14. Visual impact, landscaping and urban design

This chapter discusses the project's visual impact, landscaping and urban design on the project corridor, its surroundings and the current and future community. It considers the project with regard to safety and security and how this has been addressed in the urban design. It concludes by describing mitigation and management measures, which would minimise and mitigate impacts on the visual environment within and surrounding the project.

The chapter summarises the *Sydney Light Rail Extension Stage 1 Visual Impact Assessment* prepared by Hassell, which is contained as Technical Paper 5 in Volume 2 of this environmental assessment (EA).

DGRs	Where addressed in the EA
Design, Sustainability and Amenity — including but not limited to:	
■ stop design and corridor landscaping, relationship to surrounding land uses and built form and the visual impacts of the project from surrounding areas	Chapter 14
■ safety and security of passengers, GreenWay users and the wider community	Chapter 14
■ privacy and amenity impacts from stops, the light rail corridor and the GreenWay	Chapter 14
■ energy demand, efficiency and climate change adaptation measures	Chapters 15 and 16

14.1 Assessment approach

The visual impact assessment was to identify scenic resources that should be protected because of their value to the community, including privacy to local residents.

The visual impact of the project was determined by evaluating the visual effect of the development in the context of the visual sensitivity of the surrounding land use areas from which the proposed development may be visible.

Initially, the visual catchment of the project was determined to identify the existing and proposed character and viewer locations, both public and private for the assessment. This then allowed the visual effect and sensitivity to be determined, resulting in the visual impact for each viewpoint. A landscape and urban design strategy was then developed based on the identified potential impacts. This approach is summarised in Figure 14.1.

The visual catchment and the 18 viewpoints that were assessed as part of the project are shown in Figure 14.2. The visual effect and sensitivity are discussed in Section 14.2 and the potential visual impacts and recommendations are discussed in Section 14.3. The proposed urban and landscape design principles required to mitigate potential impacts are detailed in Section 14.6.

