Transport for NSW

Appendix D
Camellia foreshore to Rydalmere option – preliminary environmental scoping

NSW GOVERNMENT

D-1 Introduction

This appendix provides a preliminary scoping of the potential impacts on the local biophysical environment and cultural environment of an alternative light rail alignment through the Camellia foreshore to Rydalmere, which is being investigated by Transport for NSW.

Should this option proceed, further environmental impact assessment would be undertaken as part of an Amendment Report, to be prepared following exhibition of the Parramatta Light Rail Stage 2 Environmental Impact Statement (EIS).

D-1-1 Overview and purpose

The Parramatta Light Rail Stage 2 EIS has assessed a preferred alignment for the second stage of Parramatta Light Rail (the project). The preferred alignment was developed as an outcome of a comprehensive options process described in Chapter 5 (Design development, alternatives and options) of the EIS.

In Camellia and Rydalmere, the project (for which approval is sought and as described in the EIS) extends from just east of Grand Avenue North and continues east along the former freight rail (Sandown Line) corridor (the Sandown Line corridor) and Grand Avenue in Camellia. It then extends north via the proposed bridge across the Parramatta River to Rydalmere and continues north along John Street (see Figure 2.2 and Figure 2.3 in Chapter 2 (Location and setting)).

An alternative option for crossing the Parramatta River between the Camellia foreshore and Rydalmere is being considered by Transport for NSW. This route option, referred to as 'the Camellia foreshore to Rydalmere option' extends along the Sandown Line corridor in Camellia; however, instead of crossing south over to Grand Avenue, it continues along the river foreshore before extending across a new bridge structure landing in the western section of Eric Primrose Reserve, Rydalmere. The route would then extend along the northern boundary of Eric Primrose Reserve between Park Road and Jean Street, with a light rail stop located close to Rydalmere Wharf. From there, it would extend north along John Street, and east into South Street (see Figure D.1).

The Camellia foreshore to Rydalmere option was identified following the release of the *Draft Camellia Rosehill Place Strategy* ('the Strategy') in December 2021 (DPIE, 2021), which removed any potential conflicts of the river crossing at Park Road. The Strategy also identified the eastern section of Camellia, which adjoins the Grand Avenue section of the project alignment as described in the EIS, for ongoing industrial land use. The Camellia foreshore to Rydalmere option is being investigated as it may, depending on the results of further investigations, better meet the project objectives and offer improved outcomes for customers, the community and the environment.

This option is considered to have some advantages over the project alignment described in the EIS:

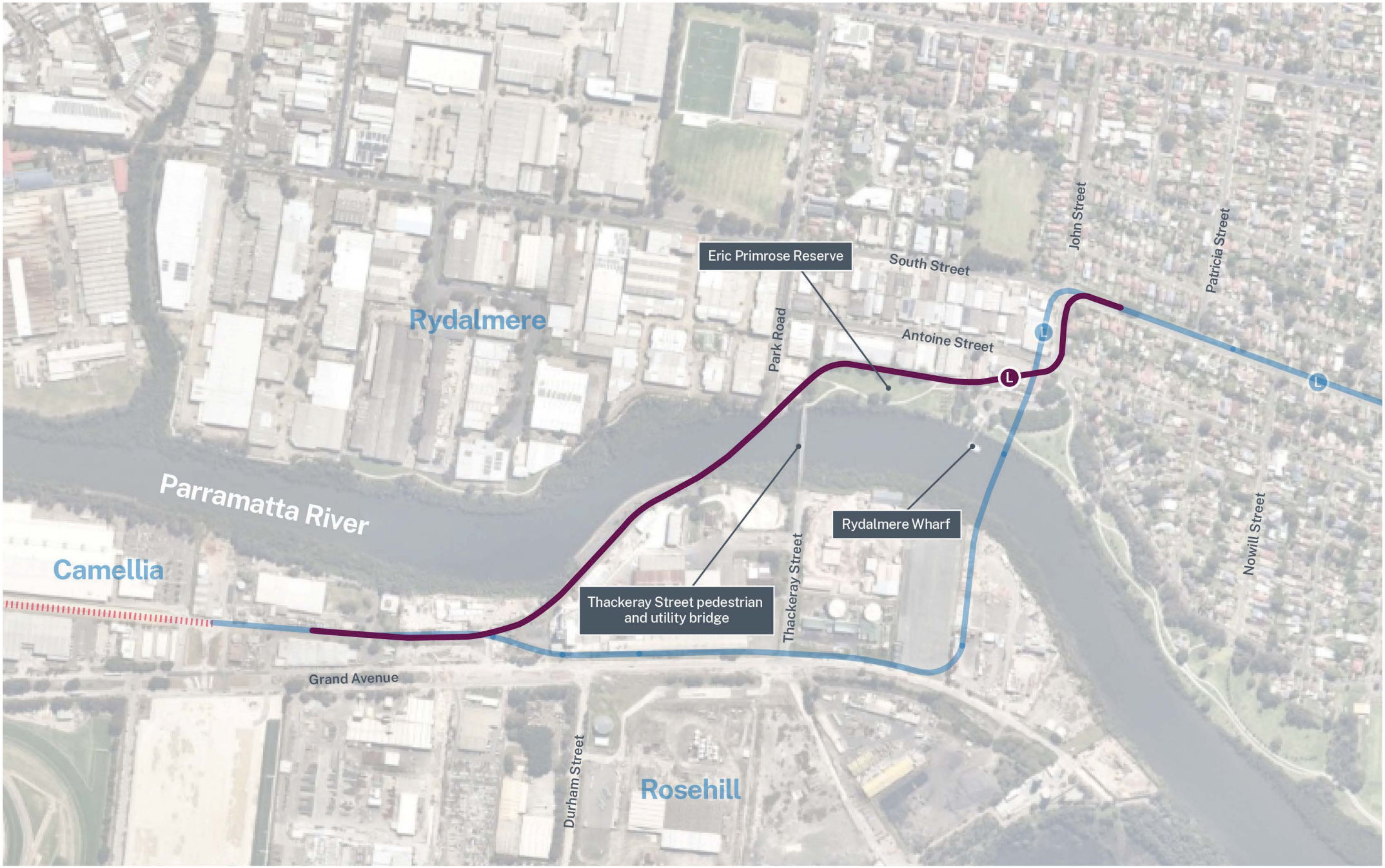
- it involves a more direct route through Camellia
- there would be fewer interactions with industrial properties in Camellia
- there would be separation from Grand Avenue avoiding heavy vehicle interactions, several new signalised intersections and property access impacts
- it would avoid several major utilities
- impacts to the Eric Primrose Reserve amenities buildings would be avoided and only minor configurations needed to the Rydalmere Wharf car park

- impacts to F3 Parramatta River ferry services from Circular Quay would be reduced as the Rydalmere Wharf would remain operational during construction of the bridge
- less clearing of mangroves adjacent to Parramatta River would be required and the removal of fig trees in Eric Primrose Reserve would be avoided.

This option may also provide light rail customers with a range of benefits such as potentially shorter journey times, an enhanced interchange as a result of a light rail stop being located closer to Rydalmere Wharf, and a more scenic route along the foreshore, which would also improve active transport link amenity for cyclists and pedestrians. This option also presents an opportunity to upgrade Eric Primrose Reserve.

If further investigations and consultation (including feedback received during the public exhibition of the EIS) identifies the Camellia foreshore to Rydalmere option as better meeting the project objectives, Transport for NSW may, with the agreement of the Planning Secretary, amend the project for which approval is sought. Any such change would be described in an Amendment Report, prepared in accordance with section 179(2) of the Environmental Planning and Assessment Regulation 2021 and the *State significant infrastructure guidelines – preparing an amendment report* (DPIE, 2021d).

This document presents an initial scoping of how the potential impacts of a project incorporating the Camellia foreshore to Rydalmere option would differ from the potential impacts of the project described in the EIS.



