Transport for NSW

# Chapter 6
# Project description – infrastructure and operation

NSW GOVERNMENT

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# 6. Project description – infrastructure and operation

This chapter provides a description of the proposed features of the project and how it would operate. It includes a description of the main light rail infrastructure proposed, ancillary infrastructure, land requirements and proposed changes to the existing road network. A description of how the project would be constructed is provided in Chapter 7 (Project description – construction).

## 6.1 Overview

The project comprises new light rail infrastructure in Macquarie Street, Parramatta and between Camellia and the Carter Street precinct adjacent to Sydney Olympic Park, located mainly within existing road reserves and transport corridors. New active transport links would be provided between Camellia and the Carter Street precinct. The project also comprises operation of a new light rail alignment between the Parramatta CBD and the Carter Street precinct. Part of that alignment (between the Parramatta CBD and Camellia) would be shared with Parramatta Light Rail Stage 1.

The new light rail alignment would use infrastructure proposed as part of the project, and that constructed as part of Parramatta Light Rail Stage 1 between the Parramatta CBD and Camellia. The new light rail alignment would form part of the Parramatta Light Rail network, connecting the Parramatta CBD and Stage 1 to Camellia, Rydalmere, Ermington, Melrose Park, Wentworth Point, Sydney Olympic Park and the Carter Street precinct.

The project design presented in this EIS would be further refined during the design development process. The final design may vary from the design described in this chapter.

The design considered by the EIS has been urban design-led, with a focus on placemaking and integrated land use and transport outcomes. The design development process, and the project's urban design and placemaking vision, objectives and principles, are described in Technical Paper 1 (Design, Place and Movement).

### 6.1.1 Key project infrastructure and operational details

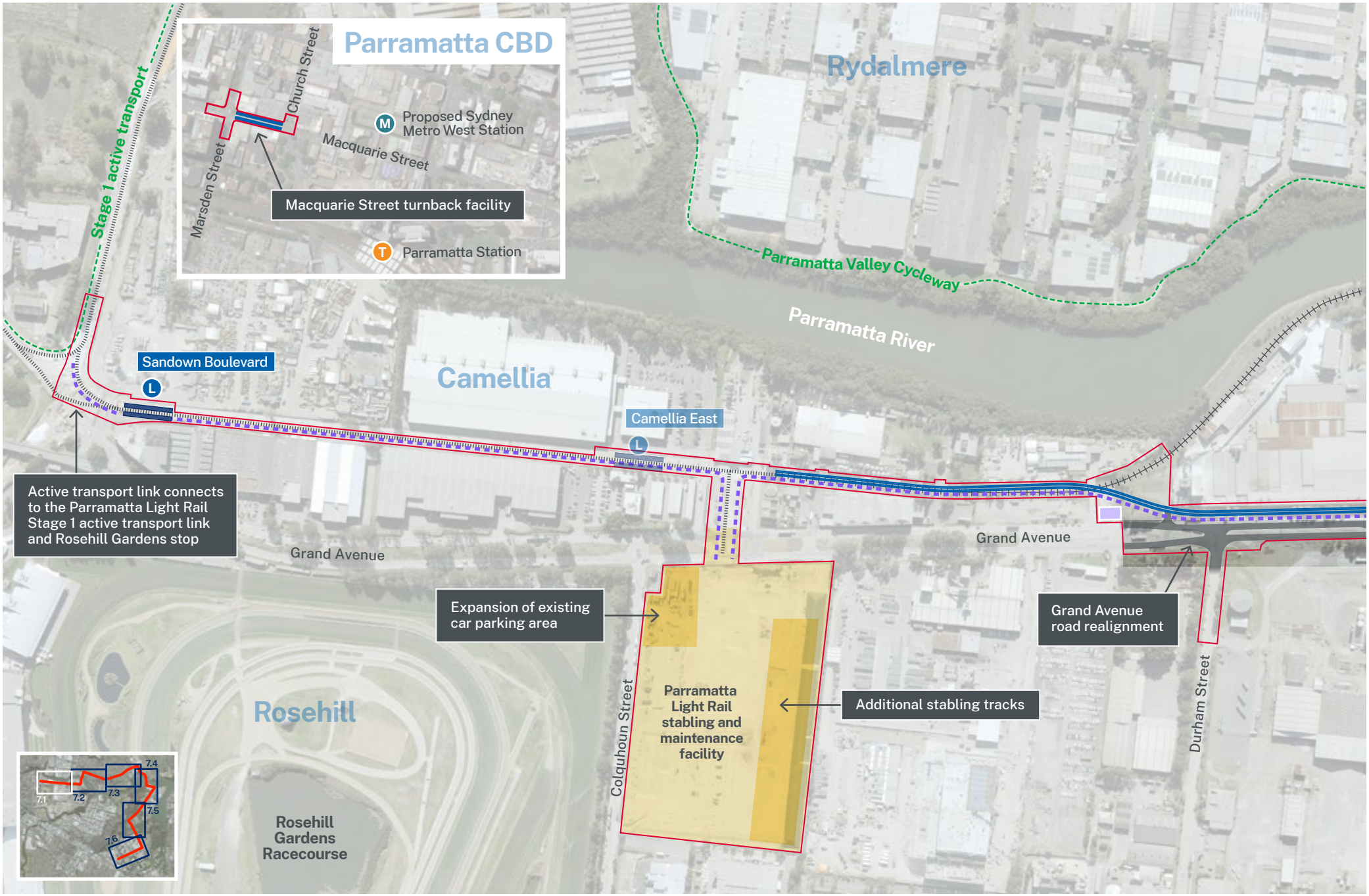
A summary of the project's main features is provided in Table 6.1 and shown on Figure 6.1 to Figure 6.6. A description of the proposed infrastructure is provided in sections 6.2 to 6.7.

Table 6.1 also summarises the proposed operational arrangements. Further information on operation is provided in section 6.10.

The project site for the purpose of the EIS is described in Chapter 2 (Location and setting).

Table 6.1 Summary of project features

| Project feature | Description |
|---|---|
| **Infrastructure** | |
| Light rail track | • about 10 kilometres of new dual light rail track would be constructed along Macquarie Street in the Parramatta CBD and between Camellia and the Carter Street precinct in Lidcombe, adjacent to Sydney Olympic Park |
| Light rail stops | • 14 light rail stops |
| Bridges over the Parramatta River | • bridge between Camellia and Rydalmere<br>• bridge between Melrose Park and Wentworth Point |
| Road overbridge | • bridge over Silverwater Road between Rydalmere and Ermington |
| Other bridge works | • bridge in Ken Newman Park connecting to Boronia Street<br>• duplication of the existing bridge on Hill Road in Sydney Olympic Park<br>• strengthening of the bridge on the Holker Busway in Sydney Olympic Park |
| Active transport links | • about 8.5 kilometres of new active transport links (footpaths, cycleways or shared paths)<br>• connections to existing active transport links, including to the Parramatta Valley Cycleway at Rydalmere and Melrose Park, and to Louise Sauvage Pathway at Wentworth Point |
| Public transport | • interchanges with other forms of public transport, including trains, ferries, buses and Sydney Metro West, with the main interchanges located in the Parramatta CBD, Rydalmere and Sydney Olympic Park<br>• provision for bus access to the proposed bridge between Melrose Park and Wentworth Point |
| Changes to the road network | • alterations to the local road network to accommodate the new light rail infrastructure, including road realignments, road closures, changes to intersection movements, and installation of new pedestrian crossings and traffic signals<br>• creation of a light rail and pedestrian zone (no through vehicle access) within Sydney Olympic Park along Dawn Fraser Avenue between Australia Avenue and Olympic Boulevard |
| Other facilities and infrastructure to support operation | • turnback facilities at Macquarie Street in the Parramatta CBD, at the Atkins Road stop in Melrose Park, near Jacaranda Square stop and at the Carter Street stop in Lidcombe<br>• adjustments to the Parramatta Light Rail Stage 1 stabling and maintenance facility in Camellia to increase its operational capacity<br>• five traction power substations (to convert electricity to a form suitable for use by light rail vehicles)<br>• overhead wiring along most of the alignment<br>• driver facilities within the Parramatta CBD and at the Carter Street stop<br>• communications equipment, including poles with heights between 12 and 25 metres |
| Other public domain works and open space | • public domain improvements at stop locations<br>• open space improvements at Ken Newman Park and Archer Park, and new public open space around the Atkins Road stop |
| **Operation** | |
| Alignment | • operation of a 13 kilometre light rail alignment between the Parramatta CBD and the Carter Street stop in Lidcombe, via Camellia, Rydalmere, Ermington, Melrose Park, Wentworth Point and Sydney Olympic Park<br>• shared running with Parramatta Light Rail Stage 1 services for about three kilometres between Camellia and the Parramatta CBD |
| Hours of operation | • light rail vehicles would operate from 5am to 1am, seven days a week |
| Vehicle frequency | • vehicles would arrive between every 7.5 and 15 minutes on weekdays, and between every 10 and 15 minutes on weekends and public holidays |




Project site
Substation
Modified roads

Platforms
Possible future platforms
Project alignment
Stabling and maintenance

Existing rail station
Light rail stop
Possible future light rail stop

Existing light rail track
Sandown Line corridor
Active transport link
Existing cycleway

Figure 6.1 Key project infrastructure – map 1

0 100 200 300m

Data source: Imagery - MetroMap (extracted 1/03/2022); Roads, Watercourses, Cadastre - NSWDCS, 2022; Metromap Tile Service.

N


Project site
Substation
Modified roads
Platforms
Project alignment
New and improved open space
Bridge works
Light rail stop
Existing ferry wharf
Active transport link
Existing cycleway

Figure 6.2 Key project infrastructure – map 2

0 100 200 300m

Data source: Imagery - MetroMap (extracted 1/03/2022); Roads, Watercourses, Cadastre - NSWDCS, 2022; Metromap Tile Service.


Project site
Substation
Modified roads
Platforms
Project alignment
New and improved open space
Bridge works
Light rail stop
Active transport link
Existing cycleway

Figure 6.3 Key project infrastructure – map 3

0 100 200 300m

Data source: Imagery - MetroMap (extracted 1/03/2022); Roads, Watercourses, Cadastre - NSWDCS, 2022; Metromap Tile Service.

