Part B

Cumulative impacts

19

19.0 Cumulative impacts

This chapter provides an assessment of the potential cumulative impacts as a result of the operation and construction of this proposal. It outlines the methodology adopted for the cumulative impact assessment and identifies mitigation and management measures to minimise these impacts.

19.1 Introduction

Cumulative benefits or impacts have the potential to occur when one project interacts or overlaps with other project(s) and can potentially result in a larger combined effect (positive or negative) on the environment or local communities. Cumulative impacts may also occur when projects are constructed or operated concurrently or consecutively. Projects constructed consecutively or sequentially can result in construction occurring over extended periods of time with little or no break in construction activities between projects for affected receivers.

The extent to which another project could interact with the operation and/or construction of this proposal would depend on its location, scale and/or timing of construction. Generally, cumulative impacts would be expected to occur where multiple long-term construction is carried out close to, and over a similar timescale to, construction activities for this proposal, or where consecutive construction occurs in the same area. Construction fatigue can occur when the same sensitive receivers experience construction impacts from multiple and/or sequential projects over a prolonged period with few or no breaks between construction activities.

Construction of this proposal is expected to commence in late 2024, subject to planning approval. The construction period would be around four years, followed by around a further year of testing and commissioning. Once Sydney Metro West is operational, other projects that interrelate may enhance this proposal to create positive cumulative benefits.

19.2 Legislative and policy context

The NSW Department of Planning and Environment published the Cumulative Impact Assessment Guidelines for State Significant Projects in July 2021. Under the transitional provisions for the new guidelines, the guidelines are not applicable to this proposal as they do not apply to Environmental Impact Statements submitted for exhibition on or before 31 March 2022, which includes this Environmental Impact Statement.

While the new guidelines do not apply to this proposal, the cumulative impact assessment methodology has been prepared generally in accordance with them.

19.3 Methodology

The cumulative impact assessment methodology for this proposal included:

- identification of relevant projects that could be included in the cumulative impact assessment
- development and application of screening criteria to determine which projects should be included in the cumulative impact assessment
- assessment of the potential cumulative impacts of the projects screened into the cumulative impact assessment, including identification of relevant issues likely to have material cumulative impacts during operation and/or construction of this proposal (e.g. traffic, noise and vibration, landscape and visual, etc.)
- identification of suitable mitigation measures to manage potential cumulative impacts.

19.3.1 Identification of relevant projects

Projects identified for consideration as part of the cumulative impact assessment included:

- major transport infrastructure projects, including public transport projects and road projects, and specifically those identified in the Secretary's environmental assessment requirements
- large-scale urban development projects and other infrastructure projects.

The following criteria were used to screen the projects initially identified:

- **spatial relevance:** where a project is considered to be spatially relevant including if it overlaps with or occurs in close proximity to this proposal
- **timing:** where timing of a project overlaps with or occurs consecutively to construction or operation of this proposal
- **scale**: where a project:
  - is designated as State significant development or State significant infrastructure
  - is classified as designated development and requires an Environmental Impact Statement
  - requires assessment under Division 5.1 of the NSW *Environmental Planning and Assessment Act 1979* and is likely to significantly affect the environment and require an Environmental Impact Statement
  - has been declared to be a controlled action under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*
  - constitutes major development (as identified through consultation with stakeholders and government agencies)
- **status:** where there is sufficient publicly available information about a project to inform a cumulative impact assessment at the time of preparation of this Environmental Impact Statement (such as timing of construction and operation and identification of potential key issues or impacts). However, where timing is unknown, the project has been included to provide a conservative assessment.

All the above criteria need to be met for a project to be included in the cumulative impact assessment.

Local strategic plans and projects identified in NSW transport and land use planning or policy documents are considered in the relevant precinct chapters of the Environmental Impact Statement. However, as these projects do not meet the criteria described above, and particularly given that sufficient information regarding their impacts are not known, they were not considered for inclusion in the cumulative impact assessment for this proposal.

Proposed over station development and/or adjacent station development at the new metro stations and precincts have been identified in this Environmental Impact Statement and, where appropriate, are being designed in an integrated manner with the proposed stations so as to minimise construction and operational impacts of these developments.

While this proposal would include relevant provisions to enable future construction of over and/or adjacent station development, the development does not form part of this proposal and would be subject to separate assessment and approval. Full consideration of the potential environmental impacts of related development would be provided as part of the relevant separate assessment and planning approval process, including the potential cumulative impacts with this proposal. Related development is discussed in further detail in Section 5.4.5 (Related development) of this Environmental Impact Statement.

19.3.2 Projects included in the cumulative impact assessment

Analysis of the projects that met the screening criteria and were therefore included in the cumulative impact assessment is provided in Table 19-1. Table 19-1 also identifies the potential key issues that may result in potential cumulative impacts during operation and/or construction. Potential key issues were determined by considering which key environmental impacts or benefits of the other projects could interact or overlap with impacts or benefits of this proposal. A description of these potential impacts is provided in Sections 19.4, 19.5 and 19.6.

Depending on the potential key issue, the type of cumulative impact assessment may be quantitative (such as predictive through modelling), qualitative, or a combination of both. For most key issues, a high-level qualitative assessment has been carried out for potential cumulative construction impacts as described in Section 19.6.

The projects included in the cumulative impact assessment are shown on Figure 19-1 to Figure 19-6. The operational and construction timeframes for the relevant projects are provided in Table 19-1.

The potential cumulative impact associated with property, hazard and risk, waste management and resource use, and sustainability, climate change and greenhouse gas were considered to be of a minor nature. The mitigation measures identified in this Environmental Impact Statement are considered appropriate and adequate to address any potential residual cumulative impacts for these other issues.

Table 19-1 Projects considered in the cumulative impact assessment

Project, status and indicative timing	Description of the project	Sites where cumulative impacts may occur	Potential key issue
Sydney Metro West Stage 1 – Major civil construction work between Westmead and the Bays Approved Construction program 2021 – 2026	Sydney Metro West (the Concept) would involve the construction and operating of a metro rail line around 24 km long between Westmead and Sydney CBD. Approval has been granted for Stage 1 of the planning approvals process, involving major civil construction work between Westmead and The Bays. Construction sites between Westmead and The Bays would continue to be used for this proposal.	• Westmead metro station • Parramatta metro station • Sydney Olympic Park metro station • North Strathfield metro station • Burwood North Station • Five Dock Station • The Bays Station • Clyde stabling and maintenance facility • Rosehill services facility	Operation: • flooding. Construction: • transport • noise and vibration • non-Aboriginal heritage • Aboriginal heritage • social impacts.
Parramatta Light Rail – Stage 1 Approved Construction program 2018 – 2023	Parramatta Light Rail Stage 1 comprises a light rail network with 16 stops from Westmead to Carlingford and Camellia, ancillary facilities, alterations to the existing road and rail network to accommodate the project, and active transport corridors along sections of the alignment.	• Westmead metro station • Parramatta metro station	Operation: • transport • landscape and visual • social impacts. Construction N/A – does not meet timing criteria for inclusion in construction cumulative assessment as construction programs do not overlap or occur consecutively
Parramatta Leagues Club Hotel Proposed No construction program	The proposal involves the demolition of existing buildings and construction of a 17-storey hotel building (plus a single level basement for services). The building would include accommodation, a café, pool, fitness/recreational uses and a function room ancillary to the hotel. Access is proposed from O'Connell Street to the south of the building (via an access road to the adjoining Parramatta Stadium). The proposal includes public domain works and service upgrades surrounding the building to integrate the building with the surrounding area and infrastructure.	• Parramatta metro station	Operation: • N/A. Construction: • transport • noise and vibration • Aboriginal heritage • soils, groundwater and contamination.

Project, status and indicative timing	Description of the project	Sites where cumulative impacts may occur	Potential key issue
Clyde Terminal Conversion Project Approved Construction program 2015-2025	The project involves the removal of redundant crude oil refinery and import facilities at the Clyde Terminal and upgrade of existing facilities to allow for the receipt, storage and distribution of finished petroleum products. The project would result in a reduced operational footprint for the terminal and involves the following components: • demolition of existing oil refinery processing units, surplus storage tanks and other redundant infrastructure • upgrade of existing storage tanks and supporting infrastructure and utilities to be retained.	• Clyde stabling and maintenance facility • Rosehill services facility	Operation: • N/A. Construction: • transport • noise and vibration • non-Aboriginal heritage • landscape and visual amenity • soils, groundwater and contamination.
Site 43/44, Sydney Olympic Park – Stage 1 and 2 (6 Australia Avenue and 2 Herb Elliot Avenue) Approved No construction program	The project involves the staged development of two mixed-use buildings for commercial and retail spaces, associated basement car parking (two to three levels), landscaping and driveway access.	• Sydney Olympic Park metro station	Operation: • N/A. Construction: • transport • noise and vibration • landscape and visual amenity • soils, groundwater and contamination.

Project, status and indicative timing	Description of the project	Sites where cumulative impacts may occur	Potential key issue
Sites 2A and 2B Sydney Olympic Park – Mixed Use Development Proposed No construction program	The project involves the construction of a mixed use development at 2A and 2B Australia Avenue, Sydney Olympic Park, comprising: • demolition of all existing improvements and structures on the site • site preparation works including tree removal and excavation. • construction and use of three mixed use buildings of various heights • construction of a six level basement with parking and end of trip facilities • construction of an extension to Dawn Fraser Avenue and a service lane • construction of a large activated public domain located in the frontage area between the proposed buildings and Australia Avenue • extension and augmentation of services and utilities to the development as required.	• Sydney Olympic Park metro station	Operation: • N/A. Construction: • transport • noise and vibration • soils, groundwater and contamination.
WestConnex M4-M5 Approved Construction program 2018 – 2023	The M4-M5 Link component of WestConnex involves the construction and operation of twin tunnels between the new M4 Motorway at Haberfield and the new M5 Motorway at St Peters, with an interchange at Rozelle and tunnel connection to Victoria Road at Iron Cove.	• Five Dock Station • The Bays Station	Operation: • transport • social impacts. Construction: • N/A – does not meet timing criteria for inclusion in construction cumulative assessment as construction programs do not overlap or occur consecutively.

Project, status and indicative timing	Description of the project	Sites where cumulative impacts may occur	Potential key issue
Western Harbour Tunnel and Warringah Freeway Upgrade Approved Construction program 2021 – 2026	The project forms part of the Western Harbour Tunnel and Beaches Link Program and comprises a new motorway tunnel connection across Sydney Harbour, and an upgrade of the Warringah Freeway to integrate the new motorway infrastructure with the existing road network, with a connection to the Beaches Link and Gore Hill Freeway Connection project. Construction sites at White Bay are proposed to support the construction of the Western Harbour Tunnel, and at Rozelle Rail Yards to support fit-out of the Western Harbour Tunnel, on and off ramps to City West Link and construction of ancillary facilities.	• The Bays Station	Operation: • N/A. Construction: • transport • noise and vibration • non-Aboriginal heritage • Aboriginal heritage • landscape and visual amenity • soils, groundwater and contamination.
Sydney Metro City & Southwest (Chatswood to Sydenham) Approved Construction program 2017 – 2024	The Chatswood to Sydenham component of Sydney Metro City & Southwest Project involves the construction and operation of a 15.5-kilometre metro line from Chatswood, under Sydney Harbour and through Sydney's CBD out to Sydenham. The Bligh Street construction site, currently used for excavation associated with Martin Place metro station would be handed over from the City & Southwest project to the Sydney Metro West project. The nearest City & Southwest stations to the proposal are Barangaroo Station, Martin Place Station, and Pitt Street Station.	• Hunter Street Station (Sydney CBD)	Operation: • transport • social impacts • business impacts. Construction: • noise and vibration • non-Aboriginal heritage • landscape and visual amenity • soils, groundwater and contamination.