LEGEND

- Project alignment (assessed in EIS)
- Potential alternate alignment
- Existing light rail track (Stage 1)
- Project light rail stop (assessed in EIS)
- Potential alternate light rail stop

Figure D.1- Camellia foreshore to Rydalmere option

0 500m

D-1-2 Description of Camellia foreshore to Rydalmere option

Infrastructure and operation

Table D.1 provides a description of the proposed infrastructure for the Camellia foreshore to Rydalmere option.

The operation of the project incorporating this alterative section of route would be consistent with the description in section 6.10 of the EIS; however, due to the overall shorter length of the route (around 150 metres) it may result in potentially shorter journey times. Ferries may also experience an improvement in journey times as they would not need to lower their mast prior to stopping at Rydalmere Wharf as the bridge would be located further away, to the west of the wharf.

Table D.1 Overview of infrastructure for the Camellia foreshore to Rydalmere option

Infrastructure element	Description
Track form	Embedded or permeable track as described in Section 6.2.1 of the EIS.
Running corridor	Predominantly off-road (separated) along the Sandown Line corridor before crossing over the new bridge and then through Eric Primrose Reserve at grade. The corridor would then become on-road (segregated) as it extends up John Street turning east onto South Street. For more information on running corridor types see section 6.2.2 of the EIS.
Light rail stop	The proposed stop location, which is shown on Figure D.1, would be located close to Rydalmere Wharf in Eric Primrose Reserve, with stop infrastructure as described in section 6.3.2 of the EIS. This would replace the light rail stop proposed on John Street as described in the EIS.
Active transport links	An active transport pathway would be provided along the Sandown Line corridor and river foreshore in Camellia, and across the bridge. A separate active transport link ramp would be provided to exit off the bridge and connect with the existing Parramatta Valley Cycleway and local footpaths. For more information on the proposed active transport links see section 6.4 of the EIS.
Bridge	The southern abutment of the bridge would be constructed towards the eastern end of the Sandown Line corridor in industrial land in Camellia. The bridge would then extend over the foreshore and mangroves and across the river, with the northern abutment constructed in the western end of Eric Primrose Reserve in Rydalmere. It is likely that the bridge would be about 260 metres long with different bridge types under consideration. The bridge would be supported by piers in the Parramatta River and on land. The highest point of the bridge deck would be about 11 metres above the river providing the minimum clearance of 5.2 metres above the highest astronomical tide.
Road corridor works and network changes	To accommodate the necessary curves to allow the light rail to travel north to South Street, the light rail track would extend along the eastern side of John Street (instead of the western side as described in the EIS). One northbound road lane would be maintained between the light rail corridor and the properties on the western side to maintain access. Adjustments may also be carried out to the Park Road turning circle. Other road changes would likely include the introduction of traffic signals at the intersections of John Street/Antoine Street and John Street/South Street. This would result in some road network changes such as the removal of the existing left turn from Antoine Street (westbound) into John Street (southbound).
Other facilities and infrastructure	Drainage would be required to mitigate potential impacts caused by the alignment and road changes and increases in stormwater flows. This could include an upgraded or new outfall that would discharge to Parramatta River near Jean Street in Rydalmere. Interchange facilities, such as wayfinding signage, pathways and passenger information displays would be installed around the light rail stop (see section 6.7.3 of the EIS). It is likely that a slight reconfiguration of the Rydalmere Wharf car park would be required to facilitate the new active transport connections and paths. Retaining walls, power supply (including overhead wiring and a traction power substation in Rydalmere) and communications systems would also be required and are described in sections 6.7.4, 6.7.5 and 6.7.6 of the EIS.

Infrastructure element	Description
Other public domain works and public open space	The Rydalmere to Camellia foreshore option would require works to a larger area of Eric Primrose Reserve than the project as described in the EIS. However, the option alignment has been carefully selected to provide positive open space and public domain outcomes. This included extending the alignment around the western and northern perimeters of Eric Primrose Reserve closer to existing buildings and impacting lower amenity tree planting allowing for open space close to the river to be retained and enhanced through proposed active transport links, landscaping and tree planting. The location of the light rail stop, while partially located in open space, would allow for an improved interchange with a shorter distance between the light rail and Rydalmere Wharf, when compared to the project as described in the EIS. It would also present opportunities to provide facilities such as kiss and ride and bike racks. Additional recreational facilities, resting points and improvements to existing walking and cycling infrastructure would also be delivered as part of this option. In addition, the Camellia foreshore to Rydalmere option would not require removal of the mature fig trees in Eric Primrose Reserve and the northern bridge abutment would be sited within a gap in the mangrove vegetation. The fig trees and mangroves both contribute to the amenity of the area.
Land requirements	The Camellia to Rydalmere foreshore option would require land to be acquired to facilitate construction and accommodate the project's permanent operational infrastructure. However, it is expected that this option would reduce the area of privately-owned land that would be required compared to the project as described in the EIS. For example, industrial properties at the eastern end of Grand Avenue in Camellia and on the western side of John Street are expected to be retained. Land requirements for the Camellia foreshore to Rydalmere option are likely to include: • public land – such as land within Eric Primrose Reserve, which is owned by City of Parramatta Council, and the Sandown Line corridor owned by the NSW Government • private land – which could require whole acquisitions to facilitate light rail infrastructure (for example properties at the end of Park Street, on Antoine Street between Jean and John streets and on the eastern side of John Street). The Immanuel Australia Church and properties on Antoine Street (between Park Road and Jean Street) in Rydalmere would be retained but these and other adjacent properties may require some partial strip acquisition to accommodate the light rail corridor. Some of the land that would be required for this option may be available for other uses (such as public open space) following construction, where it is surplus to the operational requirements of the project (see section of 6.9.2 of the EIS for more information on residual land management).

Construction

Construction of Camellia foreshore to Rydalmere option would generally include the same activities as described in the EIS (Chapter 7 (Project description – construction)):

- site establishment (see section 7.2 of the EIS) which would likely require the use of Eric Primrose Reserve as a temporary construction compound and works area
- main construction works, including constructing the light rail infrastructure, bridge between the Camellia foreshore and Rydalmere, and other proposed infrastructure (see section 7.3 of the EIS)
- finishing works, including testing, commissioning and site rehabilitation (see section 7.4 of the EIS).

Bridge construction typically includes those activities described in section 7.3.2 of the EIS:

- excavation works at approaches and supports
- existing utility protection and relocation works and installation of new services
- constructing abutments on the approaches to the bridge
- constructing bridge piles (if applicable) and pile caps (if applicable)
- constructing bridge piers (if applicable)

- constructing bridge superstructure
- installing light rail infrastructure on the bridge deck
- other bridge fit-out works, including installing handrails, overhead wiring and other safety and operational infrastructure.

More details on the construction methodology for works in and around the Parramatta River would need to be developed. It is expected that this may include the use of cranes, barges, piling rigs, temporary work platforms, coffer dams, and environmental protection measures (e.g silt curtains).

Construction materials, and plant and equipment required to construct the Camellia foreshore to Rydalmere option would be similar to the project as described in section 7.6.4 and section 7.6.5 of the EIS.

Water-based works would require the temporary closure of part, or all, of the navigational channel, which may limit the operation of the ferry service to Parramatta Wharf in a similar way to the project described in the EIS. However, a benefit of this option, compared to the project described in the EIS, is that Rydalmere Wharf would require fewer closure periods (only those associated with the closure of the navigation channel to construct the bridge between Melrose Park and Wentworth Point – see section 7.7.5). This is because the bridge would be located further to the west allowing access to be safely maintained for ferries travelling from Circular Quay. The commuter car park may still be required to be closed to facilitate construction activities, with minor reconfigurations for operation. Other transport and access considerations would be similar to those described in section 7.7 of the EIS, including restricted access to Eric Primrose Reserve, temporary removal of parking, road detours and construction traffic travelling along local streets.