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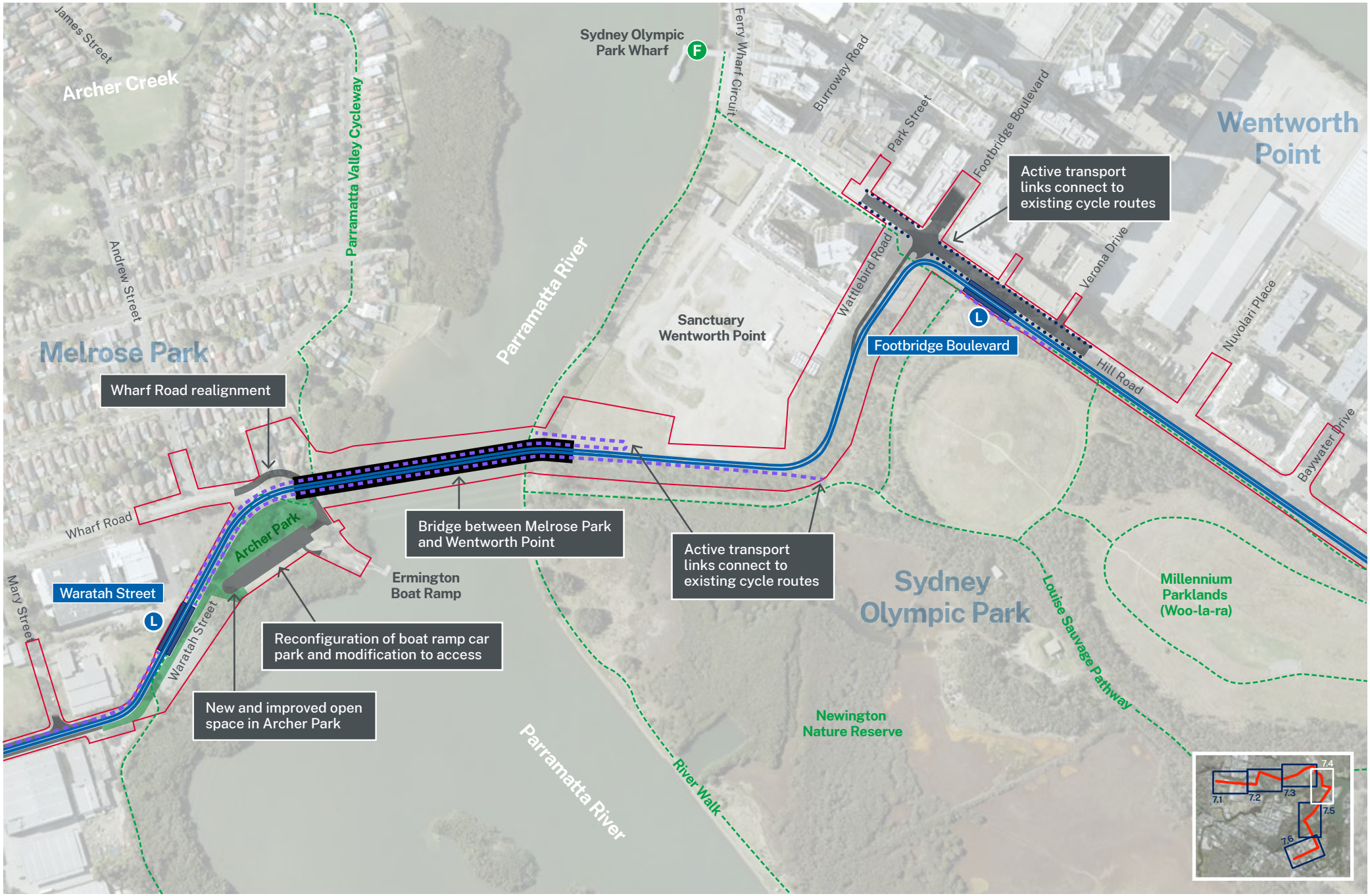
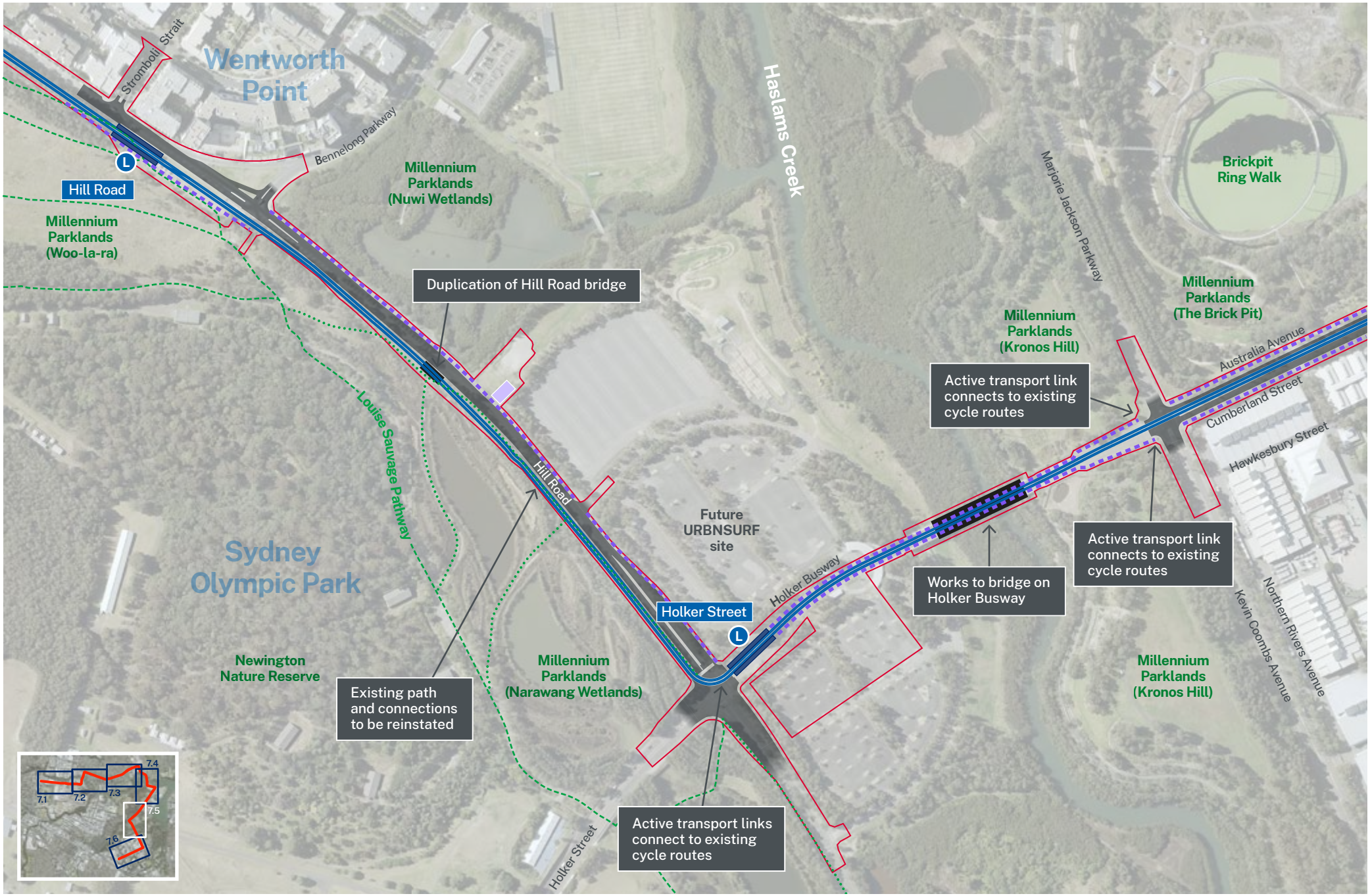



Project site
Substation
Modified roads
Platforms
Project alignment
New and improved open space
Bridge works
Light rail stop
Existing ferry wharf
Active transport link
Active transport – on-road bicycle lane
Existing cycleway

Figure 6.4 Key project infrastructure – map 4

0 100 200 300m

Data source: Imagery - MetroMap (extracted 1/03/2022); Roads, Watercourses, Cadastre - NSWDCS, 2022; Metromap Tile Service.

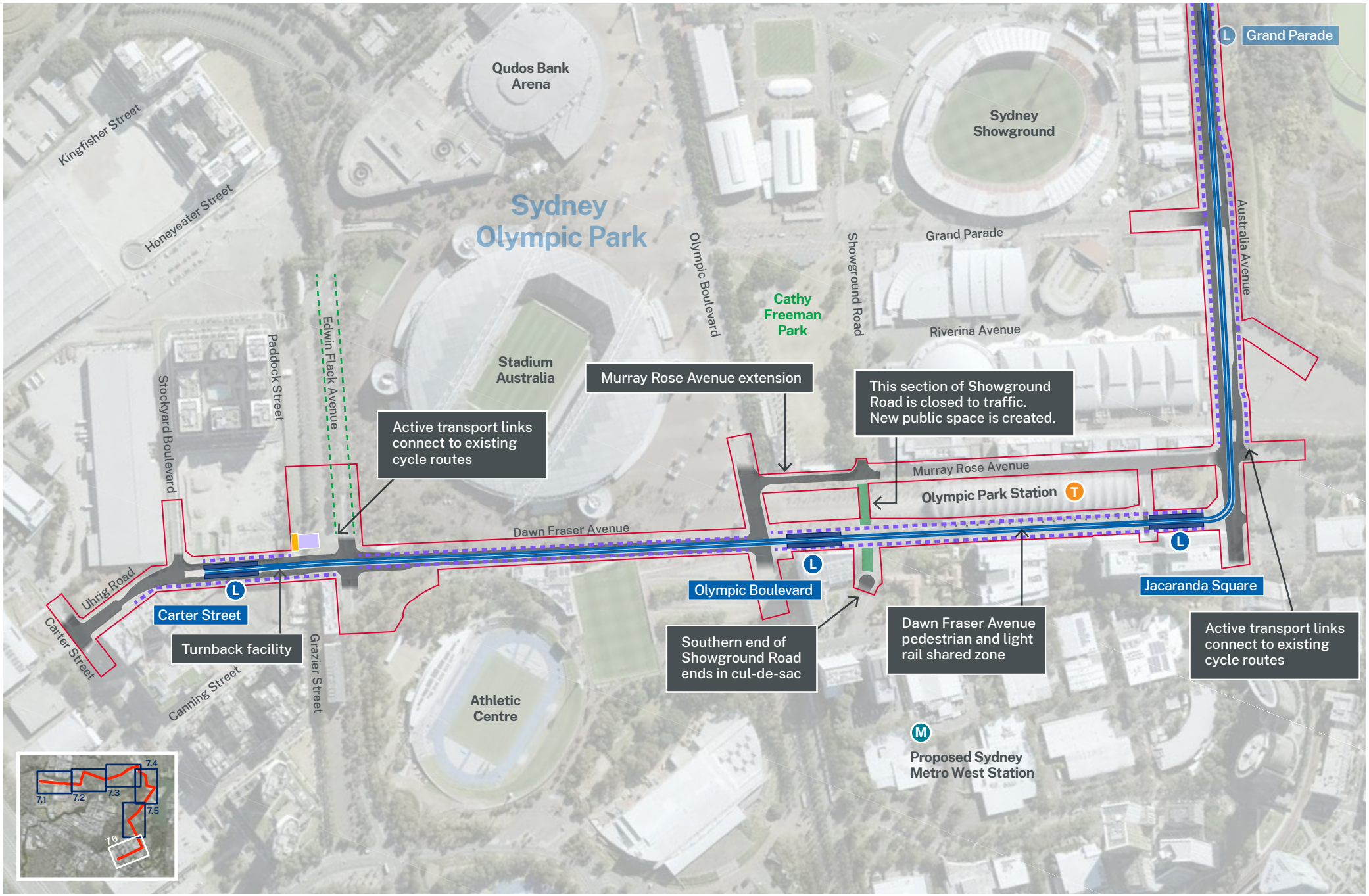



Project site
Substation
Modified roads
Platforms
Project alignment
Bridge works
Light rail stop
Active transport link
Existing cycleway
Existing pedestrian path

Figure 6.5 Key project infrastructure – map 5

0 100 200 300m

Data source: Imagery - MetroMap (extracted 1/03/2022); Roads, Watercourses, Cadastre - NSWDCS, 2022; Metromap Tile Service.