Project, status and indicative timing	Description of the project	Sites where cumulative impacts may occur	Potential key issue
Sydney Metro West Stage 2 - Major civil construction between Pyrmont and Sydney CBD Proposed Construction program 2023 – 2025	Sydney Metro West Stage 2 would involve major civil construction between The Bays and Sydney CBD, including: • enabling works such as demolition, utility supply to construction sites, utility adjustments and modifications to the existing transport network • tunnel excavation including tunnel support activities at The Bays • station excavation for new metro stations at Pyrmont and Hunter Street (Sydney CBD). The Pyrmont Station and Hunter Street Station (Sydney CBD) construction sites would continue to be used for construction of this proposal.	• The Bays Station • Pyrmont Station • Hunter Street Station (Sydney CBD)	Operation: • flooding. Construction: • transport • noise and vibration • non-Aboriginal heritage • social impacts.
The new Sydney Fish Market Approved Construction program 2020 – 2024	The project involves building a new Sydney Fish Market, which will be set within an improved public domain including the creation of a waterfront promenade. The site is located at the head of Blackwattle Bay between Pyrmont Peninsula and Glebe Peninsula.	• The Bays Station	Operation: • landscape and visual amenity • social impacts. Construction: • non-Aboriginal heritage.

Project, status and indicative timing	Description of the project	Sites where cumulative impacts may occur	Potential key issue
Cockle Bay Wharf mixed-use development Proposed No construction program	A State Significant Development application was approved by the NSW Independent Planning Commission in 2019 for the Concept Proposal and Stage 1 works, which included a commercial building envelope and demolition works. The application for Stage 2 of the works seeks consent for the detailed development, comprising: • construction of a land bridge across part of the Western Distributor • the design, construction and use of a 43-storey mixed-use development • at least 6,500 m^2 of publicly accessible open space • site interface works • subdivision.	• Pyrmont Station • Hunter Street Station (Sydney CBD)	Operation: • landscape and visual amenity • social impacts. Construction: • transport • noise and vibration • landscape and visual amenity.
50-52 Phillip Street New Hotel Proposed Construction program 2023 – 2026	The proposal involves the delivery of a new landmark hotel building in Sydney CBD. The proposal will deliver about 331 new rooms throughout the 47-storey hotel development. Lower level café/bar uses would also be included.	• Hunter Street Station (Sydney CBD)	Operation: • N/A Construction: • transport • noise and vibration • soils, groundwater and contamination.
One Sydney Harbour (Barangaroo) Approved Construction program 2019 – 2025	One Sydney Harbour is a skyscraper complex under construction which includes 808 apartments in three towers. The project is part of the major urban renewal precinct of Barangaroo.	• Hunter Street Station (Sydney CBD)	Operation: • N/A. Construction: • transport • noise and vibration • soils, groundwater and contamination.

Project, status and indicative timing	Description of the project	Sites where cumulative impacts may occur	Potential key issue
Sydney Metro – Martin Place Over Station Development Approved Construction program 2017 – 2024	This project includes two over station development commercial towers above the northern and southern entrances of the future Martin Place metro station (under construction). The development is intended to be delivered as a single, integrated project along with the delivery of rail, station, concourse infrastructure and public domain works associated with Martin Place metro station. The construction of the different elements is likely to be staged so as not to interrupt the overall construction program for this Sydney Metro line.	• Hunter Street Station (Sydney CBD)	Operation: • N/A. Construction: • transport • noise and vibration • landscape and visual amenity.
301 and 305 Kent Street Concept Hotel Development Approved No construction program	The Concept proposal is for the establishment of a building envelope, use of the site at 301 and 305 Kent Street as a hotel with ancillary uses, pedestrian and vehicular access arrangements, and the provision of on-site bicycle and car parking.	• Hunter Street Station (Sydney CBD)	Operation: • N/A. Construction: • transport • noise and vibration • soils, groundwater and contamination.

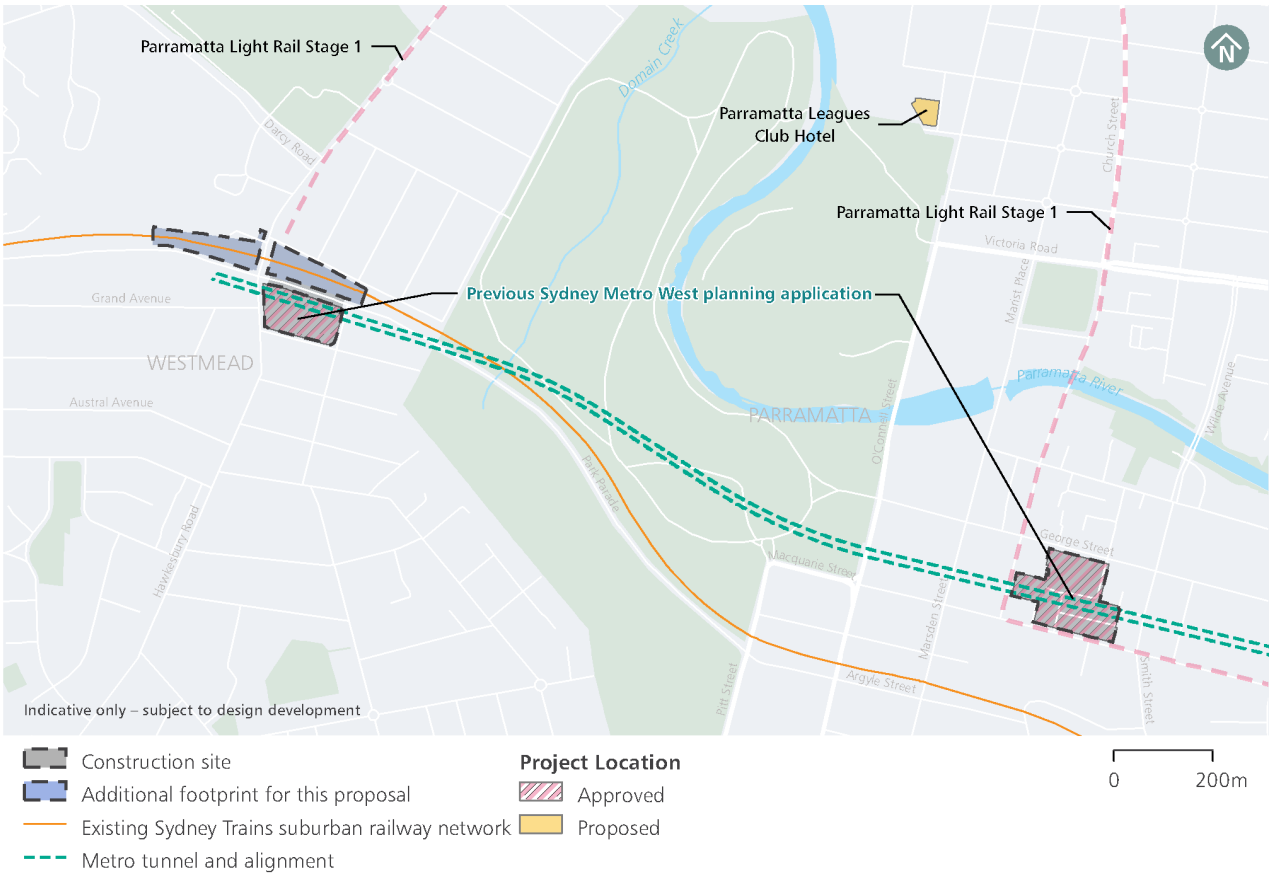

Figure 19-1 Projects included in the cumulative impact assessment – Westmead metro station and Parramatta metro station

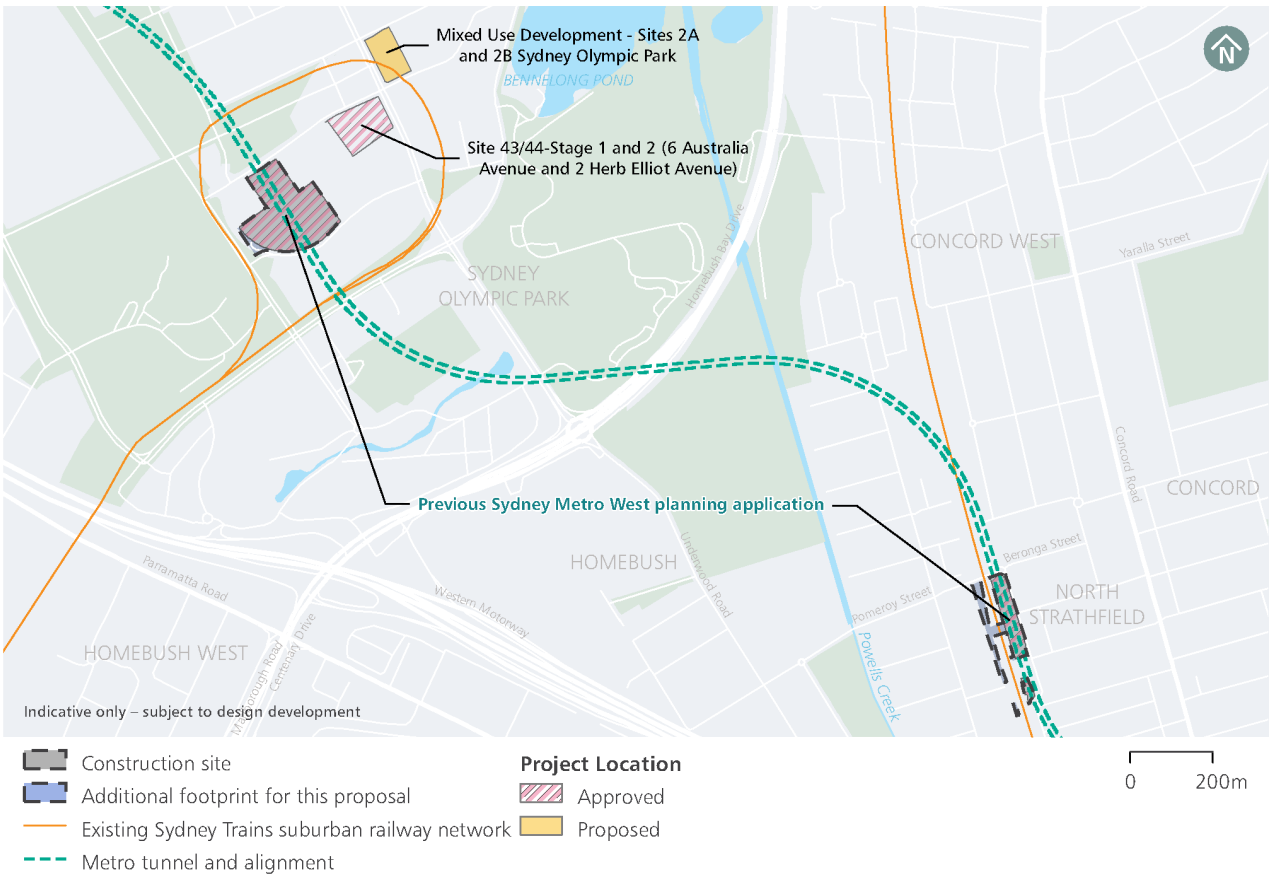

Figure 19-2 Projects included in the cumulative impact assessment – Sydney Olympic Park metro station and North Strathfield metro station