This option would avoid major utility relocation works on Grand Avenue; however, there is a Sydney Water wastewater pipeline in the northern section of Eric Primrose Reserve, running parallel to Antoine Street, that may need to be relocated. Some minor integration works may be required to provide protection to Sydney Water pipelines that extend underground on the northern side of the river in Rydalmere.

Construction would likely involve some work outside the primary project hours (see section 7.5 of the EIS) to facilitate bridge works and to minimise navigation impacts. While more detailed construction planning would be undertaken, it is expected that the Camellia foreshore to Rydalmere option would be constructed in a similar timeframe to the project as described in the EIS. There may be potential program benefits resulting from less building removal works and avoiding complex utility relocations in Camellia.

D-2 Overview of the existing environment

Table D.2 provides an overview of the existing environment for the Camellia foreshore to Rydalmere option (between the Sandown Line corridor in Camellia and South Street in Rydalmere) and surrounds. It has been informed by desktop review, including information from technical papers where the study area incorporated some or all of the Camellia foreshore to Rydalmere option route.

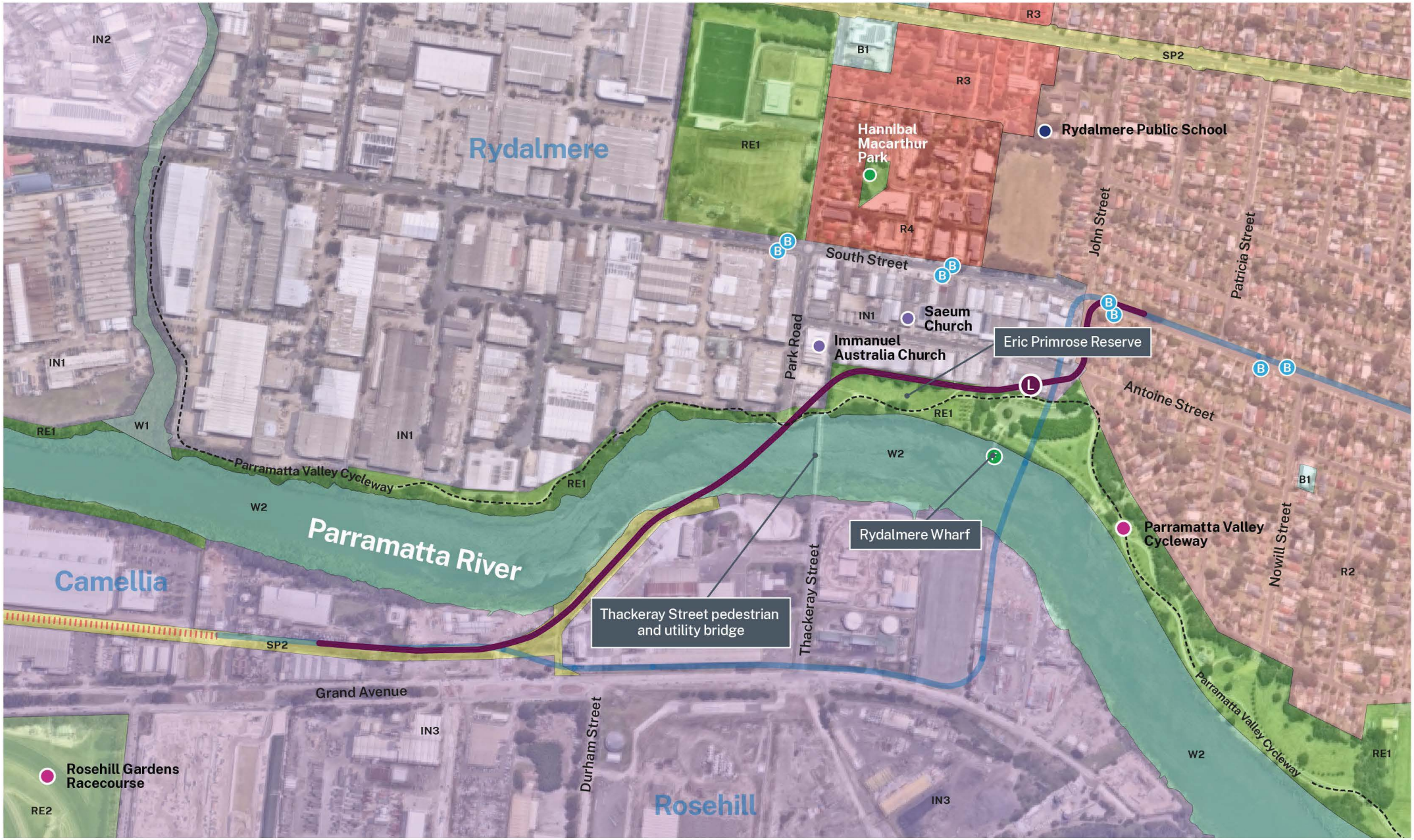
Table D.2 Existing environment overview for the Camellia foreshore to Rydalmere option

Environmental aspect		Camellia foreshore to Rydalmere option
Site description	Location	The Camellia foreshore to Rydalmere option is located in the suburbs of Rydalmere and Camellia, in the City of Parramatta local government area. The route extends from the Sandown Line corridor around the Camellia foreshore, across the Parramatta River and into a mix of industrial property and open space (Eric Primrose Reserve) in Rydalmere, before extending north along John Street back onto the project alignment at South Street.
	Land use zoning	In Camellia, the section of the route where it deviates to the north along the foreshore would extend over land zoned SP2 Infrastructure, IN3 Heavy Industrial and W2 Recreational Waterways (see Figure D.2) In Rydalmere, the route passes through land zoned W2 Recreational Waterways, RE1 Public Recreation, IN General Industrial and R2 Low Density Residential (see Figure D.2).
Transport and traffic	Road network and parking	In Camellia, the key access roads are James Ruse Drive (State road), Grand Avenue (local road) and Thackeray Street. Unrestricted parking is available on Grand Avenue and Thackeray Street. In Rydalmere, the key roads within which the route would be located are the southern end of Park Road (local road), Antoine Street (local road) and John Street (local road), which are accessible from Victoria Road (State road). Unrestricted parking is available on local streets and the Rydalmere Wharf commuter car park (70 spaces) is located immediately east of this route option.
	Public and active transport	There are no public transport facilities associated with this option in Camellia. The Thackeray Street pedestrian and utility bridge (see Figure D.1) provides pedestrian access, via stairs, from Thackeray Street in Camellia across to Eric Primrose Reserve in Rydalmere; however, there is no public access around the foreshore at Camellia. Rydalmere Wharf is located immediately east of the alternative alignment, and the nearest bus stops are located to the north on South Street (see Figure D.2). The Parramatta Valley Cycleway extends along the Rydalmere foreshore linking Parramatta to Meadowbank with a bike rack adjacent to the wharf. Eric Primrose Reserve can be accessed by pedestrians through Park Road, Jean Street and John Street.
Noise and vibration	Existing noise environment	The existing ambient noise environment typically comprises road traffic noise from major and local roads, occasional noise from ferry operations, noise from nearby industrial businesses, and recreational noise around Eric Primrose Reserve.
	Land use and receiver types	The Camellia to Rydalmere foreshore option is located within the following noise catchment areas identified in the EIS: • *C – Camellia Master Plan area:* the area identified for future redevelopment (Camellia town centre of mixed land uses) as shown in the *Draft Camellia-Rosehill Place Strategy* (DPIE, 2021) (area to the east of James Ruse Drive and south of Parramatta River). There are no existing residential land uses and this area typically consists of industrial and commercial land uses. • *D – Rydalmere industrial area*: industrial area in Rydalmere to the north of Parramatta River and west of Park Road. • *E – Rydalmere suburban area 1*: typically, suburban residential land uses in Rydalmere and includes non-residential land uses such as Rydalmere Public School, Saeum Presbyterian Church and Immanuel Australia Church (see Figure D.2).