Project site
Substation
Modified roads
Platforms
Possible future platforms
Project alignment
Light rail stop
Possible future light rail stop
Existing rail station
Proposed metro station
Active transport link
Existing cycleway
Driver amenities building
New and improved open space

Figure 6.6 Key project infrastructure – map 6

0 100 200 300m

Data source: Imagery - MetroMap (extracted 1/03/2022); Roads, Watercourses, Cadastre - NSWDCS, 2022; Metromap Tile Service.

## 6.2 Light rail track

### 6.2.1 Track form

Two sets of light rail tracks (one for each direction) would be constructed. Two main track forms are proposed as described below.

#### Embedded tracks

Embedded tracks are encased in concrete, except for the tops of the rails. Embedded tracks would be used for most of the alignment where the track would be laid within/adjoining existing or proposed roadways. This would typically occur in on-street environments where the running corridor (see section 6.2.2) would need to be trafficable by both rail and road vehicles to allow for:

- access for emergency services vehicles and buses
- shared road sections at intersections, and cycle and pedestrian crossings.

Most embedded track areas would be trafficable for pedestrians and other road users, as the tracks would be level with or slightly below the surrounding surface.

Figure 6.7 shows an indicative cross section of an embedded track arrangement.

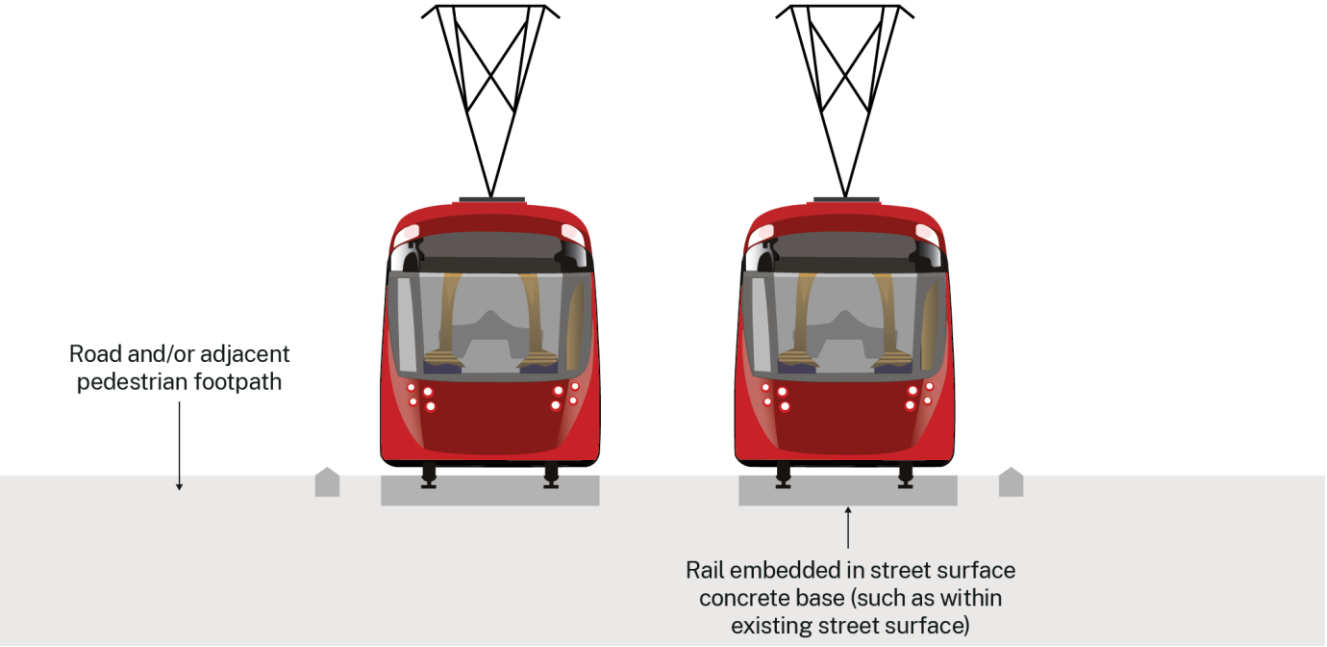



Figure 6.7 Indicative embedded track cross section

In some locations, the embedded track would include finishing materials (such as pavers) laid on top of the concrete base. This would generally include areas that are:

- likely to experience higher levels of pedestrian movements
- where the need for additional surface finishes is identified in the project's urban design requirements (see section 6.8).

Examples of locations where additional surface finishes would be used include:

- Melrose Park, including near the Melrose Park stop and areas proposed for future residential and commercial development
- Sydney Olympic Park along Dawn Fraser Avenue (between Australia Avenue and Olympic Boulevard).

### Permeable tracks

Permeable tracks are laid in a concrete slab or on concrete sleepers and incorporate space for permeable materials. Permeable tracks allow for infiltration of water to reduce stormwater runoff and improve integration with surrounding open space, parks and vegetated areas. They also use less concrete and reduce glare. Types of permeable track that may be used include:

- green track – incorporating areas between and beside the tracks planted with grasses or groundcover to create a green running corridor (see example shown on Figure 6.8)
- crushed stone – incorporating crushed stone between and beside the tracks
- permeable pavers – incorporating permeable pavers between and beside the tracks.

Locations where permeable tracks would be considered include:

- within or adjacent to areas of open space
- adjacent to vegetated or environmentally sensitive areas
- where it would contribute to the amenity of the public domain, based on existing and future land uses.

Green track would be provided in the vicinity of the Atkins Road stop and the Bulla Cream Dairy (Willowmere) heritage item (see Figure 6.3), with the extent to be confirmed during design development. The potential to provide other areas of green and permeable track would be investigated during design development.

Figure 6.8 Example of green track usage for Parramatta Light Rail Stage 1

### 6.2.2 Running corridor

Three main arrangements of tracks are proposed to create the running corridor for the light rail vehicles. These are:

- on-road (segregated) – where the light rail vehicles run adjacent to, but are segregated from, operational traffic lanes, and general traffic may need to cross the alignment where it traverses existing roads
- off-road (separated) – where the light rail vehicles run within their own separate corridor, and access by general traffic is not permitted or is controlled at key crossing locations
- shared – including mixed use environments such as shared light rail and pedestrian zones, or where the light rail vehicles share the corridor with specified vehicles, such as buses.

A description of how these running corridor arrangements are proposed to be used is provided below.

#### On-road (segregated)

The project would operate along a segregated light rail corridor within or adjacent to existing roadways for most of the alignment. This arrangement would help to ensure that the light rail vehicles operate with suitable levels of safety, speed and reliability, leading to better journey times. Traffic and pedestrian crossing signals would be provided as required.

Figure 6.9 shows an indicative cross section of an on-road segregated light rail corridor arrangement, where the light rail corridor is located adjacent to (to the side of) the general traffic lanes.

An indicative cross section of an on-road arrangement where the light rail corridor is in the centre of the roadway is shown on Figure 6.10.

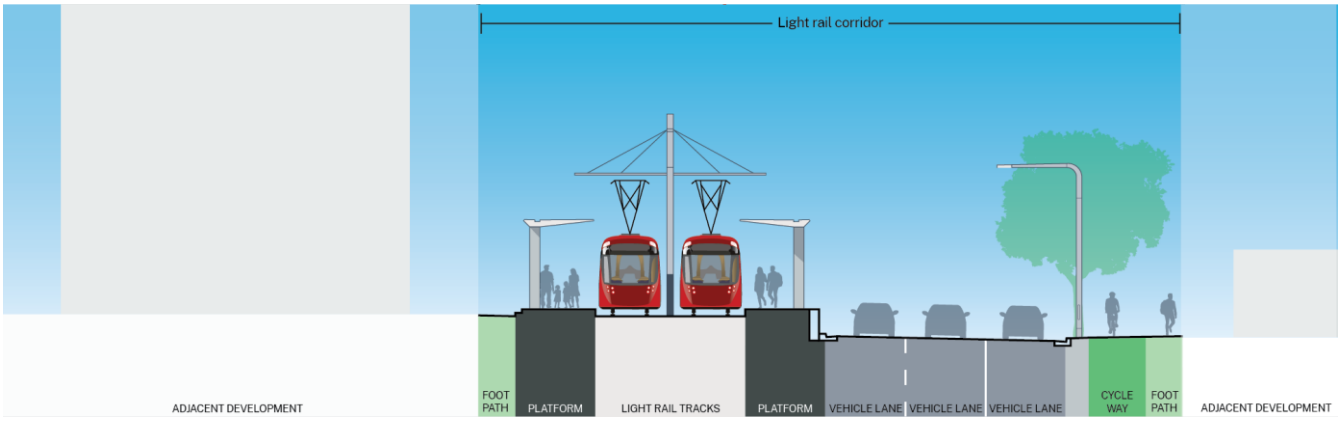



Figure 6.9 Indicative cross section of an on-road (segregated) arrangement with stop adjacent to general traffic lanes

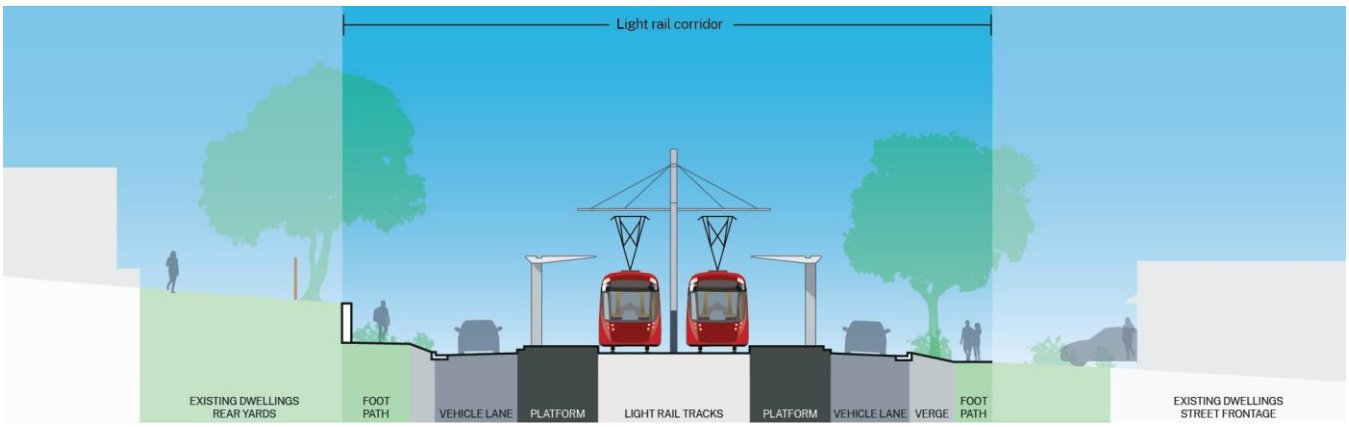



Figure 6.10 Indicative cross section of an on-road (segregated) arrangement with stop in the centre of the roadway

### Off-road (separated)

The project would operate along a separate off-road corridor where the rail corridor is located outside the existing road reserve, including:

- along the Sandown Line corridor in Camellia
- where the alignment crosses Ken Newman Park
- between Grand Avenue in Camellia and South Street in Rydalmere
- along the western edge of Hill Road, between Footbridge Boulevard and Holker Street.

