Transport for NSW

Chapter 15
Landscape and visual impacts

NSW GOVERNMENT

Contents

Tables

Figures

15. Landscape and visual impacts

This chapter provides a summary of the landscape and visual assessment. It describes the existing landscape and visual environment, identifies potential impacts, and provides measures to mitigate and manage the impacts identified. Further information is provided in the Landscape and Visual Impact Assessment report, which forms Appendix A of Technical Paper 1 (Design, Place and Movement).

15.1 Approach

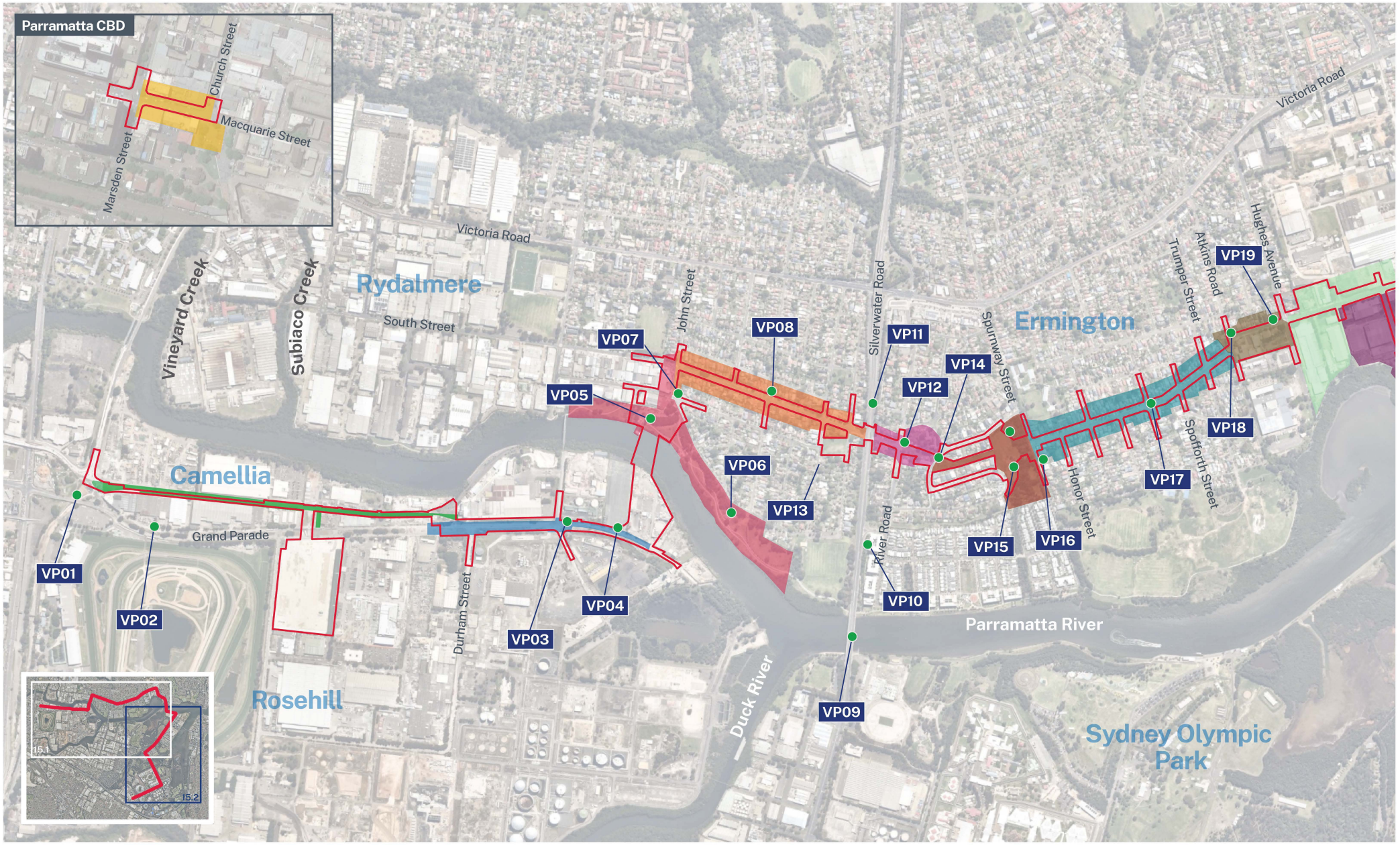
The project has been planned and developed with the involvement of urban design professionals to help shape the project design. A landscape and visual assessment has been completed as an important input to the urban design process, which is described in Technical Paper 1 (Design, Place and Movement). By commencing the landscape and visual assessment early in the design process and working closely with the design team, impacts were identified and resolved through appropriate urban design approaches. This has ensured that the overall project design is appropriate for its context, optimises community and social outcomes, and avoids or minimises adverse landscape and visual impacts as far as practicable.

The landscape and visual assessment has been undertaken in accordance with the *Guideline for landscape character and visual impact assessment* (Transport for NSW, 2020b), a key guiding document to assessing landscape and visual impacts for transport projects in NSW. The assessment has also been undertaken in accordance with the SEARs (see Appendix A) and has had regard to the *Guidance Note for Landscape and Visual Assessment* (Australian Institute of Landscape Architects, 2018).

An overview of the approach to the assessment is provided below. Further information is provided in section 2 of the Landscape and Visual Impact Assessment report (see Appendix A of Technical Paper 1 (Design, Place and Movement)).

15.1.1 Study area

The study area is defined by the identified landscape character zones (see Figure 15.1 to Figure 15.2 and section 15.2.2). These are centred around the project site and generally include land within about 100 metres of the project site.



LEGEND

- Project site
- LCZ - Parramatta CBD turnback facility
- LCZ - Sandown Line
- LCZ - Grand Avenue
- LCZ - Eric Primrose Reserve and John Street
- LCZ - South Street
- LCZ - River Road
- LCZ - Ken Newman Park
- LCZ - Boronia Street
- LCZ - Atkins Road
- LCZ - Hope Street
- LCZ - Waratah Street
- Viewpoint

