Part B

Burwood North Station

11

11.0 Burwood North Station

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

11.1 Overview

Burwood North Station would be located around the intersection of Parramatta Road and Burwood Road across two sites. The Burwood North Station northern site would be located between Burwood Road and Loftus Street on the northern side of Parramatta Road and the Burwood North Station southern site would be located between Burwood Road and Esher Lane on the southern side of Parramatta Road.

The Burwood North Station precinct is characterised by a variety of retail, commercial, light industrial, low- and medium-density development and open space uses. Concord Oval, located on the corner of Loftus Street and Parramatta Road, is an important regional sporting facility and is in the process of being redeveloped into a state-of-the-art sporting, recreation and community facility. The Burwood Strategic Centre is developed around the existing Burwood Station (to the south of Burwood North), with the Burwood shopping precinct located nearby.

Burwood North Station would support educational precincts, sporting and recreational facilities, new residential housing and employment growth in the surrounding catchment.

11.1.1 Operation

The vision for the Burwood North Station and its surrounds is for a well-designed high-density living and employment precinct, centred on the enhanced spines of Parramatta Road and Burwood Road, providing a second mass transit node for the Burwood Strategic Centre.

Customers would access the metro station via two entrances on Burwood Road, one to the north and one to the south of Parramatta Road. The two entrances would be connected via an unpaid pedestrian link below Parramatta Road, which would be open to the public during station operating hours. When operational, Burwood North Station would facilitate activation and urban renewal around the station and Parramatta Road corridor, consistent with the Parramatta Road Corridor Urban Transformation Strategy (NSW Government, 2016a) and City of Canada Bay Local Strategic Planning Statement (City of Canada Bay Council, 2020). Burwood North Station would also support the development of Burwood as a dual-node centre with activity between the metro station and the existing Burwood Strategic Centre. It would improve amenity north and south of the Parramatta Road and would be a catalyst for positive change.

The proposal would also have a positive impact on the local road network due to the expected mode shift from private vehicle trips to public transport. Changes to the local transport network to facilitate integration of the metro station would include new kiss and ride and bus zones and an upgrade to the Burton Street /Burwood Road intersection. There would be some parking loss associated with these changes. The majority of intersections around Burwood North Station would operate at satisfactory levels and similar to existing conditions.

This proposal would generally improve the 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 such as increased passing trade and improved accessibility.

Key potential impacts anticipated during operation of Burwood North Station include:

- operational noise from the station is generally predicted to comply with the applicable criteria at nearby receivers. However, a minor exceedance is predicted at the closest residential receivers to the north of the station. The detailed design process would consider further design solutions and measures to reduce the noise levels so that compliance with the applicable noise criteria is achieved. Based on the anticipated land use changes in this area, it is expected that these buildings could be redeveloped in the near future, in which case compliance would be achieved by incorporating feasible and reasonable measures as part of the redevelopment

- the height of the southern station building would result in the potential to cast a longer shadow in areas to the west, south and east of the station building during mid-winter. However, the total separation between the southern station building and adjacent residences would be consistent with setback standards identified in the State Environmental Planning Policy No 65 – Design Quality of Residential Apartment Development
- the new southern station entry building may result in some minor visual and setting impacts to the local heritage listed Bath Arms Hotel located across Burwood Road. The new metro station entry could visually compete with this item and its prominent corner location. The design of the station would be consistent with the principles and outcomes presented in the Design Guidelines developed for Sydney Metro West, including place-specific design principles that respond to contextual factors (refer to Appendix E (Design Guidelines)).

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

11.1.2 Construction

Major civil construction including station excavation and tunnelling work at Burwood North 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 Burwood North Station, and associated precinct work required for the operation of Sydney Metro West.

Construction would require the continued use of the two construction sites established under the previous Sydney Metro West planning application. The proposed work is expected to have a total duration of about four years.

Construction transport arrangements would largely be a continuation of those established under the previous Sydney Metro West planning application, including loss of parking on adjacent streets. Modelled intersection performance during construction of this proposal indicates that all intersections would perform at the same level of service with or without construction traffic.

During the worst-case scenario, daytime activities, noise impacts are predicted to be ‘moderate’ and ‘high’ when work would be carried out outside the station, particularly when noise-intensive equipment such as concrete saws are being used. Appropriate respite would be provided to affected receivers in accordance with the Sydney Metro Construction Noise and Vibration Standard (CNVS).

During the worst-case night-time scenario, 'moderate’ to ‘low’ noise impacts are generally predicted at the nearest residential receivers. More distant receivers are predicted to have ‘low’ noise impacts or comply with the noise management levels. ‘Moderate’ sleep disturbance impacts are predicted at the nearest residential receivers. These impacts would mainly result from heavy vehicles accessing the site via Burton Street and movements within the site. 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. The Sydney Metro CNVS would be implemented to manage these temporary impacts and further investigation of minimising sleep disturbance would be completed as detailed construction planning information becomes available.

Some planted street trees would be removed on Loftus Street, Burton Street and Burwood Road to facilitate continued construction vehicle access and egress following construction of the station box. The biodiversity impact of this vegetation removal and vegetation removed by the previous Sydney Metro West planning application would be minimal. The combination of trees removed by this proposal and the previous Sydney Metro West planning applications would be replaced to provide a net increase in the number of mature trees at a ratio of 2:1 across the entire Sydney Metro West project.

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 changed traffic conditions and potential amenity impacts.

Potential impacts associated with other environmental matters such as non-Aboriginal heritage, Aboriginal heritage, contamination, groundwater and flooding 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), Construction Traffic Management Framework (CTMF) and CNVS.

11.2 Station and precinct description

11.2.1 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 Canada Bay Council and Burwood Council since exhibition of the *Sydney Metro West Environmental Impact Statement – Westmead to The Bays and Sydney CBD* (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:

- provision of an underground unpaid pedestrian connection between the north and south sides of Parramatta Road, which responds to feedback from Burwood Council and is supported by the Design Advisory Panel, as well as supporting the Burwood Strategic Centre by providing for community access south of Parramatta Road
- delivery of through-site links and enhanced pedestrian permeability, responding to feedback from the City of Canada Bay Council and the Design Advisory Panel
- building setbacks from both Burwood Road and Parramatta Road to provide an improved pedestrian environment.

11.2.2 Station design

The indicative layout and key design elements of Burwood North Station are shown in Figure 11-1, with a long-section and cross-section shown in Figure 11-2 and Figure 11-3 respectively. The design of the metro station is subject to further detailed design development.

The key features of Burwood North Station are provided in Table 11-1.

Table 11-1 Key features – Burwood North Station

Key features	Description
Proposed station entry	• entry on the north-east corner of Burwood Road and Parramatta Road • entry on the south-east corner of Burwood Road and Parramatta Road.
Customers	• residents within walking and cycling distance • students, staff and visitors travelling to and from nearby schools • residents or employees travelling to and from nearby residential and employment areas • customers transferring to and from other transport modes.
Primary station function	Origin and interchange.
Catchment	Residential, education and employment.
Transport interchange	• walk • cycle • bus • point-to-point transport • kiss and ride areas, including an accessible kiss and ride.

Burwood North Station would consist of an underground station with an island platform in an east–west orientation. The station would be located to the north of Parramatta Road.

Customers would access the station via two entrances on Burwood Road, one to the north and one to the south of Parramatta Road. The two entrances would be connected via an unpaid pedestrian link below Parramatta Road, which would be open to the public during station operating hours. Escalators and/or stairs and lifts would provide access from the platform to the underground concourse areas, and onto to the surface.

Areas for station services and utilities would be provided at the eastern and western ends of the station.

The aboveground station infrastructure (including the station services, space for non-station use and concourse) would rise up to about 10 storeys above Burwood Road.

Figure 11-1 Indicative layout and key design elements – Burwood North Station

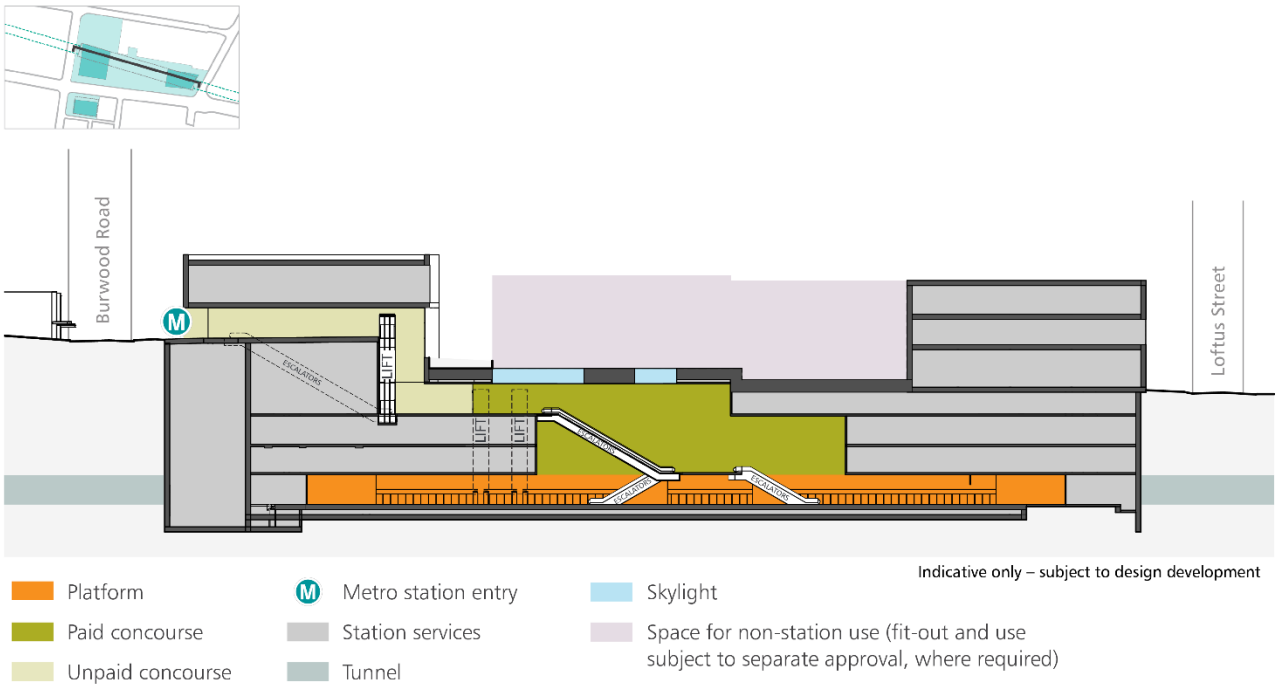

Figure 11-2 Indicative long-section – Burwood North Station

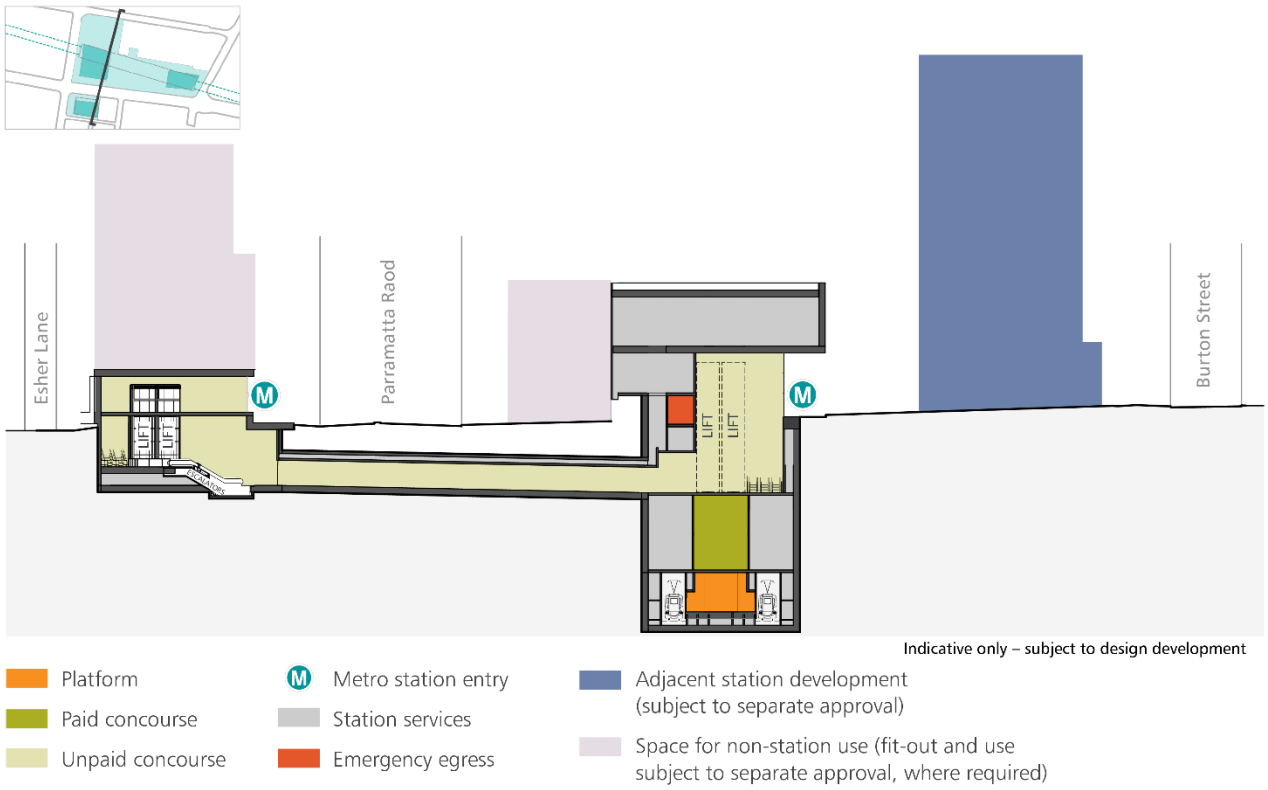

Figure 11-3 Indicative cross-section – Burwood North Station

11.2.3 Station precinct and interchange facilities

Burwood North Station would include a series of precinct and interchange elements such as:

- bicycle parking
- new bicycle path connections providing access throughout the station precinct
- bus interchange and shelters located on Burwood Road
- kiss and ride and point-to-point vehicle facilities, including accessible kiss and ride on Burton Street
- creation of new public domain areas adjacent to the proposed station entrances
- signalisation of the intersection of Burwood Road and Burton Street
- a service access lane to support future adjacent station development, station retail and other station activation opportunities (subject to separate approval)
- the structural elements for the space for non-station uses (e.g. retail, commercial and/or community facilities), including structures:
  - between the northern station entry and services building to about the same height as the services building
  - about six to seven storeys above the southern station entry
  - connected to the south of the northern entry to about the same height as the services building
  - 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.

The structures described above would be designed to align with future planning controls, zoning plans, and/or strategic plans including the Parramatta Road Corridor Urban Transformation Study and Canada Bay Planning Proposal. The additional levels of the station buildings for the spaces for non-station use cannot be constructed after completion of the station entry building due to constructability constraints (including restricted construction access during operations). Inclusion of these structures would provide a consistent design across the precinct and deliver the desired place outcomes.

11.2.4 Provisioning for adjacent station development

As shown in Figure 11-1, Figure 11-2 and Figure 11-3, adjacent station development is proposed on the residual land required for construction, to the north of the metro station, at the corner of Burwood Road and Burton Street.

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

- utility connections to support future developments, where required
- a service laneway and access to support both the metro station and future developments
- subdivision.

Delivery of the adjacent station developments does not form part of this proposal and would also 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. Adjacent station development is discussed further in Section 5.4.5 (Related development) of this Environmental Impact Statement.

11.3 Placemaking

The vision for Burwood North Station and its surrounds is for:

A well-designed high-density living and employment precinct centred on the enhanced spines of Parramatta Road and Burwood Road, providing a second mass transit node for the Burwood Strategic Centre.

11.3.1 Integration with strategic planning

With Burwood identified as a strategic centre in the Eastern City District Plan (Greater Sydney Commission, 2018c), an opportunity was sought to extend this centre to the north. To support this plan, a number of plans and strategies have been developed, which have informed the development of Burwood North Station and would guide the design development.

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).

Local Strategic Planning Statements

The relationship of Sydney Metro West to the *City of Canada Bay Local Strategic Planning Statement* (City of Canada Bay Council, 2020) and the Burwood Local Strategic Planning Statement (Burwood Council, 2020) are discussed in Section 7.10.5 of the *Sydney Metro West Environmental Impact Statement – Westmead to The Bays and Sydney CBD* (Sydney Metro, 2020a).

The main part of Burwood North Station sits within the City of Canada Bay, while the southern station entrance is in Burwood Council.

The City of Canada Bay Local Strategic Planning Statement (City of Canada Bay, 2020) prioritises land use opportunities and implications arising from Sydney Metro West. It recognises a station at Burwood North would support the Burwood Strategic Centre and facilitate land use renewal along the Parramatta Road corridor. Other themes of the Local Strategic Planning Statement that directly related to the land use vision include the creation of great streets, places and buildings for people, and aligning growth with the delivery of infrastructure. Sydney Metro West would support new and or denser development as it provides excellent access to high-frequency public transport.

The Burwood Council Local Strategic Planning Statement (Burwood Council, 2020) sets a vision for Burwood as a 'thriving town centre and cherished heritage conservation areas that are conveniently connected to world class transport, with well-designed buildings and inviting public spaces'. The planning statement advocates for improved transport options for Burwood, with a focus on new north-south transport connections and improved public and active transport options. Burwood North Station would support the development of Burwood as a dual-node centre, supporting the priorities of the Local Strategic Planning Statement. The planning statement also recognises that a metro station at Burwood North would support urban renewal along the Parramatta Road corridor.

Parramatta Road Corridor Urban Transformation Strategy

Burwood North is identified within the Burwood-Concord Precinct as part of the Parramatta Road Corridor Urban Transformation Strategy (NSW Government, 2016a). The vision of Burwood-Concord Precinct is to be a 'commercial gateway to Burwood Town Centre based around an enlivened Burwood Road building upon existing amenity for new residents.'

A Sydney Metro West station at Burwood North would provide a second node to the Burwood centre, supporting activation of Burwood Road between Burwood and Concord.

Sydney Green Grid

St Lukes Park and Concord Oval Green Link have been identified as a Green Grid project opportunity, which would seek to connect active transport to these key open spaces. The Parramatta Road Urban Renewal Corridor is also identified as a project opportunity, with the potential to improve access to open space along the corridor as renewal occurs. A Sydney Metro West station at Burwood North would support improved access to these open spaces by significantly improving transport connectivity in the area.