Figure 6.11 shows an indicative cross section of an off-road corridor arrangement proposed in Ken Newman Park.

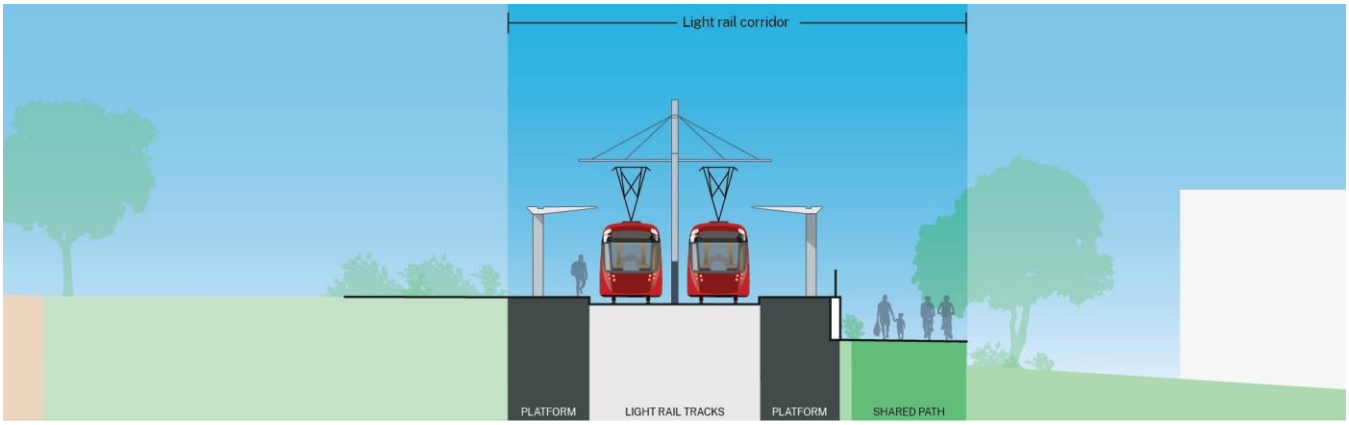



Figure 6.11 Indicative cross section of off-road (separated) arrangement with stop

### Shared

A light rail and pedestrian zone (no through vehicle access) is proposed along Dawn Fraser Avenue between Australia Avenue and Olympic Boulevard in Sydney Olympic Park. Figure 6.12 shows an indicative cross section at this location.

The light rail and pedestrian zone would provide a distinct public domain environment in the vicinity of Olympic Park Station and the proposed Sydney Metro West station. This would allow pedestrians to experience a traffic-free environment with improved urban domain elements such as wider footpaths, new seating and landscaping. The light rail would travel through this area at lower speeds than along other sections of the alignment.

The alignment would be distinguished from the surrounding environment, using different material colours, finishes, textures or paving, so that pedestrians can visually and texturally distinguish between the light rail tracks and areas for pedestrians.

The project would also operate in a shared corridor across the proposed bridge between Melrose Park and Wentworth Point and along the Holker Busway, sharing the lane with buses.

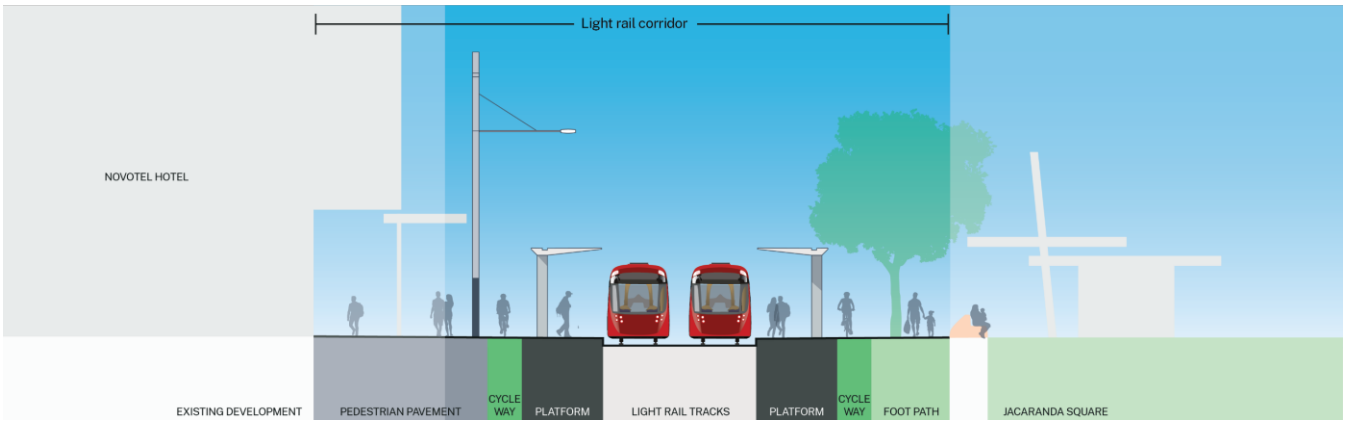



Figure 6.12 Indicative cross section of light rail and pedestrian only zone at Dawn Fraser Avenue

## 6.3 Light rail stops

### 6.3.1 Stop locations

The project includes 14 light rail stops as shown on Figure 1.1 and described in Table 6.2. Figure 6.1 to Figure 6.6 show the proposed stop locations in more detail. The names of stops are indicative and would be finalised during design development. The stop names would be determined based on stakeholder and community feedback, and approval by the Geographical Names Board of NSW.

Table 6.2 Proposed light rail stops

| Suburb | Stop name | Location | Figure reference |
|---|---|---|---|
| Camellia | Sandown Boulevard | Within the Sandown Line corridor near the Parramatta Light Rail Stage 1 Rosehill Gardens stop | Figure 6.1 |
| Rydalmere | John Street | West of John Street between South Street and Antoine Street | Figure 6.2 |
| | Nowill Street | On South Street between Nowill Street and Primrose Avenue | Figure 6.2 |
| Ermington | River Road | In the existing grassed utility easement between River Road and Hilder Road, west of Ken Newman Park | Figure 6.2 |
| | Murdoch Street | On Boronia Street between Boyle Street and Murdoch Street | Figure 6.3 |
| | Atkins Road | In the new open space south of Hope Street and east of Atkins Road | Figure 6.3 |
| Melrose Park | Melrose Park | On Hope Street west of Waratah Street | Figure 6.3 |
| | Waratah Street | On Waratah Street along shared path between Waratah Street and Wharf Road | Figure 6.4 |
| Wentworth Point / Sydney Olympic Park | Footbridge Boulevard | West of Hill Road at Half Street | Figure 6.4 |
| | Hill Street | West of Hill Road south of Stromboli Strait | Figure 6.5 |

| Suburb | Stop name | Location | Figure reference |
|---|---|---|---|
| Sydney Olympic Park | Holker Street | On Holker Busway east of Hill Road | Figure 6.5 |
| | Jacaranda Square | On Dawn Fraser Avenue between Australia Avenue and Park Street | Figure 6.6 |
| | Olympic Boulevard | On Dawn Fraser Avenue between Showground Road and Olympic Boulevard | Figure 6.6 |
| Lidcombe | Carter Street | On Uhrig Road between Edwin Flack Avenue and Stockyard Boulevard | Figure 6.6 |

### Possible future stops

The project has safeguarded space for two possible future stops, which may be constructed later. These stops would be constructed after the project commences operation based on demand and surrounding development. No stop infrastructure is currently proposed to be constructed at these locations. The possible future stops are described in Table 6.3.

Table 6.3 Possible future light rail stops

| Suburb | Stop name | Location | Figure reference |
|---|---|---|---|
| Camellia | Camellia East | Within the Sandown Line corridor, west of the stabling and maintenance facility entrance | Figure 6.1 |
| Sydney Olympic Park | Grand Parade | Australia Avenue at Grand Parade | Figure 6.6 |

## 6.3.2 Stop infrastructure

Stops have been designed to fit within their surroundings and are based on the design of Parramatta Light Rail Stage 1 stops. Stop features and facilities are described below.

### Platforms

All stops would incorporate side platforms. Side platforms are located on either side of the light rail tracks, with the two tracks running between the platforms. The Atkins Road stop would have an island platform with tracks running either side of the platform, as well as a side platform, to accommodate the turnback facility described in section 6.7.1.

Each platform would have a width of about three metres. Figure 6.9 to Figure 6.12 provide examples of side platform stop arrangements.

The stops would be about 45 metres long. Some platforms may be larger to facilitate crowd management at stops where patronage is expected to be higher, including at interchange locations and within areas with a higher customer base in the stop catchment.

### Access and safety

All platforms would be designed to comply with the *Disability Discrimination Act 1992* and Disability Standards for Accessible Public Transport, ensuring that less mobile members of the community have equal access to the stops. This includes designing the stops to be level with the floor of the light rail vehicle to ensure there is no need to step up to the vehicle.

Platforms would be accessed via ramps at either end of the platform for stops located within active road corridors. These stops would also provide safety barriers along the back of the platform to prevent passenger movements into traffic lanes.

At least one pedestrian crossing would be provided across the light rail tracks at each stop.

Where platforms are in pedestrian zones, such as the Jacaranda Square and Olympic Boulevard stops, platforms would be integrated into the surrounding footpath levels as far as practicable to create a seamless transition allowing easy access.

Paving for the platforms and paths would be nonslip and provide the required visual contrast. Warning tactile indicators would also be installed along the platforms and around the stops.

### Stop furniture and facilities

A range of stop furniture and facilities would be provided at each stop, including a shelter, windbreak screens, emergency help points, customer information points, Opal card readers, seating and rubbish bins.

The shelters would provide weather protection for standing and seating, including space for wheelchairs and prams. They would have a modular steel frame canopy structure with a solid roof. Bicycle parking and drinking bubblers would be provided at near most stops, subject to consultation with stakeholders and available space.

The shelters would be similar to those installed as part of Parramatta Light Rail Stage 1, which were developed in consultation with the City of Parramatta Council and the Parramatta Light Rail Stage 1 independent Design Review Panel. Refinement of the shelter design would be undertaken on a stop-by-stop basis informed by independent design review and further consultation with key stakeholders.