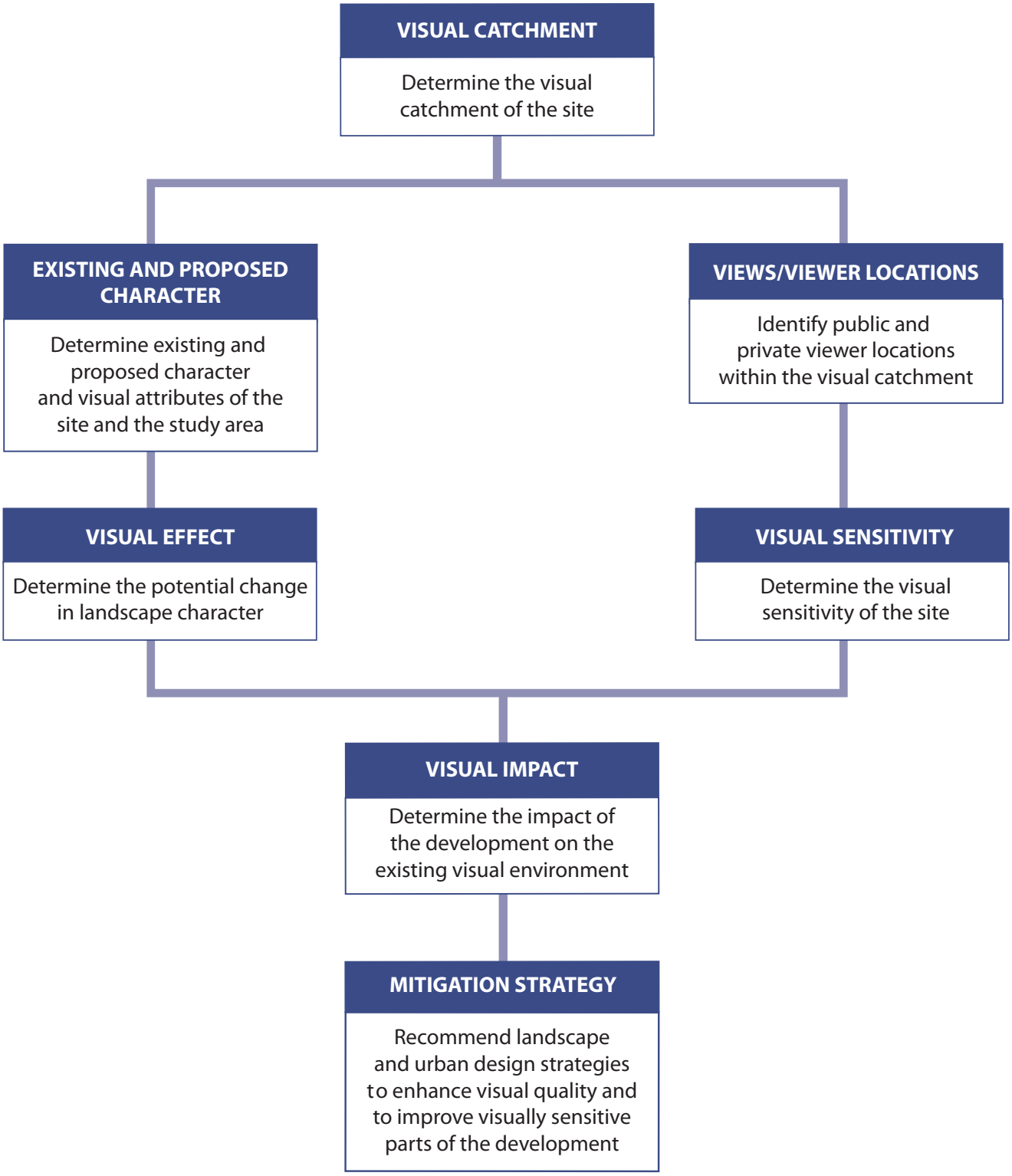

Figure 14.1 **Visual assessment approach**

- Light rail alignment
- Proposed GreenWay shared path
- Local government area boundary
- Existing light rail stop
- Proposed light rail stops
- Existing heavy rail stop

1. Lilyfield
2. Balmain Road Bridge
3. Leichhardt North stop
4. Hawthorne stop
5. Hawthorne Parade
6. Richard Murden Reserve
7. Marion stop
8. Taverners Hill stop
9. Lewisham West stop
10. Weston Street GreenWay
11. Waratah Mills stop
12. Arlington stop
13. Dulwich Grove stop
14. Jack Shanahan Park
15. Dulwich Hill Interchange stop
16. Jack Shanahan Park to Cooks River GreenWay
17. Rail corridor

Figure 14.2 Viewpoints assessed for the project

14.2 Existing visual character

This section provides an overview on the existing landform, land uses and vegetation near the project. These characteristics contribute to the project's landscape and visual character. The visual impact assessment (Section 14.3 and Technical Paper 5 in Volume 2) provides a detailed summary of the existing visual character at the 18 viewing locations assessed for this project.

The project's visual character was assessed using the following characteristics:

- Landform — which is generally reasonably flat, and consists of a shallow natural valley and low dish between the Cooks River and the Parramatta River at Iron Cove.
- Land use — which is generally enclosed within the disused Rozelle goods line corridor, but does incorporate land outside the rail corridor for the GreenWay shared path.
- Landscape and vegetation — which is characterised by a typical urban landscape, including open space reserves, existing bushcare sites, sporting infrastructure, a dog park and private gardens, as well as other established vegetation located within the rail corridor.

A detailed description of the vegetation along the project is provided in Chapter 13.

14.3 Visual impact assessment

Viewer locations are public or private places where full or screened views of the project can be seen and where there is human activity. This activity may include residential, industrial, business, schooling or recreation. Illegal or uncommon use of land that results in a view of the site has not been considered. Eighteen viewpoints have been assessed and are shown in Figure 14.2. They include:

- Lilyfield (near the Rozelle goods yard)
- Balmain Road Bridge
- Leichhardt North stop
- Hawthorne stop
- Hawthorne Parade
- Richard Murden Reserve (North) (GreenWay shared path)
- Marion stop
- Taverners Hill stop
- Lewisham West stop
- Weston Street (GreenWay shared path)
- Waratah Mills stop

- Arlington stop
- Dulwich Grove stop
- Jack Shanahan Park
- Dulwich Hill Interchange stop
- Jack Shanahan Park to Cooks River (GreenWay shared path)
- the rail corridor
- Pyrmont stabling and maintenance facility (not included on Figure 14.2).

Visual effect is the expression of the change in the existing character of a landscape through the interaction between a project and the existing environment in which it is constructed. Visual sensitivity is a measure of the importance of the visual environment to different user groups based on frequency, duration, distance and repetition of views.

The visual effect and sensitivity of the project at each of the 18 viewpoints assessed is outlined in Table 14.1.

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Table 14.1 Visual impact assessment for each vantage point