Figure 15.1 Landscape characters zones and representative viewpoints-map 1

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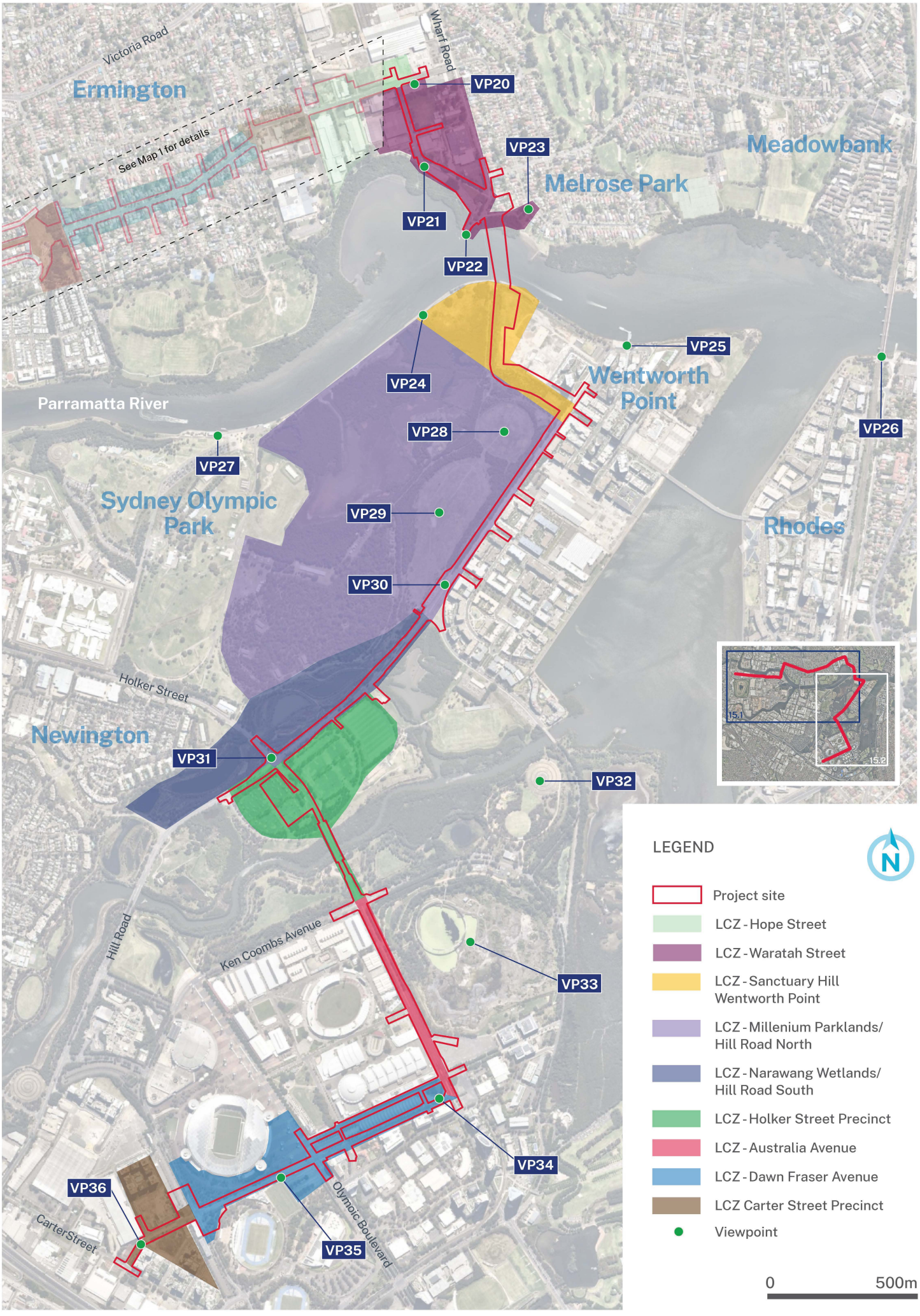


Figure 15.2 Landscape characters zones and viewpoints-map 2

15.1.2 Key tasks

The assessment involved:

- desktop analysis, including analysing aerial photography and topographic maps
- site visit and analysis to confirm the landscape and visual context
- identifying landscape character zones, based on the relationship between natural, built and community elements (such as land use, vegetation cover, topography, heritage and/or scenic values) and their sensitivity to change
- undertaking a visual envelope exercise to identify areas where the project could be viewed from
- identifying representative viewpoints and sensitive receptors (based on visual envelope mapping and ground truthing) and their sensitivity to change
- a tree (arboricultural) assessment undertaken by an arborist, including identifying significant trees (see Appendix B of Technical Paper 1 (Design, Place and Movement))
- assessing the potential for landscape and visual impacts during construction and operation (summarised below)
- determining the significance of potential impacts through a combined assessment of sensitivity and magnitude
- recommending mitigation and management measures.

Landscape impact assessment

In the urban context, landscape refers to the overall character and function of a place. It includes all elements within the public realm and the interrelationship between these elements and the people who use it. The landscape character analysis identified 18 distinct landscape character zones (see section 15.2.2).

Landscape impacts were determined based on the assessed sensitivity of the landscape character zones and the magnitude of the potential impact as a result of the project. Sensitivity refers to how sensitive the character of the setting is to the proposed change. Magnitude refers to the physical size and scale of the impact at a location. The combination of sensitivity and magnitude determines the landscape character impact, which is rated from negligible to high (see Figure 15.3).

Visual impact assessment

The area that the project could be visible from is referred to as the visual envelope. This is largely defined by the landform of the study area. A total of 36 viewpoints were selected within the visual envelope to illustrate the potential visual influence of the project (see section 15.2.3). These generally represent publicly accessible views and vistas from a range of locations and viewing situations.

Visual impacts were determined based on the assessed sensitivity of the viewpoint and the magnitude of the change. Sensitivity refers to the quality of the view and how it would be affected by the project. Magnitude refers to the change within a view due to the physical size and scale of the project and the proximity relative to the viewer. The combination of sensitivity and magnitude determines the visual impact, from negligible to high as shown by Figure 15.3.