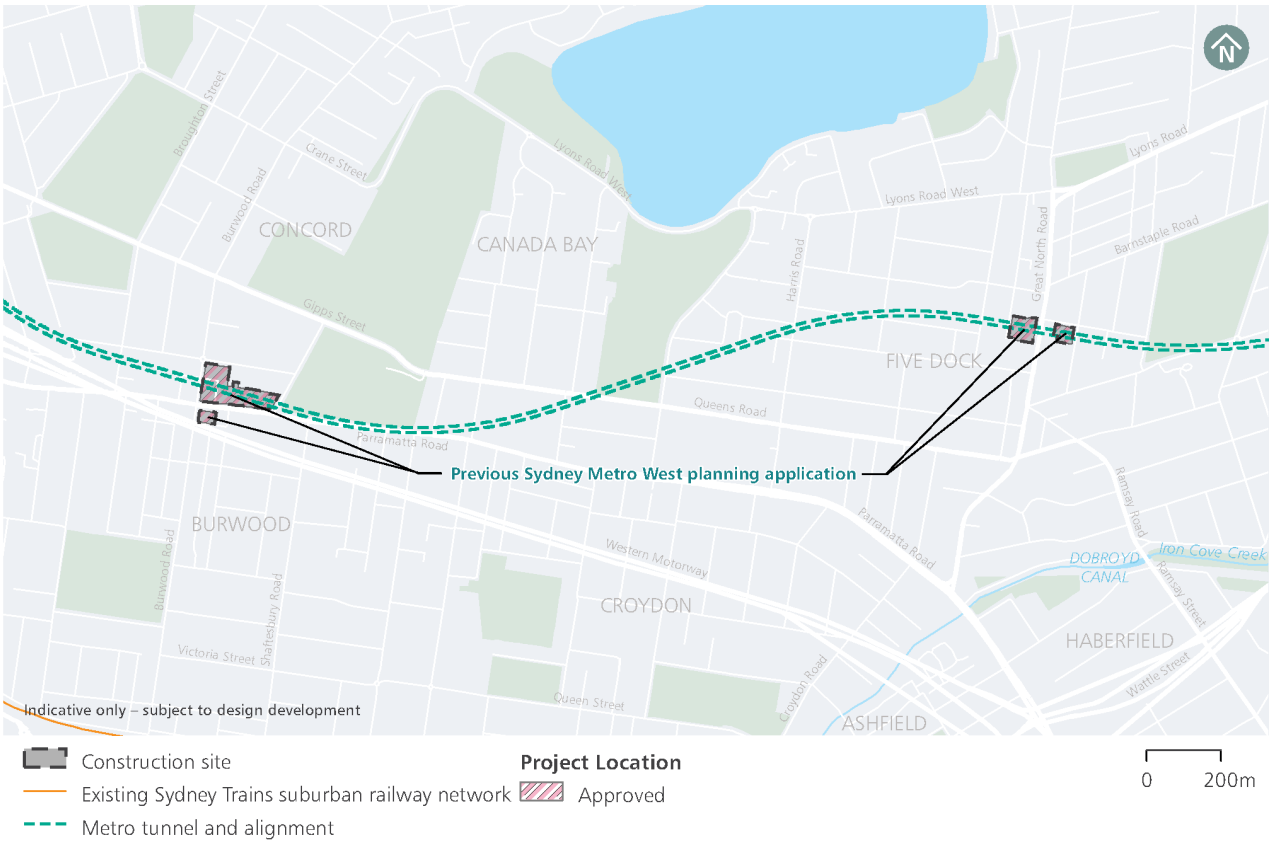

Figure 19-3 Projects included in the cumulative impact assessment – Burwood North Station and Five Dock Station

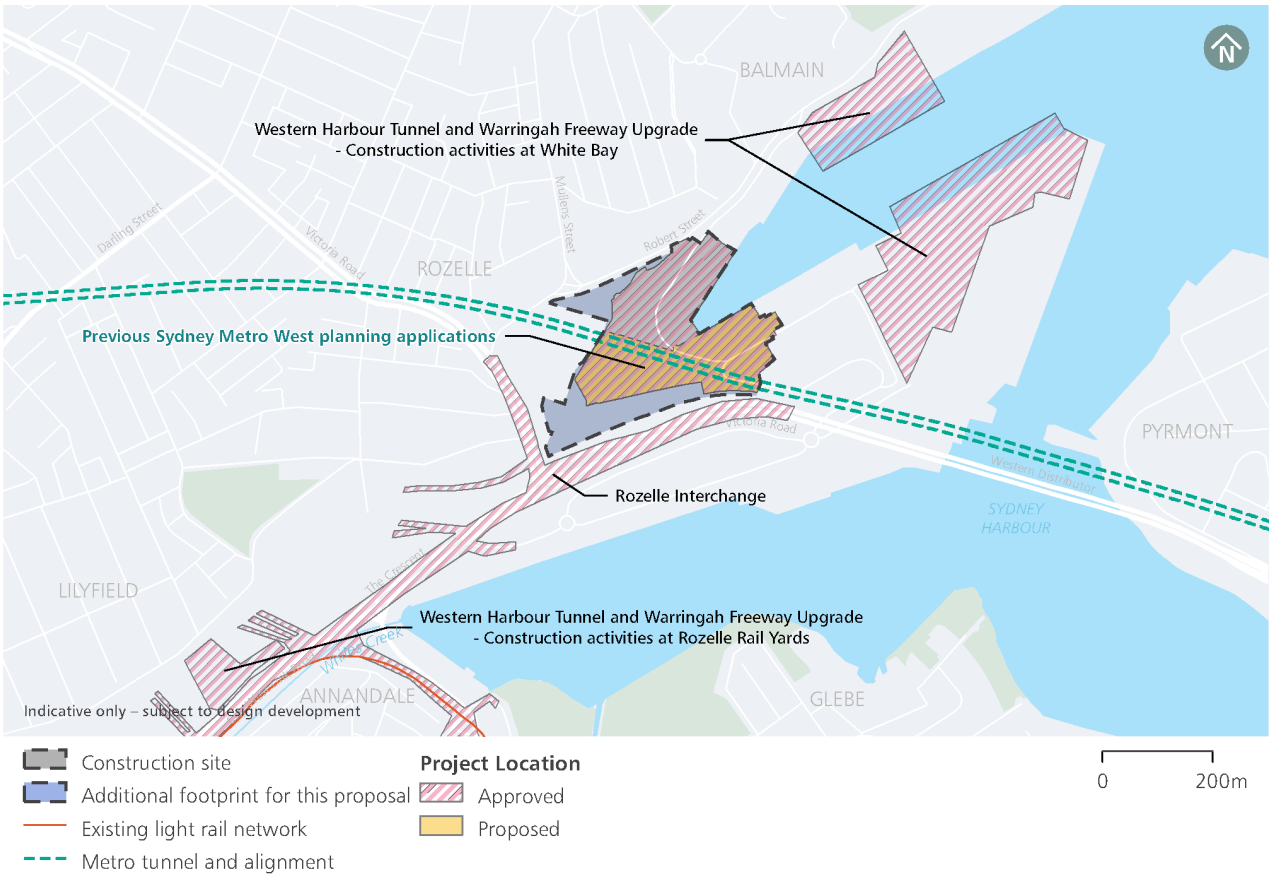

Figure 19-4 Projects included in the cumulative impact assessment – The Bays Station

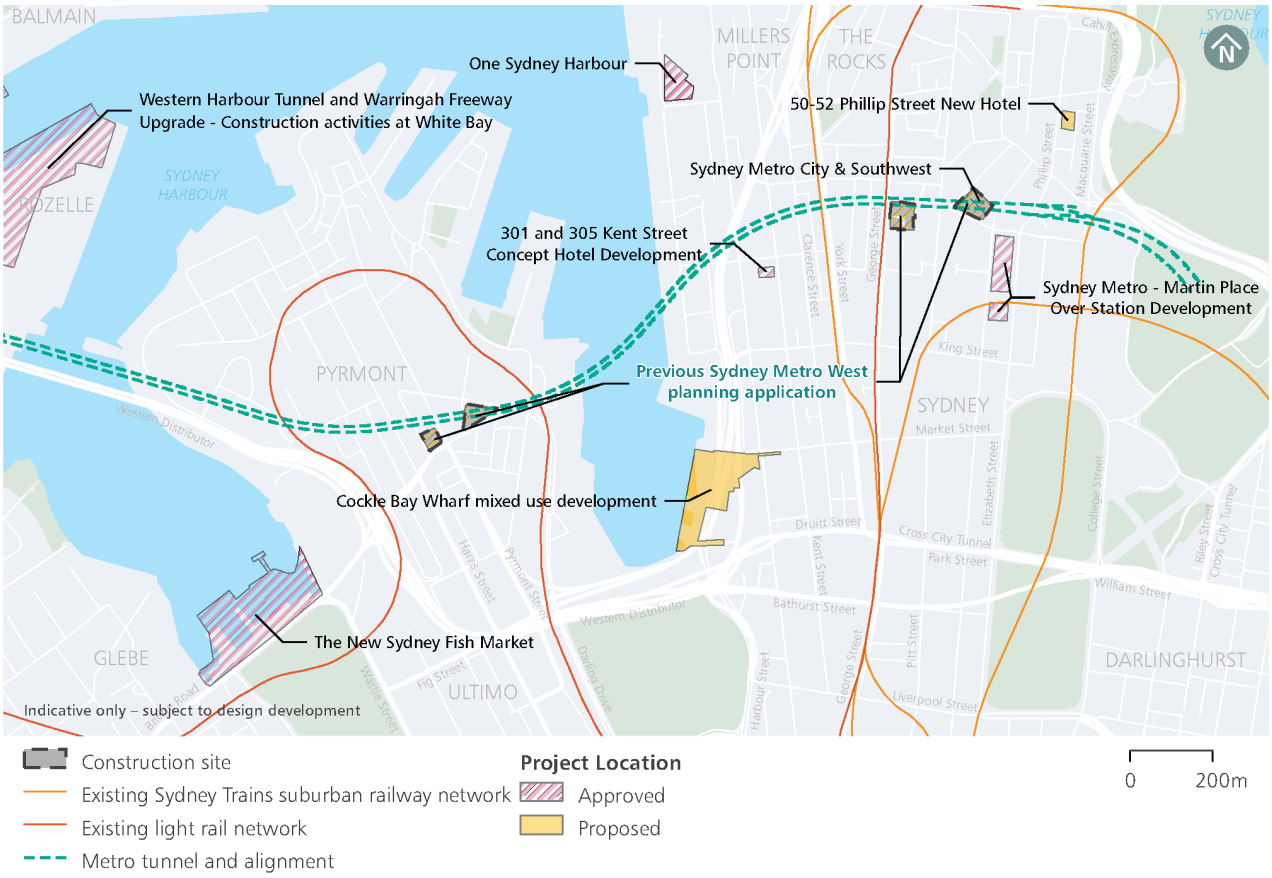

Figure 19-5 Projects included in the cumulative impact assessment – Pyrmont Station and Hunter Street Station (Sydney CBD)