11.3.2 Place and design principles

Place and design principles for Burwood North Station were identified in Section 7.10.5 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 11-2 outlines how these principles have been achieved in the Burwood North Station design.

Table 11-2 Design responses to Burwood North metro station place and design principles

Place and design principle	Design response
Improve amenity north and south of Parramatta Road with Sydney Metro as a catalyst for positive change	• the station would provide two entrances that address Burwood Road on the northern and southern sides of Parramatta Road • the entrances would be set back from the street edge to provide space for station entry plazas, including pedestrian circulation space and shade amenity • aboveground station infrastructure would be set back from Parramatta Road to provide space for street trees, pedestrians and circulation • an unpaid connection (open during station operating hours) would be provided to connect under Parramatta Road • Burwood North Station would provide opportunities for positive changes to the south along Burwood Road and to the north around the new station entry, particularly enabling day and night time activation opportunities for a diverse range of uses (residential, commercial, retail and other non-residential).
Facilitate transit-oriented development with public spaces and local services that support the station as a focal point for activity	• easy and direct interchange between buses and metro would be provided on Burwood Road, supporting connection directly to the Burwood Strategic Centre • easy and direct interchange between buses and metro would be provided on Parramatta Road, supporting east-west connectivity • the station location is complementary to the aspirations of the *Parramatta Road Corridor Urban Transformation Strategy* (NSW Government, 2016a) and would provide a mass transit connection and interchange focus to this section of the Parramatta Road corridor.
Deliver legible, safe and intuitive station entries that address both north and south of Parramatta Road	• the station entrances would be set back from the street edge to provide space for station entry plazas, including pedestrian circulation space and shade amenity • an unpaid connection (open during station operating hours) would be provided from the southern side of Parramatta Road directly into the metro station • signalisation of the Burton Street / Burwood Road intersection would provide safer access for pedestrians accessing the station from the north and west.
Improve the priority and amenity for pedestrians in the area	• the streetscape frontages on Burwood Road and Parramatta Road would have generous setbacks for pedestrians and cyclists coming into the station precinct • space is also provided for new street tree planting to improve amenity and canopy cover • a through-site link would provide improved pedestrian permeability and cyclist access between Parramatta Road and Burton Street and to the northern station entry • an east-west laneway (partially a shared zone) would also provide a pedestrian connection between Loftus Street and Burwood Road • signalisation of the Burton Street / Burwood Road intersection would provide safer access and prioritisation for pedestrians accessing the station from the north and west.
Facilitate activation and urban renewal around the station in accordance with the *Parramatta Road Corridor Urban Transformation Strategy*	• the station infrastructure (including space for non-station uses) would be set back from street frontages, consistent the *Parramatta Road Corridor Urban Transformation Strategy* (NSW Government, 2016a) • the station would enable opportunities for an activated ground plane and a diverse range of residential (as part of the adjacent station development), business, retail, commercial and other non-residential uses

Place and design principle	Design response
	• this proposal would facilitate activation and urban renewal around the station by provisioning for adjacent station development and constructing structures for non-station uses as described in Section 11.2 in accordance with the Parramatta Road Corridor Urban Transformation Strategy (NSW Government, 2016a).
Enable provision of through-site links to enhance permeability in and around the station	• a through-site link would provide improved pedestrian permeability and cyclist access between Parramatta Road and Burton Street and to the northern station entry • an east-west laneway (partially a shared zone) would also provide a pedestrian connection between Loftus Street and Burwood Road • an additional north south through site link between Parramatta Road and Burton Street would be safeguarded.

The key urban design strategies to support the implementation of the place and design principles are illustrated in Figure 11-4, Figure 11-5 and Figure 11-6.

Figure 11-4 Land use and function urban design strategies – Burwood North Station

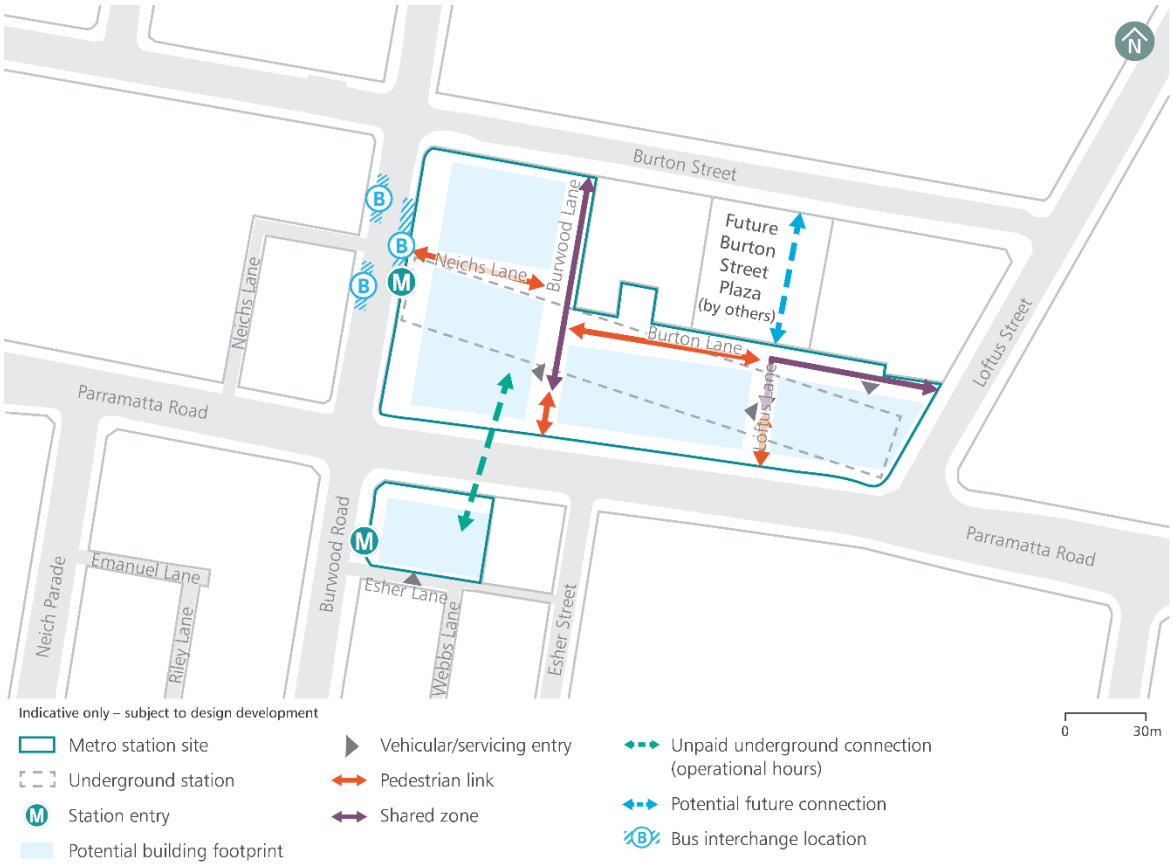

Figure 11-5 Access and connectivity urban design strategies – Burwood North Station

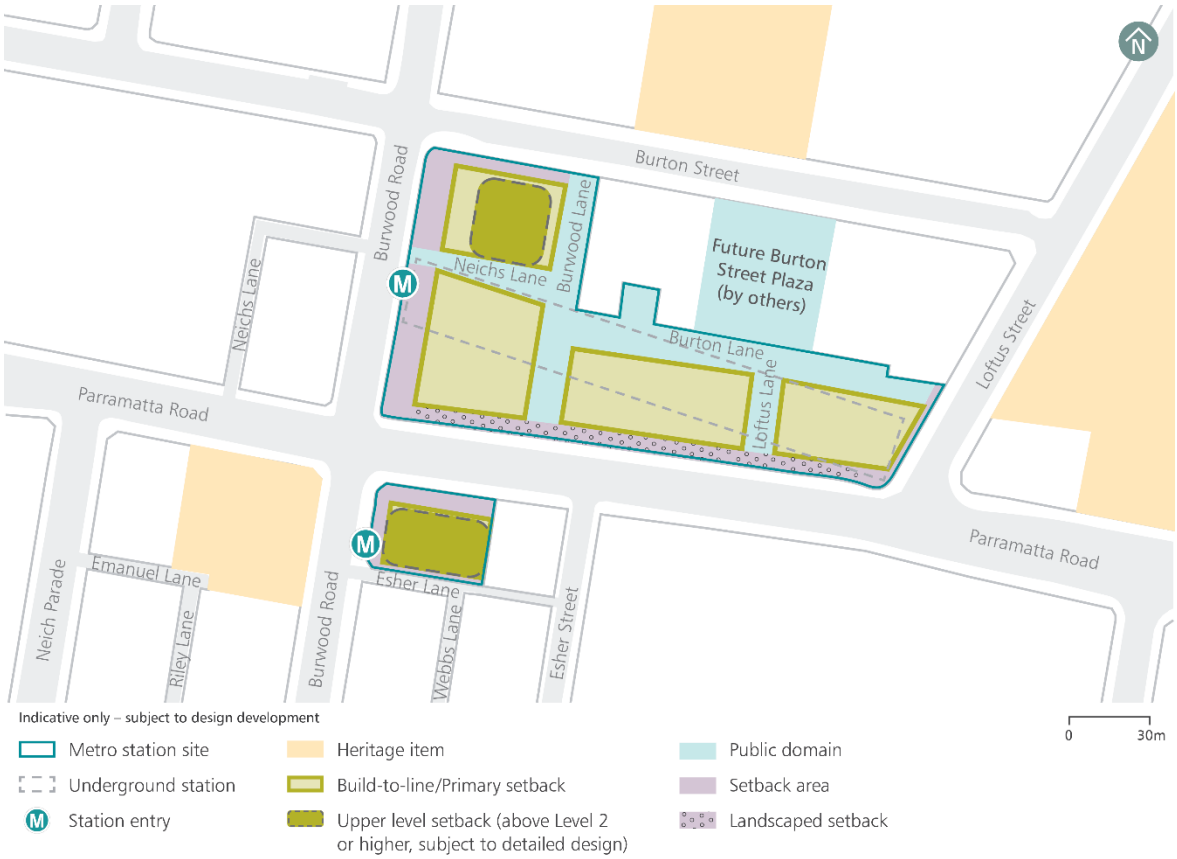

Figure 11-6 Built form urban design strategies – Burwood North Station

The Burwood North Station design includes the following key movement and place features:

- station entries that are positioned away from the busy movement environment along Parramatta Road and focused on Burwood Road to provide direct access to the existing and future main street
- generous setbacks to Parramatta Road enabling the enhancement of the amenity of Parramatta Road and giving flexibility for the future opportunities
- generous setbacks to Burwood Road to provide space for pedestrian movement and high amenity activated 'place' around the bus interchange and both station entries
- retention of all four existing pedestrian crossings at the intersection of Parramatta Road and Burwood Road
- through site links and active frontages with opportunities for a diverse range of ground level uses to enhance permeability and day and night-time activation along Burwood Road, Parramatta Road, Loftus Street and key edges along new through site links and/or laneways
- provision of an unpaid underground link that provides safe grade-separated crossing of Parramatta Road
- new traffic signals (and removal of the existing roundabout) at the intersection of Burton Street and Burwood Road to provide safe pedestrian access from the north and west
- provision for cyclists along the north-south through-site link connecting Parramatta Road and Burton Street
- new bus stops on Burwood Road and existing bus stops on Parramatta Road, addressing the key north-south and east-west movement corridors while being close to the station entries.

11.3.3 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 Burwood North Station design. The delivery of a metro station provides a new mass transit hub to the Parramatta Road Corridor Urban Transformation area. Burwood North Station would deliver new public domain to optimise the interchange function and provide safe, accessible station access.

Examples of how the Burwood North Station design integrates with other transport modes and improves access for customers and the community include:

- generous setbacks from Burwood Road near the station entries and from Parramatta Road to provide easy and safe pedestrian access to the station
- new signalised pedestrian crossings at the Burwood Road / Burton Street intersection to facilitate pedestrian access to the northern station entry from the north and west
- an unpaid underground pedestrian connection (open during station operating hours) to allow easy access for customers from the south without needing to cross Parramatta Road
- provision for cyclists along the north-south through-site link between Parramatta Road and Burton Street, connecting the bicycle parking near the northern station entry
- direct access to new bus stops on Burwood Road and existing bus stops of Parramatta Road, providing connection to north-south and east-west bus services
- new kiss and ride zones near the northern station entry on Burton Street and Burwood Road, and near the southern station entry on Burwood Road
- a new taxi zone near the southern station entry on Burwood Road.

11.4 Construction description

This section provides a description of the construction activities required to complete Burwood North Station, and associated precinct work required for the operation of Sydney Metro West.

Major civil construction including station excavation and tunnelling work at Burwood North Station 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.

11.4.1 Overview

Construction of Burwood North Station would require the continued use of two construction sites established under the previous Sydney Metro West planning application, including a northern construction site and a southern construction site. The land for of these construction sites will be consistent with that described in the *Sydney Metro West Environmental Impact Statement – Westmead to The Bays and Sydney CBD* (Sydney Metro, 2020a).

The northern construction site would be located on Parramatta Road, bounded by Burwood Road, Burton Street and Loftus Street and the southern construction site would be located on Parramatta Road, bounded by Burwood Road and Esher Lane.

The majority of the Burwood North Station construction sites would be levelled and excavated as a result of work carried out under the previous Sydney Metro West planning application prior to the commencement of this proposal.

The location and indicative layout of the Burwood North Station construction sites for this proposal are shown in Figure 11-7. Some activities would occur outside these construction sites, such as delivery of construction equipment and station precinct and interchange work.

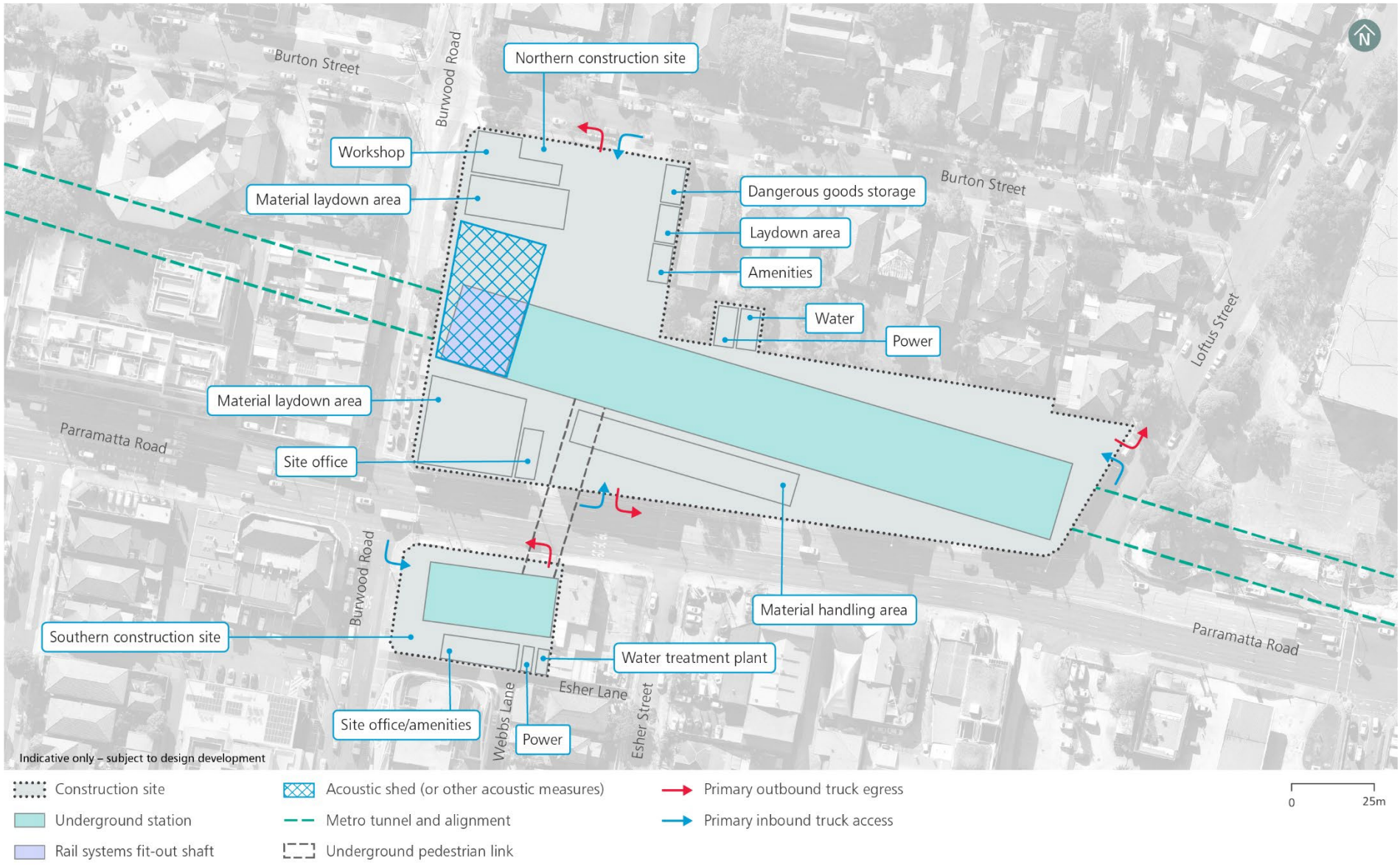

Figure 11-7 Indicative construction sites layout – Burwood North Station

11.4.2 Construction work

Key construction work at the Burwood North Station construction sites 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 Burwood North northern construction site
- construction of the station and structures for non-station use
- station fit-out, including the underground pedestrian link below Parramatta Road, providing a permanent connection between two station entrances to the north and south of Parramatta Road
- construction of station precinct and interchange facilities, including provisioning for adjacent station development
- access for tunnel fit-out and rail systems work
- finishing work, testing and commissioning.

The indicative construction program for Burwood North Station is shown in Figure 11-8.