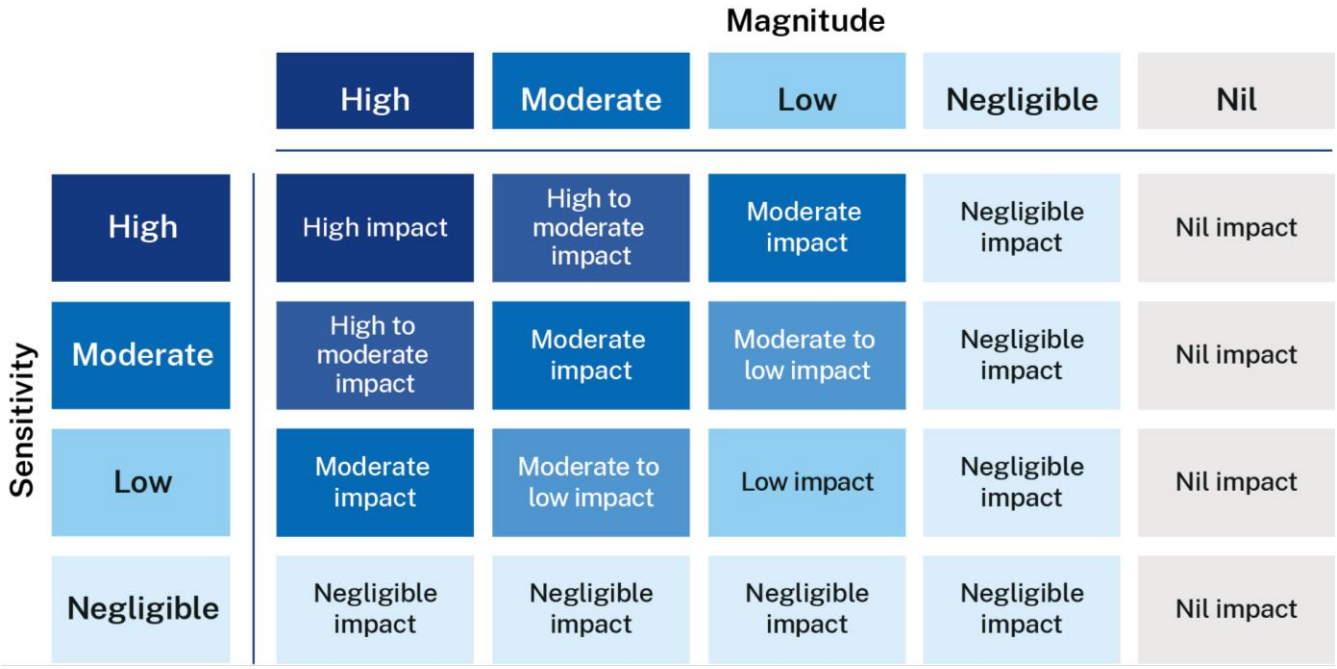


Figure 15.3 Landscape and visual impact significance rating matrix

15.1.3 How potential impacts have been avoided or minimised

The approach to design development included a focus on avoiding and/or minimising the potential for impacts during key phases of the design process. As described in Chapter 5 (Design development, alternatives and options) a project corridor and alignment options assessment process was undertaken to identify the preferred alignment. This process considered a range of factors, including potential landscape and visual impacts, with a focus on minimising these impacts during design development.

The design for the project has been refined to avoid landscape and visual impacts as far as possible, including:

- selecting an alignment with lower potential for impacts
- maximising use of existing transport corridors
- locating stops to minimise visual impacts on adjacent properties where possible
- minimising impacts on vegetation, including street trees where possible
- sensitive design of project elements through Ken Newman Park and other areas of open space
- refining the design to minimise impacts on the locally listed heritage item Bulla Cream Dairy (Willowmere).

15.2 Existing environment

15.2.1 General visual environment

The location and setting of the project site are described in Chapter 2 (Location and setting). The landscape and visual environment are characterised by the highly developed urban nature. The interaction between the range of land uses, landscape features and infrastructure influences the character and visual amenity of the study area. Key features and infrastructure include local and regional roads, the Parramatta River, areas of open space (such as Eric Primrose Reserve, Ken Newman Park and the Millennium Parklands), traditional industrial areas, and areas subject to urban regeneration and redevelopment. Further information on land use is provided in Chapter 13 (Land use and property).

The original landform has been extensively modified since European settlement, particularly to the south of the Parramatta River. South of the river, the study area is relatively flat and has been subject to significant past disturbance, including extensive areas of fill. North of the Parramatta River, the study area rises from the river towards Victoria Road, which travels along a ridge. Views are available from the northern side of the river across to the southern side due to its elevated position.

While the majority of original vegetation and other natural features along the project site have been removed or modified, some natural features remain. These are associated with riparian and intertidal environments along the Parramatta River. A series of wetlands occur south of the Parramatta River and adjacent to the project site in the Newington Nature Reserve and Millennium Parklands, and along Haslams Creek.

15.2.2 Landscape character zones

A total of 18 landscape character zones were identified within the study area as shown on Figure 15.1 and Figure 15.2. Of these zones, five have high sensitivity, two have moderate sensitivity, and 11 have low sensitivity. Landscape character zones with high and moderate sensitivity are summarised in Table 15.1. Further information on the landscape character zones, including a description of those with low sensitivity, is provided in section 4 of the Landscape and Visual Impact Assessment report.

Table 15.1 Landscape character zones with moderate and high sensitivity

Landscape character zone	Description	Sensitivity	Indicative appearance
Eric Primrose Reserve and John Street	This zone includes Eric Primrose Reserve, which is a significant area of open space along the Parramatta River, with a range of recreation facilities (including the Parramatta Valley Cycleway). The reserve is characterised by scattered areas of mature vegetation and open grassed areas. The zone includes views to the Parramatta River and the mangrove vegetation along the river.	High	
Ken Newman Park	This zone consists of Ken Newman Park, including the main area of the park to the east, and the narrow corridor along the electricity easement to Hilder Road to the west. Key features include established areas of native vegetation in the eastern part of the park and open grassed areas. The topography allows for views of surrounding areas, including towards the Parramatta River.	High	
Atkins Road	This zone consists of a mix of commercial and light industrial land uses with some residential properties to the north of Hope Street. A key feature is the heritage listed Bulla Cream Dairy (Willowmere), which includes characteristic mature trees that contribute to the heritage listing and zone character.	Moderate	

Landscape character zone	Description	Sensitivity	Indicative appearance
Sanctuary Wentworth Point	This zone is characterised by the interaction between development within the suburb of Wentworth Point (mostly to the east of Hill Road) and natural areas associated with the Woo-la-ra precinct of the Millennium Parklands and Newington Nature Reserve (to the west of Hill Road). Defining characteristics include mangrove vegetation along the Parramatta River and wetland areas within the parklands close to urban areas.	High	
Hill Road (north of Bennelong Parkway)	This zone consists of two distinct areas: • the Woo-la-ra precinct of the Millennium Parklands, which has a more natural appearance and is raised above the surrounding area • the Hill Road corridor, which is dominated by the road and adjoining urban development, includes views to parkland and vegetated areas.	High	
Hill Road (south of Bennelong Parkway)	This zone is characterised by the Narawang Wetland precinct of the Millennium Parklands and areas of well-established native vegetation, bisected by Hill Road.	High	
Dawn Fraser Avenue	This zone consists of the Dawn Fraser Avenue road corridor, which is adjoined by mixed use development, Olympic Park Station and recreation and sporting facilities. The road is lined with trees, including established Jacarandas. The corridor is somewhat visually contained at its eastern end, widening to the west of Showground Road where it is located adjacent to large open forecourt areas.	Moderate	

15.2.3 Representative viewpoints

Figure 15.1 and Figure 15.2 show the location of the 36 viewpoints selected as representative locations to assess the potential visual impacts of the project. The locations of the viewpoints are representative of the range of views available within and around the project site. Three viewpoints (viewpoints 12, 28 and 29) include multiple views.