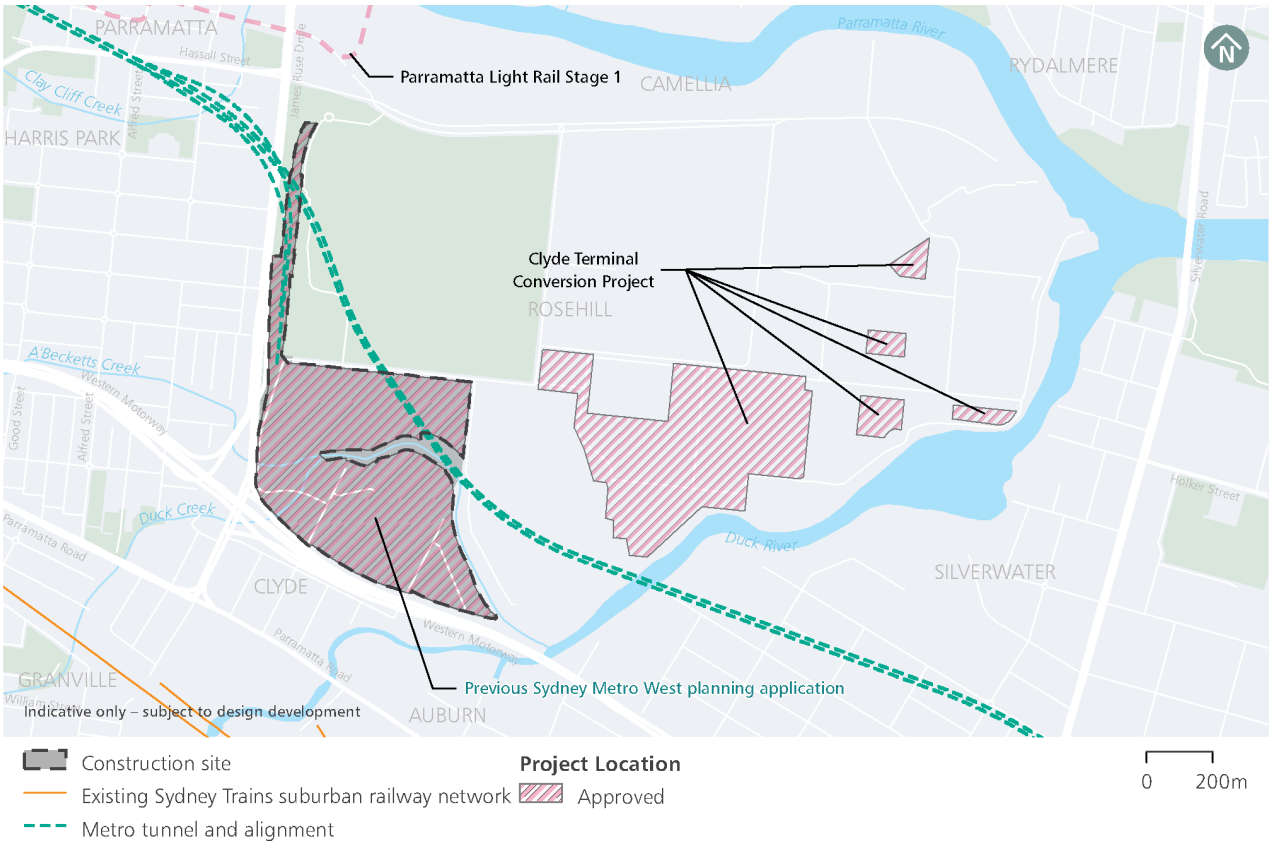

Figure 19-6 Projects included in the cumulative impact assessment – Clyde stabling and maintenance facility and Rosehill services facility

Harbourside Shopping Centre Redevelopment (SSD-7874) Concept proposal (residential tower, non-residential podium envelope, publicly accessible open space and public domain improvements) and Stage 1 work (including demolition of the existing shopping centre and structures, southern pedestrian link bridge, monorail infrastructure and tree removal) at Darling Harbour were approved on 25 June 2021. Based on consultation carried out by Sydney Metro in February 2022, it is expected that construction of Stage 1 and future stages of Harbourside Shopping Centre Redevelopment may occur concurrently with this proposal. Potential cumulative impacts during operations would be further considered as the subsequent stages of the Harbourside Shopping Centre Redevelopment planning applications are undertaken, in consultation with the key stakeholders. Potential cumulative construction impacts would be managed through the approach and measures outlined in Section 19.7.

19.4 Previous Sydney Metro West planning applications

The potential cumulative impacts associated with the previous Sydney Metro West planning applications are mainly related to the continuation of construction activities over a longer timeframe. However, the construction impacts associated with this proposal would be generally more confined and of a less intensive nature.

These continued impacts have been considered in the setting of the baseline environment and in the relevant impact assessment chapters throughout this Environmental Impact Statement.

In some cases, there is the potential for an overlap of construction activities at the construction sites under the previous Sydney Metro West planning applications and this proposal. A review of the current construction program shows that:

- the preceding approved major civil construction work between Westmead and The Bays would occur through to 2024 or 2025 at most construction sites, with the peak of construction in 2023
- the preceding proposed major civil construction between The Bays and Sydney CBD is expected begin in 2023 and be completed by the end of 2025
- construction of this proposal is expected to commence in late 2024 with the peak of construction in 2026.

This concurrent construction work could result in cumulative impacts, including construction fatigue, particularly associated with construction transport and construction noise. There may also be cumulative impacts in relation to permanent impacts to non-Aboriginal heritage items, and Aboriginal and non-Aboriginal archaeological resources.

19.4.1 Transport

In general, this proposal would use the same construction haul routes as the work carried out under the previous Sydney Metro West planning applications. Any combined use of the construction haul routes would be short term and the peak construction traffic by each stage would not coincide. The cumulative vehicle generation during this period is anticipated to be lower than the peak vehicles generated by this proposal and assessed in this Environmental Impact Statement. In addition, there would be minimal additional impacts on active transport, public transport, and parking and property access. Therefore, cumulative construction transport impacts are anticipated to be minor.

19.4.2 Noise

In relation to construction noise, the potential overlap of construction work between this proposal and the work carried out under the previous Sydney Metro West planning applications would be limited to a short period (a few months) and would typically involve the demobilisation of one contractor and the mobilisation of another. Where concurrent construction work is being completed near to a particular area, the worst-case noise levels could theoretically increase by around 3 dB (i.e. a logarithmic adding of two sources of noise at the same level). The likelihood of worst-case noise levels being generated by two different work activities at the same time is, however, considered low and rather than increase construction noise levels, the impact of concurrent construction work would generally be limited to a potential increase in the duration, and annoyance, of noise impacts on the affected receivers.

The use of the various construction sites by overlapping or successive work may also result in consecutive impacts (i.e. ‘construction fatigue’) at the surrounding receivers due to construction work being in the area for an extended period. Mitigation measures aimed at short-term construction work may be less effective where receivers are affected by longer duration impacts from several projects, especially where extensive night-time work is required. Where receivers are affected by ‘construction fatigue’, it may be necessary to consider specific mitigation and management measures to minimise the impacts.

19.4.3 Non-Aboriginal heritage

Three items have been identified that may experience permanent impacts above a negligible impact rating from this proposal and the previous Sydney Metro West planning applications. These items would be:

- the previous Sydney Metro West planning application was assessed as potentially having a moderate direct impact on the State listed White Bay Power Station, due to work within the curtilage of the item. This proposal is assessed as having a minor direct impact to the heritage item due to work and permanent infrastructure within the curtilage
- the previous Sydney Metro West planning application was assessed as potentially having a moderate indirect (visual) impact on the local listed Pyrmont Heritage Conservation Area, mainly associated with the demolition of a contributory item ('Gilbey's Distillery'). This proposal is assessed as having a minor indirect (visual) impact to the heritage conservation area due to new permanent infrastructure on the boundary of the conservation area
- the previous Sydney Metro West planning application was assessed as potentially having a moderate direct impact on the State listed former Skinners Family Hotel, due to the demolition of attached adjacent buildings. This proposal is assessed as having a minor indirect (visual) impact to the heritage item due to new permanent infrastructure that may visually dominate this location.

This proposal may also result in additional archaeological impacts at Parramatta and The Bays. For Parramatta, the *Sydney Metro West Environmental Impact Statement – Westmead to The Bays and Sydney CBD* (Sydney Metro, 2020a) provided an assessment of potential archaeological impacts associated with the entire Parramatta metro station construction site. Because the exact location (extent and depth) of excavation was not confirmed at the time, the archaeological assessment for the previous Sydney Metro West planning application at Parramatta metro station considered archaeological potential across the full extent (including depth) of the site, including where excavation of basement structures is required for this proposal. This assessment for the previous Sydney Metro West planning application concluded that there would be potential direct impacts to areas with low to moderate potential to contain archaeological and structural remains of the former Convict Drain (Parramatta LEP item #I647).

This proposal would involve the removal of about a 50 metre segment of the Convict Drain during the excavation for basement structures, which would result in a direct moderate impact to the heritage item. However, this would not result in a cumulative impact with the work carried out under the previous Sydney Metro West planning application because this application already assessed potential impacts across the extent of the site (including the segment to be removed as part of this proposal).

Potential archaeological impacts at the Parramatta metro station construction site would be managed under the approved *Sydney Metro West Parramatta Station Construction Site Archaeological Research Design and Excavation Methodology* (GML Heritage, 2021) as required by condition of approval D25 of SSI-1003 (which would be adopted for this proposal).

For The Bays, the archaeological assessment for this proposal identified that there may be impacts to the remains of the former White Bay Hotel; however there is low potential for this archaeology to be present and it would be of local significance. The previous Sydney Metro West planning application would carry out excavation in a different location at The Bays and would potentially impact different archaeological resources. Therefore, the potential for cumulative impacts to the same archaeological resource is minor.

19.4.4 Aboriginal heritage

Similar to non-Aboriginal archaeology, this proposal may potentially result in additional impacts to areas of Aboriginal archaeological potential at Parramatta and The Bays (refer to Chapter 8 (Parramatta metro station) and Chapter 13 (The Bays Station) of this Environmental Impact Statement).

The previous Sydney Metro West planning application identified one recorded Aboriginal site (AHIMS 45-6-3582) within the Parramatta metro station construction site, which is a Potential Archaeological Deposit. The exact location (and depth) of excavation was not confirmed during preparation of the previous Sydney Metro West planning application. Therefore, the Aboriginal archaeological assessment considered archaeological potential across the full extent (including depth) of the site. Archaeological potential across the whole site (including where this proposal would require excavation for basement structures) was assessed as moderate to high in the previous Sydney Metro West planning application, and it was concluded there may be direct impacts to this Potential Archaeological Deposit.

The baseline Aboriginal cultural archaeological environment defined for this proposal assumes that archaeological test excavation (and salvage where required) across the site would be carried out in accordance with condition of approval D22 for the previous Sydney Metro West planning application where intact natural profiles with the potential to contain significant archaeological deposits are encountered.

There are not expected to be cumulative impacts on known Aboriginal sites from this proposal and the previous Sydney Metro West planning application because the potential archaeology across the site has been assessed and would be managed under the previous Sydney Metro West planning application.

The additional excavation for the traction substation at The Bays (towards the west and south-west of the construction site) is located in an area with the potential to retain archaeological potential below the reclamation fill material (associated with The Bays PAD-01). Consistent with Sydney Metro West Environmental Impact Statement – Westmead to The Bays and Sydney CBD (Sydney Metro, 2020), archaeological test excavation (and salvage if required) must be carried out where intact natural profiles with the potential to contain significant archaeological deposits are encountered or if archaeological deposits are identified within AHIMS ID#45-6-3826 (The Bays PAD 01). Excavations must be undertaken in accordance with the methodology outlined in the Aboriginal cultural heritage assessment report (Artefact Heritage Pty Ltd, 2020). If Aboriginal archaeological remains are recovered, results would be incorporated into the design and Aboriginal heritage interpretation for this proposal, in consultation with registered Aboriginal parties. The nature of the cumulative impact would be dependent on the scientific cultural significance of the Aboriginal objects identified (if any).