Environmental aspect		Camellia foreshore to Rydalmere option
Aboriginal heritage	AHIMS sites	No sites registered by the Aboriginal Heritage Information Management System (AHIMS) are located along or near the route option.
	Aboriginal heritage potential	Desktop research and archaeological survey undertaken with a representative of the Deerubbin Local Aboriginal Land Council identified one potential archaeological deposit (PAD) area in the undisturbed sections of Eric Primrose Reserve (PAD3 Rydalmere Wharf – see Figure D.3). Parramatta River is also culturally significant with gathering and ceremonial places along the river. Eel traps and shell middens associated with the river are considered highly significant for Aboriginal people.
Non-Aboriginal heritage	Listed heritage items	The Camellia foreshore to Rydalmere option would partially intersect the locally listed Wetlands (Parramatta Local Environmental Plan (LEP) 2011 - Item I1) along the Camellia foreshore (see Figure D.3). Other nearby items include Truganini House (Item I591 on the Parramatta LEP) in Rydalmere and Industrial Wharves (Item I36 on the heritage schedule of State Environmental Planning Policy (Biodiversity and Conservation) 2021) in Camellia.
	Identified potential heritage items	None identified.
	Archaeological potential	The *Parramatta Historical Archaeological Landscape Management Study* (Godden Mackay Logan, 2001) has been adopted by the City of Parramatta Council and Heritage NSW to guide the management of Parramatta's archaeological resources. The study divides the Parramatta LGA into 'Archaeological Management Units', which are land areas that have similar archaeological potential (based on their historical context and level of disturbance). Several archaeological management units are identified in Camellia and Rydalmere. There are various phases of industrial and farming occupation in the Camellia and Rydalmere areas since colonisation. Depending on the level of disturbance it is possible that areas of land associated with the Camellia foreshore to Rydalmere option may have archaeological potential for resources, which, if present, could be of local or State significance. Also of note is the former Shepherds Wharf that was located at the southern end of Park Road, Rydalmere. The location of the wharf is recognised by heritage interpretative signage. The riverbed between Camellia and Rydalmere for the bridge location as described in the EIS has low potential for maritime archaeological resources. Further assessment would be required to confirm that this is also the case for the section of the riverbed over which this option extends.
Socio-economic	Nearby community facilities	• Camellia: Rosehill Gardens Racecourse and the Thackeray Street pedestrian and utility bridge over Parramatta River. • Rydalmere: Eric Primrose Reserve and river foreshore, Parramatta Valley Cycleway, Rydalmere Wharf, Immanuel Australia Church, Saeum Presbyterian Church and Rydalmere Public School.
	Business types	• Camellia: construction, transport, petroleum, waste management and warehousing businesses, as well as a cafe along Grand Avenue. • Rydalmere: construction, transport, warehousing, wholesale, and manufacturing businesses to the north and west of Eric Primrose Reserve.

Environmental aspect		Camellia foreshore to Rydalmere option
Landscape and visual	Landscape and character views	The Parramatta River is prominent in the landscape, with natural aspects such as the mangroves and grassed areas highly valued in an otherwise urban environment. The Thackeray Street pedestrian and utility bridge is also an existing feature providing pedestrians scenic views up and down the river. Mature trees are located at the end of Park Road and line the boundary of Eric Primrose Reserve adding to the visual amenity of the area. A set of fruit trees that provide a link back to previous orchards are planted immediately west of the commuter car park, while significant mature fig trees are located to the east. The foreshore and park areas are surrounded by one to two storey residential properties in Rydalmere. Industrial businesses are present in Camellia and Rydalmere, which include warehouses, buildings, car parks and work yards. Receivers in this area comprise industrial businesses, residential dwellings in Rydalmere, and recreational visitors or ferry customers at Eric Primrose Reserve.
Biodiversity	Native vegetation and threatened species and communities	There are two plant community types (PCTs) present along the foreshores in Camellia and Rydalmere (see Figure D.4). • PCT 1234 Estuarine Swamp Oak Forest – poor condition (Camellia) – an endangered ecological community under the NSW *Biodiversity Conservation Act 2016* • PCT 920 Estuarine mangrove forest – good condition (Camellia and Rydalmere) – protected marine vegetation under the NSW *Fisheries Management Act 1994.* Threatened fauna species either recorded during surveys or assumed to be present in Camellia and Rydalmere include (see Figure D.4), • Grey-headed flying fox • Green and Golden Bell Frog.
	Aquatic ecology	The Parramatta River is a large, tidal estuary. Much of the river is vegetated with mangroves. Artificial rock seawalls are present at Camellia. Parramatta River is also mapped as key fish habitat – Type 1 (key fish habitat) and also classified as Class 1 (major key fish habitat) as it is a permanently flowing river. No threatened fish or marine species listed under NSW or Commonwealth legislation are considered likely to occur within the Parramatta River.
	Groundwater dependent ecosystems	Mangroves at Camellia and Rydalmere, in or adjacent to the alternative alignment, are groundwater dependent ecosystems.
	Protected and sensitive lands	Coastal wetlands mapped by State Environmental Planning Policy (Resilience and Hazards) 2021 are located along the Parramatta River at Camellia and Rydalmere. The Camellia foreshore to Rydalmere option crosses high biodiversity value land identified on the Biodiversity Values Map under the *Biodiversity Conservation Act 2016* at Parramatta River.
Water	Watercourses and groundwater	The Camellia foreshore to Rydalmere option is located within the upper section of the Parramatta River catchment. The catchment is highly urbanised, meaning that the rainfall–runoff response of the catchment has been altered from a natural state. Geotechnical investigations undertaken for the project indicate that groundwater levels in the study area range from 0.54 to 3.34 metres below ground level. Groundwater levels adjacent to the river are likely to be shallow.

Environmental aspect		Camellia foreshore to Rydalmere option
	Flooding	Areas along the alternative alignment are subject to flooding from the Parramatta River and its tributaries, and from overland flooding when rainfall exceeds the capacity of the local stormwater drainage system. The flooded extent of the Parramatta River floodplain is largely limited to the river and open spaces (like Eric Primrose Reserve) up to the one per cent annual exceedance probability (AEP) event (see Figure D.5). In larger events there is further inundation of properties beyond the limits of open space, and large portions of Camellia become inundated. Camellia and Rydalmere experience overland flows in the five per cent and one per cent AEP events, and ponding in local road low points. Generally, the flood hazard is low, being safe for pedestrians and vehicles, with the exception of some local low points and open spaces on the banks of Parramatta River. In the probable maximum flood event Camellia is inundated and unsafe for people and vehicles. Local roads through Rydalmere experience overland flows and ponding at road low points, but otherwise are safe for people and vehicles.
	Water quality	The Parramatta River and its banks (particularly adjacent to Camellia) are regarded as contaminated, with water and soil quality affected by a wide variety of chemicals and substances. Between June 2019 and May 2020, water quality monitoring was undertaken in the Parramatta River and other waterways as part of the Parramatta Light Rail Stage 1 project. While these sites are located mostly upstream of the project, the data indicates pH, dissolved oxygen, turbidity, aluminium, copper, manganese and iron levels all above guideline values, during both wet and dry weather events. Monitoring of groundwater boreholes in the project area indicates levels of copper, nickel and zinc are above guideline values but are considered to represent background concentrations rather than specific point sources of contamination.
	Sensitive receiving environments	Parramatta River is considered a sensitive receiving environment.
Soils and contamination	Soils	The Camellia foreshore to Rydalmere option is on the disturbed terrain soil landscape type in Camellia and the Lucas Heights soil landscape type in Rydalmere. Fill material of variable thickness is anticipated to underlie the surface at the southern bridge abutment and riverbank at Camellia, which is in turn underlain by sediments of soft to stiff consistency, then sandstone at depths between 10 to 15 metres. Sub surface conditions at the northern bridge abutment and riverbank at Rydalmere are similar, but with sandstone at depths anticipated between five to 10 metres. There is a high probability of acid sulfate soils and moderate salinity potential in Camellia and Rydalmere.
	Contamination	Detailed site assessments on many properties in Camellia have confirmed the presence of contamination in soils and groundwater, with the main contaminants of concern being hexavalent chromium, petroleum hydrocarbons, chlorinated hydrocarbons, and asbestos. The potential to encounter significant or widespread contamination at Rydalmere is considered to be low. Previous sampling within the Parramatta River has indicated potential contamination within sediments, including heavy metals, total recoverable hydrocarbons and dioxins, likely to be a result of adjacent heavy industrial activity.
Air quality	Existing air quality	Local emission sources, including industrial and domestic activity, natural sources and local transport emissions, all contribute to existing air quality.