Of the identified viewpoints, four are considered to have high sensitivity and 20 are considered to have moderate sensitivity (see list in Table 15.2). Figure 15.4 shows indicative views from the viewpoints considered to have high sensitivity.

Twelve viewpoints (viewpoints 1, 3, 4, 9, 10, 11, 20, 21, 30, 31, 34 and 36 – see Figure 15.1 and Figure 15.2) are considered to have low sensitivity.

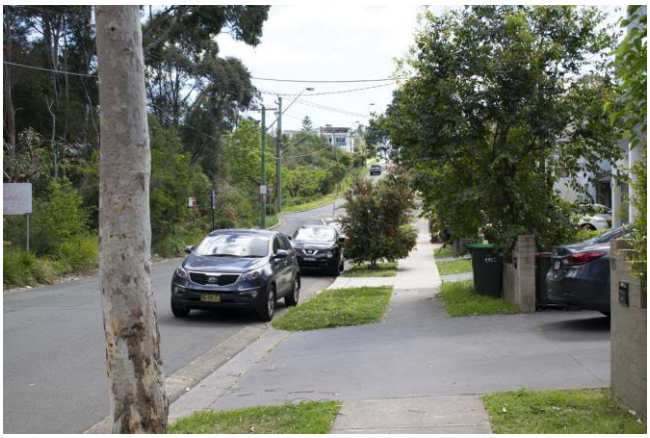
Further information on the viewpoints, including images showing views for other viewpoints, is provided in section 7 of the Landscape and Visual Impact Assessment report.

Table 15.2 List of viewpoints with moderate and high sensitivity

Viewpoint (see Figure 15.1 and Figure 15.2)	Name	Sensitivity
2	Grand Avenue	Moderate
5	Rydalmere Ferry Wharf	Moderate
6	Eric Primrose Reserve	Moderate
7	South Street at John Street	Moderate
8	South Street at Nowill Street	Moderate
12	(a) South Street at River Road (looking west)	Moderate
	(b) South Street at River Road (looking east)	Moderate
13	Hilder Road (looking south-east)	Moderate
14	Tristram Street	High
15	Heysen Avenue	High
16	Broadoaks Street	High
17	Boronia Street at Murdoch Street	Moderate
18	Boronia Street at Atkins Road	Moderate
19	Hope Street at Bulla Cream Dairy	High
22	Ermington Boat Ramp	Moderate
23	Melrose Park Playground	Moderate
24	River Walk	Moderate
25	Sydney Olympic Park Ferry Wharf	Moderate
26	John Whitten Reserve	Moderate
27	Newington Armory Wharf	Moderate
28	(a) Sanctuary (looking north)	Moderate
	(b) Sanctuary (looking south)	Moderate
29	(a) Woo-la-ra (looking north-east)	Moderate
	(b) Woo-la-ra (looking west)	Moderate
	(c) Woo-la-ra (looking east)	Moderate
32	Spiral Hill	Moderate
33	Brick Pit Ring Walk	Moderate
35	Stadium Australia	Moderate

Viewpoint 14 – Tristram Street

Viewpoint 15 – Heysen Avenue



Viewpoint 16 – Broadoaks Street

Viewpoint 19 – Hope Street at Bulla Cream Dairy (Willowmere)

Figure 15.4 Views from viewpoints considered to have high sensitivity

15.2.4 Trees within and adjacent to the project site

For the purposes of the arboricultural assessment, a 'tree' has been defined as per Australian Standard *AS 4980-2009 Protection of trees on development sites* as a 'Long lived woody perennial plant greater than (or usually greater than) three metres in height with one or relatively few main stems or trunks'.

The assessment report identified that about 4,000 trees are located within the project site and 900 trees are located close to the project site (that is, the tree protection zone extends into the project site).

The trees within/close the project site consist of a mix of locally indigenous species, Australian native species, and exotic ornamental or invasive specimens. The trees, most of which have been planted, are generally street trees, park plantings or landscaping on adjacent properties.

Trees along the road network have important visual value and can contribute to the character of the area. This is particularly the case in areas where there is limited tree canopy available due to past and ongoing development. The trees within and adjoining the project site contribute to amenity, particularly in the highly urbanised landscape of much of the study area. Trees considered to have high amenity value include:

- *ficus* trees within Eric Primrose Reserve in Rydalmere
- Norfolk Island Pines located in Spofforth Street in Ermington
- various trees within the heritage-listed Bulla Cream Dairy (Willowmere) site
- *ficus* and *eucalyptus* trees located along the southern side of Hope Street, east of Bulla Cream Dairy (Willowmere)

- *jacaranda* trees located along Dawn Fraser Avenue
- some isolated trees located predominately within or directly adjacent to road reserves, including in John, Nowill and Fallon streets (Rydalmere), Heysen Avenue, Atkins Road, Boronia Street and Spofforth Street (Ermington).

Further information on trees within and close to the project site is provided in Appendix B of Technical Paper 1 (Design, Place and Movement).

15.3 Assessment of construction impacts

15.3.1 Landscape impacts

The main landscape impacts during construction would result from the presence of construction sites, including work areas and compounds. This would include hoarding and/or fencing around work areas and structures (such as sheds), equipment and machinery. The removal of vegetation during site establishment would also result in landscape impacts.

Construction would be undertaken in all landscape character zones resulting in direct impacts. All landscape character zones would also experience indirect impacts from works located in adjacent zones. Construction vehicle movements would also affect all landscape character zones, with increased traffic and the presence of heavy vehicles and machinery.

Landscape character impacts were assessed by considering changes during construction and the scale of these changes, such as the extent of the project site. The assessment concluded that construction would result in a high impact on two landscape character zones:

- Eric Primrose Reserve and John Street
- Ken Newman Park.

These zones have the highest level of impact due to their high sensitivity (particularly as a result of the close proximity to nearby receivers or areas of open space) and a high magnitude of change to the existing landscape character. For these zones, construction would result in a change from an open environment to a closed construction compound or construction work area, together with the presence of hoarding, temporary fencing and other elements in the landscape, close to receivers.

The assessment concluded that construction would result in a high to moderate impact on three landscape character zones:

- Sanctuary Wentworth Point
- Hill Road (north of Bennelong Parkway)
- Hill Road (south of Bennelong Parkway).

The assessed levels of potential impacts for these zones are a result of the high sensitivity of these zones (influenced by their close proximity to receivers or areas of open space) and a moderate magnitude of change to the existing landscape character. For these zones, construction would result in a change from an open environment to a closed construction compound or construction work area, together with the presence of other construction features, that are close to receivers but not as close as those with the highest levels of impact.