19.4.5 Flooding

A quantitative cumulative impact assessment and modelling has been carried out for the potential cumulative flooding impacts during operation of this proposal compared against the existing environment prior to the work carried out under the previous Sydney Metro West planning applications (that is, prior to any Sydney Metro West work). Potential cumulative flooding impacts, including maps for the five per cent Annual Exceedance Probability (AEP), one per cent AEP and Probable Maximum Flood (PMF) events at each precinct, are discussed in detail in Technical Paper 8 (Hydrology, flooding and water quality).

At all sites, except for Parramatta metro station, the potential cumulative flood impacts are expected to be minor and localised. These potential impacts would generally be contained to the metro site and/or the existing drainage system.

Parramatta metro station

At Parramatta metro station there are potential cumulative flooding impacts with the previous Sydney Metro West planning application during the PMF event.

Areas to the north-east and east would experience increased flooding generally up to about 0.2 metres with smaller areas experiencing impacts in excess of 0.2 metres including sections of the Civic Link. Areas to the north west, west, south west and south would generally experience decreased flooding of up to about 0.2 metres. This is due to the increased flow conveyance through the station compared with the pre-development conveyance of Horwood Place (prior to the work carried out under the previous Sydney Metro West planning application).

The scale of these cumulative flooding impacts is modest compared to the degree of impact these properties currently experience, with inundation during the PMF event already substantial. Cumulative impacts of a similar magnitude, from flood events between the one per cent AEP climate change and PMF events may also occur.

Large scale evacuation by vehicle from the Parramatta CBD during the PMF event would be challenging as indicated in the Parramatta CBD Flood Evacuation Assessment (Molino Stewart, 2021). The Parramatta metro station has the potential to contribute to improved evacuation from the Parramatta CBD (by providing an additional transport option) until the activation of the station entry flood barriers prevents further access by customers.

19.4.6 Social impacts

This proposal has the potential to result in a cumulative positive social impact with the work carried out under the previous Sydney Metro West planning applications due to increased job opportunities and community investment. Enhanced wellbeing may result from job opportunities and community investment related to the generation of an estimated 10,000 direct and 70,000 indirect jobs in total across all stages and station localities of Sydney Metro West.

19.5 Operational impact assessment

Operational stage cumulative impacts of this proposal would largely relate to the overall strategic benefits, including the identified city shaping, transport and productivity benefits. These benefits are substantial and could be enhanced as part of the future integrated transport network.

In addition, there would be number of specific cumulative impacts in relation to:

- transport (refer to Technical Paper 1 (Operational transport))
- noise and vibration (refer to Technical Paper 3 (Operational noise and vibration))
- landscape and visual (refer to Technical Paper 6 (Landscape and visual amenity))
- flooding (refer to Technical Paper 8 (Hydrology, flooding and water quality))
- social impacts (refer to Technical Paper 9 (Social impacts))
- business impacts.

These impacts are summarised in Sections 19.5.1 to 19.5.5.

19.5.1 Transport

Projects with potential to generate cumulative operational traffic benefits and impacts can be broadly categorised as:

- major transport infrastructure projects, including public transport and road projects
- large-scale urban development and other infrastructure projects.

Cumulative operational benefits

When operational, the broader cumulative transport benefits of this proposal would be substantial. In particular, it would provide significant improvements to the public transport network capacity and efficiency including new public transport interchange facilities at and around stations. It would improve reliability across the rail network by relieving congestion on the T1 Western, T9 Northern, and T2 Inner West railway lines. It is also expected to provide wider road network benefits by encouraging greater use of public transport. It would also provide improved transport for the additional 420,000 new residents and 300,000 new workers forecast to be located within the corridor over the next 20 years.

More specifically, the operation of Parramatta Light Rail would extend the catchment of Sydney Metro West by improving the quality of feeder services, providing enhanced transport benefits and land use outcomes. Stage 1 of Parramatta Light Rail is currently under construction and is expected to open in 2023. Once complete, there will be stops in the vicinity of Westmead and Parramatta metro stations.

The NSW Government recently announced a commitment for the planning and development of Stage 2 of Parramatta Light Rail, which would connect Stage 1 and the Parramatta CBD to Ermington, Melrose Park, Wentworth Point and Sydney Olympic Park, where it would connect to the Sydney Metro West and the Sydney Trains network. This proposal would allow for transfers with Parramatta Light Rail (Stage 1) at Westmead and Parramatta, as well as with the planned Parramatta Light Rail (Stage 2) at Sydney Olympic Park.

Sydney Metro City & Southwest Martin Place Station would be about 50 metres from Hunter Street Station (Sydney CBD). A paid underground connection would be provided from Hunter Street Station (Sydney CBD) to the Sydney Metro City & Southwest Martin Place Station, allowing easy connectivity and transfer between the two stations, as well as between metro and Sydney Trains suburban rail network services. The interchange opportunities would enhance the transport benefits of this proposal and provide travel time savings for customers transferring between metro services, or between metro and Sydney Trains services.

The delivery of WestConnex is forecast to reduce traffic volumes on parts of the surface road network, such as around Burwood North, Five Dock and The Bays. It would also provide around 10 hectares of open space for the Rozelle Parklands and associated active transport links towards The Bays Station precinct. This could provide cumulative benefits with this proposal also expected to reduce car trips through the provision of a high-quality public transport alternative. The combined reduction in car use, and provision of public open space and active transport links, could also provide enhanced placemaking opportunities at these stations.

Cumulative operational impacts

The assessment of the future year scenarios in the relevant sections of Part B (Environmental Assessment) of this Environmental Impact Statement and in Technical Paper 1 (Operational transport) uses traffic growth estimates derived from strategic transport model outputs for 2036. The strategic transport model includes major future road upgrades (such as WestConnex and Western Harbour Tunnel) and other key projects within the transport study area at each precinct, as well as future growth in population and employment associated with large-scale urban development.

Therefore, the transport assessment for this proposal reflects a cumulative operational assessment that incorporates planned changes to the future road network.

Projected traffic growth in the study area is expected to be mainly from future growth in urban development, including over and/or adjacent station development, rather than from this proposal. While this future development is dependent on the provision of a high-quality public transport facility, any additional road-based traffic, including kiss and ride, taxi, and bus movements generated by the proposal itself would be minimal compared to expected future year background traffic.

Mitigation measures to manage potential operational transport impacts are outlined in Chapter 20 (Synthesis) of this Environmental Impact Statement.

19.5.2 Noise and vibration

The future noise environment during operation of this proposal may be different due to planned growth in a number of precincts, including at Westmead, Sydney Olympic Park, the Parramatta Road Corridor, The Bays and Pyrmont.

The cumulative impact of this growth and development may increase the level of background noise in the surrounding environment; however, it is not possible to quantitatively assess cumulative operational noise impacts from these projects.

The setting of criteria under the Noise Policy for Industry (EPA, 2017) which has been adopted for this proposal includes a reduction in the amenity criteria to account for the potential for future industrial development in the area (unless this type of development is not likely to occur at certain precincts based on the land use provisions). This approach inherently allows for potential cumulative operational noise associated with future developments.

19.5.3 Landscape and visual amenity

During operation at Westmead metro station, there would be a cumulative beneficial landscape character impact as a result of this proposal and Parramatta Light Rail Stage 1 due to improved accessibility, legibility, streetscape amenity and public open space provision, which would include a terminus stop on Hawkesbury Road and associated public domain improvements along Hawkesbury Road and Railway Parade. There would be a beneficial cumulative effect on views along Railway Parade and Hawkesbury Road where this proposal and Parramatta Light Rail would be seen together due to the new built form, public domain and streetscape improvements.

At Parramatta metro station, there would be a beneficial cumulative effect on the landscape as a result of this proposal and Parramatta Light Rail Stage 1 due to improved accessibility and legibility with the combined public domain improvements that would be achieved. This would include streetscape improvements, new inter-block links and shared zones. There would also be a beneficial cumulative effect on views in the vicinity of George Street, Church Street and Macquarie Street due to the new built form, reduced visual clutter in the public domain and streetscapes provided by this proposal in combination with Parramatta Light Rail.

There would be a cumulative beneficial landscape impact during operation in the vicinity of The Bays Station and Pyrmont Station as the new Sydney Fish Market, Rozelle Parklands and associated active transport links, and Cockle Bay Wharf would each be accompanied by landscape and urban design improvements to the public realm. Together this proposal, along with these projects, would contribute to the overall vision intended by the Eastern City District Plan (Greater Sydney Commission, 2018b); the Bays West Place Strategy (NSW Department of Planning, Industry and Environment, 2021a) and master planning for the area; and the Pyrmont Peninsula Place Strategy (NSW Department of Planning, Industry and Environment, 2020).

Potential cumulative landscape and visual impacts during operation are discussed in more detail in Chapter 14 of Technical Paper 6 (Landscape and visual amenity).

19.5.4 Flooding

Potential cumulative flooding impacts are discussed in detail in Technical Paper 8 (Hydrology, flooding and water quality).

A qualitative assessment has been carried out of the potential cumulative flooding impacts of this proposal with other projects. In general, potential cumulative flooding impacts would be negligible due to the nature of the projects and/or as other projects are not hydraulically connected to the sites that form part of this proposal in events up to the one per cent AEP flood event.

Parramatta Light Rail Stage 1 is included in the baseline environment for the operational flooding assessment carried out for this proposal. Therefore, the flooding assessment presented in Chapter 8 (Parramatta metro station) inherently includes the potential cumulative impacts with Parramatta Light Rail Stage 1.

19.5.5 Social impacts

During operation, cumulative social benefits (particularly due to other transport projects, such as Sydney Metro City & Southwest (Chatswood to Sydenham), Parramatta Light Rail and WestConnex) may include:

- reduction in congestion and increase in efficiency of rail services, potential reducing travel related stress for people who switch modes in peak hours by reducing the time spent in congested conditions
- improved access to jobs, universities, services and social facilities across Greater Sydney leading to potential improvements in social cohesion and reduction in social health related issues
- increase in economic activity, businesses and employment opportunities, particularly around each of the stations
- improvements to local air quality due to less motor vehicle trips (from cumulative impact of WestConnex and this proposal providing a public transport alternative), improving physical health
- positive changes in community character due to improved amenity and placemaking opportunities at station precincts, for example due to the new Sydney Fish Market and Cockle Bay Wharf projects in proximity to The Bays Station and Pyrmont Station.

Potential cumulative social and economic impacts may include potential impacts on social amenity and changes in community character.

19.5.6 Business impacts

During operation, cumulative local business benefits (particularly due to other transport projects, such as Sydney Metro City & Southwest (Chatswood to Sydenham), Parramatta Light Rail and WestConnex) may include:

- increase in passing trade from customers who have connected from other transport projects and customers who previously could not easily access the area
- improved amenity as a result of initiatives such as the Rozelle Parklands (part of the M4-M5 Link WestConnex project)
- increase in employment connectivity for people who could not previously access the area
- enhancing job-to-job connections and catalysing economic growth, particularly for Greater Parramatta.

19.6 Construction impact assessment

As identified in Section 19.4, key cumulative impacts of this proposal during the construction stage would primarily relate to the continuation of activities associated with the previous Sydney Metro West planning applications.

In some locations, construction works for this proposal could also overlap with or follow the construction of other major projects. Relevant potential cumulative impacts during construction (see Table 19-1) in relation to other key projects would relate to:

- transport
- noise and vibration
- non-Aboriginal heritage
- Aboriginal heritage
- landscape and visual amenity
- soils, groundwater and contamination
- flooding
- social impacts
- local business impacts
- biodiversity
- air quality
- hydrology and water quality.

