NORTHERN LINK

TECHNICAL REPORT NO. 14

URBAN DESIGN, LANDSCAPE AND VISUAL AMENITY

POTENTIAL IMPACTS AND MITIGATION MEASURES

AUGUST 2008

PLACE
SKM Connell Wagner JOINT VENTURE
verge URBAN LANDSCAPE ARCHITECTURE

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Executive Summary

Introduction

This report responds to the Northern Link Terms of Reference (ToR) in regard to the potential impacts and mitigation measures for the urban, landscape and visual components of the project. The report introduces the EIS Reference Design which is the blueprint for setting out the projects requirements to assess the impacts and to identify mitigation measures. In order to assess and provide concepts for urban landscape and visual outcomes a review of the existing strategic framework of the City of Brisbane was conducted which informed the Principles, Goals and Objectives as well as the urban and landscape design guidelines. The main body of the report provides a description of the potential impacts of the proposed Northern Link infrastructure and the mitigation measures devised to minimise such impacts; finishing with the visual assessment pre and post construction.

The study corridor and key locations

The Northern Link Project would be constructed within a corridor extending from the Western Freeway at Toowong to the Inner City Bypass at Kelvin Grove. The study corridor passes through parts of Toowong, Rosalie, Bardon, Auchenflower, Paddington, Milton, Red Hill, Kelvin Grove, Herston and Spring Hill. At the western end, the study corridor includes Mount Coot-tha Botanic Gardens and Anzac Park, while at the eastern end it takes in Victoria Park, the ICB/ and the railway corridor.

Within this corridor are four key locations, determined by the EIS team, which may be impacted by Northern Link. These include:

- The Western Connection;
- The Toowong Connection;
- The Northern Connection; and,
- The Kelvin Grove Connection.

These areas are reflected in the existing environment report as the Toowong Roundabouts, Kelvin Grove Road and Victoria Park Road. The four key locations have evolved due to the progression of the EIS Reference Design.

The following dot points are the Terms of Reference (ToR) for the urban design, landscape and visual component of the EIS, which guide the structure of the report.

The Terms of Reference for the Potential Impacts and Mitigation Measures

In accordance with the Terms of Reference (ToR) this report will:-

Provide an assessment of the urban landscape and visual outcomes of the project by:-

- *developing urban landscape and visual concepts, designs and guidelines for any key locations identified, reflecting predicted changes to land use, public amenity, public access and sustainability and place making principles; and*
- *assessing the likely visual impacts of the proposed works on the landscape and changes to the landscape.*

Mitigation measures for any potential urban landscape and visual impacts should be recommended. The

mitigation measures should relate to the urban landscape and visual goals, objectives and design measures for the project. This should consider a range of treatments on visual elements and urban design opportunities, including surface landscaping, portal design, ramp design and location and design of surface structures, including noise and air quality (e.g. ventilation outlets, if proposed) mitigation structures.

Where practicable, consideration of visual elements should also consider design enhancements to improve shade creation, accident prevention and crime prevention.

The issue of lighting impacts, associated with possible night time construction works or with the operational phase (e.g. sun in drivers' eyes, headlights at night, lighting for cyclists and pedestrians etc.) should be identified and mitigated to the extent practicable.

Project Vision Goals and Objectives for the EIS Reference Design

The aim of this report is to identify potential negative impacts and mitigate them through urban and landscape designs. In order to achieve these improvements, an 'amenity framework' (vision, goals and objectives) for urban, landscape and visual elements has been developed to ensure the mitigation measures are guided by appropriate principles with desired outcomes. Refer to Section 2.3 for the project Vision, Goals and Objectives.

Urban Design and Visual Guidelines

The ToR call for urban, landscape and visual guidelines to be developed for the key locations within the project. The guidelines also consider the project vision, goals and objectives relating to urban landscape values, character and connectivity. These common themes have been ordered into landscape and urban design elements so that they can be applied to a range of urban settings found in the study area. The guidelines have been used to provide urban and landscape design concepts and designs.

The following are the minimum guidelines to ensure urban and landscape designs are of the highest quality, longevity, innovation and sustainability in the provision of:-

1. Environmental Revegetation / Waterway rehabilitation
2. Landscape Open Space Enhancement
3. Recreational Opportunities
4. Connectivity
5. Neighbourhoods
6. Boulevard Treatments
7. Suburban Centre Improvement Schemes
8. Design Intervention and Integration with Engineering Proposals
9. Public Art
10. Lighting –Technical standards or requirements in regard to lighting by others. This report only highlights issues that a qualified lighting designer would need to consider in their technical design.
11. Codes and Practices

Potential Impact Analysis

The analysis highlights areas where there may be impacts on urban character and qualities within a landscape and visual context, this mainly applies at the key location scale.

The structure used to assess the impacts of the project in each key location is provided in tabulated format followed by an illustrated spatial analysis. The tables list the individual built components of the EIS Reference Design and discusses the resulting impact on the existing environment. Because of the multifaceted nature of urban environments it is necessary to synthesise the important elements that represent our understanding of the city. The following headings were adapted from the existing environment report and are used to make an orderly assessment of these complex urban environments. They are not exhaustive but cover many of the important values and experiences of public spaces, landscape, built form, functionality and also the sense of comfort and safety the existing places provide as perceived by the public.

- Predominant Land Uses and Variety
- Built Form Typologies and Grain
- Landscape Amenity & Character
- Open Space
- Accessibility and Connectivity
- Scale
- Landmarks, Legibility and Destinations
- Visual Environment (Refer to Section 5)

Mitigation Measures

This section draws together all of the investigations into the potential impacts of the EIS Reference Design on the existing urban landscape and visual environment and provides mitigation measures to offset potential negative impacts. The mitigations are guided by:-

- The strategic framework for the City of Brisbane; and,
- The visual and urban landscape, vision, goals and objectives;
- The urban landscape and visual guidelines developed in response to both.

The Mitigation Measures deal with the construction phases of the NL and the eventual operational phase of the project.

Below is a summary of the combined major impacts and mitigation measures of each key location.

Summary of Potential Impacts and Mitigation Measures for Western Connection

The main impacts of the proposed Western Connection are the 800m long transition structures which extend along the Western Freeway and require the construction of embankment cuttings into the existing vegetated hills of Brisbane Forest Park. This will be mitigated by planting appropriate species on the cuttings and medians to retain the integrity of this gateway experience. The existing pedestrian/cycle route along the southern edge of the Western Freeway will be re-aligned to the southern side of the southern transition structure, and connected to the new pedestrian/cycle bridge across the Western Freeway to Mt. Coot-tha. The ventilation outlet and station will be located in between the Botanic Gardens and the Western Freeway; the base of which will be screened to maintain minimal visual impact on surrounding residential areas. The other key impact is the location of the worksite in between the Botanic Gardens and the Western Freeway and the proposed spoil conveyor running through Brisbane Forest Park to the Mt. Coot-tha Quarry. This corridor will be rehabilitated and revegetated with

a species palette reflecting the biodiversity of this area of Brisbane Forest Park. The worksite next to the Botanic Gardens will be rehabilitated in consultation with the Botanic Gardens and will eventually become an integral part of the Gardens.

Whilst the horizontal width and scale of the Western Freeway will increase, the low level nature of the constructed elements such as the transition structure and the portals means that there will be little increase in the vertical scale. The perceived width of project in this location will be mitigated by the planting of mature trees in the medians.

Summary of Potential Impacts and Mitigation Measures for Toowong Connection

The main impacts of the Toowong Connection are the two elevated structures over Milton Road before the Frederick Street roundabout. This requires the resumption of properties below Valentine Street and the southern side of Milton Road. The opportunity exists to treat the elevated structures with lighting effects and a strong planted edge with the indigenous stately Hoop Pine to reinforce the curve of the box girder design. The open space south of Valentine Street presents valuable habitat and screening opportunities for the residents above and a high visual amenity for pedestrians, cyclists, public transport and motorists on Milton Road. The project resumes most of the unusable land within Quinn Park leaving a flat open area which is currently used as a neighbourhood park. The opportunity exists to strengthen the existing design of the park in consultation with stakeholders. The parks interface with the project will be mitigated through the planting of suitable species on the southern side of the walled edge to the park; pedestrian/cycle access is encouraged through the middle of the park along an accessible pathway thereby improving surveillance. Pedestrian/cycle movements on road through the area in general remains challenging, the north/south connections to and from the Brisbane River will be facilitated through the Milton Road intersection. However the opportunity exists to connect the two communities either side of Milton Road by a pedestrian/cycle bridge off the Croydon Street elevated structure from Morley Street into Quinn Park, or an underpass from Valentine to Quinn Street.

Whilst the horizontal width and scale of the Milton Road and Croydon Street will increase, the perceived width of project road infrastructure in this location will be mitigated by the planting of mature trees in the medians.

Summary of Potential Impacts and Mitigation Measures for Northern Connection

The main impacts on the Northern Connection are within the existing landscaped open space adjacent to the ICB, which will be mitigated by the extensive replanting of suitable species to provide landscape for both the residents of Normanby Terrace and the users of the ICB. The other impact are due to the location of the Ventilation Outlet and Ventilation Station to the east of the Northern Busway Portal, this will be mitigated through planting of suitable species and the design of the Ventilation Outlet. Another key impact is the widening of the ICB to accommodate a portal entrance to the tunnel; this will cut into the open space on the northern edge of the ICB. At present this edge contains a pedestrian/cycle pathway and a stormwater gully draining water into York's Hollow further to the east, both which will remain functional at operational stage. Overall, the mitigation opportunities at this connection centres around connecting and upgrading pedestrian/cycle access into new and existing routes, and providing high amenity landscape planting to the edge of the ICB.

Summary of Potential Impacts and Mitigation Measures for Kelvin Grove Connection

The main impacts on the Kelvin Grove connection is due to the widening of Kelvin Grove Road which removes two significant heritage listed figs in Marshall Park and two significant figs in Mc Caskie Park. The other key impacts are the property resumptions on the western side of Kelvin Grove Road to accommodate the tunnel

infrastructure. This also creates the challenge of providing pedestrian and cycle connections safely along this edge. The opportunity exists to provide areas of high landscape amenity by planting mature trees over the majority of open space created. The land below the wall at Lower Clifton Terrace will become a green edge to the busy Hale Street and Kelvin Grove Road; it is proposed that access to this land be limited because of the low surrounding surveillance. The existing access to this area is replaced by an overpass connection off the ICB pedestrian/cycle bridge straight to Lower Clifton Terrace. Further north along Kelvin Grove Road above and beside the portal exit (opposite Musk Avenue) is a newly created open space with topographical challenges. This presents opportunities to create a dramatic and sculptural series of landscaped terraces to counterpoint the 'Artspace' billboard across the road at Kelvin Grove Urban Village. The terraces also act as pedestrian/cycle pathway connecting the community of Kelvin Grove Urban Village with the community of Red Hill at Lower & Upper Clifton Terraces. The space above the portal exit will also link this space to Marshall Park by way of a tree lined pathways with ramps in order to traverse the steeply sloping terrain. All of these green spaces connect people to places in a safe manner.

Two of the tunnel portals are situated in Kelvin Grove Road which increases the scale of this road. The mitigations will reduce the perceived width of project road infrastructure by the planting of mature trees in the medians.

Visual Assessment

Finally, a visual analysis table was devised to illustrate and rate the above treatments in terms of the landscape and viewer perceptions of changes to the landscape.

1. Introduction

1.1 Purpose and scope

This report forms part of the Environmental Impact Statement (EIS) being prepared by the Sinclair Knight Merz/Connell Wagner Joint Venture (SKM/ CW JV) on behalf of the Brisbane City Council (BCC).

This report describes and illustrates the impacts of the Northern Link Project (NL) on the existing environment and proposes mitigation measures for project elements at key locations within the Study Corridor. It has been prepared as part of an iterative process between the Urban Design and Landscape team and other members of the EIS team.

The Northern Link Project would be constructed within a corridor extending from the Western Freeway at Toowong to the Inner City Bypass at Kelvin Grove. The study corridor passes through parts of Toowong, Rosalie, Bardon, Auchenflower, Paddington, Milton, Red Hill, Kelvin Grove, Herston and Spring Hill. At the western end, the study corridor includes Mount Coot-tha Botanic Gardens and Anzac Park, while at the eastern end it takes in Victoria Park, the ICB and the railway corridor. The plan Figure 1-1: Study Context provides an overview of key locations within the Study Corridor as a quick reference guide to localities covered in the *Existing Environment – Urban Design, Landscape and Visual Amenity* report, which accompanies this report.

Within this corridor are four key locations, determined by the EIS team, which may be impacted by Northern Link. These include:

- The Western Connection;
- The Toowong Connection;
- The Northern Connection; and,
- The Kelvin Grove Connection.

The following are the Terms of Reference (ToR) for the urban design, landscape and visual component of the EIS, which guides the structure of the report.

1.2 Terms of Reference for Potential Impacts and Mitigation Measures

In accordance with the Terms of Reference (ToR) this report will:-

Provide an assessment of the urban landscape and visual outcomes of the project by:-

- *developing urban landscape and visual concepts, designs and guidelines for any key locations identified, reflecting predicted changes to land use, public amenity, public access and sustainability and place making principles; and*
- *assessing the likely visual impacts of the proposed works on the landscape and changes to the landscape.*

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Where practicable, consideration of visual elements should also consider design enhancements to improve shade creation, accident prevention and crime prevention.

The issue of lighting impacts, associated with possible night time construction works or with the operational phase (e.g. sun in drivers' eyes, headlights at night, lighting for cyclists and pedestrians etc.) should be identified and mitigated to the extent practicable.

1.3 Structure and content of report

The report structure responds to the ToR through Sections 1 to 6, as follows:-

Section 1 introduces the report, and the requirements of the ToR (section 5.7.2) which outlines the assessment criteria for the potential impacts and mitigation measures for Northern Link.

Section 2.1 briefly describes the EIS Reference Design in terms of landscape, urban design and visual impact in the study corridor. Section 2.2 describes the method of assessing the existing environment of the study corridor and reviews the BCC City Plan and Living in Brisbane 2026. Section 2.3 describes the amenity framework in the form of the project's vision, principles and objectives which will drive the urban and landscape design outcomes for the project. The section ends with the further development of the amenity framework which takes the form of sustainable design guidelines for the study corridor as a whole.

Section 3 explains potential impacts of the project through a contextual analysis of the study corridor and in each key location. The key locations are primarily those areas within which proposed surface works are to take place and where direct impacts on urban, landscape and visual elements and associated values are likely to be most apparent and important. Section 3.2 deals with the broader contextual analysis of the study corridor, while Section 3.3 identifies the potential impacts on each key location at:-

- The Western Connection;
- The Toowong Connection;
- The Northern Connection; and,
- The Kelvin Grove Connection.

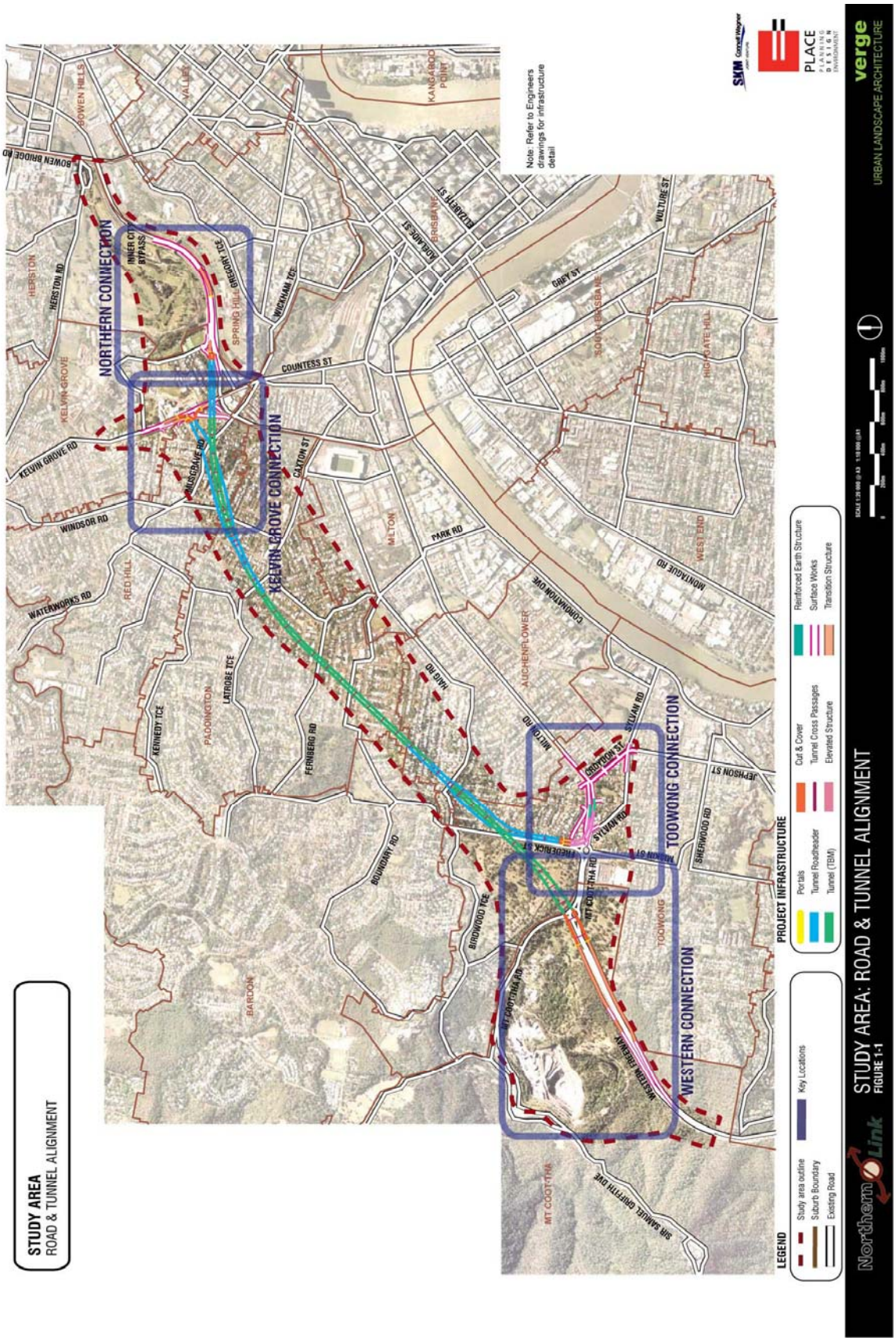


Figure 1-1 Study Corridor with key locations

Section 4 focuses on the mitigation measures and clearly identify key values where the Project should endeavour to minimise and mitigate impacts and provide opportunities for enhancement in the existing environment. This has been done for the two distinct phases of the project; for the construction phase and the operational phase.

Section 5 assesses and illustrates the visual impacts for Northern Link and tabulates the findings for each key location. The prospective changes to the landscape and interpretations of mitigation are shown from selected Vantage Points. The illustrative photo-montage series evaluates the foreseeable visual effects and character of the evolving landscape that is experienced by the people who create it and live within it.

Section 6 concludes the report and discusses findings of the potential impacts and mitigation measures for the Northern Link Project.

At the conclusion of the report, appendices have been included to:

- Provide examples of the suggested design approach to built elements of the tunnel infrastructure;
- Provide examples of planting approach to open space and interfacing with the tunnel infrastructure;

1.4 Limitations

The report provides impact analysis and mitigation measures referencing the Northern Link Project Definition (PDR) Report March 2008, which was further developed into the EIS design which is detailed in the preliminary design drawings in Volume 2 of the EIS. Throughout the report this is called the EIS Reference Design. The PDR is at concept level and subject to change through the EIS Reference Design phase.

Previously, in the preparation of the Existing Environment Report, information relating to the locations of ventilation outlets was not available. Evaluation of the impacts of ventilation outlets, particularly on visual amenity, will therefore be considered in the current report. Potential visual impacts of the proposed ventilation outlet locations have been considered and are reported in Section 3 and Section 5.

The visual assessment in Section 5 uses information provided by the EIS Reference Design to render photo montages of the potential visual impacts of the infrastructure on the existing environment. They are based on the information available and should be interpreted as an 'artist's impression' and not an assessment of the accuracy of the physical infrastructure.

Information provided by Brisbane City Council or other third parties has not been subjected to a rigorous checking process.

The ToR requires lighting impacts be considered in the mitigation measures, this portion of the ToR is being investigated by professional lighting consultants in another Chapter of the EIS.

Issues in the report which may impact upon Cultural Heritage, Ecology, Traffic, Recreation, Ground and Surface Water, all of which make up the urban landscape and visual environment, are dealt with in their respective technical reports as part of the EIS.

2. Approach

2.1 The EIS Reference Design

The Northern Link project will impact on the existing urban landscape and visual environment through the implementation of a road tunnel which connects the Western Freeway at Toowong with ICB at Kelvin Grove. The project requirements will impact on the urban landscape and visual environment through the provision of:-

- Tunnel portals at the Western Freeway, Frederick Street/Milton Road, the ICB and Kelvin Grove Road
- Ventilation Stations (VS) and Ventilation Outlets (VO)
- Surface Road changes to connect existing roads to the tunnels
- Tunnel Control Centre
- Engineering infrastructure such as elevated structures, noise walls, transition structures and embankments
- The respective property impacts as a result of the project
- Construction impacts of conveyors, changed traffic conditions, and worksites.

Tunnel Infrastructure	Type of Impact on the Urban Landscape and Visual Environment
Portals	Visual, Connectivity, Property, Vegetation, Built Form
Ventilation Outlets	Visual, Property, Vegetation, Open Space
Ventilation Stations	Property, Visual, Vegetation, Open Space
Surface Road Changes	Visual, Connectivity, Property, Vegetation, Built Form, Waterways, Open Space
Tunnel Control Centre	Visual, Property, Built Form
Engineering Infrastructure	Visual, Connectivity, Property, Vegetation, Built Form
Construction related Works	Visual, Property, Vegetation,

Table 2-1 Tunnel Infrastructure and Type of Urban Landscape and Visual Impact

The above infrastructure will bring about physical and visual changes to the existing environment. The changes must also be consistent with the strategic vision for the City of Brisbane in the Brisbane City Council's 'City Plan' 2000.

2.2 Strategic Framework

The key urban design, landscape and visual outcome for the Northern Link Project is the integration of the surface and tunnel infrastructure with the existing environment and where possible provide increased cultural, economic and environmental benefits to the local community and the city as a whole.

The integration of the Northern Link project with urban planning and infrastructure initiatives of Brisbane City Council is considered important in assessing and addressing issues associated with the project. The current BCC 'City Plan' and the BCC Living in Brisbane 2026 documents have been reviewed and summarised in terms of their relevance to the Urban Design, Landscape and Visual components of the EIS.

2.2.1 City Plan

Brisbane City Council's "City Plan" (2000) has been prepared under the Integrated Planning Act 1997 (the Act). This Act sets out the requirements for integrated planning and integrated development assessment in Queensland. The purpose of the Act is to achieve ecological sustainability.

City Plan has a vision for Brisbane's:

- Business and Retail Centres
- Green Space Areas
- Heritage Areas
- Industrial Areas
- Suburbs
- Transport Systems

The Urban Design, Landscape and Visual elements of the Northern Link Project incorporate ecological sustainability principles that support the six key areas of the City Plan vision.

Business and Retail Centres

City Plan aims to encourage local employment and business opportunities by:

- Consulting with the community, through Suburban Centre Improvement Projects and Local Plans, to improve suburban centres.
- Ensuring public transport is easy to use and lets us access places where we work and shop.
- Providing for innovative housing choices in our commercial centres.

The Urban Design, Landscape and Visual components of the Northern Link Project can support these aims by:

- Encouraging Centre regeneration.
- Creating pedestrian friendly access to public transport.
- Providing quality urban spaces that support mixed use Centres.

Green Space Areas

City Plan aims to preserve and protect Brisbane's green spaces and natural habitats by:

- Preventing waterways contamination through improved requirements for effluent disposal.
- Placing conditions on new developments.
- Creating new green spaces through Council land acquisitions.
- Protecting our parks so that all Brisbane residents can enjoy them.

The Urban Design, Landscape and Visual components of the Northern Link Project can support these aims by:

- Encouraging the rehabilitation of connecting waterways.
- Improving the environmental quality of public open space.
- Ensuring new open space areas include environmental treatments.

Heritage Areas

City Plan aims to protect Brisbane's unique qualities by:

- Introducing a heritage register that will protect our historic, cultural, social, architectural and Indigenous places of significance.
- Providing guidelines to protect areas with significant character values from demolition.
- Introducing new regulations to discourage the demolition of our traditional houses.

The Urban Design, Landscape and Visual components of the Northern Link Project can support these aims and are acknowledged in the cultural values component of the EIS:

- Acknowledging local heritage values.
- Integrating existing heritage places into improvements.

Industrial Areas

City Plan aims to improve the living conditions of people who live near factories by:

- Introducing and maintaining buffers between major industrial areas and residential neighbourhoods.
- Assessing industries according to whether they are likely to have an impact on our local community and the environment.
- Applying tougher development standards near residential areas

- Requiring industries located near houses to meet a high standard of performance in areas such as air quality and noise levels.

The Urban Design, Landscape and Visual components of the Northern Link Project can support these aims by:

- Including landscape buffer areas to existing industrial sites within the project area.

Suburbs

City Plan aims to develop vibrant communities and protect our suburb's character and heritage by:

- Ensuring developers take a range of community needs into account, such as parks, schools and child care centres, when they build new residential estates.
- Protecting character houses from demolition.
- Providing new 'work from home' guidelines to give us more flexibility in our working lives.

The Urban Design, Landscape and Visual components of the Northern Link Project can support these aims by:

- Improving the pedestrian and cycle links of centres, schools and other destinations to neighbouring residential communities.
- Promoting local suburban character through public space design.

Transport Systems

City Plan aims to provide efficient road networks and public transport infrastructure that everyone can access easily by:

- Making sure areas sure areas of commercial activity and employment are linked to fast and efficient public transport.
- Extending the city's network of walkways, bikeways and riverfront promenades to provide practical and enjoyable alternatives to using cars.

The Urban Design, Landscape and Visual components of the Northern Link Project can support these aims by:

- Improving multi-modal access to public transport ;
- Improving and extending pedestrian and cycle networks.

2.2.2 Living in Brisbane 2026 Vision

Brisbane City Council's *"Living in Brisbane 2026"* vision (2006) has been prepared as an aspirational planning tool based on research, public consultation and evaluation of the "Living in Brisbane 2010" vision and outcomes.

The *Living in Brisbane 2026* vision has been presented under a number of vision themes:

- Friendly, safe city
- Clean, green city
- Well-designed, subtropical city
- Accessible, connected city
- Smart, prosperous city
- Active, healthy city
- Vibrant, creative city
- Regional, world city

The Urban Design, Landscape and Visual elements of the Northern Link Project incorporate ecological sustainability principles that support the eight key areas of the *Living in Brisbane 2026* vision. A number of outcomes have been documented by BCC for each vision theme in its *Living In Brisbane 2026* vision document. For the purposes of this review, only those outcomes which are relevant to the Urban Design, Landscape and Visual components of Northern Link have been identified.

Friendly, safe city

Living in Brisbane 2026 aspires to "retain Brisbane's personality of freshness, friendship, optimism and community compassion while managing the rapid population growth and increasing cultural and age diversity in South East Queensland" (page 14, Our Shared Vision - *Living in Brisbane 2026*, BCC, 2006) by aiming to achieve the following outcomes:

- Active and healthy communities – Local neighbourhoods and public spaces will be designed for safety and enjoyment of all people. Small local festivals and other events will be encouraged to connect residents with each other and to different cultures.
- Safe communities – Brisbane will be a place where there is a feeling of safety – in their homes, streets, parks and travelling throughout the city.

The Urban Design, Landscape and Visual components of the Northern Link Project can support some of these aims by providing public spaces that encourage and support social interaction and offer a foundation for communities to develop socially by:

- Creating recreation networks or corridors that bridge local communities and connect them to others within their locale or more widely to the city.

- Providing quality urban spaces that are accessible to all members of the community, support community gathering and safety and offer the flexibility to encourage community activities including community events.
- Improving alternative transport networks and user choice by providing safe pedestrian and cycle connections to local destinations and those outside of the locale.

Clean, green city

Living in Brisbane 2026 aspires to "conserve the natural assets of Brisbane and its surrounding regions while meeting the demands of more housing, more roads, and more services" (page 18, BCC, 2006) to accommodate population growth in the region in the next twenty years by aiming to achieve the following outcomes:

- Green and biologically diverse city – The city will preserve urban natural habitat on private and public land and reconnect ecological corridors for wildlife movement.
- Healthy river and bay – Water catchments for the Brisbane River and Moreton Bay will be clean and healthy ecosystems, free of pollutants.
- Clean air – The city will enjoy improved air quality with a dense network of parks, leafy streetscapes and green plazas in urban public spaces.
- Towards zero waste – Waste will be a resource through reuse and recycling.
- Sustainable water use – Reliance on dams will be reduced through conservation efforts and recycling wastewater.

The Urban Design, Landscape and Visual components of the Northern Link Project can support some of these aims by:

- Encouraging the rehabilitation of connecting waterways.
- Improving the quality of run-off from roads and other hard surfaces before it reaches waterways or aquifers.
- Improving the environmental quality of public open spaces and streetscapes.
- Ensuring new open space areas include environmental treatments, encourage biodiversity and are sustainable in terms of inputs such as water and outputs such as green waste.

Well-designed tropical city

Living in Brisbane 2026 aspires to acknowledge the city's "distinct and unique opportunities for sustainability as a subtropical city" to plan, design and develop an internationally-recognised built environment that is comfortable, healthy and sustainable in terms of consumption and waste. The vision aims to achieve the following outcomes:

- Outstanding city profile – Brisbane's subtropical distinctiveness will attract visitors and students and will be recognised for its contemporary, environmentally-friendly 'subtropical urbanism'.
- Well-designed and responsive built environment – The city will be designed in response to the elements of its landscape, lifestyle and climate to improve the quality of city life and sense of place.
- Active and healthy communities - A city-wide network of parks, shaded streets and public spaces will encourage walking and an outdoor culture.
- Effective growth management – The city will optimise the integration of residential development and places of employment with transport and other infrastructure.
- Sustainable water use – Neighbourhoods will be comprised of landscapes that clean and store water and incorporate design that is both water-sensitive and biodiversity-friendly.

The Urban Design, Landscape and Visual components of the Northern Link Project can support some of these aims by:

- Ensuring that scenic amenity imparted by the city's characteristic terrain and vegetation is retained and enhanced.
- Retaining and enhancing the leafy character of Brisbane's suburbs, particularly those in the inner west by incorporating significant local indigenous or culturally-significant species into landscapes associated with existing and new development or infrastructure.
- Improving the environmental quality of public open spaces and streetscapes, particularly by incorporating shelter, shade trees and abundant foliage.
- Improving alternative transport networks and user choice by providing safe pedestrian and cycle connections to local destinations and throughout the city.
- Ensuring new open space areas include environmental treatments, encourage biodiversity .and are sustainable in terms of inputs such as water and outputs such as green waste.
- Improving the quality of run-off from roads and other hard surfaces before it reaches waterways or aquifers.