Visual effect	Visual sensitivity	Visual impact	Mitigation strategy
01 Lilyfield			
Low visual effect *Visible elements: construction* ▪ A construction compound is proposed at the termination of the existing rail corridor, which would be located east of the Catherine Street bridge *Visible elements: operation* ▪ Insertion of overhead wiring within an existing industrial rail environment ▪ Inclusion of an electrical substation next to the existing industrial buildings ▪ Minor amendments to existing Lilyfield stop ▪ Increased volume of rail traffic	**Moderate** visual sensitivity ▪ Views are experienced by residents of the top levels of residential flat dwellings. These views are a small part of the whole view and the degree of change would be small. ▪ Views are also experienced by pedestrians along Catherine Street. ▪ View change from top of residential units with windows and balconies facing the corridor is in foreground for long duration, contributing to moderate visual sensitivity.	**Low** visual impact ▪ While residents of nearby residential flat buildings can see into the rail corridor, there would be little change to the existing experience. ▪ The quality of the landscape within the rail corridor has the opportunity to be improved. ▪ Proposed changes are similar in nature and scale to existing infrastructure, with minor adjustment to existing character.	N/A
02 Balmain Road			
Low visual effect *Visible elements: construction* ▪ Construction of the overhead services structure *Visible elements: operation* ▪ As the rail corridor is in deep cutting or tunnel, there is minimal visual change. ▪ Visible elements would be the insertion of overhead wiring. ▪ Significant existing vegetation screens the rail corridor from most view points.	**Low** visual sensitivity ▪ Pedestrians on Balmain Road bridge ▪ Potential for some views from rear of adjacent properties west of Balmain Road	**Low** visual impact ▪ The project would have minimal visual impact on the area around Balmain Road.	N/A

Visual effect	Visual sensitivity	Visual impact	Mitigation strategy
03 Leichhardt North stop			
Low visual effect *Visible elements: construction* ▪ The area between the stop and the Charles Street bridge is nominated as a construction site — short-term visual impact during construction phase. *Visible elements: operation* ▪ The stop infrastructure (lifts and stairs) would be visible for motorists at the intersection of the City West Link and James Street as well as for pedestrians and motorists along Darley Road. ▪ Demolishing the industrial building and proposed footpath works provide the opportunity to improve the streetscape of Darley Road.	**Moderate** visual sensitivity ▪ Residential dwellings along adjoining streets ▪ Motorists along Darley Road ▪ Pedestrians along Darley Road, and surrounding streets ▪ Light rail stop is located below the City West Link and is screened from motorists and residents by an existing sound wall structure	**Low** visual impact ▪ While there would be a degree of change, particularly in the built form, it would create an improvement to the existing streetscape.	Demolition of the industrial building is appropriate for light rail and residential context.
04 Hawthorne stop			
Moderate visual effect *Visible Elements: Construction* ▪ Construction of stop infrastructure; rewiring overhead services ▪ Construction of pedestrian bridge over Hawthorne Canal ▪ Construction compound to the west of the proposed stop location *Visible Elements: Operation* ▪ Stop infrastructure would be visible from Daley Road as well as for users of Hawthorne Canal Reserve and the playground on Darley Road. ▪ The stop would be accessed by gently graded paths. The stop would be on a small embankment. Lightweight stop structures would have a visual effect but would not dominate. ▪ New pedestrian bridge structure built over Hawthorne Canal.	**Moderate** visual sensitivity ▪ Residential dwellings along Darley Road and Lyall Streets for long durations, with greater distance of housing from corridor ▪ Users of Hawthorne Canal ▪ Reserve and the existing playground on Darley Road	**Moderate** visual impact ▪ Retained vegetation creates a visual consistency between the current situation and the future stop, as well as providing screening to works.	Provide vegetation to screen stop infrastructure.

Visual effect	Visual sensitivity	Visual impact	Mitigation strategy
05 Hawthorne Parade			
Low visual effect *Visible elements: construction* ▪ GreenWay shared path construction *Visible elements: operation* ▪ New GreenWay shared path runs along Hawthorne Canal ▪ Substantial parkland vegetation screens new rail infrastructure. ▪ Increase in pedestrian and cycle numbers along the GreenWay shared path. ▪ New elements are consistent with existing park elements and infrastructure.	**Low** visual sensitivity. ▪ Pedestrians and users of Hawthorne Parade and Hawthorne Canal Reserve. ▪ Residents on Hawthorne Parade. ▪ Substantial street and park planting provides screening to detached homes.	**Low** visual impact.	Detailed design of GreenWay shared path to address location of pathway including the use of existing mature vegetation and the location of additional planting.
06 Richard Murden Reserve North GreenWay			
Low visual effect *Visible elements: construction* ▪ Upgrade works and install GreenWay shared path aligned with Hawthorne Canal. ▪ Construction compound will be within Richard Murden Reserve. *Visible elements: operation* ▪ Upgrade parts of the existing pedestrian and cycle path to three metre-wide GreenWay shared path. ▪ New elements are consistent with existing park elements and infrastructure.	**Low** visual sensitivity ▪ Users of the reserve, motorists along Hawthorne Parade and Marion Street ▪ Residents on Hawthorne Parade ▪ Existing mature vegetation within reserve	**Low** visual impact ▪ GreenWay shared path and upgrade would have a low visual impact on Richard Murden Reserve.	Detailed design of GreenWay shared path to address location of pathway including the use of, existing mature vegetation and the location of additional planting.