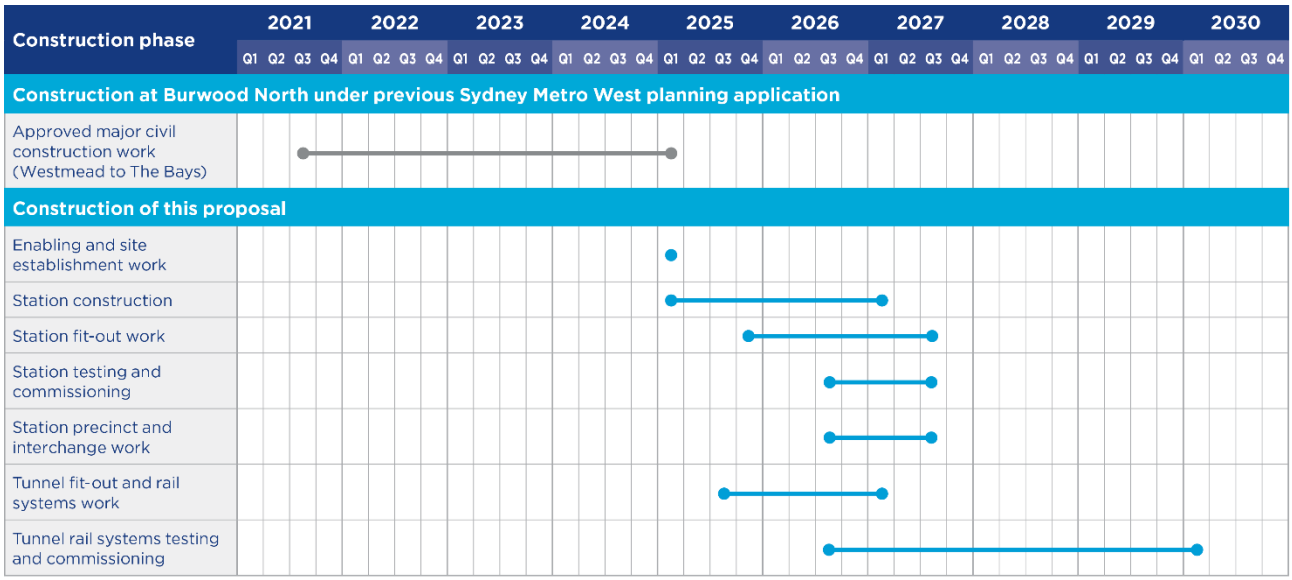

Figure 11-8 Indicative construction program – Burwood North Station

Other construction elements specific to Burwood North Station are shown in Table 11-3. Indicative construction hours, plant and equipment and workforce for Burwood North metro station construction sites are provided in Section 6.5 of this Environmental Impact Statement. Key elements specific to Burwood North Station as described in the table below, are also depicted on Figure 11-7.

Table 11-3 Other construction elements – Burwood North Station

Construction element	Description
Construction traffic access and egress	Continued access and egress arrangements established by the previous Sydney Metro West planning application that would likely be maintained during construction include: • access to the northern construction site via left-in from Parramatta Road, Burton Street and Loftus Street • egress from the northern construction site via left-out onto Parramatta Road, Burton Street and Loftus Street • access to the southern construction site via left-in from Burwood Road • egress from the southern construction site via left-out onto Parramatta Road.
	Additional and/or new access and egress arrangements likely to be required for construction of this proposal include: • potential secondary egress from the southern construction site via left-out onto Burwood Road to support access to the site following construction of the station box.

Construction element	Description
Peak daily traffic movements	Northern construction site: • about 320 daily heavy vehicle movements • about 360 daily light vehicle movements. Southern construction site: • about 168 daily heavy vehicle movements • about 168 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 temporary transport network modifications established by the previous Sydney Metro West planning application that would be maintained during construction include: • about 22 on-street parking spaces on the southern side of Burton Street between Loftus Street and Burwood Road. Around seven of these spaces would also be permanently removed for operation of the station • about seven on-street parking spaces on the western side of Loftus Street. These spaces would also be permanently removed for operation of the station • about two on-street parking spaces on the eastern side of Loftus Street • about five on-street parking spaces on the eastern side of Burwood Road between Parramatta Road and Burton Street. These spaces would also be permanently removed for operation of the station • temporary relocation of the bus stop along the southern side of Parramatta Road.
	No additional transport network modifications would be introduced as part of this proposal.

11.5 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 benefits and impacts 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.

11.5.1 Baseline environment

The baseline transport environment described for Burwood North Station includes the existing transport environment, as well as adjustments made by the previous Sydney Metro West planning application.

Active transport network

Pedestrian activity is generally high on Burwood Road between Parramatta Road, Burwood Park and the Burwood commercial area. Key pedestrian facilities surrounding Burwood North Station include:

- pedestrian footpaths on both sides of Burwood Road, Loftus Street and Esher Street
- signalised pedestrian crossings on:
  - all approaches of the Parramatta Road / Burwood Road intersection
  - two of the three approaches of the Parramatta Road / Shaftesbury Road intersection
  - the north approach of the Parramatta Road / Broughton Street intersection
- a pedestrian bridge crossing Parramatta Road near Broughton Street and Britannia Avenue, which provides a safe crossing for vulnerable pedestrian users such as school children and the elderly
- a pedestrian refuge island at the Parramatta Road / Loftus Street intersection, allowing a staged crossing.

The cycle network surrounding Burwood North Station includes:

- the abovementioned pedestrian bridge crossing Parramatta Road
- north-south connectivity to the regional cycle network via the shared path along the southern side of Parramatta Road between the pedestrian bridge on Neich Parade and Grantham Street
- east-west connectivity along Patterson Street, Gipps Street, Stanley Street and shared paths located within recreational areas, linking Burwood and Concord to the Inner West.

Public transport network

A summary of the public transport services around Burwood North Station is provided in Table 11-4.

Table 11-4 Public transport services – Burwood North Station

Mode	Description
Rail	• T1 Western Line, T2 Inner West and Leppington Line and T9 Northern Line on the Sydney Trains network around 900 metres south via Burwood Station
Bus	• 25 bus routes • as part of the work carried out under the previous Sydney Metro West planning application, one bus stop on southern side of Parramatta Road between Burwood Road and Esher Street will be temporarily relocated • On Demand bus services • 37 school bus routes

Parking, loading, servicing and pick-up arrangements

The parking environment around Burwood North Station includes:

- on-street parking on both sides Loftus Street, Burton Street, Broughton Street and Gipps Street east of Burwood Road, the majority of which is unrestricted
- no on-street parking on both sides of Gipps Street between Burwood Road and Broughton Street during weekday peak periods to allow for two trafficable lanes in each direction
- unrestricted on-street parking spaces on the western side of Burwood Road close to Gipps Street
- no parking near Parramatta Road on both sides of Burwood Road during weekday peak periods, with time-restricted parking available outside of these hours
- on-street parking along Parramatta Road is generally not provided with clearways in operation seven days a week during daytime hours, and no parking or no stopping zones along most sections of the corridor.

As part of the previous Sydney Metro West planning application, the following parking spaces will be temporarily removed:

- about 22 on-street parking spaces on the southern side of Burton Street between Loftus Street and Burwood Road
- about seven on-street parking spaces on the western side of Loftus Street between Parramatta Road and Burton Street
- about two on-street parking spaces on the eastern side of Loftus Street near Burton Street
- about five on-street parking spaces on the eastern side of Burwood Road between Parramatta Road and Burton Street.

Traffic volumes and patterns

Approximate peak-hour midblock volumes on key access roads surrounding Burwood North Station are shown in Table 11-5. The key access roads carry traffic volumes generally commensurate with their function.

Table 11-5 Existing peak hour traffic volumes (mid-block) by direction – Burwood North Station (2021)

Road	Direction	AM peak hour volume (vehicles per hour)	PM peak hour volume (vehicles per hour)
Parramatta Road west of Broughton Street	Eastbound	2,160	2,040
	Westbound	1,510	1,470
Parramatta Road west of Loftus Street	Eastbound	1,970	1,940
	Westbound	1,460	1,490
Gipps Street west of Loftus Street	Eastbound	960	830
	Westbound	710	970
Burwood Road south of Parramatta Road	Northbound	430	480
	Southbound	590	500
Loftus Street north of Parramatta Road	Northbound	20	20
	Southbound	130	90

Intersection performance

Modelled intersection performance during the AM and PM peak hours for key intersections in the vicinity of Burwood North Station is shown in Table 11-6.

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

- Gipps Street / Loftus Street during the AM and PM peak hours, which is due to this intersection being unsignalised where the worst movement is reported, which corresponds to vehicles turning right out of Loftus Street onto Gipps Street. Loftus Street is a minor road and therefore vehicles must give way to vehicles travelling on Gipps Street
- Gipps Street / Burwood Road during the PM peak hour, which is due to high through-movement volumes for Gipps Street, the presence of kerbside parking lanes, and filtered right turns on the Burwood Road approaches that increases congestion at the intersection.

Table 11-6 Modelled peak hour baseline intersection performance – Burwood North 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)	
Parramatta Road / Burwood Road (signalised)					
AM peak	5,071	27	B	NB	120
				EB	220
				SB	165
				WB	210
PM peak	4,797	25	B	NB	170
				EB	150
				SB	160
				WB	210
Parramatta Road / Loftus Street (priority controlled)					
AM peak	4,127	11	A	NB	-
				EB	<5
				SB	10
				WB	<5

Intersection and peak hour	Demand flow (vehicles per hour)	Average delay (seconds per vehicle)	Level of service	Maximum queue length by directional approaches (metres)	
PM peak	3,822	8	A	NB	-
				EB	<5
				SB	<5
				WB	<5
Loftus Street / Burton Street (priority controlled)					
AM peak	232	5	A	NB	<5
				EB	<5
				SB	<5
				WB	-
PM peak	227	5	A	NB	<5
				EB	<5
				SB	<5
				WB	-
Burwood Road / Burton Street (roundabout)					
AM peak	1,188	22	B	NB	15
				EB	20
				SB	55
				WB	<5
PM peak	1,086	11	A	NB	20
				EB	5
				SB	20
				WB	<5
Gipps Street / Loftus Street (priority controlled)					
AM peak	1,933	>100	F	NB	10
				EB	35
				SB	-
				WB	<5
PM peak	1,931	94	F	NB	5
				EB	50
				SB	-
				WB	<5
Gipps Street / Burwood Road (signalised)					
AM peak	2,646	24	B	NB	80
				EB	160
				SB	115
				WB	100
PM peak	2,611	69	E	NB	135
				EB	150
				SB	125
				WB	365

Intersection and peak hour	Demand flow (vehicles per hour)	Average delay (seconds per vehicle)	Level of service	Maximum queue length by directional approaches (metres)	
Gipps Street / Broughton Street (signalised)					
AM peak	2,734	45	D	NB	110
				EB	190
				SB	160
				WB	150
PM peak	2,664	46	D	NB	155
				EB	90
				SB	75
				WB	325
Concord Road / Patterson Street (signalised)					
AM peak	3,502	55	D	NB	75
				EB	-
				SB	460
				WB	155
PM peak	3,537	52	D	NB	160
				EB	-
				SB	400
				WB	190

11.5.2 Operational impact assessment

This section outlines the transport interchange provisions proposed at Burwood North Station as shown in Figure 11-1.

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 around 2,600 customers accessing Burwood North Station and around 850 customers egressing Burwood North Station during the AM peak hour. This indicates this station would operate mainly as an origin or bus to metro interchange location, where most passengers would be using the station to get to work. Future development around Burwood North Station and access to the Burwood town centre may increase the attractiveness of this area as a destination.

The 2036 modal breakdown of access and egress during the AM peak hour is presented in Table 11-7. These results indicate the majority of AM peak-hour trips would be made via walking from nearby suburbs that are not currently located within walking distance of a train station.

Table 11-7 2036 forecast mode of access and egress – Burwood North Station

Mode	Walk	Cycle	Bus	Kiss and ride	Park and ride
Access	56%	1%	21%	12%	10%
Egress	97%	0%	3%	0%	0%

Integration with other transport modes

A description of how Burwood North Station would integrate with existing transport modes during operation is provided in Table 11-8. Appropriate signage and wayfinding would be provided within the precinct to provide easy customer transfer and access to the station.

Table 11-8 Network integration – Burwood North Station

Network	Description
Pedestrian network	Two station entries are proposed at Burwood North Station – a northern entry from Burwood Road north of Parramatta Road and a southern entry from Burwood Road south of Parramatta Road. Station buildings would be setback from Parramatta Road and Burwood Road to provide safe, walkable streets designed for people, and reinforce pedestrianisation of the area and improve connectivity within the station precinct. New pedestrian facilities proposed to be provided as part of the station and precinct include: • an unpaid pedestrian underpass beneath Parramatta Road to connect both station entries, open during station operating hours only • signalised pedestrian crossings on all approaches at the Burwood Road / Burton Street intersection to replace the existing roundabout • a network of laneways through the site to activate the future retail and commercial precincts, to access the loading docks and underground car parks associated with future developments, and to support Sydney Metro station operations. The existing signalised pedestrian crossings at Parramatta Road / Burwood Road intersection would be retained and would be a key crossing location for pedestrians accessing the station from the bus interchange on Burwood Road. 2036 pedestrian modelling forecasts that the footpaths surrounding Burwood North Station would 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 the station and precinct include: • provision for cyclists along the through-site link between Parramatta Road and Burton Street that links to the station entry • secure bicycle parking on the eastern side of the northern station entrance.
Public transport network	Public transport integration at Burwood North Station would include: • new bus stops on Burwood Road at the northern station entrance. This area would function as the main bus interchange for the station • existing paired bus stops on Parramatta Road between the two station entrances (south of the north station entrance, and north of the south station entrance).
Road network	Road network changes that would be implemented as part of the station precinct include: • signalisation of the existing Burton Street and Burwood Road intersection and removal of the roundabout • kiss and ride zones on Burton Street near the northern station entry and Burwood Road near the southern station entry. Relatively low numbers of park-and-ride trips are forecast. No dedicated parking capacity would be provided as part of this proposal and customers who choose to drive to the station would be dependent on the availability of existing parking spaces in the local area. Parking strategies would be developed in consultation with City of Canada Bay Council and Burwood Council to manage the potential impacts associated with customer parking near the station.

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 Burwood North Station are shown in Table 11-4.

A reduction in traffic is forecast around Burwood North Station during operation. This is potentially due to the fully operational WestConnex, which will take traffic off Parramatta Road and other local streets. This proposal would have a further positive impact on the local network due to the expected mode shift from private vehicle trips to public transport during operation. Intersection performance analysis indicates that:

- intersections would operate satisfactorily at level of service C or better during the weekday AM and PM peak periods with and without this proposal
- network changes proposed as part of this proposal are not expected to have significant impact on network performance, and would rather enhance pedestrian and road safety by introduction of traffic signals at the Burton Street / Burwood Road intersection and other minor road network upgrades
- delays at intersections along Parramatta Road are likely to remain similar to existing conditions
- the difference in level of service observed at the Burwood Road / Burton Street intersection between with and without this proposal is due to the introduction of traffic signals
- the minor drop in level of service at Burwood Road / Parramatta Road intersection in the AM peak is potentially due to the increased flow of pedestrians.

Figure 11-9 Operational intersection performance – Burwood North Station (2036)

Parking and property access

Several on-street and off-street parking spaces would be removed as part of this proposal in the following locations:

- around two spaces on Burton Street along the northern kerb to accommodate a no stopping zone and kerb setbacks
- around 10 spaces on the western side of Burwood Road to accommodate two new bus stops
- around five spaces on the eastern side of Burwood Road to accommodate two new bus stops (noting these will have been temporarily removed as part of work under the previous Sydney Metro West planning application)

- around seven spaces along the western side of Loftus Street for the access and egress to the new laneway (noting these will have been temporarily removed as part of work under the previous Sydney Metro West planning application)
- around seven spaces along the southern side of Burton Street to accommodate the kiss and ride zones (noting these will have been temporarily removed as part of work under the previous Sydney Metro West planning application).

Access would be maintained for nearby properties.

11.5.3 Construction impact assessment

Construction haul routes

The primary construction haul routes for the Burwood North Station construction site are shown in Figure 11-10. Construction site access and egress locations as well as the number of daily traffic movements anticipated at Burwood North Station construction site are outlined in the sections below.

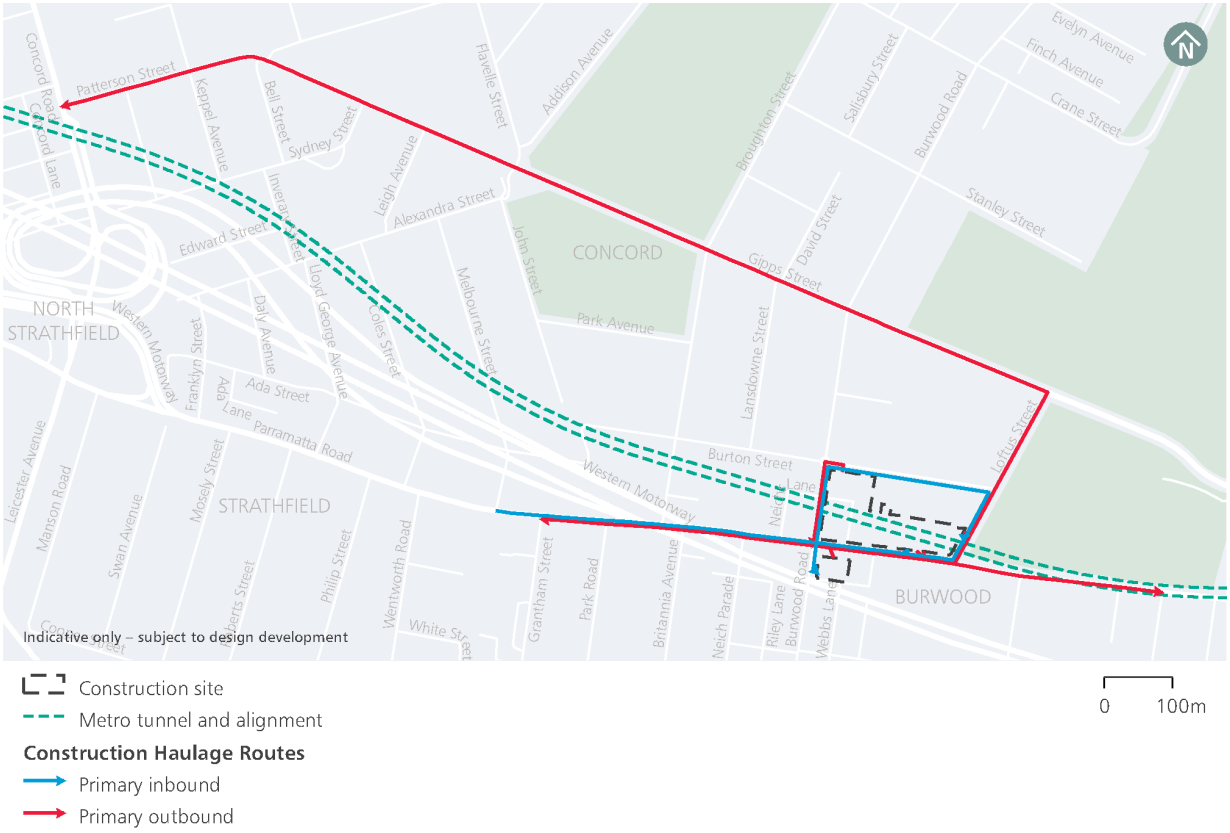

Figure 11-10 Primary construction haul routes – Burwood North Station

Active transport network

Existing pedestrian and cycle routes surrounding the Burwood North Station construction sites would be maintained throughout construction.