The assessed level of significance of impacts on landscape character zones is provided in Table 15.3. Further information about the impacts on the landscape character zones is provided in section 4 of the Landscape and Visual Impact Assessment report.

Construction impacts would be temporary, and minimised (as far as practicable) by implementing the measures provided in section 15.6.

Table 15.3 Landscape character impact significance – construction

Landscape character impact	Landscape character zones
High	Eric Primrose Reserve and John Street, Ken Newman Park
High to moderate	Sanctuary Wentworth Point, Hill Road (north of Bennelong Parkway), Hill Road (south of Bennelong Parkway).
Moderate	South Street, River Road, Boronia Street, Atkins Road, Dawn Fraser Avenue
Moderate to low	Parramatta CBD turnback facility, Hope Street, Waratah Street, Holker Busway, Uhrig Road
Low	Sandown Line, Grand Avenue, Australia Avenue

15.3.2 Visual impacts

The project would result in temporary visual impacts during construction. These impacts would be experienced by sensitive receivers (including residents, pedestrians, cyclists, motorists and local workers) in the vicinity of work areas and from the identified viewpoints to differing degrees. During construction, visible elements would include work areas, machinery and equipment, hoarding and fencing, soil stockpiles, waste materials and partially constructed structures.

The visual impact would depend on the nature and intensity of construction work. Visual impacts would be more significant at locations where residential or other sensitive receivers (for example areas of open space) have an unscreened view of the project site. The use of lighting during works outside standard working hours may result in light spill and associated impacts on neighbouring properties.

The assessment concluded that there would be the potential for high impacts at four viewpoints (viewpoints 14, 15, 16 and 19) and high to moderate impacts at eight viewpoints (viewpoints 5, 7, 8, 12 (both views), 13, 17, 18 and 22). Impacts at these viewpoints are generally a result of one or both of the following:

- proximity to residential receivers or other sensitive receivers such as open space
- large magnitude of change within the view due to the presence of larger construction areas and construction compounds.

The four viewpoints assessed as having the highest level of potential impacts are both highly sensitive and subject to a high magnitude of change.

The assessed level of significance of impacts on viewpoints is provided in Table 15.4. Further information on the ratings and detailed assessment for each key viewpoints is provided in section 6 of the Landscape and Visual Impact Assessment report.

The measures provided in section 15.6 would be implemented to minimise potential visual impacts (including light spill) as far as practicable.

Table 15.4 Visual impacts at viewpoints with a predicted significance of impact of moderate or lower

Visual impact	Viewpoints
High	14, 15, 16, 19
High to moderate	5, 7, 8, 12 (views (a) and (b)), 13, 17, 18, 22
Moderate	21, 34, 25
Moderate to low	10, 11, 20, 23, 24, 26, 27, 28 (view (a)), 30, 31, 33, 35, 36
Low	3, 4, 9
Negligible	1, 2, 6
Nil	28 (view (b)), 29 (views (a), (b) and (c)), 32

15.3.3 Tree impacts

To support a high quality, comfortable, and amenable public domain and customer environment, a significant number of new street trees would be planted along the project site and in surrounding streets. These would provide a valuable addition to the urban tree canopy.

It is estimated, based on the current stage of the design, that up to about 4,000 trees located in the project site may need to be removed to enable the project to be constructed and operated safely. A number of trees that would need to be removed contribute to the amenity and character of the local area and/or screen views from sensitive receivers, including trees identified by the arboricultural assessment as having high amenity value. The trees that may need to be removed consist of street trees and those in areas of planted vegetation (shown on Figure 16.1 to Figure 16.6) that are located within the project site.

The majority (about 70 per cent) of trees that would be impacted are located in Sydney Olympic Park. Table 15.5 outlines key locations where trees would need to be removed within Sydney Olympic Park. These three locations contribute to make up about 45 per cent of the total estimated impacts on trees.

Table 15.5 Key locations for tree removal within Sydney Olympic Park

Location	Infrastructure proposed in affected area/reason for impacts	Indicative percentage of total trees	Types of vegetation and dominant species
Electricity transmission line easement/Millennium Parklands, west of Wattlebird Road and Hill Road	Construction of the light rail tracks and active transport link between the southern end of the proposed bridge and Hill Road would require clearing of vegetation (including trees).	20	Planted vegetation, consisting mainly of *Acacia* species, *Pittosporum undulatum, Bursaria spinosa and Kunzea ambigua*
Along Hill Road north of Holker Street/Holker Busway, adjacent to Millennium Parklands	Construction of the light rail tracks, stops (Footbridge Boulevard and Hill Road) and works to the Hill Road bridge would require clearing of vegetation (including trees). To minimise impacts on Hill Road (the only private vehicle access for the suburb of Wentworth Point) the project alignment encroaches on the eastern edge of the Millennium Parklands.	15	Planted vegetation, consisting of *Eucalyptus* species, *Casuarina* species, *Melaleuca* species
Sydney Olympic Park (Kevin Coombes Road, Australia Avenue, Murray Rose Avenue, Dawn Fraser Avenue and intersecting roads)	Construction of the light rail tracks, stops (Grand Parade, Jacaranda Square and Olympic Boulevard), active transport links and associated road works would require clearing of planted vegetation/removal of street trees.	10	*Eucalyptus* species, *Corymbia species, Pyrus ussurensis*

The removal of trees would have the potential to affect visual amenity, which has been considered in the assessment of landscape and visual impacts in sections 15.3 and 15.4.

Retained trees located close to work areas, and trees adjacent to the project site, could be impacted during construction, including as a result of inadvertent damage and root disturbance. Trees to be retained within the project site, and those located close to the project site that could be impacted, would be protected in accordance with Australian Standard *AS 4970–2009 Protection of trees on development sites*.

The project would continue to be refined to avoid or minimise impacts on trees within the project site. Feasible options to reduce impacts on trees would be considered during design development and construction planning. The approach to managing impacts on trees is described in section 15.6. This would include preparing a tree offset strategy in consultation with key stakeholders, to identify how a net increase in tree canopy would be achieved.

Following construction, and with implementation of the tree offset strategy, the project is expected to result in a net increase in canopy cover as planted trees mature.

In addition to the trees proposed to be planted, additional green infrastructure would be provided in areas along, or close to, the alignment, including open spaces and adjacent streets (see section 6.9 and section 4.11 of Technical Paper 1 (Design, Place and Movement)).

15.4 Assessment of operation impacts

15.4.1 Landscape impacts

The assessment concluded that permanent landscape character impacts across the 18 landscape character zones would range from negligible to high.