Accessible, connected city

Living in Brisbane 2026 aspires to "reorient Brisbane - attitudinally and structurally – so that it is planned, built and 'greened' around efficient, friendly and safe public and active transport networks for everyone" (page 26, BCC, 2006). The vision aims to achieve the following outcomes:

- Green and active transport – Brisbane will have a network of 'greenways' offering alternative forms of movement to vehicles and will enhance its public transport network in terms of efficiency and affordability.
- Effective road networks – Subtropical boulevards will be created alongside all major upgrade projects.

- Effective growth management – Community-based hubs will co-locate residents, places of employment and retail facilities within walking and cycling distance.

The Urban Design, Landscape and Visual components of the Northern Link Project can support some of these aims by:

- Providing transport networks of high environmental quality, including visual and physical amenity.
- Improving alternative transport networks and user choice by providing safe pedestrian and cycle connections to local destinations and those outside of the locale.
- Making transport networks more user-friendly by improving their legibility and ease of use by people of all ages and levels of fitness.
- Improving permeability for pedestrians and cyclists by establishing new connections that are able to safely penetrate or straddle 'barriers' in the built environment.

Smart, prosperous city

Living in Brisbane 2026 aspires to ensure that the city will have a "strong, diversified and resilient economy, using its competitive advantages to deliver prosperity, high employment and quality jobs for all Brisbane residents" (page 30, BCC, 2006). The vision aims to achieve the following outcomes:

- Healthy economy – The city will continue to offer a business-friendly environment and encourage public and private investment.
- Effective growth management – Master planning industrial areas, hospitals, education facilities and commercial and retail centres will continue to be important to generate the economic growth of the city.

The Urban Design, Landscape and Visual components of the Northern Link Project can support some of these aims by:

- Improving the environmental quality of public open spaces and streetscapes in urban centres and key destinations to enhance local image and attract visitors, customers and investment.
- Improving alternative transport networks, user choice and affordability by providing safe pedestrian and cycle connections and comfortable public transport nodes that connect with commercial, retail, education, health and employment centres.

Active, healthy city

Living in Brisbane 2026 aspires to "increase the physical fitness, mental health and emotional well-being of all Brisbane residents… and significantly increase resident participation in local community events" (page 34, BCC, 2006). The vision aims to achieve the following outcomes:

- Active and healthy communities – All Brisbane's residents will be encouraged and supported in their choices for physical exercise and active recreation, including diverse opportunities on offer within the city's public spaces.
- Green and active transport – The majority of residents, visitors and workers will walk, cycle or undertake physical exercise in their daily activities, including travel.
- Healthy river and bay – Residents will have easy access to waterways for diverse activities along or on the city' waterways and water bodies.
- Well-designed and responsive built environment – Brisbane suburbs will be designed to foster an active and vibrant village life. Parks, public transport and local shops will al be within walking and cycling distance.
- Connected and engaged communities – The city will offer opportunities and places for residents to gather as a community.

The Urban Design, Landscape and Visual components of the Northern Link Project can support these some of these aims by:

- Creating recreation networks or corridors that offer a range of recreation opportunities for all ages within local communities and connect them to others within their locale or more widely to the city.
- Providing quality urban spaces that are accessible to all members of the community, support community gathering and safety and offer the flexibility to encourage community activities including community events.
- Improving alternative transport networks and user choice by providing safe pedestrian and cycle connections to local destinations and those outside of the locale.
- Enhance the quality of local waterways and water bodies and their active recreation potential by treating run-off from roads and other hard surface and providing access points that are well-connected with local transport networks.

Vibrant, creative city

Living in Brisbane 2026 aspires to encourage a creative environment that embraces new ideas, cultural diversity and cultural enterprise and welcomes new people, collaboration, partnerships and initiatives. The vision aims to achieve the following outcomes:

- Outstanding city profile – The city will be a thriving centre for artistic and creative endeavours and welcome contributions form all ethnic and cultural backgrounds.
- Learning and informed communities – Festivals, including the Riverfestival, will continue to contribute to creatively to celebrating, understanding and challenging our way of life.
- Connected and engaged communities – Small to medium community festivals and other cultural events will be encouraged.
- Well-designed and responsive built environment – Buildings and spaces will support artists and the creative community. Public spaces and streetscapes will be amenable to creative outdoor pursuits.

- Healthy economy – Creative enterprises and endeavours throughout the city will contribute positively to Brisbane's image and identity.

The Urban Design, Landscape and Visual components of the Northern Link Project can support these some of these aims by:

- Providing quality urban spaces and boulevards of high amenity that are accessible to all members of the community, support community gathering and safety and offer the flexibility to encourage community activities including community events.
- Providing opportunities for public art or character elements at key points within the transport network, such as entrances, public transport nodes, key destinations and places of cultural significance that respond to and enhance local image and the identity of the city.

Regional, world city

Living in Brisbane 2026 aspires to "position Brisbane as the national leader in governance, regional partnerships and civic participation" and become a city that will be viewed as achieving "high environmental standards alongside high standards of living" (page 42, BCC, 2006). The vision aims to achieve the following outcomes:

- Outstanding city profile – Brisbane is to be a major target of increasing tourist numbers.
- Connected and engaged communities the city's cultural activities, facilities and public spaces will be recognised nationally and internationally.
- Green and biodiverse city – The city will continue to contribute to the good health of the SEQ region's green space through restoration of waterways and improving fauna and flora corridors.

The Urban Design, Landscape and Visual components of the Northern Link Project can support these some of these aims by:

- Ensuring that scenic amenity imparted by the city's characteristic terrain and vegetation is retained and enhanced.
- Providing quality urban spaces and boulevards of high amenity that are accessible to all members of the community, support community gathering and safety and offer the flexibility to encourage community activities including community events.
- Ensuring existing and new open space areas and 'green' corridors are well-connected within a broader system of green spaces that extend beyond the city, are environmentally responsible and sustainable and encourage biodiversity.

2.3 Project Goals and Objectives for the EIS Reference Design

The aim of this report is to identify potential negative impacts and mitigate them through urban and landscape designs. In order to achieve these improvements, an 'amenity framework' (vision, goals and objectives) for urban, landscape and visual elements have been developed to ensure the mitigation measures are guided by appropriate principles with desired outcomes, as stated in the ToR:-

- *The mitigation measures should relate to the urban landscape and visual goals, objectives and design measures for the project.* (Section 5.7.2)

They have been derived from the Existing Environment Report where the focus was on highlighting the positive or challenging attributes of the urban landscape and visual environment. In order to make them relevant to the task of reviewing the impacts of the EIS Reference Design, they have been adapted to manage the changes to the positive or challenging attributes of the urban landscape and visual environment.

The following are the Vision, Goals and Objectives for the study area as a whole and for the four key locations. The impact analysis uses them to assess impact and the mitigation measures use them to reinforce, enhance and where possible retain the character and function of the existing environment.

2.3.1 Vision, Goals and Objectives for the Study Corridor as a Whole

The following vision, goals and objectives were formulated to complement the broad EIS objectives articulated in the ToR as they specifically relate to the study corridor as a whole.

Vision

Develop infrastructure throughout the corridor that contributes to the positive visual and physical experience of areas affected by the project and their surrounding suburbs and retain the urban and landscape character that is integral to sense of place, local image and identity. This is to be undertaken within a framework that acknowledges and responds to the urban, landscape and visual qualities of the study corridor and its surrounds which are the result of a combination of man-made interventions over time and Brisbane's striking natural environment.

Goal:

Retain characteristics of the urban landscape that contribute to positive local image and the identity of Brisbane as a subtropical 'river' city.

Objectives:

- Retain and manage residential character areas as distinctive precincts, particularly elevated areas such as that defined as the Hillside Character Precinct.
- Retain and manage the forested hilly backdrop to the study corridor, that is, Mount Coot-tha Reserve and the Taylor Range.
- Maintain and enhance vitality, activity and access along the Brisbane River for residents and visitors.

- Retain and enhance views and vistas that engage with the urban landscape, including views to the CBD, Mount Coot-tha, local landmarks and other character elements or precincts.

Goal:

Enhance the character and experience of circulation networks for all modes of movement i.e. for pedestrians, cyclists, motorists and public transport users.

Objectives:

- Enhance the amenity, legibility and safety of connections to local destinations for all modes of transport.
- Design and develop treatments for local connections and new transport infrastructure that complement local character and enhance local image.

2.3.2 Goals and Objectives for the Western Connection

The following goals and objectives were formulated to complement the broad EIS objectives articulated in the ToR as they specifically relate to the Western Connection.

Goal:

Retain characteristics of the urban landscape that contribute to positive local image and the identity of Brisbane as a subtropical 'river' city.

Objectives:

- Retain the integrity of the gateway experience from the Western Freeway moving towards the Mount Coot-tha Road roundabout, which includes a vegetated frame imparted by roadside vegetation along the Western Freeway and the edge of Anzac Park.
- Retain and manage the integrity of the Toowong Cemetery, including vegetation, monuments and more heavily vegetated edges along Mount Coot-tha Road and Frederick Street.
- Retain the character of Mount Coot-tha Road as an entrance to the Botanic Gardens and a popular tourist drive, particularly focusing on the management of roadside groups of *Eucalyptus microcorys* (Tallowwood) and complementary vegetation at the edge of Toowong Cemetery.
- Minimise visual impacts of any proposed works proximate to the Mount Coot-tha Road roundabout as viewed from Mount Coot-tha Lookout, Anzac Park, the Botanic Gardens and Toowong Cemetery, and as potentially viewed from Stuartholme and surrounding elevated residential areas.
- Retain, bond and protect the Botanic Gardens and Anzac Park from damage during construction by ensuring works are contained within approved worksites only. This applies to the conveyor footprint by ensuring it is placed with environmental sensitivity with the smallest footprint possible.

Goal:

Enhance the character and experience of circulation networks for all modes of movement i.e. for pedestrians, cyclists, motorists and public transport users.

Objectives:

- Improve circulation around the Toowong Park and Ride and Anzac Park, and provide safe connections for pedestrians and cyclists across Milton Road in the vicinity of the Frederick Street roundabout.
- Retain local on-road and off-road cyclist connections and extend through local streets and open space areas, particularly those connecting, or with a potential to connect, with local destinations, such as schools, parks and shops.
- Improve the safety and legibility for access to Mount Coot-tha Road for motorists and cyclists travelling west from Milton Road, particularly along the section of road with oncoming traffic from the Frederick Street ramp.
- Design and develop treatments for local connections and new transport infrastructure that complement local character and enhance local image.

2.3.3 Goals and Objective for the Toowong Connection

The following goals and objectives were formulated to complement the broad EIS objectives articulated in the ToR as they specifically relate to the Toowong Connection.

Goal:

Retain characteristics of the urban landscape that contribute to positive local image and the identity of Brisbane as a subtropical 'river' city.

Objectives:

- Retain the integrity of vegetation at the Toowong Bus Depot on Milton Road as a buffer to the road for public transport users and a visual buffer to the bus workshop buildings.
- Minimise the visual impact of the vehicle flyover and ramp that connects Frederick Street with the entrance to the Western Freeway as viewed from all approaches to the Frederick Street roundabout.
- Retain and enhance the character of residential precincts along Frederick Street, Miskin Street ,Valentine St and Dean Street.
- Retain and enhance the character of mix of commercial/residential precincts along Sylvan Rd, Croydon St. and Milton Road.

Enhance the character and experience of circulation networks for all modes of movement i.e. for pedestrians, cyclists, motorists and public transport users.

Objectives:

- Improve vitality and safety for pedestrians and bus users, particularly at night, within and around the Toowong Park and Ride.

- Retain local on-road and off-road cyclist connections and extend through local streets and open space areas, particularly those connecting, or with a potential to connect, with local destinations, such as schools, parks and shops.
- Improve the safety and legibility for access to Mount Coot-tha Road for motorists and cyclists travelling west from Milton Road, particularly along the section of road with oncoming traffic from the Frederick Street ramp.
- Design and develop treatments for local connections and new transport infrastructure that complement local character and enhance local image.

2.3.4 Goals and Objectives for the Kelvin Grove Connection

Goals and Objectives

The following goals and objectives were formulated to complement the broad EIS objectives articulated in the ToR, as they specifically relate to the Kelvin Grove Connection.

Goal

Retain characteristics of the urban landscape that contribute to positive local image and the identity of Brisbane as a subtropical 'river' city.

Objectives:

- Retain the integrity of the gateway experience contributed to by mature fig trees in the road reserve in Kelvin Grove Road adjacent to the Normanby Hotel.
- Retain the strong landscape character and landscape amenity characterised by fig tree plantings at the Normanby five ways, Marshall Park, McCaskie Park, the corner of Prospect Terrace and Kelvin Grove Road, and at the periphery of Brisbane Grammar School.
- Manage the strong landscape character and landscape amenity characterised by fig tree plantings along pathways adjacent to the ICB.
- Retain and enhance the character of residential precincts of Red Hill and Kelvin Grove between Musgrave Road and Kelvin Grove Road including their built form, building scale and mature subtropical vegetation.
- Enhance the character of residential precincts between the ICB and KGUV including their built form, building scale and mature subtropical vegetation.
- Minimise visual impacts to the appreciation of views to St Brigid's church at Red Hill and promote the retention of its visual integrity and character.

Goal:

Enhance the character and experience of circulation networks for all modes of movement i.e. for pedestrians, cyclists, motorists and public transport users.

Objectives:

- Improve the legibility of off- and on-road circulation for pedestrians and cyclists between Musgrave Road, Victoria Park and KGUV.
- Improve connectivity and safety for cyclists travelling to and from KGUV and the south-west including connections to the Bicentenary Bikeway.
- Improve the amenity of the pedestrian environments along Kelvin Grove Road and Musgrave Road.
- Improve vitality and the perception of personal safety for pedestrians and bus users, particularly at night, around the Normanby Hotel.
- Design and develop treatments for local connections and new transport infrastructure that complement local character and enhance local image.

2.3.5 Goals and Objectives for the Northern Connection

The following goals and objectives were formulated to complement the broad EIS objectives articulated in the ToR, as they specifically relate to the Northern Connection.

Goal:

Retain characteristics of the urban landscape that contribute to positive local image and the identity of Brisbane as a subtropical 'river' city.

Objectives:

- Manage and enhance open space areas alongside the ICB/railway yard corridor to strengthen local urban landscape character.
- Manage and enhance vegetation within the urban landscape, including the existing diversity of vegetation communities, to build on the unique image of this inner city location.
- Promote the visual enhancement of prominent edges to public and private property to strengthen local landscape character and precinct identity.

Goal:

Enhance the character and experience of circulation networks for all modes of movement i.e. for pedestrians, cyclists, motorists and public transport users.

Objectives:

- Improve the amenity of the pedestrian/cyclist environments along the northern portion of the ICB/railway corridor.
- Establish another crossing over the corridor, particularly for pedestrians and local school users to access the western end of Victoria Park.
- Enhance connections to Gregory Terrace and improve accessibility for pedestrians and cyclists to the Spring Hill Aquatic Centre (Centenary Pool) at Spring Hill.
- Design and develop treatments for local connections and new transport infrastructure that complement local character and enhance local image.

2.4 Urban and Landscape Design Guidelines

The ToR calls for urban, landscape and visual guidelines to be developed for the key locations within the project. In particular the ToR requires the focus of the guidelines to consider the following:-

- Reflecting predicted changes to land use
- Public amenity
- Public access
- Sustainability
- Place making principles.

In combination with the above, the guidelines also consider the project vision, goals and objectives relating to urban landscape values, character and connectivity. These common themes have been ordered into landscape and urban design elements so that they can be applied to a range of urban settings found in the study area. The guidelines have been used to provide urban and landscape design concepts and designs, which are later refined in the report to address specific mitigations in each key location.

The following are the minimum guidelines to ensure urban and landscape designs are of the highest quality, longevity, sustainability and innovation in the provision of:-

1. Environmental Revegetation / Waterway rehabilitation
    - Protect existing significant vegetation;
    - Revegetate and enhance areas damaged during construction;
    - Where appropriate use species indigenous to each key location;
    - Rehabilitate damage to waterways where appropriate.
    - Improve the quality of run-off from roads and other hard surfaces before it reaches waterways or aquifers;
    - Size of plant procured plant stock should suit intended purpose, i.e. revegetation of bushland or waterways – tube stock to be used, for Street Trees – 100L stock to be used, for areas requiring impact of mature trees – Ex ground stock to be used.

2. Landscape Open Space Enhancement
    - Urban Forest Treatment – Create well connected, sustainable and safe landscapes of diverse and high quality where the project creates open space or remnant space, incorporating existing parks and open space, where possible;
    - Create opportunities to enhance critical views and vistas including views to the CBD, Mount Coot-tha, local landmarks and other character elements or precincts;
    - Create water wise subtropical landscapes which are sustainable and provide shade and micro-climate benefits, where appropriate, refer Appendix 8.2 for Planting Palette;
    - Size of procured plant stock should suit intended purpose, i.e. revegetation of bushland or waterways – tube stock, for Street Trees – 100L stock or greater, for areas requiring impact of significant trees – Ex ground stock 4m high or greater;
    - Ensure that scenic amenity imparted by the city's characteristic terrain and vegetation is retained and enhanced;

- Provide innovation in response to embankment planting;
- Provide innovation in rain water harvesting for re-use;
- Provide innovation in the use of permeable surfaces.

3. Recreational Opportunities
   - Create well connected and safe community areas for active or passive recreation within discrete areas of open space;
   - For active areas consider BBQ's, shelters, drinking fountains, age appropriate play opportunities, park furniture and lighting.

4. Connectivity
   - Provide safe, legible and comfortable connections to and from all areas affected by the project for pedestrians, cyclists and public transport users (eg. shade and CPTED principles);
   - Make good and enhance all existing connections for pedestrian and cyclists;
   - Investigate other opportunities for improving alternative transport networks and user choice by providing safe pedestrian and cycle connections to local destinations and throughout the city;
   - Improve permeability for pedestrians and cyclists by establishing new connections that are able to safely penetrate or straddle 'barriers' in the built environment;
   - Provide transport networks of high environmental quality, including visual and physical amenity;
   - Provide lighting along connections and at decision points in accordance with CPTED principles;
   - Ensure pathway widths suit the degree and frequency of use, and are in accordance with Austroads, Guide to Engineering Practice, Part 14, Bicycles;
   - Provide surface treatments that enhance other connecting paths within the vicinity and street furniture that reinforces the local character of the area.

5. Neighbourhoods
   - Retain and enhance characteristics of local neighbourhoods in close proximity to project works;
   - Provide sensitive urban regeneration solutions for areas adjoining neighbourhood precincts;
   - Provide vegetative screening to sound barriers and/or provide access to views and vistas of the surrounding area using transparent materials;
   - Strengthen neighbourhood precincts through the implementation of well connected community park/s;
   - Retain and enhance the leafy character of Brisbane's suburbs, particularly those in the inner west by incorporating significant local indigenous or culturally-significant species into landscapes associated with existing and new development or infrastructure.

6. Boulevard Treatments
   - Provide significant tree planting, street furniture, public art and accessible pathways to major roads;
   - Provide enhanced amenity to existing and proposed residential streets through the provision of street tree planting with under planting and footpaths.

7. Suburban Centre Improvement Schemes
    - Urban Villages - Create well connected and safe new opportunities or strengthen the existing viability of destinations through urban design and landscape treatments.

8. Design Intervention and Integration with Engineering Proposals – Create high quality urban design and landscape treatments for the following infrastructure elements:-
    - Retaining and transition structures;
    - Elevated structures (structures should be developed to integrate urban design with structural objectives, as opposed to add on embellishments);
    - Ventilation outlets, ventilation outlet stations;
    - Sub stations;
    - Noise barriers,
    - Integrate the above with the existing environment of the each key location, and;
    - Present urban regeneration options in appropriate locations.

9. Public Art
    - Provide a Public Art Strategy with curatorial input and respond to all design elements within the project.
    - Provide opportunities for public art or character elements at key points within the transport network, such as entrances, public transport nodes, key destinations and places of cultural significance that respond to and enhance local image and the identity of the city, contributing to the legibility and user-friendliness of transport networks for by people of all ages and levels of fitness.

10. Lighting – as stated previously the following are guides only, it is not the purpose of this chapter to explain or provide technical standards or requirements in regard to lighting. It has been prepared to highlight issues that a qualified lighting designer would need to consider in their technical design.
    - Mitigate the potential for drivers to be distracted by the sun if possible;
    - Use lighting to assist legibility and choices about safe areas and routes;
    - Integrate sustainable lighting in the design integration with engineering proposals;
    - Ensure lighting during construction does not impact on any form of transport or residents;
    - Avoid inappropriate light pollution, shadowing or glare during construction and at operational stage.

11. Codes and Practices

- Include CPTED principles in all of the above mitigation measures refer ‘Crime Prevention through Environmental Design Guidelines for Queensland Part A: Essential features for safer places. 2007’;
- Provide Australian best practice urban design and landscape standards, codes and practices to all urban and landscape designs;
- On and off road Cycleways and pathways in accordance with Austroads, Guide to Engineering Practice, Part 14, Bicycles.

3. Potential Impacts

3.1 Introduction

This section of the report describes the general and specific impacts of the EIS Reference Design on the urban landscape and visual environment. In order to do this, a site analysis of the combined Western/Toowong Connection and the ICB/Kelvin Grove Connection was completed. (Refer Figures 3-1 & 3-2) The analysis highlights areas with important urban character and qualities within a landscape and visual context. This sets the scene to further explore the Project's positive and negative impacts on the existing environment.

3.2 Potential Impacts on the Study Corridor

The *Existing Environment Report – Urban Design, Landscape and Visual Amenity*, evaluated the study corridor and its surrounding suburbs at two scales; at the broad scale of the study corridor and its surrounds, and at a finer scale to evaluate areas that were identified as key locations. These key locations were identified in that report as areas within the study area largely defined as the potential visual catchments of the sites likely to be affected by surface works associated with the Northern Link Project.

Potential impacts in the broader context of the study corridor and its surrounds have been reviewed using updated and detailed information of the Project's route layout and its components, and descriptive information documented in the Existing Environment Report. From this process, it is evident that potential impacts are largely confined to key locations and their immediate surrounds (areas mapped in Figures 3-1 & 3-2) except for visual impacts associated with ventilation outlets which potentially extend beyond the study corridor. Evaluation of visual catchments and impacts of ventilation infrastructure will be explored further in Section 5 to fully address the requirements of the current ToR (refer second requirement of the ToR, Section 1.2).

It is important to acknowledge that information available at the time of the preparation of the Existing Environment Report did not include the types and locations of ventilation structures associated with tunnel infrastructure and this information was not included in the assessment of visual catchments. The current report will address this limitation by identifying the location and type of ventilation structures, assessing their impacts and developing mitigation strategies as appropriate.

3.3 Potential Impacts on Key Locations

The EIS Reference Design makes an immediate impact on the urban landscape and visual environment at key locations at the west and north ends of the study area, those being the Western/Toowong Connection and the ICB/Kelvin Grove Connection respectively.

Site analysis was undertaken at these key locations as a review and confirmation of descriptive information provided in the Existing Environment Report, and is summarised in Figures 3-1 and 3-2. This information was then used as a basis for evaluating the impacts within these key areas that are attributable to the Project's route and infrastructure components, including the location of ventilation structures, as required by the ToR (refer first requirement of the ToR, Section 1.2).

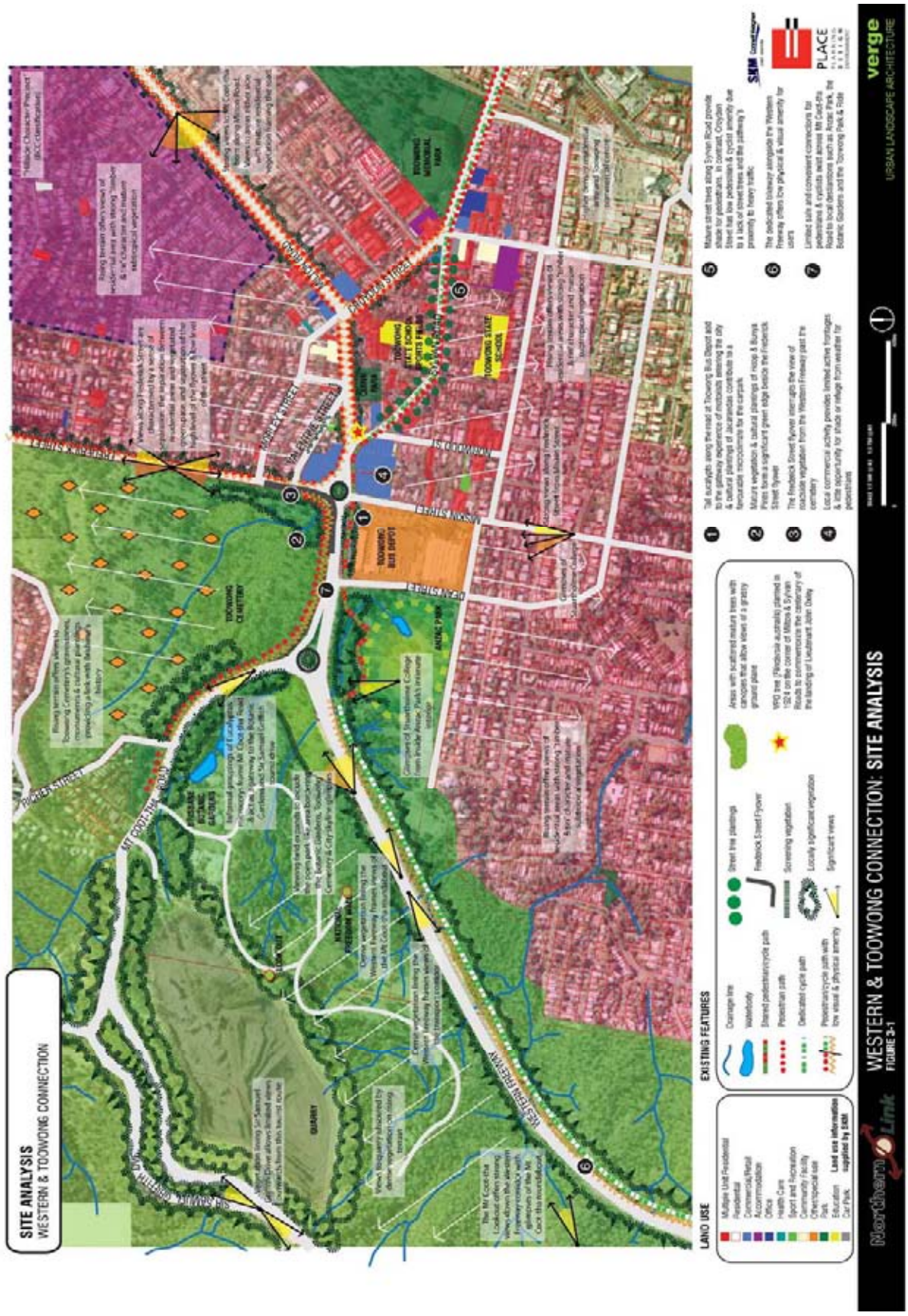


Figure 3-1 Site Analysis for the Western/Toowong Connection

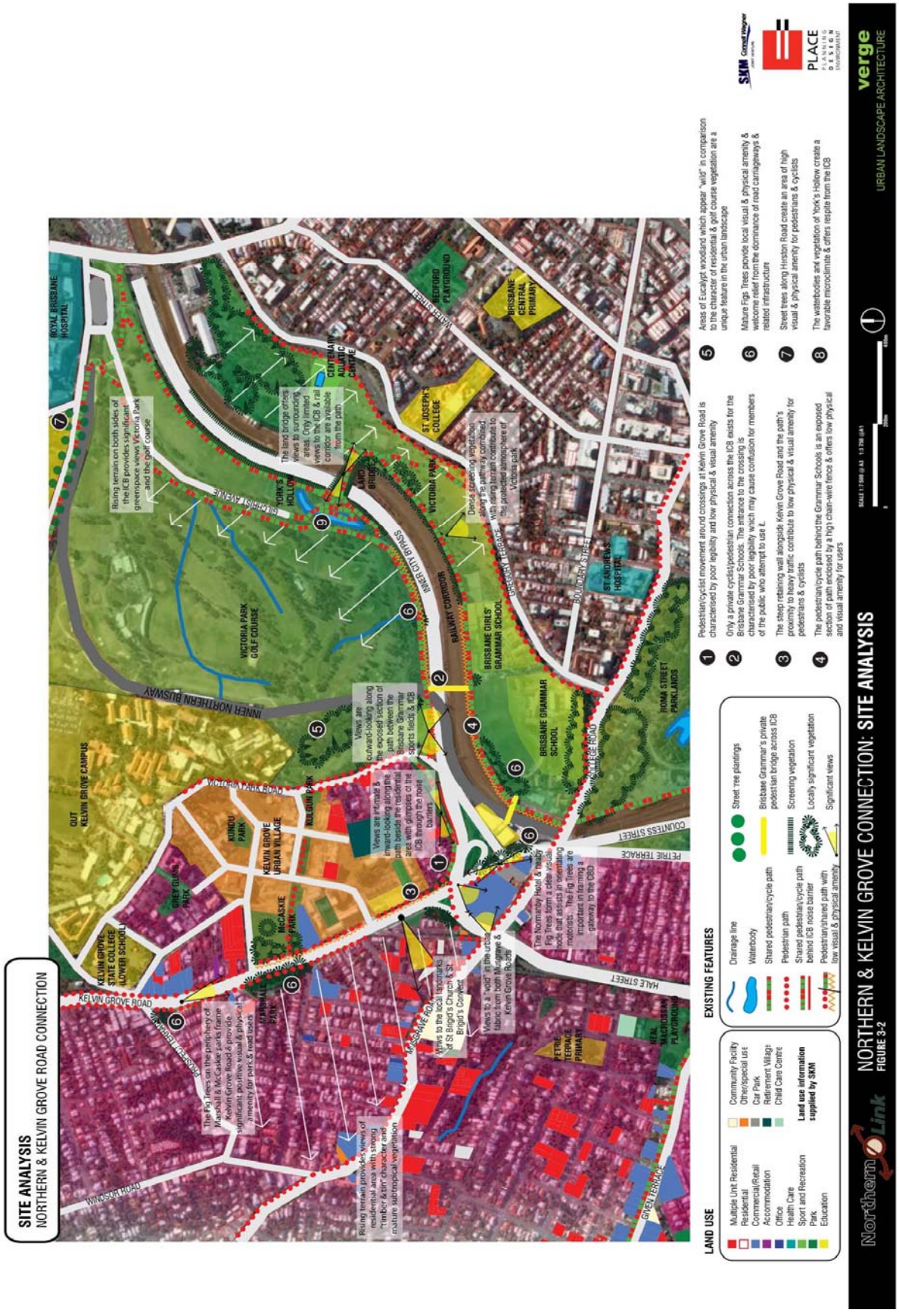


Figure 3-2 Site Analysis for the Kelvin Grove/Northern Connections

The structure used to assess the impacts of the project in each key location is provided in tabulated format followed an illustrated a spatial analysis. The tables list the individual built components of the EIS Reference Design and discusses the resulting impact on the existing environment. Because of the multifaceted nature of urban environments it is necessary to synthesise the important elements that represent our understanding of the city. The following headings were adapted from the existing environment report and are used to make an orderly assessment of these complex urban environments. They are not exhaustive but cover many of the important values and experiences of public spaces, landscape, built form, functionality and also the sense of comfort and safety the existing places provide as perceived by the public.

