Sydney Metro West planning application.

Areas within the Parramatta metro station construction site for work carried out under the previous Sydney Metro West planning application have been cleared of existing structures and vegetation, with the station box excavated. This excludes the heritage buildings within the Parramatta metro station construction site that would be retained, which would also be retained for the construction of this proposal. Under the previous Sydney Metro West planning application, all archaeological investigations will have been carried out within the approved Parramatta metro station construction site.

Because the exact location (extent and depth) of excavation was not confirmed at the time, the archaeological assessment for the previous Sydney Metro West planning application at Parramatta metro station considered archaeological potential across the full extent (including depth) of the site. In carrying out the work under the previous Sydney Metro West planning application at Parramatta metro station, all relevant conditions of approval will be met, which includes implementation of the approved Sydney Metro West Parramatta Station Construction Site Archaeological Research Design and Excavation Methodology (GML Heritage, 2021) developed as required by condition of approval D25 of SSI-10038.As such, the baseline environment assumes that all archaeology at the Parramatta metro station construction site would be managed as part of the work carried out under the previous Sydney Metro West planning application.

For the purpose of this heritage assessment, the study area for Parramatta metro station has been defined as a 50-metre buffer around the full extent of the site.

Existing setting

The existing setting around the study area comprises of medium-density commercial and retail buildings, and open civic public spaces set near the historic focal point of Parramatta CBD. These developments are situated along the historic road network in this part of Parramatta comprising Macquarie Street, George Street, Church Street and Smith Street. The Parramatta metro station study area and existing heritage items within the study area are shown in Figure 8-16.

Site history

The study area is located on land that was laid out by Governor Philip for the establishment of early convict timber housing, with small gardens that provided food for residents. Over time these houses were replaced, first by more substantial brick and sandstone residences and workshops, then ultimately by commercial development. In the period since, the site has undergone frequent commercial redevelopment as part of the commercial growth of the Parramatta CBD generally.

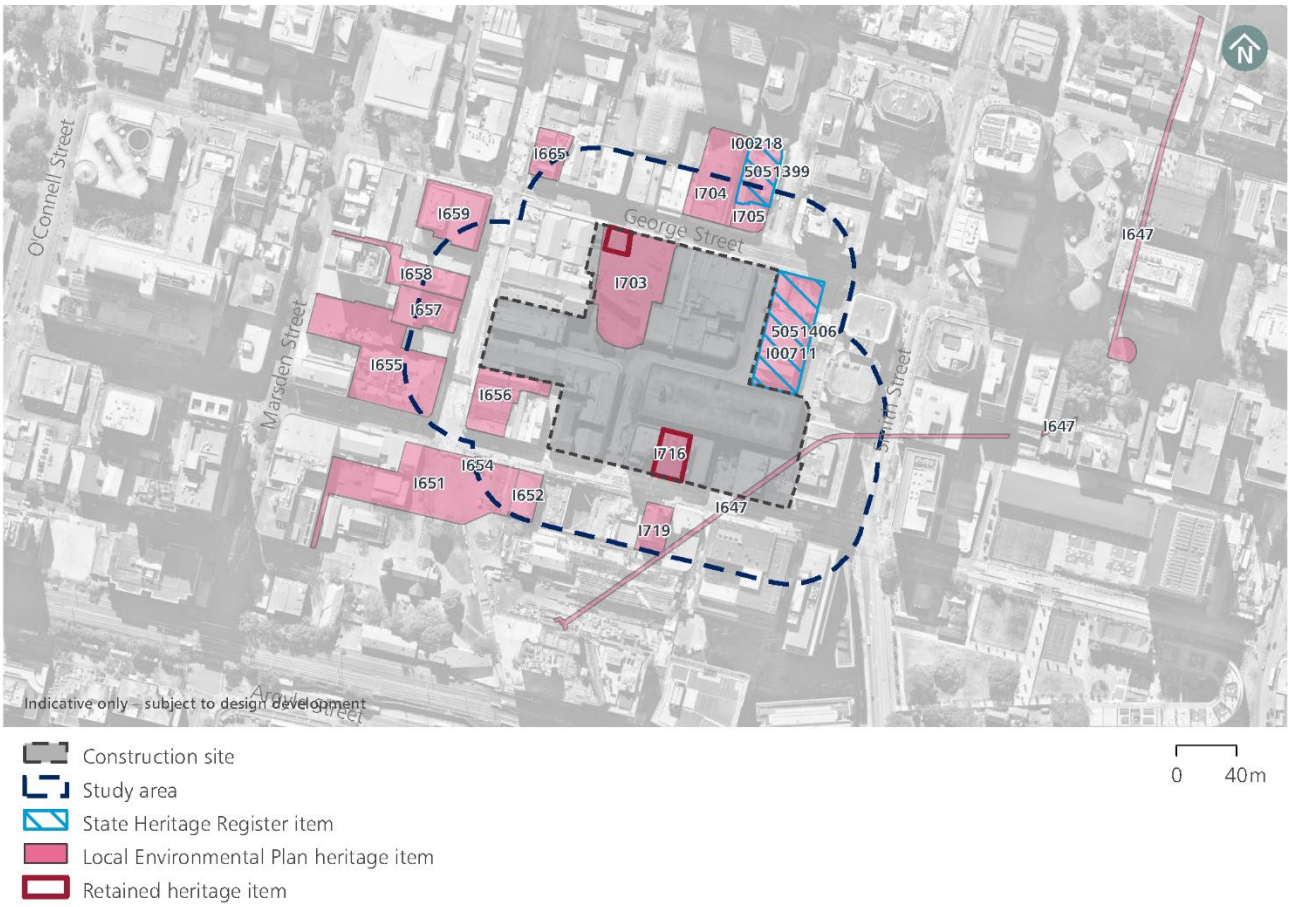

Figure 8-16 Heritage items within the study area – Parramatta metro station

8.7.1 Impact assessment

Built heritage impact assessment

Table 8-15 summarises the potential impacts of construction and operation of this proposal on built heritage items within the study area at Parramatta metro station.

Potential impacts to built heritage items in the Parramatta metro station study area would generally be neutral or negligible, with up to moderate impacts at items within the construction site. Management of potential impacts is outlined in Section 8.7.2. Enabling and site establishment work at the site would include installation or retention of protection around heritage structures including Kia Ora, Roxy Theatre and heritage-listed shop at 45 George Street.

A draft Heritage Interpretation Strategy has been prepared for this proposal (Appendix K). Where heritage items, including significant archaeology are impacted by this proposal, they would be considered for inclusion in the Heritage Interpretation Strategy or place specific interpretation plans prepared as part of this proposal.

The world heritage listed Old Government House and Domain within Parramatta Park have not been assessed in Table 8-15 as they are located beyond the study area (over 300 metres to the west of the construction site). Notwithstanding, given the distance to these items, no direct or indirect impacts are anticipated. This proposal is unlikely to be visible in key views to these items in Parramatta Park, due to its scale, distance and intervening built form (refer to Section 8.9 for further detail).

Table 8-15 Impacts on significance of built heritage items – Parramatta metro station

Item, listing and significance	Potential impact	Magnitude
Shops (and potential archaeological site) Parramatta LEP Item No. I703 Local	**Direct impact** This heritage item is located within the Parramatta metro station construction site. The item consists of the Victorian Regency structure at 43-47 George Street, which would be retained as part of the work carried out under the previous Sydney Metro West planning application. The heritage curtilage included adjoining modern buildings to the south and east which will be removed under the previous Sydney Metro West planning application. During these works, the building would be protected in accordance with condition of approval D16 for the previous Sydney Metro West planning application. The item is also identified as a potential archaeological site. Archaeological remains located within the curtilage of the building item, but outside of the building footprint, would be excavated and managed in accordance with the approved Archaeological Research Design for the previous Sydney Metro West planning application. The work for this proposal, including excavation for basement structures for over station and adjacent station development, would not physically alter the heritage significant structure. Archaeological remains within the curtilage (outside the building footprint) would have been managed under the previous Sydney Metro West planning application. As such, this proposal would result in a negligible direct (physical) impact to the heritage significance of the item.	**Negligible**
	Settlement and vibration During construction of this proposal, excavation for basement structures for over and adjacent station development of the station and associated services infrastructure would be the closest source of potential construction vibration to this heritage item. Construction vibration levels are predicted to be above the cosmetic damage screening criteria, which may result in physical damage to the structure during construction work. Ground movement assessment from settlement has identified a greater degree of ground settlement compared to that predicted for the work carried out under the previous Sydney Metro West planning application. This may result in additional superficial damage but is unlikely to result in damage to the structure of the item. Potential direct impacts associated with vibration would be managed in accordance with standard mitigation measures outlined in the CEMF that include structural assessment, identification of applicable safe vibration levels and specific consideration of the heritage values of the structure in consultation with a heritage specialist to ensure sensitive heritage fabric is adequately monitored and managed.	**Minor to moderate**
	Temporary indirect (visual) impact Site hoarding and site offices, as well as construction equipment, would continue to be visible from the item during construction of this proposal, temporarily impacting the setting of the item. Any temporary impacts to view lines or alteration of the setting of the item would not result in any loss of significance to the heritage item.	**Negligible**

Item, listing and significance	Potential impact	Magnitude
	Permanent indirect (visual) impact The proposed station services infrastructure and station entry along Church Street would be located about 80 metres from the rear of the building and about 30 metres from the southern edge of the curtilage of the item. Currently the rear elevation of the original 1840s shopfront is in an unknown condition. Following removal of the modern rear additions to the building as part of the previous Sydney Metro West planning application, the rear of this building would be made visible. However, due to intervening structures, there would be no direct view line from the rear of the 1840s structure to the five to seven storey western station services building, as the latter would be largely blocked by existing two-storey structures on Church Street. There would be limited views of the western station services building from the item, and the station services would not obstruct or overshadow views of heritage significant elements (the street frontage on Church Street) of the heritage item from this siting.	**Negligible**
Convict Drain Parramatta LEP Item No. I647 Local	**Direct impact** A portion of the convict drain heritage item is located within the south-eastern corner of the Parramatta metro station construction site, however the majority of this item is located outside the construction site. The exact location and fabric condition of the portion of the drain within the construction site is presently unknown. Excavation of basement structures for this proposal would remove any remnant portion of the drain where it is located within the Parramatta metro station construction site. Condition of approval D15 for the previous Sydney Metro West planning application (SSI-10038) requires that 'before commencement of any excavation at the Parramatta metro station construction site, a detailed investigation must be undertaken to precisely locate the Parramatta Convict Drain'. Furthermore, in accordance with condition of approval D26 of SSI-10038, the approved Sydney Metro West Parramatta Station Construction Site Archaeological Research Design and Excavation Methodology (GML Heritage, 2021) includes provision for early physical investigation of areas of impact identified as likely to contain State significant archaeology or subterranean heritage items in the research design to inform excavation in these areas'. This investigation includes the Parramatta Convict Drain and would be completed prior to construction work for this proposal. The area of intersection of the convict drain with the basement excavation at the Parramatta metro station construction site would be about 50 metres in length. The heritage listed extent of the convict drain is about 800 metres in length. However, portions of the drain have been removed and replaced over time. As detailed subsurface investigations of the convict drain in this area have not yet been conducted, the extent to which original 1840s brick and sandstone fabric of the drain may be present at the Parramatta metro station construction site is not yet known. While modern development is currently located above the drain, this development does not have an identified basement level and previous development on the site was not likely to have had deep footings. The removal of about 50 metres of the convict drain would result in the potential loss of original and highly rare early Victorian drainage infrastructure in Parramatta. However, the excavation would not remove the whole of the item.	**Moderate**

Item, listing and significance	Potential impact	Magnitude
	The removal of this segment of the drain would impact the significance of the item. However, it would not irreversibly change the overall significance of the item, and therefore would result in a moderate direct impact to its heritage significance.	
	Settlement and vibration Excavation for basement structures for over and adjacent station development and public domain work, including construction of the Civic Link, would be the closest source of potential construction vibration for sections of this heritage item that would be retained (located outside of the construction site on Macquarie Street and Smith Street). Construction vibration levels are predicted to be above the cosmetic damage screening criteria for remnant portions of the drain. Potential direct impacts associated with vibration to segments of the drain outside of the construction site have the potential for permanent physical damage to the item. It is anticipated that vibration impacts would only occur to the drain in areas that are immediately adjacent to the construction site, resulting in only localised vibrational damage to the remnant fabric of the item. Potential direct impacts associated with vibration would be managed in accordance with standard mitigation measures outlined in the CEMF that include structural assessment, identification of applicable safe vibration levels and specific consideration of the heritage values of the structure in consultation with a heritage specialist to ensure sensitive heritage fabric is adequately monitored and managed.	**Minor**
	Temporary indirect (visual) impact Not applicable in the case of this subsurface item of infrastructure and associated archaeological remains.	**Neutral**
	Permanent indirect (visual) impact Not applicable in the case of this subsurface item of infrastructure and associated archaeological remains.	**Neutral**
Roxy Theatre State Heritage Register (SHR) Listing No. 00711; Parramatta LEP Item No. I00711; Register of the National Estate (RNE) #3040 State Local	**Direct impact** The heritage item is located to the south of George Street and immediately east of the proposed Civic Link. Proposed work within the vicinity of the item would be sited outside of the heritage curtilage of the item and would not result in any adverse direct (physical) impacts.	**Neutral**
	Settlement and vibration Excavation for basement structures as part of this proposal would result in vibration levels that exceed the cosmetic damage screening criteria at this item. Excavation activities therefore have the potential to result in permanent physical damage to the structure. Ground movement assessment from settlement has identified an additional five millimetres of ground settlement (over the settlement predicted for the work carried out under the previous Sydney Metro West planning application). This additional ground movement would not result in substantial impacts to the heritage item in excess of ground movement predicted for the previous Sydney Metro West planning application.	**Minor to moderate**

Item, listing and significance	Potential impact	Magnitude
	Potential direct impacts associated with vibration would be managed in accordance with standard mitigation measures outlined in the CEMF that include structural assessment, identification of applicable safe vibration levels and specific consideration of the heritage values of the structure in consultation with a heritage specialist to ensure sensitive heritage fabric is adequately monitored and managed.	
	Temporary indirect (visual) impact Site hoarding and site offices, as well as construction equipment, would be visible around and potentially above the building during construction. Hoarding along the western façade would only obscure the lower portions of the building, allowing higher elevation detail to still be visible during construction work. Other construction elements (such as an acoustic shed or other acoustic measures facing Church Street) would not interrupt or overshadow the heritage significant façade of the building, nor would they intrude on the less significant views of the western façade.	**Negligible**
	Permanent indirect (visual) impact This proposal would not modify this heritage item, nor would it introduce any structure that would affect the street frontage of this heritage item. The proposed section of the Civic Link would be located directly west of this heritage item and would conserve the current open views that exist to the item from Horwood Place, with landscaping to surround and enhance the station entrance to the south-west of the item. The station services building (about five to seven storeys) would be of similar height to the rear portion of the Roxy Theatre and offset from it by about 20 metres. As such the heritage item would not be obstructed or overshadowed. The proposed point-to-point zone to the north of the item would not obstruct or detract from significant views of the building's northern façade.	**Negligible**
Horse Parapet Façade (and potential archaeological site) Parramatta LEP Item No. I656 Local	**Direct impact** This heritage item is located on the north-east corner of the intersection of Church Street and Macquarie Street, outside of the Parramatta metro station construction site. Protective site boundary hoarding will be installed with the advice of an experienced built heritage expert as part of the work associated with the previous Sydney Metro West planning application (refer to condition of approval D14 for the previous Sydney Metro West planning application). This would be retained for this proposal so that there would be no accidental damage to the structure during construction of this proposal.	**Neutral**
	Settlement and vibration Construction of the station and excavation for basement structures for over and adjacent station development would result in vibration levels that exceed the cosmetic damage screening criteria. Excavation activities therefore have the potential to result in permanent physical damage to the significant fabric of the item. Ground movement assessment from settlement has identified an additional five millimetres of ground settlement (over the settlement predicted for the work carried out under the previous Sydney Metro West planning application). This additional ground movement would not result in substantial impacts to the heritage item in excess of the ground movement predicted for the previous Sydney Metro West planning application.	**Minor to moderate**

Item, listing and significance	Potential impact	Magnitude
	Potential direct impacts associated with vibration would be managed in accordance with standard mitigation measures outlined in the CEMF that include structural assessment, identification of applicable safe vibration levels and specific consideration of the heritage values of the structure in consultation with a heritage specialist to ensure sensitive heritage fabric is adequately monitored and managed.	
	Temporary indirect (visual) impact Immediately north of this item, an acoustic shed (or other acoustic measures) would be installed for part of the construction of this proposal. While the shed would not conceal the heritage significant southern and western facades of the item, the scale, mass and size of the acoustic shed (or other acoustic measures) would partly and temporarily overshadow this façade from the north. This would also temporarily isolate the building from the wider heritage significant streetscape.	**Moderate**
	Permanent indirect (visual) impact This proposal includes the introduction of the western station entry and station services building, which would be around five to seven storeys in height. The station entry would introduce a new building abutting this item, and modern design materials and forms for a station entry which, with wayfinding, would compete with the prominence of the Horse Parapet street-frontage façade from Church Street and would result in a moderate change to the building's heritage significant landmark location within the streetscape.	**Moderate**
Murrays' Building (and potential archaeological site) Parramatta LEP Item No. I652 Local	**Direct impact** The heritage item is located on the southern side of Macquarie Street, south of the Parramatta metro station construction site. Due to the siting of the item in relation to the proposed construction site, construction and operation of this proposal would not result in any adverse direct (physical) impacts to the item.	**Neutral**
	Settlement and vibration Construction vibration levels are predicted to be below the cosmetic damage screening criteria. Potential direct impacts associated with vibration are not anticipated.	**Neutral**
	Temporary indirect (visual) impact Site hoarding, site offices and construction plant and equipment would be visible from the heritage item, however these elements would not obstruct or overshadow views towards the item from Macquarie Street.	**Negligible**
	Permanent indirect (visual) impact This proposal would not significantly alter the visual setting of the item, and view lines towards the item from the streetscape would be maintained	**Negligible**
Kia Ora (and potential archaeological site)	**Direct impact** This heritage item is located within the Parramatta metro station construction site; however, the original building would be retained under the previous Sydney Metro West planning application and as part of this proposal. Construction work for this proposal would be located within the heritage curtilage of the item; however, the physical fabric of the building would not be modified.	**Negligible**