The assessment concluded that the project would result in a:

- high impact on the Ken Newman Park landscape character zone
- high to moderate impacts on the Eric Primrose Reserve and John Street landscape character zone
- moderate impacts on the Atkins Road, Sanctuary Wentworth Point, Hill Road (north of Bennelong Parkway) and Hill Road (south of Bennelong Parkway) landscape character zones.

Table 15.6 outlines potential impacts on these landscape character zones. These zones are generally considered to have a higher level of impact due to a combination of higher sensitivity (particularly as a result of the close proximity to nearby receivers or areas of open space) and higher magnitudes of change.

Table 15.6 Landscape character zones with moderate to high impacts

Landscape character zone	Summary of key changes	Significance	Magnitude of change	Significance of impact
Eric Primrose Reserve and John Street	The tracks would cross a small section of the reserve with the majority of this crossing being in the form of a bridge. The project would impact some mature trees and mangrove vegetation located within the project site. The introduction of the bridge structure into the open space environment would represent a substantial change in the landscape character.	High	Moderate	High-moderate
Ken Newman Park	Parts of the zone would be converted from open space to transport infrastructure. This would represent a substantial change to its form and character. The project would also include public domain works which would change the appearance of the park; however, these works would also provide some visual benefits. The project would also include the construction of a new bridge in the eastern portion of the park through the vegetated area.	High	High	High

Landscape character zone	Summary of key changes	Significance	Magnitude of change	Significance of impact
Atkins Road	Parts of this character zones would be converted from industrial land uses to transport infrastructure and public space. The Atkins Road stop, light rail tracks and new traction power substation would introduce a number of changes in this character zone, including impacts on the heritage-listed Bulla Cream Dairy (Willowmere). An additional public domain area is proposed to complement the retained Main House at Bulla Cream Dairy (Willowmere). Potential impacts on the heritage significance of this item are described in Chapter 12 (Non-Aboriginal heritage).	Moderate	Moderate	Moderate
Sanctuary Wentworth Point	The project would introduce new transport infrastructure into this character zone. The new infrastructure would run parallel to the existing high voltage transmission line. Future changes to this character zone would also occur as a result of the Sanctuary Wentworth Point development, including the Sanctuary Foreshore Park along the river.	High	Low	Moderate
Hill Road (north of Bennelong Parkway)	The project would introduce new transport infrastructure (tracks and stops) into this zone along Hill Road, which is a highly used transport corridor. While generally in character with the zone, this would represent a change to the visual character.	High	Low	Moderate
Hill Road (south of Bennelong Parkway)	The project would introduce new transport infrastructure (tracks, a stop and duplication of the existing Hill Road bridge) into this zone along Hill Road. While generally in character with the zone, this would represent a change to the visual character.	High	Low	Moderate

The assessed impacts on other landscape character zones (those with lower levels of impacts) are listed in Table 15.7. Further information on the impacts on all character zones is provided in section 4 of the Landscape and Visual Impact Assessment report.

Table 15.7 Landscape character impact significance for impacts less than moderate - operation

Landscape character impact	Landscape character zones
Moderate to low	South Street, River Road, Boronia Street, Dawn Fraser Avenue
Low	Sandown Line, Grand Avenue, Hope Street, Waratah Street, Holker Busway, Australia Avenue, Uhrig Road
Negligible	Parramatta CBD turnback facility

15.4.2 Visual impacts

The extent to which the project would be visible from the identified viewpoints would vary depending on existing topography, vegetation, buildings and land uses, as well as the form of the project when viewed from each viewpoint. Permanent visual impacts have been assessed at the viewpoints described in section 15.2.3.

Generally, visual impacts would occur due to the presence of project infrastructure (including tracks, stops, bridges and traction power substations), removal of vegetation and changes to roadways.

The assessment concluded that the project would result in more than a moderate impact at six viewpoints (5, 12 (view (b)), 14, 15, 19, 22), as summarised in Table 15.8. These viewpoints represent the following:

- two views to the Parramatta River from public facilities within areas of public open space (viewpoints 5, 22)
- two views to Ken Newman Park representative of views from adjacent properties (viewpoints 14, 15)
- one view along the grassed utility (powerline) easement between River Road and Hilder Road (viewpoint 12 (view (b))
- one view to the heritage-listed Bulla Cream Dairy (Willowmere) (viewpoint 19).

Visual representations of the project from these viewpoints have been prepared (see Figure 15.5 to Figure 15.10). Figure 15.5 and Figure 15.6 represent the impact of the project on views to the Parramatta River from Rydalmere Wharf and the Ermington Boat Ramp (viewpoints 5 and 22). Figure 15.7 and Figure 15.8 represent the views to Ken Newman Park from Tristram Street and Heysen Avenue (viewpoints 14 and 15), with these views representative of those from adjacent residential properties. Figure 15.9 represents the view from River Road along the utility easement towards Hilder Road and Ken Newman Park (viewpoint 12 (view (b)). Figure 15.10 (from viewpoint 18) represents the views from viewpoint 19.

Table 15.8 Summary of impacts at viewpoints assessed as having a more than moderate impact

Viewpoints	Viewpoint name	Description of key changes	Sensitivity	Magnitude of change	Significance of impact
5	Rydalmere Wharf	• new bridge structure over Parramatta River • impacts to vegetation along the river bank	Moderate	High	High to moderate
12 (view (b))	South Street at River Road (looking east)	• River Road stop located within a widened road corridor • new active transport link along widened corridor • removal of some residences • removal of vegetation at rear of viewpoint • electricity infrastructure relocated underground	Moderate	High	High to moderate
14, 15	Tristram Street Heysen Avenue	• light rail alignment through Ken Newman Park • removal of some mature trees • open space works and landscaping • new bridge over the gully at the eastern end of the park	High	Moderate	High to moderate
19	Hope Street at Bulla Cream Dairy	• roundabout removed and intersection upgraded to traffic signals • light rail alignment running through intersection with the Atkins Road stop in the background • vegetation removal and active transport link in front of the heritage-listed Bulla Cream Dairy (Willowmere) • removal of the majority of industrial buildings south of Hope Street	High	Moderate	High to moderate

Viewpoints	Viewpoint name	Description of key changes	Sensitivity	Magnitude of change	Significance of impact
		• removal of some of the structures and vegetation at the Bulla Cream Dairy (Willowmere) site (see Chapter 12 (Non-Aboriginal heritage) • new open space area around the Atkins Road stop			
22	Ermington Boat Ramp	• new bridge structure over Parramatta River • impacts to vegetation along the river bank	Moderate	High	High to moderate

Figure 15.5 Visual representation of the project at viewpoint 5 – Rydalmere Wharf