- Predominant Land Uses and Variety
- Built Form Typologies and grain
- Landscape Amenity & Character
- Open Space
- Accessibility and connectivity
- Scale
- Landmarks, legibility and destinations
- Visual Environment (Refer to Section 5)

3.3.1 Potential Impacts on Western Connection

The main impacts on the Western Connection are the 800m long transition structures which extend along the Western Freeway. The construction of the transition structures requires embankment cuttings into the existing vegetated hills of Brisbane Forest Park and a re-alignment of the pedestrian/cycle route alone the southern edge of the Western Freeway. The other key impact is the location of the worksite in between the Botanic Gardens and the Western Freeway with a spoil conveyor through Brisbane Forest Park to the Mt. Coot-tha Quarry. The visual impact of the ventilation outlet and station will be minimal to surrounding residential areas refer Figure 3.3 for location. The following table provides a greater level of detail by listing the individual built components of the EIS Reference Design and discusses resulting impact on the existing environment.

Tunnel Infrastructure	Impacts of the EIS Reference Design on the visual & physical environment
Portals	Predominant Land Uses, Built Form and Variety • The portals are located approximately 200m south west of the Mt. Coot-tha roundabout and encroach into the existing land uses of Anzac Park to the SE and the BCC land adjacent to the Botanic Gardens to the NW. Landscape Amenity & Open Space • The existing landscape amenity is low for pedestrian/cycles but high for

Tunnel Infrastructure	Impacts of the EIS Reference Design on the visual & physical environment
	motorists. The portals will further decrease the landscape amenity and open space at the edges of Botanic Gardens and Anzac Park. • Existing trees to the edges of the Botanic Gardens and Anzac park will be impacted by the portal foot print, to date some of this vegetation has been cleared due to the new pedestrian and cycle overpass. • Due to the portals low profile, the impacts on Landscape Character is negligible, however the introduction of road infrastructure will change the perceived existing Landscape Character of open space, dense bush and vegetated hills. Accessibility, Permeability and Connectivity • The portals will impact on the existing pedestrian/cycle links along the Western Freeway. For road transport, the portals enhance permeability and connectivity. Scale • The portal roofs are level with the adjacent ground, and will have negligible impact on the vertical scale of this environment which is dominated by the Toowong Cemetery. Landmarks, Legibility and Destinations • The portal roofs are level with adjacent ground; therefore they are relatively low in profile and will have no impact on visual access to landmarks as viewed from approaches. They do not compromise legibility and promote access to destinations. The journey into the portals will obscure the views to the landmarks at the Toowong Cemetery. Visual Environment • Refer to section 5 for Visual Assessment
Ventilation Outlets (VO) Refer to Figure 3-3 for location	Predominant Land Uses and Variety • The VO is located approximately 400m south west of the Mt. Coot-tha roundabout and encroach into the BCC land adjacent to the Botanic Gardens to the NW Built Form, Typologies and Grain • Not Applicable at this connection. Landscape Amenity • The VO will make an impact on landscape amenity because it will be visible to motorists along the Western Freeway especially those travelling north west. The VO will be contrasted against the existing 'sylvan' nature of the dense bush and vegetated hills and will therefore have a high visual impact. • The VO will make an impact on landscape amenity because it will be highly

Tunnel Infrastructure	Impacts of the EIS Reference Design on the visual & physical environment
	visible users of the Botanic Gardens who may have intermittent or obstructed views to the VO depending obstructing topography, open clearings and vegetation. • The VO is likely to impact on the existing landscape character of its immediate environment, including the surrounding residential areas which may have intermittent or obstructed views to the VO depending obstructing topography, building and vegetation. • The type of aesthetic treatment of the VO will have an impact on the contribution to this immediate environment. • The VO includes a pipeline from the tunnel to the VO; the trenching of the pipeline to the VO will run along the Western Freeway corridor and cleared work site and will not affect vegetation. • The VO is likely to also have visual impacts which are far reaching, but due to the nature of viewing from a distance the visual impacts will over time blend into the urban fabric of the city and will therefore be negligible. Open Space • Because of the relatively small footprint of the VO's the impact on open space is negligible. Accessibility, Permeability and Connectivity • The VO's has no impact on Accessibility, Permeability and Connectivity Scale • The VO will impact on the scale of the immediate surrounding land uses due to its size and elevation, and will be able to be viewed from afar it has the potential to have negligible impact due to viewing obstructions such as topography, buildings and vegetation. Landmarks, Legibility and Destinations • Depending on the design of the VO it has the potential to be either a non descript piece of infrastructure which is camouflaged to blend into its environment or become an instantly recognised landmark which can be used to assist legibility. Refer to Urban Mitigation Chapter of the EIS. Visual Environment • Refer to section 5 for Visual Assessment
Ventilation Station (VS)	Predominant Land Uses and Variety • The VS is located below the Ventilation Outlet approximately 400m south west

Tunnel Infrastructure	Impacts of the EIS Reference Design on the visual & physical environment
The design of the VS depends on the method of construction. It is proposed the VS is partially buried:-	of the Mt. Coot-tha roundabout and encroach into the BCC land adjacent to the Botanic Gardens to the NW. It will be partially buried. Built Form, Typologies and Grain • Not Applicable to this location Landscape Amenity & Character • The VS will be partially buried and situated between the Botanic Gardens and the Western Freeway therefore it will have an impact on the landscape character of this area. Open Space • The ventilation station will be partially buried. There will be minor visual impact of this structure for motorists travelling along the Western Freeway Accessibility, Permeability and Connectivity • The VS will not impact on accessibility, permeability and connectivity. Scale • Because the VS is partially buried resulting scale of the building will have a negligible impact on the surrounding environment. Due to the surrounding topography and vegetation there will also be negligible impact on distant views. Landmarks, Legibility and Destinations • Depending on the design of the VS it has the potential to be either a non descript piece of infrastructure which is camouflaged to blend into its environment or become an instantly recognised landmark which can be used to assist legibility. Visual Environment • The ventilation station will be partially buried. There will be a medium visual impact of this structure for motorists travelling along the Western Freeway
Surface Road Changes Surface road is defined in this report by the reinstatement of existing traffic conditions pavements and line markings in either new or existing locations. It does not	Predominant Land Uses and Variety • Not Applicable at this connection. Built Form, Typologies and Grain • Not Applicable at this connection. Landscape Amenity & Open Space • There will be negligible negative impacts on Landscape Amenity and Open Space at this connection as there are little or no surface road changes, due to the reinstatement of the existing round-about at Mt. Coot-tha Road and the

Tunnel Infrastructure	Impacts of the EIS Reference Design on the visual & physical environment
include ramps or transition structures.	Western Freeway after the cut and cover for the tunnel is complete. Refer Engineered Infrastructure for impacts due to transition structures along the Western Freeway. • Potential positive impacts to provide 'gateway' planting to the reinstated roundabout islands. Accessibility, Permeability and Connectivity • There will be negligible negative impact on existing low Accessibility, Permeability and Connectivity at this connection as there are little or no surface road changes, due to the reinstatement of the existing round-about at Mt. Coot-tha Road and the Western Freeway. Refer Engineered Infrastructure for impacts due to transition structures along the Western Freeway. Scale • The removal of existing vegetation at the roundabout Mt. Coot-tha Road and the Western Freeway will reduce the vertical scale of surrounding vegetation experienced in this location. (the new pedestrian and cycle overpass at the Western Freeway has already removed vegetation close to the freeway and this will exacerbate the reduction in vertical scale). Not withstanding the existing large scale of the Western Freeway, the surrounding vegetation provides a vertical frame to the freeway and imparts a more 'intimate' driving experience. Landmarks, Legibility and Destinations • Not Applicable at this connection. Visual Environment • Refer to section 5 for Visual Assessment
Engineering Infrastructure Below are the components of engineered infrastructure used to construct tunnels. The	Predominant Land Uses and Variety • The engineering infrastructure extends approximately 800m south west of the Mt. Coot-tha roundabout and encroach into the existing land uses of Anzac Park to the SE and the BCC land adjacent to the Botanic Gardens to the NW. The predominant land use remains consistent with existing at Operational Phase therefore the impact is minimal. Built Form, Typologies and Grain

Tunnel Infrastructure	Impacts of the EIS Reference Design on the visual & physical environment
highlighted components below correspond to the ones used in this particular key location.	• Not applicable in this location. Landscape Amenity & Open Space • The will be negative impacts on existing landscape amenity for motorists at this connection due to 800m of transition structures through the Western Freeway cuttings.
▪ Transition Structures; ▪ Elevated Structures; ▪ Cut & Cover; ▪ Reinforced Earth; Structures; ▪ Noise walls.	• Impacts will be evident due to loss of dense bushland on the fringe of the Brisbane Forest Park straddling the Western Freeway. • The wide footprint cuts into the existing Botanic Garden on the north western side and Anzac Park on the South East side of the Western Freeway. Accessibility, Permeability and Connectivity • There will be impact on the existing low amenity pedestrian/cycle links on the south-eastern side of the Western Freeway. It is proposed this will be relocated to the outside of the new transition structure. Scale • The scale of the transition structures embankment cuttings will have an impact on existing motorist experience on both sides of the Western Freeway. Landmarks, Legibility and Destinations • Because the transition structures are cut into the ground, the impact on the surface condition on the existing Western Freeway remains relatively the same, therefore visual access to access the landmarks of the Toowong Cemetery and views to the CBD remain uninterrupted. • Legibility to and from destinations remains the same as existing conditions. Visual Environment • Refer to section 5 for Visual Assessment
Construction Related Works • Worksites Refer to Figure 3-3 for worksite locations.	Predominant Land Uses and Variety • The worksite has a major impact on the land adjacent to Botanic Gardens and the north- western side of the Western Freeway. Landscape Amenity, Character & Open Space • The worksite footprint has little impact on the 'gateway experience' and local

Tunnel Infrastructure	Impacts of the EIS Reference Design on the visual & physical environment
• Conveyors • Change surface conditions The impact from these components of tunnel construction is temporary.	character provided by the existing Eucalyptus microcorys on the bank adjacent to Mt. Coot-tha Road. (Refer Figure 3-3) • Major impacts on the existing vegetation from the clearing and construction related activities at the Botanic Gardens interface at this location. • Surface water impacts due to location of worksite down stream of existing Botanic Garden water bodies, which flow under the Western Freeway into Anzac Park. • The proposed water storage Dam for the Botanic Gardens will be delayed due to the worksite location. • The proposed conveyor to remove spoil from the tunnel to the Quarry will impact on the bushland abutting the Western Freeway and plantings at the western end of the Botanic Gardens by removing existing vegetation. (Refer Figure 3-3 for location) • The proposed conveyor will temporarily impact on the user experience of the Botanic Gardens. Accessibility, Permeability and Connectivity • Currently there is limited public access and connectivity to the area of land adjacent to the Botanic Gardens next to the Western Freeway therefore there is little or no impact to access and connectivity of the work site. • Site access for operations and workers will impact the experience of connections to Mt. Coot-tha Road, for residents; and visitors to the Botanic Gardens and Mt. Coot-tha Lookout. • There will be some interface impacts with the proposed pedestrian/cycle bridge over the Western Freeway. This connection may be temporarily interrupted due to the construction of the cut and cover near the roundabout. • Surface changes over the phases of construction will temporarily impact the existing pedestrian and cycle route to and from Mt. Coot-tha. This route will remain open but in a changed traffic environment. Scale • The scale of the worksite will impact on the motorist experience along the Western Freeway, and potentially for residents with views to the site and the recreational users of the Gardens and the Toowong cemetery.

Tunnel Infrastructure	Impacts of the EIS Reference Design on the visual & physical environment
	Landmarks, Legibility and Destinations • Legibility to the tourist destinations of Mt. Coot-tha Lookout and the Botanic Gardens will be temporarily impacted due to the changed traffic environment. Visual Environment • Refer to section 4.1.1

Table 3-1 Potential Impacts on the Western Connection

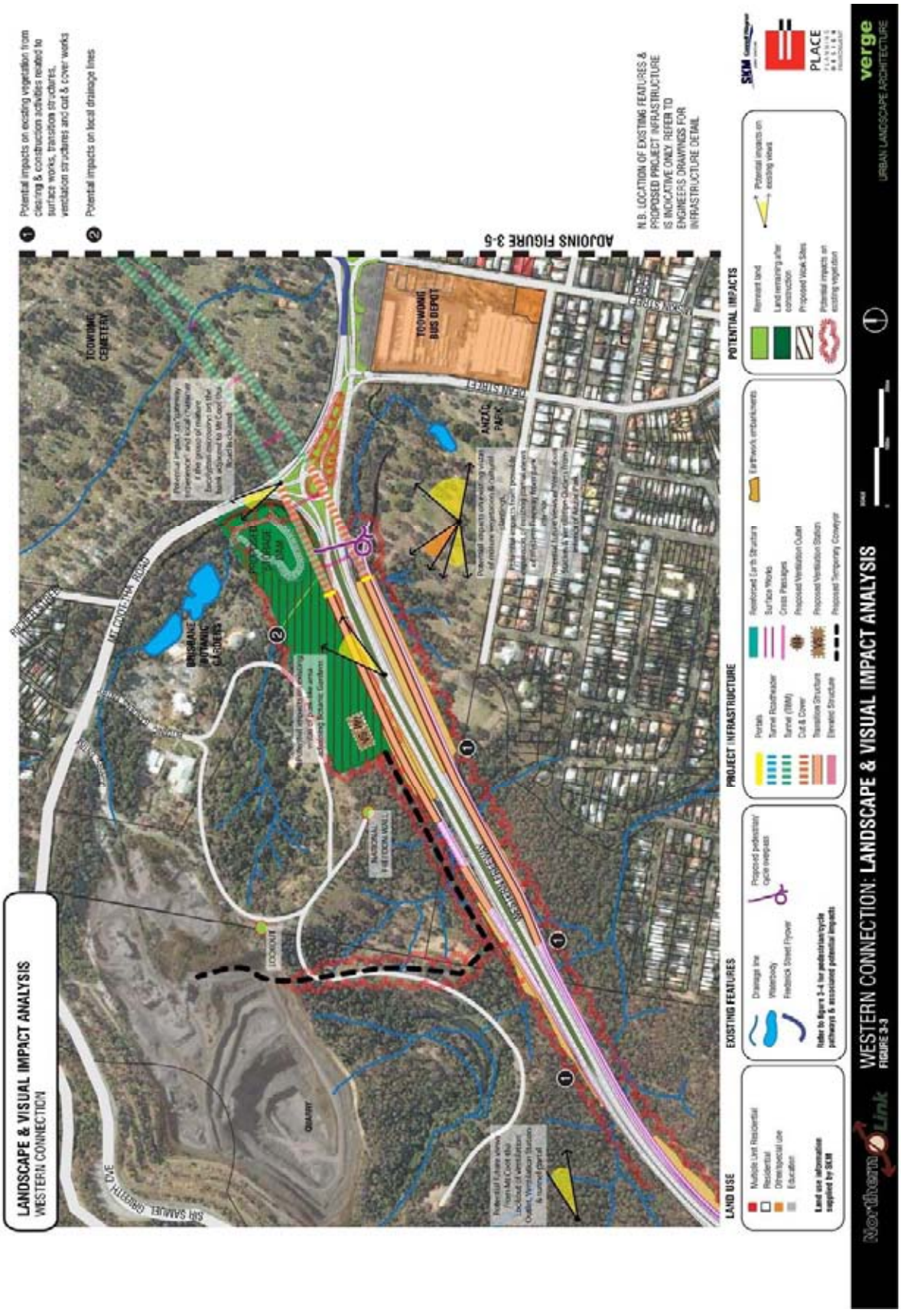


Figure 3-3 Landscape and Visual Impact Analysis - Western Connection

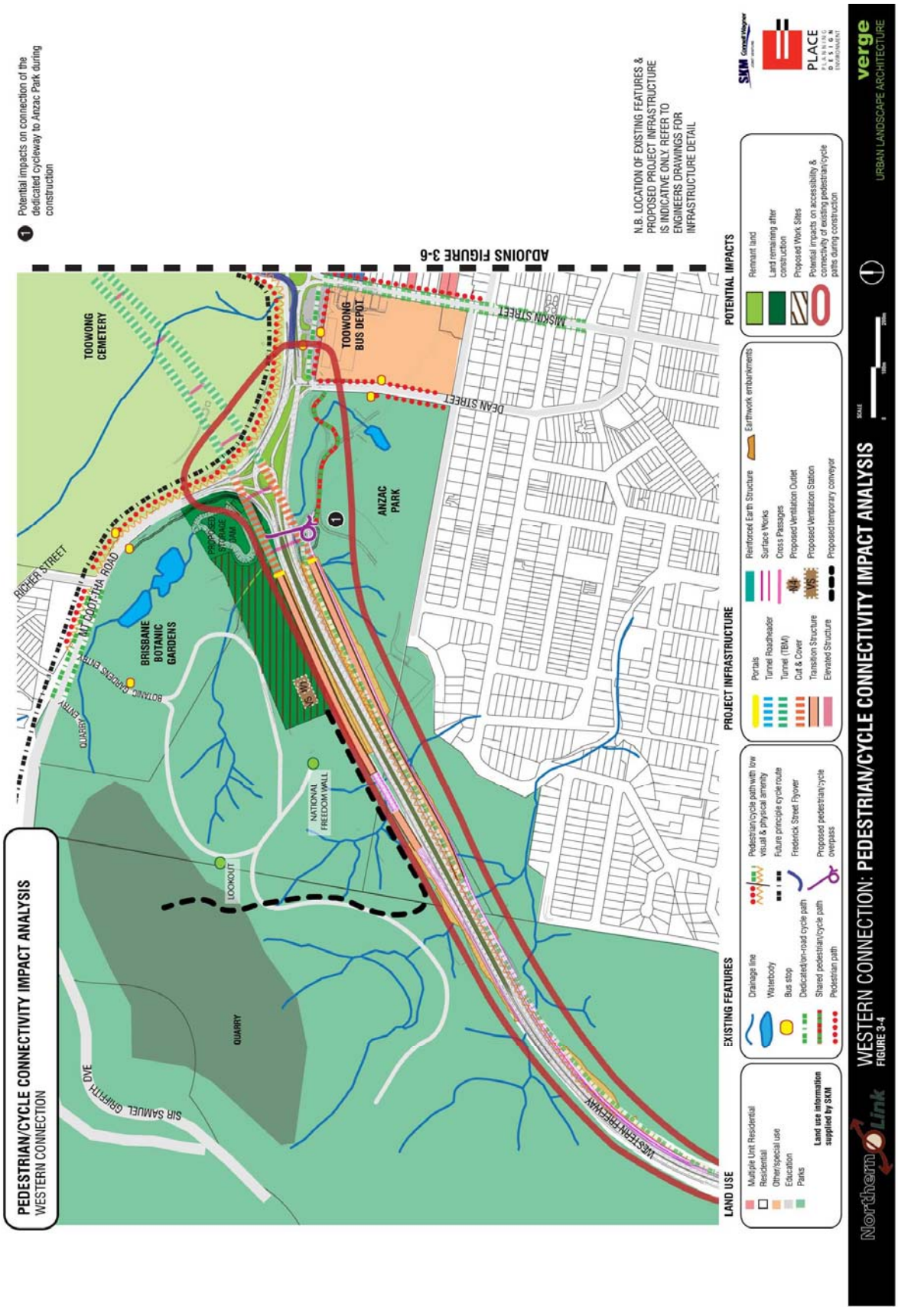


Figure 3-4 Pedestrian/Cycle Impact Analysis - Western Connection

3.3.2 Potential Impacts on Toowong Connection

The main impacts on the Toowong Connection are the two elevated structures, portals and retained earth structures over Milton Road before the Frederick Street roundabout. This requires the resumption of properties below Valentine Street and the southern side of Milton Road. Road widening to Croydon Street also impacts on property through resumptions. Refer to Figure 3-5 and 3-6 for the spatial analysis of the impacts.

The following table provides a greater level of detail by listing the individual built components of the EIS Reference Design and discusses resulting impact on the existing environment.

Tunnel Infrastructure	Impacts of EIS Reference Design on the visual & physical environment
Portals	Predominant Land Uses, and Variety • The portals are sited south of Morley Street, impacting on the existing residential nature of Valentine Street where is meets Frederick Street. Built Form • The portals are sited south of Morley Street with property resumptions and changed conditions for existing residents due to the proximity of the portal. Refer to Engineering Infrastructure in this table for impacts on commercial properties. Landscape Amenity • The portals are sited south of Morley Street and impact on the existing vegetation within existing private properties. Open Space • The portals do not impact on existing open space but creates open space due to the infrastructure footprint Accessibility, Permeability and Connectivity • The portals do not impact on existing low accessibility, permeability or connectivity. Scale • The scale of the portals will be modest and in keeping with the topography of the existing suburban neighbourhood. Landmarks, Legibility and Destinations • The portals do not obscure or impact on existing landmarks in the adjacent Toowong Cemetery Visual Environment • Refer to chapter 5 for Visual Assessment

Tunnel Infrastructure	Impacts of EIS Reference Design on the visual & physical environment
Surface Road Changes Surface road is defined in this report by the reinstatement of existing traffic conditions pavements and line markings in either new or existing locations. It does not include ramps or transition structures.	Predominant Land Uses and Variety • Some properties along Milton Road and Croydon Street are impacted by the EIS Reference Design through property resumptions, opening up the surrounding residential structure to new open space. Built Form, Typologies and Grain • The infrastructure provides visual access to the 'Timber and Tin' landscape character of the residential neighbourhood north of Milton Road, by the removal of businesses south of Valentine Street. • The commercial edge at the corner of Milton Road and Frederick Street will be impacted through property resumptions. This will change the nature of the built form along this edge. Landscape Amenity & Character (Refer Figure 3-6) • The existing mature vegetation at the northern end of Quinn Park next to Milton Road will be cleared for surface works and ramp structures. • The existing memorial to commemorate the Centenary of John Oxley's landing by local politicians on the corner of Sylvan Road and Milton Road is compromised by the project works. This memorial also incorporates a VPO listed tree (Flindersia australis) but the tree is in poor condition. • Vegetation and street trees will be impacted along:- i. Part of Croydon Street from Ventnor Street to Milton Road; ii. Part of Milton Road between Norwood Street and Eldridge Street; iii. The Southern side of Valentine Street; and, iv. Part of Sylvan Street from Croydon Street to St. Osyths Street. Open Space • Half of Quinn Park is resumed and impacted by the project surface works and also ramp structures. Accessibility, Permeability and Connectivity • Existing low Accessibility, Permeability and Connectivity will be impacted during construction and will be impacted upon operation of the project. • The introduction of a cul-de-sac impacts on connectivity for motorists at Valentine Street, but not for pedestrian/cyclists.

Tunnel Infrastructure	Impacts of EIS Reference Design on the visual & physical environment
	• The regrading of Valentine Street will increase the amenity of this street, but not for pedestrians or cyclists. • The introduction of a cul-de-sac impacts on connectivity for motorists at Quinn Street, but not for pedestrian/cyclists. Scale • The widths of Milton Road and Croydon Street (from Milton Rd. to Eldridge Street) will be doubled therefore increasing the scale of the road.
Engineering Infrastructure Below are the components of engineered infrastructure used to construct tunnels. The highlighted components below correspond to those used in this particular connection. • Transition Structures; • Elevated Structures; • Cut & Cover; • Ramp/Reinforced Earth Structures; • Noise walls.	Predominant Land Uses and Variety • The area along the northern edge Milton Road (between Croydon and Frederick Street) will change from commercial uses to road infrastructure and 'left over' spaces. Built Form, Typologies, and Grain • The removal of businesses south of Valentine Street provides visual access to the 'Timber and Tin' built form character of the residential neighbourhood north of Milton Road. • The businesses and residents on the southern side of Milton Road between Miskin St and Croydon St, will be impacted by the overshadowing of the elevated ramps and noise walls. Where possible the noise walls can be made transparent to mitigate micro climate issues. • The 6m noise walls on the north western side of Croydon Street will impact through overshadowing for the residents along this north western edge. They will potentially block views and light if the noise walls are not transparent. Refer Appendix 8.1 for locations. (Refer Noise and Vibration Impact Assessment for noise wall detail) Landscape Amenity & Character • The already low landscape amenity is exacerbated by elevated structures and ramps. The infrastructure is likely to further reduce this. • The motorist experience in and out of the tunnel infrastructure opens up the 'Timber and Tin' landscape character of the residential neighbourhood to the north and south. • The landscape character of the gateway experience (the low amenity roundabout at Miskin Street) to the Western Freeway remains unaffected by the engineered infrastructure.

Tunnel Infrastructure	Impacts of EIS Reference Design on the visual & physical environment
	• The landscape character experience inbound to the CBD at the low amenity roundabout at Frederick Street is impacted by the two elevated structures over Milton Road. The open space created by the project has the potential to mitigate this. • The landscape amenity for residents of Valentine Street and those overlooking the Frederick Street roundabout will be impacted by the EIS Reference Design due to the elevated structures and reinforced ramps at Milton Road. • The landscape amenity of Quinn Park is impacted due to the ramp and elevated structures and noise walls which run the length of its northern boundary. • A 6m Noise wall will impact on the views south for the residents of Valentine Street if the panels are not transparent. • A 6m Noise wall to the north western side of Croydon Street from Milton Road to Sylvan Road will impact on the residential character along this street. Refer Appendix 8.1 for locations. (Refer Noise and Vibration Impact Assessment for noise wall detail) • A 5 to 6m noise wall on the south eastern side of Milton Road from Croydon Street to Sylvan Road will impact on the residential character along this side of the street. Refer Appendix 8.1 for locations. (Refer Noise and Vibration Impact Assessment for noise wall detail) Open Space • Open space is created by the project south of Valentine Street to Milton Road. • Half of Quinn Park is impacted by the EIS Reference Designs surface works and also ramp structures and noise barriers. • Open space is created by the EIS Reference Design along Croydon Street between Milton Road and Sylvan Street due to property impacts. • The open space of Quinn Park is impacted due to the ramp and elevated structures which run the length of its northern boundary. Accessibility, Permeability and Connectivity • The already low accessibility, permeability and connectivity will be further impacted by the EIS Reference Design from Milton Road between Frederick Street and Croydon Street. • The existing poor connections will be impacted for pedestrian/cyclists from

Tunnel Infrastructure	Impacts of EIS Reference Design on the visual & physical environment
	Frederick Street to Sylvan Road and vice versa. Visual Environment • Refer to section 5 for Visual Assessment
Construction Related Works • Worksites Refer to Figure 3-5 for worksite locations. • Change surface conditions The impact from these components of tunnel construction is temporary.	Predominant Land Uses and Variety • The work site south of Valentine Street introduces new but temporary structures which will change the function and limit the variety of opportunities along northern edge of Milton Road. From what were commercial businesses to a single purpose work site with access onto the busy Milton Road. Built Form, Typologies and Grain • The work site south of Valentine Street introduces new but temporary structures which will be highly visible along northern edge of Milton Road Landscape Amenity & Character • The already low landscape amenity along this northern edge of Milton Road is exacerbated by the work site south of Valentine Street. Open Space • A worksite is created by the EIS Reference Design south of Valentine Street. Accessibility, Permeability and Connectivity • The already low accessibility, permeability and connectivity will be further impacted by the phasing of construction works. Landmarks, Legibility and Destinations • Not Applicable Visual Environment • Refer to section 4.1.2

Table 3-2 Potential Impacts on the Toowong Connection

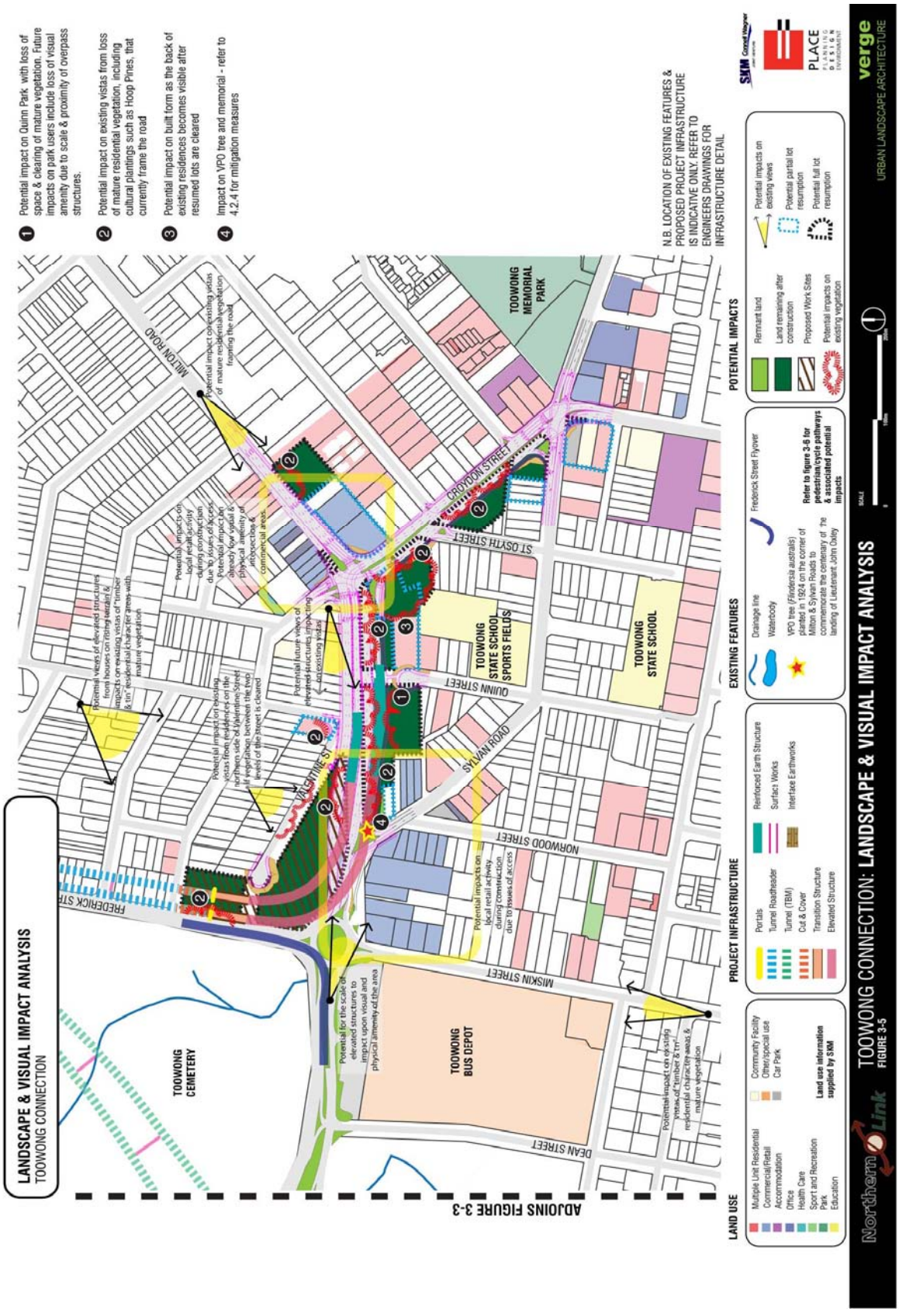


Figure 3-5 Landscape and Visual Impact Analysis - Toowong Connection

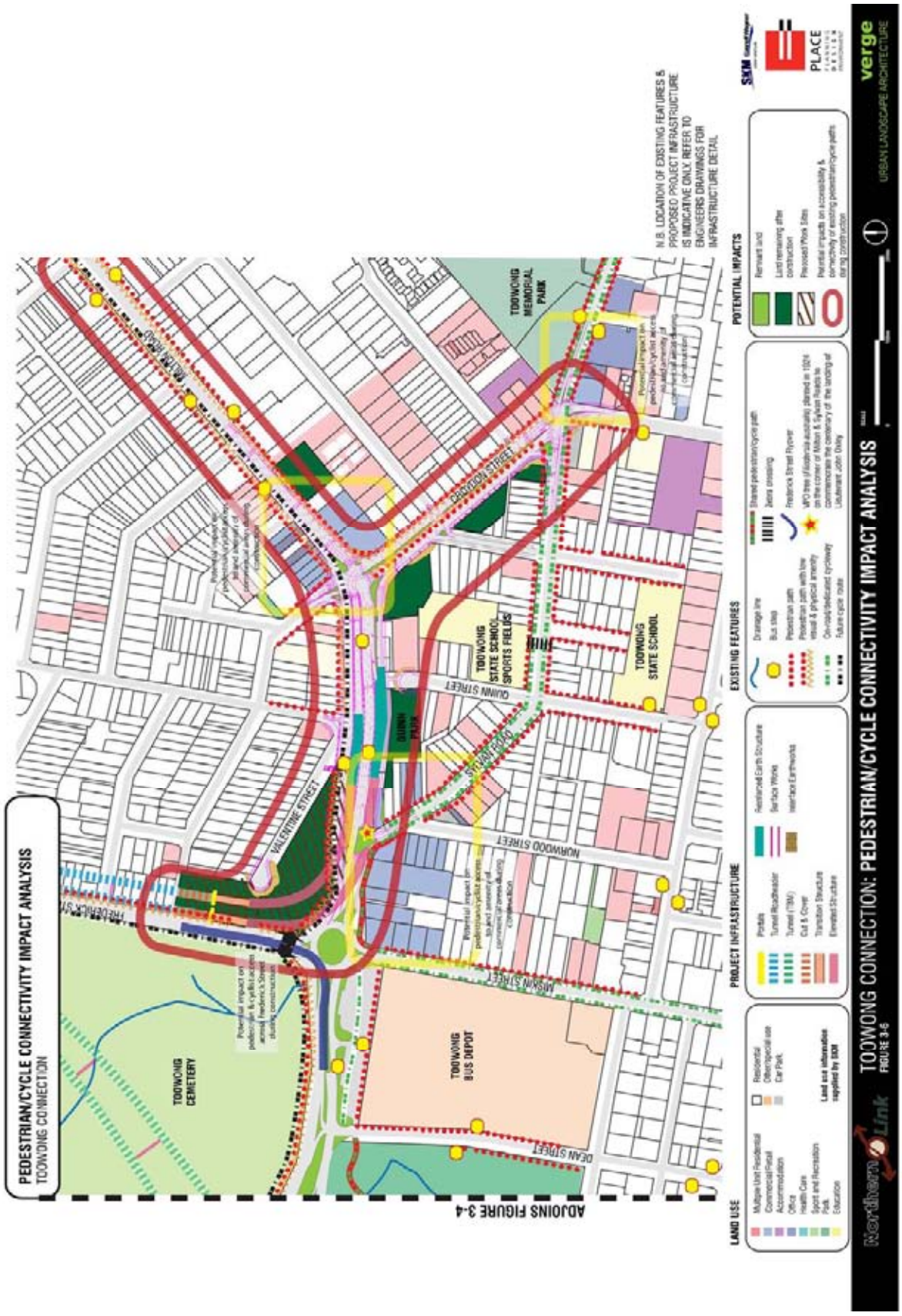


Figure 3-6 Pedestrian/Cycle Analysis - Toowong Connection

3.3.3 Potential Impacts on Northern Connection

The main impacts on the Northern Connection are within the existing landscaped open space adjacent to the ICB, and the widening of the ICB to accommodate a portal entrance to the tunnel. Refer to Figure 3-7 and 3-8 for the spatial analysis of the impacts.