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

Patterson Street and Gipps Street are designated on-road cycle environments of moderate and high difficulty. These roads would be temporarily used by construction vehicles travelling from the Burwood North Station northern construction site. Construction vehicles would also travel adjacent to shared paths along Parramatta Road and Concord Road. 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 Burwood North Station construction vehicle route that are also used by buses include Parramatta Road, Burwood Road and Gipps 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.

The bus stop that was relocated as part of the work carried out under the previous Sydney Metro West planning application would continue to operate in its relocated position during construction of this proposal.

Parking and property access

The parking spaces removed on Loftus Street, Burton Street and Burwood Road as part of work carried out under the previous Sydney Metro West planning application would continue to be removed during construction of this proposal. The spaces of Loftus Street, Burwood Road and about five of the spaces on Burton Street would also be permanently removed for operation for this proposal.

To facilitate precinct construction work, there may be short-term removal (for around a few months) of some on-street parking spaces on Burwood Road to establish new bus stops and on Burton Street to establish a new kiss and ride zone. Impacts are anticipated to be minor given that these parking spaces would be removed for a short duration.

Where existing parking is removed to facilitate construction activities, a parking management plan would be developed in accordance with the requirements of the CTMF. This would include consultation with the City of Canada Bay Council or Burwood Council to investigate opportunities to provide alternative parking facilities.

No impacts on 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 11-11.

During the AM peak hour (7:45am to 8:45am) and PM peak hour (5:15pm to 6:15pm), it is anticipated that during the peak construction activity:

- the Burwood North Station northern construction site would generate a total of 58 light vehicle movements and 38 heavy vehicle movements
- the Burwood North Station southern construction site would generate a total of 28 light vehicle movements and 24 heavy vehicle movements.

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 all intersections would perform at the same level of service with or without construction traffic.

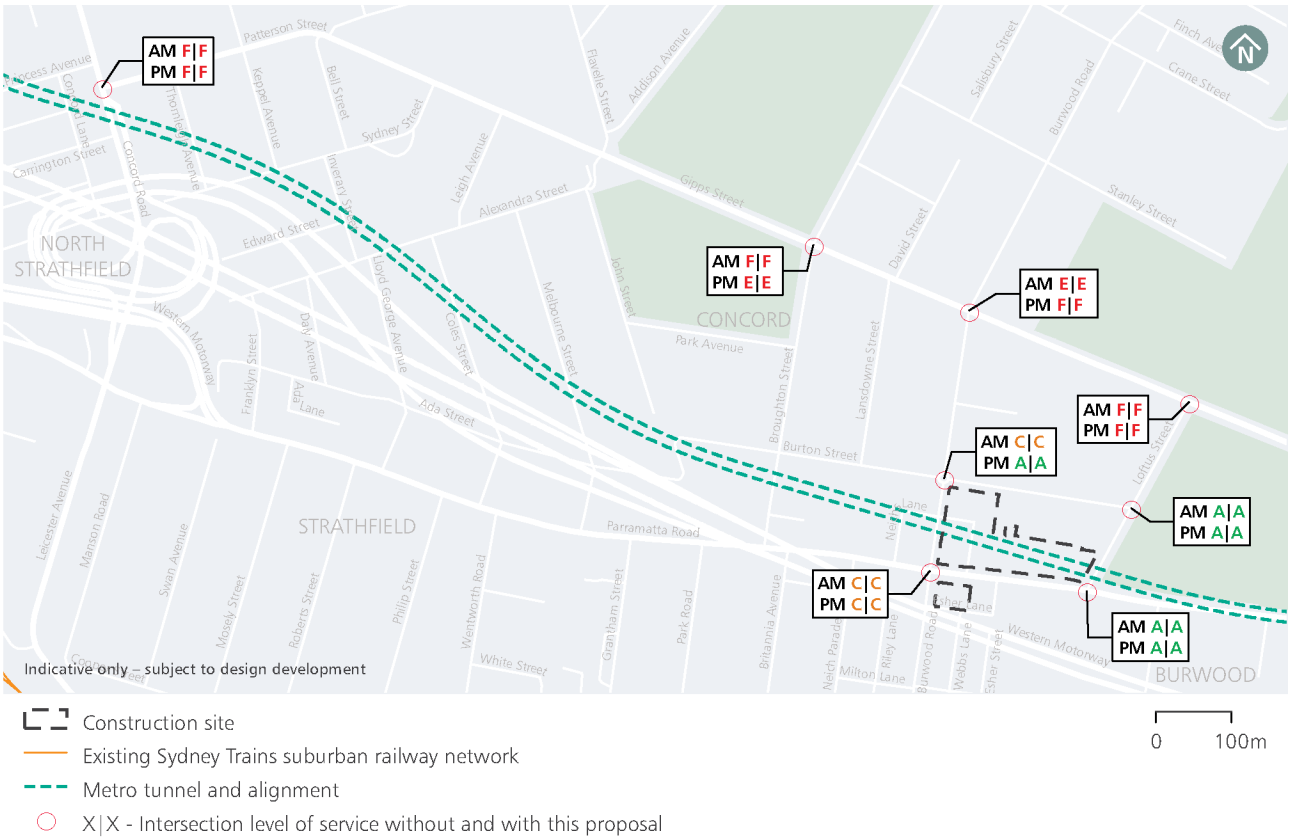

Figure 11-11 Construction sites intersection performance – Burwood North Station (2026)

11.5.4 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.

11.6 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).

11.6.1 Baseline environment

Existing noise levels around Burwood North Station are controlled by road traffic noise on the surrounding road network, particularly on Parramatta Road. The area surrounding Burwood North Station is mostly residential with some commercial receivers, typically retail use.

This precinct has been divided into two noise catchment areas (NCAs) for the construction noise assessment – NCA12 and NCA13. The site and NCAs are shown in Figure 11-12.

Figure 11-12 Location of sensitive receivers near Burwood North Station and NCAs

Unattended noise monitoring was carried out at sensitive receiver locations near Burwood North 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.

The results of the unattended noise monitoring are summarised in Table 11-9 and indicate that background noise levels generally reflect the residential nature of the area.

Short-term attended noise monitoring was also carried out at Burwood North 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 11-9 Summary of unattended noise monitoring – Burwood North 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.12	17 Burton Street, Concord	43	43 (47)[3]	42	56	55	50
B.13	8 Esher Street, Burwood	48	48	44	57	56	55

Notes:

1. The RBL and L_{Aeq} noise levels have been determined with reference to the procedures in the Noise Policy for Industry (NPfI) (NSW Environment Protection Authority, 2017)
2. Daytime is 7am to 6pm, evening is 6pm to 10pm, and night-time is 10pm to 7am
3. The monitored evening level was found to be higher than the daytime. In this situation the NPfI requires that the evening level be reduced to match the daytime

11.6.2 Operational impact assessment

The operational noise associated with Burwood North Station has been assessed for the nearest and most noise affected commercial and residential sensitive receivers for each source type, as presented in Table 11-10.

The results indicate that with the inclusion of appropriate noise attenuation, the predicted noise levels would generally be compliant with the amenity target level. The exception would be in one area for residential receivers located in Burton Street (north). Given the scope for future industrial development in Burwood North is limited, the amenity acceptance criteria are considered to be more appropriate at this location. Noise levels at these receivers would comply with the amenity acceptance criteria, apart from a small exceedance during the night-time period.

The minor predicted exceedances would be due to the close proximity of these receivers to the station services facility located at the eastern end of the site. The detailed design process would consider design solutions and measures to reduce the noise levels to future additional receivers so that compliance with the environmental noise criteria is achieved. These measures may include re-positioning of plant and equipment locations, vent orientation, additional attenuators, acoustic louvres and at-property treatments. This location is expected to experience land use changes with these buildings potentially being redeveloped in the near future. In this case compliance would be achieved by incorporating feasible and reasonable measures as part of the redevelopment.

At Burwood North Station the sleep disturbance noise criteria is L_{AFmax} 59 dB(A). The highest predicted noise impact is L_{AFmax} 53 dB(A), which is compliant with the noise criteria. Given compliance with the applicable noise criteria is achieved, further consideration of noise attenuation is not required.

There would be no sources of vibration as part of 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 11-10 Operational noise levels – Burwood North Station

Period/source	Criteria[1], dB(A)	Predicted noise level ($L_{Aeq,15min}$)
Burwood Road (west) – commercial		
Daytime	60	50
Evening	60	50
Night-time	60	46
Emergency mode	65	52
Burton Street (north) – residential		
Daytime	53	52
Evening	48 (53[2])	52
Night-time	43 (48[2])	50
Emergency mode	48 (53[2])	52
Draught relief noise impacts	65 L_{Amax}	53
North side of Burton Street – residential		
Daytime	53	42
Evening	48	42
Night-time	43	41
Emergency mode	48	41
Draught relief noise impacts	65 L_{Amax}	53

Period/source	Criteria[1], dB(A)	Predicted noise level ($L_{Aeq,15min}$)
Parramatta Road (south) – residential		
Daytime	53	42
Evening	48	42
Night-time	43	41
Emergency mode	48	44
Draught relief noise impacts	65 L_{Amax}	52
Loftus Road (east) – commercial		
Daytime	60	53
Evening	60	53
Night-time	60	50
Emergency mode	65	53

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

11.6.3 Construction impact assessment

The construction scenarios and anticipated working hours at the Burwood North Station construction sites are shown in Table 11-11. 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 11-8 for the indicative construction program at Burwood North Station.

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 11-11 Construction activities and working hours – Burwood North 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	2	✓	✓	-	-
	Peak	Bored piling with support plant		✓	✓	-	-
Station/facility construction[2]	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	21	✓	✓	✓	✓
	Peak	Deliveries and tunnel access		✓	✓	✓	✓

Notes:
1. OOH = out-of-hours
2. For the southern site, this includes an elevated source at the maximum height that noise intensive equipment is expected to be required for the construction of the structure for non-station use

Airborne construction noise

The predicted airborne NML exceedances from the Burwood North Station construction sites are summarised in Table 11-12 for all residential receivers and in Table 11-13 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 station/facility construction when noise intensive equipment such as a concrete saw would be in use. The highest impact work is expected to last for around 27 months; however, concrete saws would only be used intermittently as required when concrete slabs are poured.

During the night-time, the highest construction noise impacts are predicted for internal construction and fit-out during station/facility construction. 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 11-12 Overview of NML exceedances (residential receivers) – Burwood North Station

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	18	12	1	39	14	3	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	Peak		44	17	4	88	20	14	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Piling	Typical	2	22	4	1	48	11	4	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	Peak		48	11	4	85	22	5	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Station/facility construction	Typical	27	16	4	-	31	6	1	31	6	1	51	8	1	15	3	-
	Peak 1		39	8	1	111	19	4	111	19	4	n/a	n/a	n/a	n/a	n/a	n/a
	Peak 2		349	39	14	658	136	28	658	136	28	n/a	n/a	n/a	n/a	n/a	n/a
Rail systems access shaft	Typical	21	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Peak		1	-	-	4	-	-	4	-	-	5	-	-	21	5	-

Table 11-13 Overview of NML exceedances (other sensitive receivers) – Burwood North Station

Scenario	Activity	Indicative duration (months)	Number of receivers exceeding NML																				
			Commercial			Café/bars			Child care			Educational			Hotel			Place of worship			Active 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	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-
	Peak		1	-	-	1	-	-	-	-	-	-	-	-	1	-	-	1	-	-	-	-	-
Piling	Typical	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Peak		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-
Station/facility construction	Typical	27	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Peak 1		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Peak 2		5	-	-	1	-	-	1	-	-	9	-	-	-	1	-	1	1	-	1	-	-
Rail systems access shafts	Typical	21	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Peak		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

The findings of the worst-case construction noise impact assessment at the Burwood North Station construction sites during the daytime indicate:

- the nearest residential receivers would be relatively close to the construction sites and impacts are predicted to be ‘moderate’ to ‘high’ when work would be carried out outside the station, particularly when noise-intensive equipment, such as concrete saws, is being used as part of station/facility construction work. Concrete saws are expected to only be infrequently throughout the 27-month construction period
- impacts during ‘typical’ work that do not require noise-intensive equipment or are inside the station are predicted to substantially reduce. ‘Moderate’ to ‘high’ impacts are still predicted at certain nearby residential receivers due to their proximity to the site
- 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 commercial and ‘other sensitive’ receivers are predicted to be impacted during some of the noisier activities. ‘Moderate’ worst-case impacts are predicted at St Luke’s Anglican Church and Bath Arms Hotel. The highest impacts at these receivers are predicted when concrete saws are being used as part of station/facility construction.

The findings of the worst-case construction noise impact assessment at the Burwood North Station construction sites during the night-time indicate:

- 'moderate’ to ‘low’ impacts are generally predicted at the nearest residential receivers
- more distant receivers are predicted to have ‘low’ impacts or comply with the noise management levels
- ‘low’ impacts are generally predicted during rail systems access shaft which would occur in an acoustic shed (or other acoustic measures) at the western end of the site.

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

A small number of receivers are predicted to be highly noise affected during peak facility construction in the daytime and evening when concrete saws are being used outside. These receivers are located to the north and south of the construction sites.

Sleep disturbance

A sleep disturbance screening assessment has been completed for the construction work and is summarised in Table 11-12.

‘Moderate’ sleep disturbance impacts are predicted at the nearest residential receivers. These impacts mainly result from heavy vehicles accessing the site via Burton Street and movements within the site.

Outdoor equipment being used during station/facility construction would also contribute to the predicted sleep disturbance impacts at this site.

The number of potential instances of sleep disturbance would depend on several factors, including the number of heavy vehicles accessing the site during the night-time, the way in which vehicles are operated, the type of equipment being used, and the duration of the noisy work. The number of night-time heavy vehicles at the construction sites is expected to be around four trucks per hour.

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

Vibration impacts

Construction work for this proposal at Burwood North Station would not involve major sources of vibration-generating equipment. As such, potential vibration impacts are anticipated to be negligible and would be managed through the Sydney Metro CNVS.

Ground-borne noise

Ground-borne noise impacts would only arise where ground-borne noise levels are higher than the corresponding airborne noise levels. This can occur where work is underground or where surface work is shielded by noise barriers or other structures. For all scenarios at the Burwood North Station construction sites, airborne noise is anticipated to be higher than ground-borne noise levels and, as such, a ground-borne noise assessment is not required.

Construction traffic noise

Construction related traffic has the potential to temporarily increase road traffic noise levels at receivers that are adjacent to the construction sites and haul routes. The forecast construction traffic volumes outlined in Technical Paper 2 (Construction traffic) 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. No roads around the Burwood North Station construction sites are anticipated to have a greater than 2 dB increase.

11.6.4 Management and mitigation measures

Environmental management for this proposal would be undertaken through the environmental management approach as detailed in Chapter 20 (Synthesis) of the 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 (refer to 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 the Environmental Impact Statement.

11.7 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).

11.7.1 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 the work carried out under the previous Sydney Metro West planning application.

Areas within the Burwood North Station construction sites for work carried out under the previous Sydney Metro West planning application will have been cleared of existing structures and vegetation, with the station box excavated.

As part of the work carried out under the previous Sydney Metro West planning application, all archaeological investigations will have been carried out within the approved Burwood North Station construction sites.

For the purpose of this heritage assessment, the study area for Burwood North Station has been defined as a 50-metre buffer around the full extent of the sites.

Existing setting

The Burwood North Station northern site fronts Parramatta Road between Burwood Road and Loftus Street, Concord, with a portion extending to Burton Street. The existing setting surrounding the northern site comprises a combination of low- to medium-density early to mid-20th century commercial development alongside Parramatta Road and Burwood Road; low-density mid- to late-20th century suburban residential development along Burton Street to the north; and low-density mid- to late-20th century residential and commercial development along Loftus Street.

The Burwood North Station southern site is location on the south-eastern corner of Parramatta Road and Burwood Road. The existing setting comprises low-density early to mid-20th century commercial development that is one and two storeys in height.

The Burwood North Station study area and existing heritage items within the study area are shown in Figure 11-13.

Site history

The study area for the Burwood North Station construction sites was initially used for the Longbottom Government Stockade and Farm from the 1790s. The stockade and farm employed varying numbers of convicts over this period. In the 19th Century, the stockade was no longer required and fell into disrepair. An informal village formed and was formalised in 1843. Development surrounding the site was slowly subdivided, and Concord Oval was created in 1866. Residential development was replaced with commercial development and car parking along Parramatta Road.

Figure 11-13 Heritage items within the study area – Burwood North Station

11.7.2 Impact assessment

Built heritage impact assessment

Table 11-14 summarises the potential impacts of construction and operation of this proposal on built heritage items within the study area at Burwood North Station.

Potential impacts to build heritage items in the Burwood North Station study area would generally be neutral, negligible or minor. Management of potential impacts is outlined in Section 11.7.3. 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.