At the Sandown Boulevard and Jacaranda Square stops, which would provide access to events at Rosehill Gardens Racecourse and Sydney Olympic Park respectively, additional shelters and feature lighting may be provided.

Figure 6.13 shows an example of a typical Parramatta Light Rail Stage 1 stop.


Figure 6.13 Indicative image of a Parramatta Light Rail Stage 1 stop

### Signage

The project would incorporate signage that meets the standards for light rail operations and applies consistent branding in accordance with Transport for NSW requirements.

Signage would generally include wayfinding, warning and customer information signage on cabinets, poles or totems located on and around the stop or fixed to shelter structures. The final branding, wayfinding and signage designs would be confirmed during design development in accordance with Transport for NSW design standards and in consultation with key stakeholders.

### Security

The stops would be designed according to crime prevention through environmental design principles and would include the following security features:

- unimpeded sight lines from adjacent land uses to improve passive surveillance as far as possible
- closed circuit television (CCTV) cameras linked to the operations control centre for passenger security and to deter anti-social behaviour and vandalism
- lighting to maximise passenger safety at stops, along access paths and the active transport link, and to enable CCTV operation
- an emergency help point.

Lighting would be designed, mounted, screened and directed in accordance with relevant standards (including *AS/NZS 4282:2019 Control of the obtrusive effects of outdoor lighting*) to minimise nuisance to surrounding residents.

## 6.4 Active transport links

The project would include about 8.5 kilometres of new active transport links for both pedestrians and cyclists constructed along or close to the light rail alignment. The active transport links would include a combination of:

- shared paths for use by pedestrians and cyclists
- separated cycleways for use by cyclists
- roadside footpaths
- separated pedestrian paths on bridges
- use of existing shared paths.

Figure 6.14 shows the type and location of the proposed active transport links. Figure 6.1 to Figure 6.6 show the locations of the proposed active transport links as well as connections to key existing active transport infrastructure.


Figure 6.14 Indicative active transport link types

The proposed links would connect with existing active transport infrastructure, including the Parramatta Valley Cycleway and Louise Sauvage Pathway. The connections would be finalised in consultation with key stakeholders during design development.

With the two proposed bridges over the Parramatta River, and connections to existing facilities, the new active transport links would create three new active transport loops across and along the northern and southern banks of the river.

The material used for the active transport links would vary depending on the surrounding environment and would be guided by the urban design requirements. Localised treatments may include:

- slightly elevated surfaces where areas of sensitive vegetation, such as tree roots, cannot be avoided
- materials designed to be consistent with the surrounding public domain, taking into consideration key surrounding features (such as the location of heritage items and areas of open space)
- painted markings on the road to segregate bicycles where the active transport link would be provided on existing roads.

The active transport links would be designed in accordance with the principles outlined in Technical Paper 1 (Design, Place and Movement), the urban design requirements, relevant guidelines and standards (including *Guide to Road Design Part 6A: Paths for Walking and Cycling* (Austroads, 2017) and *AS 1428.1-2009 Design for access and mobility*), and crime prevention through environmental design principles.

Directional and safety signage would also be provided.

## 6.5 Bridges

The following key design features have been used as the basis for the EIS. The design of the bridges would continue to be refined during design development, as described in sections 5.6 and 5.7.

### 6.5.1 Bridges over the Parramatta River

#### Bridge between Camellia and Rydalmere

The bridge would provide a connection across the Parramatta River between proposed redevelopment areas in Camellia and Rosehill to the south, and Rydalmere to the north. The southern end of the bridge would be located on existing industrial land to the north of Grand Avenue in Camellia. The northern end of the bridge would be located within Eric Primrose Reserve and Rydalmere Wharf commuter car park to the south of John Street in Rydalmere (see Figure 6.2).

The bridge would be a three-span, concrete box girder about 200 metres long. It would include centrally located light rail tracks with an active transport link on either side. The overall width of the bridge would be about 19 metres. The bridge would consist of a larger central span (about 90 metres long) over the river's navigation channel. Smaller spans would be located to the south over mangrove vegetation, and to the north within Eric Primrose Reserve. One pier (for the southern span) would be located within the river, just north of the mangrove vegetation.

The highest point of the bridge deck would be about 12 metres above the river and provide a clearance of about 7.6 metres above the highest astronomical tide.

The northern piers of the bridge would be located to ensure movements within Eric Primrose Reserve and to and from Rydalmere Wharf would be maintained.

Figure 6.15 provides an indicative elevation of the bridge.

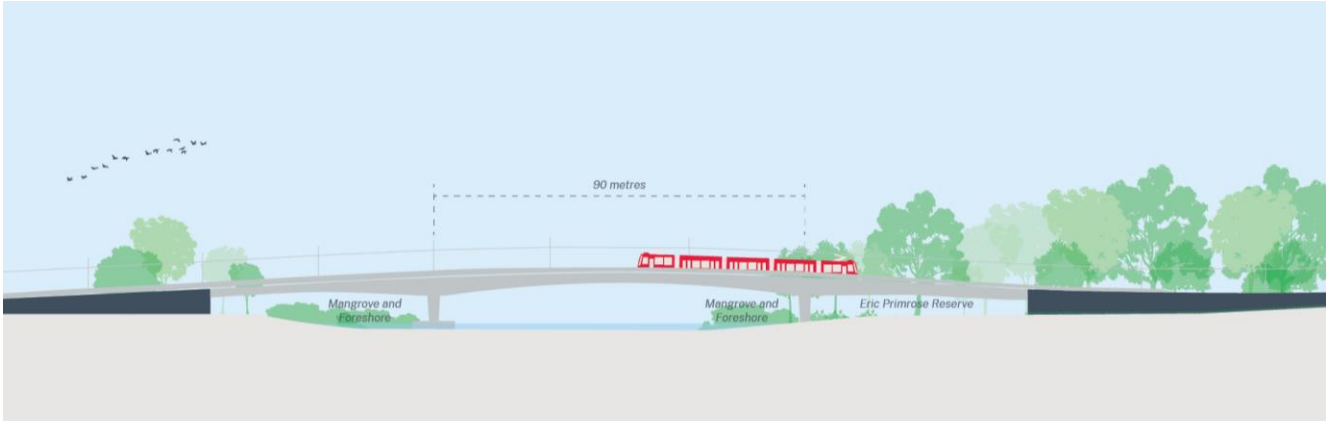



Figure 6.15 Indicative elevation of bridge between Camellia and Rydalmere (viewed from the east)

### Bridge between Melrose Park and Wentworth Point

The bridge would provide public and active transport access to and from proposed redevelopment areas in Melrose Park, and the developing suburb of Wentworth Point across the Parramatta River. The northern end of the bridge would be located at the southern end of Wharf Road to the east of the Ermington Boat Ramp in Melrose Park. The southern end of the bridge would be located to the west of Sanctuary Wentworth Point and Hill Road (see Figure 6.4).

The bridge would be a six-span, concrete bridge about 320 metres long. It would include centrally located light rail tracks with an active transport link on either side. The bridge would also include covered rest areas on the sides of the bridge adjacent to the active transport link. The overall width of the bridge would be about 22 metres. The bridge would consist of a larger span (about 72 metres long) over the navigation channel of the river and smaller spans over the mangrove vegetation and existing active transport infrastructure on both sides of the river. The bridge would be supported by three piers in the Parramatta River. The width of the navigable channel between bridge piers would be about 46 metres.

The highest point of the bridge deck would be about 15 metres above the river and provide a clearance of about 11 metres above the highest astronomical tide.

The bridge and its approaches would be designed to enable future shared running of light rail and bus services.

Figure 6.16 provides an indicative elevation of the bridge.


Figure 6.16 Indicative elevation of bridge between Melrose Park and Wentworth Point (viewed from the west)

## 6.5.2 Bridge over Silverwater Road

A new, integrated light rail and active transport bridge would provide a connection over Silverwater Road between South Street, Rydalmere to the west and South Street, Ermington to the east (see Figure 6.2). The existing pedestrian bridge, stairs and lifts would be removed.

The bridge would be a three-span concrete bridge. It would be about 96 metres long and about 15 metres wide. The active transport link would be on the southern side of the bridge. The bridge would consist of a large central span (about 42 metres long) providing about 5.4 metres clearance over Silverwater Road. The arrangement of the ramps and lifts would be finalised during design development in consultation with key stakeholders.

Figure 6.17 provides an indicative elevation of the bridge.

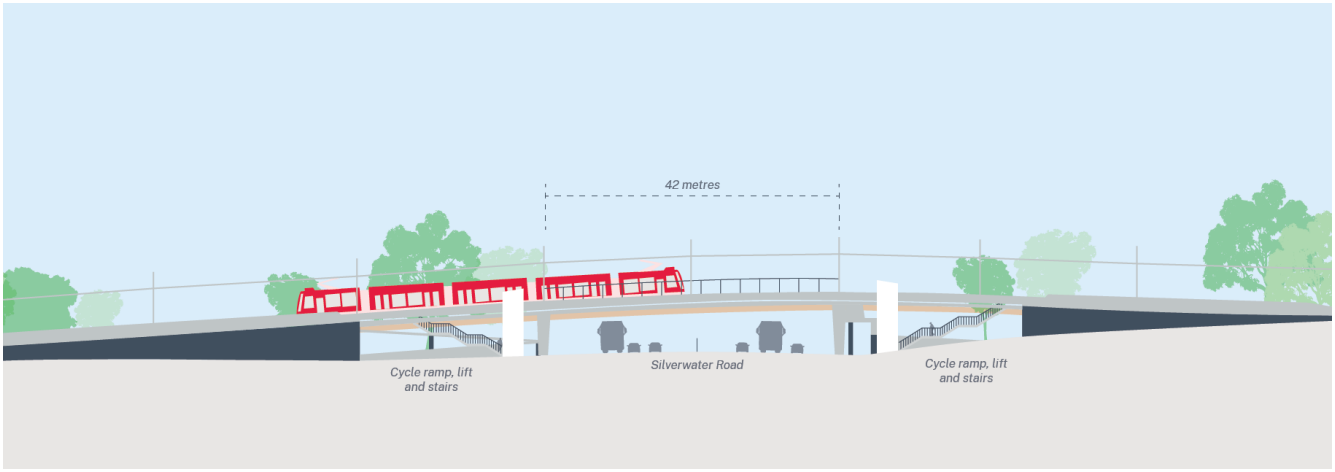



Figure 6.17 Indicative elevation of Silverwater Road bridge (viewed from the south)

### 6.5.3 Bridge in Ken Newman Park

The light rail alignment in Ken Newman Park would include a bridge over the drainage gully at the eastern end of the park (see Figure 6.3). The bridge would be a two-span, concrete or steel bridge about 36 metres long, consisting of two equal length spans. It would be about 15 metres wide with the active transport link on the southern side of the bridge. No piers would be required in the gully and pedestrian access would be retained underneath the bridge. The highest point of the bridge would be about six metres above ground level.

### 6.5.4 Bridge works in Sydney Olympic Park

Works would be required at two bridges in Sydney Olympic Park (see Figure 6.5) as described below.