The following table provides a greater level of detail by listing the individual built components of the EIS Reference Design and discusses resulting impact on the existing environment.

Tunnel Infrastructure	Impacts of EIS Reference Design on the visual & physical environment
Portals	Predominant Land Uses and Variety • There is little impact on existing land uses which result in little change to the variety of activities and opportunities currently exist in this area. • The strip of land running along the north of ICB will be encroached due to the portal in the middle of the ICB upon but function of this corridor will remain. Built Form, Typologies and Grain • Not applicable to this area Landscape Amenity & Character • The medium to high landscape amenity for motorists on the northern side of the ICB will be impacted by the location of the eastern bound portal, at Ithaca Street/Victoria Park Road. • The landscape amenity to the south west of the Brisbane Grammar School playing grounds is impacted due to the removal of a defined landscape edge at Ithaca Street. This will be reinstated. • The western bound portal sits within the existing ICB corridor and will have a little impact on the existing landscape amenity. Open Space • The portal has little impact on existing useable open space in the Ithaca Street location. Accessibility, Permeability and Connectivity • The relatively good pedestrian/cycle connectivity to the east and west of the ICB is positively impacted but some re routing of existing paths will be needed. • There is still a barrier to Accessibility, Permeability and Connectivity in the north/south direction for pedestrian/cyclists.

Tunnel Infrastructure	Impacts of EIS Reference Design on the visual & physical environment
	Scale • The eastbound portal would emerge adjacent to the bottom end of Victoria Park Road but the road surface at the portal would be considerably lower than the existing ICB road surface level. The portal would therefore be partially concealed from view and its scale would be consistent and compatible with the surrounding area and would have little impact. • The western bound portal sits within the existing ICB corridor and will have a slight impact on the existing scale of the road. Landmarks, Legibility and Destinations • The portals do not interfere with any landmarks. Visual Environment • Refer to section 5 for Visual Assessment
Ventilation Outlet	Predominant Land Uses and Variety • The VO is located within the Brisbane City Council owned Victoria Park Golf Course. (Refer Figure 3-7 for location). The VO has a small impact on the existing use of the golf course but does not change the variety of use or opportunities that already exist here. Built Form, Typologies and Grain \ • Not Applicable to this location Landscape Amenity & Character • The VO will make an impact on landscape amenity because it will be highly visible to motorists along the ICB especially those travelling north west. The VO will be contrasted against the existing golf course environment and will therefore have a high visual impact. • The VO will make an impact on landscape amenity because it will be highly visible users of the golf course who will have intermittent and unobstructed views to the VO depending user location, topography, open clearings and vegetation. • The VO is likely to impact on the existing landscape character of its immediate environment. The residents, students and workers located around the inner city ridges around Spring Hill, Kelvin Grove, The Royal Brisbane Hospital will have intermittent or unobstructed views to the VO depending obstructing topography, building and vegetation. • The type of aesthetic treatment of the VO will have an impact on the contribution to this immediate environment.

Tunnel Infrastructure	Impacts of EIS Reference Design on the visual & physical environment
	• The VO includes a pipeline from the tunnel to the VO; the pipeline to the VO will run parallel and offset from the existing Inner Northern Busway tunnel. There will be some impact on existing vegetation due to trenching for the pipeline from the Ventilation Station. Open Space • Because of the relatively small footprint of the VO's the impact on open space is negligible. Accessibility, Permeability and Connectivity • The VO's has a minor impact on accessibility of golf course users (this will be mitigated to ensure not negative impacts occur), but no impact on, Permeability and Connectivity Scale • The VO will impact on the scale of the immediate surrounding land uses due to its size, material choice and elevation which will provide a contrast with the existing golf course surrounds. Landmarks, Legibility and Destinations • Depending on the design of the VO it has the potential to be either a nondescript piece of infrastructure which is camouflaged to blend into its environment or become an instantly recognised landmark which can be used to assist legibility. Refer to Urban Mitigation Chapter of the EIS. Visual Environment • Refer to section 5 for Visual Assessment
Ventilation Stations (VS) 1.	Predominant Land Uses and Variety • The VS is located on the edge of the Victoria Park Golf Course in between the ICB and the Inner Northern Busway tunnel (Refer Figure 3-7 for location), it will be partially buried into the existing landscaped bank. The VS has a small impact on the existing use of the golf course but does not change the variety of use or opportunities that already exist here. Built Form, Typologies and Grain • Not Applicable to this location Landscape Amenity & Character • The VS will be partially buried into the existing bank between the ICB, the Golf Course and the Inner Northern Busway Tunnel, therefore it will have a medium to minor impact on the landscape character of this area. • Those land uses directly opposite the VS to the south across the railway will

Tunnel Infrastructure	Impacts of EIS Reference Design on the visual & physical environment
	notice a change in the landscape character of the existing vegetated bank. Open Space • The VS will be partially buried into the existing bank between the ICB, the Golf Course and the Inner Northern Busway Tunnel, therefore it will have a minor impact on the usable open space of this area. It will however encroach on existing open space. Accessibility, Permeability and Connectivity • The VS will not impact on the existing path and stairway between the ICB and the golf course. Scale • Because the VS is partially buried into the existing bank between the ICB and the Golf Course the resulting scale of the building will have a negligible impact on the surrounding environment Landmarks, Legibility and Destinations • Not Applicable to this location Visual Environment • The ventilation station will be partially buried. There will be minor visual impact of this structure for motorists travelling north west along the ICB.
Surface Road Changes	Predominant Land Uses and Variety • There is little impact on existing land uses which result in little change to the variety of activities and opportunities currently exist in this area. • The strip of land running along the north of ICB will be encroached due to the portal in the middle of the ICB but function of this corridor will remain. Built Form, Typologies and Grain • Not applicable to this area Landscape Amenity & Character • The surface road impacts the medium to high landscape amenity on the northern edge of the ICB due to the widening of lanes. Open Space • The surface road changes impacts on the open space on the northern edge of the ICB from the embankment planting at west Normanby Terrace to the land bridge

Tunnel Infrastructure	Impacts of EIS Reference Design on the visual & physical environment
	Accessibility, Permeability and Connectivity • Due to the widening of lanes on the northern side of the ICB the existing pedestrian/cycle paths in the east/west direction will also be moved slightly north. Scale • The lane widening increase the already wide carriage ways of the ICB, increasing the scale of the road way. Landmarks, Legibility and Destinations • Not applicable Visual Environment • Refer to section 5 for Visual Assessment
Engineering Infrastructure Below are the components of engineered infrastructure used to construct tunnels. The highlighted components below correspond to those used in this particular connection. ▪ Transition Structures; ▪ Elevated Structures; ▪ Cut & Cover; ▪ Reinforced Earth/Ramp Structures; ▪ Noise walls.	Predominant Land Uses and Variety • The use of noise walls will impact on the residents backing onto the ICB as is this is the current situation. Built Form, Typologies and Grain • Not Applicable in this location Landscape Amenity & Character • During construction the re-routing of the ICB cuts into the medium to high landscape amenity of this area. • Noise walls along the edge of the ICB will impact on the potential for high landscape amenity. Refer Appendix 8.1 for locations. (Refer Noise and Vibration Impact Assessment for noise wall detail) Open Space • The transition structures and cut and cover have little impact on existing useable open space at the Ithaca Street location. Accessibility, Permeability and Connectivity • The poor north/south pedestrian movements from Kelvin Grove Urban Village into the city and vice versa remain unchanged. Scale

Tunnel Infrastructure	Impacts of EIS Reference Design on the visual & physical environment
	• The length and depth of the transition structure for the western bound carriage way in the centre of the ICB changes the vertical scale in this location. • The transition structure in the centre of the ICB causes the widening of the ICB and thereby increasing its perceived width. Landmarks, Legibility and Destinations • The transition structures do not interfere with any landmarks in the area. Visual Environment • Refer to section 5 for Visual Assessment
Construction Related Works • Change surface conditions The impact from these components of tunnel construction is temporary.	Predominant Land Uses and Variety • The rerouting of traffic through existing landscape bank at the northern edge of the ICB from Victoria Park Road to Kelvin Grove Road. will result in a temporary change of land use. Built Form, Typologies and Grain • Not Applicable in this location Landscape Amenity & Character • The medium to high landscape amenity along this northern edge of the ICB from Victoria Park Road to Kelvin Grove Road will be removed during construction to allow for traffic re routing. Open Space • The open space along this northern edge of the ICB from Victoria Park Road to Kelvin Grove Road will be impacted during construction to allow for traffic re routing. Accessibility, Permeability and Connectivity • The accessibility, permeability and connectivity will be temporarily impacted by the phasing of construction works along the Northern edge of the ICB from Victoria Park Road to Kelvin Grove Road. Landmarks, Legibility and Destinations • Not Applicable Visual Environment • Refer to section 4.1.3 for Visual Assessment •

Table 3-3 Potential Impacts on the Northern Connection

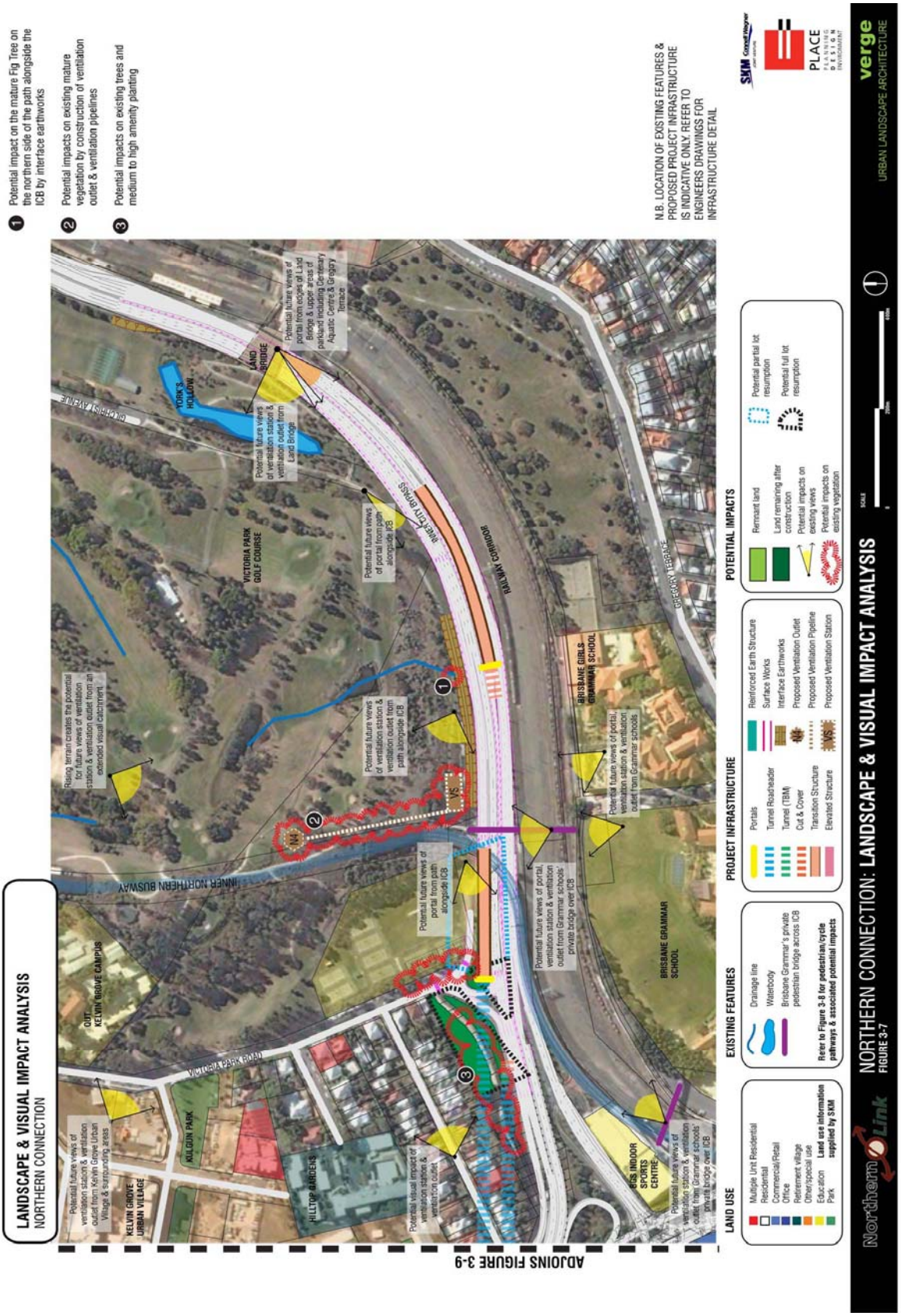


Figure 3-7 Landscape and Visual Impact Analysis - Northern Connection

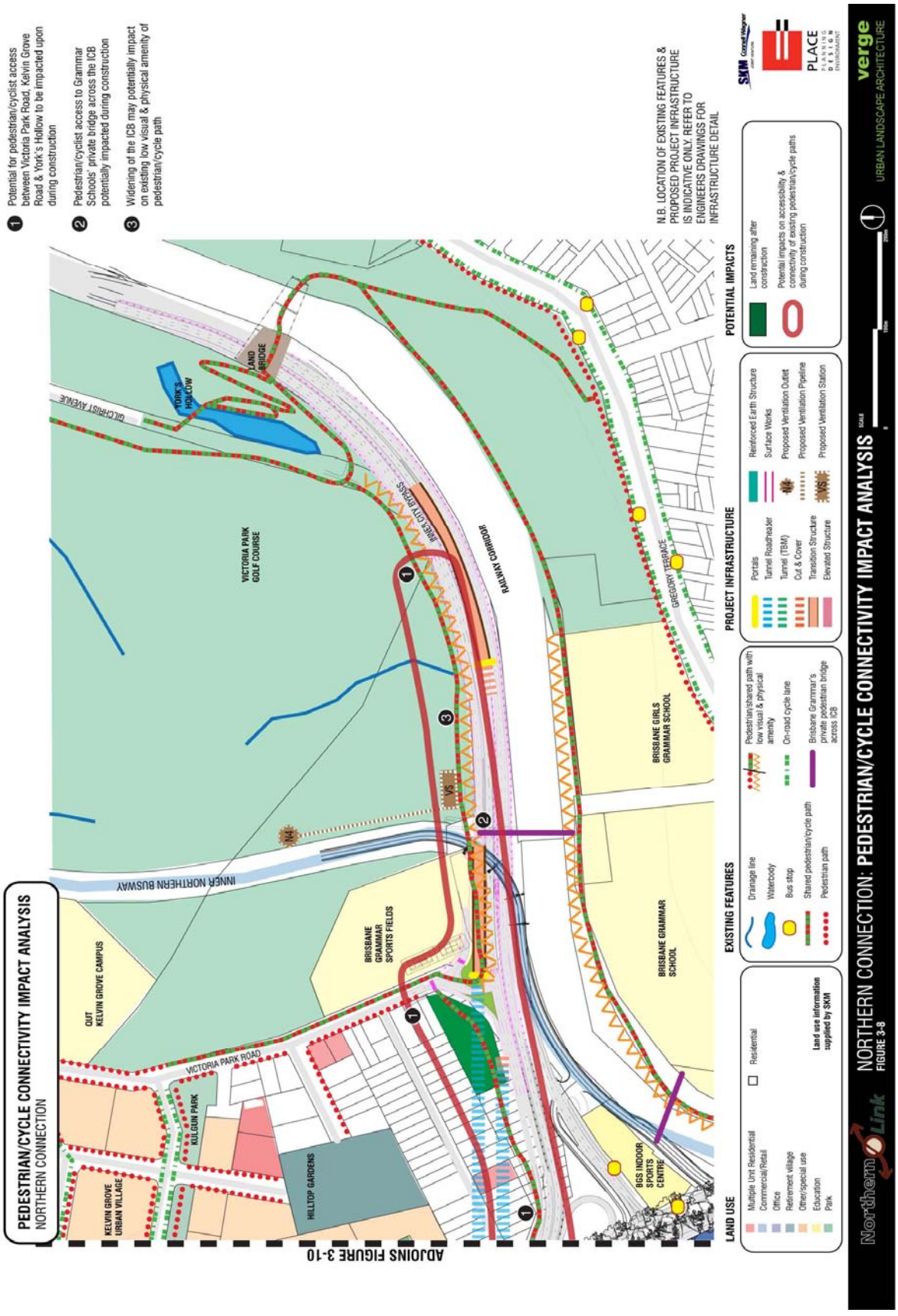


Figure 3-8 Pedestrian/Cycle Impact Analysis - Northern Connection

3.3.4 Potential Impacts on Kelvin Grove Connection

The main impacts on the Kelvin Grove connection is the widening of Kelvin Grove Road and the property resumptions on the western side of Kelvin Grove Road to accommodate the tunnel infrastructure. Two of the tunnel portals are situated in Kelvin Grove Road whilst the other one is located on the edge of Kelvin Grove Road directly opposite Musk Avenue. The main challenges at this location are the pedestrian and cycle connections along the western side of Kelvin Grove Road. Refer to Figure 3-9 and 3-10 for the spatial analysis of the impacts.

The following table provides a greater level of detail by listing the individual built components of the EIS Reference Design and discusses resulting impact on the existing environment.

Tunnel Infrastructure	Impacts of EIS Reference Design on the visual & physical environment
Portals There are three portals within this key location. 1. East bound portal opposite Musk Avenue; 2. A west bound portal from the city, below Lower Clifton Terrace and: 3. A west bound portal in the middle of Kelvin Grove Road adjacent to QUT	Predominant Land Uses and Variety • The current residential land uses will be impacted by the portals opposite Musk Avenue, and as a result the residential nature of this edge will change. Built Form, Typologies and Grain • The current residential land uses will be impacted due to resumptions by the portals opposite Musk Avenue, and as a result the residential nature of this edge will change. Landscape Amenity & Character • The portal opposite Musk Avenue impacts the existing 'urban character' vegetation and the 'green edge' this vegetation provides. Open Space • The portals themselves do not impact on existing open space. Accessibility, Permeability and Connectivity • The portals block vehicular connections from Lower Clifton Terrace and Westbury Street to Kelvin Grove Road. This impacts on the accessibility, permeability and connectivity along not only to these streets but in a north south direction along this portion of Kelvin Grove Road. • The accessibility of this area is already difficult due to the hilly terrain, however the portals themselves do not add to this difficulty. Scale • There is a lack of human scale in the existing areas where the portals are located and the portals themselves will do little to alleviate this condition.

Tunnel Infrastructure	Impacts of EIS Reference Design on the visual & physical environment
	This is in part due to the topography of the location. • The eastern bound portal opposite Musk Avenue nestles into the hillside to the west of Kelvin Grove Road and changes the character of this vegetated/residential edge. Landmarks, Legibility and Destinations • The legibility of this area is heavily compromised by the complicated nature of the pedestrian network of bridges, ramps, underpasses and stairs. The portals themselves add to this confusion. • The QUT Creative Industries Precinct fronting Kelvin Grove Road on the eastern side and the 'Artspace' billboard will benefit from a greater audience due to direct facing portal opposite Musk Avenue. Visual Environment • Refer to section 5 for Visual Assessment
Surface Road Changes	Predominant Land Uses and Variety • The current residential land uses will be impacted by the widening of Kelvin Grove Road, and as a result the built form of this edge will change. Built Form, Typologies and Grain • The infrastructure provides visual access to the 'Timber and Tin' hilly landscape character of the residential neighbourhood west of Kelvin Grove Road. Landscape Amenity • Where the road is widened to accommodate traffic, the surface work will impact on the existing urban character, vegetation and the housing related 'transitional character' associated with residential areas on an undulating terrain. • In particular the widening of the Hale Street underpass cuts into two groups of existing trees. One group is associated with the resumed houses below Lower Clifton Terrace; the other at the triangular piece of remnant land in between Hale Street and Kelvin Grove Road. Open Space

Tunnel Infrastructure	Impacts of EIS Reference Design on the visual & physical environment
	• There will be some impacts of the existing remnant land between Kelvin Grove Road and the Hale Street underpass. Accessibility, Permeability and Connectivity • The accessibility of this area is already difficult due to the hilly terrain, however the surface works required will add to this difficulty. • Due to the widening and traffic movements along Kelvin Grove Road, connectivity along the western edge will be impacted. Scale • The widening of Kelvin Grove Road from the ICB to Blamey Street will increase the scale of the road infrastructure and decrease the human scale of the already compromised streetscape of this area. Landmarks, Legibility and Destinations • Surface road changes near McCaskie Park would necessitate the removal of two significant existing fig trees located at the southern end of the park. • Surface road changes at the southern end of Marshall Park removes two heritage listed fig trees. Visual Environment • Refer to section 5 for Visual Assessment
Engineering Infrastructure Below are the components of engineered infrastructure used to construct tunnels. The highlighted components below correspond to those used in this particular connection. ▪ Transition Structures; ▪ Elevated Structures; ▪ Cut & Cover;	Predominant Land Uses and Variety Built Form, Typologies and Grain • Due to the nature of the topography along the western edge of Kelvin Grove Road from the ICB overpass to Victoria Street, the current residential land uses will be impacted by the portals opposite Musk Avenue, and as a result the residential nature of this edge will change. • The 5m noise walls on the western side of Kelvin Grove Road from Upper Clifton Terrace through to Victoria Street will impact through overshadowing for the residents along this western edge. They will potentially block views and light if the noise walls are not transparent. Landscape Amenity • The transition structures and associated tunnel works impact on the landscape amenity along the western edge of Kelvin Grove Road, by

Tunnel Infrastructure	Impacts of EIS Reference Design on the visual & physical environment
▪ Reinforced Earth/Ramp Structures; ▪ Noise walls.	resuming property below Lower Clifton Terrace and the vegetation associated with this. • The 5m noise walls to the south of Lower Clifton Terraces will impact on the potential for landscape amenity in this area, unless they are transparent. Refer Appendix 8.1 for locations. (Refer Noise and Vibration Impact Assessment for noise wall detail) • The 2m noise walls to the eastern edge of Marshall Park will have a highly negative impact on the existing landscape amenity enjoyed by both motorist and park users. Refer Appendix 8.1 for locations. (Refer Noise and Vibration Impact Assessment for noise wall detail) Open Space • The transition structures will impact on the vegetated remnant island in between Kelvin Grove Road and the Hale Street underpass. Accessibility, Permeability and Connectivity • The transition structures along Kelvin Grove Road near the Hale Street underpass and the ICB overpass impact on the existing underpass under Hale Street. • In general the transition structures and associated tunnel works impact on the North South accessibility and connectivity along the western edge of Kelvin Grove Road. • The 5m noise walls to the south of Lower Clifton Terraces will impact on the perceived safety of this area because of the lack of surveillance. Refer Appendix 8.1 for locations. (Refer Noise and Vibration Impact Assessment for noise wall detail) Scale • The transition structures will increase the scale of the road infrastructure and decrease the human scale in this area. Landmarks, Legibility and Destinations • The QUT Creative Industries Precinct fronting Kelvin Grove Road on the eastern side, and the 'Artspace' billboard will benefit from a greater audience due to city bound transition structure opposite Musk Avenue. Visual Environment • Refer to section 5 for Visual Assessment

Tunnel Infrastructure	Impacts of EIS Reference Design on the visual & physical environment
Construction Related Works • Worksites Refer to Figure 3-9 for worksite locations. • Change surface conditions The impact from these components of tunnel construction is temporary.	Predominant Land Uses and Variety • The work sites will impact on the existing Land Uses due to the residential property resumptions, and a change of use as work sites. Built Form, Typologies and Grain • The work sites will temporarily impact on the surrounding area by temporarily changing the built for through the provision of work sheds and offices. Landscape Amenity • The worksites and changed road conditions will impact on the existing landscape amenity environment along the western and eastern edge of Kelvin Grove Road. Open Space • The worksites will open up new areas of open space once construction is completed. Accessibility, Permeability and Connectivity • Accessibility and Connectivity is likely to be highly constrained along the western edge of Kelvin Grove Road. Landmarks, Legibility and Destinations • Surface road changes near McCaskie Park would necessitate the removal of two existing fig trees located at the southern end of the park. • Surface road changes at the southern end of Marshall Park removes two significant fig trees. Visual Environment • Refer to section 4.1.4

Table 3-4 Potential Impacts on the Kelvin Grove Connection

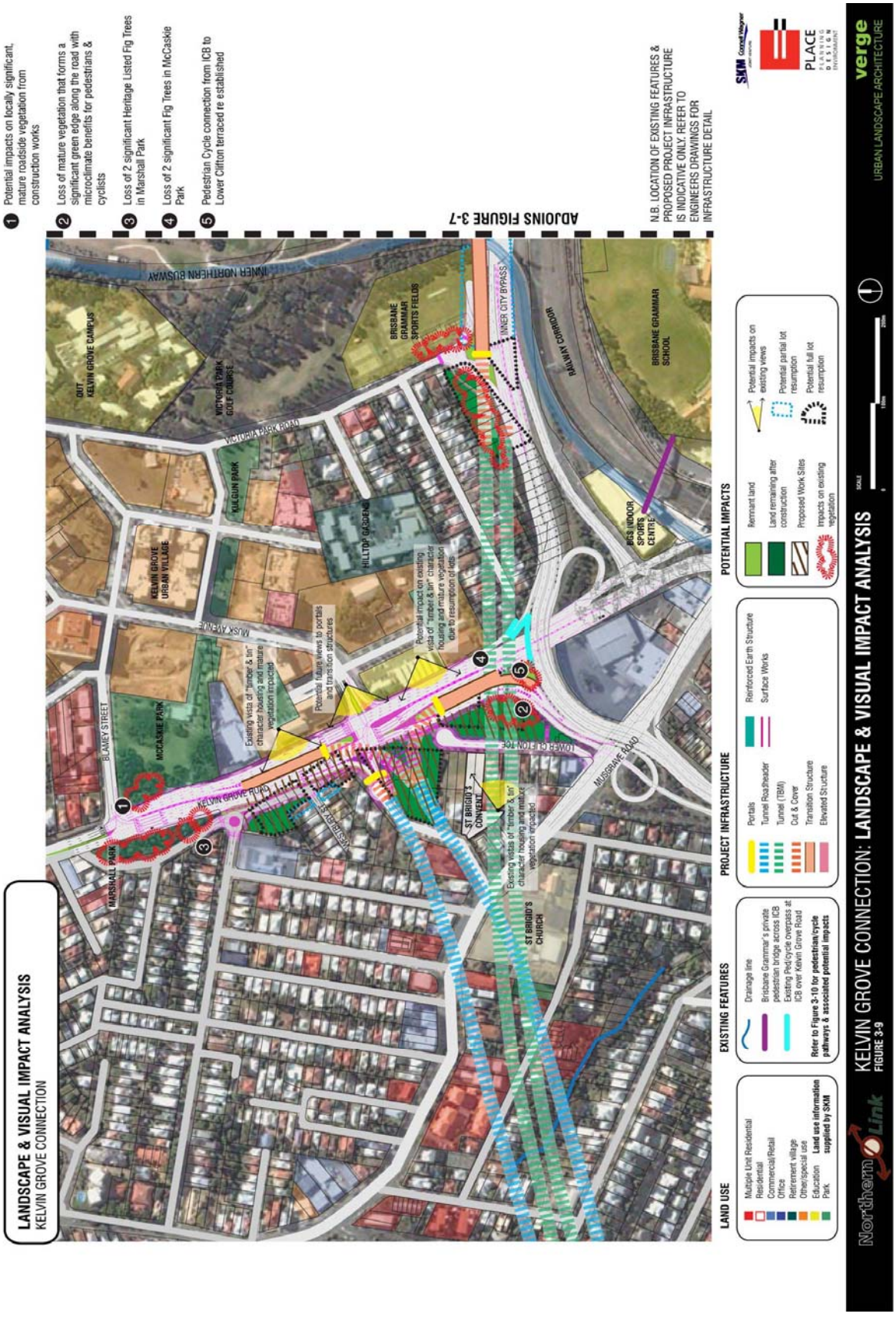


Figure 3-9 Landscape and Visual Analysis - Kelvin Grove Connection

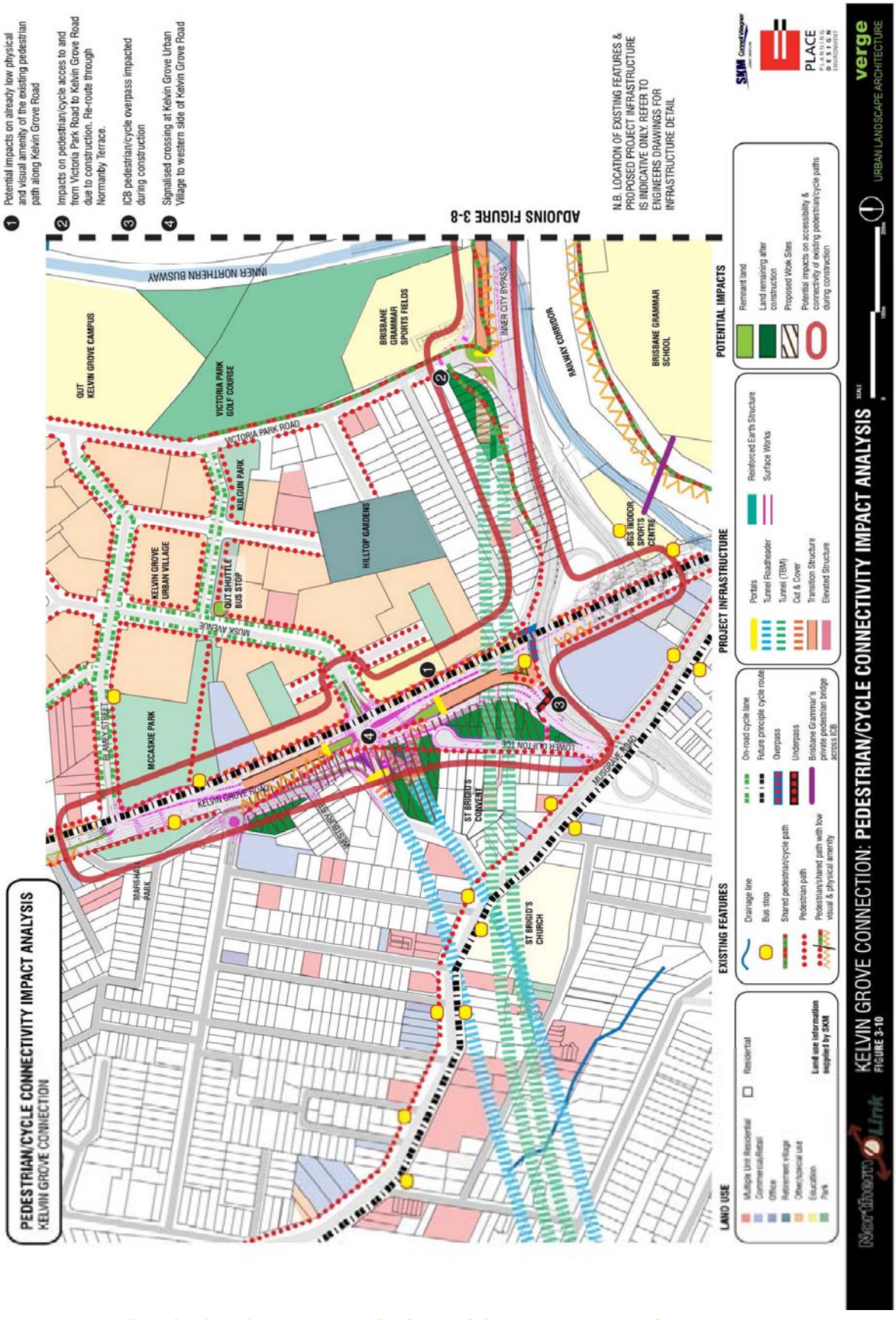


Figure 3-10 Pedestrian/Cycle Impact Analysis - Kelvin Grove Connection

4. Mitigation Measures

This section draws together all of the investigations into the potential impacts of the EIS Reference Design on the existing urban landscape and visual environment and provides mitigation measures to offset potential negative impacts. The mitigations are guided by:-

- The strategic framework for the City of Brisbane; and,
- The urban landscape and visual, vision, goals and objectives;
- The urban landscape and visual guidelines developed in response to both.