LEGEND

- Project alignment (assessed in EIS)
- Potential alternate alignment
- Existing light rail track (Stage 1)
- Potential alternate light rail stop
- Parramatta Valley Cycleway

Community facility types

- Recreation/sports facilities
- Community and cultural facility
- Open space, parks and reserves
- Education

Land zoning under the Parramatta LEP

- RE1-Public Recreation
- RE2-Private Recreation
- W1-Natural Waterways
- W2-Recreational Waterways
- IN1-General Industrial
- IN3-Heavy Industrial
- B1-Neighbourhood Centre
- B2-Local Centre
- SP2-Infrastructure
- R2-Low Density Residential
- R4-High Density Residential
- Ferry wharf
- Bus stop

Figure D.2 Land use and community facilities for the Camellia foreshore to Rydalmere option

0 500m

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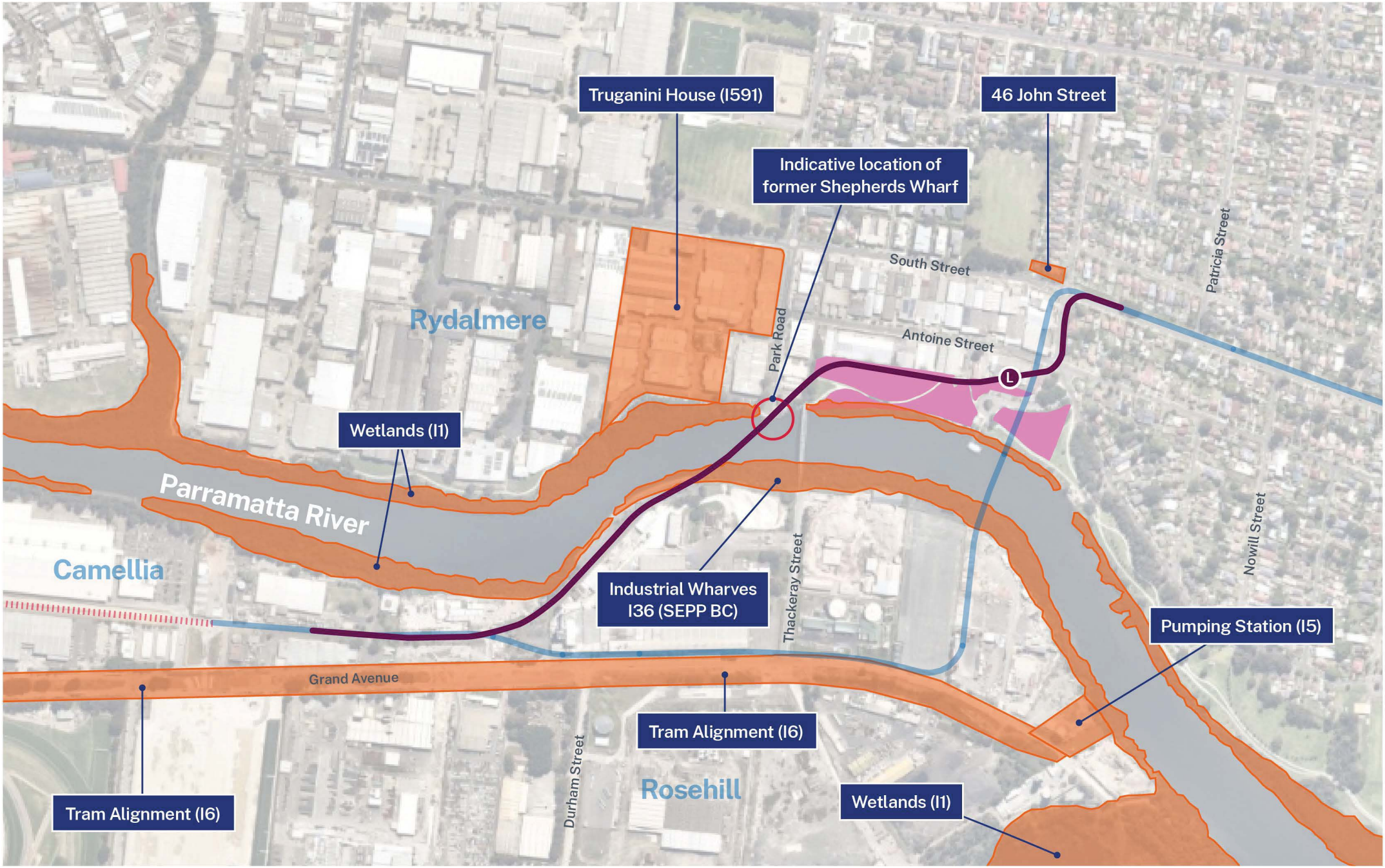