Item, listing and significance	Potential impact	Magnitude
Parramatta LEP Item No. I716; RNE #3088 Local	**Settlement and vibration** Excavation for basement structures for over and adjacent station development would result in vibration levels that exceed the cosmetic damage screening criteria. Excavation activities therefore have the potential to result in permanent physical damage to the significant fabric of the item. Ground movement from settlement has not been predicted for this item in excess of that predicted for the work carried out under the previous Sydney Metro West planning application. Potential direct impacts associated with vibration would be managed in accordance with standard mitigation measures outlined in the CEMF that include structural assessment, identification of applicable safe vibration levels and specific consideration of the heritage values of the structure in consultation with a heritage specialist to ensure sensitive heritage fabric is adequately monitored and managed.	**Minor to moderate**
	Temporary indirect (visual) impact All buildings and structures surrounding this item would have been removed under the previous Sydney Metro West planning application, substantially altering the setting of this heritage item. Construction hoardings would obscure the whole lower elevation of the street façade of the building and temporarily prevent views of the Georgian townhouse building during the construction of this proposal.	**Moderate**
	Permanent indirect (visual) impact During operation, this proposal would situate Kia Ora within the public domain of the Parramatta metro station site (refer to Figure 8-1 for indicative extent of public domain). Views of all elevations of the building would be publicly accessible and the building would be in a highly prominent place within the revised public streetscape, allowing better public appreciation of the heritage item.	**Minor positive**
Dr Pringle's Cottage Parramatta LEP Item No. I705 Local	**Direct impact** The heritage item is located along the northern boundary of George Street and directly west of the northern section of Horwood Place. The item would be located over 100 metres to the south of the Parramatta metro station construction site and about 15 metres south of the proposed Civic Link – also to be delivered as part of this proposal. As such there would be no adverse direct (physical) impacts.	**Neutral**
	Settlement and vibration Construction vibration levels for this proposal are predicted to be below the cosmetic damage screening criteria. Potential direct impacts associated with vibration or settlement are not anticipated.	**Neutral**
	Temporary indirect (visual) impact Site hoarding, site offices, construction plant and equipment would be visible from this item during construction. These elements of construction infrastructure would not impede views of the significant fabric of the item.	**Neutral**
	Permanent indirect (visual) impact The Civic Link sections delivered as part of this proposal would preserve views of the item currently seen from Horwood Place. Other built elements of this proposal would not be noticeable from the building due to their distance (in excess of 100 metres).	**Neutral**
Redcoat's Mess House	**Direct impact** The heritage item is located approximately 40 metres north of the construction site. This proposal would not result in any direct (physical) impact to the heritage item.	**Neutral**

Item, listing and significance	Potential impact	Magnitude
SHR Listing No. 00218; Parramatta LEP Item No. I00218 State	**Settlement and vibration** Construction vibration levels for this proposal are predicted to be below the cosmetic damage screening criteria. Potential direct impacts associated with vibration or settlement are not anticipated.	**Neutral**
	Temporary indirect (visual) impact There are no direct views of this heritage item from the construction site. While tall construction equipment may be visible from the heritage significant elements of the building, located behind a modern structure on Horwood Place, these would not overshadow or obstruct the limited public views of the 1830s significant architectural elements of the structure.	**Neutral**
	Permanent indirect (visual) impact This proposal would not introduce structures which would be visible from this heritage item. Limited public views towards the significant 1830s building would not be impeded.	**Neutral**
Civic Arcade (former theatre) (and potential archaeological site) Parramatta LEP Item No. I704 Local	**Direct impact** The heritage item is located along the northern side of George Street. The item is not located within the construction site. Due to the location of the item, the proposed works would not result in any adverse direct (physical) heritage impacts to the heritage item.	**Neutral**
	Settlement and vibration Construction vibration levels for this proposal are predicted to be below the cosmetic damage screening criteria. Potential direct impacts associated with vibration are not anticipated.	**Neutral**
	Temporary direct (visual) impact Site hoarding, site offices and tall machinery and plant would be visible from this item during construction. However, these elements would not impede or overshadow views of the heritage significant façade of the item.	**Neutral**
	Permanent indirect (visual) impact The metro station entrance and station services structures would be located over 100 metres south of the item and would not impede views or overshadow the heritage significant façade of the former cinema. The realignment of Horwood Place would result in a direct view of the street frontage of the building from the south, providing an additional view line toward the aesthetically significant Art Deco façade of the building, which would be a positive heritage outcome.	**Negligible positive**
Westpac Bank Parramatta LEP Item No. I665 Local	**Direct impact** The heritage item is located at the north-eastern corner of the George Street and Church Street junction, about 45 metres north-west of the construction site. Due to its location outside the construction site, there would be no adverse direct (physical) impact to this item.	**Neutral**
	Settlement and vibration Construction vibration levels for this proposal are predicted to be below the cosmetic damage screening criteria. Potential direct impacts associated with vibration are not anticipated.	**Neutral**
	Temporary indirect (visual) impact Tall machinery and plant and construction equipment may be visible from this item; however, they would not impede views of its significant street frontage or diminish the prominence of the item on the corner of George Street and Church Street intersection.	**Neutral**
	Permanent indirect (visual) impact The proposed western station services building would not be visible from this item and the proposed works to integrate the realigned Horwood Place into George Street would not affect the streetscape that this significant building contributes to.	**Neutral**

Item, listing and significance	Potential impact	Magnitude
Former Courthouse Wall and Sandstone Cellblock (and potential archaeological site) Parramatta LEP Item No. I659 Local	**Direct impact** The heritage curtilage of the item is located about 40 metres to the north-west of the construction site and the stone wall physical fabric is located over 100 metres from the construction site. Due to its location outside the construction site, there would be no adverse direct (physical) impact to this item.	**Neutral**
	Settlement and vibration Given the distance of the item from the construction site, potential direct impact by vibration is not anticipated.	**Neutral**
	Temporary indirect (visual) impact There would be no view lines to or from this heritage item and therefore no adverse indirect (visual) impacts.	**Neutral**
	Permanent indirect (visual) impact There would be no view lines to or from this heritage item and therefore no adverse indirect (visual) impacts.	**Neutral**
HMV (former Commonwealth Bank) (and potential archaeological site) Parramatta LEP Item No. I658 Local	**Direct impact** The heritage item is located along the western boundary of Church Street and about 25 metres north-west of the construction site. Due to the siting and location of the item, this proposal would not result in any direct (physical) impacts.	**Neutral**
	Settlement and vibration Construction vibration levels for this proposal are predicted to be below the cosmetic damage screening criteria. Potential impacts associated with vibration are not anticipated. Ground movement from settlement has been predicted to be greater than that predicted for work carried out under the previous Sydney Metro West planning application. This additional ground movement may result in superficial damage but unlikely to result in structural impacts. Potential direct impacts associated with vibration would be managed in accordance with standard mitigation measures outlined in the CEMF that include structural assessment, identification of applicable safe vibration levels and specific consideration of the heritage values of the structure in consultation with a heritage specialist to ensure sensitive heritage fabric is adequately monitored and managed.	**Minor**
	Temporary indirect (visual) impact An acoustic shed (or other acoustic measures) would be located on Church Street nearly directly opposite this item for part of the construction phase. The aesthetic significance of the item is associated with its inter-war colonnade and façade. While the acoustic shed (or other acoustic measures) would be a noticeable physical mass and size, this would not detract from the prominent position of the heritage item on Church Street or obscure views of the item, therefore the potential impact would be negligible.	**Negligible**
	Permanent indirect (visual) impact The height of the proposed western station services building (about five to seven storeys) would be higher than to existing two-storey commercial buildings on the western side of Church Street. While this new structure would not obstruct existing view-lines towards the structure, it would compete with the Inter-War Classical prominent façade of the building, resulting in a minor reduction in its prominence in the streetscape.	**Minor**

Item, listing and significance	Potential impact	Magnitude
Telstra House (former post office) (and potential archaeological site) Parramatta LEP Item No. I657; RNE #3037 Local	**Direct impact** The heritage item is located along the western boundary of Church Street and about 20 metres west of the construction site. Given the location of this item, this proposal would not result in any adverse direct (physical) impacts.	**Neutral**
	Settlement and vibration Vibration levels from the surrounding construction works are predicted to be below the cosmetic damage screening criteria. Potential direct impacts associated with vibration are not anticipated.	**Neutral**
	Temporary indirect (visual) impact At the western end of the site, facing Church Street, an acoustic shed (or other acoustic measures) would be installed for part of the construction phase. This would be a large structure of physical mass and size and would temporarily visually compete with the heritage item and its prominent contribution within the streetscape.	**Minor**
	Permanent indirect (visual) impact The proposed western services building would be about five to seven storeys in height, which would be inconsistent with existing buildings that front Church Street on the western side. The station services building would not obstruct views of the item from the street, however its height and mass would partially overshadow the heritage item, resulting in a minor impact to its heritage significant prominence on Church Street.	**Minor**
Shop (and potential archaeological site) Parramatta LEP Item No. I655 Local	**Direct impact** The heritage item is located at the north-western corner of Macquarie and Church Streets, about 20 metres west of the construction site. Due to the siting and location of the item, this proposal would not result in a direct (physical) impact to the item.	**Neutral**
	Settlement and vibration Vibration levels from the surrounding construction works are predicted to be below the cosmetic damage screening criteria. Potential direct impacts associated with vibration are not anticipated. Ground movement from settlement has been predicted to be greater than that predicted for work carried out under the previous Sydney Metro West planning application. This additional ground movement may result in superficial damage but unlikely to result in structural impacts. Potential impacts associated with vibration would be managed in accordance with standard mitigation measures outlined in the CEMF that include structural assessment, identification of applicable safe vibration levels and specific consideration of the heritage values of the structure in consultation with a heritage specialist to ensure sensitive heritage fabric is adequately monitored and managed.	**Minor**
	Temporary indirect (visual) impact During construction, the temporary acoustic shed (or other acoustic measures) would be of large size and scale and would be a prominent element of the Church Street streetscape. However, views of significant decorative elements would not be obstructed or overshadowed by the acoustic shed (or other acoustic measures).	**Negligible**

Item, listing and significance	Potential impact	Magnitude
	Permanent indirect (visual) impact The western station services building would be constructed on the opposite side of Church Street to the north-eastern corner of this heritage item. The new building would be sufficiently offset from and would not overshadow the former item on the opposite side of the road or overshadow the item's significant corner prominence on Church Street and Macquarie Street.	**Negligible**
Bicentennial Square and adjoining buildings Parramatta LEP Item No. I651 Local	**Direct impact** The heritage item is located along the southern boundary of Macquarie Street and about 30 metres south-west of the construction site. This proposal would not impact the heritage curtilage of the item, resulting in no direct (physical) impacts to the item.	**Neutral**
	Settlement and vibration Vibration levels from the surrounding construction works are predicted to be below the cosmetic damage screening criteria. Potential direct impacts associated with vibration are not anticipated.	**Neutral**
	Temporary indirect (visual) impact Site hoarding, site offices, construction plant and machinery and plant would be partly visible from this heritage item during the construction of this proposal. The heritage significance of the item is associated with its civic associations, heritage significant civic architecture (gates, fountains and clocks) and its ongoing use as a public plaza. The activity and construction work within the Parramatta station construction site would not impede the public appreciation of these significant elements.	**Negligible**
	Permanent indirect (visual) impact The nearest element of this proposal would be the Civic Link and public domain area where it links with Macquarie Street near the heritage item Kia Ora, which would be only partly visible from the Bicentennial Square and adjoining buildings. This would not alter the setting or context of the heritage item or obstruct views of the heritage significant elements of this item.	**Neutral**
Centennial Memorial Clock Parramatta LEP Item No. I654; RNE #3087 Local	**Direct impact** The heritage item is located to the south of Macquarie Street within item 'Bicentennial Square and adjoining buildings' (Parramatta LEP Item No. I651), and about 30 metres south-west of the construction site. This proposal would not impact the heritage curtilage of the item, resulting in no direct (physical) impacts to the item.	**Neutral**
	Settlement and vibration Vibration levels from the surrounding construction works are predicted to be below the cosmetic damage screening criteria. Potential direct impacts associated with vibration are not anticipated.	**Neutral**
	Temporary indirect (visual) impact The activity and construction work within the Parramatta metro station construction site would not obstruct or overshadow views of the memorial clock in any way and the construction activities within site would not alter the setting of this heritage item.	**Neutral**
	Permanent indirect (visual) impact The only works for this proposal visible from this heritage item would be the Civic Link in the vicinity of the Kia Ora heritage item. These works would not result in obstruction of the memorial clock or any alteration to its heritage setting.	**Neutral**

Item, listing and significance	Potential impact	Magnitude
Leigh Memorial Uniting Church Parramatta LEP Item No. I719 Local	**Direct impact** The heritage item is located along the southern boundary of Macquarie Street, about 20 metres to the south of the construction site. This proposal would not impact the heritage curtilage of the item, resulting in no direct (physical) impacts to the item.	**Neutral**
	Settlement and vibration Vibration levels from the surrounding works are predicted to be below the cosmetic damage screening criteria. Potential direct impacts associated with vibration are not anticipated.	**Neutral**
	Temporary indirect (visual) impact While the heritage item is significant to its contribution to the character of the Macquarie Street streetscape, temporary site hoarding and construction activity across the road as part of this proposal would not diminish from the church's prominent position on Macquarie Street.	**Negligible**
	Permanent indirect (visual) impact The eastern Parramatta metro station entry and services building would be located about 40 metres to the north-east of this item and would be visible across the proposed public domain and Civic Link around the Kia Ora heritage item. However, this new building would not be situated on Macquarie Street or alter the character of that streetscape, and would not adversely affect the heritage significant views of the façade of the building. The proposed Civic Link would provide additional views of the item's front façade and improve sight lines towards the prominent building.	**Negligible positive**

Archaeological impact assessment

As noted in Section 8.7.1, the archaeological assessment for the previous Sydney Metro West planning application at Parramatta metro station considered archaeological potential across the full extent (including depth) of the site. Parramatta metro station construction site would be managed under the approved *Sydney Metro West Parramatta Station Construction Site Archaeological Research Design and Excavation Methodology* (GML Heritage, 2021), developed as required by condition of approval D25 of SSI-10038.

The area within the Parramatta metro station construction site has been previously assessed in Chapter 12 of the *Sydney Metro West Environmental Impact Statement – Westmead to The Bays and Sydney CBD* (Sydney Metro, 2020a), and all archaeological investigations will be completed prior to the construction of this proposal (including for the area where excavation is required for basement structures for this proposal). As such, no further non-Aboriginal archaeological assessment of this location would be required for this proposal.

The approved *Sydney Metro West Parramatta Station Construction Site Archaeological Research Design and Excavation Methodology* (GML Heritage, 2021) would also be implemented as part of this proposal.

8.7.2 Management and mitigation measures

Environmental management for this proposal would be undertaken through the environmental management approach as detailed in Chapter 20 (Synthesis) of this Environmental Impact Statement. This includes operational mitigation measures (where relevant) and performance outcomes for the operation and construction of this proposal.

During construction of this proposal, Non-Aboriginal heritage would be managed in accordance with Sydney Metro's CEMF (refer to Appendix F (Construction Environmental Management Framework)). The CEMF includes heritage management objectives and mitigation measures to minimise impacts as relevant to this proposal as a whole. Mitigation measures that are specific to the operation and construction of Parramatta metro station to address potential impacts are listed in Table 8-16.

Table 8-16 Non-Aboriginal heritage mitigation measures – Parramatta metro station

Ref	Impact/issue	Proposed mitigation measure	Timing
Non-Aboriginal heritage			
EIS-NAH2	Permanent indirect (visual) impact	Detailed design for aboveground station elements, ancillary facilities and public domain and landscaping work located in or near to heritage significant items, would respond to the following heritage guidelines during design development in order to minimise indirect (visual) impacts to heritage items identified under this proposal: • The Burra Charter – The Australia ICOMOS Charter for Places of Cultural Significance (2013), Australia ICOMOS • Better Placed – Design Guide for Heritage (2019), prepared by the NSW Government Architect • Design in Context (2005), prepared by the NSW Heritage Office and the Royal Australian Institute of Architects NSW Chapter • New Uses for Heritage Places (2008), prepared by the Heritage Council of NSW and the Royal Australian Institute of Architects NSW • Draft Connecting with Country Framework (2020), Government Architect NSW. Detailed design would also respond to guidelines and policies outlined in existing Conservation Management Plans or other relevant heritage assessment documents for relevant heritage items (State Abattoir, White Bay Power Station), with particular focus on preserving significant views towards the item.	Operation
EIS-NAH3	Permanent indirect (visual) impact	In order to mitigate permanent indirect (visual) impacts to heritage items located adjacent to or within the Parramatta metro station site: • the new Civic Link would incorporate a landscape design that enhances the heritage significant elements and features of the adjacent 'Roxy Theatre' (SHR # 00711) • the design of any aboveground station elements would consider setbacks from adjacent heritage items ('Kia Ora (potential archaeological site) (Parramatta LEP item # I716), and 'Horse Parapet Façade (and potential archaeological site)' (Parramatta LEP item # I656)) in order to respect the heritage setting of these items and their visual connection to other heritage items in the vicinity • the design of aboveground station elements would respond to the existing alignment and orientation of adjacent heritage items, particularly 'Horse Parapet Façade (and potential archaeological site)' (Parramatta LEP Item # I656) which is aligned with the surrounding street development.	Operation

Ref	Impact/issue	Proposed mitigation measure	Timing
EIS-NAH4	Direct (physical) and permanent indirect (visual) impacts	An Adaptive Reuse Strategy and Conservation Management Plan would be prepared for heritage items which would be integrated into the proposed metro station precincts. Relevant heritage items include: • 'Shops (potential archaeological site)' Parramatta LEP item #I703 • 'Kia Ora' (Parramatta LEP item #I716) 'Skinners Family Hotel' (SHR #00584).	Operation
EIS-NAH6	Archaeology	Non-Aboriginal archaeology at the Parramatta metro station construction site would be managed in accordance with approved *Sydney Metro West Parramatta Station Construction Site Archaeological Research Design and Excavation Methodology* (GML Heritage, 2021) developed as required by condition of approval D25 of SSI-10038.	Construction
EIS-NAH7	Archival recording and archaeological management	Prior to the removal of the Convict Drain (Parramatta LEP Item # I647) associated with the excavation for basement structures, it would be archivally recorded as part of archaeological management in accordance with relevant recording provisions outlined in the approved *Sydney Metro West Parramatta Station Construction Site Archaeological Research Design and Excavation Methodology* (GML Heritage, 2021). The convict drain must have its location precisely surveyed and integrity investigated, in accordance with condition of approval D15 of SSI-10038.	Construction

8.8 Aboriginal heritage

The approach and methodology for the Aboriginal heritage assessment are provided in Chapter 4 (Methodology) of this Environmental Impact Statement. The legislative context for the assessment is provided in Appendix B (Legislative and policy context).