The Mitigation Measures deal with the construction phases of the NL and the eventual operational phase of the project.

4.1 Mitigation Measures During Construction

The construction related works will be temporary but they will impact on the existing environment in terms of clearing existing vegetation for worksites, and re-routing existing pedestrian/cycle connections. The following sub sections describes the phasing of construction for each key location with measures to ensure the management of existing urban landscape and visual issues.

4.1.1 Mitigation Measures during construction for Western Connection

This connection contains one major worksite at the interface of the Botanic Gardens and the Western Freeway. The worksite will remove most of the vegetation existing on this site, therefore protection and management of existing trees surrounding the worksite and the project works interface with the existing environment will be very important. Final mitigation measures will only be possible at the end of the construction and this is dealt with in section 4.2.1.

This connection contains a conveyor corridor for spoil removal which will cut through some existing vegetation along the Western Freeway and to the north to deposit at the Mount Coot-tha Quarry. A detailed Vegetation Management will be needed to assist in route selection and a re-vegetation and rehabilitation plan will need to be put in place after the conveyor ceases to operate.

The other major impact on this area will be a change in traffic environment during the construction of the cut and cover tunnels and the transition structure. The re-aligned surface works will need to also consider pedestrians and cycles at:

- the roundabout to Mt. Coot-tha ;
- the Western Freeway commuter/recreation route, and,
- the existing pedestrian/cycle overpass over the Western Freeway (Refer Figure 4.1 & 4.2).

The following are the minimum guidelines tailored to the Western Connection during construction in the provision and implementation of:-

- A Visual Mitigation Plan during construction for the management of hoardings where appropriate.
- A Vegetation Management Plan by a qualified arborist (Level 5), prior to construction including bonding for significant tree protection during construction and for a period of 2 years after construction, include tree protection details.
- A Vegetation Management Plan by a qualified arborist (Level 5), for the conveyor route prior to route selection.
- A Pedestrian and Cycle Plan designating how routes are to be managed where road realignment changes occur due to construction phasing.

The final mitigation measures for these sites will only be possible at the end of the construction and this is dealt with in section 4.2.2.

4.1.2 Mitigation Measures during construction for Toowong Connection

This connection contains one major worksite between Valentine Street and Milton Road. The worksite will require the removal of existing buildings and a re-grading of Valentine Street. Because the site is relatively contained it does not directly interfere with existing pedestrian/cycle routes, however where road realignment changes occur due to construction phasing the re-routing of pedestrian/cycle movements will need to be managed. The residents of Valentine Street will be impacted visually and hoardings and/or vegetation will provide some visual mitigation. (Refer Noise and Vibration Impact Assessment for noise and Air Quality Assessment mitigations in this area).

The following are the minimum guidelines tailored to the Toowong Connection during construction in the provision and implementation of:-

- A Visual Mitigation Plan during construction for the management of hoardings where appropriate.
- A Vegetation Management Plan by a qualified arborist (Level 5), prior to construction including bonding for significant tree protection during construction and for a period of 2 years after construction, include tree protection details.
- Revegetation Plan for the lower half of Valentine Street, to provide a visual buffer for the residents of Valentine Street from the construction site to the south.
- A Pedestrian and Cycle Plan designating how routes are to be managed where road realignment changes occur due to construction phasing.

The final mitigation measures for these sites will only be possible at the end of the construction and this is dealt with in section 4.2.2.

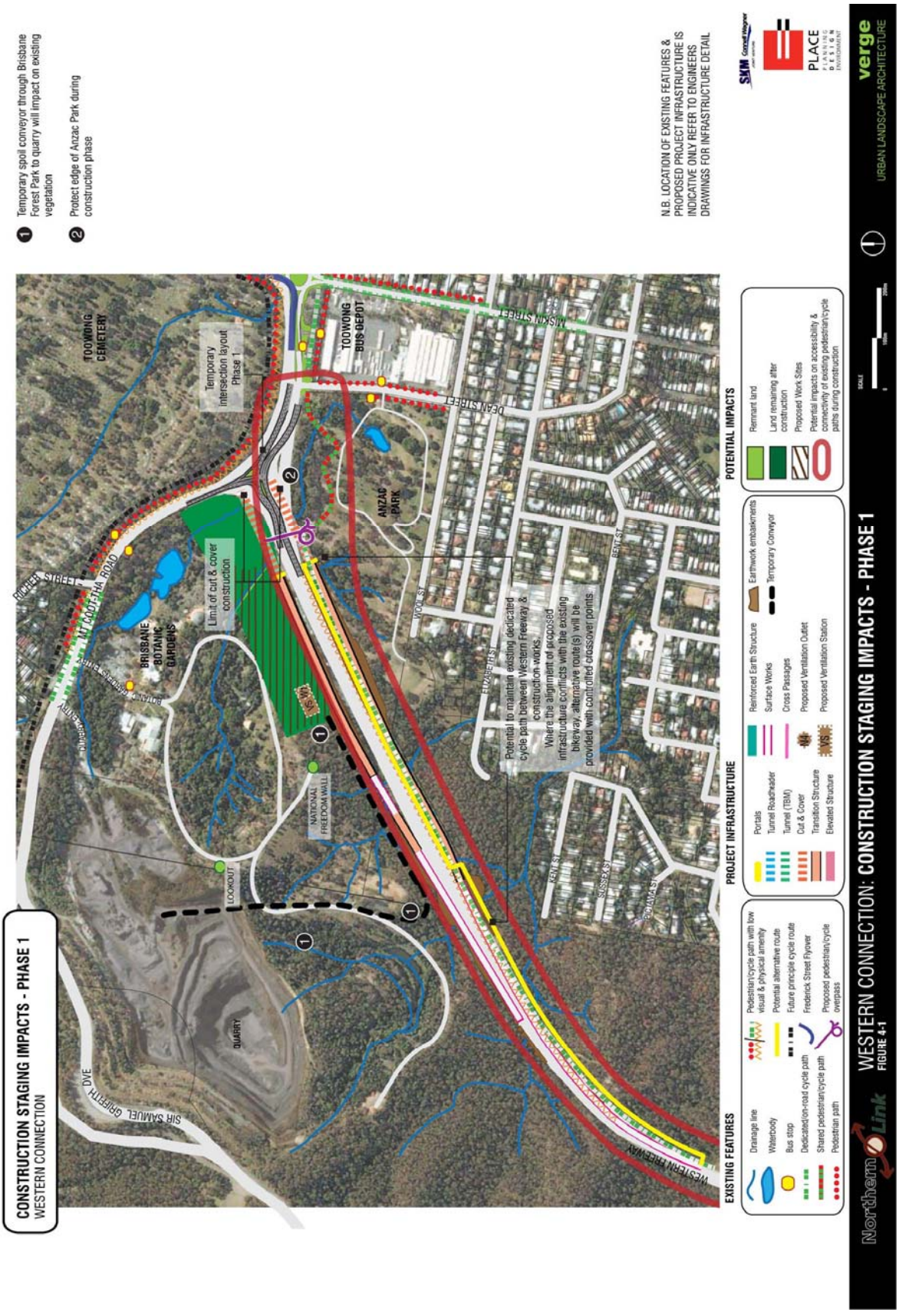


Figure 4-1 Construction Phase 1 Pedestrian/Cycle Impact Analysis – Western Connection

Figure 4-2 Construction Phase 2 Pedestrian/Cycle Impact Analysis – Western Connection

4.1.3 Mitigation Measures during construction for Northern Connection

There is no nominated work site at this connection. However there are significant road realignment changes to occur due to construction phasing the re-routing of pedestrian/cycle movements will need to be managed. (Refer Figure 4.3). The residents of Normanby Terrace backing onto the ICB will impacted visually during construction and a combined hoarding / noise wall will provide some visual and acoustic mitigation. (Refer Noise Impact Assessment and Air Quality Assessment for noise and dust mitigations in this area).

The following are the minimum guidelines tailored to the Northern Connection during construction in the provision and implementation of:-

- A Visual Mitigation Plan during construction for the management of hoardings where appropriate.
- A Vegetation Management Plan by a qualified arborist (Level 5), prior to construction including bonding for significant tree protection during construction and for a period of 2 years after construction, include tree protection details.
- A Pedestrian and Cycle Plan to deal with the highly constrained existing pedestrian/cycle routes to be managed where road realignment changes occur due to construction phasing.

The final mitigation measures for these sites will only be possible at the end of the construction and this is dealt with in section 4.2.3.

4.1.4 Mitigation Measures during construction for Kelvin Grove Connection

The following are mitigation measures for construction they deal with the temporary nature of the works and highlight the need for management of existing vegetation, and the work site/existing environment interface. This connection contains a series of linear worksites along the western side of Kelvin Grove Road, which will require property resumptions and loss of associated vegetation.

The following are the minimum guidelines tailored to the Kelvin Grove Connection during construction in the provision and implementation of:-

- A Visual Mitigation Plan during construction for the management of hoardings where appropriate.
- A Vegetation Management Plan by a qualified arborist (Level 5), prior to construction including a bond (calculated by BCC using a current and accepted tree valuation method) for significant tree protection (in particular the Marshall Park figs and the Mc Caskie Park figs) during construction and for a period of 2 years after construction, include tree protection details. Removal of significant vegetation commits tenderer to project works to mitigate against losses as determined by the client to the value of the bond.
- A Pedestrian and Cycle Plan to deal with the highly constrained existing pedestrian/cycle routes to be managed where road realignment changes occur due to construction phasing.

The final mitigation measures for these sites will only be possible at the end of the construction and this is dealt with in section 4.2.4.

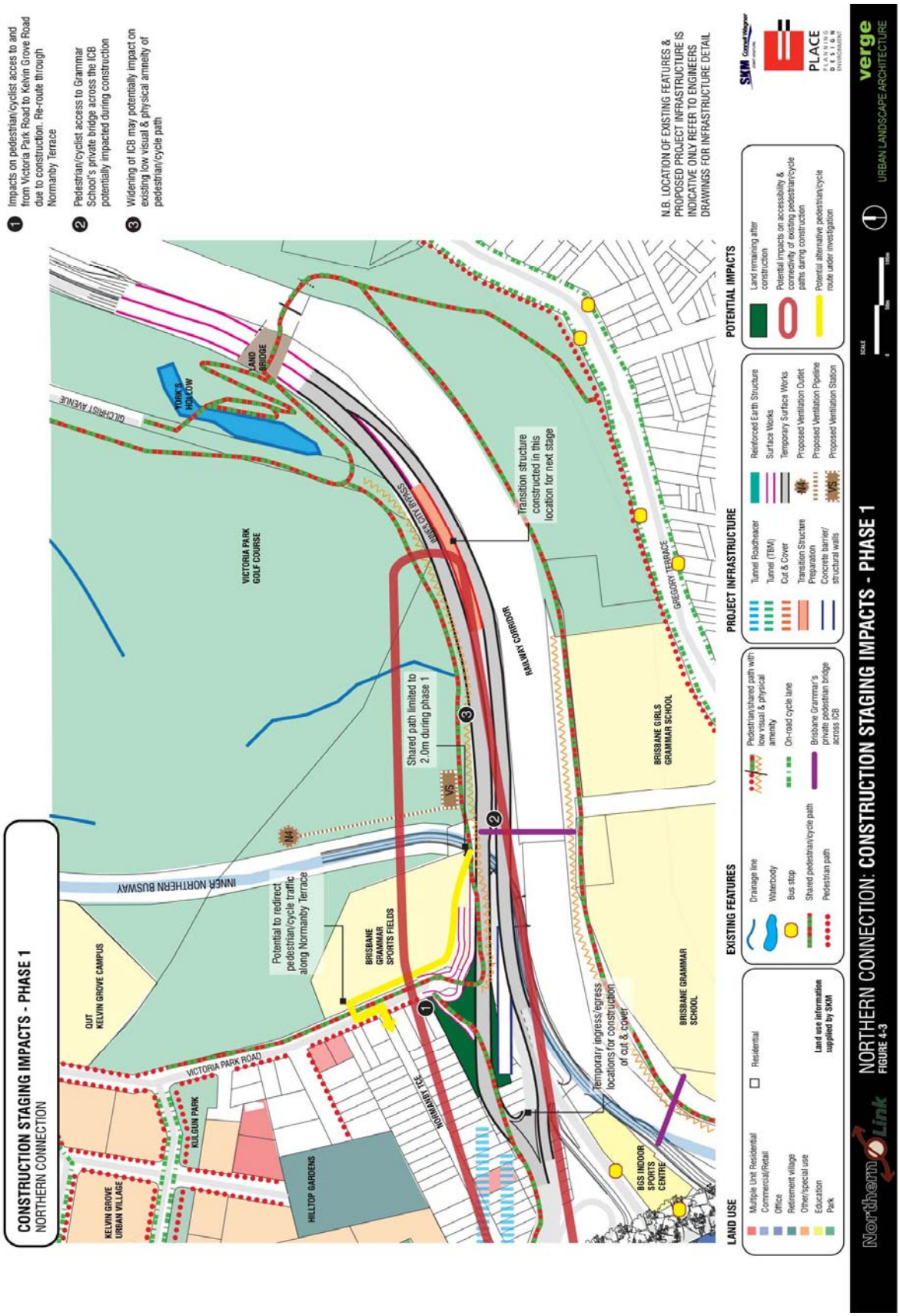


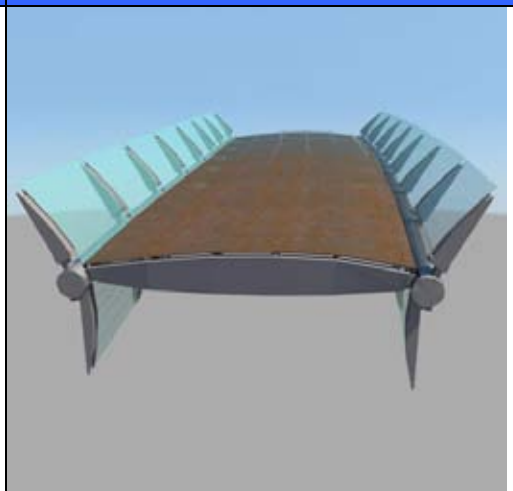
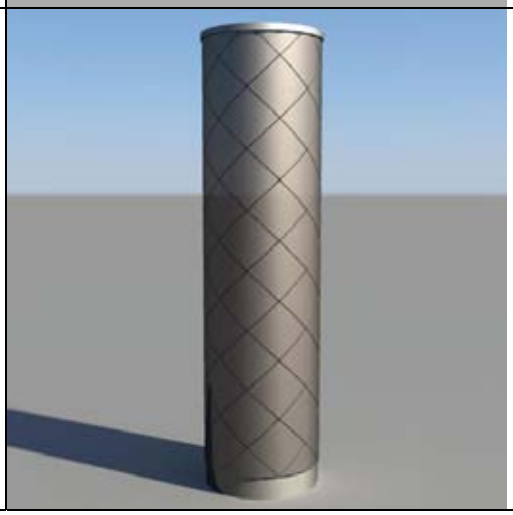
Figure 4-3 Construction Phasing and Pedestrians and Cyclists - Northern Connection

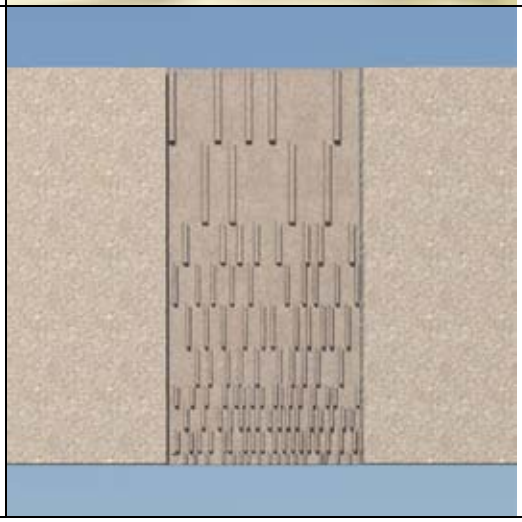
4.2 Mitigation Measures During Operational Phase

The mitigation measures for Northern Link provide the opportunity to enhance the existing environment through the integration of engineering and urban landscape design into areas surrounding the project works. The successful integration of this is dependent on the collaborative efforts of allied planning, engineering and urban design professionals at all stages of the project. This would ensure that urban landscape design thinking is incorporated into the masterplan designs as well as the technical design of the built elements of tunnel infrastructure.

This section provides an insight into the types of built elements used for tunnel infrastructure and provides examples of some of the ways they can be integrated with urban and landscape design. (Refer Table 4-1). It finishes with illustrated urban and landscape masterplans designed to complement the EIS Reference Design at the four key locations and provides location specific guidelines for their successful integration.

The table below provides examples some of the ways the built elements of tunnel infrastructure can be designed without becoming mere embellishments. The inspiration for all of these examples have been drawn from the existing environment and abstracted into sculptural forms.

Tunnel Infrastructure	Urban Design integrated with Engineering Infrastructure	
Portals		Refer Appendix 8.1 for materials
Ventilation Station Outlets		Refer Appendix 8.1 for materials

Tunnel Infrastructure	Urban Design integrated with Engineering Infrastructure	
Transition Structures		Refer Appendix 8.1 for materials
Elevated Structures		
Reinforced Earth Ramp Structures		Refer Appendix 8.1 for materials

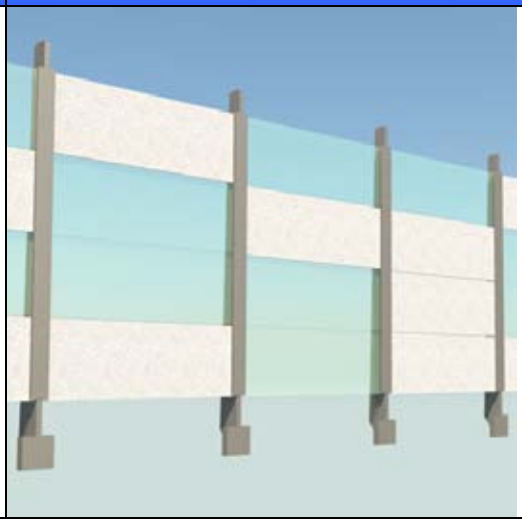
Tunnel Infrastructure	Urban Design integrated with Engineering Infrastructure
Noise Walls	

Table 4-1 Examples of Urban Design integrated with Infrastructure

4.2.1 Mitigation Measures for Western Connection

The main impacts on Western Connection are the 800m long transition structures which extend along the Western Freeway. The construction of the transition structures requires embankment cuttings into the existing vegetated hills of Brisbane Forest Park and a re-alignment of the pedestrian/cycle route alone the southern edge of the Western Freeway. The other key impact is the location of the worksite in between the Botanic Gardens and the Western Freeway with a spoil conveyor along the Western Freeway through vegetation to the Mt. Coot-tha Quarry. The following masterplan illustrates the mitigation measures to reduce these impacts and provides opportunities to enhance the surrounding environment as a result of the project works. (Refer Figure 4.4)

The following are the minimum guidelines tailored to the Western Connection to ensure urban and landscape designs of the highest quality, longevity, sustainability and innovation in the provision of:-

1. Environmental Revegetation / Waterway rehabilitation (in addition to the overarching guidelines in section 2.4)
    - Protect existing significant vegetation;
    - Revegetate, rehabilitate and enhance areas damaged during construction, in particular areas disturbed due to the spoil conveyor through Brisbane Forest Park and the Botanic Gardens;
    - Revegetate the cuttings to retain the integrity of the gateway experience from the Western Freeway moving towards the Mt. Coot-tha roundabout, the key objective is to provide a vegetated frame of roadside vegetation along the freeway and at the edge of Anzac Park;
    - Revegetate any disturbance to and/or enhance the existing gateway to the Botanic Gardens and Mt. Coot-tha Lookout, the key objective is to recreate or manage the arrival/departure experience of these popular destinations especially the existing roadside grouping of *Eucalyptus microcorys* (Tallowwood) and the new opportunities presented due to the re-instatement of the roundabout
    - Provide the planting component to the Botanic Gardens (i to v below) in consultation with the Botanic Gardens and their expansion options and to rehabilitate the worksite
        i. Planting to the Dam surrounds;

ii. Planting to the Desalination Research Facility;
iii. Planting to the earth sculptured berms;
iv. Planting to the interface of the Gardens with the worksite;
v. Turfing to the remainder of the site.

- Where appropriate use species indigenous to each key location;
- Rehabilitate damage to waterways where appropriate, in particular the existing waterway in Anzac Park and the Botanic Gardens;

2. Landscape Open Space Enhancement (in addition to the overarching guidelines in section 2.4)
   - Urban Forest Treatment – Create well connected, sustainable and safe landscapes of diverse and high quality where the project creates open space or remnant space, incorporating existing parks and open space, where possible;
   - Provide opportunities to enhance the critical views and vistas including views to the CBD, Mount Coot-tha, local landmarks and other character elements or precincts;
   - Create water wise subtropical landscapes which are sustainable and provide shade and micro-climate benefits, where appropriate, Appendix 8.2 for Planting Palette;
   - Provide earth sculptured berms in the form of detailed mounding and regrading and turfing of the worksite in accordance with the Botanic Gardens expansion options;
   - Provide the water storage dam and Desalination Research Facility in accordance with the Botanic Gardens expansion options;
   - Size of procured plant stock should suit intended purpose, i.e. revegetation of bushland or waterways – tube stock, for Street Trees – 100L stock or greater, for areas requiring impact of significant trees – Ex ground stock 4m high or greater;
   - Ensure that scenic amenity imparted by the city's characteristic terrain and vegetation is retained and enhanced;
   - Provide innovation in rain water harvesting for re-use;
   - Provide innovation in the use of permeable surfaces.

3. Recreational Opportunities (in addition to the overarching guidelines in section 2.4)
   - Create well connected and safe community areas for active or passive recreation within discrete areas of open space at Anzac Park;
   - In consultation with the Botanic Gardens develop a preferred expansion option to rehabilitate the proposed worksite between the Botanic Gardens and the Western Freeway, consider the following, BBQ's, shelters, drinking fountains, age appropriate play opportunities, park furniture and lighting.

4. Connectivity (in addition to the overarching guidelines in section 2.4)
   - Provide safe, legible and comfortable connections within the western connection key location for pedestrians, cyclists and public transport users (eg. shade and CPTED principles) to and from the western suburbs, the CBD, Mt. Coot-tha, the Botanic Gardens, the Toowong park and ride, Anzac Park, the Toowong Cemetery and the surrounding suburbs;
   - Identify and make good and enhance all existing connections for pedestrian and cyclists, in particular the new pedestrian/cycle overpass over the western freeway;

- Investigate other opportunities for improving alternative transport networks and user choice by providing safe pedestrian and cycle connections to the western suburbs, Mt. Coot-tha and the Botanic Gardens;
- Provide lighting and/or upgrade lighting along new or existing connections and at decision points in accordance with CPTED principles;
- Ensure new and/or reinstated pathway widths suit the degree and frequency of use, and are in accordance with Austroads, Guide to Engineering Practice, Part 14, Bicycles;
- Provide surface treatments that enhance other connecting paths within the vicinity and street furniture that reinforces the local character of the area.

5. Boulevard Treatments (in addition to the overarching guidelines in section 2.4)
   - Provide enhanced streetscape amenity through the provision of street tree planting with under planting and accessible footpaths to the following streets and roads affected by the project (with sight line considerations):-
     i. Mt. Coot-tha Road to the Quarry turn off;
     ii. The part of the Western Freeway between Frederick St and the Mt. Coot-tha turn off roundabout.

6. Design Intervention and Integration with Engineering Proposals – Create high quality urban design and landscape treatments for the following built elements of the tunnel infrastructure:-
   - Retaining and transition structures;
   - Portals;
   - Elevated structures (structures should be developed to integrate urban design with structural objectives, as opposed to add on embellishments);
   - Ventilation stations (VS), ventilation outlet (VO), - minimise the visual impact of the VO refer Appendix 8.1
   - Sub stations;
   - Noise Walls, and;
   - Integrate the above with the existing environment of the Western Connection in a sustainable way.

7. Public Art
   - Provide a Public Art Strategy with curatorial input and respond to all design elements within the project.
   - Provide opportunities for public art or character elements at key points within the transport network, at locations such as:-
     i. the Toowong-Mt.Coot-tha roundabout;
     ii. the Toowong Park and Ride;
     iii. Anzac Park; and,
     iv. The Botanic Gardens interface with the Western Freeway.

8. Lighting – It is not the purpose of this report to provide technical standards or requirements in regard to lighting. The following guidelines highlight issues that a qualified lighting designer would need to consider in their technical design.
    - Mitigate the potential for drivers to be distracted by the sun if possible;
    - Use lighting to assist legibility and choices about safe areas and routes;
    - Integrate sustainable lighting in the design integration with engineering proposals;
    - Ensure lighting during construction does not impact on any form of transport or residents;
    - Avoid inappropriate light pollution, shadowing or glare during construction and at operational stage.

9. Codes and Practices

- Include CPTED principles in all of the above mitigation measures refer 'Crime Prevention through Environmental Design Guidelines for Queensland Part A: Essential features for safer places. 2007'.
- Provide and exceed Australian best practice urban design and landscape standards, safety and engineering standards, access and mobility standards and all relevant Australian Standards, codes and practices to urban and landscape designs.
- On and off road Cycleways and pathways in accordance with Austroads, Guide to Engineering Practice, Part 14, Bicycles.