Table 11-14 Impacts on significance of built heritage items – Burwood North Station

Item, listing and significance	Potential impact	Magnitude
St Luke's Park gateway/entrance Gates and trees only Canada Bay LEP Item No. I308 Local	**Direct impacts** The western boundary of the item's heritage curtilage is located over 20 metres east of the northern Burwood North Station construction site. This proposal would not result in any adverse direct (physical) impacts to the item.	**Neutral**
	Settlement and vibration Vibration levels from the proposed construction activities are predicted to be below the cosmetic damage screening criteria. Potential direct impacts associated with vibration are not anticipated.	**Neutral**
	Temporary indirect (visual) impact Temporary structures, hoarding and construction plant would be located about 100 metres to the west of the heritage significant elements of this item, and would not obstruct or overshadow views of these significant elements.	**Neutral**
	Permanent indirect (visual) impact The station services building and other aboveground infrastructure at the northern site would be located to the west of the item. While this would be a prominent structure, this proposal would not obstruct or overshadow views of the significant elements of the heritage item, and the setting of those significant elements would not be impacted.	**Negligible**
St Luke's Anglican Church and grounds Canada Bay LEP Item No. I40 Local	**Direct impacts** The heritage item is located on the northern side of Burton Street, over 20 metres north of the northern Burwood North Station construction site. This proposal would not include work within the heritage curtilage of the item. As such, the proposed works would not result in any adverse direct (physical) impacts to the item.	**Neutral**
	Settlement and vibration Vibration levels from the proposed construction activities 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 offices, workshops and storage facilities located on the Burton Street frontage of the Burwood North Station northern construction site would be visible from the street frontage of the heritage item. The acoustic shed (or other acoustic measures) at the western extent of the station box excavation would also be temporarily visible from the street frontage of the heritage item. The construction work and facilities would not overshadow or obstruct the significant views of the church entrance or historic trees of the item.	**Negligible**
	Permanent indirect (visual) impact An aboveground station building would be located on Burwood Road near its intersection with Parramatta Road; however, it would not be clearly visible from the front of the heritage item. The public domain areas and interchange would not detract, obstruct or overshadow views of the heritage significant elements of this item (church building, oak tree and fencing facing Burton Street), and infrastructure constructed to support non-station use would be sufficiently offset from these elements to prevent overshadowing of them.	**Negligible**

Item, listing and significance	Potential impact	Magnitude
Bath Arms Hotel Burwood LEP Item No. I94 Local	**Direct impacts** The heritage item is located about 20 metres west of the southern Burwood North Station construction site. No elements of this proposal would be sited within the heritage curtilage of the item. As such, the proposed works would not result in any adverse direct (physical) impacts to the item.	**Neutral**
	Settlement and vibration Vibration levels from the proposed construction activities are predicted to be below the cosmetic damage screening criteria. Potential direct impacts associated with vibration are not anticipated.	**Neutral**
	Temporary indirect (visual) impact Construction hoarding, machinery, plant, site offices and an acoustic shed (or other acoustic measures) would be visible from across Burwood Road during the construction of this proposal. These elements would not overshadow or disrupt the heritage item's prominence on the Parramatta Road and Burwood Road intersection.	**Negligible**
	Permanent indirect (visual) impact During operation, this heritage item would be located about 20 metres west of the southern Burwood North Station entrance building. The new entrance would include infrastructure to support space for non-station use, resulting in a structure about seven to ten storeys tall to the east of the item. Although multi-storey developments are located directly south of the proposed structure, due to the short distance between the item and this proposal, the new structure would visually compete with the item and its prominent corner location.	**Minor**

Archaeological impact assessment

The area within the Burwood North Station construction sites 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. No new archaeological impacts are anticipated as a result of this proposal, as potential archaeological resources would be identified and managed during the work carried out under the previous Sydney Metro West planning application.

11.7.3 Management and mitigation measures

Environmental management for this proposal would be carried out 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 (Appendix F). The CEMF includes heritage management objectives and mitigation measures to minimise impacts as relevant to this proposal as a whole.

11.8 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).

11.8.1 Baseline environment

The previous Sydney Metro West planning application assessed the potential impacts of the establishment of the Burwood North Station construction sites.

This section summarises the existing environment presented in *Sydney Metro West Environmental Impact Statement – Westmead to the Bays and Sydney CBD* (Sydney Metro, 2020a) to provide context for this proposal. No additional footprint beyond that already assessed as part of the previous Sydney Metro West planning application is required for this proposal at the Burwood North Station construction sites.

Landscape and archaeological context

The Burwood North Station construction sites are within the Cumberland Lowlands physiographic region of the Cumberland Plain, at the eastern base of a low-lying sandstone and shale ridgeline (refer to Technical Paper 4 of the *Sydney Metro West Environmental Impact Statement – Westmead to the Bays and Sydney CBD* (Sydney Metro, 2020a)). An unnamed channelised watercourse is the closest permanent watercourse. Reference to the 1:100,000 Geological Map Sheet for Sydney (9130) indicates that the surface geology is dominated by Wianamatta Group units, comprising Ashfield Shale, Minchinbury Sandstone and Bringelly Shale, overlying the Mittagong Formation and the Hawkesbury Sandstone. Raw materials include shale (claystone and siltstone), carbonaceous claystone, laminite and fine to medium-grained lithic sandstone.

Review of historical reference materials indicates that the Burwood North Station construction sites are heavily influenced by urban development. The archaeological implication is the potential disturbance or destruction of pre-existing Aboriginal sites and archaeological deposits.

Previous Aboriginal cultural heritage assessments

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

- Biosis Pty Ltd undertook an Aboriginal Due Diligence assessment to support the redevelopment of the Concord Repatriation General Hospital, located about three kilometres north of the Burwood North metro station construction sites. No previously unrecorded sites or objects were located during the site survey of the project's study area. No further archaeological investigation was recommended on the basis that the project's study area was assessed as having low archaeological potential
- Artefact Heritage Services Pty Ltd undertook archaeological survey of the area as part of the *Sydney Metro West Environmental Impact Statement – Westmead to The Bays and Sydney CBD* (Sydney Metro, 2020a). The survey identified that the Burwood North metro station construction sites was located in a low sensitivity landform away from major permanent water sources and suggested that A horizon soils had likely been removed during development. On the basis of its previous disturbance and distanced from permanent water, the area was assessed as having a low archaeological potential. The assessment did not identify any site-specific cultural values associated with the Burwood North Station construction sites, however, did identify cultural values associated with Parramatta Road as it originally formed a Wangal walking track.

Recorded Aboriginal sites

The *Sydney Metro West Environmental Impact Statement – Westmead to the Bays and Sydney CBD* (Sydney Metro, 2020a) for the major civil construction work between Westmead and The Bays did not identify any previously recorded Aboriginal sites. No surface sites were identified during the field survey for the previous Sydney Metro West planning application and subsurface archaeological potential was assessed as low.

An updated search of the AHIMS database was undertaken for this assessment on 21 August 2021 (Search ID 609566). There were no additional entries identified in the search results within 100 metres of the Burwood North Station construction sites.

Aboriginal community consultation and cultural values

During consultation undertaken with Registered Aboriginal Parties for the *Sydney Metro West Environmental Impact Statement – Westmead to the Bays and Sydney CBD* (Sydney Metro, 2020a) did not identify any site-specific cultural values associated with the Burwood North Station construction sites. Registered Aboriginal Parties noted that the area is part of a wider cultural landscape of high cultural significance to the local Aboriginal community. In particular, major fresh water sources in the area were of particular cultural significance. Parramatta Road also originally formed a Wangal walking track, which is located adjacent to Burwood North Station construction sites.

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 *Sydney Metro West Environmental Impact Statement – Westmead to the Bays and Sydney CBD* (Sydney Metro, 2020) included a survey of the Burwood North Station construction sites undertaken with participation from Registered Aboriginal Party field representatives Selina Timothy and Cecil Heron from the Metropolitan Local Aboriginal Land Council. Further field investigation has not been undertaken at the Burwood North Station construction sites 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.

11.8.2 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 Burwood North 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 Burwood North 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 conditions of approval CB4 and CB5, a draft Heritage Interpretation Strategy has been prepared for this proposal (Appendix K) which details how Aboriginal heritage values would be interpreted 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).

11.8.3 Construction impact assessment

Direct impacts

No registered sites were identified within the construction sites and archaeological potential was assessed as low. This proposal does not require any additional footprint areas at Burwood North Station construction sites. Therefore, no identified Aboriginal sites or objects and/or site-specific cultural values would be directly impacted during construction of this proposal at the Burwood North Station construction sites.

Indirect impacts

No identified Aboriginal sites, objects and/or site-specific cultural values would be indirectly impacted during construction of this proposal at the Burwood North Station construction sites.

11.8.4 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.

11.9 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).

11.9.1 Baseline environment

There are two Burwood North Station construction sites, generally between Burwood Road and Loftus Street. One site would be to the north of Parramatta Road (northern site) and the second to the south of Parramatta Road (southern site).

All buildings and vegetation within these sites will have been removed as a part of the work carried out under the previous Sydney Metro West planning application. This will include the buildings on the north-east and south-east corners of the Burwood and Parramatta Road intersection, and several small shopfronts extending north along Burwood Road and east along the northern side of Parramatta Road. As part of the previous Sydney Metro West planning application, there will have been station excavation carried out on the site and there will be site boundary fencing and hoarding established on the site.

At the Burwood North Station site, Parramatta Road is six lanes wide and heavily trafficked. It comprises a variety of retail, commercial, light industrial, medium-density development and open space uses. This road presents a visually harsh streetscape with few street trees, poor pedestrian environments and vehicle dominated uses. Burwood Road is a busy north-south road that is currently undergoing increased intensification with the recent construction of medium-density development near Parramatta Road.

Nearby, the local heritage listed St Luke's Anglican Church, located mid-way on Burton Street, forms a notable local visual feature. The church is located in an attractive landscaped setting and contributes to the amenity of the residential area to the north of the northern site.

Concord Oval, located on the corner of Loftus Street and Parramatta Road, is an important regional sporting facility. Concord Oval contains a local heritage listed gate and five mature fig trees, which were once the entrance to St Luke's Park. The redevelopment of Concord Oval has commenced and is scheduled for completion in early 2022, including the construction of a new indoor recreation centre and passive recreation areas.

Section 11.3 provides further discussion of the intended future character local strategic plans relevant to Burwood North. 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, are outlined in Table 11-15.

Table 11-15 Landscapes and public realm areas – Burwood North Station

Location	Baseline environment	Landscape sensitivity level
Parramatta and Burwood Road streetscapes	On Parramatta Road, the width and high traffic volumes reduce the pedestrian amenity and north-south connectivity. A lack of trees and continuous awnings, and varied building setbacks creates a streetscape lacking cohesion. This section of Parramatta Road is lined with a mix of commercial uses and contains some remnant buildings that exhibit a traditional main street character, such as the local heritage listed Bath Arms Hotel on the corner of Parramatta Road and Burwood Road. On Burwood Road, a mix of uses to the south of the intersection with Parramatta Road creates a disjointed streetscape, whereas to the north of the intersection terraced shopfronts with awnings frame and activate the street. There are few trees along Burwood Road in the vicinity of the site. Both Parramatta Road and Burwood Road are undergoing urban renewal and increased intensification, including the recent construction of medium-rise residential development.	Local
Burton Street, Loftus Street and Niches Laneway streetscapes	Burton Street and Loftus Street comprise a mix of medium to low density dwellings. There are several mature trees on the corner of Loftus Street and Parramatta Road located within the Concord Oval precinct, which along with nearby heritage listed fig trees, are important contributors to the leafy streetscape character of Loftus Street. Neichs Laneway is a narrow urban laneway, which provides rear access and car park access for commercial and residential properties. As part of the work carried out under the previous Sydney Metro West planning application, Neichs Laneway will have been closed and diverted along Burwood Road and Burton Street.	Local

Representative viewpoints

Seven representative viewpoints have been selected to inform the daytime visual impact assessment and are shown in Figure 11-14. These viewpoints are of local sensitivity.

While the impact rating for all seven viewpoints are provided, the following three have been selected as the most representative viewpoints 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 2: view south across the intersection of Burwood Road and Burton Street** – presents potential impacts associated with an acoustic shed at the Burwood North Station construction sites
- **viewpoint 6: view east across the intersection of Parramatta Road and Burwood Road** – presents views from both sides of Parramatta Road, a major throughfare
- **viewpoint 7: view south-east from the intersection of Parramatta Road and Burwood Road** – presents potential impacts associated with work and new structures at the southern Burwood North Station construction site.

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

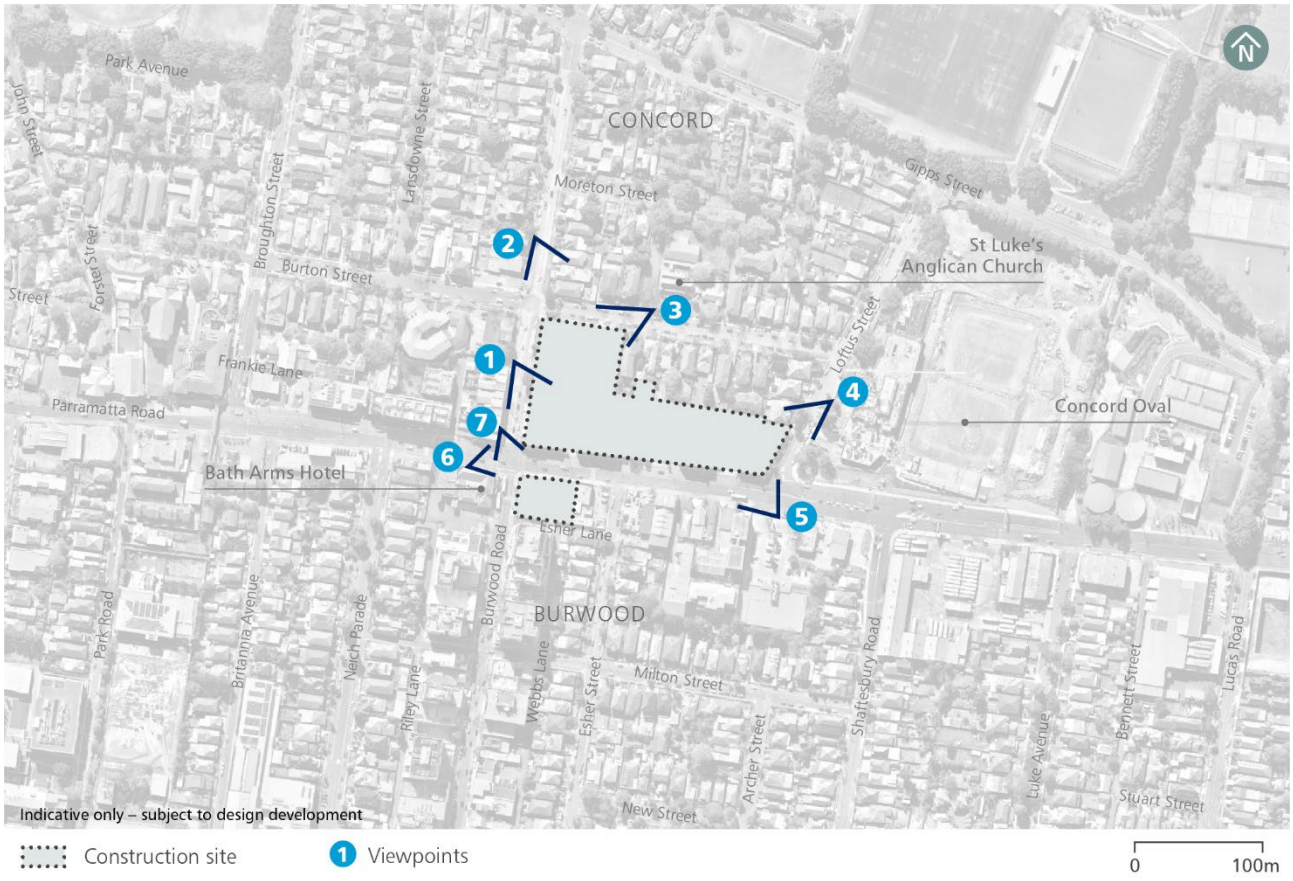

Figure 11-14 Representative viewpoints – Burwood North Station

Night-time visual sensitivity

Burwood North Station is located in an area of medium district brightness (A3) that is of low sensitivity. This area includes a concentration of brightly lit commercial, industrial, retail and medium-density residential buildings. On Parramatta Road and Burwood Road, there are high volumes of traffic headlights, streetlights and traffic lights that contribute to the brightness and skyglow. The residential area to the north generally has a lower level of lighting. Concord Oval, as a venue for local and regional sporting activities, is brightly lit during night events. There will be some remaining security lighting at the Burwood North Station construction sites as a part of the work carried out under the previous Sydney Metro West planning application.

11.9.2 Operational impact assessment

In operation, Burwood North Station would comprise both underground and aboveground elements. The key elements of this proposal that would be visible are described in Section 11.2.

Landscape impact

Landscape impacts anticipated as a result of the operation of this proposal are summarised in Table 11-16. Management of potential impacts is discussed in Section 11.9.4.

During operation, there would be a moderate beneficial impact to the Parramatta Road and Burwood Road streetscapes and Burton Street, Loftus Street and Niches Laneway streetscapes, due to the improvements in accessibility, legibility and amenity for road users, cyclists and pedestrians. There would also be new areas of public domain along these streets adjacent to the site, including high-quality pavements, street trees and gardens, lighting and street furniture.

There would be two station entries facing Burwood Road (one north and one south of Parramatta Road). Both station entries would be set back from the busy intersection with Parramatta Road, and address Burwood Road. The northern station entry would be of a considerably larger scale than the former heritage character terraces facing Burwood Road, increasing the visual prominence of the station entry and legibility within the precinct. There would also be an unpaid connection under Parramatta Road. Together these improvements to Parramatta Road and Burwood Road would significantly improve accessibility in this area.

There would be two new through-site links, including north-south established between Burton Street and Parramatta Road, and east-west between Loftus Street and Burwood Road. These laneways would improve the permeability and accessibility of this precinct. A new accessible kiss and ride zone is proposed for Burton Street and a pedestrian crossing at the corner of Burton and Loftus.

The southern station building would be located adjacent to the residences within the mid-rise development on Burwood Road, south of Esher Lane. Space for non-station use in the southern station building would rise about seven storeys above the station services infrastructure. This building would be taller than existing buildings on the site (that would be removed as a part of the work carried out under the previous Sydney Metro West planning application) and would therefore have the potential to cast a longer shadow in areas to the west, south and east of the station building during mid-winter, when the angle of the sun is at its lowest. The adjacent north facing residential properties would be separated from the proposed southern station building by Esher Lane, and setback from the northern boundary of the southern station building by several metres. The total separation between the station building and these residential properties would be about nine to 10 metres, consistent with setback standards identified for habitable rooms in the State Environmental Planning Policy No 65 – Design Quality of Residential Apartment Development.

As these residences are located to the south of the station building, it is predicted that there would be shadows cast across the properties in mid-winter, which would be longer than the existing condition. In mid-winter, when the angle of the sun is at its lowest, there would also be a greater shadow cast along properties to the south of Parramatta Road, between the proposed southern station building and Shaftesbury Road in the east. Technical Paper 6 (Landscape and visual amenity) provides further detail of overshadowing for properties located in the vicinity of the Burwood North Station.

There would also be a longer duration of shadow experienced on footpaths and areas of public realm to the west, south and east of the station building; however, this would be consistent with what is commonly experienced in dense urban areas. Overall, due to the existing setting of medium- and high-density development, there would be a small potential for additional shading of the adjacent residential building and surrounding public realm, resulting a minor adverse landscape impact. Further detail on the potential overshadowing impact is provided in Technical Paper 6 (Landscape and visual amenity).