8.8.1 Baseline environment

The previous Sydney Metro West planning application assessed the potential impacts of the establishment of the Parramatta metro station construction site.

This section summarises the existing environment presented in the *Sydney Metro West Environmental Impact Statement – Westmead to the Bays and Sydney* CBD (Sydney Metro, 2020a) for context for this assessment. Additional excavation is required for this proposal within Parramatta metro station construction site for basement structures associated with future over and adjacent station development. This excavation would occur within the existing Parramatta metro station construction site boundary but will extend deeper below ground level in some areas when compared to the approved site in the previous Sydney Metro West planning application.

Landscape and archaeological context

The Parramatta metro station construction sites are located within the Cumberland Lowlands physiographic region of the Cumberland Plain. Consistent with the description by Chapman & Murphy (1989), the immediate environs lie on a generally flat landform, associated with the distal floodplain of the Parramatta River. Reference to contemporary aerial photography indicates that areas of substantial ground disturbance associated with the construction of the existing Parramatta Station and surrounding buildings are present. The archaeological implication is the potential disturbance or destruction of pre-existing Aboriginal sites and archaeological deposits.

The closest permanent watercourse is the Parramatta River, approximately 400 metres north of the Parramatta metro station construction site, a significant cultural resource for Aboriginal people in the past. Reference to the 1:100,000 Geological Map Sheet for Sydney (9130) indicates that the underlying geology of the Parramatta metro station construction site is dominated by Wianamatta Group units, with Ashfield Shale, Minchinbury Sandstone and Bringelly Shale, overlying the Mittagong Formation and the Hawkesbury Sandstone, with raw materials suitable for artefact manufacture occurring in the region.

Although not mapped, Quaternary valley fill (alluvium) comprising a deep sand sheet is generally known to underlie portions of the Paramatta CBD, inclusive of the Parramatta metro station construction site. This sand sheet forms a superficial cover of unconsolidated sandy sediments deposited over the Wianamatta Group shales, forming the contemporary floodplains of the Parramatta River and its tributaries. Mitchell (2008) describes the distribution of the principal components of the sand body as extending along the river from Church Street to Arthur Street and back from the river to the eastern end of Macquarie Street, inclusive of at least the eastern portion of the Parramatta metro station construction site. Recent Aboriginal archaeological investigations have identified extant instances of the Parramatta Sand Sheet in the Parramatta CBD containing Aboriginal sites in subsurface deposits.

Previous Aboriginal cultural heritage assessments

The Aboriginal cultural heritage assessment report for the previous Sydney Metro West planning application (Sydney Metro, 2020a) presents the findings of relevant archaeological investigations for Parramatta metro station construction site.

The following summarises key archaeological investigations undertaken in the local environs that are relevant to this proposal:

- Attenbrow (1994) undertook a preliminary site survey undertaken in association with the management and interpretation of Aboriginal sites in Parramatta Park. Attempts were made to relocate three previously recorded sites within the park: two artefact scatters (45-5-0762 and 45-5-0864), one of which was associated with two probable scarred trees, and scarred tree 45-5-277. Artefact scatter 45-5-072, located near the Crescent at the top of the low ridge between the Parramatta River and Domain Creek, reported to consist "*of a sparse scatter of flaked stone artefacts exposed in areas devoid of grass, about 120 m to the north of the Boer War Memorial*" (Attenbrow 1994a: 7). Silcrete was noted as the dominant raw material, with two broken Bondi points also originally present. Artefact scatter 45-5-0864, located to the south of 45-5-0762, originally recorded by Guider, was reported to contain 13 stone artefacts of silcrete, chert and quartz, as well as fragments of cockle and oyster shell. Locations of several other unregistered sites within park, including one artefact scatter, three isolated artefacts and some scarred trees, were also noted
- Jo McDonald Cultural Heritage Management Pty Ltd (2005) undertook archaeological salvage program for site CG1, located at the corner of Charles and George Streets in the Parramatta CBD. A total of 6,763 artefacts were recovered from site, with more than 680 manuports also retrieved. More than half of the assemblage (62 per cent) was recovered from 0-20 centimetres depth, with maximum reported depth of 60-100 centimetres. Observed artefact densities were characterised as "low-to-moderate", with an average overall density of 24 artefacts per metres squared. Five hand-excavated squares yielded >100 artefacts, with a maximum of 393 per square
- Haglund (2004) undertook archaeological test excavation across the Parramatta Children's Court Site. A total area of 45.75 metres squared was excavated in the form of isolated one metre squared pits and trench 'complexes' of variable size. Stone artefacts were recovered from all trench complexes and all but one square pit, with excavations extending to a maximum depth of 60 centimetres below zero surface level (range: 30-60 centimetres)
- Jo McDonald Cultural Heritage Management Pty Ltd (2004) undertook archaeological test excavation across the Civic Place development site in conjunction with historical (European) archaeological investigation. Fourteen test pits (one square metre) were hand-excavated within six larger, mechanically excavated trenches. Evidence of historical fill materials/features overlying and/or protruding into artefact-bearing Aboriginal deposits were identified in all tested areas. Fill material was present to a maximum depth of about 80 cm. Only one trench contained a profile with identifiable A1 and A2 horizons. Probable alluvial deposits were noted in two trenches. Stone artefacts were identified in all six mechanical trenches, with the majority of hand excavated pits yielding artefacts (71 per cent). However, a very low average overall density of 2.6 artefacts per metre was recorded. A total of 37 stone artefacts were recovered

- Artefact Heritage Services Pty Ltd undertook archaeological survey of the area as part of *Sydney Metro West Environmental Impact Statement – Westmead to The Bays and Sydney CBD* (Sydney Metro, 2020a). The survey identified that the Parramatta site was located within a modified industrial landscape. However, the assessment suggested that the majority of the Parramatta metro station construction site retained potential for Aboriginal objects and truncated natural ground surface contexts to occur in those areas. Overall, the archaeological potential of the Parramatta metro station construction site was concluded to be moderate to high. The assessment identified site-specific cultural values within the Parramatta metro station construction site associated with the potential for sites to be present in subsurface deposits within the registered Potential Archaeological Deposit (AHIMS 45-6-3582) (to be impacted by the previous Sydney Metro West planning application). No further site-specific cultural values were identified.

Recorded Aboriginal sites

The *Sydney Metro West Environmental Impact Statement – Westmead to the Bays and Sydney CBD* (Sydney Metro, 2020a), identified one previously recorded Aboriginal site within the bounds of the Parramatta metro station construction site, AHIMS 45-6-3582. Although registered as a site, this was actually an area of Potential Archaeological Deposit, comprising a 220 metre by 160 metre footprint. This is an unverified area of archaeological sensitivity, and the registration is a trigger to ensure further investigations would be undertaken to determine presence or absence prior to impacts occurring at this location. No surface sites were identified during the survey undertaken for the previous Sydney Metro West planning application. Due to the registration of Potential Archaeological Deposit associated with the Parramatta Sand Sheet subsurface, archaeological potential was assessed as moderate to high (Sydney Metro, 2020a). The work carried out under the previous Sydney Metro West planning application to be undertaken prior to this proposal will impact on the registered area of Potential Archaeological Deposit.

An updated search of the AHIMS database was undertaken for this assessment on 21 August 2021 (Search ID 609567). There were no additional entries identified in the search results within 100 metres of the Parramatta metro station construction site, beyond AHIMS 45-6-3582 previously identified.

In accordance with mitigation measure AH2 from the previous Sydney Metro West planning application, archaeological test excavation (and salvage when required) at Parramatta metro station during the work carried out under the previous Sydney Metro West planning application would be carried out where intact natural profiles with the potential to contain significant archaeological deposits are encountered. Excavations would be conducted in accordance with the Aboriginal archaeological test excavation methodology as required by condition of approval D22 for the previous Sydney Metro West planning application and in consultation with Registered Aboriginal Parties.

In addition, in accordance with mitigation measure AH3 from the previous Sydney Metro West planning application, if Aboriginal archaeological remains are recovered during work for the previous Sydney Metro West planning application, results would be incorporated into Aboriginal heritage interpretation for Sydney Metro West in consultation with Registered Aboriginal Parties.

Aboriginal community consultation and cultural values

Consultation undertaken with Registered Aboriginal Parties for the previous Sydney Metro West planning application identified site-specific cultural values within the Parramatta metro station construction site associated with the potential for sites to be present in subsurface deposits within the registered Potential Archaeological Deposit (AHIMS 45-6-3582) (to be impacted by the previous Sydney Metro West planning application).

Consultation with Registered Aboriginal Parties identified that the Parramatta area more broadly retained cultural significance for the Aboriginal community. The Parramatta Native Institute was noted for being the institutional system established by Governor Macquarie whereby Aboriginal children were removed from their parents and held at the institution. Parramatta Park, located to the west of the Parramatta metro station construction site, is known to contain several scarred trees and believed to be a major camping place for the Burramatta peoples.

Ongoing consultation with Aboriginal heritage knowledge holders is underway as part of design development for this proposal, including for the purposes of better understanding cultural values and addressing the Connecting with Country framework.

Field investigation results

The assessment for the previous Sydney Metro West planning application included a survey of the Parramatta metro station construction site undertaken with participation from Registered Aboriginal Party representative from Deerubbin Local Aboriginal Land Council. Steve Randall identified that further assessment should be undertaken within the Parramatta metro station construction site as there was a potential for culturally significant sites to be present in subsurface deposits. Further field investigation has not been undertaken at Parramatta metro station construction site for this proposal as the land required for this proposal would be consistent with the site assessed and approved under the previous Sydney Metro West planning application.

8.8.2 Operational impact assessment

Direct impacts

No identified Aboriginal sites, objects and/or site-specific cultural heritage values would be directly impacted during operation of this proposal at Parramatta metro station.

Indirect impacts

No identified Aboriginal sites, objects and/or site-specific cultural heritage values would be indirectly impacted during operation of this proposal at Parramatta metro station.

During development of Sydney Metro West, consultation was undertaken with knowledge holders to inform the project development as part of the Connecting with Country Pilot program. This consultation will continue during further development of the project.

In accordance with Concept condition of approval CB4 and CB5, a draft Heritage Interpretation Strategy has been prepared for this proposal (Appendix K) which details how Aboriginal heritage values at Parramatta metro station would be interpreted (if archaeological remains are encountered) and reflected within the design of this proposal.

Further details regarding Sydney Metro's approach to Connecting with Country, and heritage and archaeology design guidelines are provided in the station and precinct design guidelines in Appendix E (Design Guidelines).

8.8.3 Construction impact assessment

Direct impacts

Archaeological potential was assessed as moderate to high at the Parramatta metro station construction site due to the Potential Archaeological Deposit associated with AHIMS 45-6-3582.

The exact location (extent and depth) of excavation was not confirmed during preparation of the previous Sydney Metro West planning application. Therefore, the archaeological assessment for the previous Sydney Metro West planning application at Parramatta metro station considered archaeological potential across the full extent (including depth) of the site. As such, the baseline Aboriginal cultural archaeological environment defined for this proposal assumes that archaeological test excavation (and salvage where required) would be carried out in accordance with condition of approval D22 for the previous Sydney Metro West planning application where intact natural profiles with the potential to contain significant archaeological deposits are encountered. This would occur prior to commencement of this proposal.

In accordance with mitigation measures AH3 from the previous Sydney Metro West planning application, if Aboriginal archaeological remains are recovered during work for the previous Sydney Metro West planning application, results would be incorporated into Aboriginal heritage interpretation for Sydney Metro West in consultation with Registered Aboriginal Parties.

Indirect impacts

This proposal would not result in indirect impacts to known Aboriginal sites, objects and/or values during construction at Parramatta metro station construction site.

8.8.4 Management and mitigation measures

Environmental management for this proposal would be undertaken through the environmental management approach as detailed in Chapter 20 (Synthesis) of this Environmental Impact Statement. This includes operational mitigation measures (where relevant) and performance outcomes for the operation and construction of this proposal.

During construction of this proposal, Aboriginal heritage would be managed in accordance with Sydney Metro's CEMF (Appendix F). The CEMF management objectives and mitigation measures to minimise impacts as relevant to this proposal as a whole.

8.9 Landscape and visual amenity

Further details on the landscape and visual amenity assessment, including the approach and methodology, are provided in Technical Paper 6 (Landscape and visual amenity).

8.9.1 Baseline environment

Parramatta metro station would be situated between Church, George, Smith and Macquarie Streets, in the heart of the Parramatta CBD. The Parramatta CBD is characterised by a highly urban mix of contemporary and historic built form character.

All buildings and vegetation within the site will have been removed as a part of the work carried out under the previous Sydney Metro West planning application, including the excavation of the station and temporary closure of Horwood Place. As part of these works, the site will be enclosed by hoarding. Heritage listed buildings located within the construction site will be retained.

Parramatta Light Rail Stage 1 is under construction along Church and Macquarie Streets (to be completed in 2023, prior to the construction of this proposal). This work associated with Parramatta Light Rail Stage 1 includes the partial closure of Church Street and Macquarie Street, construction fencing, removal of streetscape vegetation, and installation of new paving and landscaping works. As part of Parramatta Light Rail Stage 1, the Church Street streetscape will be transformed into a new shared light rail and pedestrian zone, including wider footpaths, street furniture and streetscape planting.

George Street, Macquarie Street and Phillip Street are Parramatta's three main east-west streets and contain a mix of contemporary and historic built form character. These long straight streets traverse the city centre and channel views to Robin Thomas Reserve in the east and Parramatta Park in the west. Notable visual landmarks within the study area include the Brislington Medical and Nursing Centre Museum, St John's Anglican Cathedral, Centennial Memorial Clock, London plane trees in Centenary Square, Kia Ora, the Leigh Memorial Uniting Church and the Roxy Theatre.

South of Macquarie Street and directly opposite the metro station site, Parramatta Square (previously known as Civic Place) is a mixed-use urban renewal precinct, which is currently under construction (to be completed in 2022). Parramatta Square will comprise six new buildings including a Western Sydney University campus, a refurbished town hall and public domain.

Section 8.3 provides further discussion of the intended future character local strategic plans relevant to Parramatta. A detailed review of local planning guidance relevant to landscape and visual context is provided in Technical Paper 6 (Landscape and visual amenity).

Landscapes and public realm areas

The landscapes and public realm areas potentially impacted by this proposal, and the landscape sensitivity level for these areas, are outlined in Table 8-17.

Table 8-17 Landscapes and public realm areas – Parramatta metro station

Location	Baseline environment	Landscape sensitivity level
Church Street streetscape	Church Street provides north-south access through the Parramatta CBD, connecting Prince Alfred Square and Parramatta River in the north with Centenary Square in the south. Several distinctive heritage buildings with decorative facades assist in wayfinding and contribute to the character of the street. The street is activated along its length with retail and cafe frontages. Church Street will be transformed by the future Parramatta Light Rail Stage 1, with the removal of vehicles and the introduction of light rail and several stops along its length.	Regional
Macquarie Street and George Street streetscapes	Macquarie Street is a main east-west thoroughfare for traffic and pedestrians in the Parramatta CBD. This street contains a mix of contemporary and historic character buildings and is activated in parts with retail frontages. The Parramatta Square development will deliver a civic precinct located to the south of Macquarie Street.	Local

Location	Baseline environment	Landscape sensitivity level
	George Street is characterised by a mix of modern and heritage buildings including the Roxy Theatre and the sandstone Victorian terraces at 45 George Street. Some buildings with awnings and intermittent street trees contribute to the pedestrian amenity of this busy street.	
The site, Horwood Place, Macquarie Lane and United Lane	Horwood Place, Macquarie Lane and United Lane provide access between George Street and Macquarie Street, Smith Street and Horwood Place. These lanes mainly provide rear access to buildings and car parking areas and have limited pedestrian amenity and street trees. These laneways would have been closed under the previous Sydney Metro West planning application. Traffic diversions would be in place and there would be temporarily reduced permeability in this block and area of the CBD.	Neighbourhood
Centenary Square	Centenary Square is an important civic square within the Parramatta CBD, providing a forecourt to Parramatta Town Hall and St John's Anglican Cathedral. Centenary Square includes a mix of heritage and modern buildings, mature trees and an interactive water feature. Lawn areas, garden beds, fixed and temporary seating areas, colourful shade umbrellas and high-quality paving enhance the amenity of the square.	Regional
Parramatta Park	Parramatta Park is a nationally important parkland featuring the World Heritage listed Old Government House and Domain. Old Government House is sited on a prominent highpoint within the park. Views from Old Government House and the grounds of Parramatta Park towards George Street are identified as important in the *Old Government House and Domain, Parramatta Park Management Plan* (National Trust and Parramatta Park Trust, 2008).	National

Representative viewpoints

Representative viewpoints that have been selected to inform the daytime visual impact assessment are shown in Figure 8-17. These viewpoints are of local sensitivity.