These impacts are summarised in Sections 19.6.1 to 19.6.13. Further details on the potential cumulative impacts during construction are presented in the relevant technical papers.

19.6.1 Transport

Potential cumulative transport impacts during construction are discussed in more detail in Technical Paper 2 (Construction transport).

Parramatta metro station construction site

Relevant project: Parramatta Leagues Hotel

The construction timeframe for the Parramatta Leagues Club Hotel is not publicly available. However, a review of construction information indicates that O'Connell Street and Parkes Street form part of primary construction vehicle routes for the Parramatta Leagues Club Hotel and this proposal. Construction vehicle volumes generated due to the construction of Parramatta Leagues Club Hotel would be low.

In addition, there would be minimal additional impacts on active transport, public transport, and parking and property access. Therefore, cumulative construction impacts at the Parramatta metro station construction site are anticipated to be minor.

Sydney Olympic Park metro station construction site

Relevant projects: Site 43/44, Sydney Olympic Park – Stage 1 and 2 (6 Australia Avenue and 2 Herb Elliot Avenue), Sites 2A and 2B Sydney Olympic Park – Mixed Use Development

The construction timeframes for the Sites 2A and 2B Sydney Olympic Park and Site 43/44 Sydney Olympic Park projects are not publicly available. However, a review of construction information indicates that Homebush Bay Drive, Australia Avenue and Herb Elliott Avenue east of the site form part of primary construction vehicle routes for Sites 2A and 2B Sydney Olympic Park, Site 43/44, Sydney Olympic Park, and for this proposal. Furthermore, Hill Road forms part of the primary construction vehicle routes for Sites 2A and 2B Sydney Olympic Park and for this proposal. Construction vehicle volumes generated due to the construction of Sites 2A and 2B Sydney Olympic Park and Site 43/44 Sydney Olympic Park are anticipated to be low.

In addition, there would be minimal additional impacts on active transport, public transport, and parking and property access. Therefore, cumulative construction impacts at the Sydney Olympic Park metro station construction site are anticipated to be minor.

The Bays Station construction site

Relevant project: Western Harbour Tunnel and Warringah Freeway Upgrade

A review of the construction program for the Western Harbour Tunnel indicates that main construction works would be occurring in 2023 at the Rozelle Rail Yards construction site and Victoria Road construction site, and in 2023 and 2024 at the White Bay construction support sites. Tunnel fit-out and finishing, testing and commissioning, connection to Rozelle Interchange and site clean-up and demobilisation would be carried out in the first quarter of 2026.

City West Link forms part of primary construction vehicle routes for both the Western Harbour Tunnel and this proposal.

The last stages of work at the Rozelle Rail Yards construction site in the first quarter of 2026 are anticipated to generate a low number of construction vehicles. The duration of overlap between these last stages of work and peak construction of this proposal is short and therefore cumulative construction impacts are anticipated to be minor.

Hunter Street Station (Sydney CBD) construction site

Relevant projects: Cockle Bay Wharf Redevelopment, 301 and 305 Kent Street Concept Hotel and 50-52 Phillip Street New Hotel, One Sydney Harbour, Sydney Metro City & Southwest and Sydney Metro – Martin Place Over Station Development

Construction timeframes for the Cockle Bay Wharf Redevelopment and 301 and 305 Kent Street Concept Hotel are not publicly available. Construction on the 50-52 Phillip Street New Hotel is expected to commence in 2023 and is likely to take around 2.5 years to complete. A review of construction information indicates that:

- Clarence Street forms part of primary construction vehicle routes for the Cockle Bay Wharf Redevelopment and this proposal
- construction vehicle routes for 301 and 305 Kent Street Concept Hotel are not publicly available. However, given its proposed location, Clarence Street could also form part of primary construction route
- Bridge Street, Bent Street and Macquarie Street forms part of primary construction vehicle routes for 50-52 Phillip Street New Hotel and this proposal.

Construction vehicle volumes generated due to the construction of the Cockle Bay Wharf Redevelopment, 301 and 305 Kent Street Concept Hotel, and 50-52 Phillip Street New Hotel would likely be low. In addition, there would be minimal additional impacts on active transport, public transport, and parking and property access.

A review of the construction program for One Sydney Harbour indicates that peak construction activity occurred in September 2020, with final construction activities occurring in 2025. There are no local roads within the Sydney CBD network that form part of primary construction vehicle routes for both the construction of One Sydney Harbour and this proposal.

A review of the construction programs for Sydney Metro City & Southwest and Sydney Metro – Martin Place Over Station Development indicates that the final construction activities at the Barangaroo Station construction site and Martin Place construction site are expected to occur through to 2022. As a result, there is no anticipated overlap in construction activities between work carried out for Sydney Metro City & Southwest and this proposal.

Therefore, cumulative construction impacts at the Hunter Street Station (Sydney CBD) construction site are anticipated to be minor and manageable.

Clyde stabling and maintenance facility and Rosehill services facility construction site

Relevant project: Clyde Terminal Conversion Project

Construction works for the Clyde Terminal Conversion Project would be completed before 2026, and peak construction traffic vehicle movement would occur in 2026 for this proposal. Therefore, cumulative construction impacts at the Clyde stabling and maintenance facility and Rosehill services facility construction sites are not anticipated.

19.6.2 Noise and vibration

Potential cumulative noise and vibration impacts during construction are discussed in more detail in Technical Paper 4 (Construction noise and vibration).

Where projects are expected to be completed prior to work starting on this proposal (including WestConnex M4-M5 Link and Sydney Metro City & Southwest (Chatswood to Sydenham)), concurrent cumulative noise impacts are unlikely.

Where construction work overlaps or is consecutive, construction may result in prolonged noise impacts resulting in construction fatigue for surrounding receivers. Specific additional mitigation and management measures may need to be considered to minimise the impacts.

The likelihood of cumulative construction noise impacts resulting from concurrent or consecutive construction activities of other projects and this proposal would be reviewed during detailed design when detailed construction schedules are available. Coordination would occur between potentially interacting projects to minimise concurrent or consecutive construction activities in the same areas, where possible. Specific mitigation strategies would be developed to manage impacts. Depending on the nature of the impact, this could involve adjustments to construction program or activities of Sydney Metro West or of other construction projects.

19.6.3 Non-Aboriginal heritage

Potential cumulative non-Aboriginal heritage impacts during construction are discussed in more detail in Technical Paper 5 (Non-Aboriginal heritage). For projects where cumulative impacts were identified as neutral in Technical Paper 5 (Non-Aboriginal heritage), these are not discussed in this chapter.

The Bays Station construction site

Relevant projects: Western Harbour Tunnel and Warringah Freeway Upgrade, The new Sydney Fish Market

Potential cumulative impacts between this proposal and these projects are presented in Table 19-2.

Table 19-2 Potential cumulative non-Aboriginal heritage impacts – The Bays Station construction site

Project	Potential cumulative non Aboriginal heritage impacts
Western Harbour Tunnel and Warringah Freeway Upgrade	The Western Harbour Tunnel and Warringah Freeway Upgrade project has the potential to have potential direct, indirect (visual) and indirect (vibration) impacts on the White Bay Power Station; however, with mitigation measures it is expected to have negligible impact overall. The Western Harbour Tunnel and Warringah Freeway Upgrade project would avoid direct impacts to most of the Valley Heritage Conservation Area, Rozelle and Balmain. Direct impacts include demolition of buildings within the old heritage conservation area boundary; however, these have been excluded from the updated heritage conservation area boundary. Overall impact is assessed as minor. This proposal would involve enabling work, the construction of The Bays Station and surrounding ancillary works, including roadways and a substation. These works, with the application of mitigation measures, would result in negligible to minor non-Aboriginal heritage impacts. There would be no additional cumulative impacts to specific heritage items caused by this proposal when combined with impacts from the Western Harbour Tunnel and Warringah Freeway Upgrade.
The new Sydney Fish Market	The new Sydney Fish Market would involve demolition of the former coal loader and office/weighbridge building, which are unlisted heritage items and in poor condition, but still of some heritage significance. This demolition would result in a loss of heritage fabric but improve the visual appeal and amenity of the public domain and promenade. The new Sydney Fish Market project may also result in the loss of archaeological deposits, known and unknown, and may have physical impacts on the heritage listed stormwater channel. Mitigation measures are to be considered to minimise potential impacts.

Project	Potential cumulative non Aboriginal heritage impacts
	The proposed waterfront promenade as part of the new Sydney Fish Market will provide a heritage walk with interpretation between Jackson's Landing and Jubilee Park/Glebe Point heritage foreshore walks, encouraging public engagement with the early industrial heritage and working harbour history of the area. Proposed works would improve the aesthetic contribution of the Blackwattle Bay area and consequently significantly improve the setting of known heritage items in the close vicinity. It also provides an opportunity to enhance the heritage context of the area. Designed to provide significant opportunities for heritage interpretation, both physical and visual, including using salvage materials from the coal loader and office/weighbridge building, and display archaeological deposits to provide additional engagement opportunities for the public with the history of the area. The works for this proposal within The Bays Station study area are predominately minor in nature and, following the application of mitigation measures, would not result in any cumulative impacts. There would be no cumulative impacts to specific heritage items caused by this proposal when combined with impacts from the new Sydney Fish Market project.

Hunter Street Station (Sydney CBD) construction site

Relevant project: Sydney Metro City & Southwest (Chatswood to Sydenham)

Direct (physical) and indirect (visual) impacts were identified for the Sydney Metro City & Southwest (Chatswood to Sydenham) project as a result of the Barangaroo Station site and Martin Place Station site. This proposal would not increase heritage impacts to the heritage items at Martin Place or Barangaroo Station and therefore cumulative impacts are not expected.

Clyde stabling and maintenance facility and Rosehill services facility construction site

Relevant project: Clyde Terminal Conversion Project

The Clyde Terminal Conversion Project was assessed as resulting in no impacts to a locally listed heritage item within the project footprint. However, significant impacts to potential heritage items of state and local significance (Clyde Terminal and Clyde Refinery) were identified. Further archaeological investigations identified two areas of archaeological potential within the project study area. Impacts from demolition and construction works were recommended to be mitigated through the preparation of a Photographic Archival Recording for the built structures, and an Archaeological Research Design and Methodology be prepared and implemented to manage the archaeological potential of the area.

The Clyde Terminal Conversion Project is sited over 200 metres to the north-east of this proposal. However, there is one heritage item located within the study area for the Clyde Terminal Conversion Project which is also assessed under this proposal at the Clyde stabling and maintenance facility and Rosehill services facility ('Wetlands' Parramatta LEP Item No. I1). No direct or indirect impacts under this proposal would exacerbate the assessed impacts for the Clyde Terminal Conversion Project. As such, potential cumulative non-Aboriginal heritage impacts for these projects are considered to be neutral.

19.6.4 Aboriginal heritage

A review of other projects that could affect Aboriginal objects or areas of archaeological potential identified the potential for Aboriginal heritage cumulative impacts for this proposal to occur at Parramatta metro station construction site and The Bays Station construction site.

Parramatta metro station construction site

Areas of high archaeological potential within Parramatta are largely associated with areas near watercourses and the mapped extent of the Parramatta Sand Body. A large area of high potential is located within the Parramatta CBD approximately bound by the Parramatta River in the north and Hunter Street in the south.

High levels of redevelopment within this area, including the Parramatta Leagues Club Hotel, may result in the continued reduction of the potential archaeological resource.