Table 11-16 Landscape impacts during operation – Burwood North Station

Location	Landscape sensitivity level	Magnitude of change	Impact rating
Parramatta Road and Burwood Road streetscapes	Local	Considerable improvement	Moderate beneficial
Burton Street, Loftus Street and Niches Laneway streetscapes	Local	Considerable improvement	Moderate beneficial

Daytime visual amenity impact

Visual amenity impacts anticipated as a result of the operation of this proposal are summarised in Table 11-17. Management of potential impacts is discussed in Section 11.9.4. An artist's impression of Burwood North Station during operation is shown in Figure 11-15. 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).

The majority of viewpoints would experience minor beneficial or negligible impact due to the introduction of new public domain areas and the compatibility with the planned future character of the Burwood North area.

Table 11-17 Daytime visual impacts during operation – Burwood North Station

Location	Sensitivity rating	Magnitude of change	Impact rating
Viewpoint 1: view south along Burwood Road	Local	Noticeable improvement	Minor beneficial
Viewpoint 2: view south across the intersection of Burwood Road and Burton Street	Local	Noticeable improvement	Minor beneficial
Viewpoint 3: view south-west along Burton Street	Local	No perceived change	Negligible
Viewpoint 4: view south-west along Loftus Street	Local	No perceived change	Negligible
Viewpoint 5: view north-west along Parramatta Road	Local	Noticeable improvement	Minor beneficial
Viewpoint 6: view east across the intersection of Parramatta Road and Burwood Road	Local	Noticeable improvement	Minor beneficial
Viewpoint 7: view south-east from the intersection of Parramatta Road and Burwood Road	Local	Noticeable improvement	Minor beneficial

As noted in Section 11.9.1, the most representative viewpoints have been discussed in detail in this section. Potential impacts from these viewpoints would include the following:

- **viewpoint 2: view south across the intersection of Burwood Road and Burton Street** – during operation there would be a minor beneficial visual impact to this view. The new northern metro station entrance would be visible in the middle ground, rising several stories above Burwood Road. The southern metro station entrance building and space for non-station use (fit-out and use subject to separate approval, where required) above the station entrance building would also be visible in the background, across a new widened area of public domain at the intersection of Parramatta and Burwood Roads. While this proposal would transform the character of this view, the new station entries, services buildings and space for non-station use would be consistent with the emerging character of this area identified in strategic plans, and there would be generous areas of high-quality public domain improving the streetscape amenity
- **viewpoint 6: view east across the intersection of Parramatta Road and Burwood Road** – there would be a minor beneficial impact to this view due to the new areas of public domain and capacity of this view to absorb potential visual impacts. The northern metro station entrance would be seen in the middle ground of this view, north of Parramatta Road, facing Burwood Road. It would be a new contemporary structure, rising around twice the height of the previous built form on the site. This station entry building would be set back from the corner of Parramatta Road by a widened area of public domain, which would extend east along Parramatta Road. The scale of this proposal, including two new station entrance buildings, would be consistent with the intended transformation of this area identified in strategic plans. Overall, this view has the capacity to absorb the additional height and form of the proposed station building due to the mixed built form visible and compatibility with the planning intentions of this area

- **viewpoint 7: view south-east from the intersection of Parramatta Road and Burwood Road** – there would be a minor beneficial visual impact to this view due to improvements in the streetscape character and the consistency of this proposal with the emerging character of this area. The southern metro station entry would be seen in the middle ground of this view, at street level (left of view) and facing Burwood Road. This would include station services facilities above the station entry and space for non-station use combined in a building that would rise about 10 storeys above Burwood Road, blocking views to the medium rise apartment building beyond. This proposal would be set back from the Parramatta Road and Burwood Road intersection by a broad area of upgraded public domain. The proposed station building would be contemporary in style, contrasting in height and scale to the Bath Arms Hotel, a local listed heritage building, opposite (right of view). It would, however, be consistent with the building form and scale intended by the precinct planning for this area, and the existing higher density buildings seen in the background of this view. There would be a new kiss and ride and point-to-point facilities along Burwood Road, beyond the station entrance. The existing view from this viewpoint, and a photomontage of Burwood North Station from this viewpoint are provided in Figure 11-16 and Figure 11-17 respectively.

Indicative only – subject to design development

Figure 11-15 Artist's impression of Burwood North Station during operation

Figure 11-16 Existing view from viewpoint 7 (view south-east from the intersection of Parramatta Road and Burwood Road – Burwood North Station. Extent of demolition as part of work carried out under the previous Sydney Metro West planning application is shown in orange

Indicative only – subject to design development

Figure 11-17 Photomontage from viewpoint 7 (view south-east from the intersection of Parramatta Road and Burwood Road) – Burwood North Station

Night-time visual amenity impact

The anticipated night-time visual impacts during operation are summarised Table 11-18.

The new station and public domain areas would be brightly lit to ensure customer safety. Existing and new street trees would contain some lighting from the station, and all lighting would be designed to minimise light spill and skyglow. While the level of lighting required to ensure safety for customers at night would increase the light levels around the precinct, this additional light would be absorbed into this area of medium district brightness, set within an area intended for redevelopment with increased development density. However, there would be additional lighting seen from adjacent residential areas, resulting in a minor adverse impact.

Table 11-18 Night-time visual amenity impacts during operation – Burwood North Station

Location	Sensitivity rating	Magnitude of change	Impact rating
Burwood North Station	A3: Medium level brightness	Noticeable reduction	Minor adverse

11.9.3 Construction impact assessment

Construction of Burwood North Station would require the continued use of two construction sites established as part of work carried out under the previous Sydney Metro West planning application (a northern construction site and a southern construction site). The main elements that would be visible would include the proposed works, construction site features, equipment and vehicle access routes described in Chapter 6 (Proposal description – construction) of this Environmental Impact Statement and Section 11.4.

Landscape impact

Landscape impacts anticipated as a result of the construction of this proposal are summarised in Table 11-16. Management of potential impacts is discussed in Section 11.9.4.

During construction of this proposal, the existing construction sites would be enclosed by hoarding (generally about three metres high). There would be large-scale machinery, plant and vehicles seen within the site to support station fit-out and the construction of station buildings and proposed public domain.

Although the presence of construction activity would continue to reduce the amenity for users of surrounding streets, and alterations to footpaths adjacent to the site would continue to occur during some periods of construction, there would be no further restrictions on access, movement and legibility in this area.

There would continue to be construction activity to the south of Burton Street and west of Loftus Street, including storage and laydown areas, workshops, site parking and station construction works located behind site perimeter hoarding. There would be heavy vehicles travelling along these streets and accessing the site via Burton Street and Loftus Street. The presence of construction activity would continue to reduce the amenity of the adjoining pedestrian environment.

The large size of the northern construction site and the continued diversion of Niches Laneway would reduce the accessibility and permeability of this area for residences to the north of Parramatta Road.

Table 11-19 Landscape impacts during construction – Burwood North Station

Location	Landscape sensitivity level	Magnitude of change	Impact rating
Parramatta Road and Burwood Road streetscapes	Local	Considerable reduction	Moderate adverse
Burton Street, Loftus Street and Niches Laneway streetscapes	Local	Noticeable reduction	Minor adverse

Daytime visual amenity impact

Visual amenity impacts anticipated as a result of the construction of this proposal are summarised in Table 11-20. Generally, there would be minor and moderate adverse visual impacts due to the temporary presence and scale of construction activities. Management of potential impacts is discussed in Section 11.9.4.

Table 11-20 Daytime visual impacts during construction – Burwood North Station

Location	Sensitivity rating	Magnitude of change	Impact rating
Viewpoint 1: view south along Burwood Road	Local	Considerable reduction	Moderate adverse
Viewpoint 2: view south across the intersection of Burwood Road and Burton Street	Local	Considerable reduction	Moderate adverse
Viewpoint 3: view south-west along Burton Street	Local	Considerable reduction	Moderate adverse
Viewpoint 4: view south-west along Loftus Street	Local	Noticeable reduction	Minor adverse
Viewpoint 5: view north-west along Parramatta Road	Local	Considerable reduction	Moderate adverse
Viewpoint 6: view east across the intersection of Parramatta Road and Burwood Road	Local	Noticeable reduction	Minor adverse
Viewpoint 7: view south-east from the intersection of Parramatta Road and Burwood Road	Local	Noticeable reduction	Minor adverse

As noted in Section 11.9.1, the most representative viewpoints have been discussed in detail in this section. Potential impacts from these viewpoints would include the following:

- **viewpoint 2: view south across the intersection of Burwood Road and Burton Street** – during construction of this proposal, there would be a temporary moderate adverse visual impact to this view due to the scale and extent of construction work. There would continue to be a construction site located in the middle ground of this view, along the eastern side of Burwood Road. There would be workshops and laydown areas visible in front of the proposed acoustic shed, at the south-eastern corner of Burton and Burwood Road. The southern construction site would also be visible in the background of view. Following the station fit-out work, the acoustic shed (or other acoustic measures) would be removed and there would be large-scale construction activity visible across the site for the construction of the new northern station entrance building. This work would rise several stories above the site; however, it would be visible in the context of the taller residential buildings located in the background of this view. A comparison of the existing view from viewpoint 2 with the indicative views resulting from the construction of this proposal is provided in Figure 11-18 and Figure 11-19
- **viewpoint 6: view east across the intersection of Parramatta Road and Burwood Road** – there would be a temporary minor adverse impact as there would continue to be large-scale construction activity visible within both the northern and southern construction sites from this location. An acoustic shed (or other acoustic measures) would be visible from this viewpoint; however, it would be partly screened by the intervening commercial buildings on Parramatta Road and set back from the road. Construction vehicles would be visible travelling in both directions along Parramatta Road and accessing and egressing the sites. Following the removal of the acoustic shed (or other acoustic measures), construction of the aboveground station (about six to seven stories high) would be visible, as well as work to install public domain facilities at the intersection and along Parramatta Road. While this view has a high absorption capacity for the works, the construction activity would extend across a substantial portion of this view and be of a large scale and intensity
- **viewpoint 7: view south-east from the intersection of Parramatta Road and Burwood Road** – there would be a temporary minor adverse visual impact at this view due to the scale of construction work. The scale of the work would, however, be largely absorbed into this view. There would be construction work and equipment visible above southern construction site, located at the corner of Burwood and Parramatta Roads (left of this view), extending south to Esher Lane. There would be hoarding enclosing the site and visible along Burwood Road and Parramatta Road. There would be construction vehicles seen egressing the site via Parramatta Road (left of view). Construction of the southern station entrance building would be seen rising above the site. The construction of this building would be set back from the intersection and work would rise a couple of storeys above the site. Following this, the works to construct the surrounding public domain would be visible.

To manage these potential impacts, management and mitigation measures are provided in Section 11.9.4 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 11-18 Existing view from viewpoint 2 (view south across the intersection of Burwood Road and Burton Street) – Burwood North Station

Indicative only – subject to design development

Figure 11-19 Photomontage from viewpoint 2 (view south across the intersection of Burwood Road and Burton Street) – Burwood North 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 11-21.

Work would be required at night at the Burwood North Station construction sites. The acoustic shed (or other acoustic measures) would contain some lighting in the vicinity of Burwood Road. However, this lighting would increase the light levels within the construction sites, seen from adjacent residences and commercial properties on Burton Street, Loftus Street and Esher Lane. There would also be additional headlights from heavy vehicles accessing and moving along the surrounding streets, such as Burton Street and Loftus Street. This additional lighting would be seen within an area of medium district brightness where there is existing lighting associated with the commercial developments, the stadium at Concord Oval, and the continuous stream of headlights on Parramatta Road and Burwood Road.

Table 11-21 Night-time visual amenity impacts during construction – Burwood North Station

Location	Sensitivity rating	Magnitude of change	Impact rating
Burwood North Station	A3: Medium level brightness	Noticeable reduction	Minor adverse

11.9.4 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 (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 Burwood North Station to address potential impacts are listed in Table 11-22.

Table 11-22 Landscape and visual amenity mitigation measures – Burwood North 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

11.10 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) of this Environmental Impact Statement and Appendix D (Detailed assessment methodologies). The legislative context for the assessment is provided in Appendix B (Legislative and policy context).

11.10.1 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 infrastructure on the land required for the Burwood North Station construction sites will be demolished, and bulk excavation work will have occurred as part of the work carried out under the previous Sydney Metro West planning application. The bulk excavation works will include excavation for the station box and crossover cavern at the Burwood North Station northern construction site, subsurface pedestrian connection under Parramatta Road, and shaft at the Burwood North Station southern construction site.

Soils

The existing soils environment is described in detail in Chapter 19 of the *Sydney Metro West Environmental Impact Statement – Westmead to The Bays and Sydney CBD* (Sydney Metro, 2020a) and is summarised in the following sections.

Soil and geology types

The geological units expected to be encountered at Burwood North Station include Quaternary deposits (zero to two metres below ground level), Ashfield Shale and Mittagong Formation (two to 22 metres below ground level) and Hawkesbury Sandstone (greater than 22 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 Blacktown (strongly acidic and hard setting soils) soil units in the vicinity of Burwood North Station.

Soil salinity

The NSW Natural Resources Atlas sourcing information from the *Salinity Hazard Map of NSW* (DIPNR, 2018) does not indicate saline soils at this site and immediately surrounding areas.

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 Burwood North Station. No potential acid sulfate soils were identified within the construction sites and immediate vicinity. However, 'disturbed terrain' (see Figure 11-21) is located around 200 metres east of the construction sites, which is 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. Soils containing high-risk sediments are also located around 800 metres north-east of the construction sites.

Contamination

Work carried out under the previous Sydney Metro West planning application would include the investigation and remediation of soil and/or groundwater contamination 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 the Burwood North Station construction sites are described as follows:

- AEI 41 – Leaks and spills from automotive dealer (within the northern construction site) – moderate risk of groundwater contamination from leaks and spills of heavy metals, hydrocarbons, volatile organic compounds and asbestos associated with automotive facilities, car dealerships and bus depot
- AEI 42 – Chemical and wax use (within the northern construction site) – moderate risk of groundwater contamination associated with car wash and detailing including heavy metals, hydrocarbons, surfactants and per- and poly-fluoroalkyl substances (PFAS)
- AEI 43 – Hazardous building materials (within the construction sites) – very low risk of soil contamination from hazardous building materials within or from on-site buildings/structures, demolition wastes, including heavy metals, hydrocarbons, pesticides and asbestos
- AEI 44 – Vehicle particulate deposition (within the construction sites) – very low risk of soil contamination from historical vehicle deposition of particulate matter including from hydrocarbons, leads, asbestos
- AEI 45 – Historical commercial and industrial use in surrounding locality (outside of construction sites) – moderate risk of groundwater contamination from historical inappropriate chemical storage and use, industrial operations, waste disposal and management, including from heavy metals, hydrocarbons, volatile organic compounds.

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 11-20.

Overall, the risk of shallow soil contamination or encountering previously dumped construction waste within the existing construction sites is expected to be low as it would have been removed or managed prior to construction of this proposal. The ingress of contaminated groundwater to subsurface infrastructure is expected to be partially or fully mitigated through remediation performed during the work carried out under the previous Sydney Metro West planning application. An additional review of residual contaminant concentrations and rates of inflow would be required for of this proposal to determine the requirements for any additional groundwater remediation.

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

Figure 11-20 Areas of environmental interest (moderate risk or above) – Burwood North Station

Groundwater

The work carried out under the previous Sydney Metro West planning application will include the excavation of:

- an untanked station box at the northern construction site (excavation that allows groundwater to flow into the structure)
- an untanked shaft for the southern station entrance at the southern construction site
- mined subsurface pedestrian connection under Parramatta Road between the northern and southern construction sites
- a tanked crossover cavern (excavation/cavern constructed with an impermeable casing/membrane that minimises groundwater inflows to negligible rates) to the west of the station box at the northern construction site.

The baseline groundwater environment for this proposal is described further in Table 11-23, and shown in Figure 11-21.

Table 11-23 Groundwater baseline environment – Burwood North 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 station area is predicted to reduce to about 26 metres below ground level (Sydney Metro, 2020a) (see Figure 11-21 for groundwater drawdown extent). This groundwater level is assumed to remain at the commencement of construction for this proposal. The predicted groundwater inflows to the Burwood North Station box and shaft, both untanked, of about 2.8 litres per second is expected to continue at the commencement of construction work for this proposal. Localised groundwater flow is expected to be towards the untanked station box and shaft.
Groundwater quality	The baseline groundwater quality may be impacted by a change in the groundwater flow direction, towards the untanked station box and shaft (which has the potential to induce contaminated groundwater seepage). Potential contaminants of concern include heavy metals, hydrocarbons, solvents, volatile organic compounds, surfactants and perfluorooctanesulfonic acid. The potential contamination impact was assessed to be moderate for groundwater (as described above and in Chapter 20 of the *Sydney Metro West Environmental Impact Statement – Westmead to The Bays and Sydney CB*D (Sydney Metro, 2020a)). Saline intrusion modelling predicted that the freshwater-saltwater interface could advance inland from Parramatta River by 50 metres at depths of less than 10 metres below ground level (Sydney Metro, 2020a) at the commencement of construction of this proposal. The potential impacts to sensitive receptors are discussed in Section 5.9.8 of Technical Paper 7 (Hydrogeology) of the *Sydney Metro West Environmental Impact Statement – Westmead to The Bays and Sydney CBD* (Sydney Metro, 2020a). Groundwater supply bores and groundwater dependent ecosystems were not identified in this area in the zone of saline intrusion. The likelihood of environmental impact due to saline intrusion in the groundwater is therefore considered to be low.
Groundwater users	Fifteen registered bores are located within the predicted extent of groundwater drawdown and are expected to have a reduced groundwater level at the commencement of this proposal. Thirteen registered bores are reportedly used for monitoring, one for de-watering, and one for domestic water supply. The registered water supply bore, GW305646, is located about 880 metres north-west from the construction sites. This bore is expected to have a reduced groundwater level of about two metres as a result of the work carried out under the previous Sydney Metro West planning application
Groundwater dependent ecosystems	Figure 11-21 shows one groundwater dependent ecosystem identified within the predicted groundwater drawdown extent (Turpentine – Grey Ironbark open forest on shale in the lower Blue Mountains, Sydney Basin Bioregion), about 250 metres north-west of the construction sites. There is a low potential for this groundwater dependent ecosystem to be impacted by about 15 metres of groundwater drawdown during the work carried out under the previous Sydney Metro West planning application. This because the groundwater dependent ecosystem lies in soils that are likely to be of relatively low permeability and is considered to intermittently rely on groundwater.
Surface water and groundwater interaction	The interaction between surface water and groundwater in proximity to the Burwood North Station construction sites 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 area is 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.