Visual effect	Visual sensitivity	Visual impact	Mitigation strategy
07 Marion stop			
Moderate visual effect *Visible elements: construction* ▪ Visual effect of removal of trackside vegetation, particularly on the western side of the tracks on Richard Murden Reserve ▪ Construction of lift and stair access on western side of rail bridge on north side of Marion Street ▪ Construction of electrical substation ▪ Construction compound near proposed stop location *Visible elements: operation* ▪ Signalised pedestrian crossing on Marion Street ▪ Path and stair within reserve east of the rail line ▪ General improvement to public domain of Marion Street ▪ Location of electrical substation east of the rail line, north of Marion Street	**Moderate** visual sensitivity ▪ Motorists travelling east on Marion street, sustained mid-ground views of new stair and lift structure. ▪ Cyclists and pedestrians on the existing cycle path. ▪ Users of Richard Murden Reserve — removal of vegetation along embankment would make stop more visible.	**Moderate** visual impact ▪ The project could improve the general urban design quality of Marion Street.	Reinstatement of trackside vegetation. Ensure that the change in grade between the rail corridor and Hawthorne Canal would enable establishment of vegetative screen. Include appropriate urban design elements where the stair and lift structure is located on Marion Street.
08 Taverners Hill stop			
Moderate visual effect *Visible elements: construction* ▪ Construction works on Parramatta Road underbridge (raising of bridge) ▪ Construction of new GreenWay shared path bridge including lifts and stairs ▪ Removal of trackside vegetation for construction of GreenWay shared path along western side of track ▪ Construction compound near proposed stop location *Visible elements: operation* ▪ GreenWay shared path bridge and lift and stair structures on either side of Parramatta Road ▪ Stop infrastructure ▪ Path and stairs access from end Hathern Street	**Moderate** visual sensitivity ▪ Motorists on Parramatta Road, short, fleeting views ▪ Residents of Hawthorne Parade, views east from rear yards ▪ Existing vegetation along Canal for screening ▪ Pedestrians and cyclists on existing cycleway	**Moderate** visual impact ▪ Current bridge structure has little appeal and the attachment of the pathway to the rail bridge could provide some urban design continuity.	Endeavour to protect vegetation outside rail corridor during construction. Reinstatement of trackside vegetation following construction works.

Visual effect	Visual sensitivity	Visual impact	Mitigation strategy
09 Lewisham West stop			
Moderate visual effect *Visible elements: construction* ▪ Located within the future urban development area between the Summer Hill Mills site (former Mungo Scott Mills) and industrial area to the south of the rail corridor. ▪ Major change would be the inclusion of stop infrastructure and the GreenWay shared path next to the rail line. ▪ Construction compound would be near proposed stop location, along western side of rail corridor and under Old Canterbury Road overbridge. ▪ Construction compound is proposed next to the Inner West Rail Line on Railway Terrace. *Visible elements: operation* ▪ Location of GreenWay shared path along the rail corridor with associated planting ▪ Electrical substation east of the rail line near the end of Hudson Street *Future context:* Parts of the industrial area are subject to a development proposal for redevelopment into a mixed use site, with significant residential components. This would alter the visual effect.	**Low** visual sensitivity ▪ Limited views from existing users; the Summer Hill Mills site (former Mungo Scott Mills) is under design for future development. ▪ The adjacent park is in poor condition and would be upgraded in the future.	**Low** visual impact ▪ Activation of the street frontage along Hudson and McGill Streets would improve access legibility.	Incorporate lighting along Hudson street and signage on Old Canterbury Road.
10 Weston Street — GreenWay shared path			
Low visual effect *Visible elements: construction* ▪ Implementation of road marking *Visible elements: operation* ▪ Visible road markings and increase in volume of cycle and pedestrian traffic ▪ No tree removal assumed	**Moderate** visual sensitivity ▪ Residential dwellings on Weston Street would see an increase in pedestrian and cycle traffic for prolonged periods.	**Low** visual impact ▪ The impact of the GreenWay shared path on Weston Street would be an increase in cycle and pedestrian traffic within a quiet residential street.	**N/A**

Visual effect	Visual sensitivity	Visual impact	Mitigation strategy
11 Waratah Mills stop			
Low visual effect *Visible elements: construction* ▪ Removal of vegetation next to the Waratah Mills residential development ▪ Vehicle access route at Weston Street ▪ Insertion of new underpass to Davis Street bridge: removal of vegetation ▪ Construction compound near Davis Street overbridge *Visible elements: operation* ▪ New stop infrastructure ▪ GreenWay shared path within the rail corridor ▪ New underpass through Davis Street overbridge for accommodation of the GreenWay shared path	**Moderate** visual sensitivity ▪ Long duration views from residents in Waratah Mills development, from rear of houses on Weston Street ▪ Limited residential views from south of the rail corridor	**Low** visual impact	Detailed design of GreenWay shared path adjacent to Waratah Mills residential development would address issues of privacy. Reinstatement of vegetative screening between GreenWay shared path and residences. Retention of vegetation on southern side of rail corridor. Bush regeneration works post construction to same quality as that existing at Davis Street.
12 Arlington stop			
Moderate visual effect *Visible elements: construction* ▪ Construction of stop infrastructure. ▪ Construction compound near proposed stop and Constitution Road overbridge *Visible elements: operation* ▪ Location of lift and stair structure within Johnson Park inserts a structure into a park setting. ▪ GreenWay shared path between Johnson Park and rail corridor creates substantial change in grade. ▪ Remove existing trackside vegetation.	**Moderate** visual sensitivity ▪ Users of Johnson Park ▪ Limited residential views to Arlington Stop ▪ Motorists on constitution Road ▪ Generally industrial land use in immediate vicinity	**Moderate** visual impact ▪ Changes within Johnson Park have a small viewer catchment and can be integrated into the park configuration through design and vegetation.	Detailed design would need to address urban design principles to ensure the new lift and stair structure is integrated within the existing Johnson Park. Reinstatement of trackside vegetation.