While the impact ratings for all seven viewpoints are provided, the following three have been selected as the most representative for this station to be discussed in this section. These take into account the degree of sensitivity and potential operational and construction elements that would be visible:

- **viewpoint 1: view south-east along Church Street** – due to the importance of Church Street as a key north-south street in the Parramatta CBD
- **viewpoint 3: view south from George Street along Horwood Place** – includes the future Civic Link and presents potential visual impacts to the heritage-listed Roxy Theatre
- **viewpoint 6: view north from Macquarie Street** – presents potential visual impacts to the heritage-listed Kia Ora.

These viewpoints are assessed in further detail in this section. A detailed assessment of all viewpoints is provided in Technical Paper 6 (Landscape and visual amenity).

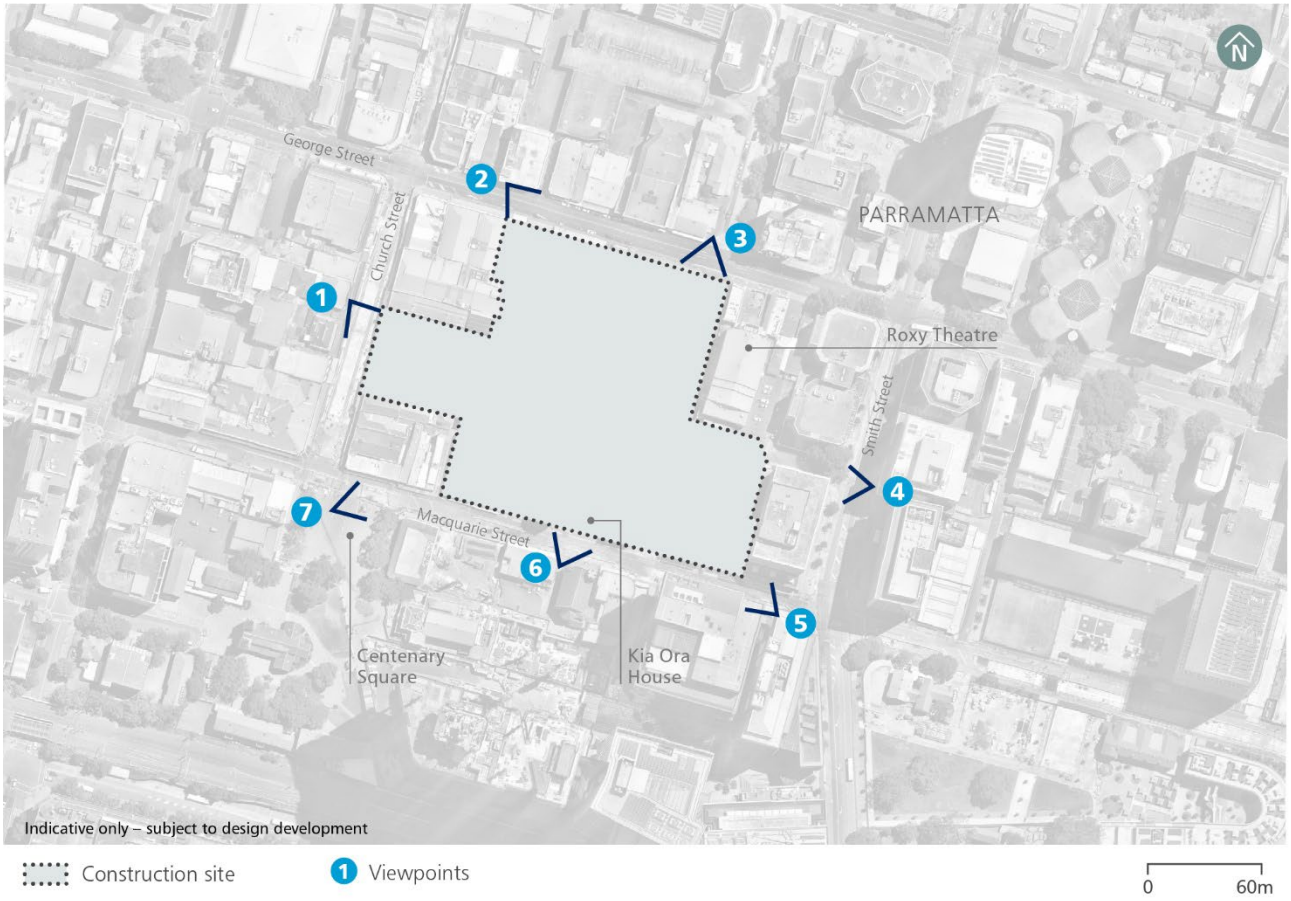

Figure 8-17 Representative viewpoints – Parramatta metro station

Night-time visual sensitivity

The setting of the Parramatta metro construction station site is an area of high district brightness (A4) and would have a very low sensitivity. This is due to the density of brightly lit commercial, retail, educational, government, hotel and residential apartment buildings within this highly urban city centre. The brightly lit streetscapes of George Street, Macquarie Street and Church Street, including headlights from traffic and the brightly lit plazas such as Centenary Square within the Parramatta CBD, contribute to night-time lighting levels.

There will be some remaining security lighting at the Parramatta Station construction site as a part of the work carried out under the previous Sydney Metro West planning application.

8.9.2 Operational impact assessment

Operation of this proposal at Parramatta metro station would comprise underground and surface elements. The key elements that would be visible are described in Section 8.2.

Landscape impact

Landscape character impacts anticipated as a result of the operation of this proposal are summarised in Table 8-18. Management of potential impacts is discussed in Section 8.9.4.

During operation, the amenity of the streetscape would be improved, with the station having a high-quality architectural finish and introducing new public domain areas.

There would be a metro station entry addressing Church Street, providing street-level activation. This station entry would improve the accessibility and legibility of this area, providing a direct connection between Parramatta Light Rail Stage 1 and Sydney Metro West.

There would be new areas of public domain along Macquarie Street and George Street, including a section of the Civic Link. The Civic Link would be connected to public domain areas and surround Kia Ora, a local listed heritage building that contributes to the heritage character of Macquarie Street.

There would also be improvements in the accessibility, legibility and amenity for road users and pedestrians across the site and in the reinstated Horwood Place, shared zones, and the Civic Link. This would include the reinstatement of Horwood Place, the delivery of a section of the Civic Link, and share-ways between the Civic Link and Smith Street in the east.

This proposal would not directly impact Centenary Square; however, there would be improvements to the public domain in the vicinity of the Square.

This proposal is unlikely to be visible in key views to Parramatta Park identified in the *Old Government House and Domain, Parramatta Park Management Plan* (National Trust and Parramatta Park Trust, 2008) due to its scale, the distance and intervening built form.

Table 8-18 Landscape impacts during operation – Parramatta metro station

Location	Landscape sensitivity level	Magnitude of change	Impact rating
Church Street streetscape	Regional	Noticeable improvement	Moderate beneficial
Macquarie Street and George Street streetscapes	Local	Considerable improvement	Moderate beneficial
The site, Horwood Place, Macquarie Lane and United Lane	Neighbourhood	Considerable improvement	Minor beneficial
Centenary Square	Regional	No perceived change	Negligible
Parramatta Park	National	No perceived change	Negligible

Daytime visual amenity impact

Visual amenity impacts anticipated as a result of the operation of this proposal are summarised in Table 8-19. Management of potential impacts is outlined in Section 8.9.4. An artist's impression of Parramatta metro station during operation is shown in Figure 8-18. Potential station finishes would be identified as part of further design development and would be consistent with the principles and outcomes presented in the Design Guidelines (Appendix E).

Generally, there would be minor to moderate beneficial visual impacts during operation, due to improvements in the public domain and permeability of the Parramatta metro station precinct.

Table 8-19 Daytime visual impacts during operation – Parramatta metro station

Location	Sensitivity rating	Magnitude of change	Impact rating
Viewpoint 1: view south-east along Church Street	Local	Considerable improvement	Moderate beneficial
Viewpoint 2: view south-east along George Street	Local	Noticeable improvement	Minor beneficial
Viewpoint 3: view south from George Street along Horwood Place	Local	Considerable improvement	Moderate beneficial
Viewpoint 4: view west from Smith Street	Local	Noticeable improvement	Minor beneficial
Viewpoint 5: view north-west along Macquarie Street at the corner with Smith Street	Local	Considerable improvement	Moderate beneficial
Viewpoint 6: view north from Macquarie Street to Kia Ora	Local	Considerable improvement	Moderate beneficial
Viewpoint 7: view north-east along Macquarie Street from near Centenary Square	Local	Noticeable improvement	Minor beneficial

As noted in Section 8.9.1, the most representative viewpoints have been discussed in detail in this section. Potential impacts from these viewpoints would include the following:

- **viewpoint 1: view south-east along Church Street** – there would be a moderate beneficial visual impact to this view during operation, due to improvements in the amenity of the view and architectural quality of the metro station. A new station entry would be seen in the middle ground of this view along Church Street, activating the street and providing a consistent vertical scale with the existing frontages along this section of the street. To the north of the station entry there would be an activated space, with temporary or permanent activated uses in the location of a future east-west lane
- **viewpoint 3: view south from George Street along Horwood Place** – there would be a moderate beneficial impact to this view during operation, due to the opening up of a new vista and improvements to public domain areas. A section of the Civic Link would be established in the centre of this view, including elements such as high-quality pavements, street furniture, lighting and trees – improving the setting of the Roxy Theatre. The new public domain would create a long vista, through the station precinct to Macquarie Street and beyond. The area for future use to the west of the Civic Link section (refer to Figure 8-1) may be fenced with appropriate hoarding and result in a temporary a break in the building line along George Street
- **viewpoint 6: view north from Macquarie Street** – there would be a moderate beneficial impact to this view during operation, due to improvements in the public domain, including enhancements to the setting of the heritage-listed Kia Ora. There would be a new area of public domain along the northern side of Macquarie Street with a plaza creating an attractive setting for the Kia Ora building. The main façade of the Kia Ora building would address the plaza. The new public domain would also provide a continuous finish with the Parramatta Light Rail Stage 1 streetscape works. To the west, Horwood Place would be reinstated in a new location, directly alongside the Kia Ora building, reintroducing vehicles to this area. Beyond this, to the east, the new station building would be seen in the middle ground of this view. The aboveground station would provide space for non-station uses (fit-out and use subject to separate approval, where required) extending about five to six storeys above the street. While the built form of the station would be taller than the former buildings on the site, this setting within the Parramatta CBD has the capacity to absorb larger scale built form.

Indicative only – subject to design development

Figure 8-18 Artist's impression of Parramatta metro station during operation

Night-time visual amenity impact

The potential night-time visual impacts during operation are summarised in Table 8-20.

The proposed station, interchange and public domain areas, including the section of the Civic Link, would be brightly lit to provide for customer safety. There would be street lights associated with the reinstated Horwood Place and proposed shared zones, as well as headlights from vehicle movements in the vicinity of the metro station.

All lighting would be designed to minimise light spill. It is not expected that there would be any direct light spill on private residences. The level of lighting would be consistent with and largely absorbed into the surrounding brightly lit night scene.

Table 8-20 Night-time visual amenity impacts during operation – Parramatta metro station

Location	Sensitivity rating	Magnitude of change	Impact rating
Parramatta metro station	A4: High district brightness	No perceived change	Negligible

8.9.3 Construction impact assessment

Construction of Parramatta metro station would require the continued use of a construction site established under the previous Sydney Metro West planning application. No additional construction areas would be required. The main elements that would be visible would include the proposed works, construction site features, equipment and vehicle access routes. Further details are included in Chapter 6 (Proposal description – construction) and Section 8.4.

Landscape impact

Landscape impacts anticipated as a result of the construction of this proposal are summarised in Table 8-21. Management of potential impacts is discussed in Section 8.9.4.

Construction of this proposal would generally result in negligible to minor adverse landscape impacts.

There would be no direct landscape impact on Church Street. While the construction site would maintain the loss of the streetscape activation, it would reduce the exposure of activities along Church Street to the construction activity within the construction site. The acoustic shed (or other acoustic measures) facing Church Street would partly fill the small break in the continuity of the built form.

The approved construction site would continue to be used for the construction of this proposal, with large frontages directly facing Macquarie Street and George Street. The site would be enclosed by hoarding and there would be large-scale machinery, plant and vehicles within the site. While no further removal of trees or buildings would be required, the presence of construction activity would continue to temporarily reduce the amenity of these streets for pedestrians and road users.

There would continue to be restricted laneway access within the construction site as a part of this proposal. This would continue the reduced permeability and accessibility of this block and area of the Parramatta CBD. A temporary, north-south pedestrian access through the construction site between George Street and Macquarie Street would be provided.

Temporary reductions in accessibility associated with construction of this proposal would be somewhat offset by the future Parramatta Light Rail Stage 1, which would be operational and will have improved the public domain along Macquarie Street in the vicinity of the light rail stop.

While the construction site would be visible from the northern boundary of the Centenary Square, there would be no direct impacts on the accessibility, legibility and permeability of the square. This proposal is also unlikely to be visible in key views to Parramatta Park, due to its scale, the distance and intervening built form.

Table 8-21 Landscape impacts during construction – Parramatta metro station

Location	Landscape sensitivity level	Magnitude of change	Impact rating
Church Street streetscape	Regional	No perceived change	Negligible
Macquarie Street and George Street streetscapes	Local	Noticeable reduction	Minor adverse
The site, Horwood Place, Macquarie Lane and United Lane	Neighbourhood	Noticeable reduction	Negligible
Centenary Square	Regional	No perceived change	Negligible
Parramatta Park	National	No perceived change	Negligible

Daytime visual amenity impact

Visual amenity impacts anticipated as a result of the construction of this proposal are summarised in Table 8-22. Generally, there would be minor and moderate adverse temporary visual impacts due to the proposed construction activities. Management of potential impacts is discussed in Section 8.9.4.

Table 8-22 Daytime visual impacts during construction – Parramatta metro station

Location	Sensitivity rating	Magnitude of change	Impact rating
Viewpoint 1: view south-east along Church Street	Local	Noticeable reduction	Minor adverse
Viewpoint 2: view south-east along George Street	Local	Considerable reduction	Moderate adverse
Viewpoint 3: view south from George Street along Horwood Place	Local	Considerable reduction	Moderate adverse
Viewpoint 4: view west from Smith Street	Local	Noticeable reduction	Minor adverse
Viewpoint 5: view north-west along Macquarie Street at the corner with Smith Street	Local	Noticeable reduction	Minor adverse
Viewpoint 6: view north from Macquarie Street to Kia Ora	Local	Considerable reduction	Moderate adverse
Viewpoint 7: view north-east along Macquarie Street from near Centenary Square	Local	Noticeable reduction	Minor adverse

As noted in Section 8.9.1, the most representative viewpoints have been discussed in detail in this section. Potential temporary impacts for the duration of construction from these viewpoints would include the following:

- **viewpoint 1: view south-east along Church Street** – there would be a temporary minor adverse impact to this view during construction, as an acoustic shed (or other acoustic measures) would be present on Church Street. This would obstruct any views into the works being undertaken within the construction site. However, the acoustic shed (or other acoustic measures) would fit with the scale of the existing streetscape and be absorbed into the surrounding built form of this section of Church Street. The existing view from this viewpoint, and a photomontage of the construction site are provided in Figure 8-19 and Figure 8-20 respectively

- **viewpoint 3: view south from George Street along Horwood Place** – there would be a temporary moderate adverse impact to this view during construction of this proposal, due to the scale and extent of construction work visible alongside the Roxy Theatre. A temporary pedestrian connection would provide public access between George and Macquarie Streets. This would be visible to the west of the Roxy Theatre and extend to Macquarie Street in the south. There would continue to be construction work visible along the southern side of George Street on the site, established under the previous Sydney Metro West planning application. This would include the continued presence of hoarding and construction equipment visible above the hoarding. Construction vehicles would be seen travelling along George Street, and across this view
- **viewpoint 6: view north from Macquarie Street** – there would be a temporary moderate adverse impact to this view during construction of this proposal, due to the scale of the construction work and temporary reductions in the amenity of the setting of the Kia Ora building. There would continue to be construction work, to the north of Macquarie Street, on the site established under the previous Sydney Metro West planning application. The heritage-listed Kia Ora would be protected; however, it would be seen surrounded by construction activity. This would continue to reduce the amenity of the setting of this building. The temporary pedestrian connection would be visible, generally toward the eastern edge of the construction site. Beyond this, work to construct the station building would be seen, rising about five to six storeys above the street.

To manage these potential impacts, management and mitigation measures are provided in Section 8.9.4 and Chapter 20 (Synthesis) of this Environmental Impact Statement. These sections include measures to locate elements of construction sites to minimise visual impact, where feasible and reasonable.

Figure 8-19 Existing view from viewpoint 1 (view south-east along Church Street) – Parramatta metro station. Extent of previous demolition as part of the work carried out under the previous Sydney Metro West planning application is shown in orange

Indicative only – subject to design development

Figure 8-20 Construction site photomontage from viewpoint 1 (view south-east along Church Street) – Parramatta metro station

Night-time visual amenity impact

The anticipated night-time visual impacts as a result of the construction of this proposal are summarised in Table 8-23.

Night work would be required at this location during construction. This would include brightly lit task lighting, lighting at key areas of the construction sites, and additional headlights from heavy vehicles accessing the site. This lighting would generally be screened by surrounding buildings along George Street, Macquarie Street, Smith Street and Church Streets.