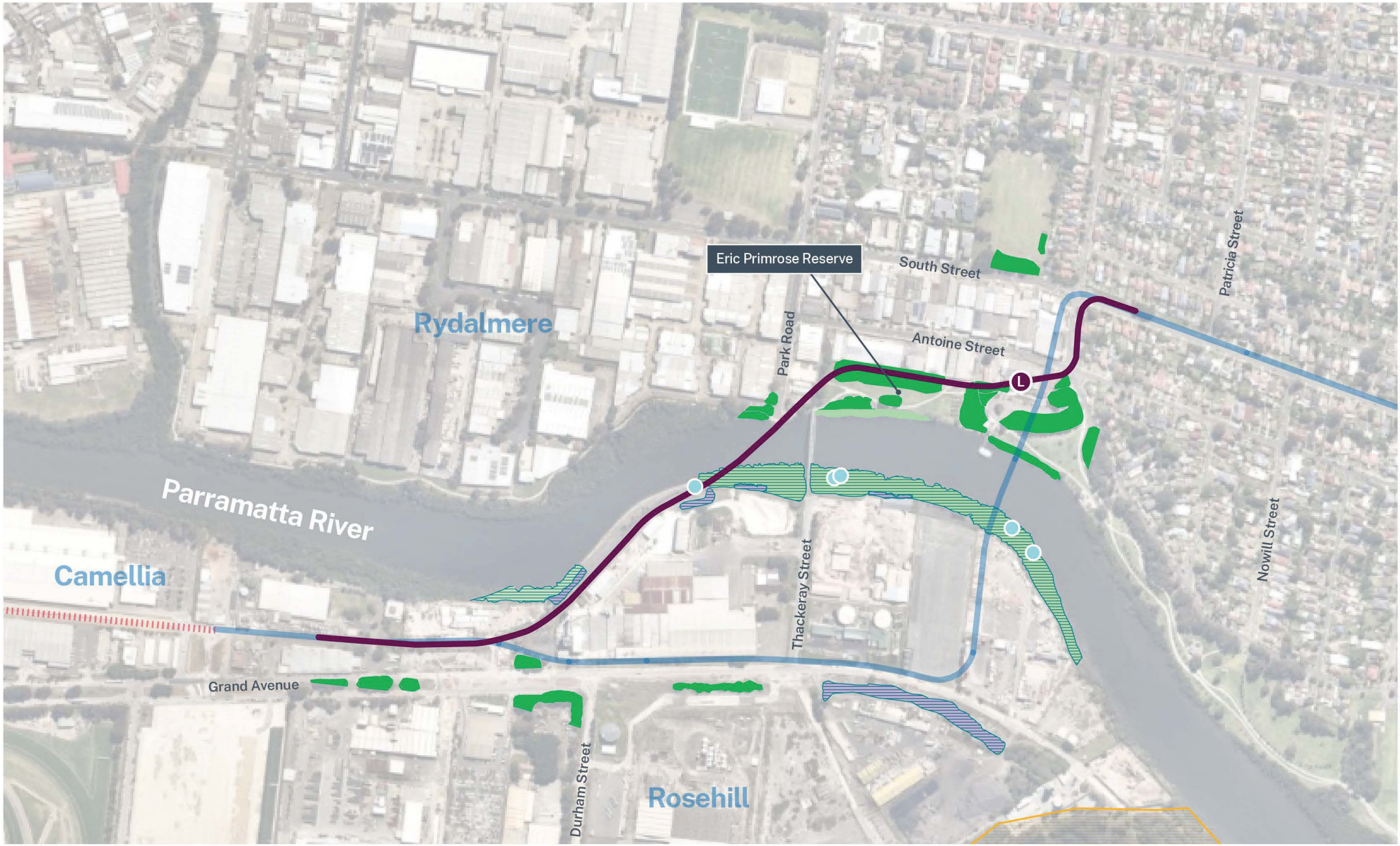
LEGEND

- Potential alternate alignment
- Project alignment (assessed in EIS)
- Existing light rail track (Stage 1)
- Potential alternate light rail stop
- Potential archaeological deposit 3 (PAD3)
- Heritage item

Figure D.3 Key heritage features of the Camellia foreshore to Rydalmere option

0 500m

N



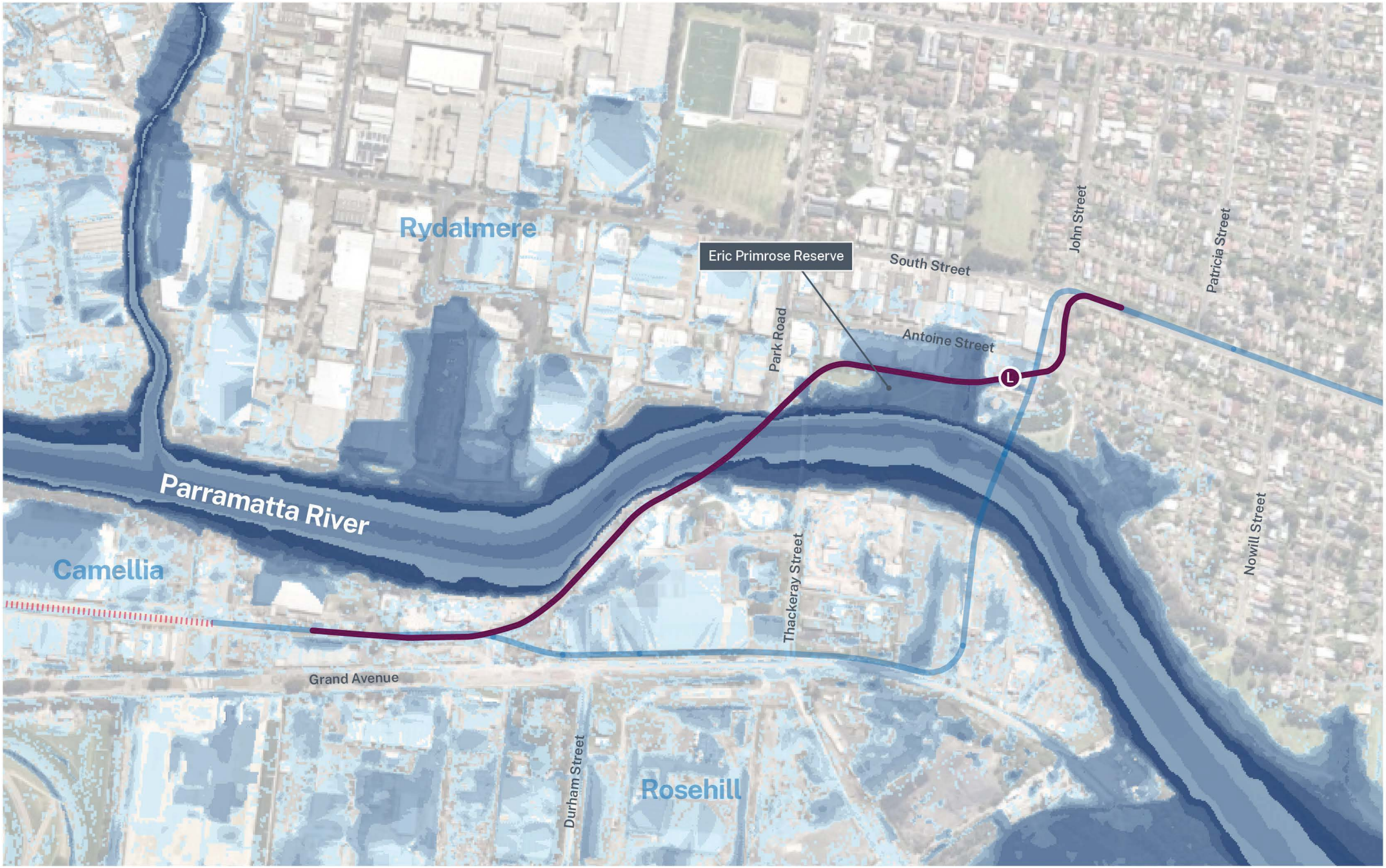
LEGEND

- Project alignment (assessed in EIS)
- Potential alternate alignment
- Existing light rail track (Stage 1)
- Potential alternate light rail stop
- Green and Golden Bell Frog habitat (movement habitat)
- Green and Golden Bell Frog habitat (from SOPA 2019)
- Threatened fauna – Grey headed Flying-Fox
- Planted vegetation
- Estuarine Swamp Oak forest (PCT 1234) Poor condition
- Estuarine mangrove forest (PCT 920) Good condition

0 500m

N

Figure D.4 Key biodiversity features of the Camellia foreshore to Rydalmere option



LEGEND

- Project alignment (assessed in EIS)
- Potential alternate alignment
- Existing light rail track (Stage 1)
- L Potential alternate light rail stop
- 0 – 0.05m
- 0.05 – 0.1m
- 0.1 – 0.25m
- 0.25 – 0.5m
- 0.5 – 1m
- 1 – 2m
- 2 – 3m
- 4m+

Figure D.5 - Existing flooding conditions for the Camellia foreshore to Rydalmere option (one per cent annual exceedance probability)

0 500m

N

D-3 Impact scoping

The EIS provides an assessment of the potential impacts of the project for which approval is sought. The screening assessment provided in Table D.3 considers the potential environmental impacts of the project with the inclusion of the Camellia foreshore and Rydalmere option. It identifies whether there is likely to be a change in the potential impacts described in the EIS if the project were to adopt the alternative alignment for this section of the route. Where the screening assessment identifies that the potential impacts described in the EIS could change as a result of adopting the Camellia foreshore and Rydalmere option, further assessment is proposed and an indicative scope has been provided.

If this option were to progress, any further assessments required would be undertaken in accordance with the relevant SEARs. The results of further assessments would be provided as part of an Amendment Report. The assessments would focus on the impacts specific to constructing and operating the Camellia and Rydalmere foreshore option and would consider the need for changes to the relevant mitigation measures provided in the EIS (see Appendix K (Consolidated mitigation measures)).