Aspect	Description
	Groundwater drawdown is expected at St Lukes Park Canal and Barnwell Park Canal at the commencement of construction for this proposal as a result of the work under the previous Sydney Metro West planning application (see Figure 11-18). They are located around 250 metres and 850 metres east of the construction sites, respectively.

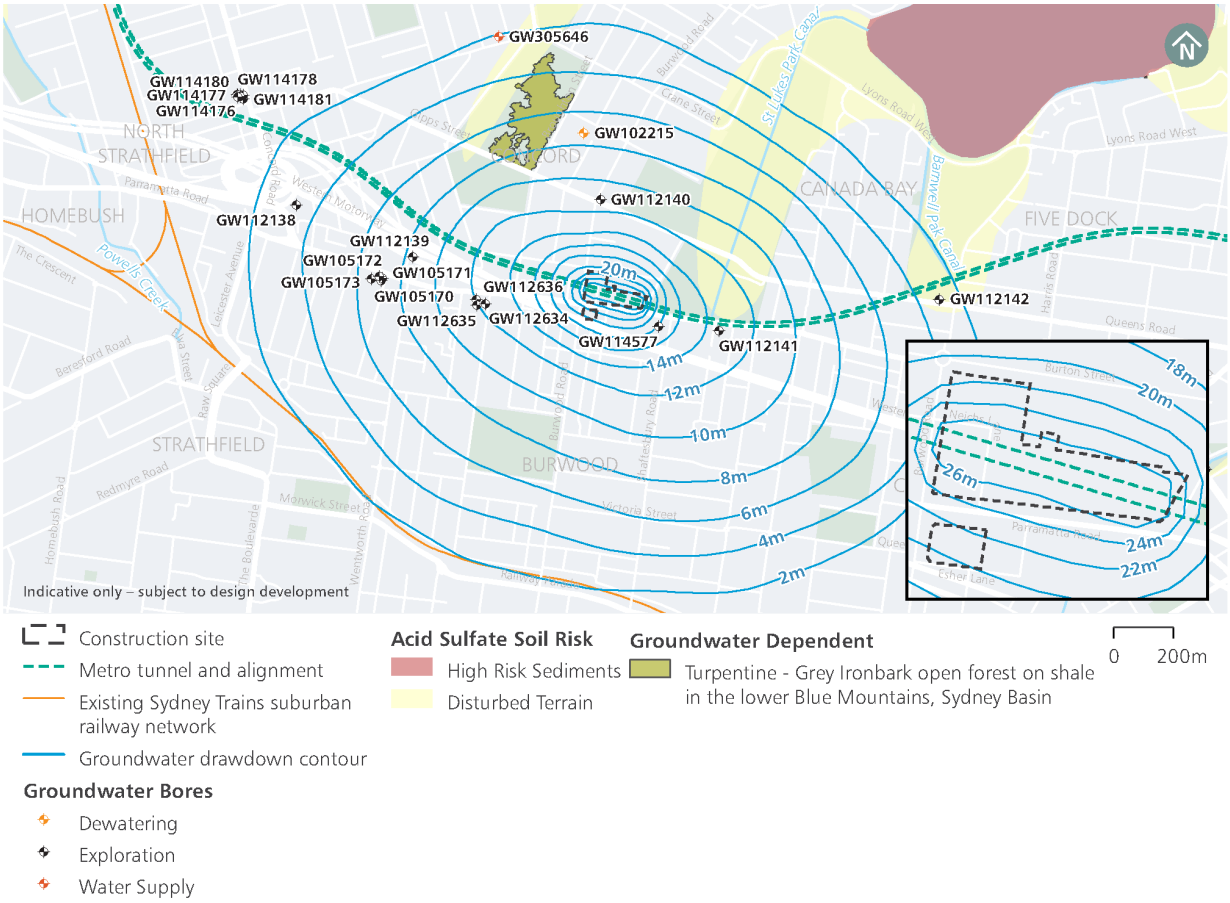

Figure 11-21 Groundwater baseline environment - Burwood North Station

11.10.2 Operational impact assessment

Soils

The operation of Burwood North 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 operation phase contamination impacts at Burwood North Station, with the exception of ongoing treatment of groundwater inflow to the untanked station. All groundwater extracted from the station would be captured, pumped to the operational water treatment plant at the Clyde stabling and maintenance facility and treated prior to discharge, in accordance with the water quality requirements outlined in Section 18.9 (Hydrology and water quality) of this Environmental Impact Statement.

Operation of Burwood North Station would require limited use and storage of chemicals, oils or fuels. There are no significant sources of 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 Burwood North Station are described in Table 11-24.

Table 11-24 Potential impacts to groundwater during operation – Burwood North Station

Potential impact	Discussion
Groundwater recharge	The surface area of impervious surfaces at Burwood North 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	During operation of this proposal, the tanked crossover cavern would promote a partial reduction in groundwater drawdown and associated inflows (compared with construction phase groundwater) until a new long-term groundwater level is achieved around the station. The groundwater inflows for the untanked station would continue throughout operation at roughly the modelled inflow rates identified as part of the baseline environment (refer to Table 11-23). This inflow rate is deemed to be a conservative representation of long-term inflow rates for operation of this proposal. The influence of the untanked station on the overall regional flow patterns is expected to be minimal due to the effect of the tanked cavern. Overall, the potential impacts of this proposal on the baseline groundwater levels and inflows are expected to be partially reduced in comparison to construction phase impacts, due to the tanked crossover cavern. Further groundwater modelling to confirm potential impacts and flow patterns would be carried out for 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 is expected to remain consistent with the baseline conditions (refer to Table 11-23). However, the volume of potentially contaminated groundwater to be managed during the operation of this proposal would be less than the volume predicted for the work carried out under the previous Sydney Metro West planning application. This is due to the excavations for the crossover cavern being tanked at commencement of this proposal, which would reduce the groundwater drawdown and associated inflow until a new groundwater level is achieved around the station. The risk of adverse impacts from existing groundwater contamination during operation is low. All groundwater extracted from de-watering of Burwood North Station would be pumped to 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 users	This proposal would have a negligible impact on one registered groundwater bore (GW305646) with no change or minor improvement to the groundwater level for the bore after completion of construction of the work carried out under the previous Sydney Metro West planning application, due to the tanking of the crossover cavern.
Groundwater dependent ecosystems	Potential impacts on the identified groundwater dependent ecosystem (terrestrial vegetation) in proximity of Burwood North Station is expected to be partially reduced by comparison to the baseline conditions during station operation, due to the tanking of the crossover cavern contributing to reduced inflows. 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 11.10.4).

Potential impact	Discussion
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 Burwood North Station. St Lukes Park Canal and Barnwell Park Canal are concrete lined and are unlikely to receive groundwater baseflow. The potential for groundwater drawdown as a result of this proposal to impact on the groundwater recharge to surface water is expected to be unlikely.
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 work carried out under the previous Sydney Metro West planning application are expected to be carried through and complied with during the operation phase of this proposal. Impacts from the alteration of groundwater levels and flow regime are likely to be partially reduced during operation of this proposal, due to the tanked crossover cavern that would reduce the groundwater drawdown and associated inflow until a new groundwater level is achieved around the station.

11.10.3 Construction impact assessment

Soils

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

Disturbance of saline soils is not expected at Burwood North Station, as saline soils were not identified within and immediately surrounding the construction sites.

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 work carried out under the previous Sydney Metro West planning application. This would be reviewed for this proposal to identify the potential need for further measures to manage acid sulfate soils if present.

Contamination

Existing contamination

All areas of environmental interest were ranked as moderate risk except for AEI 43 and AEI 44, which were ranked as very low risk. Soil and groundwater contamination within the Burwood North Station construction sites will be investigated, and shallow soils and soils within the station box would be excavated or remediated as required as part of the work carried out under the previous Sydney Metro West planning application. Residual groundwater contamination could remain, as off-site sources of contamination would not be remediated.

In accordance with condition of approval D122 for the previous Sydney Metro West planning application, a Groundwater Modelling Report will be developed to assess impacts from groundwater drawdown. Specific mitigation and monitoring recommended in this report, including where required for groundwater contamination, would be reviewed, and, as applicable, adopted during construction of this proposal.

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), 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

Potential impacts to groundwater during construction at Burwood North Station are outlined in Table 11-25.

Table 11-25 Potential impacts to groundwater during construction – Burwood North Station

Potential impact	Discussion
Groundwater recharge	Almost all of the surface area within the Burwood North construction sites is expected to be impervious surfaces at the commencement of this proposal and therefore the net impact on regional groundwater recharge as a result of construction of this proposal is considered negligible.
Groundwater levels, inflows, and flow patterns	The tanked crossover cavern would reduce groundwater inflows during construction of this proposal compared with the inflow rates for the work carried out under the previous Sydney Metro West planning application. This would partially promote recovery of groundwater levels. The untanked station box would maintain the groundwater inflows modelled for the previous Sydney Metro West planning application (refer to Table 11-23) throughout construction of this proposal. Tanking of the crossover cavern as part of the work carried out under the previous Sydney Metro West planning application would reduce the groundwater inflows and, in turn, promote recovery of groundwater levels around the cavern over time (recovery continued through construction of this proposal). As such, this proposal would have similar or slightly reduced impacts to baseline groundwater levels, inflows and groundwater flow regime compared with the work carried out under the previous Sydney Metro West planning application. Potential groundwater impacts of this proposal would be managed through the implementation of mitigation measures outlined in the CEMF and Chapter 20 (Synthesis) of this Environmental Impact Statement. This would include the development of a Groundwater Construction Monitoring Program that would be consistent with the requirements of condition of approval C17 for the work carried out under the previous Sydney Metro West planning application.
Groundwater quality	There is a risk of encountering localised contaminated groundwater as part of this proposal. However, the volume of potentially of impacted groundwater to be managed during construction of this proposal would be reduced by comparison to the work carried out under the previous Sydney Metro West planning application. Groundwater inflows would be collected, treated at construction water treatment plants, and discharged in accordance with the water quality requirements outlined in Section 18.9 (Hydrology and water quality) of this Environmental Impact Statement. Further groundwater monitoring to confirm groundwater quality and groundwater modelling to confirm potential groundwater flow patterns would be carried out for the previous Sydney Metro West planning application. This would be further reviewed and updated as required for this proposal (refer to the mitigation measures in Chapter 20 (Synthesis) of this Environmental Impact Statement).
Groundwater users	Given that tanking of the crossover cavern (as part of the work carried out under the previous Sydney Metro West planning application) would promote recovery of groundwater levels around the cavern over time, there would be negligible change in groundwater drawdown levels at the registered groundwater bore reportedly used for domestic water supply as a result of this proposal.
Groundwater dependent ecosystems	Given that tanking of the crossover cavern as part of the work carried out under the previous Sydney Metro West planning application would promote recovery of groundwater levels around the cavern over time, additional impacts on identified groundwater dependent ecosystems (terrestrial vegetation) in proximity of Burwood North Station are not anticipated to occur during construction of this proposal.

Potential impact	Discussion
	Additional investigations and assessment completed as part of 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 to groundwater dependent ecosystems due to groundwater drawdown, and to identify any required mitigation through design (see mitigation measure EIS-GW3 in Section 11.10.4).
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 the Burwood North construction sites. St Lukes Park Canal and Barnwell Park Canal are concrete lined and are unlikely to receive groundwater baseflow. Potential for groundwater drawdown to impact on recharge to surface water features during construction of this proposal is considered unlikely.
Policy compliance	The minimal harm criteria in the NSW Aquifer Interference Policy (NSW Department of Primary Industries, 2012and Water Sharing Plan rules (NSW Department of Industry, 2011) adopted for the work carried out under the previous Sydney Metro West planning application would be complied with into construction of this proposal. Impacts from the alteration of groundwater levels and flow regime are expected to be reduced for this proposal compared to the baseline.
Ground movement	The potential for ground movement (and therefore potential impacts to buildings and structures) as a result of construction of this proposal is unlikely due to the excavation of the station box, crossover cavern and shaft being carried out as part of the work carried out under the previous Sydney Metro West planning application. As such, the extent of ground movement is considered to be negligible as a result of construction of this proposal.

11.10.4 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 (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 Burwood North Station to address potential impacts are listed in Table 11-26.

Table 11-26 Soils, contamination and groundwater mitigation measures – Burwood North Station

Ref	Impact/issue	Mitigation measure	Timing
Soils, contamination and groundwater			
EIS-GW3	Impacts to groundwater dependent ecosystems	Additional investigations and assessment completed as part of 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

11.11 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).

11.11.1 Baseline environment

Burwood North Station would be located on the northern side of an overland flow path that flows through Burwood and into Canada Bay, about 1.5 kilometres downstream of the site. The southern site ranges from 11.6 metres Australian Height Datum (AHD) to 14 metres AHD and the northern site ranges from 6.5 to 17 metres AHD.

Flood study mapping and the previous Sydney Metro West planning application identified that the Burwood North Station sites and immediate surrounds are affected by shallow flood depth within the kerb of adjacent roadways with small areas of ponding within the sites. This includes up to 0.2 metres and 0.22 metres flood depth along the kerb of Parramatta Road in the five per cent Annual Exceedance Probability (AEP) (with climate change) and one per cent AEP (with climate change) flood events, respectively. This flood depth increases to 0.4 metres in the Probable Maximum Flood (PMF) event. The sites are outside of high flood hazard, floodway and flood storage areas.

Flood hazard in the five per cent AEP (with climate change), one per cent AEP and one per cent AEP (with climate change) flood events is generally low within the sites, with small, localised areas of high hazard areas located adjacent to the sites along Parramatta Road. In the PMF event, much of Parramatta Road and sections of Burwood Road adjacent to the proposed sites are high hazard areas.

There are no mainstream flooding or coastal inundation risks relevant to the sites and immediate surrounds.

Modelling suggests that several private properties would already experience inundation during the baseline PMF event. This includes three properties in Burton Street, five to six properties in Loftus Street and 22 properties in Burwood Road (from around Milton Street southwards).

The station box, shaft for southern station entrance, subsurface pedestrian connection and crossover cavern at Burwood North Station will have been excavated as part of the work carried out under the previous Sydney Metro West planning application.

The previous Sydney Metro West planning application identified that impacts to existing flooding behaviour at the Burwood North Station northern and southern construction sites and immediate surrounds are unlikely.

11.11.2 Operational impact assessment

The flood protection levels for Burwood North Station are driven by the one per cent AEP (with climate change) flood event (plus 0.3 metres of freeboard), which is 13.6 metres AHD at the southern station entry and 17.65 metres AHD at the northern station entry. The existing surface levels at the southern station entry and northern station entry are 13.6 and 17.75 metres AHD respectively. Therefore, the design level of the station is at or above the flood level, which indicates the station is unlikely to be affected by flooding during this flood event.

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 Burwood North Station is provided in Table 11-27 and shown in Figure 11-22. 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).

Potential impacts during operation of this proposal at Burwood North Station are generally expected to be minor in all flooding events. Mitigation measures to manage potential impacts are outlined in Section 11.11.2.

Table 11-27 Potential flooding impacts for the modelled one per cent AEP and PMF flood events – Burwood North Station

Potential impact	Description
Change in peak flooding levels	• during one per cent AEP (with climate change) event, increased flood depths of up to about 0.1 metres are predicted in Burwood Road (south of Parramatta Road). Increased flood depths are also predicted on Parramatta Road toward Loftus Street, which would be contained with the road. Some increases to flood depths in the kerb and gutter are anticipated due to this proposal • similar flood behaviour is predicted in the PMF event, however this would occur with wider flood extents in all roads surrounding the site • as set out in the mitigation measures (refer to Section 11.11.4), further design refinement would occur to manage potential local flooding impacts.
Change in flood extent	• during the one per cent AEP event, flood modelling indicates potential increases to the flood extents of up to 0.1 metres in the one per cent AEP on Burwood Road, Burton Street and Loftus Street, however this would be largely contained to within the road. There are also minor increases in flood extent on Parramatta Road toward Loftus Street • similar increases in flood extent are predicted during the PMF event • during design development, consideration would be given to the flood risk at all sites and include identification of measures to not worsen flood impacts on the community and on other property and infrastructure, up to and including the one per cent AEP flood event.
Compatibility with the flood hazard of the land	• flood risk and potential impacts from this proposal are considered manageable and therefore are considered compatible with the flood hazard of the site • during the one per cent AEP event, flood hazard would generally be considered low around the site • during the PMF flood event there would be areas of high flood hazard within the streets adjacent to the site, particularly within the kerb and gutter of Burton Street, Parramatta Road and Burwood Road. It is expected with the further design development that flows would be contained within the minor and major (road) urban drainage system
Change in duration of inundation	• change in duration of inundation in all flood events would be negligible.
Potential property impacts	• during the one per cent AEP event, increased flood depths would result in an additional property on Burwood Road and Milton Street potentially becoming flood affected • flood modelling indicates that one property on Burwood Road and three on Burton Street would experience increased inundation during flood events as a result of the proposed road design elements that would redirect flows which would have previously drained into Parramatta Road • further design refinement would be carried out during the detailed design of this proposal so that no additional private properties would be affected by flooding up to and including the one per cent AEP due to permanent infrastructure delivered as part of this proposal. Further detail on the criteria is included in Technical Paper 8 (Hydrology, flooding and water quality).
Consistency with floodplain risk management	• there is no applicable floodplain risk and stormwater management plan for this site. The northern construction site is not within the Canada Bay Local Environmental Plan 2013 flood planning area. The southern construction site is not within the Burwood Local Environmental Plan 2012 flood planning area. The Parramatta Road Corridor Flood Risk Assessment was undertaken for the City of Canada Bay Council (WMA Water, 2020). The mapping shows flooding consistent with the modelling undertaken as part of this assessment, with the sites being flood free and minor street flooding adjacent to the sites.

Potential impact	Description
Potential impacts to critical infrastructure and emergency management arrangements for flooding	• the site is located within the South West Metropolitan Regional Emergency Management Plan (South West Metropolitan Regional Emergency Management Committee, 2017) area, which identifies Parramatta Road as a major transport route. This proposal would not increase the vulnerability of Parramatta Road during extreme flood events.
Potential social and economic costs from flooding impacts	• given the generally low flood affectation at Burwood North Station and the expected low impact on flood behaviour on surrounding properties and infrastructure as a result of this proposal (with the implementation of mitigation measures), the potential social and economic costs from flooding impacts are considered low.