Some residences and guests within the upper levels of tall apartment buildings and hotels nearby may potentially overlook these works; however, it is not expected that there would be any direct light spill onto these properties. Additional light sources and skyglow that would be seen from these areas would be generally absorbed into the existing brightly lit night scene.

Table 8-23 Night-time visual amenity impacts during construction – Parramatta metro station

Location	Sensitivity rating	Magnitude of change	Impact rating
Parramatta metro station	A4: High district brightness	Noticeable reduction	Negligible

8.9.4 Management and mitigation measures

Environmental management for this proposal would be undertaken through the environmental management approach as detailed in Chapter 20 (Synthesis) of this Environmental Impact Statement. This includes operational mitigation measures (where relevant) and performance outcomes for the operation and construction of this proposal.

During construction of this proposal, landscape and visual amenity impacts would be managed in accordance with Sydney Metro's CEMF (refer to Appendix F). The CEMF includes landscape and visual amenity management objectives and mitigation measures to minimise impacts as relevant to this proposal as a whole.

The design of this proposal would also be consistent with the principles and outcomes presented in the Design Guidelines (Appendix E).

Mitigation measures that are specific to the operation and construction of Parramatta metro station to address potential impacts are listed in Table 8-24.

Table 8-24 Landscape and visual amenity mitigation measures – Parramatta metro station

Ref	Impact/issue	Mitigation measure	Timing
Landscape and visual amenity			
EIS-LV6	Activation of streetscapes	Opportunities to provide temporary activation would be explored in areas of future adjacent station development (that would be delivered by others).	Operation
EIS-LV15	Activation of streetscapes	Opportunities to provide temporary activation during construction in the vicinity of the Parramatta metro station construction site and the Five Dock Station western construction site would be explored in consultation with the City of Parramatta Council and City of Canada Bay Council respectively.	Operation

8.10 Soils, contamination and groundwater

Further details on the contamination assessment, including the approach and methodology, are provided in Technical Paper 7 (Contamination). The approach and methodology for the soils and groundwater assessments are provided in Chapter 4 (Methodology) and Appendix D (Detailed assessment methodologies). The legislative context for the assessment is provided in Appendix B (Legislative and policy context).

8.10.1 Baseline environment

The baseline environment as relevant to soils, contamination and groundwater is discussed in the following sections.

Prior to the commencement of this proposal, buildings and other infrastructure located on the land required for the Parramatta metro station construction site will be demolished (with the exception of two heritage buildings) and bulk excavation work for the station will have occurred as a result of work carried out under the previous Sydney Metro West planning application.

This proposal would include additional excavation (within the footprint of the approved construction site) for basement structures for future over and adjacent station development.

Soils

The existing soils environment at Parramatta metro station is largely consistent with the baseline described in Chapter 19 of the *Sydney Metro West Environmental Impact Statement – Westmead to The Bays and Sydney CBD* (Sydney Metro, 2020a).

The existing soils environment is summarised in the following sections.

Soil and geology types

The geological units expected to be encountered at the Parramatta metro station construction site include Quaternary deposits (0-16 metres below ground level), Ashfield Shale and Mittagong Formation (16 to 19 metres below ground level) and Hawkesbury Sandstone (greater than 19 metres below ground level).

The Soil Landscapes of Sydney 1:100,000 Sheet (Chapman et al., 2009) and Penrith 1:100,000 Sheet (Bannerman et al., 2010) identify Birrong (deep soils on older alluvial terraces) and Blacktown (strongly acidic and hard setting soils) soil units in the vicinity of Parramatta metro station.

Soil salinity

The *Sydney Metro West Environmental Impact Statement – Westmead to The Bays and Sydney CBD* (Sydney Metro, 2020a) identified there is the potential to encounter saline soils at the Parramatta metro station construction site.

Acid sulfate soils

Potential acid sulfate soils risk maps obtained from the former Office of Environment and Heritage (now part of NSW Department of Planning and Environment) were reviewed to assess the probability of potential acid sulfate soils being present in proximity to Parramatta metro station. No potential acid sulfate soils were identified within the construction site and immediate vicinity. However, areas around the Parramatta River, including Parramatta metro station, are identified as 'disturbed terrain' (see Figure 8-22), which are often located on reclaimed land or land subject to dredging or mining, with the potential presence of acid sulfate soils. These areas are associated with fill and/or alluvium that extends from harbour shores up local drainage lines. Investigations would be undertaken prior to the work being carried out under the previous Sydney Metro West planning application to further assess the presence of acid sulfate soils.

Contamination

Investigation and remediation of soil and/or groundwater contamination would be undertaken under the previous Sydney Metro West planning application where required in accordance with the applicable mitigation measures and conditions of approval.

Areas of environmental interest identified in Chapter 20 of the *Sydney Metro West Environmental Impact Statement – Westmead to The Bays and Sydney CBD* (Sydney Metro, 2020a) at Parramatta metro station construction site are described as follows:

- AEI 6 – Former and existing structures with hazardous building materials (within construction site) – low risk of soil and groundwater contamination; however, surface soil contamination and previously dumped construction waste is expected to be transported off-site or managed appropriately prior to construction of this proposal
- AEI 7 – Dry cleaners (56-67 George Street) (within construction site) – moderate risk of groundwater contamination from solvents and leaks associated with dry cleaning activities
- AEI 8 – General historical commercial and industrial land use (within construction side) – moderate risk of groundwater contamination from past inappropriate chemical storage, use or disposal
- AEI 9 – General historical commercial and industrial surrounding land use (outside of construction site) – moderate risk of groundwater contamination from past inappropriate chemical storage, use or disposal.

AEIs rated as moderate risk or above following the completion of the work carried out under the previous Sydney Metro West planning application are shown on Figure 8-21.

Overall, the risk of shallow soil contamination or encountering previously dumped construction waste within the existing construction site is expected to be low as it would have been removed or managed under the previous Sydney Metro West planning application prior to construction of this proposal. However, subsurface residual soil and groundwater contamination could remain when undertaking additional excavation required for this proposal.

The conceptual site model and risk ranking for the areas of environmental interest at Parramatta metro station are detailed in Appendix C of Technical Paper 7 (Contamination).

Figure 8-21 Areas of environmental interest (moderate risk or above) – Parramatta metro station

Groundwater

The excavation of a tanked cut and cover station box (this refers to excavation constructed with an impermeable casing/membrane that minimises groundwater inflows to negligible rates) would be completed as part of the previous Sydney Metro West planning application.

The baseline groundwater environment for this proposal is described further in Table 8-25, and shown in Figure 8-22.

Table 8-25 Groundwater baseline environment – Parramatta metro station

Aspect	Description
Groundwater levels and flow	As a result of the work carried out under the previous Sydney Metro West planning application, the groundwater level within the immediate area is predicted to reduce to about 21 metres below ground level (Sydney Metro, 2020a) (see Figure 8-22 for groundwater drawdown extent). This groundwater level is expected to remain at the commencement of construction for this proposal. The predicted groundwater inflow rates to the station box would be about 2.7 litres per second as a result of the work carried out under the previous Sydney Metro West planning application. The station box would be tanked, and as such, would minimise groundwater inflows. Localised groundwater flow is expected to be towards the station box.

Aspect	Description
Groundwater quality	The baseline groundwater quality may be impacted by a change in the groundwater flow direction towards the station box (which has the potential to induce groundwater seepage). Potential contaminants of concern in the area include heavy metals, hydrocarbons, chlorinated hydrocarbons, volatile organic compounds and phenol. The potential contamination impact was assessed to be moderate for groundwater associated with AEI 7, 8 and 9 (as described above and in Chapter 20 of the *Sydney Metro West Environmental Impact Statement – Westmead to The Bays and Sydney CBD* (Sydney Metro, 2020a)). Groundwater level drawdown in the vicinity of local saltwater bodies has the potential to cause saltwater to intrude into fresh groundwater systems. There is potential that the saline waters of Parramatta River east of the Charles Street weir could be drawn into the groundwater adjacent to the river.
Groundwater users	There are no registered groundwater bores within the vicinity of Parramatta metro station and therefore no bores are expected to have a reduced groundwater level at commencement of this proposal. Given that no bores were identified in the predicted extent of groundwater drawdown, potential impacts to groundwater users from this proposal are not expected and have not been discussed further.
Groundwater dependent ecosystems	There was one groundwater dependent ecosystem identified within the predicted groundwater drawdown extent from the work carried out under the previous Sydney Metro West planning application. This is a community of Forest Red Gum – Rough-barked Apple grassy woodland on alluvial flats of the Cumberland Plain located around 300 metres to the north-west of the construction site. It is considered to have a moderate to high likelihood of being groundwater dependent. The work carried out under the previous Sydney Metro West planning application has the potential to result in about four metres of groundwater drawdown for this groundwater dependent ecosystem (beyond the existing groundwater level in the area which is six metres below ground level).
Surface water and groundwater interaction	The interaction between surface water and groundwater in proximity to Parramatta metro station is considered limited due to the altered nature of the area. The primary interactions include: • surface water acting as recharge to underlying groundwater units, where hydraulic gradients and modified environments (e.g. concrete-lined waterways/channels) allow • groundwater discharging to surface water as baseflow, especially in areas of low elevation (where hydraulic gradients and modified environments allow) • induced flow of surface water into groundwater due to the predicted groundwater drawdown resultant from the work carried out under the previous Sydney Metro West planning application • the surrounding is area highly urbanised with predominantly impervious surfaces across the catchments prior to the commencement of work for this proposal, which reduces possible surface water infiltration into soils and underlying groundwater. Groundwater drawdown (about two to four metres) is expected in proximity to Clay Cliff Creek (around 500 metres south east from the construction site – refer Figure 8-22) as a result of the work carried out under the previous Sydney Metro West planning application.

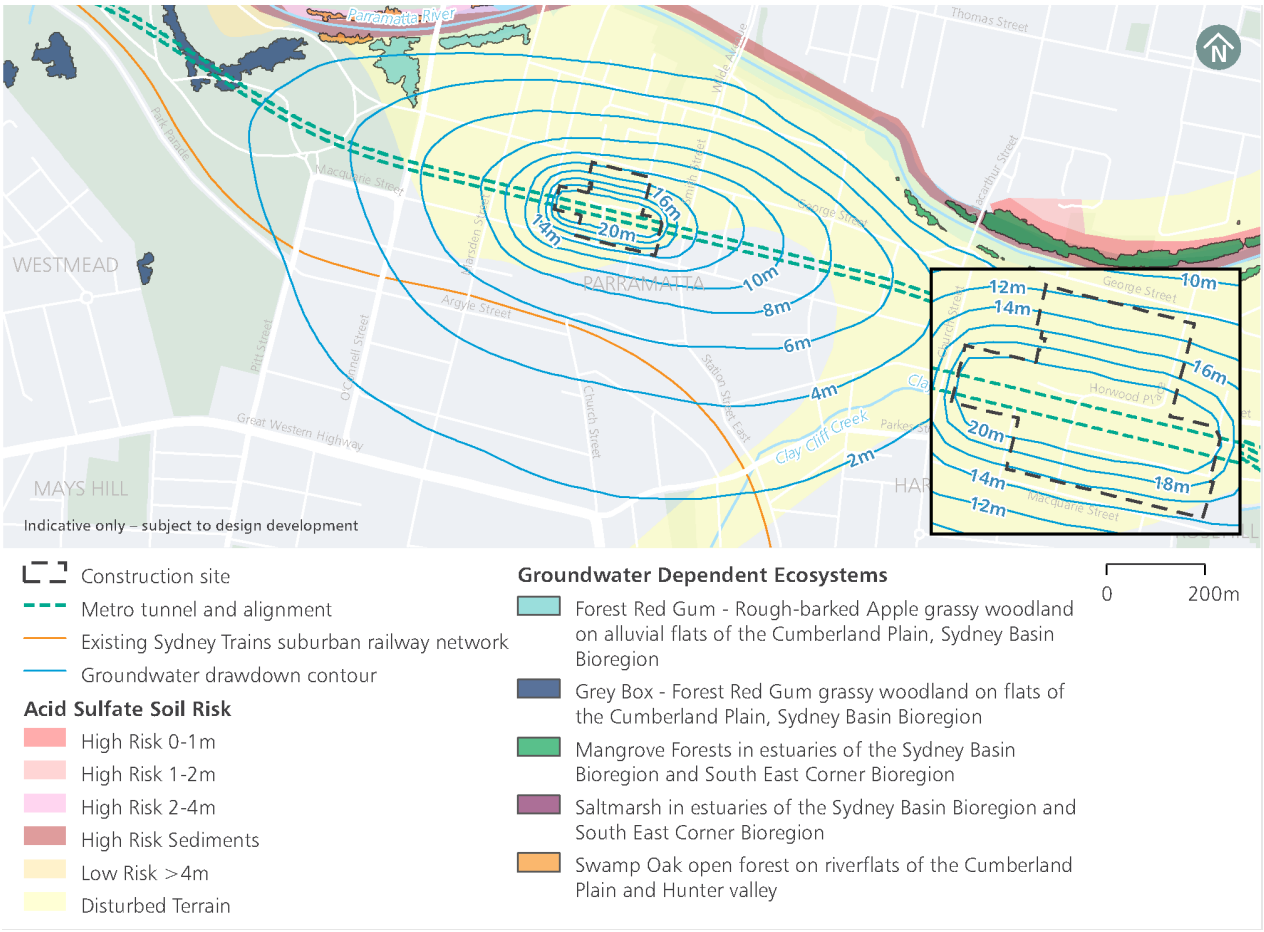

Figure 8-22 Groundwater baseline environment – Parramatta metro station

8.10.2 Operational impact assessment

Soils

The operation of Parramatta metro station is not expected to have any further impact on soils, including from saline soils, as there would be no excavation after completion of construction. Acid sulfate soil investigations would be undertaken under the previous Sydney Metro West planning application within the zone of groundwater drawdown to assess potential impacts and decide whether an Acid Sulfate Soils Management Plan (ASSMP) is required for operation of this proposal.

Contamination

Soil and/or groundwater contamination, if present, is expected to be investigated and remediated during the work carried out under the previous Sydney Metro West planning application in accordance with the relevant mitigation measures and conditions of approval. There are no anticipated impacts during operation of Parramatta metro station from existing contamination during operation. The Parramatta metro station box would be tanked and therefore groundwater inflows would be negligible and significant contaminated groundwater drawdown is not expected to need collection and treatment. While expected to be limited, any contaminated groundwater inflows would be collected, pumped to the operational water treatment plant at the Clyde stabling and maintenance facility and treated in accordance with the water quality requirements outlined in Section 18.9 (Hydrology and water quality) of this Environmental Impact Statement.

Operation of Parramatta metro station would require limited use and storage of chemicals, oils or fuels during operation. There are no significant sources of new contamination or impacts anticipated from the operation of the station or public domain. Management measures associated with the use and storage of chemicals during operation would be implemented (refer to Chapter 20 (Synthesis) of this Environmental Impact Statement.

Groundwater

Potential impacts to groundwater during operation at Parramatta metro station are described further in Table 8-26.

Table 8-26 Potential impacts to groundwater during operation – Parramatta metro station

Potential impact	Discussion
Groundwater recharge	The surface area of impervious surfaces at Parramatta metro station is not expected to substantially increase due to the operational elements for this proposal, as the construction site prior to commencement of work for this proposal would comprise predominately paved (impervious) surfaces.
Groundwater levels, inflows, and flow patterns	The potential impacts of this proposal on the baseline groundwater levels, inflows, and flow regime are expected to reduce during operation in comparison to those predicted under the previous Sydney Metro West planning application. The station box and adjacent basements would be tanked during operation of this proposal. The tanking of the station box would promote the long-term recovery of groundwater level and associated inflows (compared with construction phase drawdown) until a new groundwater level is achieved around the station. The influence of the tanked station box and adjacent basements on the overall regional flow patterns and directions is expected to be minimal. Further groundwater modelling to confirm potential groundwater impacts and flow patterns would be carried out under the previous Sydney Metro West planning application in accordance with condition of approval D122. This groundwater modelling report would be further reviewed and updated to incorporate the scope of this proposal.
Groundwater quality	Groundwater quality impacts are expected to be reduced and limited in comparison to those experienced during the work carried out under the previous Sydney Metro West planning application (refer to Table 8-25). The volume of potentially contaminated groundwater to be managed during the operation of this proposal would be substantially less than during the work carried out under the previous Sydney Metro West planning application. This is due to the excavation for the station box and adjacent basements being tanked, which would reduce the groundwater drawdown and associated inflow volumes. Any long-term groundwater inflows would be collected, treated at the operational water treatment plant at the Clyde stabling and maintenance facility, and discharged in accordance with the water quality requirements outlined in Section 18.9 (Hydrology and water quality) of this Environmental Impact Statement.
Groundwater dependent ecosystems	Potential impacts on identified groundwater dependent ecosystems are expected to be enhanced from their baseline conditions during station operation, as groundwater levels are expected to partially recover during operation compared to construction phase of this proposal due to the tanked station. Potential impacts to groundwater dependent ecosystems as a result of operation of this proposal are anticipated to be negligible. As per mitigation measure B3 for the previous Sydney Metro West planning application, additional investigations and assessment would be completed to confirm the potential for impacts to groundwater dependent ecosystems due to groundwater drawdown, and to identify any required mitigation through design. This would be reviewed and updated as required for this proposal (refer to mitigation measure EIS-GW3 in Section 8.10.4).
Surface water – groundwater interaction	Groundwater acting as baseflow to surface water features is considered to be a minor component of recharge in the vicinity of Parramatta metro station. Clay Cliff Creek is a concrete-lined channel and is unlikely to receive groundwater baseflow. Groundwater baseflow contribution to Parramatta River would likely be negligible relative to total river water flows/volumes. Additionally, groundwater conditions during the operation of this proposal (and therefore any impacts to the interaction with surface water) in proximity to the station are expected to generally recover close to the existing conditions present prior to commencement of work carried out under the previous Sydney Metro West planning application.