Figure 4-4A Urban and Landscape Masterplan – Western Connection

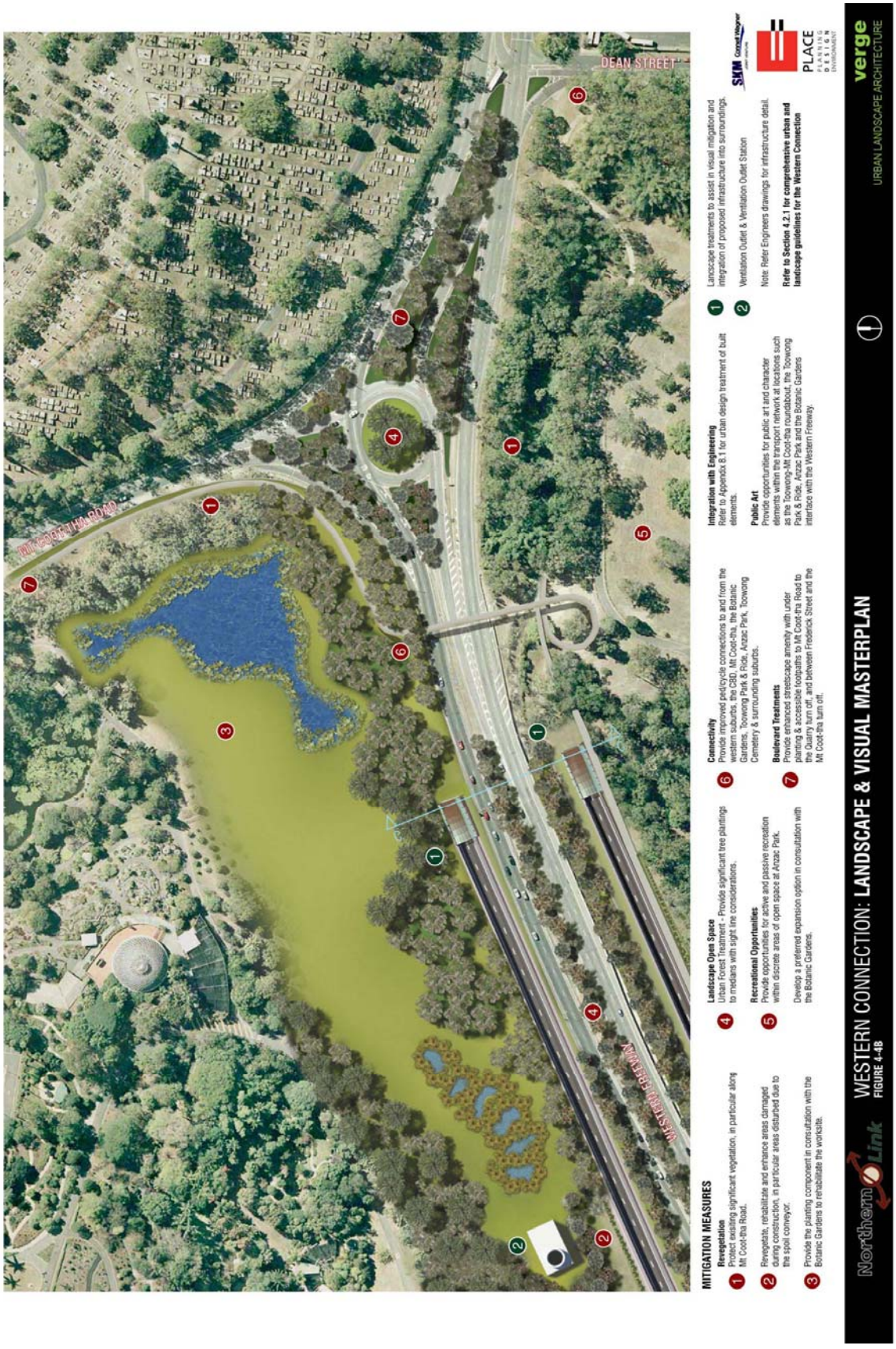


Figure 4.4B Urban and Landscape Masterplan – Western Connection

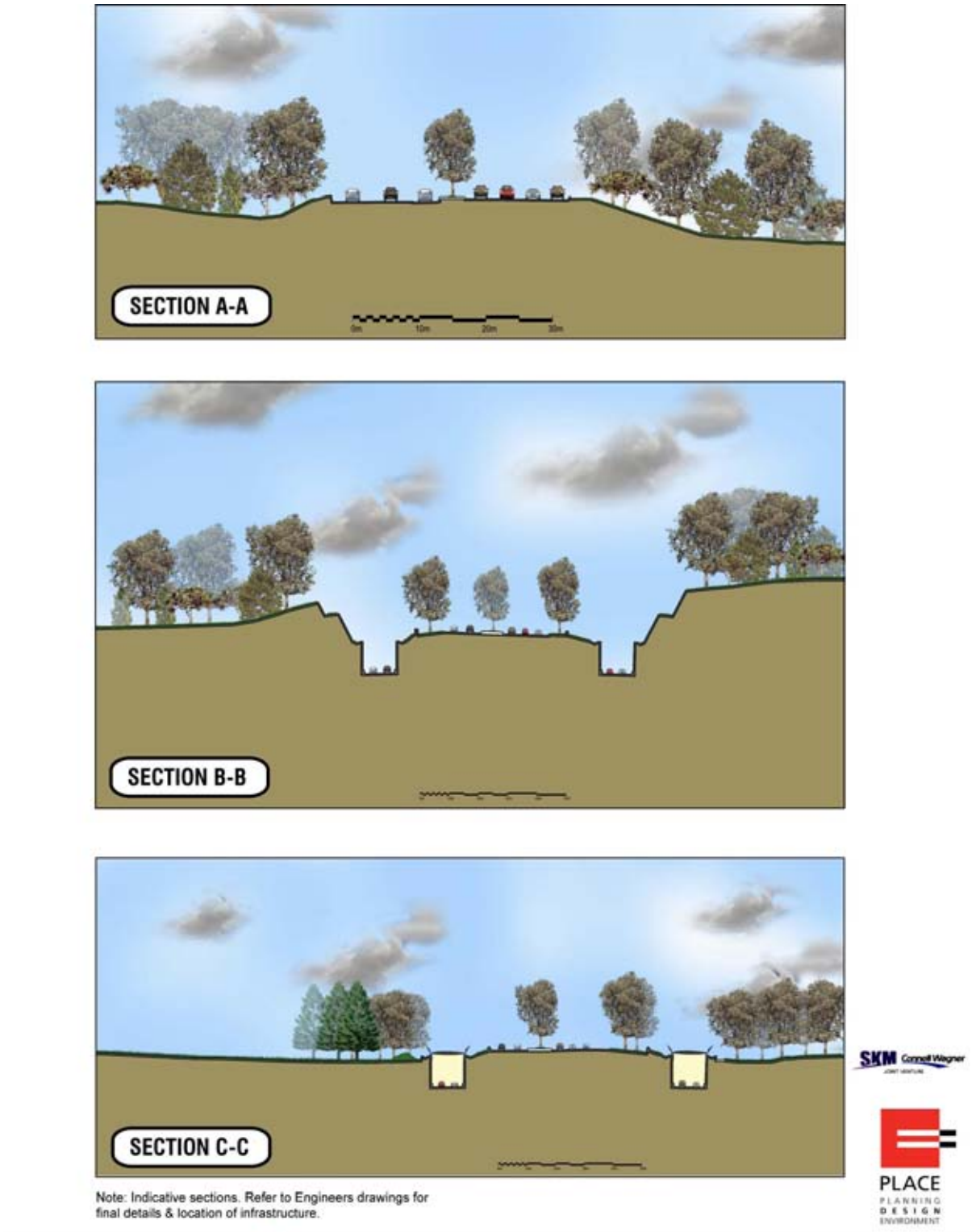


Figure 4-5 Urban and Landscape Design Sections – Western Connection

4.2.2 Mitigation Measures for Toowong Connection

The main impacts at the Toowong Connection are the two elevated structures, portals and reinforced earth structures over Milton Road before the Frederick Street roundabout. This requires the resumption of properties below Valentine Street and the southern side of Milton Road. The widening of Croydon Street also requires properties to be resumed. The following masterplan illustrates the mitigation measures to reduce the impacts and provides opportunities to enhance the surrounding environment as a result of the project works.(Refer Figure 4-6).

The following are the minimum guidelines to ensure urban and landscape designs of the highest quality, longevity, innovation and sustainability in the provision of:-

1. Environmental Revegetation / Waterway rehabilitation (in addition to the overarching guidelines in section 2.4)
    - Protect existing significant vegetation,
    - Provide replacements for the vegetation removed due to project works in particular Valentine Street (trees to centre median to be retained), Morley Street, Quinn Street, Croydon Street and Milton Road;
    - Provide significant tree plantings to open space areas and medians created by the project;
    - Revegetate and enhance areas damaged during construction;
    - Where appropriate use species indigenous to each key location; and,
    - Improve the quality of run-off from roads and other hard surfaces before it reaches waterways or aquifers
    - Size of plant procured plant stock should suit intended purpose, i.e. revegetation of bushland or waterways – tube stock to be used, for Street Trees – 100L stock to be used, for areas requiring impact of mature trees – Ex ground stock to be used.

2. Landscape Open Space Enhancement (in addition to the overarching guidelines in section 2.4)
    - Urban Forest Treatment – Create well connected, sustainable and safe landscapes of diverse and high quality where the project creates open space or remnant such as:-
        i. South of Valentine Street and north of Milton Road, (opportunity to move noise walls to create landscape open space directly south of Valentine Street);
        ii. South of Morley Street; and in existing parks such as Quinn Park
        iii. The northern end of Quinn Park which is abutted by a large reinforced earth wall.

    - Create opportunities to enhance critical views and vistas including views to the CBD, Mount Coot-tha, and Toowong Cemetery and in particular soften the impact of the elevated structures over Milton Road and the Frederick Street flyover.
    - Provide opportunities for the appropriate setting and location of park memorials and commemorative items at Quinn Park impacted as a result of the project;
    - Create water wise subtropical landscapes which are sustainable and provide shade and micro-climate benefits, where appropriate, in particular in the medians in the middle of Croydon Street and Milton Road to reduce the scale of these roads, refer Appendix 8.2 for Planting Palette;

- Size of procured plant stock should suit intended purpose, i.e. revegetation of bushland or waterways – tube stock, for Street Trees – 100L stock or greater, for areas requiring impact of significant trees – Ex ground stock 4m high or greater;
- In consultation with BCC and other stakeholders relocate existing VPO tree and commemorative plaque at the corner of Sylvan and Milton Road to a suitable location such as Anzac Park;
- Provide innovation through rain water harvesting for re-use;
- Provide innovation through the use of permeable surfaces.

3. Recreational Opportunities (in addition to the overarching guidelines in section 2.4)
   - Provide a masterplan for the redevelopment of Quinn Park in consultation with stakeholders;
   - Create well connected and safe community areas for active or passive recreation within Quinn Park;
   - Enhance existing community facilities, park furniture, lighting and play ground equipment and consider providing BBQ's, shelters, drinking fountains, and age appropriate play opportunities.

4. Connectivity (in addition to the overarching guidelines in section 2.4)
   - Provide safe, legible and comfortable connections to and from all areas affected by the project for pedestrians, cyclists and public transport users (eg. shade and CPTED principles) to and from:-
     i. the community north of Milton Road to the principle cycle route on Sylvan Road through to the Brisbane River the CBD;
     ii. the southern side of Milton Road between Croydon Street and Frederick Street running through Quinn Park.
   - Identify, make good and enhance all existing connections for pedestrian and cyclists, in particular the pedestrian/cycle path from Milton Road at Croydon Street to Milton Road at Miskin Street across to the Toowong Park and Ride;
   - Investigate other opportunities for improving alternative transport networks and user choice by providing safe pedestrian and cycle connections to and from:-
     i. Frederick Street to Sylvan Road;
     ii. Frederick Street to La Trobe Terrace;
     iii. Milton Road at Croydon Street to Milton Road at Miskin Street to the Toowong Park and Ride; and,
     iv. Milton Road as a future principle cycle route.
   - Improve permeability for pedestrians and cyclists by establishing new connections that are able to safely navigate 'barriers' in particular along the length of Frederick Street crossing into the Toowong Cemetery;
   - Provide new sheltered bus stops on Milton Road south of Valentine and north of Quinn Park;
   - Provide lighting along pedestrian/cycle connections and at decision points in accordance with CPTED principles;
   - Ensure pathway widths suit the degree and frequency of use, and are in accordance with Austroads, Guide to Engineering Practice, Part 14, Bicycles;
   - Provide surface treatments that enhance other connecting paths within the vicinity and street furniture that reinforces the local character of the area.

5. Neighbourhoods (in addition to the overarching guidelines in section 2.4)
    - Retain and enhance characteristics of local neighbourhoods in close proximity to project works in particular Valentine Street, Morley Street, Quinn Street, Croydon Street and Milton Road;
    - Provide vegetative screening to sound barriers and/or provide access to views and vistas of the surrounding area using transparent materials;
    - Strengthen neighbourhood precincts through the implementation of well connected community park/s, with a focus on Quinn Park, the Toowong Cemetery, Anzac Park and Toowong Memorial Park;
    - Retain and enhance the leafy character of Brisbane's suburbs, particularly those in the inner west by incorporating significant local indigenous or culturally-significant species into landscapes associated with existing and new development or infrastructure.

6. Boulevard Treatments (in addition to the overarching guidelines in section 2.4)
    - Provide significant tree planting, public art, street furniture and accessible pathways to the medians in the middle of Croydon Street and Milton Road to reduce the scale of these roads;
    - Provide enhanced streetscape amenity through the provision of street tree planting with under planting and accessible footpaths to the following streets and roads affected by the project, (with sight line considerations):-
        i. Sylvan Road;
        ii. Valentine Street;
        iii. Parts of Morley Street, Miskin Street and Sylvan Road;
        iv. Frederick Street; and,
        v. Quinn Street.

7. Suburban Centre Improvement Schemes –
    - Urban Villages - Create well connected and safe new opportunities or strengthen the existing viability of destinations through urban design and landscape treatments at the convenience precinct at the corners of Milton Road/Morley Street and Milton Road/Croydon Street.

8. Design Intervention and Integration with Engineering Proposals – Create high quality urban design and landscape treatments for the following infrastructure elements:-
    - Retaining and transition structures;
    - Portals;
    - Elevated structures (structures should be developed to integrate urban design with structural objectives, as opposed to add on embellishments);
    - Noise walls, it is recommended that noise walls be modified where possible to retain views, landscape values and loss of sunlight – through either relocation or through the use of transparent materials;
    - Present urban regeneration options where possible and appropriate; and,
    - Integrate the above with the existing environment of the Toowong Connection in a sustainable way.

9. Public Art

- Provide a Public Art Strategy with curatorial input and respond to all design elements within the project.
- Provide opportunities for public art or character elements at key points within the transport network, such as:-

    i. Quinn Park;
    ii. The new open space created by the project to the south of Valentine Street;
    iii. The new open space created by the project to the south of Morley Street;
    iv. New bus stops;
    v. Future pedestrian/cycle connections, entrances, public transport nodes, key destinations and places of cultural significance that respond to and enhance local image and the identity of the city Making transport networks more user-friendly by improving their legibility and ease of use by people of all ages and levels of fitness

10. Lighting – It is not the purpose of this report to explain or provide technical standards or requirements in regard to lighting. It has been prepared to highlight issues that a qualified lighting designer would need to consider in their technical design.
    - Mitigate the potential for drivers to be distracted by the sun if possible;
    - Use lighting to assist legibility and choices about safe areas and routes;
    - Integrate sustainable lighting in the design integration with engineering proposals;
    - Ensure lighting during construction does not impact on any form of transport or residents;
    - Avoid inappropriate light pollution, shadowing or glare during construction and at operational stage.

11. Codes and Practices

- Include CPTED principles in all of the above mitigation measures refer 'Crime Prevention through Environmental Design Guidelines for Queensland Part A: Essential features for safer places. 2007'.
- Provide and exceed Australian best practice urban design and landscape standards, safety and engineering standards, access and mobility standards and all relevant Australian Standards, codes and practices to urban and landscape designs.
- On and off road Cycleways and pathways in accordance with Austroads, Guide to Engineering Practice, Part 14, Bicycles.

Figure 4-6 Urban and Landscape Design Masterplan – Toowong Connection

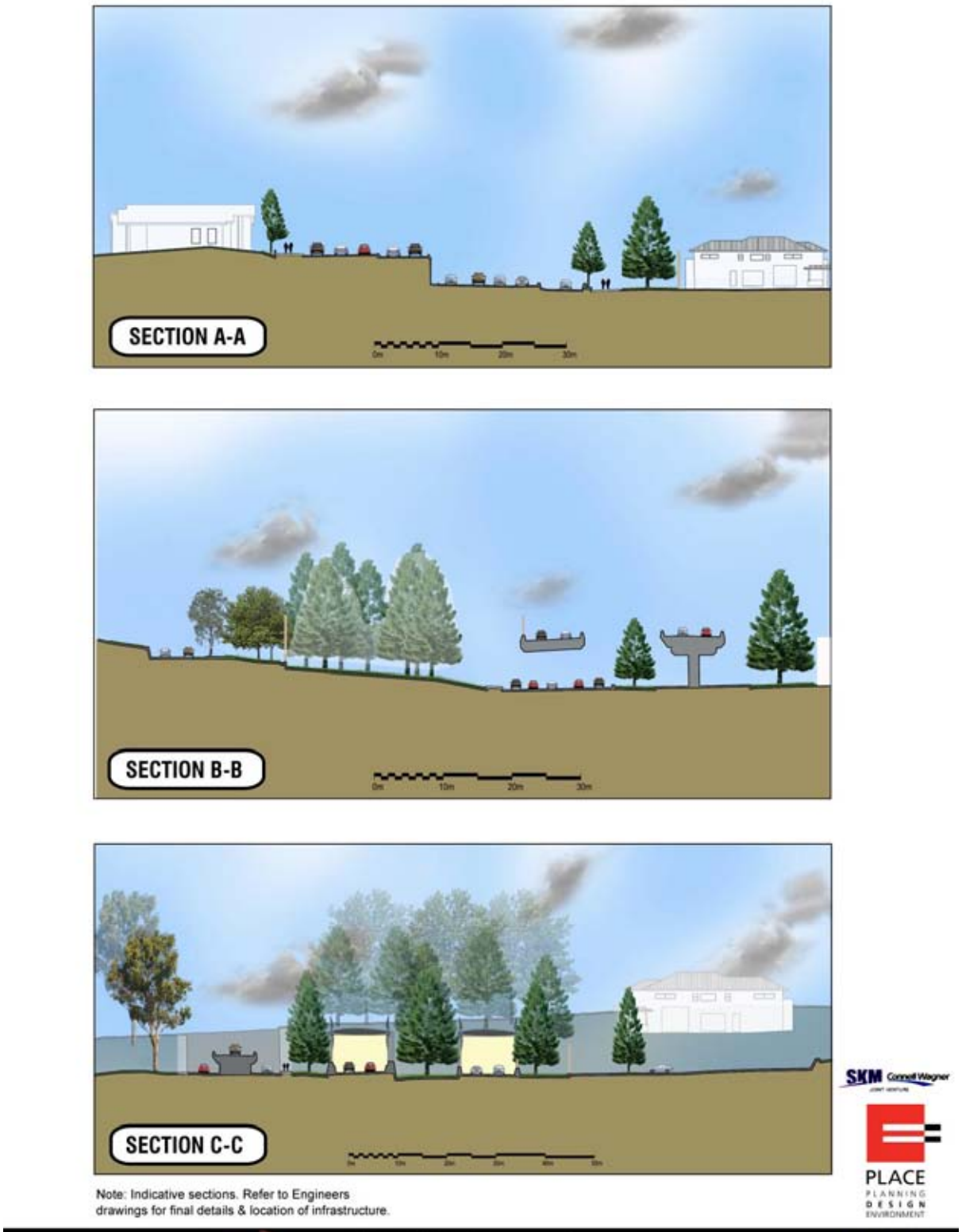


Figure 4-7 Urban and Landscape Design Sections – Toowong Connection

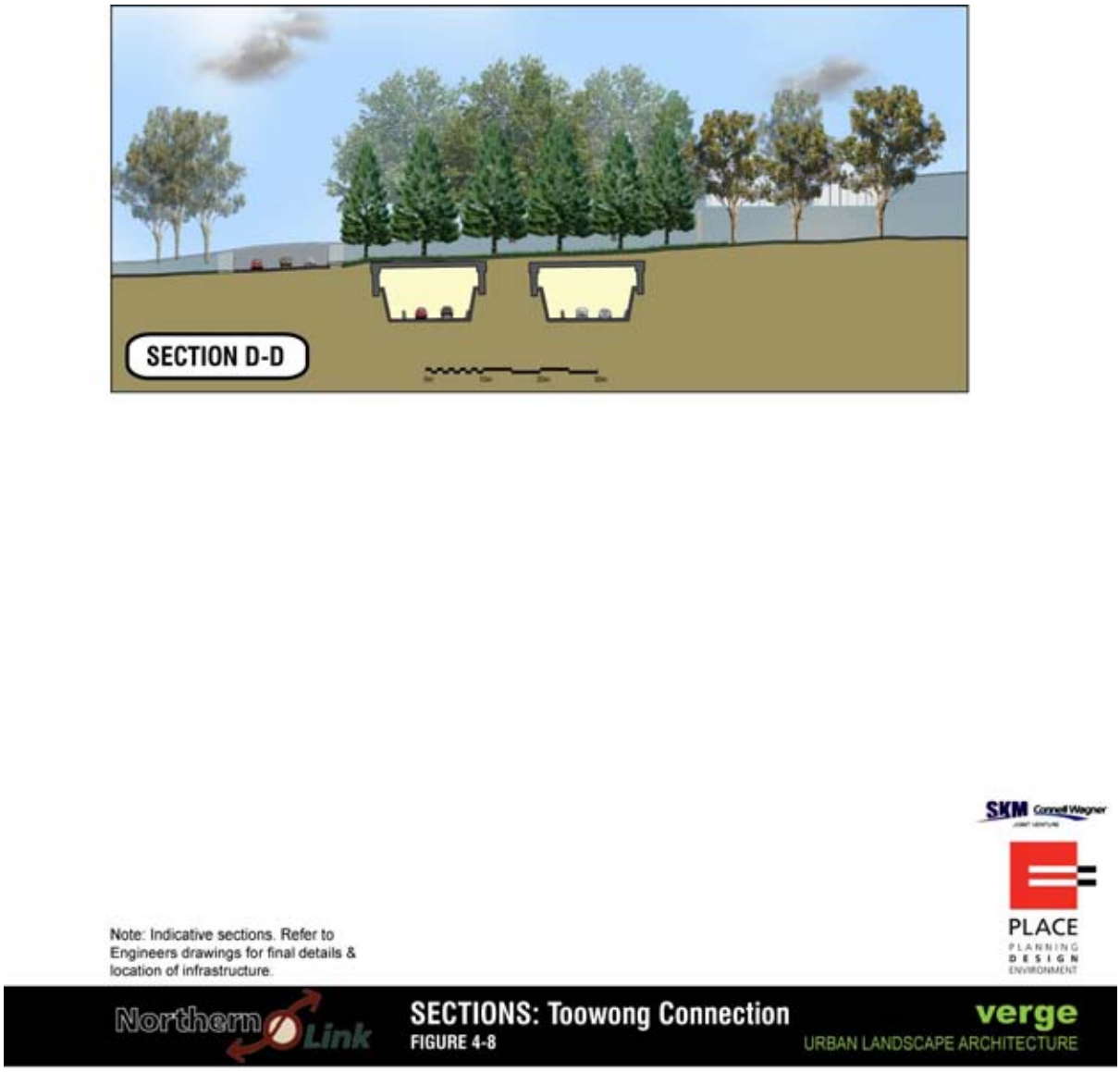


Figure 4-8 Urban and Landscape Design Sections – Toowong Connection

4.2.3 Mitigation Measures for Northern Connection

The main impacts on the Northern Connection are within the existing landscaped open space adjacent to the ICB, and the widening of the ICB to accommodate a portal entrance to the tunnel. The following masterplan illustrates the mitigation measures to reduce the impacts and provides opportunities to enhance the surrounding environment as a result of the project works. (Refer Figure 4.9)

The following are the minimum guidelines to ensure urban and landscape designs of the highest quality, longevity, sustainability and innovation in the provision of:-

1. Environmental Revegetation / Waterway rehabilitation
    - Protect existing significant vegetation;

- Revegetate and enhance areas damaged during construction, unless require to create new landscapes;
- Where appropriate use species indigenous to each key location;
- Rehabilitate damage to waterways where appropriate, in particular drainage channel which flows into Yorks Hollow beside the ICB;
- Improve the quality of run-off from roads and other hard surfaces before it reaches waterways or aquifers;
- Size of plant procured plant stock should suit intended purpose, i.e. revegetation of bushland or waterways – tube stock to be used, for Street Trees – 100L stock to be used, for areas requiring impact of mature trees – Ex ground stock to be used.

2. Landscape Open Space Enhancement
   - Create well connected, sustainable and safe landscapes of diverse and high quality where the project creates open space or remnant space, in particular:-
     i. The open space created by the portals and cut and cover tunnels adjacent to the ICB;
     ii. The open space next to the Brisbane Grammar Schools playing fields;
     iii. The long strip of land in-between the ICB and the Victoria Park Golf Club.
   - Create opportunities to enhance critical views and vistas including views to the Victoria Park Golf Club, the figs at the Normanby Five ways, and other character elements or precincts.
   - Create water wise subtropical landscapes which are sustainable and provide shade and micro-climate benefits, where appropriate, refer Appendix 8.2 for Planting Palette;
   - Size of procured plant stock should suit intended purpose, i.e. revegetation of bushland or waterways – tube stock, for Street Trees – 100L stock or greater, for areas requiring impact of significant trees – Ex ground stock 4m high or greater.
   - Ensure that scenic amenity imparted by the city's characteristic terrain and vegetation is retained and enhanced
   - Provide innovation in rain water harvesting for re-use;
   - Provide innovation in the use of permeable surfaces.

3. Connectivity
   - Provide safe, legible and comfortable connections to and from all areas affected by the project for pedestrians, cyclists and public transport users (eg. shade and CPTED principles), in particular to and from
     i. The Kelvin Grove Urban Village to the CBD
     ii. The local connection from Victoria Park Road to the ICB Pedestrian/cycle overpass;
     iii. The pathway along the ICB from Kelvin Grove Road to Yorks Hollow and the Land Bridge;
   - Make good and enhance all existing connections for pedestrian and cyclists, in particular the connections from the southern end of Victoria Park Road to the ICB pedestrian/cycle overpass;
   - Investigate other opportunities for improving alternative transport networks and user choice by providing safe pedestrian and cycle connections to local destinations and throughout the city, in particular a green link between Kelvin Grove Urban Village over the ICB and Railway to the CBD;

- Improve permeability for pedestrians and cyclists by establishing new connections that are able to safely navigate 'barriers' in the built environment;
- Provide transport networks of high environmental quality, including visual and physical amenity
- Provide lighting along connections and at decision in accordance with CPTED principles;
- Ensure pathway widths suit the degree and frequency of use, and are in accordance with Austroads, Guide to Engineering Practice, Part 14, Bicycles;
- Provide surface treatments that enhance other connecting paths within the vicinity and street furniture that reinforces the local character of the area.

4. Neighbourhoods
   - Retain and enhance characteristics of local neighbourhoods in close proximity to project works, in particular Normanby Terrace and parts of Victoria Park Road;
   - Provide vegetative screening to sound barriers and/or provide access to views and vistas of the surrounding area using transparent materials;
   - Retain and enhance the leafy character of Brisbane's suburbs, by incorporating significant local indigenous or culturally-significant species into landscapes associated with existing and new development or infrastructure. In particular to the residents of Normanby Terrace backing onto the new open space adjacent to the ICB.

5. Boulevard Treatments
   - Provide significant tree planting, to the rear of the portal of the west bound tunnel;
   - Provide enhanced amenity to existing and proposed residential streets through the provision of street tree planting with under planting and footpaths, to the following streets (with sight line considerations):-

     i. Normanby Terrace;
     ii. The southern part of Victoria Park Road.

6. Design Intervention and Integration with Engineering Proposals – Create high quality urban design and landscape treatments for the following infrastructure elements:-
   - Retaining and transition structures;
   - Elevated structures (structures should be developed to integrate urban design with structural objectives, as opposed to add on embellishments);
   - Ventilation outlets, ventilation outlet stations,
   - Sub stations;
   - Noise barriers, it is recommended that noise walls be modified where possible to retain views, landscape values and loss of sunlight – through either relocation or through the use of transparent materials; and;
   - Integrate the above with the existing environment of the each key location.
   - Present urban regeneration options in appropriate locations.

7. Public Art

- Provide a Public Art Strategy with curatorial input and respond to all design elements within the project.

Provide opportunities for public art or character elements at key points within the transport network, at locations such as:-

i. the new open space adjacent to the ICB,

Ensure works that respond to and enhances the local image and identity of the city. Whilst also making transport networks more user-friendly by improving their legibility and ease of use by people of all ages and levels of fitness

8. Lighting – It is not the purpose of this report to explain or provide technical standards or requirements in regard to lighting. It has been prepared to highlight issues that a qualified lighting designer would need to consider in their technical design.
   - Mitigate the potential for drivers to be distracted by the sun if possible;
   - Use lighting to assist legibility and choices about safe areas and routes;
   - Integrate sustainable lighting in the design integration with engineering proposals;
   - Ensure lighting during construction does not impact on any form of transport or residents;
   - Avoid inappropriate light pollution, shadowing or glare during construction and at operational stage.
9. Codes and Practices
   - Include CPTED principles in all of the above mitigation measures refer 'Crime Prevention through Environmental Design Guidelines for Queensland Part A: Essential features for safer places. 2007';
   - Provide and exceed Australian best practice urban design and landscape standards, safety and engineering standards, access and mobility standards and all relevant Australian Standards, codes and practices to urban and landscape designs.
   - On and off road Cycleways and pathways in accordance with Austroads, Guide to Engineering Practice, Part 14, Bicycles.