The baseline Aboriginal cultural archaeological environment defined for this proposal assumes that archaeological test excavation (and salvage where required) would be carried out as part of the previous Sydney Metro West planning application where intact natural profiles with the potential to contain significant archaeological deposits are encountered prior to commencement of this proposal. Therefore, the excavation for basement structures required for this proposal is not expected to result in cumulative Aboriginal archaeological impacts in Parramatta.

The Bays Station construction site

The Bays area is located in a highly disturbed urban environment which is undergoing significant development, including transport links and industrial development. The environmental impact assessment of the Western Harbour Tunnel and Warringah Freeway Upgrade project has identified areas of Aboriginal archaeological potential. If Aboriginal objects are identified during further investigations for The Bays Station construction site and the Western Harbour Tunnel and Warringah Freeway Upgrade, then there may be a cumulative impact. The nature of the cumulative impact would be dependent on the scientific and cultural significance of the Aboriginal objects identified for this proposal. If Aboriginal archaeological remains are recovered, results would be incorporated into the design and Aboriginal heritage interpretation for this proposal, in consultation with registered Aboriginal parties. The nature of the cumulative impact would be dependent on the scientific cultural significance of the Aboriginal objects identified (if any).

This proposal also has the potential to impact on unidentified surface and subsurface archaeological sites and identified cultural values, which could result in potential cumulative impacts on identified cultural and archaeological values (such as values of significance to Aboriginal people resulting from traditions, customs, beliefs and history, and those associated with waterways surrounding the project). Sydney Metro is developing a Designing with Country strategy to inform the development of appropriate Aboriginal Cultural Design Principles that will be incorporated into the design, public art and cultural heritage interpretation of Sydney Metro West. The Designing with Country strategy would continue to be informed by further field investigations (including with field representatives from Registered Aboriginal Parties) and consultation with Aboriginal cultural heritage knowledge holders.

19.6.5 Landscape and visual amenity

Potential cumulative landscape and visual impacts during construction are discussed in more detail in Chapter 14 of Technical Paper 6 (Landscape and visual amenity). For projects where cumulative impacts were not identified in Technical Paper 6 (Landscape and visual amenity), for example due to separation from this proposal or no interaction between views, these are not discussed in this chapter.

Potential landscape and visual impacts during construction would be reduced and managed in accordance with the mitigation measures provided in Chapter 20 (Synthesis) of this Environmental Impact Statement.

Sydney Olympic Park metro station construction site

Relevant project: Site 43/44, Sydney Olympic Park – Stage 1 and 2 (6 Australia Avenue and 2 Herb Elliot Avenue)

This project would require the removal of further trees and increase the area where there would be construction activity across the Sydney Olympic Park metro station precinct. Combined, there would be a cumulative landscape impact due to the reduction in canopy cover, effects on local accessibility and legibility where there are impacted footpaths, and temporary impacts on local roads, that would be experienced consecutively.

There would also be a potential cumulative visual impact to views from:

- Herb Elliott Drive and the Abattoir heritage gardens in the north
- Figtree Avenue and adjacent commercial properties in the south
- Olympic Boulevard and the existing bus interchange in the west.

This proposal would extend the duration of the identified adverse visual impacts rather than their magnitude.

Any night works carried out for this proposal would be seen as a continuation of the night works currently visible on and surrounding the site. This setting is in an area of medium district brightness and has a high capacity to absorb additional light sources at night.

The Bays Station construction site

Relevant projects: Western Harbour Tunnel and Warringah Freeway

Many of the infrastructure projects occurring within the vicinity of The Bays Station construction site have impacted the existing vegetation and canopy cover, connectivity of footpaths, and area of available open space in areas in the vicinity of the site. The landscape is currently characterised by construction work associated with the previous Sydney Metro West planning application, heavy traffic, and industrial-scale support structures and buildings. Some further removal of vegetation, buildings and/or structures would be required as part of this proposal to the north and south of the former White Bay Power Station, along the boundary with Robert Street and adjacent to the Anzac Bridge.

This proposal would extend the duration of the impacts caused by the activity in the area, currently as a consequence of the Western Harbour Tunnel and Warringah Freeway Upgrade.

During construction for this proposal there would be a potential cumulative landscape impact, of which this proposal would have a relatively small contribution, as part of a wider transformation of the precinct. This cumulative impact would reduce over time with the completion of adjacent infrastructure projects.

There would also be a potential cumulative visual impact to views from the north, including from locations within Balmain and Balmain East, from White Bay and the harbour. In these views this proposal would be seen within the context of the construction sites for these projects. Combined they temporarily alter the character of a broad area of White Bay. The differentiation of the construction of these projects in these views would be difficult. This cumulative impact would result in the extension of duration of identified adverse visual impacts.

Similarly, in views from the south and south-west, such as from the residential areas along Hornsey Street and from the Anzac Bridge access road, there would be a cumulative temporary visual impact with the foreground of these views being dominated by construction works associated with these projects and this proposal. The setting of this proposal within an area currently occupied by and surrounded by other construction sites, would both increase the absorption capacity of this proposal into the view and extend the duration of the visual impacts experienced.

Any night works carried out for this proposal would be seen as a continuation of the night works currently visible on and surrounding the site. This setting is an area of high district brightness and therefore has a high capacity to absorb additional light sources at night. There is a substantial separation between this site and the surrounding residences, further reducing the potential for a cumulative visual impact at night from these locations.

Pyrmont Station construction site

Relevant projects: Cockle Bay Wharf mixed use development

When moving through the Darling Harbour and Pyrmont Peninsula, there may be views to the Cockle Bay Wharf project and this proposal in succession. This would include views to multiple large-scale construction sites and heavy vehicles on the road network. However, this construction activity would be somewhat absorbed into the densely urban environment, and a part of the character of this area as it undergoes an intended transformation, which would not have a cumulative visual impact during the day or at night.

Hunter Street Station (Sydney CBD) construction site

Relevant projects: Sydney Metro City & Southwest (Chatswood to Sydenham) and Sydney Metro – Martin Place Over Station Development

There are Sydney Metro City & Southwest construction sites in close proximity to the Hunter Street Station (Sydney CBD) eastern construction site for this proposal, including the Bligh Street construction site, Martin Place metro station and associated over station development. These two projects currently impact the footpaths along Hunter Street and O'Connell Street, as well as the amenity of Richard Johnson Square at the corner of Hunter and Bligh Streets. The landscape impacts of this proposal on an additional section of Hunter Street and O'Connell Street, and the continued landscape impact surrounding the Bligh Street construction site and impacts on Richard Johnson Square, would result in a cumulative landscape impact for a short period when construction programs overlap.

At the eastern site there are locations where multiple construction sites would be seen in views from Hunter Street, Bligh Street and O'Connell Street. Some work would be visible at street level and extending into the skyline at various distances. Richard Johnson Square would continue to be surrounded by construction activity and would experience a cumulative visual impact for the duration of this proposal. This construction activity would be somewhat absorbed into the dense urban environment and a part of the character of the Sydney CBD as it continues to accommodate development, renewal and refurbishment work.

Clyde stabling and maintenance facility and Rosehill services facility construction site

Relevant project: Clyde Terminal Conversion Project

This proposal would be located within the same network of streetscapes and creek systems as the Clyde Terminal Conversion Project. The landscape impacts on these aspects during construction of this proposal and of the Clyde Terminal Conversion Project would have a cumulative landscape impact, due to reduced vegetation. However, the wider surrounding area is already characterised by industrial land uses which would mean the cumulative landscape and visual amenity impact of reduced vegetation would be minor.

19.6.6 Groundwater

The cumulative impact assessment with respect to groundwater focuses on projects with the potential to result in impacts to the quality and quantity of groundwater resources that are also potentially impacted by this proposal, and how this could result in cumulative impacts to groundwater dependent ecosystems, groundwater users, and surface water-groundwater interactions.

Parramatta metro station construction site

Relevant project: Parramatta Leagues Hotel

Parramatta Leagues Club Hotel is expected to have single level basement and has potential to result in groundwater impacts such as groundwater drawdown during construction; however, the project is located on the opposite side (northern side) of Parramatta River to the Parramatta metro station and is outside the extent of predicted drawdown for this proposal.

Potential cumulative groundwater impacts as a result of the Parramatta Leagues Hotel and this proposal are expected to be negligible.

Sydney Olympic Park metro station construction site

Relevant project: Site 43/44, Sydney Olympic Park – Stage 1 and 2 (6 Australia Avenue and 2 Herb Elliot Avenue), Sites 2A and 2B Sydney Olympic Park – Mixed Use Development

The Site 43/44, Sydney Olympic Park and Sites 2A and 2B Sydney Olympic Park projects are within the predicted drawdown extent of this proposal and will include basement carparking (up to six levels). Therefore, it is likely that cumulative impacts to groundwater would occur.

There are potential impacts to surface water-groundwater interactions for Haslams Creek, the Mason Park wetlands, Bicentennial Park wetlands and the pond at Brickpit Park due to Sydney Metro West. Potential impacts will be investigated prior to commencement of the previous Sydney Metro West planning application (mitigation measure GW2 and GW3 (Sydney Metro, 2020c)).

There is potential that groundwater dependent ecosystems approximately 500 metres west of Sydney Olympic Park metro station would be impacted by cumulative drawdown. Further investigation and assessment would be completed prior to commencement of construction works if the construction schedule for both projects overlap. Potential cumulative groundwater impacts as a result of the Site 43/44, Sydney Olympic Park and Sites 2A and 2B Sydney Olympic Park projects and this proposal are expected to be medium significance.

There are no registered groundwater bores used for water supply purposes within the vicinity of the projects.

The Bays Station construction site

Relevant projects: Western Harbour Tunnel and Warringah Freeway Upgrade

As discussed in Section 5.15 of Technical Paper 7 (Hydrogeology) of the *Sydney Metro West Environmental Impact Statement – Westmead to The Bays and Sydney CBD* (Sydney Metro, 2020a), an additional groundwater drawdown of up to three metres would be expected at The Bays Station construction site due to the Western Harbour Tunnel.

There are no groundwater dependent ecosystems within the vicinity of drawdown and impacts to surface water-groundwater interaction would be low as nearby Whites Creek is concrete lined.

There is one registered water supply bore (GW109209) located about two kilometres from The Bays Station. As part of the Western Harbour Tunnel project, the bore will be monitored during the construction of the tunnel. Potential cumulative groundwater impacts as a result of Western Harbour Tunnel and Warringah Freeway Upgrade and this proposal are therefore expected to be minor.

Hunter Street Station (Sydney CBD) construction site

Relevant projects: Sydney Metro City & Southwest (Chatswood to Sydenham), 50-52 Phillip Street New Hotel, One Sydney Harbour, and 301 and 305 Kent Street Concept Hotel Development

Potential cumulative impacts between this proposal and these projects are presented in Table 19-3.

There are no registered water supply bores or groundwater dependent ecosystems within the vicinity of the projects that would be impacted by cumulative drawdown.