Potential impact	Discussion
Policy compliance	The minimal harm criteria in the NSW Aquifer Interference Policy (NSW Department of Primary Industries, 2012) and Water Sharing Plan rules (NSW Department of Industry, 2011) adopted under the previous Sydney Metro West planning application are expected to be carried through and complied with during the operation of this proposal. Impacts from the alteration of groundwater levels and flow regime are likely to be reduced during operation of this proposal.

8.10.3 Construction impact assessment

Soils

There may be potential temporary minor soil erosion from the exposure of soil to water runoff and wind during excavation works required for this proposal, including during the additional excavation for basement structures required for this proposal. This would be adequately managed with the implementation of standard erosion and sediment controls.

There is the potential to disturb saline soils at the Parramatta metro station construction site. Any potential salinity impacts would be managed in accordance with Book 4 Dryland Salinity: Productive Use of Saline Land and Water (NSW Department of Environment and Climate Change, 2008b).

There is potential for acid sulfate soils within the predicted groundwater drawdown extent during construction. The exposure of acid sulfate soils during construction could result in the release of acid sulfates, which could pollute downstream watercourses. Further investigation of acid sulfate soils would be undertaken as part of the previous Sydney Metro West planning application to inform an Acid Sulfate Soils Management Plan (ASSMP). This would be reviewed for this proposal during detailed construction planning to identify the potential need for further measures to manage acid sulfate soils if present.

Contamination

Existing contamination

Surface soil and groundwater contamination within the station box would be predominantly excavated during the work carried out under the previous Sydney Metro West planning application in accordance with its mitigation measures and conditions of approval.

Soil contamination may be encountered during the excavation for basement structures required for this proposal. Soil contamination encountered would be managed in accordance with the mitigation measures outlined in Section 8.10.4 which have been development to be consistent with the conditions of approval for the previous Sydney Metro West planning application.

In the remainder of the construction site, shallow soils are also likely to be remediated if required during the work carried out under the previous Sydney Metro West planning application. Deeper residual soil and groundwater contamination from off-site sources could remain in the rest of the construction site that may require management or remediation during the construction of this proposal.

The underground station and excavation for basement structures would be untanked within bedrock during construction of this proposal and groundwater dewatering would occur. The previous Sydney Metro West planning application identified that groundwater contamination could be present in groundwater within the Parramatta metro station construction site at concentrations above the relevant assessment criteria but is likely to be limited in extent. In accordance with condition of approval D122 for the previous Sydney Metro West planning application, a revised Groundwater Modelling Report is required to assess impacts from groundwater drawdown. Specific mitigation and monitoring where required, including in relation to groundwater contamination, would be continued during construction of this proposal. As the groundwater contamination is likely localised in extent and the groundwater would be collected and treated to the required discharge quality, the risk is considered low.

New contamination

With the exception of the use and storage of chemicals associated with construction activities (e.g. fuels and oils associated with the operation of plant and equipment), the construction activities associated with this proposal are unlikely to represent a significant source of contamination. Management measures associated with the use and storage of chemicals during construction activities would be implemented (refer to Chapter 20 (Synthesis) of this Environmental Impact Statement).

Groundwater

In comparison to the approved station box, the excavation for basement structures for this proposal would by larger in lateral extent; however, it would about half the depth.

Potential impacts to groundwater during construction at Parramatta metro station construction site are outlined in Table 8-27.

Table 8-27 Potential impacts to groundwater during construction – Parramatta metro station

Potential impact	Discussion
Groundwater recharge	Almost all of the surface area within the construction site is expected to be comprised of impervious surfaces at the commencement of this proposal following completion of the work carried out under the previous Sydney Metro West planning application and therefore, the net impact on regional groundwater recharge due to the construction work for this proposal is considered negligible.
Groundwater levels, inflows, and flow patterns	The tanked station box would promote recovery of groundwater levels around the station box over time. Dewatering due to the excavation of the adjacent basements for this proposal would cause groundwater to drawdown to about 12 metres below ground level (approximate depth of excavation). Groundwater flow is expected to be in the same direction as that assessed in the *Sydney Metro West Environmental Impact Statement – Westmead to The Bays and Sydney CBD* (Sydney Metro, 2020a) (i.e. flow towards the excavation for basement structures). The potential impacts from construction of this proposal are expected to be similar or reduced in comparison to the baseline groundwater levels, inflows, and flow regime from the work carried out under the previous Sydney Metro West planning application (refer to Table 8-25). This is because the station box would be tanked prior to commencement of construction of this proposal with associated recovery of groundwater levels, and because the excavation for basement structures would be shallower and involve reduced excavation volumes in comparison to the station box excavation work. This would result in any drawdown associated with the excavation for basement structures having a similar or reduced lateral extent compared to the previous drawdown associated with the station box excavation. Additionally, impacts would be reduced through the tanking of the station box and implementation of mitigation measures, CEMF and relevant sub-plans, as well as condition of approval C17 for the previous Sydney Metro West planning application. Groundwater predictive modelling carried out under the previous Sydney Metro West planning application would be reviewed and updated to consider further developments in basement design and confirm potential groundwater impacts for this proposal.
Groundwater quality	Groundwater quality is expected to be similar to the baseline conditions (as described in Table 8-25). The volume of potentially impacted groundwater to be managed during construction of this proposal would likely be similar or less than the work carried out under the previous Sydney Metro West planning application. As the groundwater contamination is likely localised in extent and the collected groundwater would be treated to the required discharge quality, the risk is considered low. Further groundwater assessment would occur in accordance with the measures included in the CEMF, to inform design development and groundwater quality treatment for this proposal. Groundwater inflows would be collected, treated, and discharged in accordance with the water quality requirements outlined in Section 18.9 (Hydrology and water quality) of this Environmental Impact Statement.

Potential impact	Discussion
Groundwater dependent ecosystems	Potential impacts on identified groundwater dependent ecosystems in proximity of Parramatta metro station are expected to be similar or reduced in lateral extent compared to baseline conditions during construction of this proposal because the station box would be tanked prior to commencement of construction of this proposal with associated recovery of groundwater levels, and because the excavation for basement structures would be shallower and involve reduced excavation volumes in comparison to the station box excavation work. This is because the impact on groundwater levels due to the construction phase for this proposal is likely to be similar or reduced compared to the impacts from the work carried out under the previous Sydney Metro West planning application. Additional investigations and assessment completed under the previous Sydney Metro West planning application (in accordance with measure B3 for those works) would be reviewed and updated for this proposal, to confirm the potential for impacts, and to identify any required mitigation through design (see mitigation measure EIS-GW3 in Section 8.10.4).
Surface water – groundwater interaction	Groundwater acting as baseflow to surface water features is considered to be a minor component of recharge in the area surrounding Parramatta metro station. Clay Cliff Creek is a concrete-lined channel and is unlikely to receive groundwater baseflow. Groundwater baseflow contribution to Parramatta River would likely be negligible relative to total river water flows/volumes.
Policy compliance	The minimal harm criteria in the NSW Aquifer Interference Policy (NSW Department of Primary Industries, 2012) and Water Sharing Plan rules (NSW Department of Industry, 2011) adopted for the previous Sydney Metro West planning application are expected to be carried through and complied with into construction of this proposal, noting that impacts from the alteration of groundwater levels and flow regime are likely to be greater during the work carried out under the previous Sydney Metro West planning application preceding approved major civil construction work between Westmead and The Bays than for construction of this proposal.
Ground movement	For work carried out under the previous Sydney Metro West planning application, the specific risk to most buildings and structures due to ground movement was assessed as negligible, with superficial damage to buildings unlikely (Sydney Metro, 2020a). There is the potential for ground movement during construction of this proposal including due to excavation of basement structures and associated groundwater drawdown. If not adequately managed, ground movement has the potential to cause damage to infrastructure, nearby buildings and other structures. A preliminary assessment considering the Rankin 1988 risk classification identified that the risk to buildings, including heritage buildings and structures, in the vicinity of the Parramatta metro station construction site due to ground movement would be slight (possible superficial damage which is unlikely to have structural significance) to negligible (superficial damage unlikely). In accordance with the measures in the CEMF, the detailed geotechnical and hydrogeological model developed prior to construction under the previous Sydney Metro West planning application would be adopted, as relevant, for this proposal and progressively updated during design and construction, including to determine potential ground movement impacts. Building condition surveys would also be carried out where there is the potential to cause damage prior to the commencement of construction.

Potential impact	Discussion
	During detailed assessment, if ground movement impacts are predicted to exceed acceptable criteria for buildings and/or heritage items, a range of potential options are available to reduce impacts to acceptable levels including: • changes to elements of the construction methodology • consideration of ground improvement options • provision of structural support to the tunnels/excavations and/or to the structures potentially impacted • ground movement monitoring for identified sensitive areas of this proposal. These options have been successfully implemented to manage ground movement impacts on a number of other rail and road tunnelling projects in NSW.

8.10.4 Management and mitigation measures

Environmental management for this proposal would be undertaken through the environmental management approach as detailed in Chapter 20 (Synthesis) of this Environmental Impact Statement. This includes operational mitigation measures (where relevant) and performance outcomes for the operation and construction of this proposal.

During construction of this proposal, soils, contamination and groundwater would be managed in accordance with Sydney Metro's CEMF (refer to Appendix F). The CEMF includes soil, contamination and groundwater management objectives and mitigation measures to minimise impacts as relevant to this proposal as a whole.

Mitigation measures that are specific to the operation and construction of Parramatta metro station to address potential impacts are listed in Table 8-28.

Table 8-28 Soils, contamination and groundwater mitigation measures – Parramatta metro station

Ref	Impact/issue	Mitigation measure	Timing
Soils, contamination and groundwater			
EIS-GW3	Groundwater dependent ecosystems	Additional investigations and assessment completed under the previous Sydney Metro West planning application (mitigation measure B3) would be reviewed and updated for this proposal, to confirm the potential for impacts to groundwater dependent ecosystems due to groundwater drawdown, and to identify any required mitigation through design.	Construction

8.11 Flooding

Further details on the flooding assessment, including the approach and methodology, are provided in Technical Paper 8 (Hydrology, flooding and water quality). The legislative context for the assessment is provided in Appendix B (Legislative and policy context).

8.11.1 Baseline environment

Parramatta metro station is located on a local high point within the Parramatta River floodplain. The site is about 300 metres to the south of Parramatta River, immediately downstream of the Charles Street weir. The site ranges from around nine to 11.1 metres Australian Height Datum (AHD).

Flood study mapping and the previous Sydney Metro West planning application identified that the Parramatta metro station construction site and immediate surrounds are affected by overland flooding and mainstream flooding with shallow ponding and flooding from the local catchment, including flood depths of about 0.15 metres in the one per cent Annual Exceedance Probability (AEP) event and about one metre in the PMF event. The construction site and immediate surrounds are outside of high flood hazard, floodway and flood storage areas.

In the PMF event, the area is inundated by floodwaters from local and Parramatta River catchments causing a maximum flood depth in excess of one metre. This produces a flood level of between 10.5 metres AHD at the eastern extent in George Street, and 12.5 metres AHD at the western extent near Macquarie Street.

The overall flood hazard is low in the five per cent AEP (with climate change), one per cent AEP and one per cent AEP (with climate change) flood events. There would be no substantial conveyance across the site. Evacuation from the site is readily available via all adjacent streets.

In the PMF event, the flood hazard is extreme. There are no evacuation routes available in the PMF flood event.

The station box at Parramatta metro station will have been excavated under the previous Sydney Metro West planning application.

The previous Sydney Metro West planning application identified the following potential flooding impacts at Parramatta metro station construction site:

- potential inundation of the construction site and ingress of floodwaters into station excavations during the PMF event (although the station excavation would be protected from these events)
- potential minor to moderate localised flooding impacts to Horwood Place between Macquarie Street and George Street and the Macquarie Lane access to Smith Street from the obstruction of existing flow paths through the construction site.

8.11.2 Operational impact assessment

The flood protection levels for Parramatta metro station are driven by the PMF event, which is 12.41 metres AHD at Church Street and 10.87 metres AHD at Macquarie Lane. The proposed surface levels at the station entries are 10.5 and 9.9 metres AHD respectively, which is below the flood level. Mitigation measures to protect Parramatta metro station from the flood protection level are outlined in Section 8.11.4.

Operational flood impact criteria established for this proposal are described in Section 3.1.4 of Technical Paper 8 (Hydrology, flooding and water quality). An assessment of potential flooding impacts at Parramatta metro station is provided in Table 8-29 and shown in Figure 8-23. The operational flooding assessment considers the flooding extent for the one per cent AEP (with climate change) and PMF events. The five per cent AEP (with climate change) is also considered in Technical Paper 8 (Hydrology, flooding and water quality). Figures showing the modelling for a range of flooding events are provided in Appendix B and C of Technical Paper 8 (Hydrology, flooding and water quality).

During operation there are anticipated to be some residual flooding impacts associated with Parramatta metro station beyond the immediate vicinity of the site. Mitigation measures to manage potential impacts are outlined in Section 8.11.4.

Table 8-29 Potential flooding impacts for the modelled one per cent AEP and PMF flood events – Parramatta metro station

Potential impact	Description
Change in peak flooding levels	• during the one per cent AEP event, the site would be affected by shallow ponding and flooding from direct rainfall on the site, and there would be no overland flows through the site. Potential minor reductions in flood levels of up to about 0.04 metres in George Street and Smith Street are predicted • during the PMF event, the site would be affected by flooding in excess of one metre. Redirection of flows compared to the baseline scenario would result in increases in flood levels to the west of the site with reductions in flood level to the east • inundation of the site and the surrounding Parramatta CBD would occur during the PMF event both with and without this proposal.
Change in flood extent	• during the one per cent AEP event, potential increases in the flood extent in the kerb and gutter of George Street and potential decreases in flood extent on Macquarie Street as shown in Figure 8-23 • during the PMF event, the flood extent would not be considerably increased. Some increases are predicted in areas within the site on George Street.

Potential impact	Description
Compatibility with flood hazard of the land	• during the one per cent AEP event, the site and surrounding streets would present a low flood hazard which is accepted as safe for people, vehicles and buildings. Access and evacuation routes are readily available via the adjacent streets though Smith Street is likely to have about 0.5 metres of water so other routes may be more appropriate • in the PMF event, the hazard on the site and surrounding streets continues to be characterised by high flood hazard • the Parramatta metro station would be protected from inundation in the PMF event which would provide shelter in place arrangements during extreme flood events. Potential hazard to people and vehicles accessing the metro station would be managed through emergency response planning and mitigation measures outlined in Section 8.11.4.
Change in duration of inundation	• change in duration of inundation would be minor as a result of this proposal in all flood events.
Potential property impacts	• there are not anticipated to be any newly flood-affected private properties as a result of this proposal.
Consistency with floodplain risk management	• the City of Parramatta Council flood risk mapping identifies the site as low risk, which notes flooding is extremely rare but when this happens flooding covers a large area with dangerous water in many places. This is consistent with the mapping in Appendix A of Technical Paper 8 (Hydrology, flooding and water quality) where the one per cent AEP (with climate change) event causes local flooding only • the City of Parramatta Council recently endorsed the *Update of Parramatta Floodplain Risk Management Plans* (Molino Stewart, 2021a) which identified flood depths in the PMF event between one and two metres which is also consistent with the mapping in Appendix A of Technical Paper 8 (Hydrology, flooding and water quality).
Potential impacts to critical infrastructure and emergency management arrangements for flooding	• no major road or rail transport routes within the *Parramatta Local Emergency Management Plan Area* (Parramatta Local Emergency Management Committee, 2018) would be affected • streets adjacent to the block in which this proposal would be situated are considered feeder routes to the evacuation routes outlined in the *Parramatta CBD Flood Evacuation Assessment* (Molino Stewart, 2021b). However, the assessment concludes that safe vehicular evacuation would not be realistically achievable under any circumstances for the one per cent AEP event and PMF event. Consultation would occur with NSW State Emergency Services and the City of Parramatta Council in relation to potential impacts to existing community emergency management arrangements for flooding (refer to Section 8.11.4).
Potential social and economic costs from flooding impacts	• given the potential flood impacts at Parramatta metro station and surrounds, there is potential for social and economic costs from flooding impacts, however the scale of impact is modest compared to the degree of impact these properties would already experience.