Visual effect	Visual sensitivity	Visual impact	Mitigation strategy
13 Dulwich Grove stop			
Moderate visual effect *Visible elements: construction* ▪ Removal of existing vegetation within rail corridor for the GreenWay shared path ▪ Excavation and construction of new stop infrastructure ▪ Construction compound near proposed stop and New Canterbury Road overbridge and Hercules Street overbridge *Visible elements: operation* ▪ Location of stop within cutting ▪ New lift and stair structure on New Canterbury Road ▪ Upgrade of existing rail access track into 2.5 m path link along upper western side of stop with connection to New Canterbury Road and Hercules Street ▪ Stair link between path and stop within cutting ▪ Improved public domain	**Moderate** visual sensitivity ▪ Residential dwellings located to the west of the stop: top floor dwellings would have views into the rail corridor, these form part of the foreground view. Residents have wider district views and replacement vegetation would screen rail views. ▪ Would affect pedestrians and motorists on the New Canterbury Road and Hercules Street bridges. ▪ High construction sensitivity experienced by residents west of the stop.	**Moderate** visual impact	Landscape treatment and re-introduction of substantial vegetative screen between residential dwellings and the rail corridor. The design of lift and stair structure on New Canterbury Road would address urban design issues of lighting, paving, access, safety and integration with existing streetscape. Retaining wall and terracing needs detailed design to maximise potential for vegetation, and avoidance of smaller staggered vegetation beds within the steep battered edges of the corridor.
14 Jack Shanahan Park (GreenWay shared path)			
Low visual effect *Visible elements: construction* ▪ Location of construction compound sites at the rear of Hercules Street dwellings; construction vehicle access point from Hercules Street *Visible Elements: Operation* ▪ New bush care planting adjacent to the rail corridor following completion of construction works ▪ New GreenWay shared path ▪ Improved access to Jack Shanahan Park across disused rail tracks	**Moderate** visual sensitivity ▪ Residential dwellings along Hercules Street would have views of the worksite during construction. ▪ The width of the rail corridor would enable substantial screen planting between the rear of the Hercules Street dwellings and the GreenWay shared path. ▪ People who use Jack Shanahan Reserve.	**Low** visual impact ▪ During construction the impact on residents of Hercules Street would be high; however, following reinstatement of vegetation there would be an improvement to existing conditions. ▪ Clearer access to Jack Shanahan Park would activate the park and increase safety.	Reinstatement of any vegetation removed during construction to address privacy.

Visual effect	Visual sensitivity	Visual impact	Mitigation strategy
15 Dulwich Hill Interchange stop			
Moderate visual effect *Visible elements: construction* ▪ Construction of new stop within cutting adjacent to existing Dulwich Hill Railway Station ▪ Vehicle access point and route along Bedford Crescent *Visible elements: operation* ▪ Changes to parking layout and vegetation along Bedford Crescent ▪ New lift and stair structure at the corner of Wardell Street and Bedford Crescent ▪ New edge of escarpment	**Moderate** visual sensitivity ▪ Would affect residents of Bedford Crescent. ▪ Motorists along Wardell Road and Ewart Lane would see new lift and stair structure. ▪ Views to changes to the escarpment would be mostly limited to within the existing heavy rail corridor.	**Moderate** visual impact ▪ Changes to the escarpment between Bedford Crescent and the Dulwich Hill Interchange stop would have a large visual impact. ▪ Changes to Bedford Crescent would affect local residents and users of Dulwich Hill Railway Station.	Reinstatement of any vegetation removed during construction would reduce visual impact. Detailed design of Bedford Crescent to address street trees, pedestrian connections and car parking and general amenity. Potential for improvement to streetscape along Wardell Road
16 Jack Shanahan Park to Cooks River GreenWay shared path			
Low visual effect *Visible elements: construction* ▪ Road markings, minor road infrastructure upgrades *Visible elements: operation* ▪ On-road cycle link between Hercules Street underpass and Cooks River ▪ Increased volume of pedestrian and cycle traffic	**Moderate** visual sensitivity ▪ Residents of Riverside Crescent and Ewart Street ▪ Motorists on Riverside Crescent, Ewart Street and Wardell Road	**Low** visual impact ▪ Increased volumes of pedestrian and cycle traffic ▪ Road markings	N/A
17 Rail Corridor			
Low visual effect *Visible elements: construction* ▪ Construction equipment and activities *Visible Elements: Operation* ▪ Nine new stops along the rail corridor ▪ Increased light rail, pedestrian and cycle traffic ▪ Improvement to vegetation along the corridor, improvement to overall amenity of the corridor ▪ Upgrade of an existing unused industrial rail corridor into a multi-use transport corridor with associated upgrades to infrastructure	**Low** visual sensitivity ▪ Viewers of the rail corridor in areas other than those outlined in locations 1-16 would be limited to users of the new rail and GreenWay shared path, viewers from some bridges and other areas outside of the rail corridor.	**Low** visual impact	General rail corridor design to include an assessment of vegetation along the corridor and a concept for the establishment of a corridor wide vegetation strategy.