Figure 11-22 Potential change in flood levels (one per cent AEP event) – Burwood North Station

11.11.3 Construction impact assessment

The duration of construction at the Burwood North Station construction sites would be about four to five years (see Figure 11-8). 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, impacts to existing flooding behaviour at the northern and southern construction sites and immediate surrounds are unlikely because the majority of the sites are located outside of the flooding extents and are mapped as low flood hazard in both the five per cent AEP (with climate change) and one per cent AEP (with climate change) events.

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

- direct intense rainfall onto the site may cause nuisance flooding and drainage issues
- continued potential interruption of overland flow paths by installation of temporary construction site infrastructure (i.e. noise barriers, acoustic sheds, retaining walls) and/or modifications to landforms (i.e. placement of fill materials, stockpiles)
- continued increase in runoff volumes following rainfall events due to an increase in impervious surfaces (i.e. construction sites)
- the potential interruption or diversion of existing flood routes away from the location of bunding or spoil within construction activities in roadways, resulting in a reduction of flood storage and an increased flood risk to adjacent areas
- 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 (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.

Compatibility of construction sites with flood conditions

The previous Sydney Metro West planning application identified that the Burwood North Station construction sites are considered to be compatible with flood conditions due to low flood risk within the sites in five per cent AEP and one per cent AEP events (both with climate change).

Consistency with floodplain risk management plans

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

The Parramatta Road Corridor Flood Risk Assessment was undertaken for the City of Canada Bay Council (WMA Water, 2020). The mapping shows flooding consistent with the modelling undertaken for this proposal, with the sites not being flood affected and minor street flooding adjacent to the sites.

Potential impacts to emergency management arrangements for flooding

The site is located within the South West Metropolitan Regional Emergency Management Plan (South West Metropolitan Regional Emergency Management Committee, 2017) area. Consistent with the previous Sydney Metro West planning application, flood impacts during construction are expected to be minor. As a result, the impacts to flood evacuation routes such as Parramatta Road are generally expected to be unlikely or minor.

Potential social and economic costs from flooding impacts

Similar to the operations phase, potential social and economic costs from flooding impacts during construction at Burwood North as a result of this proposal are considered low given the 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 (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.

11.11.4 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 management objectives and mitigation measures to minimise impacts as relevant to this proposal as a whole.

11.12 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.

11.12.1 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 Burwood North 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 Burwood North Station is discussed in Table 11-28. This summary considers the proximal area of analysis only. A discussion of the potential broader corrido-wide regional social impacts (both benefits and disbenefits) is provided in Chapter 18 (Proposal-wide) of this Environmental Impact Statement.

Table 11-28 Community capitals summary – Burwood North Station

Capital	Summary
Human	The population of the Burwood North locality was relatively older, driven by a high share of the population within the 35 to 64 age group and 64 to 84 age groups. The Burwood North locality had the highest share of residents attending educational facilities at 28.8 per cent. A total of 42 per cent of these residents were attending university or other tertiary facilities. A total of 21.5 per cent of residents were attending infants/primary school and 19 per cent were attending secondary school.
Social	In this locality, the share of couple families were slightly smaller due to a greater share of one parent families. Burwood North locality had the third highest share of group households across the corridor. In 2016, 33.8 per cent of households in the Burwood North locality reported speaking only English at home, which was slightly lower compared to localities directly to the east along the corridor. Burwood North had the highest percentage of the population needing help or assistance in one or more of the three core activity areas (7.8 per cent compared to 4.9 per cent of the Greater Sydney population). This is potentially reflective of the aging population and indicates a higher level of social vulnerability in this locality when compared to other localities and Greater Sydney.
Economic	The economic profile of Burwood North shows similar traits to North Strathfield in 2016. 30 per cent of households earning above $2,500 per week and a high proportion of households were either owned outright (30.2 per cent) or owned with a mortgage (24.6 per cent). It also had similar proportions of mortgage repayments in the lowest quartile as North Strathfield (21.1 per cent paying between 0 to $1184 per month). Slightly more people rented in the area (43.4 per cent of households) and of those renting, 63.3 per cent were paying in the highest quartile (paying greater than $443 per week). The locality also had high occupancy rates (93.5 per cent).

Capital	Summary
	Unemployment levels in Burwood North were higher when compared to the whole corridor and Greater Sydney at 8.1 per cent of the eligible working age population (those aged between 16 and 65 who are not engaged in secondary education and who are able to work), compared to 6.8 per cent and 6 per cent respectively. It also had a lower percentage of labour force participants (59.8 per cent), reflective of the aging population when compared to other localities and Greater Sydney. Of those that were employed, the dominant industry was health care and social assistance (12.2 per cent) followed by accommodation and food services (10.6 per cent).
Physical	Dwelling types were evenly balanced within the Burwood North locality with 38.5 per cent of households being flats, units, or apartments, while 42 per cent were separate houses. There was also a high share of dwellings that were semi-detached, row or terrace houses or townhouses. The average household size within the Burwood North locality was 2.8 persons per household, which was among the highest across all the localities. Residents tended to be fairly car dependent with 39.5 per cent of residents travelling to work via car and 30.3 using a train or bus. Nearby man-made parks include Concord Oval, St Lukes Park, Burwood Park and Goddard Park.
Natural	The Parramatta River is in proximity to Burwood North Station.

11.12.2 Operational impact assessment

Social impacts would be experienced at different geographies or spatial extents. A large proportion of operational social impacts associated with Burwood North Station would be felt at a regional and 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 Burwood North Station is outlined in Table 11-29. These potential impacts would be appropriately managed through the implementation of the mitigation measures outlined in Section 11.12.4 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 in Table 11-29 to quantify the impacts after mitigation measures have been applied.

Table 11-29 Summary of operational social impacts – Burwood North 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. The improved public transport options and reduced travel times will provide benefits for community cohesion and improve equity, particularly for vulnerable groups that currently experience transport or mobility difficulties.	Health and wellbeing Way of life Accessibility Livelihoods	Positive	Very high
Social amenity and placemaking benefits, including improvements to the aesthetic value of the area by creating attractive and active public spaces are reflect the existing or desired future scale and character of local areas.	Surroundings	Positive	High

Pre mitigation impact	Social impact category	Impact type	Residual impact rating
In a similar way to Westmead metro station, in this locality there is currently no real sense of a town centre. The operation of Sydney Metro West will help enhance that sense of community character and possibly change the way the community functions, by providing a focal point for the community to meet, pause and engage in urban life. In terms of the permanent physical changes to the locality, Technical Paper 6 (Landscape and visual amenity) found that given the improved accessibility, legibility and amenity for road users, cyclists and pedestrians, that the station would be a considerable improvement in the amenity of the surrounding streetscapes.			
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 for residents located on Burton Street.	Way of life	Negative	Low
Potential decline in how people experience their living environments due to light spill for the adjacent residential areas at night.	Way of life Livelihoods	Negative	Medium

Overall, the assessment found that Burwood North Station would support new residential housing and employment growth in the surrounding catchment by providing access to public transport in an area that is not currently serviced by the existing Sydney Trains suburban rail network, introducing a travel time saving of 15 minutes between Burwood North and Parramatta. Other impacts mainly relate to increased social amenity and placemaking benefits.

There would be some residual negative social impacts with respect to noise and vibration and visual impact; however, these would be managed to an acceptable level through the mitigation measures as identified in Chapter 20 (Synthesis) of this Environmental Impact Statement.

11.12.3 Construction impact assessment

Construction activities would be carried out within the same construction sites required for 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 Burwood North Station are outlined in Table 11-30. These potential impacts are unmitigated and would be appropriately managed through the implementation of the mitigation measures outlined in Section 11.12.4 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 11-30 Summary of construction social impacts – Burwood North Station

Pre mitigation impact	Social impact category	Impact type	Residual impact rating
Continued changes to community character and connection to place due to ongoing construction activity and changes to streetscape.	Community Surroundings	Negative	Low
Continued impact on how people experience local social infrastructure, including churches, schools and a nursing home, due to ongoing construction and associated noise, traffic, parking, access, air quality and vibration impacts. Considering the larger representation of residents who require assistance with mobility or communication, low-income households and older and elderly residents, these vulnerable communities could be potentially disproportionally impacted.	Surroundings Way of life	Negative	Medium
Potential wellbeing impacts associated with ongoing construction activity for those people sensitive to noise and vibration. Psychosocial impacts as a result of inherent changes to the social fabric or the local area. Considering the larger representation of residents who require assistance with mobility or communication, low-income households and older and elderly residents, these vulnerable communities could be potentially disproportionally impacted.	Health and wellbeing	Negative	Low

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, surroundings and way of life and would be temporary and short term 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.

11.12.4 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 (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 Burwood North Station to address potential impacts are listed in Table 11-31.

Table 11-31 Social mitigation measures – Burwood North 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

11.13 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).

11.13.1 Baseline environment

The Burwood North Station construction sites 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 impact 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

The main business areas around Burwood North are focused on the Parramatta Road and Burwood Road corridors. This area includes a wide range of businesses, including retail, motor repairs and showrooms, light industries, industrial retail outlets, commercial offices, and casual and takeaway restaurants. These areas are attractive locations for businesses due to the high level of exposure to passing traffic. These types of businesses (including the restaurants) are generally considered not to be reliant on a high level of amenity due to the high level of passing traffic.

Table 11-32 identifies the types of existing businesses within the local business impacts study area.

Table 11-32 Businesses within the local business impacts study area – Burwood North Station

Impact area	Types of businesses	Approximate number of businesses
Within 100 metres of the site	Commercial, retail, education, health, cafes and restaurants	30 to 50
Between 100 and 400 metres of the site	Health, commercial, retail, education, health, cafes and restaurants	20 to 40

Employment

At the 2016 Census, about 5,230 people were employed within the ‘destination zones’ relevant to the Burwood North local business study area, with the majority of these jobs being in household services. Destination zones are the spatial unit used to code ‘place of work’ by the Australian Bureau of Statistics.

Education and training is the highest employing industry in the precinct, accounting for 18.6 per cent of total employment, followed by health care and social assistance (16.6 per cent). Retail trade, accommodation and food services, followed by professional, scientific and technical services are the third and fourth most prominent employing industries in the local business area.

Travel patterns

Australian Bureau of Statistics 2016 Census data indicates workers within the area are highly dependent on car to get to and from work, with 69.5 per cent of residents using a car (as driver). Compared to other locations, this proportion is relatively high. Major arterial roads including Parramatta Road and Burwood Road provide good connections to labour markets and support the use of car as a method of travel.

While the Burwood North local business impacts study area does not have a train station located nearby, travel by train was the second highest recorded method of travel to work (14.9 per cent of all commutes), reflecting the relatively close proximity of the existing Strathfield Station and Burwood Station (both around 950 metres from the site).

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

11.13.2 Operational impact assessment

A qualitative assessment of the potential indirect operational changes to the local businesses at Burwood North is provided in Table 11-33. There are no direct impacts anticipated for local businesses during operation. Potential opportunities for local businesses during operation are also provided in Table 11-33.

The operation of Burwood North Station would see an increase in the use of Sydney's public transport network, as the area is currently not serviced by the existing suburban rail network. The station would improve access to major employment centres and educational facilities. Business investment would be attracted to the area as the metro would allow it to become more accessible, have access to labour markets and more customers.

Table 11-33 Local business impacts during operation – Burwood North Station

Potential impact operation	Risk assessment	
	Likelihood	Significance
Potential opportunities		
Increased passing trade for businesses Some businesses (e.g. retail, cafes, restaurants) located around Burwood North Station may benefit from an increase in passing trade from customers accessing the station.	Likely	Moderate positive
Improved accessibility Many 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. Additionally, increased pedestrian and cyclist accessibility (such as the pedestrian crossing at the Burwood Road and Burton Street roundabout) will allow for safe access around the station, thereby possibly increasing foot traffic for those businesses reliant on passing trade.	Likely	Moderate positive
Improved amenity Improved amenity (e.g. visual amenity and urban design) around Burwood North 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.	Likely	Moderate positive

Potential impact operation	Risk assessment	
	Likelihood	Significance
Potential indirect impacts		
Impacts on accessibility Some businesses may experience reduced accessibility due to altered traffic and parking conditions. Changed traffic arrangements could collectively restrict and hinder servicing, delivery and customer access opportunities, resulting in time and vehicle related costs. About 23 parking spaces will be removed in total, to accommodate operational aspects such as kiss and ride zones, as well as new bus stops. This notwithstanding, parking is available in close proximity to local businesses affected by these changes.	Unlikely	Slight negative

11.13.3 Construction impact assessment

A qualitative assessment of the potential indirect construction impacts to local businesses at Burwood North is provided in Table 11-34. There are no direct impacts anticipated for local businesses during construction. Potential opportunities for local businesses during construction are also provided in Table 11-34.

Overall, the nature of the businesses within the Burwood North local business study area and the existing environment suggests that most of the businesses would be more resilient to construction impacts. Additionally, anticipated construction impacts are expected to be similar and would be a continuation of those for 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 work carried out under the previous Sydney Metro West planning application due to the nature of this proposal's activities.

Table 11-34 Local business impacts during construction – Burwood North 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
Continued 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 impact construction	Risk assessment	
	Likelihood	Significance
Potential indirect impacts		
Continuation of temporary traffic congestion and increased travel times Some businesses surrounding the construction sites 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 although they would be unlikely for the majority of businesses around the site. Businesses in this location are generally situated along major regional roads such as Parramatta Road and Burwood Road. Businesses along these corridors would be accustomed to large volumes of traffic and traffic congestion. As such, potential temporary increases in traffic congestion and travel times would not be expected to significantly affect customers accessing businesses within the local business study area. It is anticipated that intersections along Gipps Street would continue to perform at the same level of service compared to a scenario without construction traffic.	Unlikely	Slight negative
Continued impacts on parking Some businesses surrounding the construction sites may have experienced impacts associated with temporary loss of parking during the work carried out under the previous Sydney Metro West planning application, although these are anticipated to be unlikely. These potential impacts to parking availability (including from construction workers) are expected to continue to be minimal, including the new impacts to around four on-street spaces along Burton Street for this proposal. Impacts would be minimal given the location and low number of lost parking spaces, and the availability of parking on nearby streets.	Unlikely	Slight negative
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 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 sites may have experienced impacts associated with reduced local amenity (e.g. noise and vibration, air quality, visual impact) during the work carried out under the previous Sydney Metro West planning application, although these are anticipated to be minor. These impacts may continue during construction of this proposal, however, impacts to businesses from temporary reduced amenity are anticipated to be unlikely. Nearby businesses are generally located on Burwood Road and Parramatta Road which are already subject to reduced amenity from being located on busy major roads and would mostly be separated from the construction sites by existing roads. Most of these businesses are also generally not of a type that are dependent on urban amenity or visibility.	Unlikely	Slight negative
Continuation of reduced 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.	Rare	Neutral

Potential impact construction	Risk assessment	
	Likelihood	Significance
These perceived impacts are likely to be limited to the small amount of retail and cafes and restaurants located near Burwood North Station construction sites 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.		

11.13.4 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 (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.

11.14 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).

11.14.1 Baseline environment

Site context

The area immediately surrounding the proposed location of Burwood North 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 residential and commercial land uses. The area is relatively flat, with a landform generally draining towards the Parramatta River to the north-east.

The nearest area of native vegetation is Queen Elizabeth Park, about 550 metres to the north-west, the majority of which has been revegetated as part of the park's development as public open space.

Vegetation characteristics

Vegetation in the area surrounding the proposed location of Burwood North Station is limited to landscape and ornamental plantings only. No remnant native vegetation is present. All vegetation within Burwood North Station construction sites will be removed by the work carried out under the previous Sydney Metro West planning application prior to the commencement of this proposal.

Vegetation in the area surrounding the metro station precinct is similarly comprised solely of landscape planting and street trees and is not remnant. The majority of this vegetation would not be affected by this proposal, though limited removal of street trees would be required to enable construction access and egress (refer to Section 11.8.3 and Figure 11-23).

The Burwood North Station construction sites will be cleared as part of work carried out under the previous Sydney Metro West planning application prior to the commencement of this proposal.

Figure 11-23 Vegetation - Burwood North Station

Threatened ecological communities

There are no threatened ecological communities present within the Burwood North Station construction sites.

Groundwater dependent ecosystems

There are no groundwater dependent ecosystems present within the Burwood North Station construction sites.

As identified in Section 11.10.1, one groundwater dependent ecosystem (Turpentine – Grey Ironbark open forest on shale in the lower Blue Mountains, Sydney Basin Bioregion) is within around 250 metres north-west of the Burwood North Station construction sites.

Threatened flora species

There are no threatened flora species present within the Burwood North Station construction sites.

Threatened fauna species

The Burwood North metro station construction sites will be cleared as part of the work carried out 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 Burwood North Station construction sites.

Aquatic ecology

There is no aquatic habitat present within the Burwood North Station construction sites.

11.14.2 Operational impact assessment

Direct impacts

Direct impacts related to the operation of Burwood North Station would be limited to the disruption of 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 Burwood North 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 Burwood North Station site, 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 (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 11.10.2.

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 Burwood North Station (refer to Chapter 18 (Proposal-wide) of this Environmental Impact Statement).

11.14.3 Construction impact assessment

Direct impacts

As described in Section 11.4, construction activities associated with Burwood North Station would take place entirely within the Burwood North Station construction sites established as part of the work carried out under the previous Sydney Metro West planning application.

Some vegetation removal would be required for this proposal to allow for construction vehicle access and egress of the northern construction site. This would include one planted street tree on Loftus Street (*Brush box*), five planted street trees (Bottlebrush (*Callistemon sp.*) (x1), orange jessamine *(Murraya paniculata*) (x3) and Chinese Tallow tree (*Triadica sebifera*) (x1)) on Burton Street and one planted street tree (Water gum) on Burwood Road. This vegetation does not represent a coherent plant community type. No threatened flora is present within this location and the habitat value of this area for threatened fauna is considered to be very low, given that the vegetation proposed to be removed comprises planted street trees. As such there would be no significant impact on threatened species or ecological communities associated with the removal of this vegetation.

Construction of Burwood North Station would also result in disruption to fauna due to noise, light and human activity. In the context of the locality adjacent to Paramatta Road and within a mixed urban, commercial and residential area, 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 Burwood North Station construction sites, 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 11.10.3. The mobilisation of sediment and contaminants from the construction sites would be managed through the implementation of mitigation measures outlined in Appendix F (Construction Environmental Management Framework). 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.

11.14.4 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.