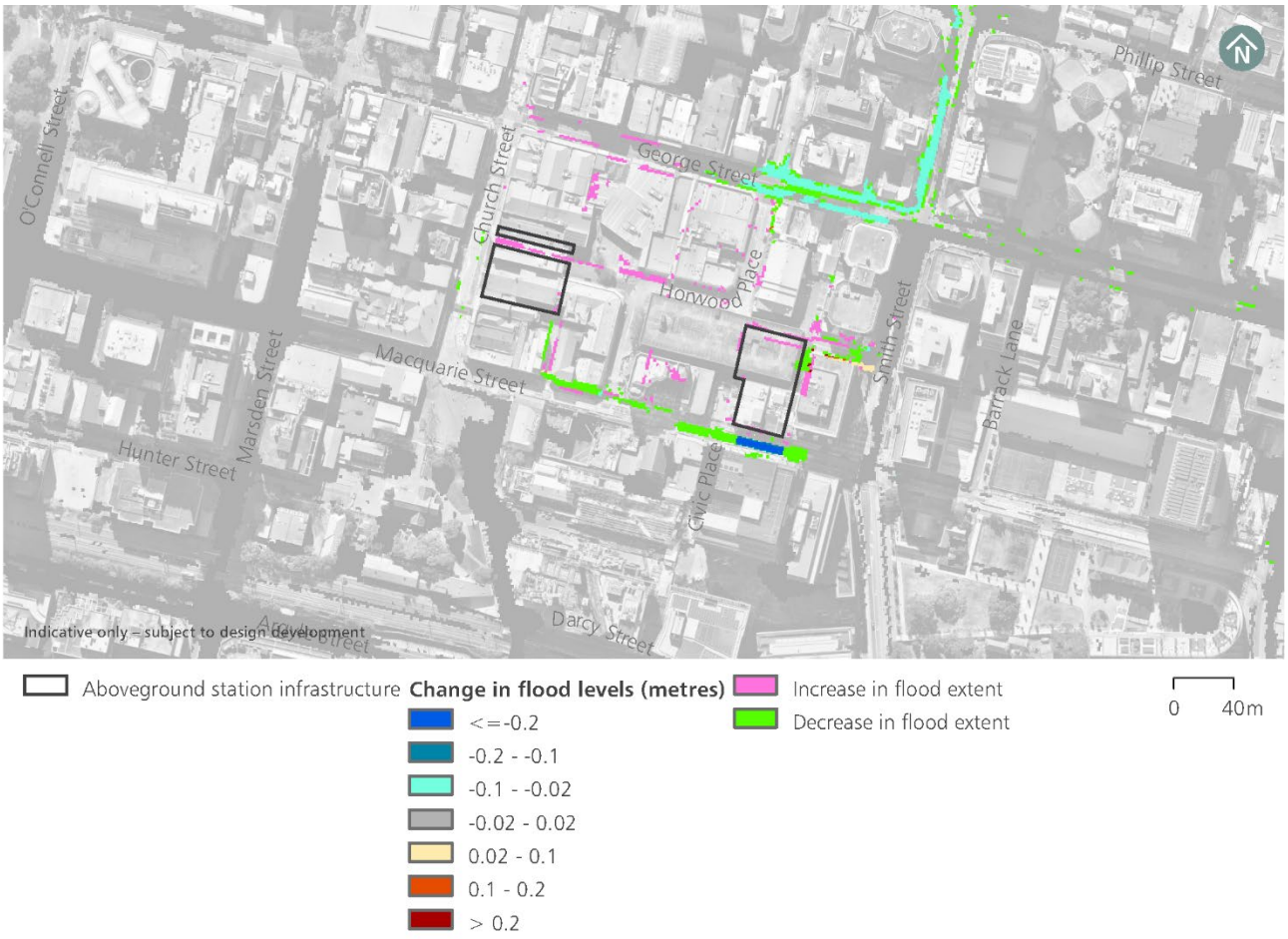

Figure 8-23 Potential change in flood levels (one per cent AEP event) – Parramatta metro station

8.11.3 Construction impact assessment

The duration of construction at the Parramatta metro station construction site would be about four to five years (see Figure 8-11). In general, the potential construction phase flood risks would be a continuation of the potential flooding risks associated with the work carried out under the previous Sydney Metro West planning application. That is, there is potential inundation of the construction site and ingress of floodwaters into excavations during the PMF event. There is also potential for minor to moderate localised flooding impacts to Horwood Place between Macquarie Street and George Street and the Macquarie Lane access to Smith Street from the obstruction of existing flow paths through the construction site.

The potential impacts on flood behaviour from the previous Sydney Metro West planning application that would continue during construction of this proposal include:

- direct intense rainfall onto the site may cause nuisance flooding and drainage issues
- flow of water into basement excavation areas
- continued potential interruption of overland flow paths from temporary construction site infrastructure and modifications to landforms
- the potential interruption or diversion of existing flood routes away from the location of bunding or spoil within construction sites, resulting in a reduction of flood storage and an increased flood risk to adjacent sites
- disruption of street kerb and gutter at construction site vehicle entry locations which may result in localised ponding
- potential blocking of drainage networks through increased sedimentation of surface water.

The CEMF (refer to Appendix F) requires the preparation of a Soil and Water Management Plan that would include consideration of surface water and flooding measures and progressive erosion and sediment control plans to manage potential impacts.

Potential hazard to people and vehicles accessing the site would need to be managed through the CEMF in rare and extreme flood events.

Compatibility of construction sites with flood conditions

The previous Sydney Metro West planning application identified that the Parramatta metro station construction site is considered to be compatible with flood conditions due to generally low flood risk within the site and immediate surrounds. Flooding depths in the five per cent AEP and one per cent AEP events (both with climate change) are expected to be minor and localised.

Consistency with floodplain risk management plans

The *Update of Parramatta Floodplain Risk Management Plans* (Molino Stewart, 2021a) (recently endorsed by City of Parramatta Council) presents PMF mapping that is consistent with the mapping for this proposal in Appendix A of Technical Paper 8 (Hydrology, flooding and water quality).

The City of Parramatta Council also includes online flood risk mapping. The mapping shows the site area as low risk for the five per cent and one per cent flooding events (both with climate change), which is consistent with the risk identified in Technical Paper 8 (Hydrology, flooding and water quality).

A review of this mapping did not identify any conflicts or inconsistencies with proposed floodplain risk management measures.

Potential impacts to emergency management arrangements for flooding

No major road or rail transport routes identified in the *South West Metropolitan Regional Emergency Management Plan* (South West Metropolitan Regional Emergency Management Committee, 2017) or *Parramatta Local Emergency Management Plan Areas* (Parramatta Local Emergency Management Committee, 2018) would be impacted by flood flows from the construction site.

According to the *Parramatta CBD Flood Evacuation Assessment* (Molino Stewart, 2021b), Great Western Highway, Church Street, Harris Street, Pennant Hills Road and Victoria Road were considered as evacuation routes leading out of the Parramatta CBD. All the streets adjacent to the block within which this proposal would be situated are considered feeder routes to these evacuation routes. CEMF (Appendix F) (requires that construction planning at Parramatta metro station is undertaken in consultation with the NSW State Emergency Service and the City of Parramatta Council.

Potential social and economic costs from flooding impacts

Similar to the operations phase, potential social and economic costs from flooding impacts during construction at Parramatta as a result of this proposal are considered low given the generally low flood affectation during the five per cent AEP and one per cent AEP events (both with climate change) and the expected low impact on flood behaviour on surrounding properties and infrastructure. The CEMF (refer to Appendix F) requires the preparation of a Soil and Water Management Plan that would include consideration of surface water and flooding measures and progressive erosion and sediment control plans to manage potential impacts.

8.11.4 Management and mitigation measures

Environmental management for this proposal would be undertaken through the environmental management approach as detailed in Chapter 20 (Synthesis) of this Environmental Impact Statement. This includes operational mitigation measures (where relevant) and performance outcomes for the operation and construction of this proposal.

Potential flood risks during construction of this proposal would be managed in accordance with Sydney Metro's CEMF (Appendix F). The CEMF includes flooding objectives and mitigation measures to minimise impacts as relevant to this proposal as a whole.

Mitigation measures that are specific to the operation and construction Parramatta metro station to address potential impacts are listed in Table 8-30.

Table 8-30 Flooding mitigation measures – Parramatta metro station

Ref	Impact/issue	Mitigation measure	Timing
Flooding			
EIS-HF3	Impacts during operation	Ongoing consultation would occur with State Emergency Services and relevant councils in relation to potential impacts to existing community emergency management arrangements for flooding.	Operation

8.12 Social impacts

Further details on the social impact assessment, including the approach and methodology, are provided in Technical Paper 9 (Social impacts). A discussion of potential broader proposal-wide and regional social impacts (both benefits and disbenefits) are provided in Chapter 18 (Proposal-wide) of this Environmental Impact Statement.

8.12.1 Baseline environment

The characteristics of the communities within the social locality is described as the social baseline. The social baseline has been analysed by considering the human, social, economic, physical, and natural capital present around Parramatta metro station.

Statistical analysis of the social baseline has been carried out by considering the primary geographical areas of interest as defined by the Australian Bureau of Statistics (ABS). These areas of interest have been termed as:

- **the proximal area:** Statistical Area level 1 (SA1s) have been chosen as the closest approximation of each of the localities along the corridor
- **suburb:** Statistical Area level 2 (SA2s) have been chosen to prepare community profiles for this proposal corridor
- **region:** the Greater Sydney area has been chosen to assist with the assessment of the broader social impacts. It has also been used for comparative purposes.

A summary of the community capitals related to Parramatta metro station is discussed in Table 8-31. This summary considers the proximal area of analysis only. A discussion of potential broader corridor-wide regional social impacts (both benefits and disbenefits) is provided in Chapter 18 (Proposal-wide) of this Environmental Impact Statement.

Table 8-31 Community capitals summary – Parramatta metro station

Capital	Summary
Human	In 2016, the Parramatta locality hosted the second largest population of all Sydney Metro West localities, second only to Pyrmont. The population of the Parramatta locality was 6,848 residents, of which three quarters were between 20 and 64, making up a large percentage of the potential active workforce. Only 5 per cent of the population were over the age of 65, which is less than half that of the corridor (10.8 per cent) and almost a third of Greater Sydney (14 per cent), meaning the locality was less vulnerable when it came to an aged or elderly population, when compared to other localities within the corridor. In 2016, 19.5 per cent of all residents of the Parramatta locality were attending an educational institution, including preschool, infants/primary or secondary school, university, TAFE, or other educational facilities. Of the residents attending an educational institution, 37.5 per cent of residents were attending university or other tertiary institution, which was slightly higher than the corridor average. The Parramatta locality had one of the lowest shares of residents attending secondary education along the corridor.
Social	Four out of five residents living in the Parramatta locality in 2016 were born overseas, with Hindi and Mandarin being the second and third most dominant languages spoken at home. The percentage of residents born overseas is the highest of all the localities and more than double that of Greater Sydney (78.8 per cent compared to 38.1 per cent).

Capital	Summary
	In 2016, 65.9 per cent of households were family households, which was comparable to the metro corridor (65.3 per cent). The majority of these family households were couple family households, of which there were slightly more couple families with children than couples with no children. This locality also had one the highest overall share of group households when compared to other localities. The stability of residence within the Parramatta locality was the second lowest of the localities, with 22.4 per cent living at the same address give years ago, compared to 44.5 per cent across the corridor.
Economic	Overall, households in the Parramatta locality were slightly less financially advantaged compared to other localities, as they have a lower median household annual income, with only one in four households earning above $2,500 per week, which is considered a high income. Parramatta had the highest proportion of households rented across the corridor (73.9 per cent), with over 90 per cent paying weekly rent in either the medium highest or highest quartile (greater than $340 per week). The occupancy rate of rentals was also high (92.8 per cent) pointing towards a strong rental sale and driving up rental prices. Parramatta locality had the highest levels of unemployment in 2016 at 9.9 per cent of the eligible working age population, compared to 6 per cent in Greater Sydney). Unemployment levels are calculated based on those of eligible age (between the ages of 16 and 65), who are not engaged in secondary education and who are able to work). Of those that were employed, the dominant industry was similar to Westmead, with 24 per cent employed in professional, scientific and technical services. Despite the high unemployment levels, the labour force participation of those 15-85 years (including those are unemployed looking) was quite high when compared to Greater Sydney (75.9 per cent and 65.6 per cent respectively).
Physical	The overwhelming majority of dwellings within the Parramatta locality were flats, units or apartments, which accounted for 93 per cent of all dwelling structure types. This share was also the second highest compared to all the other localities in the corridor. The Parramatta locality also had the highest share of 'other dwelling' types, which includes dwellings such as caravans, cabins, improvised homes, and house or flat attached to a shop or office. The average household size was 2.5 persons, which was slightly higher compared to the average household size of the corridor (2.4 persons). Compared to other localities, residents in the Parramatta locality were relatively less car dependent, with only 24.8 per cent reporting travelling to work via car as a driver. On the contrary, the Parramatta locality had the highest overall share of residents travelling to work via train or bus, and the third highest locality by walking. This implies that residents in the Parramatta locality have relatively good access to public transport, with some residents also living within walking distance to work. Key community infrastructure assets include various heritage, cultural, or built form landmarks, including the Westmead Hospital and Westmead Children's Hospital, Western Sydney University Parramatta campus, and Parramatta Park.
Natural	The Parramatta metro station locality has several examples of strong natural capital. The Parramatta River is located nearby, as well as many small creeks and tributaries. It is also in close proximity to the UNESCO World Heritage listed Parramatta Park.

8.12.2 Operational impact assessment

Social impacts would be experienced at different geographies or spatial extents. A large proportion of operational social impacts associated with Parramatta metro station would be felt at a regional or a suburb level; however, some would be experienced at a proximal level. This section focuses on the operational impacts at the proximal level, while a region- and suburb-based analysis, including potential beneficial social impacts, is provided in Chapter 18 (Proposal-wide) of this Environmental Impact Statement.

An assessment of the potential social impacts, both positive (benefits) and negative (disbenefits), of the operation of Parramatta metro station are outlined in Table 8-32. The identified potential impacts are presented in Table 8-32 are unmitigated and would be appropriately managed through the implementation of the mitigation measures outlined in Section 8.12.4 and through the performance outcomes detailed in Chapter 20 (Synthesis) of this Environmental Impact Statement. Sydney Metro would also develop a Community Benefit Plan to guide the development of community benefit initiatives (by Principal Contractors).

A residual impact rating has been assigned to each mitigated impact in Table 8-32 to quantify the impacts after mitigation measures have been applied.

Table 8-32 Summary of operational social impacts – Parramatta metro station

Pre mitigation impact	Social impact category	Impact type	Residual impact rating
Increased access to jobs, businesses, education, services, and social facilities improving social cohesion and social health for the whole community, including vulnerable persons.	Health and wellbeing Way of life Accessibility Livelihoods	Positive	High
Social amenity and placemaking benefits, including improvements to the aesthetic value of the area by creating attractive and active public spaces that reflect the existing or desired future scale and character of local areas.	Surroundings	Positive	High
Change in community character due to permanent changes to improve local visual character.	Community	Positive	High
Potential decline in social amenity and ability to experience surroundings in the way the community have done in the past to due to ongoing operational noise, including those visitors to Leigh Memorial Church.	Way of life	Negative	Low
Potential decline in how people experience their living environments due to light spill, visual amenity and/or extended opening hours of services	Way of life	Negative	Low

Overall, the assessment found that the operation of Parramatta metro station would serve and support the growth of Parramatta as Sydney's second CBD, boosting jobs and improving connections to recreational and tourist attractions. The new metro station would also improve customer experience at the existing Parramatta Station by relieving demand in peak times. In terms of visual amenity, Technical Paper 6 (Landscape and visual amenity) found the new station (including improved architectural quality of the station building and improvements to streetscapes) would improve visual amenity in the area.

In addition, the assessment also found that the longer term and ongoing negative social impacts of this proposal would be directly in relation to a decline in social amenity and a potential decline in how people experience their living environments. There would be some residual negative social impacts in relation to way of life; however, these would be managed to an acceptable level through the mitigation measures as identified in Chapter 20 (Synthesis) of this Environmental Impact Statement.

8.12.3 Construction impact assessment

Construction activities would predominantly be carried out within the same construction site required for the work carried out under the previous Sydney Metro West planning application. Anticipated construction impacts are expected to be similar and would be a continuation of those from the work carried out under the previous Sydney Metro West planning application. During this proposal, local amenity impacts such as noise, vibration, and air quality would reduce compared to the preceding major civil construction work due to the nature of the construction activities for this proposal.

An assessment of the potential social impacts of constructing this proposal at Parramatta metro station is outlined in Table 8-33. The potential impacts presented in Table 8-33 are unmitigated and would be appropriately managed through the implementation of the mitigation measures outlined in Section 8.12.4 and through the performance outcomes detailed in Chapter 20 (Synthesis) of this Environmental Impact Statement. Sydney Metro would also develop a Community Benefit Plan to guide the development of community benefit initiatives (by Principal Contractors).

A residual impact rating has been assigned to each pre-mitigated impact to quantify the impacts after these mitigation measures have been applied.

Table 8-33 Summary of construction social impacts – Parramatta metro station

Pre mitigation impact	Social impact category	Impact type	Residual impact rating
Continued impact to cultural festivals and Aboriginal and European heritage items of significance adjacent to the construction site, with attendant impacts to communities' connection to place, shared histories and the future of their community.	Culture	Negative	Medium
Potential wellbeing impacts associated with ongoing construction activity for vulnerable people including those people sensitive to noise and vibration, needing assistance with mobility or communication or experience mental ill health. Psychosocial impacts as a result of inherent changes to the social fabric or the local area. Culturally and linguistically diverse households and communities may be disproportionately impacted if communication materials are not accessible in their language.	Health and wellbeing Community Culture	Negative	Medium
Continued reduction in amenity in local area due to ongoing construction and associated noise, air quality and vibration impacts.	Surroundings Way of life Livelihoods	Negative	Medium

The assessment indicates that the social impacts of this proposal would effectively represent a continuation of the impacts identified for the work carried out under the previous Sydney Metro West planning application, though generally at a lower level of intensity and extent. Key negative impacts would be largely related to community, culture, and surroundings, and would be temporary in nature. These impacts would be managed to an acceptable level through proven mitigation measures as identified in Chapter 20 (Synthesis) of this Environmental Impact Statement.

8.12.4 Management and mitigation measures

Environmental management for this proposal would be undertaken through the environmental management approach as detailed in Chapter 20 (Synthesis) of this Environmental Impact Statement. This includes operational mitigation measures (where relevant) and performance outcomes for the operation and construction of this proposal.

During construction of this proposal, social impacts would be managed in accordance with Sydney Metro's CEMF (refer to Appendix F). The CEMF includes social impact management objectives and mitigation measures to minimise impacts as relevant to this proposal as a whole.

The OCCS (Appendix C) also specifies that a Community Communication Strategy would be prepared and implemented during construction which would define the location-specific measures to be implemented to minimise impacts on people during construction.

Design refinements that have occurred to avoid or minimise social impacts, and to respond to stakeholder feedback are provided in Technical Paper 9 (Social impacts). Monitoring commitments during the operation and construction of this proposal, including adaptive management measures, are provided in Technical Paper 9 (Social impacts).

Mitigation measures that are specific to the operation and construction of Parramatta metro station to address potential impacts are listed in Table 8-34.