Visual effect	Visual sensitivity	Visual impact	Mitigation strategy
18 Pyrmont stabling and maintenance facility			
Low visual effect *Visible elements: construction* ▪ Construction works to extend existing rail track into the staff car parking area and to install extra security measures. *Visible elements: operation* ▪ Light rail vehicles (LRVs) stabled overnight in part of staff car park and in the existing car wash rail area between the light rail depot and the monorail depot. The area would continue to be used for staff parking and rail washing, respectively, during the day.	**Low** visual sensitivity ▪ Views are limited to fleeting views from light rail passengers on the existing network and motorists on Western Distributor, as well as light rail operations and maintenance staff.	**Low** visual impact	N/A

14.4 Construction impacts

The construction of the project may temporarily reduce visual amenity for surrounding residents, adjacent businesses and road users nearby due to:

- general construction activities within the construction footprint, such as vegetation clearing, earthworks, stockpiling materials and the parking/use of construction plant and vehicles
- the establishment of construction compounds (Figure 7.1a to Figure 7.1f)
- use of temporary construction access points to access the site at construction compounds and other temporary construction access points (such as at Longport Street, Marion Street, Lilyfield Road and Bedford Crescent)
- erection of fencing, barricades, gates and lighting to provide safe and secure worksites
- construction vehicle movements, both within the construction footprint and along nominated haulage routes
- traffic disruption associated with construction traffic.

The project's impact on individual sensitive receivers would depend on the stage of the project, their location and the severity of the impact. Visual amenity impacts during the project's construction would be greatest at locations where residential or sensitive receivers have an unscreened view of the project construction corridor, or where vegetation clearing provides a clear view of construction activities.

In general, it is anticipated the majority of sensitive receivers located close to the construction works, construction compounds and construction access routes would only experience a temporary reduction in visual amenity during the proposed 12-month period while these activities take place.

Works to raise the Parramatta Road underbridge and construct the GreenWay shared path bridge over Parramatta Road are anticipated to result in highly visible construction activities due to the prominent location of the structures on Parramatta Road.

Light spill from construction sites may also affect the visual amenity of adjacent sensitive receivers during construction when night works are required. Light spill occurs where light falls outside the area intended to be lit, for instance, by shining over a fence into a neighbouring property. Security lighting may be required at some of the construction compounds to prevent/discourage unauthorised access by members of the public.

This lighting would need to be managed to minimise light spill to neighbouring land uses, while also not compromising security requirements.

The visual amenity impacts associated with the project's construction would be temporary (up to 12 months, depending on staging of construction works).

The potential construction impacts are described above in Table 14.1. Any potential impacts on the visual amenity of the area during construction are considered acceptable, provided that appropriate mitigation measures are implemented (refer Table 14.1 and Section 14.6).

14.5 Operational impacts

14.5.1 Visual impacts

Visual impacts from the project in its operational form would be mainly associated with:

- the new stops and associated infrastructure associated with these locations (including stairs, lifts, lighting, additional signage, etc.)
- removal of existing trackside vegetation
- the new substations located within the rail corridor
- LRVs travelling along the track
- the new GreenWay shared path, including new bridge structures over Hawthorne Canal and Parramatta Road and stencilling along on-street sections
- an increase in pedestrians and cyclists along the GreenWay shared path.

The potential operational impacts for each viewing location are described above in Table 14.1. Any potential impacts on the visual amenity of the area during operation are considered acceptable, provided that appropriate mitigation measures are implemented (refer Table 14.1 and Section 14.6).

14.5.2 Safety and security

Passenger and pedestrian safety and security

Passenger safety has been identified as primary factor in the design of the project, particularly with respect to operating the light rail. The procedures and guidelines that currently guide the operation of the existing light rail system would continue to be the basis for the light rail operations for the project.