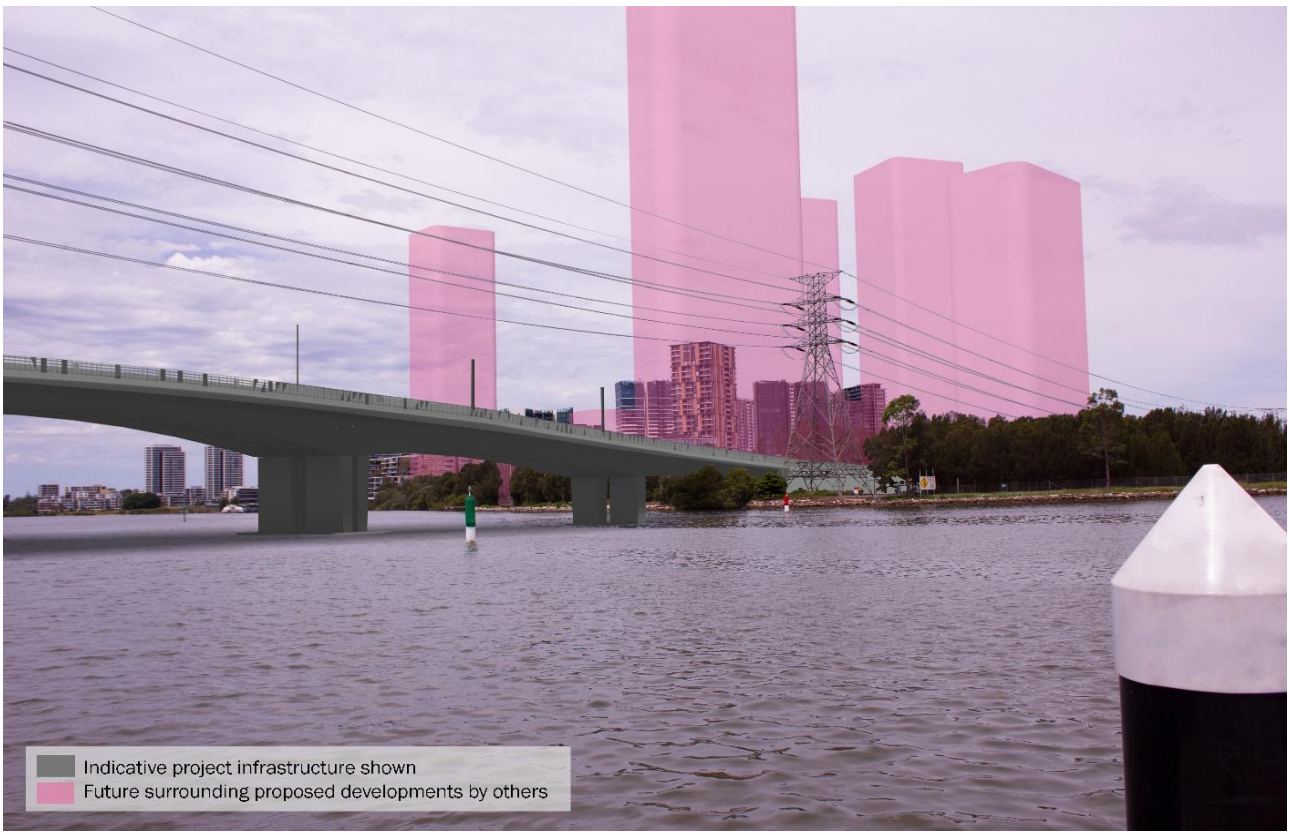


Figure 15.6 Visual representation of the project at viewpoint 22 – Ermington Boat Ramp

Figure 15.7 Visual representation of the project at viewpoint 14 – Tristram Street

Figure 15.8 Visual representation of the project at viewpoint 15 – Heysen Avenue

Figure 15.9 Visual representation of the project at viewpoint 12 (view (b)) – South Street at River Road (looking east)

Figure 15.10 Visual representation of the project at viewpoint 18 – representative of viewpoint 19

The assessed level of significance of impacts on other viewpoints is listed in Table 15.9. Further information on the ratings and detailed assessment for all viewpoints is provided in section 6 of the Landscape and Visual Impact Assessment report.

The visual impacts on heritage-listed items are considered in section 12.4.

Table 15.9 Visual impacts at viewpoints – summary of the predicted significance of impacts

Visual impact	**Viewpoints** (see Figure 15.1 and Figure 15.2)
High to moderate	5, 12 (view (b)), 14, 15, 19, 22
Moderate	7, 8, 12 (view (a)), 13, 16, 17, 18, 25
Moderate to low	4, 24, 26, 28 (view (a)), 35
Low	3, 9, 10, 11, 20, 21, 30, 31, 34, 36
Negligible	1, 2, 23, 27, 33
Nil	6, 28 (view (b)), 29 (views (a), (b) and (c)), 32

An assessment of the potential for visual impacts during the night was also undertaken. The level of impact at the representative viewpoints is generally considered to be consistent with that during the day, with the exception of the following viewpoints:

- Viewpoint 13 is predicted to experience high to moderate impacts at night due to the impacts of lighting at the River Road stop and along the active transport link.
- Viewpoints 25, 26 and 27 are predicted to experience negligible impacts at night as the views of the bridge between Melrose Park and Wentworth Park would be more limited at night.

The assessment concluded that 30 viewpoints would be impacted by the project, with impacts ranging from low impacts, to high to moderate impacts. Over time, the level of impact may reduce as landscaping becomes established.

The project includes installing communication poles (up to 25 metres high) as part of the communications system, in locations to be confirmed during design development. Depending on the final height, these could affect visual amenity and views from the viewpoint in which they would be located.

Where these poles are located in areas with existing or future high-rise development, potential impacts would be reduced due to the scale of the poles compared with surrounding buildings. Impacts would be higher in areas where densities and building heights are lower (Rydalmere and Ermington).

Mitigation measures are provided in section 15.6 to minimise adverse visual impacts as far as practicable.

15.5 Cumulative impacts

Cumulative landscape and visual impacts between the project and other recent and proposed developments in the study area may occur, as summarised below.

Cumulative impacts would result from concurrent and consecutive construction activities viewed from a number of viewpoints. This would include activities associated with development projects in Camellia, Melrose Park, Wentworth Point and Sydney Olympic Park (including Sanctuary Wentworth Point, and URBNSURF Sydney in Sydney Olympic Park).

Impacts would be associated with increased areas of construction activity, which could affect views from surrounding receivers. Consecutive construction periods, while resulting in a lower level of visual impact at the one time, could result in impacts occurring over a longer period.

Redevelopment areas in the vicinity of the project site have the potential to contribute to cumulative visual impacts. The assessment of visual impacts (summarised in section 15.4.2) considered the impacts of the project in the context of future urban change. In areas subject to significant change, the project would be viewed in the context of surrounding urban development. For example, Figure 15.6 shows views towards an indicative form of the proposed bridge between Melrose Park and Wentworth Point, with indicative future development shown in the background.