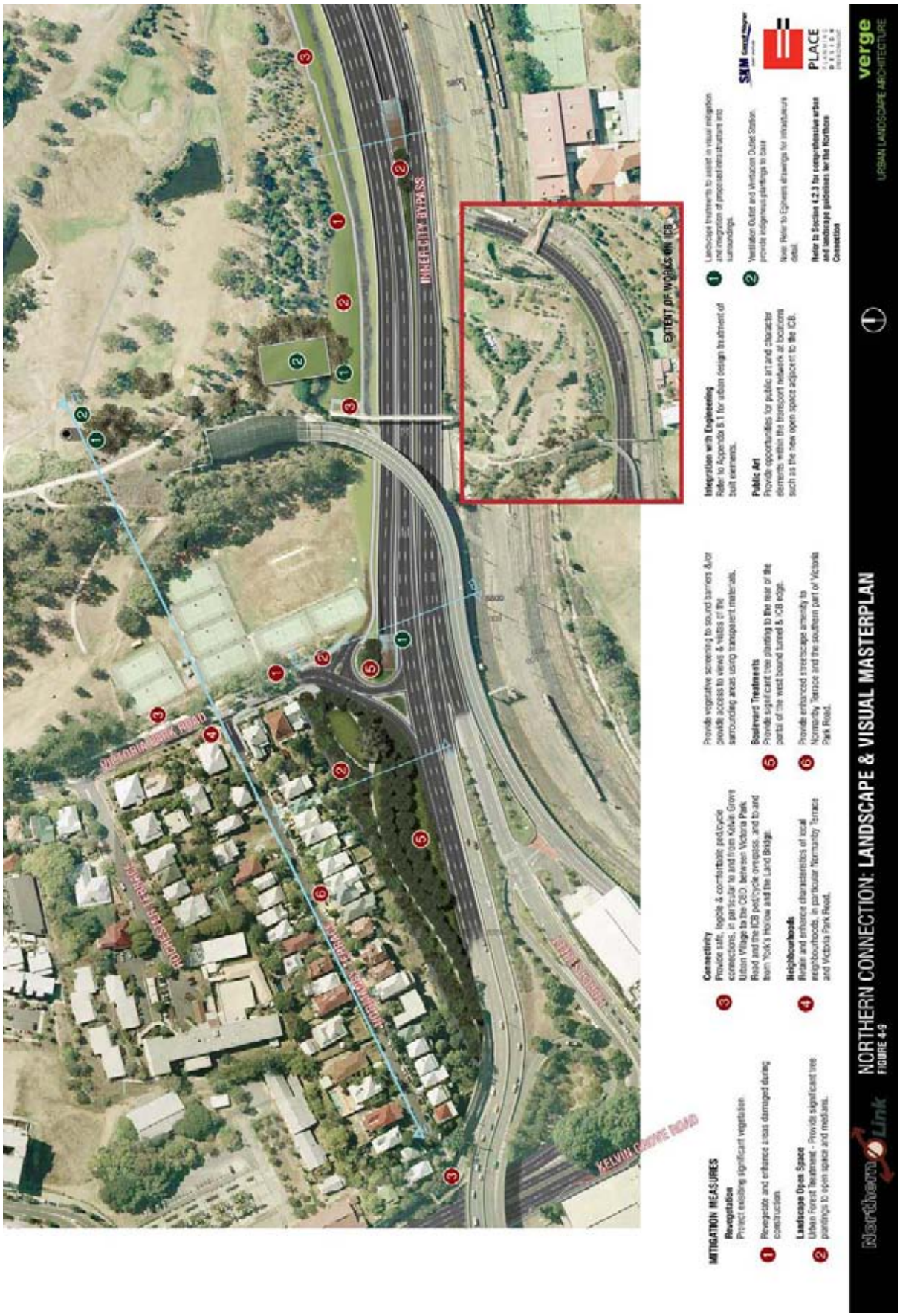


Figure 4-9 Urban and Landscape Design Masterplan – Northern Connection

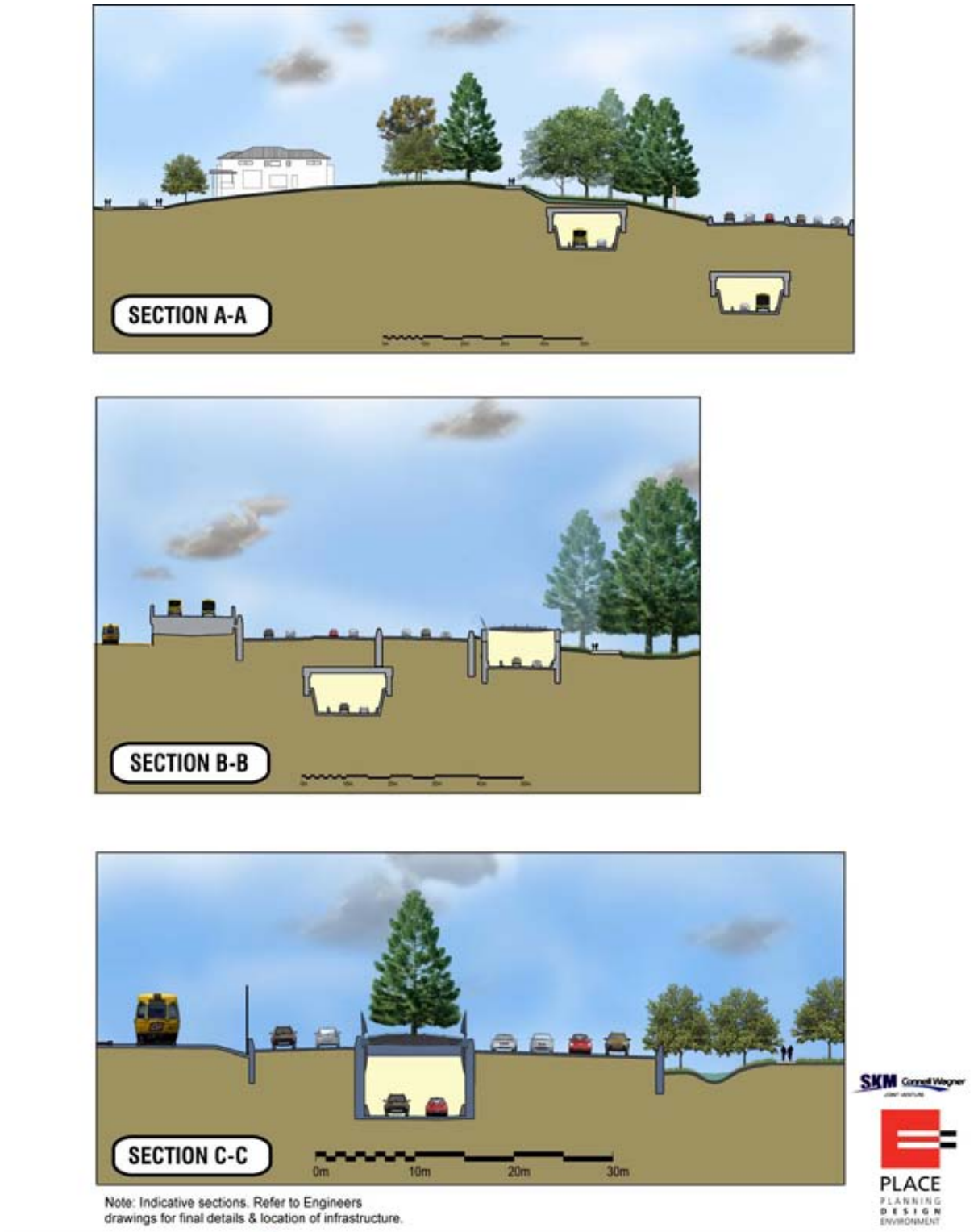


Figure 4-10 Urban and Landscape Design Sections – Northern Connection

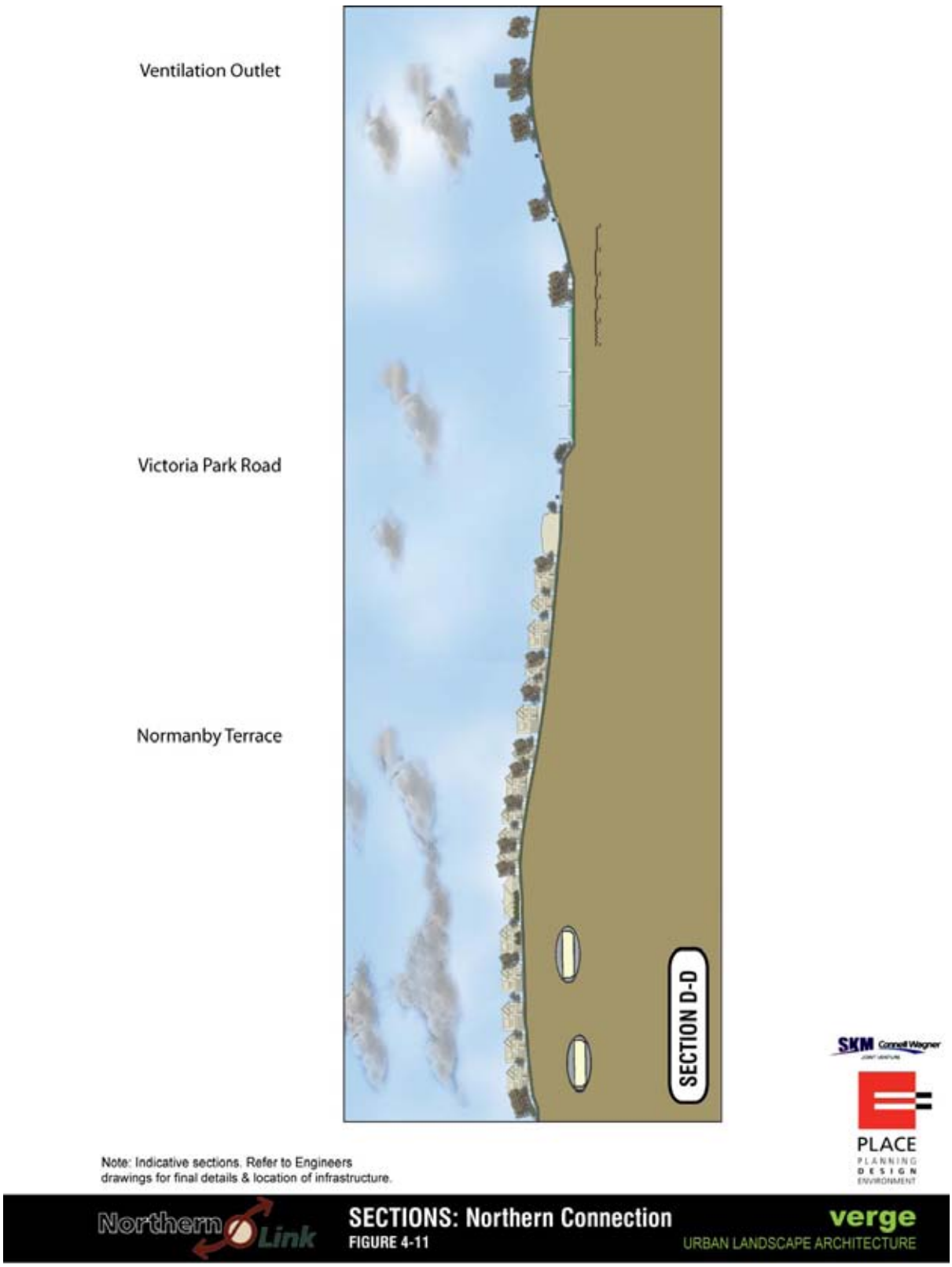


Figure 4-11 Urban and Landscape Design Section – Northern Connection

4.2.4 Mitigation Measures for Kelvin Grove Connection

The main impacts on the Kelvin Grove connection is due to the widening of Kelvin Grove Road which removes two significant heritage listed figs in Marshall Park and two significant figs in Mc Caskie Park. Other key impacts are property resumptions on the western side of Kelvin Grove Road to accommodate the tunnel infrastructure. Two of the tunnel portals are situated in Kelvin Grove Road whilst the other two are located on the edge of Kelvin Grove Road directly opposite Musk Avenue. The main challenges at this location are the pedestrian and cycle connections along the western side of Kelvin Grove Road. The following masterplan illustrates the mitigation measures to reduce these impacts and provides opportunities to enhance the surrounding environment as a result of the project works. (Refer Figure 4-12)

The following are the minimum guidelines to ensure urban and landscape designs of the highest quality, longevity, sustainability and innovation in the provision of:-

1. Environmental Revegetation / Waterway rehabilitation (in addition to the overarching guidelines in section 2.4)
    - Protect existing significant vegetation;
    - Revegetate and enhance areas damaged during construction;
    - Where appropriate use species indigenous to each key location; and
    - Rehabilitate damage to waterways to area below Lower Clifton Terrace, where appropriate.
    - Improve the quality of run-off from roads and other hard surfaces before it reaches waterways or aquifers;
    - Size of plant procured plant stock should suit intended purpose, i.e. revegetation of bushland or waterways – tube stock to be used, for Street Trees – 100L stock to be used, for areas requiring impact of mature trees – Ex ground stock to be used.

2. Landscape Open Space Enhancement (in addition to the overarching guidelines in section 2.4)
    - Urban Forest Treatment – Create well connected, sustainable and safe landscapes of diverse and high quality where the project creates open space or remnant space, in particular the following areas:-
        i. The land below Lower Clifton Terrace (however do not encourage the use of this area it has poor passive surveillance surrounded by a busy traffic environment);
        ii. The land opposite Musk Avenue above the portals;
        iii. The land to the western side of Kelvin Grove Road in between Westbury Street and Victoria Street;
        iv. The medians above the portals and within Kelvin Grove Road.
    - Create opportunities to enhance critical views and vistas including views to the CBD, the Kelvin Grove Urban Village 'Artspace' billboard, St. Bridgid's, Lower Clifton Terrace and the new greenspace opposite Musk Avenue above the portals;
    - Create water wise subtropical landscapes which are sustainable and provide shade and micro-climate benefits, where appropriate;
    - Size of procured plant stock should suit intended purpose, i.e. revegetation of bushland or waterways – tube stock, for Street Trees – 100L stock or greater, for areas requiring impact of significant trees – Ex ground stock 4m high or greater;

- Ensure that scenic amenity imparted by the city's characteristic terrain and vegetation is retained and enhanced, in particular the Figs in Marshall Park, Mc Caskie Park and the Normanby Fiveways;
- Provide innovation in rain water harvesting for re-use;
- Provide innovation in the use of permeable surfaces.

3. Recreational Opportunities
   - Create well connected and safe community areas for active or passive recreation within the following areas:-
     i. Marshall Park
     ii. The land to the western side of Kelvin Grove Road in between Westbury Street and Victoria Street;
   - For active areas consider BBQ's, shelters, drinking fountains, age appropriate play opportunities, park furniture and lighting.

4. Connectivity
   - Provide safe, legible and comfortable connections to and from all areas affected by the project for pedestrians, cyclists and public transport users (eg. shade and CPTED principles) to and from:-
     i. The western side of Kelvin Grove Road from the Normanby Fiveways to Blamey Street;
     ii. The ICB pedestrian/cycle overpass to Lower Clifton Terrace;
     iii. Kelvin Grove Road to Lower Clifton Terrace;
     iv. Kelvin Grove Urban Village to Upper Clifton Terrace;
     v. The new road created between Westbury Street and Upper Clifton Terrace to Victoria Street;
     vi. Lower Clifton Terrace to Upper Clifton Terrace.
   - Make good and enhance all existing connections for pedestrian and cyclists, in particular the ICB pedestrian/cycle overpass to Lower Clifton Terrace;
   - Investigate other opportunities for improving alternative transport networks and user choice by providing safe pedestrian and cycle connections to local destinations and throughout the city;
   - Improve permeability for pedestrians and cyclists by establishing new connections that are able to safely navigate 'barriers' in the built environment;
   - Provide transport networks of high environmental quality, including visual and physical amenity;
   - Provide lighting along connections and at decision in accordance with CPTED principles;
   - Ensure pathway widths suit the degree and frequency of use, and are in accordance with Austroads, Guide to Engineering Practice, Part 14, Bicycles;
   - Provide surface treatments that enhance other connecting paths within the vicinity and street furniture that reinforces the local character of the area.

5. Neighbourhoods
   - Retain and enhance characteristics of local neighbourhoods in close proximity to project works;
   - Provide sensitive urban regeneration solutions for areas adjoining neighbourhood precincts;

- Provide vegetative screening to sound barriers and/or provide access to views and vistas of the surrounding area using transparent materials;

- Strengthen neighbourhood precincts through the implementation of well connected community park/s;
- Retain and enhance the leafy character of Brisbane's suburbs, particularly those in the inner west by incorporating significant local indigenous or culturally-significant species into landscapes associated with existing and new development or infrastructure.
- Retain and enhance characteristics of the local neighbourhood in and around Upper and Lower Clifton Terrace, Westbury Street, Victoria Street, in particular their character as narrow, low traffic, local streets with limited connectivity;
- Provide access to views and vistas of the surrounding area from the elevated terrain around Upper Clifton Terrace, using transparent materials.

6. Boulevard Treatments
   - Provide significant tree planting, public art, in particular to the medians in the middle of Kelvin Grove and street furniture, and accessible pathways to major roads;
   - Provide enhanced streetscape amenity through the provision of street tree planting with under planting and accessible footpaths to the following streets and roads affected by the project (with sightline considerations):-
     i. Lower Clifton Terrace;
     ii. Upper Clifton Terrace;
     iii. Victoria Street;
     iv. Westbury Street;
     v. Repair any damage to Musk Avenue planting.

7. Design Intervention and Integration with Engineering Proposals – Create high quality urban design and landscape treatments for the following infrastructure elements:-
   - Retaining and transition structures;
   - Elevated structures (structures should be developed to integrate urban design with structural objectives, as opposed to add on embellishments);
   - Ventilation outlets, ventilation outlet stations,
   - Sub stations;
   - Noise barriers, it is recommended that noise walls be modified where possible to retain views, landscape values and loss of sunlight – through either relocation or through the use of transparent materials; and;
   - Integrate the above with the existing environment of the each key location.
   - Present urban regeneration options in appropriate locations.

8. Public Art
   - Provide a Public Art Strategy with curatorial input and respond to all design elements within the project.

- Provide opportunities for public art or character elements at key points within the transport network, at locations such as:-
    i. The length of Kelvin Grove Road from the Normanby Fiveways to Blamey Street;
    ii. The new open space above the portal opposite Musk Avenue;
    iii. The triangular shaped land in-between Hale Street and Kelvin Grove Road;
    iv. The ICB pedestrian/cycle overpass;
    v. The new open space between Westbury Street and Upper Clifton Terrace; an in
    vi. Marshall Park and McCaskie Park.

  That responds to and enhances local image and the identity of the City Making transport networks more user-friendly by improving their legibility and ease of use by people of all ages and levels of fitness.

9. Lighting – These guidelines have been prepared to highlight issues that a qualified lighting designer would need to consider in their technical design.
    - Mitigate the potential for drivers to be distracted by the sun if possible;
    - Use lighting to assist legibility and choices about safe areas and routes;
    - Integrate sustainable lighting in the design integration with engineering proposals;
    - Ensure lighting during construction does not impact on any form of transport or residents;
    - Avoid inappropriate light pollution, shadowing or glare during construction and at operational stage.

10. Codes and Practices

- Include CPTED principles in all of the above mitigation measures refer 'Crime Prevention through Environmental Design Guidelines for Queensland Part A: Essential features for safer places. 2007'.
- Provide and exceed Australian best practice urban design and landscape standards, safety and engineering standards, access and mobility standards and all relevant Australian Standards, codes and practices to urban and landscape designs.
- On and off road Cycleways and pathways in accordance with Austroads, Guide to Engineering Practice, Part 14, Bicycles.

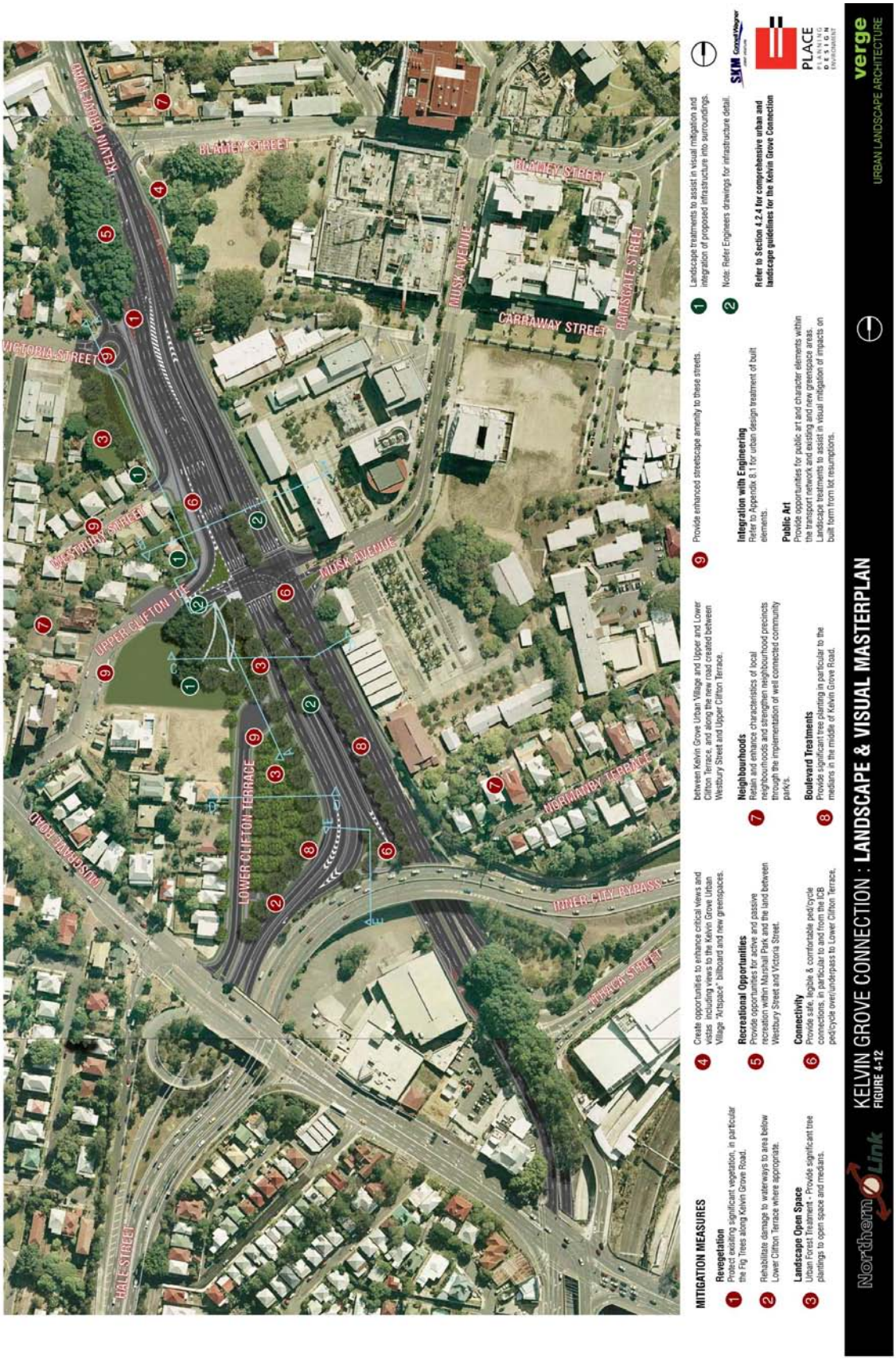


Figure 4-12 Urban and Landscape Design Masterplan – Kelvin Grove Connection

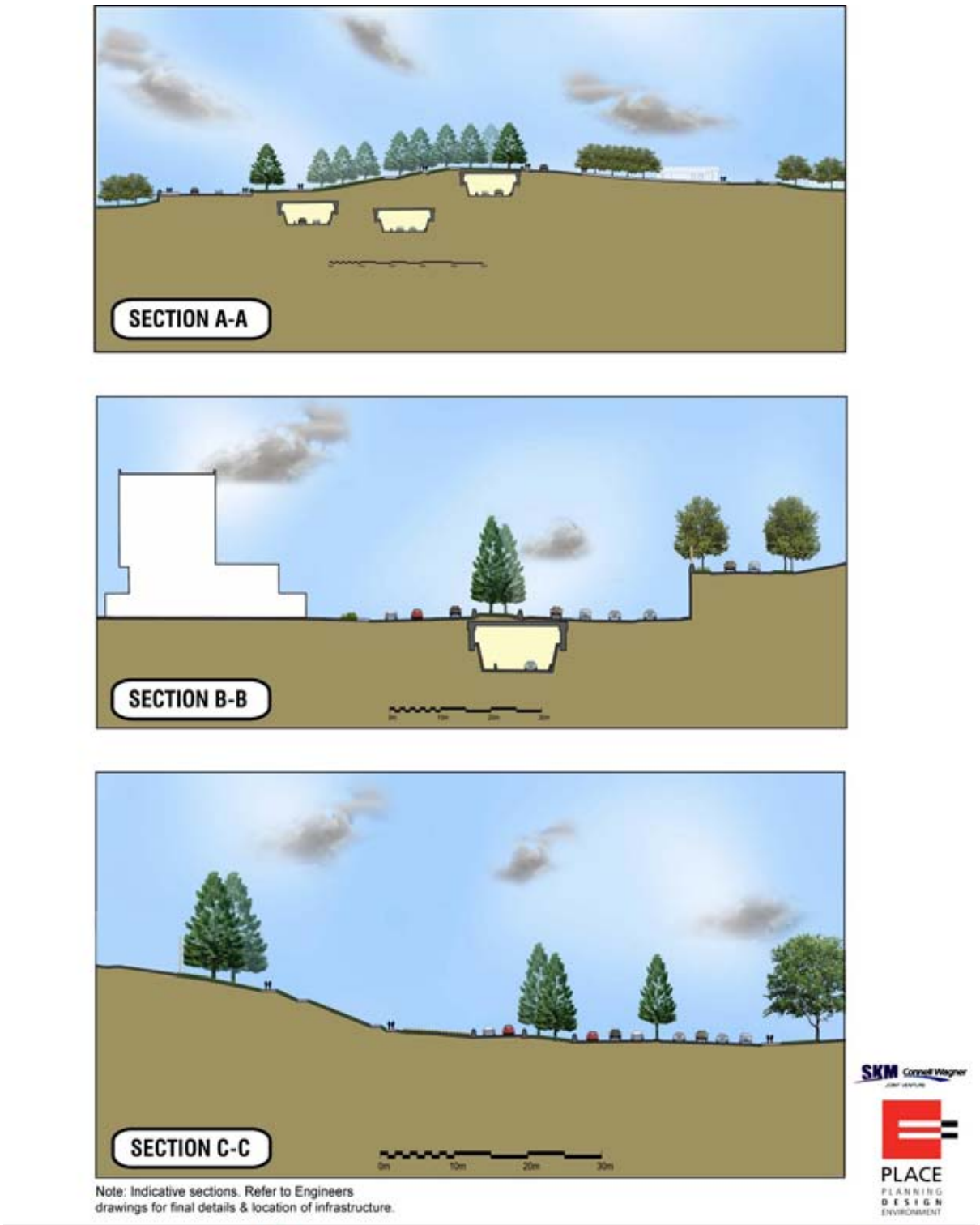


Figure 4-13 Urban and Landscape Design Sections – Kelvin Grove Connection

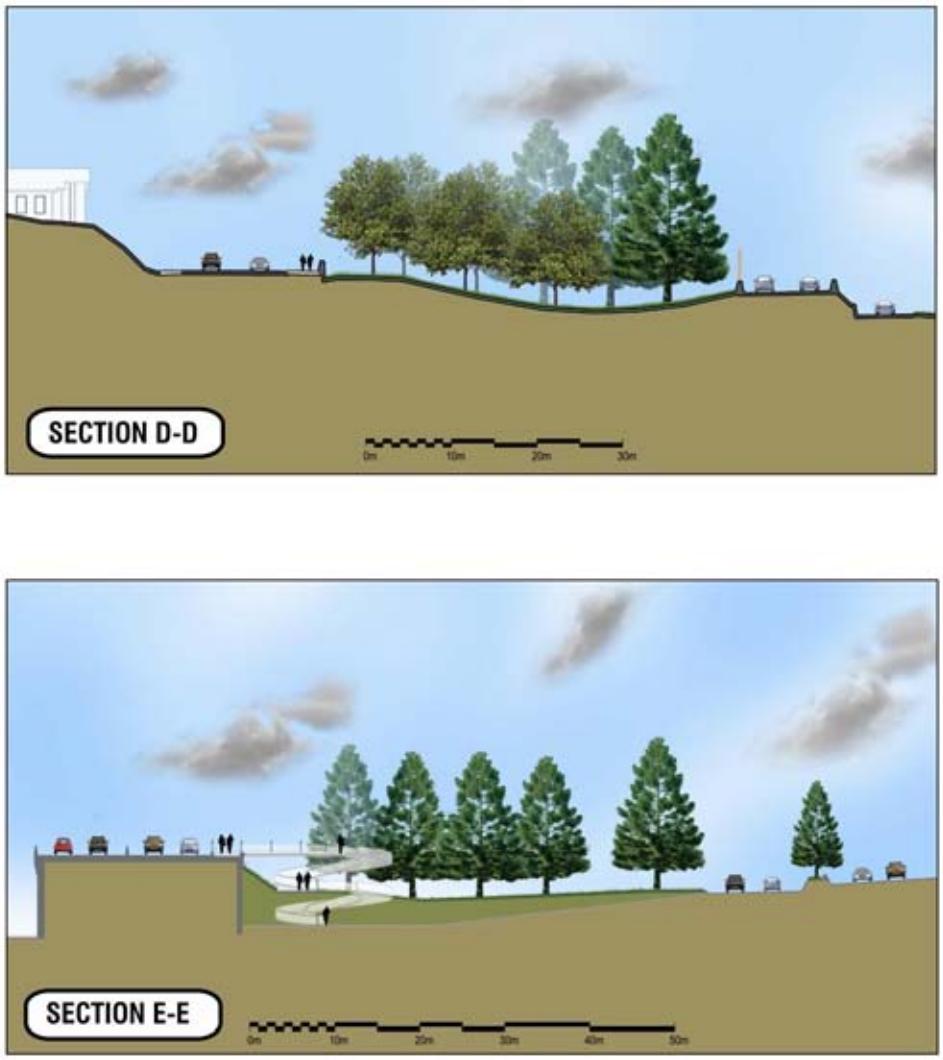


Figure 4-14 Urban and Landscape Design Sections – Kelvin Grove Connection

5. Visual Assessment Methodology

The ToR requires the following:-

- *assessing the likely visual impacts of the proposed works on the landscape and changes to the landscape.*

The following methodology describes how this report answers the ToR.

Methodology

In the ever evolving landscapes that people create and live within, visual effects are the evidence of development and progression. Be it the fabric, the quality and the character of the landscape, the views and changing perspectives of the landscape are experienced by people in many ways.

This form of assessment has been based on a select number of resourced and referenced assessment documents; however the methodology is generally based on 'The Guidelines for Landscape and Visual Impact Assessment' (LI and IEMA, 2002).
Evaluations are therefore made while referencing site specific observations of landscape character and spatial form.

Assessment Criteria

Effects are assessed by describing the composition of the existing landscape. This is performed with certain detail taking into consideration the topography, land use, built form, infrastructure and the natural environment, among other components.

The importance of sensitivity and impact to the components are assessed by accounting for the proposed and foreseeable changes.

The scope to which a landscape can take up proposed change is variable to a number of factors:

- existing land use
- pattern of the landscape
- scale of the landscape
- visual enclosure
- visual receptors
- scope for mitigation
- value of landscape

Potential impacts and proposed changes in the landscape can relate to elements, features and characteristics. This can occur in existing features and to the addition of new features. The Visual Assessment therefore

considers how the landscape will take on and interact with changes to the landscape character. The criteria below, provides a scope of measurement to carry out the Visual Assessment process.

View Sensitivity

In order to identify the extent and nature of views, a series of representative and entitled Vantage Points are selected. The characteristics of the visual amenity and potentially sensitive receptors are accounted with the selected vantage points. Using the sensitivity guide below, mitigation measures can be determined and presented conceptually.

View sensitivity is ***high*** when viewed from private dwellings by residents. Viewers are familiar and knowledgeable with the overlying character. Recurrent and static views are experienced in this viewing situation.

Landscapes of a ***significant*** sensitivity are generally viewed from open spaces and informal recreational facilities where a quality view is important. Views are observed at various low speeds of passage.

Sensitivity is ***moderate*** when viewed from public facilities and commercial / employment / education for example. The viewer is familiar with the landscape but with a reduced value as it is of a secondary nature.

Views from surrounding road and rail infrastructure networks are of ***limited*** sensitivity. Viewers gain transient views where speed of passage is of a somewhat greater velocity than pedestrian movement. Therefore sensitivity is encountered through momentary glimpses.

Low view sensitivity applies to travel routes and road corridors or recreation areas, not included above, where visual quality is of less concern to typical users. These may include non-recreational open space areas.

5. High View Sensitivity
4. Significant View Sensitivity
3. Moderate View Sensitivity
2. Limited View Sensitivity
1. Low View Sensitivity

Visual Impact

The visual effect and its significance can then be gauged to appraise the mode of mitigation measures to enhance or minimize the effect. Visual effects are not always found to be detrimental and are in fact welcomed as beneficial impacts to support mitigation measures. The following scale can be used to consider the mitigation approach.

Substantial Adverse:	Significant deterioration of view
Adverse:	Noticeable deterioration of view
Neutral:	No discernable deterioration or improvement of view
Beneficial:	Noticeable improvement of view
Substantial Beneficial:	Significant improvement of view

Mitigation Process

Mitigation measures for perceived visual impacts are shown in selected graphic formats as part of this EIS phase. The perceived visual benefits and impacts are presented as digitally generated plans and sections, and perspectives in digitally illustrated form. The mitigation measures relate to the urban design, landscape and visual goals, principles and objectives for the project. Consideration for a range of treatments on visual elements and urban design opportunities are paramount. Measures are incorporated into surface landscaping, portal design, ramp design and siting and design of surface structures.