Each of the new stops would be configured to provide a level pedestrian crossing between the new platforms to allow for access to both sides of the stop and the surrounding land uses. Signage, tactile warning markers and fencing barriers would assist in creating safe pedestrian crossing points.

Pedestrian safety is also considered to be an important factor at the GreenWay shared path crossing at Marion Street. This intersection provides a link between the north and south sides of Marion Street and would incorporate a signalised intersection. By providing independent crossing times (through timed signalisation) it is considered that the risk of collision between motor vehicles and pedestrians and cyclists would be minimised.

Conflicts in safety may also occur between the light rail corridor and the GreenWay shared path, where the shared path is located within the overall light rail corridor. Appropriate fencing would be provided to separate the GreenWay shared path and the light rail corridor.

Conflict between pedestrians and cyclists may occur on the GreenWay shared path and at stop access points.

Measures to mitigate safety and security impacts are discussed in Section 14.6.

Vehicle accidents

The light rail component of the project would be confined to within the existing rail corridor. As a result there would not be any on-street sections of light rail operations that would directly interact with the local street networks within the Inner West in a similar manner to the existing light rail network. Consequently, there is no risk of light rail vehicle impacts with general traffic for the Lilyfield to Dulwich Hill extension.

The GreenWay shared path component of the project would also mainly be a dedicated, off-street pathway that would involve minimal interaction with the local street network. However, two sections of the GreenWay shared path would incorporate on-street sections due to constraints within the corridor.

These areas are:

- the proposed signalised crossing of Marion Street at the south end of Richard Murden Reserve
- along Weston Street between the Waratah Mills and Lewisham West stops, and the northern end of the project corridor near Dobroyd Point
- south of Dulwich Hill Railway Station along parts of Hercules Street, Ewart Street, Riverside Crescent and Wardell Road.

Appropriate management measures would be applied to these sections of the GreenWay shared path to maximise safety for all users of the path. This would include appropriate signs and line marking delineation on the street to indicate the separation between the GreenWay shared path and general traffic within these streets.

14.5.3 Privacy and amenity impacts

Potential privacy impacts may be experienced by some sensitive receivers who adjoin the project corridor during the project's operation. These would include:

- passengers being able to see the rear of adjoining properties while travelling on the light rail
- GreenWay shared path users being able to see along into adjoining properties along exposed or elevated sections of the GreenWay shared path, such as the following sections between:
  - Davis Street and Johnson Park

- Constitution Road and New Canterbury Road
- Hercules Street and Jack Shanahan Park.

Throughout a number of locations along the project corridor, existing vegetation would provide some screening between the project and adjoining sensitive receivers. However, in areas along the project corridor where vegetation would be cleared to construct stops or the GreenWay shared path, the existing screening of some adjacent land users may be reduced, with associated privacy impacts.

Further details of the potential amenity impacts of the project are considered in Chapter 17.1 and Chapter 17.9.

14.6 Management of impacts

Table 14.1 provides a summary of the mitigation measures for each of the viewpoints assessed. The strategies identified below are a summary of the mitigation measures for the construction and operation phases of the project to reduce and manage any adverse visual and landscape impacts.

14.6.1 Construction

To avoid unnecessary visual and amenity impacts during the project's construction, the following mitigation measures would be adopted:

- construction zones, accessways and compound sites would be located to minimise impacts on sensitive receivers and removal of vegetation
- establishment of protection measures for significant and individual trees before construction works begin, particularly where these provide screening to adjacent properties
- work and compound sites would be kept in a tidy condition and within clearly defined boundaries
- stockpiling construction materials and waste would not be permitted outside of the designated construction compounds
- parking/storing of construction vehicles/plant and equipment would (where possible after consideration of available space and site requirements) not be permitted outside of the designated construction compounds
- all construction compound sites would be restored to their pre-construction condition or better as quickly as possible with new planting once construction is completed.

Landscape and visual mitigation measures to be implemented through construction would be documented in an Urban and Landscape Strategy prepared as part of the project's detailed design.

14.6.2 Operation

Urban design

The following principles would guide the project's urban design.

Stop design

The design of each of the stops would adopt the following principles:

- where lift and stair structures are required at stops, detailed position and design would integrate with the surrounding urban context, including residential, industrial and parklands
- a consistent architectural expression that allows for innovative designs but to create civic identity maintains a unique identity for individual stops in accordance with local variations
- similar materials and treatments at all stops would be used to achieve consistent visual coordination
- each of the stops would provide a link to the local neighbourhood, roads and open spaces
- each of the stops would incorporate safe pedestrian, cycle and vehicular links through the GreenWay shared path and other access points
- access for emergency and service vehicle access would be maintained
- best-practice materials and best-value solutions based on life-cycle costing criteria would be used during the detailed design phase.