#### Hill Road bridge

The Hill Road bridge would be retained and duplicated, with a new bridge provided for light rail vehicles on the western side of the existing bridge. The new bridge would be a single span, concrete structure, about 20 metres long and 12 metres wide. It would be of a similar height to the existing bridge.

The light rail running corridor would be angled slightly from Hill Road over about 130 metres on either side of the bridge and would operate in an off-road (separated) arrangement. Retaining structures on the western side would be required to manage the differences between the existing ground level and light rail alignment.

Minor works may be required on the existing bridge associated with the road adjustment works to comply with relevant standards.

#### Holker Busway bridge

The existing bridge would be retained, new barriers would be installed, and the bridge would be strengthened to support the load of the light rail vehicle operations and infrastructure. Strengthening works may include strengthening the bridge deck and cantilever portions of the bridge, replacing bridge bearings and addition of external structural elements to increase the capacity of the bridge. Details of the strengthening works required would be confirmed as part of further design development.

The light rail running corridor would operate on the bridge in a shared running arrangement with buses.

## 6.6 Road network changes

Most of the project would be constructed within existing roadways or road reserves. As a result, changes to the road network would be required to accommodate the proposed light rail infrastructure, particularly the tracks and stops.

Changes to the road network would include realigning or closing some roads, changes to intersection movements, installing new pedestrian crossings and traffic signals, pavement works, changes to lane configuration and directional flow, and/or removal of on-street car parking to accommodate displaced traffic lanes.

The following sections provide an overview of the changes proposed.

### 6.6.1 Road realignments and closures

Road realignments and closures would be required in some locations to provide space for the project's infrastructure and allow safe operation of the project and road network. The proposed changes are summarised in Table 6.4. Further information on the proposed changes to the road network is provided in section 4 of Technical Paper 2 (Transport and Traffic).

Table 6.4 Road realignments and closures

| Suburb | Road | Proposed change |
|---|---|---|
| **Road realignments** | | |
| Camellia | Grand Avenue | To accommodate the light rail tracks along the northern side of Grand Avenue, the road would be realigned slightly to the south and a new section of pavement constructed. |
| Rydalmere | Rydalmere Wharf commuter car park | A new access to the reconfigured Rydalmere Wharf commuter car park would be created from Antoine Street (west). |
| Melrose Park | Wharf Road | The southern end of Wharf Road would be realigned around and under the new bridge structure to maintain access to the Ermington Boat Ramp. |
| Sydney Olympic Park | Murray Rose Avenue | Murray Rose Avenue would be extended between Showground Road and Olympic Boulevard. |
| **Road closures** | | |
| Rydalmere | Antoine Street | Antoine Street would be closed at John Street to accommodate the light rail tracks and John Street stop. |
| Ermington | South Street | South Street would be closed between Silverwater Road and River Road to accommodate the eastern abutment of the proposed bridge over Silverwater Road. |
| | Hilder Road | Hilder Road would be closed to accommodate the light rail tracks and River Road stop, and as a result of the topography at this location. |
| Sydney Olympic Park | Dawn Fraser Avenue | This section of Dawn Fraser Avenue would be closed to through vehicles between Australia Avenue and Olympic Boulevard to create a light rail and pedestrian zone between Jacaranda Square and Olympic Boulevard stops. |
| | Showground Road | The proposed light rail and pedestrian zone (noted above) would also require closure of Showground Road between Dawn Fraser Avenue and Murray Rose Avenue. |

### 6.6.2 Adjustments to existing lanes, intersections and access arrangements

Existing traffic lanes and intersections would be adjusted along some roads to accommodate the light rail infrastructure (including stops) within or adjacent to the road reserve. These adjustments would involve providing new pavement within the road reserve (or in some instances within additional land adjoining the existing road reserve) and the marking of new lanes, including any required turning lanes.

Traffic signals would be provided at about 22 intersections that are not currently signalised. Signalisation of intersections and adjustment of existing traffic signals to support the safe and efficient operation of the project and road network would be refined during design development in consultation with the relevant road authority.

There would also be changes to the way that some side streets access the roads on which the light rail alignment is located. In some locations, existing right-turn movements would not be allowed due to the presence of light rail infrastructure. Access from these roads would be limited to left-in/left-out movements.

The project would include tie-in works on some adjoining roads.

Further information about the proposed adjustments and new traffic signals is provided in section 4 of Technical Paper 2 (Transport and Traffic).

### 6.6.3 Adjustments to property access

New access arrangements would be required for the industrial property at 37 Grand Avenue, Camellia. A new access road is proposed to provide access to the property beneath the proposed bridge abutment on the southern side of the river.

Access to other properties may also need to be adjusted due to the difference in grade between the property and the light rail or road alignment. This could involve changes to the location or arrangement of driveways. Design refinements that reduce property access adjustments would continue to be considered during design development.

Potential impacts on access are considered in Chapter 9 (Transport and traffic).

## 6.7 Other facilities and infrastructure to support operation

### 6.7.1 Turnback facilities

Track turnback facilities using crossovers would be provided at strategic locations along the alignment to facilitate efficient light rail operation. Crossovers between the tracks allow light rail vehicles to change tracks and travel in the opposite direction. Turnback facilities are proposed at the following locations:

- Macquarie Street, Parramatta (described below)
- Atkins Road stop, Melrose Park (described below)
- Jacaranda Square stop, Sydney Olympic Park
- Carter Street stop, Lidcombe.

The double crossover at Jacaranda Square and Atkins Road stops would be used during special events as a temporary turnback facility for light rail vehicles.

### Macquarie Street

A light rail turnback facility would be provided along part of Macquarie Street to the west of the Parramatta Square stop (see Figure 6.1). The facility would consist of two tracks, about 100 metres long, between Church Street and Marsden Street, and would enable the temporary layover of light rail vehicles. The turnback would be accessed via a new turnout from the Parramatta Light Rail Stage 1 track, located at the Macquarie Street and Church Street intersection.

### Atkins Road stop

A light rail turnback facility would be provided at the Atkins Road stop to enable the temporary layover of light rail vehicles and provide additional services between Melrose Park and Sydney Olympic Park during special events (see Figure 6.3). The facility would consist of a third track of about 140 metres long, which would terminate at the Atkins Road stop. The stop would have two platforms, one side platform and one island platform.

## 6.7.2 Stabling and maintenance facility

The Parramatta Light Rail stabling and maintenance facility is being constructed as part of Parramatta Light Rail Stage 1 on the southern side of Grand Avenue, adjacent to the Rosehill Gardens Racecourse in Rosehill.

Works would be undertaken within the stabling and maintenance facility boundary to increase the capacity of the facility to provide sufficient space to maintain and stable about 13 additional light rail vehicles (in addition to those used for Parramatta Light Rail Stage 1).

The following modifications to the facility are proposed to increase the capacity of the facility:

- provision of additional light rail stabling tracks along the eastern side of the facility
- provision of additional signalling and power facilities to integrate the new stabling tracks
- expansion of the existing staff car park to provide about 100 additional parking spaces
- provision of supporting infrastructure (e.g., walkways, lighting, drainage) and adjustments inside the maintenance building.

## 6.7.3 Interchange facilities

Interchanges with other forms of public transport are proposed, including with trains, buses, ferries and Sydney Metro West services. The main interchange locations would be in the Parramatta CBD, Rydalmere and Sydney Olympic Park. During operation, customers would be able to change between transport modes at stops in these locations, as well as other stops (see section 6.3.1).

To facilitate these interchanges, works are proposed as part of the project at and in the vicinity of the stops listed in Table 6.6. This would include public domain improvements to ensure customers can change between transport modes in an easy and safe manner, including provision of:

- wayfinding signage to direct users between public transport services
- direct pathways and line of sight to other public transport services
- free-standing passenger information displays
- landscaping works to improve amenity (including providing shade where possible).

Interchange operational arrangements are described in section 6.10.3. Further information about the public domain works proposed as part of the project is provided in section 6.8.

### 6.7.4 Power supply

#### Traction power substations

Electricity is required to power the light rail vehicles in the form of 750 volt direct current power (traction power) supplied from the existing 11 kilovolt (kV) Endeavour Energy and Ausgrid electricity distribution network. Five traction power substations would be constructed to transform the electricity supplied by the existing distribution network to the required voltage. The substations are proposed at the following locations:

- Camellia – adjacent to Grand Avenue and west of Durham Street (see Figure 6.1)
- Rydalmere – near the John Street stop (see Figure 6.2)
- Melrose Park – near the Atkins Street stop (see Figure 6.3)
- Wentworth Point – on Hill Road midway between Bennelong Parkway and Holker Busway (see Figure 6.4)
- Lidcombe – near the Carter Street stop (see Figure 6.6).

The substations would typically comprise a prefabricated modular building (about 17 metres long by five metres wide with a height of about five metres), with the overall substation sites occupying an area of about 100 square metres.

The substation buildings would incorporate design features and materials (such as a fitted external façade) to integrate the buildings with the surrounding environment and minimise the potential for off-site impacts, including noise and visual impacts. The substation would include vehicle access and paved areas for service vehicle parking. The design of the site and structures would be further refined during design development.

Figure 6.18 provides an example of a traction power substation.

Figure 6.18 Example of traction power substation

### Overhead wiring

Power would be distributed from the substations to the light rail vehicles via overhead wiring strung on poles. Poles would be located so as not to obstruct existing infrastructure, footpaths or cycle routes.

The overhead wiring structures would be located and designed based on site characteristics and operational requirements. The structures would typically include foundations, poles and associated electrical infrastructure.

The final configuration and design of the overhead wiring and poles would be determined during design development in consultation with key stakeholders. This would include consideration of elements such as integration of street lighting and traffic signals to minimise visual clutter.

Wire-free power supply would be provided underground along Dawn Fraser Avenue between the Jacaranda Square and Carter Street stops. Further investigations would be conducted during design development in consultation with key stakeholders to assess the potential to incorporate wire-free design in other locations. This could include visually sensitive environments or areas where existing above-ground infrastructure and significant trees need to be retained.

Wiring, tracks and other infrastructure would be designed to mitigate risks associated with high voltage cabling and potential earth leakage.

## 6.7.5 Retaining walls

Retaining walls would be provided in some locations as a result of the difference between the height of the existing ground surface and the proposed alignment. This would include the following locations:

- South Street between the light rail track and the westbound traffic lane near the Nowill Street stop (up to about 1.6 metres high)
- Hilder Road along both sides of the light rail tracks (up to about one metre high)
- Ken Newman Park along the northern side of proposed alignment (up to about 0.5 metres high)
- Boronia Street along both sides of the light rail tracks, with the track lower than the road surface (up to about 3.3 metres high) (Figure 6.19 shows an indicative cross section)
- Waratah Street along both sides of the light rail tracks (up to about 0.6 metres high).

The finishes on the retaining walls would be confirmed during further design development, in accordance with the requirements outlined in Technical Paper 1 (Design, Place and Movement).