Table 19-3 Potential cumulative groundwater impacts – Hunter Street Station (Sydney CBD) construction site

Project	Potential cumulative groundwater impacts
Sydney Metro City & Southwest (Chatswood to Sydenham)	Cumulative drawdown impacts are likely due to the proximity of the completed Martin Place metro station excavation to Hunter Street Station (Sydney CBD). Prior to construction of Hunter Street Station (Sydney CBD), investigations will be carried out to confirm the existing baseflow contribution by groundwater resources to Circular Quay, and to confirm the likelihood and significance of potential impacts of predicted drawdown on baseflow (mitigation measure GW3 (Sydney Metro, 2021a)). However, impacts are likely to be low as Circular Quay is a part of Sydney Harbour and surface water – groundwater interaction is expected to be minimal or negligible. Potential cumulative groundwater impacts as a result of Sydney Metro City & Southwest (Chatswood to Sydenham) and this proposal are expected to be minor.
50-52 Phillip Street New Hotel	The proposed construction of this project includes a basement of unknown depth and is located within the predicted drawdown extent. Cumulative drawdown impacts are likely due to the proximity to Hunter Street Station (Sydney CBD) and overlapping construction timeframes. Prior to construction of Hunter Street Station (Sydney CBD), investigations will be carried out to confirm the existing baseflow contribution by groundwater and potential impacts as detailed above for Sydney Metro City & Southwest (Chatswood to Sydenham). However, impacts are likely to be minor as Circular Quay is a part of Sydney Harbour and surface water – groundwater interaction is expected to be minimal or negligible.
One Sydney Harbour	The proposed construction of this project includes a basement structure. Cumulative drawdown impacts are likely, if excavation of the parking structure overlaps in time, due to the proximity to Hunter Street Station (Sydney CBD). Prior to construction of Hunter Street Station (Sydney CBD), investigations will be carried out to confirm the existing baseflow contribution by groundwater and potential impacts as detailed above for Sydney Metro City & Southwest (Chatswood to Sydenham). However, impacts are likely to be minor as Circular Quay is a part of Sydney Harbour and surface water – groundwater interaction is expected to be minimal or negligible.
301 and 305 Kent Street Concept Hotel Development	The proposed construction of this project includes a five-level basement carpark. Cumulative drawdown impacts are likely during construction of the basement carpark, as it is located within the predicted long-term drawdown extent for the Hunter Street Station (Sydney CBD). Prior to construction of Hunter Street Station (Sydney CBD), investigations will be carried out to confirm the existing baseflow contribution by groundwater resources to Circular Quay, and to confirm the likelihood and significance of potential impacts of predicted drawdown on baseflow. Potential cumulative groundwater impacts as a result of the new this development and the proposal are expected to be moderate.

Clyde stabling and maintenance facility and Rosehill services facility construction site

Relevant project: Clyde Terminal Conversion Project

The south-western corner of project being decommissioned is within predicted drawdown extent for the Clyde stabling and maintenance facility and Rosehill service facility. There is potential for excavation works within this area to remove any underground storage tanks and associated infrastructure. However, excavation would likely be relatively shallow (maximum five metres depth) and would be open for a short duration while the infrastructure is removed.

Potential cumulative groundwater impacts as a result of the Clyde Terminal Conversion Project and this proposal are expected to be low significance.

19.6.7 Contamination

Potential cumulative contamination impacts are discussed in more detail in Technical Paper 7 (Contamination). Where it was concluded that a project would have no interfaces with this proposal from a contamination perspective, these are not discussed in this chapter.

Sydney Olympic Park metro station construction site

Relevant project: Site 43/44, Sydney Olympic Park – Stage 1 and 2 (6 Australia Avenue and 2 Herb Elliot Avenue), Sites 2A and 2B, Sydney Olympic Park – Mixed Use Development

The construction timeframe for Site 43/44, Sydney Olympic Park is unknown. Environmental Investigation Services (2010) conducted a Phase 1 Preliminary Environmental Site Assessment which concluded that the potential of significant widespread soil contamination was relatively low. Geotechnique (2010) also conducted additional drilling at Site 43/44, which encountered limited groundwater seepage at approximately 2.6 metres below ground level in one of eight locations investigated. Based on the information reviewed there are not likely to be any interfaces with contamination management between Site 43/44, Sydney Olympic Park and this proposal. Given the proposed shallow depth of the proposed basement (as part of Site 43/44), groundwater dewatering would be expected to be minimal.

The construction timeframe for Sites 2A and 2B, Sydney Olympic Park is also unknown. The construction would require bulk excavation and dewatering. Douglas Partners (2018) undertook a contamination investigation of Sites 2A and 2B, Sydney Olympic Park, which comprised a review of previous reports and additional soil and groundwater sampling. Based on the information reviewed there are not likely to be any interfaces with contamination management between the Sites 2A and 2B, Sydney Olympic Park project and this proposal, with the exception of potential groundwater dewatering (refer to Section 19.6.6).

As the dewatering for the excavation for this proposal is likely to only occur for a proportion of the construction period, the cumulative impact of lowering of local groundwater levels is likely to be short term. Further modelling undertaken during work carried out under the previous Sydney Metro West planning application prior to construction of this proposal would consider potential cumulative impacts of surrounding projects, including potential dewatering.

The Bays Station construction site

Relevant projects: Western Harbour Tunnel and Warringah Freeway Upgrade

One of the construction compounds for the Western Harbour Tunnel (referred to as WHT3) is located adjacent to The Bays Station construction site for this proposal and is located on both sides of White Bay. No earthworks will be carried out in the WHT3 construction compound during the Western Harbour Tunnel construction period.

The changes due to groundwater drawdown of both this proposal and the Western Harbour Tunnel could have impacts to the migration of existing groundwater contamination and potential oxidation of acid sulfate soils in the same area of White Bay. Both projects would require detailed soil and groundwater investigations, an acid sulfate soil management plan and a groundwater monitoring plan to monitor and manage environmental impacts.

Hunter Street Station (Sydney CBD) construction site

Relevant projects: Sydney Metro City & Southwest (Chatswood to Sydenham), 301 and 305 Kent Street Concept Hotel Development

Potential cumulative impacts between this proposal and these projects are presented in Table 19-4.

Table 19-4 Potential cumulative contamination impacts –Hunter Street Station (Sydney CBD) construction site

Project	Potential cumulative contamination impacts
Sydney Metro City & Southwest (Chatswood to Sydenham)	Components of the project relevant to Hunter Street Station (Sydney CBD) construction site include the tunnelling/construction of stations at Barangaroo and Martin Place. No areas of environmental interest were identified in the vicinity of the Martin Place metro station in the contamination assessment. Barangaroo Station is over 300 metres from the proposal and there are not expected to be any interfaces relating to contamination and this proposal.
301 and 305 Kent Street Concept Hotel Development	The construction of this development would include bulk excavation and de-watering for a five-level basement. The Detailed Site Investigation (DSI) for this project concluded that the risks to human health associated with soil contamination were negligible and that the site was suitable for the proposed development. Based on this information no potential cumulative impacts from management of contamination have been identified.

Clyde stabling and maintenance facility and Rosehill services facility construction site

Relevant project: Clyde Terminal Conversion project

According to details in the AECOM Australia Pty Ltd (2013b) Clyde Terminal Conversion Project Environmental Impact Statement, the project involves shallow excavations in areas of the Clyde Terminal ranging between 0.3 and 1 metre below ground level. No groundwater dewatering was anticipated to be required.

There are not likely to be any interfaces with contamination management or cumulative impacts between the Clyde Terminal Conversion Project and this proposal.

19.6.8 Flooding

Potential cumulative flooding impacts are discussed in detail in Technical Paper 8 (Hydrology, flooding and water quality).

A qualitative assessment has been carried out of the potential cumulative flooding impacts of the construction of this proposal with other projects. In general, potential cumulative flooding impacts would be negligible due to the nature of the projects and/or as other projects are not hydraulically connected to the sites in events up to the one per cent AEP flood event.

Potential cumulative flooding impacts would be mitigated through the implementation of flooding mitigation measures identified in Chapter 20 (Synthesis) of this Environmental Impact Statement, contributing to the management of flows and flood levels for receiving catchments and watercourses.

19.6.9 Social impacts

The cumulative social benefits of the identified projects during construction may include increased opportunities for economic development and employment opportunities, contributing to increased household incomes for construction workers.

The potential cumulative social impacts during construction may include:

- concurrent construction activities, which may cause an additional temporary increase in construction traffic, with the potential to produce a potential cumulative traffic noise impact along common haul routes, as well as parking and access impacts
- cumulative noise and vibration impacts during construction which could impact on the way of life, wellbeing and social amenity of affected receivers
- cumulative landscape character impacts due to construction of other projects contributing to a potential decline in the way people experience their surroundings. This cumulative impact would reduce over time with the completion of adjacent infrastructure projects
- additional increased traffic on local roads, as well as construction activities, which may cause temporary changes in the amenity of nearby properties and social infrastructure due to construction noise, vibration and dust

- potential additional impacts on culture and connections to Country if Aboriginal objects are identified during further investigations for The Bays Station construction site
- extended construction periods and potential associated impacts on traffic, noise, air quality and amenity, which may result in construction fatigue in surrounding communities.

These potential cumulative impacts are more likely to occur at construction sites in close proximity to the projects identified in Table 19-1, including but not limited to Parramatta, Clyde, Sydney Olympic Park, The Bays, Pyrmont and Hunter Street. Communities around these particular areas have been and will continue to be subject to impacts associated with the construction of a number of major infrastructure projects over an extended period of time.

19.6.10 Local business impacts

Measures to avoid, reduce, or mitigate the potential impacts of this proposal are collated in Chapter 20 (Synthesis) of this Environmental Impact Statement. These measures would reduce the likelihood and magnitude of cumulative impacts during construction should they occur.

Potential cumulative impacts to businesses around construction sites (especially the Westmead metro station, Parramatta metro station, The Bays Station, Pyrmont Station and Hunter Street Station (Sydney CBD) metro station construction sites) as a result of other projects being carried out concurrently in the surrounding area could include:

- additional temporary changes and general disruption to traffic and transport services
- potential additional temporary interruption of utilities
- potential additional temporary increased travel times for workers
- additional temporary reduction in amenity (as a result of construction noise, traffic congestion, changes to visibility, and dust).

19.6.11 Biodiversity

This proposal is located within areas already subject to substantial urban development and historic environmental pressures, including residential, commercial and industrial land uses. This has resulted in limited and fragmented natural biodiversity values within the baseline environment for this proposal.

This proposal is expected to have minimal impacts on biodiversity values. Vegetation removal required for this proposal includes landscape plantings and naturally propagated weeds or common urban-adapted native species. The implementation of biodiversity mitigation measures for this proposal and other projects would also mean that cumulative impacts on biodiversity are considered to be negligible.

19.6.12 Air quality

The adoption of mitigation and management measures set out in Chapter 20 (Synthesis) and Appendix F (Construction Environmental Management Framework (CEMF)) are expected to result in the adequate management of dust and other emissions for this proposal. Potential cumulative air quality impacts would be temporary and managed through consultation with the relevant stakeholders and coordinating construction programs with other nearby projects.

The potential for cumulative air quality impacts is expected to be highest at the following construction sites, as a result of the number, proximity and/or scale of other nearby major projects:

- Clyde stabling and maintenance facility and Rosehill services facility construction sites
- The Bays Station construction site
- Pyrmont Station construction sites
- Hunter Street Station (Sydney CBD) construction sites.

19.6.13 Hydrology and water quality

The projects identified in Table 19-1 are also located within the Parramatta River and Sydney Harbour catchment and therefore have the potential to result in cumulative impacts on hydrology and local water quality from concurrent construction activities, including vegetation clearing, earthworks, materials handling, and from exposed surfaces and stockpiles.

Potential cumulative water quality impacts are largely related to the erosion, sedimentation and discharge of wastewater into common waterways. However, cumulative water quality impacts are not expected as this proposal and these other projects would be required to implement standard construction mitigation measures outlined in The Blue Book (Landcom, 2004), and relevant water quality guidelines.

19.7 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 cumulative impacts during construction would be managed through standard measures outlined in the CEMF (Appendix F). This includes consultation with the stakeholders where required to manage the interface of projects under construction at the same time, and the coordination of works and traffic arrangements between projects.