Table D.3 Preliminary environmental scoping – Camellia foreshore to Rydalmere option

Environmental aspect	Potential impacts	Further detailed assessment required	Scope of assessment/key tasks
Transport and traffic	Construction impacts specific to this option would likely include: • road closures and detours of different roads to those assessed as part of the EIS – this option would remove the need for construction works on Grand Avenue reducing vehicle conflicts in this area • parking impacts – which may still include temporary closure of the Rydalmere Wharf car park to facilitate construction activities but would reduce the temporary parking impacts along Grand Avenue when compared to the project as described in the EIS • property access changes • changes to public and active transport – this would include temporary closure of a section of the Parramatta Valley Cycleway (with a detour provided), Thackeray Street pedestrian and utility bridge and other local footpaths. A benefit of this option is that Rydalmere Wharf would remain operational during construction given the larger separation distances between the wharf and bridge works, however ferry services to Parramatta may be disrupted at times, with alternative transport services (such as buses) to be provided by the operator of the Parramatta River ferry service in conjunction with Transport for NSW • river access and navigation impacts – would include partial or full closures of the river upstream, which would have the potential to impact ferry services travelling to Parramatta. Operational impacts would likely include: • traffic network connectivity and performance – this option would remove the need for three signalisations on Grand Avenue, which would be an improved traffic outcome and would reduce associated conflicts between heavy vehicles, light rail and pedestrian and cycling movements • removal of some parking – on local streets while the Rydalmere Wharf car park would be retained	Yes	The following assessment tasks are proposed: • review proposed construction activities and staging with respect to site access, road and navigational channel closures, and potential impacts on the transport network and maritime facilities • review project conditions during operation, including integration with other transport modes, changes to road network conditions, and walking and cycling connections. As the proposed changes are unlikely to have major adverse changes/impacts to the road network beyond those assessed in the EIS, it is not proposed to update traffic modelling.

Environmental aspect	Potential impacts	Further detailed assessment required	Scope of assessment/key tasks
	• public transport – potentially shorter journey times and a positive interchange experience with the light rail stop closer to Rydalmere Wharf. There is also an opportunity for a reduction in bus movements into Parramatta when ferry services need to be replaced due to low tide (where the light rail could transport customers instead of replacement buses) • active transport – this option would have potential benefits in terms of providing important north–south connections, with improved safety outcomes and less potential conflict with vehicles as a result of the light rail extending along the Camellia foreshore instead of Grand Avenue. Improvements to existing walking and cycling infrastructure would also be delivered as part of this option • river navigation – the greater separation between the bridge and Rydalmere Wharf would reduce impacts on navigation (for example ferries would not need to lower their mast prior to stopping at Rydalmere Wharf).		
Noise and vibration	Due to a revised project site boundary, construction of the Camellia foreshore to Rydalmere option would result in potential noise and vibration impacts on different surrounding land uses and sensitive receivers than those assessed in the EIS. Potential impacts would occur as a result of the operation of plant and equipment during construction, particularly during night-time works. Operation of light rail vehicles along the alternative alignment has the potential to generate noise and vibration impacts on nearby receivers. The change in alignment includes curves that can influence operational noise and vibration impacts and would need to be reassessed.	Yes	It is proposed to remodel the construction and operational noise and vibration impacts for receivers in the Camellia and Rydalmere noise catchment areas based on the alternate alignment and change in location of infrastructure and construction activities.

Environmental aspect	Potential impacts	Further detailed assessment required	Scope of assessment/key tasks
Aboriginal heritage	Construction of the Camellia foreshore to Rydalmere option has the potential for direct impacts to the western and northern section of PAD 3 Rydalmere Wharf. This could result from ground disturbance, excavation and vegetation clearance associated with bridge works and from vehicle and plant movements. Such works could result in a partial or total loss of value. There may also be impacts to cultural (or intangible) values associated with this area.	Yes	Transport for NSW is undertaking a program of archaeological testing in late 2022 to establish the extent and significance of any archaeological deposits. This would inform the next stages of design and assist with minimising the potential for impacts as far as possible. This includes testing PAD 3 Rydalmere Wharf which includes the Camellia foreshore to Rydalmere option. A cultural values assessment, informed by cultural interviews, is also planned and would incorporate the Camellia foreshore to Rydalmere option. Following this, the Final Aboriginal Cultural Heritage Assessment Report (and salvage methodology) would be prepared based on a revised project site boundary for the Camellia foreshore to Rydalmere option, informed by the test excavations and cultural values assessment.
Non-Aboriginal heritage (built heritage)	Construction of the Camellia to Rydalmere foreshore option has the potential for direct and indirect (visual) impacts on the locally listed Wetlands (Item I1 Parramatta LEP). However, the impacts may be less than the project as described in the EIS as the northern bridge abutment for this option would be sited within a gap in the mangrove vegetation (and heritage curtilage) when compared to the project as described in the EIS where the northern bridge abutment would extend through the curtilage. There is also the potential for direct impacts from vibration and indirect impacts to the heritage setting for nearby items. This option would avoid direct impacts to the locally listed Tram Alignment (Item I6 Parramatta LEP) and unlisted house of local significance at 46 John Street, Rydalmere, when compared to the project as described in the EIS.	Yes	The following assessment tasks are proposed: • carry out a site inspection to identify any potential heritage items in this area • include an assessment of nearby heritage items (e.g. Truganini House and Industrial Wharves) not previously assessed as they were located away from the project site • carry out a revised assessment of directly impacted items (e.g. Wetlands).

Environmental aspect	Potential impacts	Further detailed assessment required	Scope of assessment/key tasks
Non-Aboriginal heritage (archaeology)	Construction of the Camellia to Rydalmere foreshore option would involve excavation works that could impact archaeological resources, if present. Assessments prepared to date have not specifically assessed the area that would be impacted by this option. However, adjacent areas have been identified as having varying levels of potential for local or State significant resources. The former Shepherds Wharf was located at the southern end of Park Road, Rydalmere. The project has the potential to impact any archaeological evidence present, along with the existing interpretative signage that may need to be removed/relocated. There is also the potential for impacts resulting from construction activities, such as damage from the movement of construction machinery and vibration impacts.	Yes	The following assessment tasks are proposed: • identify and map Historical Archaeological Management Units and Maritime Archaeological Management Units to the revised project site boundary • undertake research to provide an assessment of the archaeological potential and significance of resources, if present and the potential impacts of the project to these • provide recommendations regarding further investigation and management. Based on existing available information it is not envisaged that sonar survey of the riverbed for the Camellia to Rydalmere foreshore option would be required.
Land use and property	The Camellia to Rydalmere foreshore option would require land to be acquired to facilitate construction and accommodate permanent infrastructure. However, it is expected that this option would reduce the overall requirement for privately-owned land compared to that of the project as described in the EIS. For example, industrial properties at the eastern end of Grand Avenue in Camellia and on the western side of John Street are expected to be retained. There would be impacts to community facilities/recreational uses. This would include impacts to Eric Primrose Reserve at the northern bridge abutment, active transport off ramp and light rail track, which would extend above and through the reserve. Some of this area would be permanently required as part of the project's operational footprint, while the remainder would be required temporarily for most of the construction period. The area that would be affected during construction only would be restored and returned to public use when works are complete. In addition, new recreation facilities, better walking and cycling connections through the stop and ferry wharf environment, and improvements to the Parramatta Valley Cycleway would be provided within Eric Primrose Reserve. The Rydalmere Wharf car park may still be required to be closed to facilitate construction activities, with minor reconfigurations for operation.	Yes	The following assessment tasks are proposed: • update the estimate of temporary and permanent land requirements based on a revised project site boundary • update the assessment of how properties and land uses in Camellia and Rydalmere may be affected by the project's land requirements.

Environmental aspect	Potential impacts	Further detailed assessment required	Scope of assessment/key tasks
Socio-economic	The main potential for social impacts and benefits to people and communities during construction of the Camellia foreshore to Rydalmere option would occur as a result of: • the effects of the project's land requirements and the need for residential property acquisition • changes to access arrangements and connectivity during construction and improved public transport and active transport facilities in operation • changes to residential and community amenity • impacts on community infrastructure, including recreation and open space facilities (like Eric Primrose Reserve and the Parramatta Valley Cycleway). During operation, the potential social impacts and benefits would be similar to those described in the EIS. However, there would be additional improvements to Eric Primrose Park, including recreational areas, resting points and walking and cycling infrastructure, along with an enhanced interchange with the light rail stop in closer proximity to Rydalmere Wharf. The Camellia to Rydalmere foreshore option would have less impacts to businesses than the project as described in the EIS, due to less industrial land being required along Grand Avenue in Camellia and on the western side of John Street. The alternate alignment along the foreshore would also remove the need to install three traffic signals on Grand Avenue, which would avoid potential business impacts associated with the project described in the EIS.	Yes	The following assessment tasks are proposed: • incorporate feedback received during the EIS exhibition period • update the estimate of temporary and permanent land requirements based on a revised project site boundary • update assessment of potential social and business impacts and benefits during construction and operation.