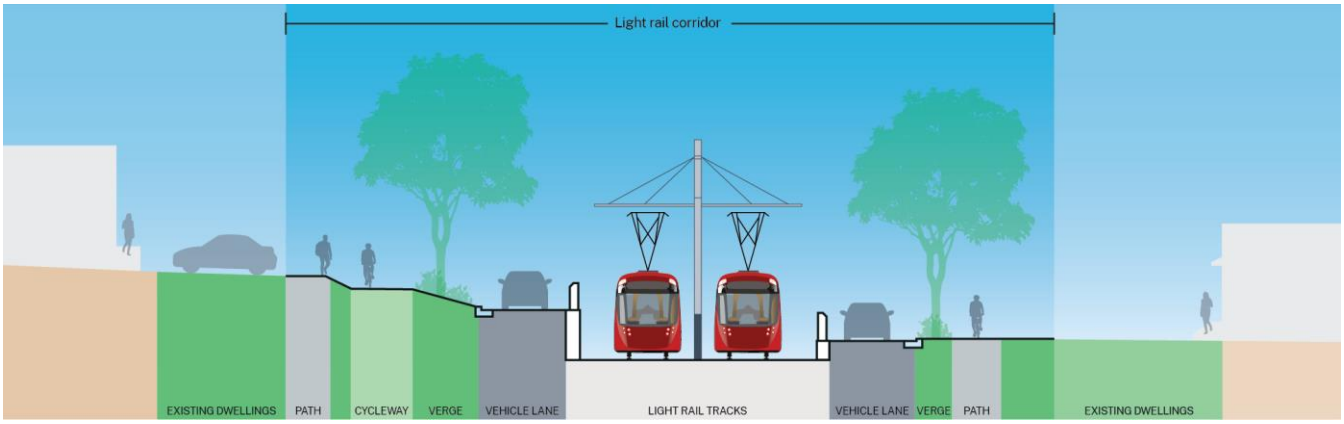



Figure 6.19 Indicative cross section showing retaining walls at Boronia Street

### 6.7.6 Communications system

The communications system would provide timely and reliable transmission of voice, data and video signals from key operational locations throughout the light rail system. It would be an extension of the system provided for Parramatta Light Rail Stage 1, and would include providing additional radio system poles, antennas, Wi-Fi access points and cabling.

Communications system equipment would be located at stops, road intersections and within the proposed substations. The communication system would use infrastructure constructed for Parramatta Light Rail Stage 1 in the operations control centre at the stabling and maintenance facility and the backup control centre in Dundas. Signalling infrastructure would be monitored from the operations control centre.

### 6.7.7 Driver facilities

Driver facilities, including a bathroom and staff room would be provided near the Macquarie Street turnback facility and Carter Street stop. The driver facilities would be about four metres wide by nine metres long, with a height of about three metres.

During design development, opportunities to integrate the driver facilities with the surrounding environment and minimise the potential for off-site impacts would be investigated, such as integration within another building or façade treatments.

## 6.8 Public domain works and open space

Public domain works would integrate the project with surrounding land uses and achieve the project's urban design and placemaking objectives and desired outcomes.

Technical Working Paper 1 (Design, Place and Movement) describes the design, place and movement framework developed for the project and the outcomes for each precinct. A summary of the key outcomes is provided below. The design of public domain elements would be guided by the framework and the project's urban design requirements.

Public domain works would include:

- integrating works associated with the project into the surrounding streetscape
- providing new and improved open spaces and recreation facilities, and repurposing some residual land
- providing tree planting, landscaping and street furniture.

### 6.8.1 Integration works

The project would provide new, high quality walking and cycling facilities, new public spaces and streetscape improvements along the alignment, particularly around stops and in pedestrian-focused areas.

Stops would be integrated with their surroundings and have been designed to support pedestrian accessibility from adjacent footpaths and active transport links. Stops would provide weather protection and include fixtures such as seating, wayfinding, customer information, wind screens and rubbish bins. Bicycle parking and bubblers would be incorporated in the public domain which would improve the amenity and functionality of the stop precinct. At locations such as the Atkins Road open space in the vicinity of the Bulla Cream Dairy (Willowmere) heritage item, there are opportunities to incorporate public art and heritage interpretation, which would contribute to place benefits.

The pedestrianisation of Dawn Fraser Avenue would create a new public space which would prioritise pedestrian amenity and encourage increased activation of adjacent buildings and spaces. Stops at Jacaranda Square and Olympic Boulevard would also create new points of arrival and activation within Sydney Olympic Park.

The project would also provide for future integration and interface with proposed future developments in key locations, such as:

- Camellia town centre
- development areas in Melrose Park
- Sanctuary Wentworth Point
- development areas at Carter Street precinct.

### 6.8.2 Public open space

The project would provide new and improved open spaces and recreation facilities and repurpose some residual land to increase open space. This would offset the areas of open space directly impacted by the project (see section 6.9.1 and Chapter 13 (Land use and property)).

The identification of opportunities and needs for open space along the corridor has followed a considered and detailed process of consultation with the City of Parramatta Council, and where available, input from the community it represents. Analysis of existing facilities, community needs and values, future growth, development and demand has influenced and shaped the concept plans (described below) that have been prepared for Ken Newman Park, the proposed Atkins Road open space and Archer Park.

Specific considerations that have informed the concept plans include:

- recreational needs outlined in the City of Parramatta Council's *Community Infrastructure Strategy* (City of Parramatta, 2020).
- City of Parramatta Council's capital works programs and plans for open spaces and river foreshore areas.

Public exhibition of the EIS would provide an opportunity for community feedback on the concept designs for these open spaces. Transport for NSW would continue to consult with the City of Parramatta Council and other key stakeholders as the design is further developed.

Feedback received would be considered in design development and the design of these open spaces would evolve in response to engagement.

#### Ken Newman Park

A concept plan has been developed for Ken Newman Park (see Figure 6.20) to integrate the project and improve the existing open space. Ken Newman Park slopes steeply, which limits the useable and accessible open space, particularly in the northern section. The concept plan includes:

- terracing of the northern grassed section of the park (where the steep slope limits usable space) to increase the level space available and improve connectivity within the park
- a new lookout at the northern edge of the park
- seating and covered picnic facilities
- additions to playground facilities
- additional paths to improve connectivity to and within the park
- integration of wayfinding, signage, heritage interpretation and public art

- landscaped areas and tree planting to increase canopy cover.


Figure 6.20 Concept plan for Ken Newman Park improvements

### Atkins Road stop open space

A concept plan has been developed for a new open space around the Atkins Road stop and the heritage-listed Bulla Cream Dairy (Willowmere) (see Figure 6.21). Recommendations and opportunities outlined in the *Assessment of Cultural Significance for the property Willowmere at 64 Hughes Avenue, Ermington* (Lucas Stapleton Johnson & Partners and Circle Square Design, 2018) have been considered, together with other design constraints (including the presence of existing utilities, cyclist and road safety and the findings of Technical Paper 5 (Statement of Heritage Impact – Built Heritage). The concept plan includes:

- playground facilities
- lawns open and spaces for sitting and passive recreation
- new forecourt courtyard integrating with Bulla Cream Dairy (Willowmere) and potential relocation of heritage plantings (see Chapter 12 (Non-Aboriginal heritage))
- integration of wayfinding, signage, heritage interpretation and public art
- tree planting and landscaped areas
- introduction of green tracks to integrate with the new open space.


Figure 6.21 Concept plan for Atkins Road open space

## Archer Park

A concept plan has been developed for Archer Park to improve the existing open space, and to integrate and address the required reconfiguration of the Ermington Boat Ramp car park (see Figure 6.22). The plan considers the City of Parramatta Council's *Draft Central River City – Green Grid Spatial Framework* and includes:

- new seating areas
- separated cycle and pedestrian paths and improved connection to Parramatta Valley Cycleway
- integration of wayfinding, signage, heritage interpretation and public art
- landscaped areas and tree planting to increase canopy cover.


Figure 6.22 Concept plan for Archer Park improvements

### 6.8.3 Landscaping

The provision of landscaping would be a key element in achieving the placemaking and tree canopy objectives of the project. The landscaping design would:

- maximise retention of trees where possible and safe to do so
- replace trees in suitable sizes to mitigate impacts and suit the location
- consider the desired character of each precinct and locations for visual consistency
- consider important views and environmentally sensitive areas
- consider local soil and climate conditions
- prioritise canopy and balance the need for summer shade and winter sun, to maximise amenity for users along footpaths, active transport links and open spaces
- consider biodiversity opportunities
- consider safety, including sight lines and passive surveillance
- consider the impacts of climate change and the suitability of any new tree selections in a changed climate.

Landscape planning would consider:

- progressive rehabilitation and revegetation
- timing for implementation, including opportunities for early offset plantings
- monitoring and maintenance procedures for built elements, vegetation and landscaping.

Landscaping requirements would be defined by the urban design requirements.

## 6.9 Land requirements

### 6.9.1 Permanent land requirements

Most of the land required for the project's operational infrastructure is located within existing road reserves and land owned by Transport for NSW or other government-owned land. However, some privately-owned land and other public land would also be permanently required. In total, it is estimated that about 20.7 hectares of land would be permanently required, including about 5.8 hectares of privately-owned land.

Transport for NSW is empowered to acquire land, and interests in land, pursuant to section 177 of the *Roads Act 1993* and Schedule 1, Part 3, section 11 of the *Transport Administration Act 1988* for the purpose of exercising its functions as well as other purposes set out in the Acts. These purposes include the planning, oversight and delivery of transport infrastructure.

All property acquisition would be managed by Transport for NSW in accordance with the *Land Acquisition (Just Terms Compensation) Act 1991*. Transport's preference is to achieve a negotiated agreement with the affected landowner in the first instance. However, if a negotiated agreement cannot be reached the compulsory process would then be followed.

The compensation payable is pursuant to section 55 of the *Land Acquisition (Just Terms) Compensation Act 1991*, which includes provisions for market value, special value, severance, disturbance (such as associated legal costs, valuation fees, relocation and removal expenses, and mortgage costs), disadvantage resulting from relocation and any increase or decrease in the value of adjoining or severed land in the same ownership.

Further information about the project's land requirements, including property impacts associated with these requirements, and the acquisition process for the project is provided in Chapter 13 (Land use and property).

The project would also require some temporary leasing of land for construction. Temporary land requirements are described in Chapter 7 (Project Description – Construction).

### 6.9.2 Residual land

Some of the land acquired by Transport for NSW to construct the project would be available for other uses following construction, where the land is surplus to the operational requirements of the project. This land is referred to as 'residual land' for the purpose of the EIS.

It is estimated that the residual land would comprise a total of about 17,700 square metres (1.77 hectares) with most of the residual land located:

- west of the John Street stop, Rydalmere
- in the vicinity of the Atkins Road stop, Melrose Park
- north of Hope Street west of Melrose Park stop, Melrose Park
- at the south-east corner of Hope and Waratah streets, Melrose Park.

The final area of residual land would be subject to ongoing design development. This would include consideration of opportunities to consolidate lots where practicable to maximise the land available for potential future uses.