Table 8-34 Social impacts mitigation measures – Parramatta metro station

Ref	Impact/issue	Mitigation measure	Timing
Social impacts			
EIS-S2	Potential impacts on school infrastructure	Ongoing engagement would be undertaken with NSW Department of Education to continue to investigate feasible and reasonable mitigation measures related to construction traffic, pedestrian safety, construction noise and vibration, and air quality.	Construction
EIS-S3	Activation of streetscapes	In addition to temporary activation measures outlined in the Construction Environmental Management Framework, temporary activation considered in the vicinity of the Five Dock Station western construction site and Parramatta metro station construction site would include opportunities to provide spaces and places for the community to gather and meet each other.	Construction

8.13 Local business impacts

The approach and methodology for the local business assessment are provided in Chapter 4 (Methodology) of this Environmental Impact Statement. The legislative context for the assessment is provided in Appendix B (Legislative and policy context).

8.13.1 Baseline environment

The Parramatta metro station construction site will be established under the previous Sydney Metro West planning application. This included a description of the existing environment as it relates to this business impacts assessment, based on ABS Census 2016 data. As updated census data is not yet available, the broad existing environment described in Chapter 16 of the *Sydney Metro West Environmental Impact Statement - Westmead to The Bays and Sydney CBD* (Sydney Metro, 2020a) is considered to remain largely relevant to this assessment.

To verify this, a desktop gap analysis was carried out with respect to any new data available and the specific scope of this proposal. The baseline environment is summarised in the sections below and more detail is provided in Chapter 16 of the *Sydney Metro West Environmental Impact Statement – Westmead to The Bays and Sydney CBD* (Sydney Metro, 2020a).

Local business profile

Parramatta is the second largest commercial office centre in NSW outside the Sydney CBD. The Parramatta CBD is predominantly located north of the existing Parramatta Station. The existing Parramatta Station is located around 150 metres south of the Parramatta metro station construction site.

The Parramatta CBD contains a highly developed commercial core, alongside a wide range of commercial, retail, health, education, community, and government administration uses. Within 400 metres of the construction site, businesses are primarily commercial, retail and education activities, with a number of cafes and restaurants located along the retail strips of Church Street (known as ‘Eat Street’) and George Street.

The frontage along Macquarie Street contains more commercial office premises, with businesses such as tax accountants, lawyers, real estate agents and banks, as well as health care consulting rooms and education/training premises. In addition to the ground-level retail and restaurant businesses, higher density commercial office buildings are located around the construction site, particularly to the north-east. Westfield Parramatta is the largest shopping mall for Parramatta and is situated around 220 metres south of the Parramatta metro station construction site.

Broadly speaking, the commercial, education, government administration and health businesses differ in their mode of interaction with customers compared with retail. Most of these businesses would be expected to interact with customers by appointment or a pre-determined schedule. Conversely, retail businesses would be expected to have a greater reliance on visibility and passing trade, particularly from foot traffic. Interactions with suppliers and other businesses would be highly business-specific and dependent on other factors such as location or accessibility (or need) for deliveries.

Table 8-35 identifies the types of existing businesses within the local business impacts study area.

Table 8-35 Businesses within the local business study area – Parramatta metro station

Impact area	Types of businesses	Approximate number of businesses
Within 100 metres of the site	Commercial, retail, cafes and restaurants, commercial services, government administration, and education	150 to 200
Between 100 and 400 metres of the site	Commercial, retail, cafes and restaurants, commercial services, government administration, and education	150 to 200

Employment

At the 2016 Census, some 41,340 people were working in the 'destination zones' relevant to the Parramatta metro station local business study area. Destination zones are the spatial unit used to code 'place of work' by the Australian Bureau of Statistics. Most of these jobs were in business services, which are primarily office jobs that provide services for businesses. The next largest sector was the 'other' sector which mostly comprised jobs in public administration and safety.

Most jobs were located in the north-east of the local business impacts study area, with retail being primarily located across a number of shopping malls, including Westfield Parramatta shopping centre, about 220 metres south of the construction site.

Travel patterns

Australian Bureau of Statistics 2016 Census data indicates that workers within the local business study area rely mostly on cars (as driver) and the train to travel to work, with these two transport modes accounting for 43.3 and 35 per cent of worker trips, respectively. This suggests workers are dependent on good access to the road network as well as to the existing Parramatta Station.

Since the 2016 Census, it is likely that the share of workers working from home in the local business impacts area has increased, with this trend likely to be accelerated in a post-COVID-19 environment.

8.13.2 Operational impact assessment

A qualitative assessment of potential indirect operational impacts to local businesses at Parramatta metro station are provided in Table 8-36. There are no anticipated direct impacts to local businesses at Parramatta metro station during operation. Potential opportunities for local businesses during operation are also provided in Table 8-36.

Overall, the Parramatta area is a diverse and dynamic area with a large number of businesses. These businesses would have a degree of resilience to potential negative operational impacts and would benefit from the presence of this proposal.

A new metro station in the Parramatta CBD would improve connectivity between Sydney's two core business districts (that is, Parramatta CBD with Sydney CBD), further enhancing and reinforcing their regional and national importance. It is expected Parramatta metro station would support further business investment and growth within the Parramatta CBD by providing greater connections between businesses, labour markets, customers and clients located within and near this proposal.

Table 8-36 Local business impacts during operation – Parramatta metro station

Potential impact operation	Risk assessment	
	Likelihood	Significance
Potential opportunities		
Increased passing trade for businesses Some businesses (e.g. retail and cafes) located around Parramatta metro station may benefit from an increase in passing trade from customers accessing Parramatta metro station.	Likely	Moderate positive
Improved accessibility Some businesses may experience increased accessibility (both those reliant on passing trade and destination businesses, for example those that are visited by appointment) bringing in new customers who previously could not easily access the area.	Likely	Moderate positive

Potential impact operation	Risk assessment	
	Likelihood	Significance
Improved amenity Improved amenity (e.g. visual impacts and urban design) around Parramatta metro station would make the area a more attractive place. This could contribute to improved customer experiences (for a range of business types) throughout the area and increased foot traffic for those businesses reliant on passing trade. Night-time operational lighting is expected to have a negligible impact on amenity, as it will largely be absorbed into the surrounding brightly lit night scene.	Likely	Moderate positive
Changed behaviours during construction which continue to the operation stage A forced change in consumer, supplier or employee behaviour during construction (such as travel route or diversion) may have longer term effects if continued during operation. For example, an alternative pedestrian route provided during construction between Macquarie Street and George Street (if this would move passing trade away from a given business) may result in a permanent change in behaviour or travel direction even when no longer enforced. This could benefit some businesses to which trade was diverted.	Unlikely	Slight positive
Potential indirect impacts		
Impacts on accessibility Some businesses may experience reduced accessibility due to 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.	Unlikely	Slight negative
Changed behaviours during construction which continue to the operation stage A forced change in consumer, supplier or employee behaviour during construction (such as travel route or diversion) may have longer term effects if continued during operation. For example, an alternative pedestrian route provided during construction between Macquarie Street and George Street (if this would move passing trade away from a given business) may result in a permanent change in behaviour or travel direction even when no longer enforced. This could negatively affect businesses from which trade was diverted.	Unlikely	Slight negative

8.13.3 Construction impact assessment

A qualitative assessment of potential indirect impacts to local businesses during construction at Parramatta metro station is provided in Table 8-37. There are no anticipated direct impacts to local businesses at Parramatta metro station during construction. Potential opportunities during construction for local businesses are also provided in Table 8-37.

Similar to the potential operational impacts, Parramatta is a diverse and dynamic area with a large number of businesses, and most of these businesses are likely to have a degree of resilience to potential negative construction impacts, for example the business services and government administration businesses may be less affected by local changes.

Additionally, potential construction impacts would be a continuation of those from the work carried out under the previous Sydney Metro West planning application. During this proposal, local amenity impacts such as noise, vibration, and air quality would reduce compared to the work carried out under the previous Sydney Metro West planning application due to the nature of the construction activities for this proposal.

Table 8-37 Local business impacts during construction - Parramatta metro station

Potential impact construction	Risk assessment	
	Likelihood	Significance
Potential opportunities		
Continuation of passing trade from construction workforce Businesses in the local area may benefit from a continuation in the increased number of customers as a result of construction workers buying goods and services from retail, cafes and restaurants, in comparison to pre-construction numbers.	Likely	Slight positive
Continuation of redistribution of trade As a result of the work carried out under the previous Sydney Metro West planning application, some local customers could have redistributed their trade towards similar locally serving businesses within other parts of the business study area or the surrounding area which would be positive for those businesses that potentially experience an increase in trade. This redistribution of trade could continue during construction of this proposal.	Possible	Slight positive
Potential indirect impacts		
Continuation of redistribution of trade As a result of the work carried out under the previous Sydney Metro West planning application, some local customers could have redistributed their trade towards similar locally serving businesses within other parts of the study area or the surrounding area which would be a negative impact for those businesses that potentially experience a reduction in trade. This redistribution of trade could continue during construction of this proposal.	Possible	Slight negative
Continuation of temporary traffic congestion and increased travel times Some businesses surrounding the construction site may have experienced impacts associated with traffic congestion and increased travel times during the work carried out under the previous Sydney Metro West planning application. These impacts may continue during construction of this proposal. The extent to which workers and customers would be affected would depend on their proximity to the Parramatta metro station construction site, and whether they travel on roads that are part of the construction haul routes (primarily George Street, Pitt Street, Macquarie Street, and O'Connell Street).	Unlikely	Slight negative
Continuation impacts on parking Some businesses surrounding the construction site may have experienced impacts associated with temporary loss of parking during the work carried out under the previous Sydney Metro West planning application (including the removal of the City Centre car park). These parking impacts would continue during construction of this proposal – a continued loss of around 850 car spaces through a combination of the removal of the City Centre car park and some street parking. The demolition of the City Centre car park was previously identified in the Draft Parramatta CBD Public Car Parking Strategy (City of Parramatta, 2017), which identifies measures to offset potential loss of car parking. The potential temporary impact to parking availability for local businesses from the presence of a construction workforce is expected to continue to be minimal. Construction workers would be encouraged to access the site using nearby public transport options.	Almost certain	Slight negative

Potential impact construction	Risk assessment	
	Likelihood	Significance
Temporary loss of power and utilities Unplanned power and utility interruptions could result in business impacts during interruptions. Given most utility works would be completed as part of the work carried out under the previous Sydney Metro West planning application, any substantial impact from unplanned power and utility interruptions is very unlikely.	Almost unprecedented	Slight negative
Continuation of temporarily reduced local amenity Some businesses surrounding the construction site may have experienced impacts associated with reduced local amenity (noise, vibration, visual amenity, and air quality) during the work carried out under the previous Sydney Metro West planning application, although these are anticipated to be minor. Businesses potentially affected by local amenity impacts would primarily be those located closest to the Parramatta metro station construction site and those more reliant on a pleasant urban amenity and adequate visibility. Impacts on Church Street (Eat Street) would be mitigated by the relatively small direct frontage of the construction site to Church Street, and because the construction works would be carried out behind hoardings.	Almost certain	Slight negative
Continuation of safety and security impacts There is potential for businesses to experience a temporary reduction in patronage due to perceptions related to safety and security when travelling through the local business study area. Safety and security could relate to the perception of potentially becoming a victim of crime. These perceived impacts are likely to be limited to retail and cafes and restaurants located near the Parramatta metro station construction site that would normally continue trading into the evening. This is because safety and security impacts tend to become more prevalent outside of daylight hours when any reduction in visibility decreases surveillance and the ability to see and navigate hazards.	Rare	Slight negative

8.13.4 Management and mitigation measures

Environmental management for this proposal would be undertaken through the environmental management approach as detailed in Chapter 20 (Synthesis) of this Environmental Impact Statement. This includes operational mitigation measures (where relevant) and performance outcomes for the operation and construction of this proposal.

During construction of this proposal, local business impacts would be managed in accordance with Sydney Metro's CEMF (refer to Appendix F).

The OCCS (Appendix C) also specifies that a Community Communication Strategy would be prepared and implemented during construction and include requirements related to small business engagement. The Community Communication Strategy would define the location specific measures to be implemented to minimise impacts on individual businesses during construction, taking into account the commercial character of the locality, its general trading profile (daily and annually), and information gained from the business profiling.

8.14 Biodiversity

The approach and methodology for the biodiversity assessment are provided in Chapter 4 (Methodology) of this Environmental Impact Statement. The legislative context for the assessment is provided in Appendix B (Legislative and policy context).

8.14.1 Baseline environment

Site context

The area immediately surrounding Parramatta metro station is highly urbanised, with a history of clearing and development over the past 200 years. This includes the earlier use of the area for agriculture, with subsequent redevelopment for a variety of uses including residential, commercial and industrial land uses. The area is relatively flat, with a landform generally draining northwards towards the Parramatta River.

The nearest area of native vegetation is the Parramatta Park, approximately 450 metres to the east, the majority of which has been revegetated as part of the development of the surrounding public open space.

Additional excavation is required for this proposal within Parramatta metro station construction site for basement structures associated with future over and adjacent station development (refer to Figure 8-2).

Vegetation characteristics

Vegetation in the area surrounding Parramatta metro station is limited to landscape and ornamental plantings only. No remnant native vegetation is present. The Parramatta metro station construction site is occupied by several multi-storey buildings, with associated native and exotic landscape plantings in isolated garden beds, or as street trees.

All vegetation within the Parramatta metro station construction site will be removed under the work previous Sydney Metro West planning application. Canopy vegetation within the construction site is limited to a small number of mature London Plane trees, Brush box and weeping fig, all of which are planted.

Vegetation in the surrounding area is similarly comprised solely of landscape planting and street trees and is not remnant. This vegetation would not be affected by this proposal.

Threatened ecological communities

There are no threatened ecological communities present within the Parramatta metro station construction site.

Groundwater dependent ecosystems

There are no groundwater dependent ecosystems present within the Parramatta metro station construction site.

As discussed in Section 8.10.1, a community of Forest Red Gum – Rough-barked Apple grassy woodland on alluvial flats of the Cumberland Plain is located around 300 metres to the north-west of the Parramatta metro station construction site. It is considered to have a moderate to high likelihood of being groundwater dependent.

Threatened flora species

There are no threatened flora species present within the Parramatta metro station construction site.

Threatened fauna species

The Parramatta metro station construction site will be cleared under the previous Sydney Metro West planning application. As such, at the commencement of work associated with this proposal no roosting habitat would be present for microbats, threatened or otherwise. No potential impacts to microbats are therefore anticipated and impacts have not been assessed further.

Migratory species

There is no habitat associated with migratory species present within the Parramatta metro station construction site.

Aquatic ecology

There is no aquatic habitat present within the Parramatta metro station construction site.

8.14.2 Operational impact assessment

Direct impacts

Direct impacts related to the operation of Parramatta metro station would be limited to the disruption of non-threatened fauna due to noise, light and human activity. As the majority of activity would be underground at this location, impacts would only include those associated with surface activities such as people moving in and out of the station, additional street-level lighting and the increased movement of private vehicles, buses and taxis. In the context of the urban locality including substantial residential and retail development, as well as movements associated with the existing station, these impacts would be minor.

Indirect impacts

Indirect impacts associated with the operation of Parramatta metro station would be limited to the management of stormwater runoff and its impacts to local waterways. This may include changes in the quantity and quality of stormwater runoff leaving the Parramatta metro station, resulting in subsequent impacts to nearby aquatic systems such as the Parramatta River. Biodiversity impacts associated with such changes include temporary or permanent inundation of wetland habitat, changes in water chemistry affecting sensitive breeding habitat (such as pH changes affecting amphibian breeding and foraging habitat) and changes in turbidity affecting the overall health and productivity of aquatic plants and animals.

Potential impacts to groundwater dependent ecosystems are discussed in Section 8.10.1.

This proposal is located within an area that is already highly urbanised, and the existing stormwater systems are likely to already be contributing to the impacts described above. Despite this, this proposal would seek to manage operational stormwater effectively and manage the quantity and quality of water leaving the Parramatta metro station construction site (refer to Chapter 18 (Proposal-wide) of this Environmental Impact Statement).

8.14.3 Construction impact assessment

Direct impacts

As discussed in Section 8.14.1, construction activities associated with Parramatta metro station would take place entirely within the Parramatta metro station construction site cleared and established as part of the work carried out under the previous Sydney Metro West planning application. As such, no removal of vegetation at Parramatta metro station construction site is anticipated for this proposal. Direct impacts would include the disturbance of fauna due to noise, light and human activity. Given the context of the existing residential and commercial development of the Parramatta Railway station precinct, the impact of this direct disturbance is not anticipated to be significant.

Indirect impacts

Potential changes to the quantity and quality of stormwater runoff leaving the Parramatta metro station construction site, sediment-laden runoff and spills could result in indirect adverse impacts to nearby aquatic systems such as the Parramatta River. Biodiversity impacts associated with this would include temporary or permanent inundation of wetland habitat, changes in water chemistry affecting breeding habitat (e.g. pH changes affecting amphibian breeding and foraging habitat) and changes in turbidity affecting the overall health and productivity of aquatic plants and animals.

Potential impacts to groundwater dependent ecosystems are discussed in Section 8.10.

The mobilisation of sediment and contaminants from the construction site (including during excavation for basement structures) would be managed through the implementation of mitigation measures outlined in Appendix F (CEMF). Potential water quality and quantity impacts would be managed through the measures included in Chapter 18 (Proposal-wide) of this Environmental Impact Statement. As such the potential for indirect downstream biodiversity impacts is expected to be low.

8.14.4 Management and mitigation measures

Environmental management for this proposal would be undertaken through the environmental management approach as detailed in Chapter 20 (Synthesis) of this Environmental Impact Statement. This includes operational mitigation measures (where relevant) and performance outcomes for the operation and construction of this proposal.

During construction of this proposal, biodiversity would be managed in accordance with Sydney Metro's CEMF (Appendix F). The CEMF includes biodiversity management objectives and mitigation measures to minimise impacts as relevant to this proposal as a whole.