Safety

All proposed urban design measures, including bridge underpasses, should comply with crime prevention through environmental design (CPTED) requirements. A number of specific safety and security components would be provided at each of the light rail stops and along the GreenWay shared path.

Measures that would be considered during detailed design include:

- appropriate fencing between the light rail corridor and the GreenWay shared path
- underpasses that would provide a clear and unobstructed view into and out of the underpass
- closed circuit television cameras similar to the existing light rail stops between Lilyfield and Central Railway Station
- emergency telephone/help point and warning signs at each stop
- anti-throw screens on some overbridges

- aligning stairs and lifts to maximise surveillance from adjoining public areas and roads and maintaining clear lines of sight where ever possible along pathway alignments

- appropriate levels of lighting at stops, pedestrian pathways and the GreenWay shared path.

Each of the stops, the light rail line, and the GreenWay shared path at the detailed design phase, would be fully reviewed and assessed in accordance with CPTED principles.

Signs, line-marking and tactile devices to warn of changing footpath conditions where the GreenWay shared path intersects with the location of stops would be provided to minimise conflicts between users.

Signs and line markings would be provided as appropriate along the GreenWay shared path to advise of the shared path conditions and make people aware of operating conditions.

Further mitigation measures for the potential safety and hazard impacts of the project are considered in Section 17.9.

Privacy screening

To mitigate the potential privacy impacts, vegetation screening would be used to minimise visual intrusion. If this could not be done or would not provide adequate privacy, additional urban design elements, such as retaining walls, barriers, fence or other screening designs, would be considered to improve the privacy of existing sensitive receivers. These measures would be considered, as required, during the detailed design of the project.

Lighting

Lighting within the rail corridor would be required to address safety and environmental considerations. Detailed design of a lighting strategy would need to consider light spill to adjoining properties, especially where these are residential properties or other potentially sensitive receivers.

The lighting design for the project would use fixtures that prevent light within the light rail corridor and along the GreenWay shared path from spilling upwards and/or beyond the required area to be lit and into adjacent residences or sensitive environmental areas.

Light spill from all urban structures would be reduced as much as possible. Options to reduce light spill, including lower wattage bulbs and 'spot' lighting or directional lights, rather than ‘wash’ lighting, such as streetlights, would be investigated during the project’s detailed design. Lighting would be designed by a specialist lighting consultant and would comply with relevant Australian Standards, including *AS4282-1997 (Control of the obtrusive effects of outdoor lighting*).

Landscaping

Revegetation

Where the establishment of planting works would not directly intrude on construction processes (such as the construction of stops, pedestrian bridges etc.), it is proposed that work take place before construction works to allow maximum time to establish new plantings.

Where new bushcare sites are proposed, the quality and species selection should integrate with existing bushcare sites. Species selection should reference the *GreenWay Bushcare Management Plan* (Inner West Environment Group 2010), which includes agreed bushcare principles for the GreenWay, the location and staging of new sites, and responsibility for implementing the plan. Transport NSW would also aim to offset any loss of bushcare sites within the corridor as a result of the project as far as possible.

The detailed design process would need to consider how to avoid existing vegetation. Where the GreenWay shared path is located close to residential dwellings, detailed design would also be required to make provisions to create or retain privacy for those residents who may be affected by the GreenWay shared path, as discussed above.

Ancillary design elements

Retaining Walls and shotcrete

The project design aims for minimal use of retaining walls; however, some walls would be required at points along the project corridor, in particular between Waratah Mills stop and Dulwich Hill Interchange stop.

Any retaining walls would be subject to detailed design to maximise their integration with surrounding vegetation and materials and minimise the visual impact of these design elements. The detailed project design would aim to avoid constructing retaining walls, unless they are absolutely necessary due to vertical alignment and surrounding land uses of the project corridor.

Where the construction of retaining walls is considered necessary for structural and safety reasons, the walls would be designed so they are simple and unobtrusive and do not incorporate unnecessary embellishments. Retaining walls would generally be screened by vegetation where possible.

In addition, the use of shotcrete is anticipated to be required where it is not feasible to build retaining walls. The use of shotcrete should be in accordance with the Roads and Traffic Authority (RTA) 2005, *Shotcrete Design Guidelines*.

Where possible, the use of shotcrete would be avoided, due to its high ongoing maintenance cost, preclusion of vegetation establishment and its visually intrusive nature. Where this construction technique is unavoidable, its use would be minimised and the appearance of shotcrete improved as much as possible in accordance with the RTA (2005) *Shotcrete Design Guidelines*. The detailed design would address the final appearance of any areas of shotcrete.

Substations

Detailed design of substations and other project elements near the substations would need to make provisions to create or retain vegetation screens for those residents and business owners close to their placement.

Public art

A public art strategy would contribute to developing an integrated movement corridor incorporating both the light rail and GreenWay shared path from Lilyfield to Dulwich Hill. The project would make a contribution to the GreenWay public art strategy.