Environmental aspect	Potential impacts	Further detailed assessment required	Scope of assessment/key tasks
Landscape and visual	Construction impacts would be similar to those assessed in the EIS. During operation, introduction of a new bridge and removal of trees in Eric Primrose Reserve would represent a visual change and create some potential shadowing impacts. The project would increase lighting at this location as a result of the bridge lighting, needed to meet navigational requirements of ferries. However, this option would allow for the mature fig trees east of the Rydalmere Wharf to be retained. These trees contribute to the visual amenity of this area and are proposed to be removed for the project as described in the EIS. The Camellia to Rydalmere foreshore option would have a positive visual amenity impact by providing light rail customers, cyclists and pedestrians a more scenic experience along the Camellia foreshore, compared to the project alignment along Grand Avenue.	Yes	The following assessment tasks are proposed: • identify any new landscape character zones or viewpoints that could be impacted by the Camellia to Rydalmere foreshore option • update the landscape and visual impact assessment at new or nearby viewpoints (including updates to, or preparation of, new photomontages to illustrate visual changes) • undertake additional survey of trees that may be impacted along Camellia foreshore, in Eric Primrose Reserve and around Park Road.
Biodiversity	Construction of the Camellia to Rydalmere foreshore option would require the clearing of planted and native vegetation (including PCT 1234 Estuarine Swamp Oak Forest – poor condition and PCT 920 Estuarine mangrove forest – good condition) and works within key fish habitat and coastal wetlands. However, when compared with the project as described in the EIS, impacts to mangroves may be less as the northern bridge abutment would be sited within a gap in the mangrove vegetation and shading impacts from the alternate bridge location may be less. Clearing of vegetation and other construction works would result in direct and indirect impacts to a range of threatened and migratory species, including the Green and Golden Bell Frog and Grey-headed Flying-fox. During operation, the alternate bridge structure would result in flooding impact changes, which would need to be reconsidered together with the potential for shading impacts to native vegetation around the bridge structure. Other potential operational impacts to fauna are likely to be consistent with the project as described in the EIS.	Yes	Desktop research and field surveys for the project has already gathered data and information for the area that would be impacted by the Camellia to Rydalmere foreshore option. As such, the scope of assessment would be to: • additional fieldwork to align with the revised project site boundary (if required) • calculate impacts and offsets based on a revised project site boundary for the Camellia to Rydalmere foreshore option in accordance with the Biodiversity Assessment Method (BAM) • update assessments of direct and indirect impacts to the various biodiversity aspects, including threatened and migratory species • revise assessments related to shadowing and flooding impacts as a result of the alternate bridge location and design. The Camellia to Rydalmere foreshore option formed part of the study area for the referral lodged under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*. If deemed a controlled action, Technical Paper 9 (Biodiversity Development Assessment Report) would be updated to address impacts to species and communities listed under Commonwealth legislation.

Environmental aspect	Potential impacts	Further detailed assessment required	Scope of assessment/key tasks
Water	Construction of the Camellia to Rydalmere foreshore option would involve bridge works, and other excavation or piling works which have the potential to affect water quality of the Parramatta River through erosion and sedimentation, and disturbance of potentially contaminated sediments. There is also the potential for altered flow paths during construction of the bridge resulting in changes to water levels, velocities and scour potential. Most excavation work is unlikely to intercept groundwater. However, during periods of high rainfall, there is potential for elevated groundwater levels to seep into some excavations, in particular, when located close to the Parramatta River. Construction impacts to water are anticipated to be of a similar scale to the project as described in the EIS. Flooding may result in localised changes in overland flow paths and volumes due to increased impervious surfaces and local changes in surface levels. The bridge over the Parramatta River may also change the capacity to convey flood flows. Due to the closeness of the alternative route option to existing properties in an area already susceptible to flooding, the project (incorporating this option) has the potential to impact surrounding properties during operation. This would require further design development and investigation.	Yes	The following assessment tasks are proposed: • update the Model for Urban Stormwater Improvement Conceptualisation (MUSIC) based on a revised bridge design to understand surface water quality impacts • update the flood modelling in TUFLOW based on a revised bridge design for the five per cent AEP, one per cent AEP (with and without climate change) and PMF events • update the assessments of water quality, groundwater and flooding impacts based on the revised bridge design, construction methodology and project site boundary.
Soils and contamination	Construction of the Camellia to Rydalmere foreshore option would involve excavation in potentially contaminated soil and groundwater as well as areas containing potential or actual acid sulfate soils and saline soils. This is of particular concern for Camellia and the Parramatta River. However, the alternative route in Camellia has the potential to avoid areas of significant contamination such as 37A Grand Avenue.	Yes	As described in the EIS further investigations along the project site are currently underway and include areas along the Camellia foreshore. The results of this assessment would be provided as part of the Amendment Report.

Environmental aspect	Potential impacts	Further detailed assessment required	Scope of assessment/key tasks
Hazards and risk	There are a range of general hazards and safety risks during construction and operation. These would be similar to those assessed for the project in the EIS. However, the Camellia to Rydalmere foreshore option would avoid major utilities (and proposed relocation works) in Grand Avenue associated with the project as described in the EIS. A Sydney Water wastewater pipeline in Eric Primrose Reserve may need to be relocated. Some minor integration works may be required to provide protection to Sydney Water pipelines that extend underground on the northern side of the river in Rydalmere.	No	Impacts associated with the Camellia to Rydalmere foreshore option would be consistent with the assessment already undertaken for the EIS, and the proposed mitigation measures are considered adequate to manage potential impacts.
Air quality (and greenhouse gas)	Construction of the Camellia to Rydalmere foreshore option would result in air quality impacts such as dust generation, exhaust emissions, odours, landfill gas and greenhouse gas generation. It is anticipated that air quality impacts would be at a similar scale to the project as described in the EIS. During operation, potential air quality impacts would be mainly associated with particulate matter generated by light rail vehicle braking, from maintenance activities and emissions from maintenance vehicles or equipment.	No	Impacts associated with the Camellia to Rydalmere foreshore option would be consistent with the assessment already undertaken for the EIS, and the proposed mitigation measures are considered adequate to manage potential impacts.
Climate change	Similar to the project as described in the EIS, extreme rainfall events, flooding, extreme heat, and increase in bushfire and fire weather conditions are expected to present the highest risks in the future for the construction and operation of the Camellia foreshore to Rydalmere option.	No	The climate change risk assessment would continue to be refined in accordance with *AS 5334-2013 Climate change adaptation for settlements and infrastructure – A risk based approach* and the *Climate Risk Assessment Guidelines version 4.1* (Transport for NSW, 2021a). The design changes that would result from this option, if progressed, would be considered as part of the assessment. Given this, and that the climate change risks associated with this route option would be similar to the project, it is not proposed to update the climate change risk assessment.
Waste and resources	Construction of the Camellia to Rydalmere foreshore option would result in spoil (excavated soil, rock or dirt) which, like the project described in the EIS, is expected to be the largest waste stream. These would be similar to those assessed for the project in the EIS. Other waste types may be general solid waste (not-putrescible), liquid waste, restricted or hazardous waste, which if not appropriately managed, can have an adverse impact. While construction would increase demand on local and regional resources, it is unlikely that it would result in any resource becoming scarce or in short supply.	No	Impacts associated with the Camellia to Rydalmere foreshore option would be consistent with the assessment already undertaken for the EIS, and the proposed mitigation measures are considered adequate to manage potential impacts.