Potential future uses of residual land would be determined by Transport for NSW in consideration of:

- surrounding land uses and existing zonings
- local and regional strategic planning, including master planning for identified urban renewal areas

- consultation with key stakeholders
- the requirements (including any remediation of contaminated land) to make the land suitable for potential future uses.

A residual land management plan would be prepared by Transport for NSW which outlines the approach to managing residual land, including the future use of the land, determined in consultation with key stakeholders (see section 13.7).

### 6.9.3 Subdivision

Where acquired land is identified as being surplus to operational requirements, or requires boundary adjustment, a subdivision of the land would be undertaken and Deposited Plans for the subdivision would be developed and lodged at NSW Land Registry Services. Subdivision may be carried out to divide land for the purposes of:

- public road and public open space
- light rail operation
- management of residual land.

Any proposed subdivision is considered to be part of the project and would be undertaken in accordance with the provisions of section 104Q of the *Transport Administration Act 1988*.

## 6.10 Operation

The project would operate between the Parramatta Square stop in the Parramatta CBD (provided as part of Parramatta Light Rail Stage 1) and the Carter Street stop in Lidcombe. Parramatta Light Rail Stage 2 services would terminate at the Parramatta Square stop to allow customers direct access to the Parramatta CBD, Parramatta Light Rail Stage 1 services or other forms of public transport. Between the Parramatta CBD and Camellia, the project would operate along about three kilometres of the Parramatta Light Rail Stage 1 alignment. From Camellia, the project would operate along the light rail infrastructure proposed as part of Stage 2, terminating at the Carter Street stop.

### 6.10.1 Service frequency

#### Operating hours

The project would operate as a turn-up-and-go light rail service from 5am to 1am, seven days a week, similar to the operation of Parramatta Light Rail Stage 1.

Different service schedules for weekdays, weekends and public holidays (see Table 6.5) are proposed to meet passenger demand. The operator may adapt the services in response to demand and usage changes and for special events.

Table 6.5 Summary of proposed services

| Time of day | Operating hours | Indicative time between services (minutes) | Vehicles per hour (each direction) |
|---|---|---|---|
| **Weekday services** | | | |
| Early morning | 05:00 – 07:00 | 10 | 6 |
| Day | 07:00 – 19:00 | 7.5 | 8 |
| Evening | 19.00 – 23.00 | 10 | 6 |
| Night | 23:00 – 01:00 | 15 | 4 |
| **Weekend and public holiday services** | | | |
| Early morning | 05:00 – 07:00 | 15 | 4 |
| Day / Evening | 07:00 – 23:00 | 10 | 6 |
| Night | 23:00 – 01:00 | 15 | 4 |

### Indicative journey times

The following provides an overview of the indicative journey times:

- 20 minutes between the Parramatta Square stop and the Melrose Park stop
- 16 minutes between the Melrose Park stop and Olympic Boulevard stop
- 11 minutes between the Footbridge Boulevard stop and Carter Street stop
- 36 minutes between the Parramatta Square stop and Sydney Olympic Park (Olympic Boulevard stop).

## 6.10.2 Special event operations

The project connects several key entertainment areas, including the Parramatta CBD, Rosehill Gardens Racecourse and Sydney Olympic Park (including Sydney Showground). During special events at these locations, there would be an increase in demand for light rail services and a special event timetable may be implemented, depending on the scale of the event.

During special events at Rosehill Gardens Racecourse and Sydney Olympic Park, changes to the frequency and stopping patterns of light rail services may be required to cater for customer demand.

During events at Sydney Olympic Park with an attendance of over 60,000 people, services would terminate at the Jacaranda Square stop and not operate from the Olympic Boulevard and Carter Street stops. A turnback facility at Jacaranda Square would facilitate the turnaround of light rail vehicles. Further information on special event operations is provided in sections 6.1 and 6.2 of Technical Paper 2 (Transport and Traffic).

Special event services may run beyond the standard hours of operations and there is the potential to provide 24-hour operations for certain special events (such as New Year's Eve events). It is anticipated that about six to eight additional services per hour in off peak periods would operate during special event periods.

## 6.10.3 Public transport network changes

### Interchange with other public transport services

Interchanges with other forms of public transport are proposed, including trains, buses, ferries and Sydney Metro West services.

Table 6.6 indicates the locations where interchange with other forms of transport would occur and the closest light rail stop.

Table 6.6 Locations where customers can change transport modes or services

| Suburb | Stop | Public transport services located in the vicinity of the stop |
|---|---|---|
| Parramatta CBD | Parramatta Square (constructed by Parramatta Light Rail Stage 1) | Parramatta Light Rail Stage 1<br>Sydney Trains (Parramatta Station)<br>Sydney Metro West (Parramatta Station)<br>Bus services to Burwood, West Ryde and Central |
| Camellia | Sandown Boulevard | Parramatta Light Rail Stage 1 (Rosehill Gardens stop) |
| Rydalmere | John Street | F3 Parramatta River ferry (Rydalmere Wharf)<br>Bus services to Ryde and Western Sydney University |
| Ermington | River Road | Bus services to Eastwood and Auburn (via Newington) |
| Melrose Park | Melrose Park | Bus services to Pennant Hills (via Carlingford), Macquarie Park (via Ryde), Concord Hospital (via Rhodes) and Lidcombe |
| Wentworth Point/ Sydney Olympic Park | Footbridge Boulevard | Bus services to Concord Hospital (via Rhodes)<br>F3 Parramatta River ferry (Sydney Olympic Park Wharf) |
| Sydney Olympic Park | Holker Street | Bus services to Lidcombe (via Newington) |
| | Jacaranda Square | Sydney Trains (Olympic Park Station)<br>Bus services to Lidcombe, Macquarie Park (via Ryde), Strathfield, Parramatta, Carlingford (via Melrose Park) and Wentworth Point |
| | Olympic Boulevard | Sydney Trains (Olympic Park Station)<br>Sydney Metro West (Sydney Olympic Park Station)<br>Bus services to Lidcombe, Strathfield, Burwood, Macquarie Park (via Ryde), Parramatta, Carlingford (via Melrose Park) and Wentworth Point |
| Lidcombe | Carter Street | Bus services to Burwood, Lidcombe and Rhodes |

### Bus service changes

Existing bus routes along roads affected by the project would be retained as far as practicable. However, an initial review has identified that some changes to the bus network may be required, including:

- introducing new routes to meet existing and future customer travel patterns
- truncating or removing some services to better integrate with the project and the broader transport network (for example reducing services that operate in a similar corridor to the project)
- changing routes to adapt to proposed changes to the road network (see section 6.6)
- considering opportunities for on-demand services in the study area.

Changes to the bus network are outside the scope of the project and would be assessed and delivered separately by Transport for NSW in conjunction with bus operators.

Minor changes to some bus stop infrastructure and locations would be required. Relocated stops would be located as close as possible to the existing stop.

Further information on changes to public transport is provided in section 9.4 (Transport and traffic).

### 6.10.4 Light rail vehicles

The proposed light rail vehicles would be about 45 metres long, electric-powered, low floor and airconditioned with real-time information provided via audio and visual displays (see Figure 6.23 for an indicative light rail vehicle).

Each light rail vehicle would provide seating and standing areas for about 300 passengers. Accessible priority seating for those with limited mobility would be provided.

To accommodate the proposed service frequency at the commencement of operations, a fleet of about 13 light rail vehicles (including one spare light rail vehicle) would be used. The proposed vehicles would be interoperable with the light rail vehicles procured for Parramatta Light Rail Stage 1.

On-board security would consist of emergency help points and CCTV cameras linked to the operations control centre.


Figure 6.23 Indicative light rail vehicle

### 6.10.5 Ticketing system and passenger information

#### Ticketing

Ticketing would be integrated with the Opal ticketing system used for Sydney's public transport network. Opal card readers would be located at each stop, with passengers required to tap on before boarding, and tap off after alighting the light rail vehicles.

#### Passenger information displays and public address system

Passenger information displays would be located in the interchange area to provide passengers with the information to make informed decisions on journey plans. These displays would provide up to date service information specific to the stop, general information and information during operational disruptions.

A public address system would be installed at all stops. It would be used only in the event of an emergency and would be designed to minimise impacts to the amenity of the surrounding community. Regular service information would not be provided by the public address system.

### 6.10.6 Operational control and safety

#### Operation control

The project would be operated from the existing operations control centre, which forms part of the Parramatta Light Rail stabling and maintenance facility.

#### Road and light rail vehicle safety

The operator would have responsibility for the safe and efficient operation of the system. Light rail vehicle drivers would use line-of-sight operation. In on-street sections, light rail vehicles would form part of the general road traffic and light rail vehicle drivers would observe the relevant provisions of the NSW *Road Rules 2014*. The light rail vehicle drivers would also be required to give due consideration to traffic flow and pedestrian movements, assessing light rail vehicles speeds and braking requirements against actual or potential hazards.

### Speed limits

Speed limits for light rail vehicles would be developed considering the existing and desired street character, transport and journey time objectives, engineering requirements, and safety considerations. Where light rail operates in the street environment, it would observe the signposted speed limits of the existing roadways. Speed limits are not expected to exceed 50 kilometres per hour due to the existing road environment; however, slower speeds would be used in some sections of the alignment (such as the light rail and pedestrian zone along Dawn Fraser Avenue in Sydney Olympic Park).

### Disruptions to light rail services and incident management

During operation, incidents may disrupt light rail services, preventing parts of the network from being operated. The operator would develop and implement procedures to minimise the occurrence and impact of disruptions and incidents. Such incidents could include:

- road traffic accidents (including a collision involving a light rail vehicle)
- major fault or failure of a light rail vehicle, requiring traffic diversion until the disabled light rail vehicle has been recovered
- infrastructure faults (e.g. track, overhead wiring or signals)
- derailment of a light rail vehicle
- unruly or ill passenger(s)
- environmental events (such as flooding).

All emergency or incident responses would be subject to safe management processes including risk assessments, staff training and agreements with emergency services and utilities agencies.

### Customer safety

The operator would be responsible for the safety of customers, staff and the public where they interact with the light rail system. The operator would maintain a customer safety plan (or similar management plan) identifying how customers would be made aware of the safety risks associated with being near light rail vehicles. This plan would be agreed and implemented in consultation with Transport for NSW and would form part of the operator's accreditation process prior to commencement of operations.

The operator would also be responsible for the security of the light rail network (active and passive security).

## 6.10.7 Maintenance

Maintenance would be required along the light rail track, at bridges, stops, substations and ancillary facilities, and would include the following activities:

- track and overhead wiring inspections, inspection and clearing of the track drainage system
- preventative maintenance and repair
- maintenance of landscaping to maintain appropriate clearances
- cleaning of passenger facilities
- track grinding and periodic replacement of track and other light rail infrastructure.

Cleaning and minor maintenance would be undertaken during off-peak periods and at night. Major maintenance works requiring suspension of services would be performed during scheduled shutdowns, about two to four times per year.

Light rail vehicles would be maintained at the Parramatta Light Rail stabling and maintenance facility.