In many locations changes in the visual landscape resulting from the project would be limited to new track, stops and wiring infrastructure, which would be small scale compared to future high-rise development near the project site.

15.6 Mitigation and management measures

15.6.1 Approach to mitigation and management

The assessment identified that the project would result in visual impacts, landscape character changes and the removal of trees during both construction (temporary impacts) and operation (permanent impacts).

Approach to managing the key potential impacts identified

The visual impacts of the project would continue to be minimised as far as practicable by undertaking an integrated urban design led process, as described in Chapter 5 (Design development, alternatives and options), section 15.1 and Technical Paper 1 (Design, Place and Movement).

The key approach to minimising the landscape and visual impacts of the project would be to design the project in accordance with the urban design requirements, which would be finalised as described in section 2.5 of Technical Paper 1. This is the primary form of landscape character and visual impact mitigation.

To further mitigate the visual impacts of the project, impacts on trees would be minimised as far as practicable, and the loss of trees that cannot be avoided would be offset. A tree register would be prepared during design development and updated throughout construction to identify trees with the potential to be impacted, the extent of impacts (that is, removal or pruning), and trees that would be protected during construction.

A tree offset strategy would be developed to define how the loss of trees would be offset to achieve a net increase in tree canopy. The strategy would identify:

- objectives, requirements and delivery strategy
- how impacts on trees would be offset
- locations for replacement trees, including locations outside the project site identified in consultation with key stakeholders
- species and trees sizes to ensure a mix of species and a range of mature heights to provide visual diversity appropriate to the proposed planting locations – taking into account the operational requirements of the project, the surrounding environment, including sensitive ecological areas, and the urban design requirements
- requirements for monitoring and maintenance of planted trees.

The tree offset strategy would be developed in consultation with relevant stakeholders, including City of Parramatta Council, City of Ryde Council and Sydney Olympic Park Authority.

Approach to managing other impacts

Measures are provided in Table 15.10 to minimise the temporary visual impacts of construction as far as practicable. Implementing other relevant measures in Chapters 13 (Land use and property), 14 (Socio-economic impacts) and 16 (Biodiversity) would assist in further minimising the potential for landscape character and visual impacts during construction. A measure to manage the potential for lighting impacts on biodiversity is provided in section 16.6 (mitigation measure BD7).

15.6.2 List of mitigation measures

Measures that will be implemented to address potential impacts on landscape and visual impacts are listed in Table 15.10.

Table 15.10 Landscape and visual mitigation measures

Impact/issue	Ref	Mitigation measure	Timing
Minimising visual impacts	LV1	The urban design requirements will be finalised in accordance with the vision, principles and outcomes defined in Technical Paper 1 (Design, Place and Movement), to provide detailed urban design guidelines and key requirements for the project, including individual design elements. The urban design requirements will be finalised in consultation with key stakeholders, the operator, the rail regulator, and the Design Review Panel.	Design
	LV2	Design development will be undertaken in accordance with the urban design requirements and in consultation with the Design Review Panel.	Design

Impact/issue	Ref	Mitigation measure	Timing
Managing impacts on trees	LV3	A tree register will be prepared by a qualified arborist to identify all trees with the potential to be impacted by the project, and the proposed impacts on trees, including: • definitions of tree and canopy • definition of what constitutes an impact (generally more than minor crown or root pruning of more than 10 per cent) • location of each tree • tree values and condition • where a tree requires removal, whether, in the opinion of the arborist, it can be successfully transplanted • the extent of the proposed impact (complete removal or extent of pruning).	Design, construction
	LV4	The design will continue to be refined to avoid or minimise impacts on trees and will include consideration of options to reduce impacts on trees, including: • operational requirements in relation to tree locations • adjustments to the design to avoid impacting trees (such as opportunities for localised narrowing of footpaths, use of porous pavement) • reduction in the standard offset distances required for underground services • consideration of the health of each tree, including its vigour and likely ability to survive in situ pruning or transplanting.	Design
	LV5	A tree offset strategy will be developed to offset the loss of trees and achieve a net increase in tree canopy. The strategy will define and identify: • how impacts on trees will be offset • locations for replacement trees • species and trees sizes to ensure a mix of species and a range of mature heights to provide visual diversity as appropriate to proposed planting locations • requirements for monitoring and maintenance. The strategy will be developed in consultation with City of Parramatta Council, City of Ryde Council and Sydney Olympic Park Authority.	Design
Lighting	LV6	Lighting will be designed and sited to minimise glare and light spill into adjoining areas in accordance with Australian/New Zealand Standard *AS/NZS 4282:2019 Control of the obtrusive effects of outdoor lighting* and relevant standards in the series *AS/NZS 1158:2005 Lighting for roads and public spaces*.	Design
Managing impacts on trees	LV7	Construction planning will demonstrate consideration of all practicable options to avoid or minimise impacts on trees, including: • review of the construction methodology and layout of work sites, compounds, access, ancillary infrastructure and fencing • consideration of alternative construction methods and equipment. Trees to be retained, and trees with the potential to be impacted during construction, will be protected in accordance with Australian Standard *AS 4970–2009 Protection of trees on development sites*.	Pre-construction, construction
	LV8	Any tree pruning that is more than minor will be undertaken by a qualified arborist in accordance with *AS 4373–2007 Pruning of amenity trees*.	Construction

Impact/issue	Ref	Mitigation measure	Timing
Construction site management	LV9	Construction site hoarding and fencing will be designed, erected and maintained to minimise visual impacts. This will include: • erecting hoarding/fencing as early as possible in the site establishment phase to provide visual screening • using high quality materials suitable for parks and public spaces where sites are located close to sensitive receivers and public open space • featuring graphics, artwork or project information at appropriate locations in consultation with Transport for NSW • maintaining hoarding/fencing regularly, including the prompt removal of graffiti.	Construction
	LV10	Lighting of work areas, compounds, and work sites will be oriented to minimise glare and light spill impact on adjacent receivers.	Construction
Site restoration and rehabilitation	LV11	Following completion of construction, site restoration will be undertaken in accordance with the rehabilitation strategy (mitigation measure LP9). Temporary impacts on public open space will be rehabilitated in consultation with the relevant local council or Sydney Olympic Park Authority.	Construction
	LV12	Early planting and revegetation works will be undertaken where practicable to provide a screening buffer that has time to mature before the project is operational.	Construction
	LV13	Construction programming will provide for the progressive rehabilitation of disturbed areas as far as practicable, to minimise the duration and extent of temporary visual and landscape character impacts.	Construction