Assessment and Evaluation

The scope and the objective schema for Visual Assessment based on the selected Vantage Points can then be developed graphically and tabulated with descriptive text. The Vantage Point series presents the existing landscape and predict the prospective effect and demonstrates a viable mitigation concept. The format is a combination of a graphic sequence and description table.

Graphic Sequence

Image View:	Shows the existing on the ground landscape and character using conventional photography with some aerial imagery, in consideration of the subject areas, study locations and vantage points of the intended concept design.
Section View:	Shows the same segment of existing landscape with superimposed digital 3D modelling of the intended impact of the design changes using digital artistry.
Perspective View:	Shows the foreseeable landscape effect with future mitigation and character in refined digital illustration quality as a photomontage.

Description Table

Vantage Point:	Location, connections, proximity and reference.
View Sensitivity:	Evaluates the visual amenity and potentially sensitive receptors.
View Impact:	Gauges the visual effect and its significance to the existing landscape.
Mitigation Efficiency:	Comparative statement surmising sensitivity and impact with the mitigation intent.

Rating Graduations

View Sensitivity:

The overall rating of view sensitivity, through value and vulnerability is scaled as follows.

★☆☆☆☆	1 star rating:	Low View Sensitivity
★★☆☆☆	2 star rating:	Limited View Sensitivity
★★★☆☆	3 star rating:	Moderate View Sensitivity

★★★★☆	4 star rating:	Significant View Sensitivity
★★★★★	5 star rating:	High View Sensitivity

Visual Impact:

The overall rating of visual impact, through observer contact is scaled as follows.

★☆☆☆☆	1 star rating:	Substantial Adverse:	Significant deterioration of view
★★☆☆☆	2 star rating:	Adverse:	Noticeable deterioration of view
★★★☆☆	3 star rating:	Neutral:	No discernable change of view
★★★★☆	4 star rating:	Beneficial:	Noticeable improvement of view
★★★★★	5 star rating:	Substantial Beneficial:	Significant improvement of view

Mitigation Efficiency:

The overall rating of mitigation treatment, quality and efficiency is scaled as follows.

★☆☆☆☆	1 star rating:	Basic level of mitigation treatment is required
★★☆☆☆	2 star rating:	Acceptable level of mitigation treatment is required
★★★☆☆	3 star rating:	Good level of mitigation treatment is required
★★★★☆	4 star rating:	High level of mitigation treatment is required
★★★★★	5 star rating:	Excellent level of mitigation treatment is required

Base Mapping

The Visual Assessment documentation is further supported by a series of base maps to pin point the Vantage Points from which photos were taken. Vantage Points are marked in context and supported with character images and notation to provide a plan view perspective of scale and landscape value and interest.

5.1 Visual Assessment at Operational Phase

The methodology and assessment process, as outlined above, describes the prospective changes to the landscape and interpretations of mitigation as seen from selected Vantage Points. The illustrative photo-montage

series evaluates the foreseeable visual effects and residual character of the ever evolving landscape that is experienced by the people who create it and live within it.

The visual assessment series is presented using key plans to inform the user of the location of Vantage Points from which photos were taken; following these is the visual assessment tables with before and after images.

5.1.1 Visual Assessment for Western Connection

Vantage Points: Western Connection

VANTAGE POINTS

1. Western Freeway driving inbound with Mount Coot-tha Gardens to the left.
2. Western Freeway looking outbound with ANZAC Park to the left.
3. Birdwood Terrace panoramic view over Toowong Cemetery.
4. Intersection of Birdwood Terrace and Richer Street.
5. Mount Coot-tha Lookout view across to Mount Coo-tha Botanic Gardens and Western Freeway.
6. Wool Street looking across Anzac Park and the Dog Off Leash Area.

PHOTOGRAPHIC VANTAGE POINT | VIEW (LINE OF SIGHT) | LOCATION OF PORTALS | W1 POSSIBLE VENTILATION LOCATIONS

Vantage Point: WC1

IMAGE VIEW:

INTEGRATED VIEW:

VISUAL PERCEPTION:

VISUAL ASSESSMENT

VANTAGE POINT	VISUAL DISTANCE	VIEW PERIOD	VIEW SENSITIVITY	VIEW IMPACT	MITIGATION
WC1	0 - 50m	Limited	★★★☆☆	★★☆☆☆	★★★☆☆
Western Freeway heading inbound in north-easterly direction. Transition section with portals.	Immediate surrounding bushland of Mt. Coot-tha Botanic Gardens to the left and scattered trees and grass in Anzac Park to the right.	Vehicles in motion, with heavy regular commuter and transport traffic. Visible signage.	Due to changed views on approach to Mt. Coot-tha junction with noticeable impact in immediate and middle distance for the length of the proposed infrastructure.	Noticeable deterioration of view by driver due to embankments and transition zone to portal	Landscape enhancements and stabilisation of eastern and western embankments to improve visibility along Western Freeway. Reinstatement of existing vegetation.

Vantage Point: WC2

IMAGE VIEW:

INTEGRATED VIEW:

VISUAL PERCEPTION:

VISUAL ASSESSMENT

VANTAGE POINT	VISUAL DISTANCE	VIEW PERIOD	VIEW SENSITIVITY	VIEW IMPACT	MITIGATION
WC2	100 - 200m	Moderate	★★★☆☆	★★☆☆☆	★★★☆☆
Western Freeway heading outbound in a westerly direction with the tunnel portals in view.	Middle-ground focus on the Western freeway with the interface of Portals and signage.	Vehicles in motion, pedestrians, cyclists, heavy regular commuter and transport traffic.	Due to transient views of new western embankment in the middle-ground.	Noticeable deterioration of view due to embankments, transition zone and portals.	Landscape enhancements and stabilisation of western embankment to improve visibility along Western Freeway.

Vantage Point: WC3

IMAGE VIEW:

INTEGRATED VIEW:

VISUAL PERCEPTION:

VISUAL ASSESSMENT

VANTAGE POINT	VISUAL DISTANCE	VIEW PERIOD	VIEW SENSITIVITY	VIEW IMPACT	MITIGATION
WC3	10 - 1000m	Moderate	★★★★☆	★★☆☆☆	★★★☆☆
Birdwood Terrace panoramic view over Toowong Cemetery	Middle-ground focus on the Cemetery and beyond in the direction of the Western Freeway.	Pedestrians, cyclists, and residential aspects.	Due to transient views across the Cemetery and the downward sloping embankments.	Noticeable deterioration of view due to the high vantage point showing the location of Ventilation complex.	Some landscape enhancements required to add to effect of dense existing vegetation canopies.

Vantage Point: WC4

IMAGE VIEW:

INTEGRATED VIEW:

VISUAL PERCEPTION:

VISUAL ASSESSMENT

VANTAGE POINT	VISUAL DISTANCE	VIEW PERIOD	VIEW SENSITIVITY	VIEW IMPACT	MITIGATION
WC4	10 - 600m	Significant	★★★★☆	★★☆☆☆	★★★☆☆
Intersection of Birdwood Terrace & Richer Street looking across towards Mount Coot-tha Gardens and the Western Freeway	Middle-ground focus on the white Planetarium dome in the Mount Coot-tha gardens area.	Pedestrians, vehicles, cyclists, and static residential aspects.	Due to transient views across the residential streets and dwellings on the downward sloping embankments.	Noticeable deterioration of view due to the high vantage point showing the location of Ventilation complex.	Landscape enhancements and reinstatements required to add to existing effect of dense vegetation canopies.

Vantage Point: WC5

IMAGE VIEW:

INTEGRATED VIEW:

VISUAL PERCEPTION:

VISUAL ASSESSMENT

VANTAGE POINT	VISUAL DISTANCE	VIEW PERIOD	VIEW SENSITIVITY	VIEW IMPACT	MITIGATION
WC5	100- 10,000m	Significant	★★★★☆	★★☆☆☆	★★★☆☆
Mount Coot-tha Lookout looking towards the Western Freeway road alignment with the CBD on horizon.	Middle-ground focus on the Western Freeway and the white Planetarium dome in the Mount Coot-tha Botanic Gardens.	Pedestrians, cyclists, and static lookout aspects. (some enhanced telescopic views are possible from lookout)	Due to transient views across Mount Coot-tha Gardens and dense vegetation on downward sloping embankments.	Noticeable deterioration of view due to the high vantage point showing the location of portals and Ventilation complex.	Landscape enhancements and reinstatements required to add to soften impact of major infrastructure presence.

Vantage Point: WC6

IMAGE VIEW:

INTEGRATED VIEW:

VISUAL PERCEPTION:

VISUAL ASSESSMENT

VANTAGE POINT	VISUAL DISTANCE	VIEW PERIOD	VIEW SENSITIVITY	VIEW IMPACT	MITIGATION
WC6	10 - 1000m	Moderate	★★★★☆	★★★☆☆	★★★☆☆
Wool Street looking across Anzac Park and the Dog Off Leash Area.	Middle-ground focus on the vegetation layers in the direction of the Western Freeway.	Pedestrians, cyclists, and residential dwelling aspects.	Due to potential residential views from Wool Street and through Anzac Park.	Nodiscernable change of view due to the dense vegetation screening the location of Ventilation complex.	Some landscape enhancements and reinstatement at the Ventilation complex site required to add to effect of dense existing vegetation canopies.

5.1.2 Visual Assessment for Toowong Connection

Vantage Points: Toowong Connection

PHOTOGRAPHIC VANTAGE POINTS

1. Miskin Street looking towards the roundabout interchange.
2. Frederick Street looking into the WF flyover with Toowong Cemetery on right.
3. Milton Road looking towards the roundabout interchange.
4. Croydon Street intersection on Milton Road.
5. Quinn Park looking directly at the embankment of Milton Road.
6. Norwood Street road connection to the major intersection entering Milton Road.

PHOTOGRAPHIC VANTAGE POINT | VIEW (LINE OF SIGHT) | LOCATION OF PORTALS | VT1 POSSIBLE VENTILATION LOCATIONS

Vantage Point: TC1

IMAGE VIEW:

INTEGRATED VIEW:

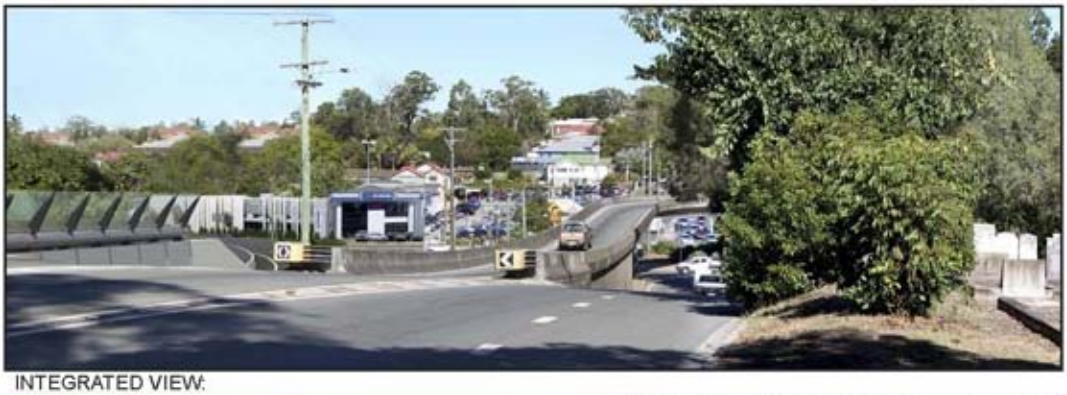
VISUAL PERCEPTION:

VISUAL ASSESSMENT

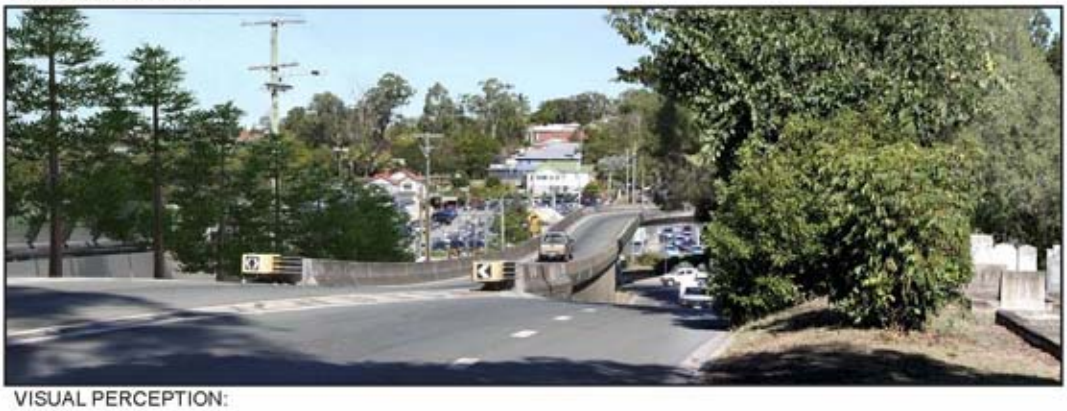
VANTAGE POINT	VISUAL DISTANCE	VIEW PERIOD	VIEW SENSITIVITY	VIEW IMPACT	MITIGATION
TC1	100 - 400m	Significant	★★★★☆	★★☆☆☆	★★★★★
Miskin Street approach to the roundabout and Toowong flyover. Duplication of eastern flyover will be visible.	Immediate surrounds of street trees and houses and existing road infrastructure. Toowong flyover partially screened by existing vegetation in the near distance.	Vehicles in motion or parked along Miskin Street. Pedestrian access along footpath.	Due to changed views from Miskin Street with proposed eastern flyover.	Noticeable deterioration of view due to a partly obstructed view along Miskin Street towards flyovers.	Streetscape enhancement including tree planting in roundabout and required screening of portal areas and elevated structures.

Vantage Point: TC2

IMAGE VIEW:



INTEGRATED VIEW:



VISUAL PERCEPTION:

VISUAL ASSESSMENT

VANTAGE POINT	VISUAL DISTANCE	VIEW PERIOD	VIEW SENSITIVITY	VIEW IMPACT	MITIGATION
TC2	0 - 100m	Significant	★★★★☆	★★☆☆☆	★★★★☆
Western side of Frederick Street approaching proposed eastern flyover with Toowong Cemetery.	Immediate surrounds of houses and footpaths with fringing vegetation along Toowong Cemetery.	Vehicles in motion or parked along Frederick Street, Pedestrian access along footpaths.	Due to changed views from Frederick Street proposed eastern flyover and portals.	Substantial deterioration of view due to the loss of residential interface and planting.	Streetscape enhancement including planting and screening of portals and flyover.

Vantage Point: TC3

IMAGE VIEW:

INTEGRATED VIEW:

VISUAL PERCEPTION:

VISUAL ASSESSMENT

VANTAGE POINT	VISUAL DISTANCE	VIEW PERIOD	VIEW SENSITIVITY	VIEW IMPACT	MITIGATION
TC3	100 - 200m	Moderate	★★★★☆	★☆☆☆☆	★★★★★
Croydon Street intersection with Milton Road on western approach to Toowong flyovers.	Immediate surrounds of Croydon Street and Milton Road - houses, businesses, street trees and existing road infrastructure leading to Toowong flyovers.	Vehicles in motion or parked along Sylvan and Milton Roads. Pedestrian access along footpaths.	Due to distance, topography and existing houses and infrastructure. Change due to proposed eastern flyover and extensive surface works.	Adverse change of view due to loss of residential interface and extensive surface works and elevated structures.	Formal vertical planting to create screening along linear edges of the road surfaces.

Vantage Point: TC4

IMAGE VIEW:

INTEGRATED VIEW:

VISUAL PERCEPTION:

VISUAL ASSESSMENT

VANTAGE POINT	VISUAL DISTANCE	VIEW PERIOD	VIEW SENSITIVITY	VIEW IMPACT	MITIGATION
TC4	0 - 100m	Significant	★★★★☆	★☆☆☆☆	★★★★☆
Milton Road and Quinn Street intersection. Approach to Toowong roundabout and flyover with Toowong Cemetery to the right.	Near and middle distance surrounds of existing roads, houses, footpaths with fringing vegetation.	Vehicles in motion along Milton Road. Pedestrian access along footpaths. Access to residential streets.	Due to significant view changes on Milton Road with the addition of elevated road structures and extensive surface works.	Substantial deterioration of view due to obstructed views along Milton Road towards Toowong flyover and proposed eastern flyover.	Streetscape enhancements along Milton Road and reinforced structures. Screening to soften the vertical extent of retaining structures.

Vantage Point: TC5

IMAGE VIEW:

INTEGRATED VIEW:

VISUAL PERCEPTION:

VISUAL ASSESSMENT

VANTAGE POINT	VISUAL DISTANCE	VIEW PERIOD	VIEW SENSITIVITY	VIEW IMPACT	MITIGATION
TC5	100m	Significant	★★★★★	★☆☆☆☆	★★★★★
Quinn Park looking north towards Milton Road and Quinn Road to the east.	Surrounds of existing parkland backing onto Residential rows with fringing trees.	Pedestrian access along footpaths to open space parkland and informal recreational facilities.	Due to changed views from Milton Road of proposed eastern flyover.	Substantial Adverse deterioration of view due to loss of open space amenity.	Comprehensive visual screening of proposed infrastructure with extensive planting and streetscape treatments.

Vantage Point: TC6

IMAGE VIEW:

INTEGRATED VIEW:

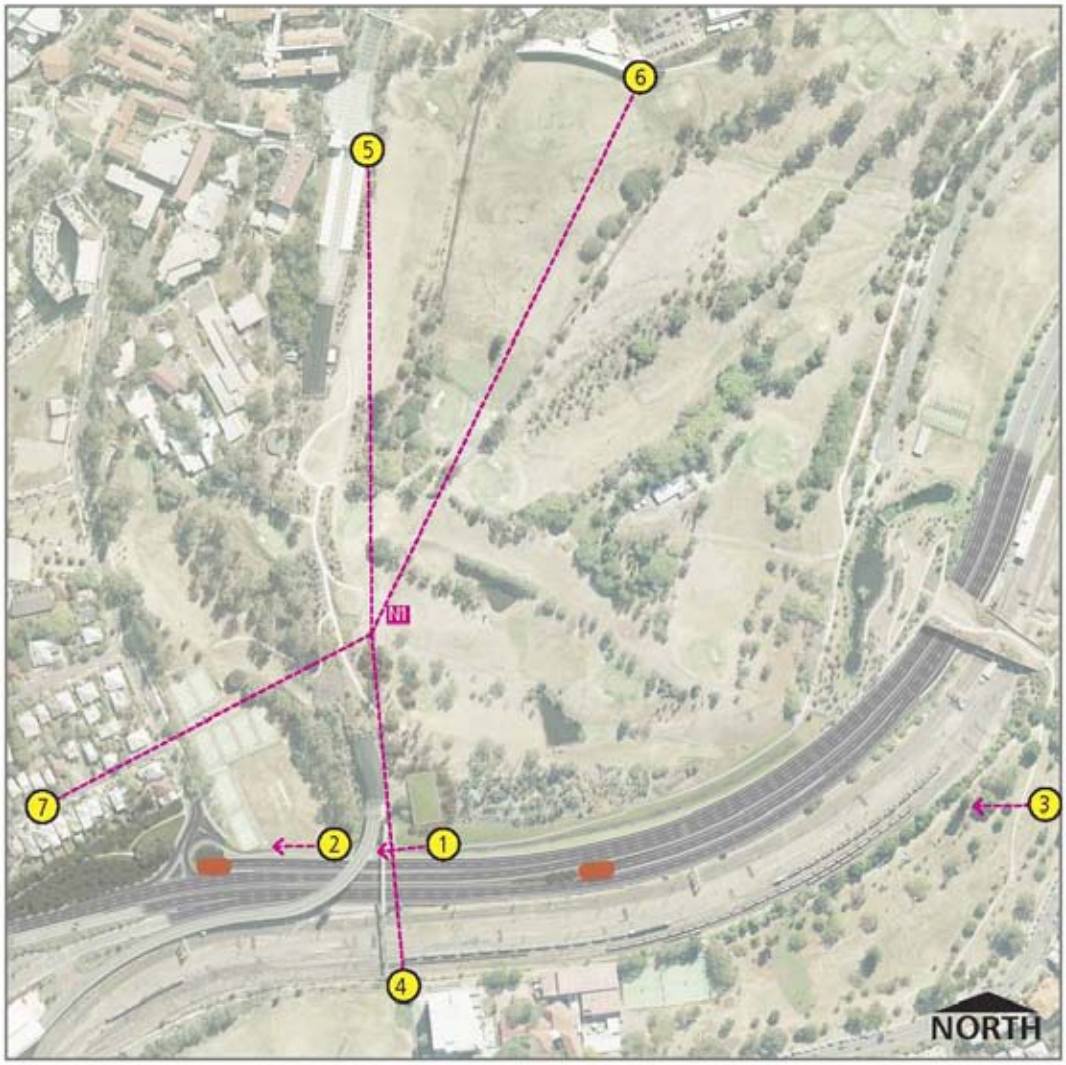
VISUAL PERCEPTION:

VISUAL ASSESSMENT

VANTAGE POINT	VISUAL DISTANCE	VIEW PERIOD	VIEW SENSITIVITY	VIEW IMPACT	MITIGATION
TC6	100m	Significant	★★★★★	★☆☆☆☆	★★★★★
Norwood Street road connection to the major intersection entering Milton Road.	Surrounds of existing parkland backing onto Residential rows with fringing trees.	Pedestrian access along footpaths of road connection and medium to heavy commuter traffic.	Due to changed views from Milton Road of proposed elevated flyover structures.	Substantial Adverse deterioration of view due to loss of pedestrian and spatial amenity .	Comprehensive visual screening of proposed infrastructure with extensive planting and streetscape treatments.

5.1.3 Visual Assessment for Northern Connection

Vantage Points: Northern Connection



VANTAGE POINTS

1. Inner City Bypass pedestrian path heading inbound approaching ICB pedestrian bridge.
2. Inner City Bypass pedestrian path heading inbound adjacent to BGS playing fields.
3. Gregory Terrace and Gregory Grove through Victoria Park and ICB.
4. Pedestrian ICB overpass at BGS end across to QUT Kelvin Grove campus and INB canopy.
5. QUT Kelvin Grove campus busway station.
6. Victoria Park Driving Range.
7. Normanby Terrace looking across Victoria Park Road and BGS Tennis Courts.

PHOTOGRAPHIC VANTAGE POINT | VIEW (LINE OF SIGHT) | LOCATION OF PORTALS | N1 POSSIBLE VENTILATION LOCATIONS

Vantage Point: NC1

IMAGE VIEW:

INTEGRATED VIEW:

VISUAL PERCEPTION:

VISUAL ASSESSMENT

VANTAGE POINT	VISUAL DISTANCE	VIEW PERIOD	VIEW SENSITIVITY	VIEW IMPACT	MITIGATION
NC1	200m	Moderate	★★★☆☆	★★☆☆☆	★★★☆☆
Inner City Bypass near Inner Northern Busway bridge passing Victoria Park.	Beside the ICB surface road towards the portal from Kelvin Grove Road in middle distance.	Vehicles in motion, heavy regular commuter and transport traffic with pedestrians and cyclists using other adjacent accessways.	Due to presence of portal within existing infrastructure elements.	Noticeable deterioration due to portal presence. Changes to existing landscape on northern side embankments	Landscape enhancements, stabilisation of embankments to improve visual amenity along ICB.

Vantage Point: NC2

IMAGE VIEW:

INTEGRATED VIEW:

VISUAL PERCEPTION:

VISUAL ASSESSMENT

VANTAGE POINT	VISUAL DISTANCE	VIEW PERIOD	VIEW SENSITIVITY	VIEW IMPACT	MITIGATION
NC2	100m	Moderate	★★★☆☆	★★☆☆☆	★★★☆☆
Inner City Bypass passing Victoria Park Road. Looking in a westerly direction.	Immediate streetscape with portal presence outbound from Kelvin Grove Road.	Vehicles in motion, heavy regular commuter and transport traffic with pedestrians and cyclists using other adjacent accessways.	Due to presence of portal within this major infrastructure and institutional precinct.	Noticable change of view due to proposed portal and constructed embankments.	Landscape enhancements and screening to embankments on nothern side along ICB.

Vantage Point: NC3

IMAGE VIEW:

INTEGRATED VIEW:

VISUAL PERCEPTION:

VISUAL ASSESSMENT

VANTAGE POINT	VISUAL DISTANCE	VIEW PERIOD	VIEW SENSITIVITY	VIEW IMPACT	MITIGATION
NC3	500 - 1500m	Low	★★★☆☆	★★☆☆☆	★★★☆☆
Victoria Park, from Gregory Terrace level, overlooking the Inner City Bypass.	Looking through Victoria Park towards ICB area across to St. Brigid's Church and Mt. Coot-tha on the horizon.	Distant glimpse by pedestrians, cyclists and park users.	Due to proposed Portal area noticeable in the middle distance as part of the existing ICB.	Noticeable change in view due to works associated with the portal area.	Landscape enhancements to embankments north of the ICB.

Vantage Point: NC4

IMAGE VIEW:

INTEGRATED VIEW:

VISUAL PERCEPTION:

VISUAL ASSESSMENT

VANTAGE POINT	VISUAL DISTANCE	VIEW PERIOD	VIEW SENSITIVITY	VIEW IMPACT	MITIGATION
NC4	200m	Moderate	★★★☆☆	★★☆☆☆	★★★☆☆
Pedestrian ICB overpass at BGS end across to QUT Kelvin Grove campus and INB canopy.	Middle-ground views of transport infrastructure modes and elevated pedestrain bridging towards the embankments of Victoria Park	Glimpses on various levels by pedestrians, vehicle drivers, cyclists and park users.	Due to current presence of extensive structural features into the landscape terrain.	Noticeable change of view due to the location of the proposed ventialation complex.	Landscape enhancements to areas north of the ICB beyond the Victoria Park embankments seen.

Vantage Point: NC5

IMAGE VIEW:

INTEGRATED VIEW:

VISUAL PERCEPTION:

VISUAL ASSESSMENT

VANTAGE POINT	VISUAL DISTANCE	VIEW PERIOD	VIEW SENSITIVITY	VIEW IMPACT	MITIGATION
NC5	200m	Moderate	★★★☆☆	★★★☆☆	★★★☆☆
QUT Kelvin Grove campus busway station view from within the overpass enclosure.	Middle-ground views of transport infrastructure and surrounding Victoria Park Golf Course and Driving Range.	Glimpses on various levels by pedestrians, public transport patrons and cyclists.	Due to current presence of extensive structural features into the landscape terrain.	Noticeable change of view due to the location of the proposed ventialation complex.	Landscape reinstatement and enhancements required to soften the presence of the Ventilation structures.

Vantage Point: NC6

IMAGE VIEW:

INTEGRATED VIEW:

VISUAL PERCEPTION:

VISUAL ASSESSMENT

VANTAGE POINT	VISUAL DISTANCE	VIEW PERIOD	VIEW SENSITIVITY	VIEW IMPACT	MITIGATION
NC6	200m	Moderate	★★★☆☆	★★★☆☆	★★★☆☆
Victoria Park Golf Course Driving Range from the edge of the carpark and platform embankment.	Middle-ground views of Driving Range and surrounding Victoria Park grounds.	Glimpses on various levels by pedestrians, private vehicles and Golf Course patrons.	Due to existing Driving Range configuration and surrounding landscape terrain.	No discernable change of view due to the location of the proposed ventialation complex.	Landscape reinstatement and enhancements required at the Ventilation structure site.

Vantage Point: NC7

IMAGE VIEW:

INTEGRATED VIEW:

VISUAL PERCEPTION:

VISUAL ASSESSMENT

VANTAGE POINT	VISUAL DISTANCE	VIEW PERIOD	VIEW SENSITIVITY	VIEW IMPACT	MITIGATION
NC7	200m	High	★★★★★	★☆☆☆☆	★★★★★
Normanby Terrace looking across Victoria Park Avenue and the BGS Tennis Courts.	Middle-ground views of Victoria Park embankments and existing vegetation.	Glimpses on various levels a residential precinct by pedestrians, cyclists, private vehicles and residents.	Due to existing Residential aspect and views across surrounding landscape terrain.	Significant deterioration of view due to the location of the proposed ventialation complex.	Landscape reinstatement and enhancements required at the Ventilation structure site.

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5.1.4 Visual Assessment for Kelvin Grove Connection

Vantage Points: Kelvin Grove Connection

VANTAGE POINTS

1. Musk Avenue intersection, Kelvin Grove Urban Village gateway.
2. Musk Avenue intersection view from 'The Hub' podium, Kelvin Grove Urban Village.
3. Normanby Terrace pedestrian overpass looking over Kelvin Grove Road.
4. Lower Clifford Terrace looking into KGUV intersection the QUT 'The Hub' building.

PHOTOGRAPHIC VANTAGE POINT | VIEW (LINE OF SIGHT) | LOCATION OF PORTALS | N1 POSSIBLE VENTILATION LOCATIONS

Vantage Point: KG1

IMAGE VIEW:

INTEGRATED VIEW:

VISUAL PERCEPTION:

VISUAL ASSESSMENT

VANTAGE POINT	VISUAL DISTANCE	VIEW PERIOD	VIEW SENSITIVITY	VIEW IMPACT	MITIGATION
KG1	50 - 100m	Moderate	★★★☆☆	★★☆☆☆	★★★★☆
Musk Avenue intersection with Kelvin Grove Road looking south-west.	Immediate streetscape view towards portal area.	Vehicles in motion, pedestrians, cyclists, heavy regular commuter and transport traffic.	Due to changed views with proposed portal area.	Adverse deterioration of view due to works associated with the portal and embankments.	Streetscape enhancements with screening and planting along the western side of Kelvin Grove Road.

Vantage Point: KG2

IMAGE VIEW:

INTEGRATED VIEW:

VISUAL PERCEPTION:

VISUAL ASSESSMENT

VANTAGE POINT	VISUAL DISTANCE	VIEW PERIOD	VIEW SENSITIVITY	VIEW IMPACT	MITIGATION
KG2	50 - 100m	Significant	★★★★☆	★☆☆☆☆	★★★★☆
Musk Avenue intersection with Kelvin Grove Road, in a southerly direction.	Immediate streetscape with portal presence outbound from Kelvin Grove Road.	Vehicles in motion, pedestrians, cyclists, heavy regular commuter and transport traffic.	Due to changed elevated views with proposed portal area and associated infrastructure works.	Substantial deterioration of view due to proposed portal areas and loss of residences with associated embankments.	Streetscape enhancements to screen and soften proposed portal areas along western side of Kelvin Grove Road.

Vantage Point: KG3

IMAGE VIEW:

INTEGRATED VIEW:

VISUAL PERCEPTION:

VISUAL ASSESSMENT

VANTAGE POINT	VISUAL DISTANCE	VIEW PERIOD	VIEW SENSITIVITY	VIEW IMPACT	MITIGATION
KG3	200 - 400m	Significant	★★★★☆	★★★☆☆	★★★★☆
Kelvin Grove Road heading outbound from the City and looking in a northerly direction.	Immediate streetscape with portal presence outbound from Kelvin Grove Road.	Vehicles in motion, pedestrians, cyclists, heavy regular commuter and transport traffic.	Due to changed elevated views with proposed portal area and associated infrastructure works.	Noticable deterioration of view due to works associated with portal areas, transition areas and associated embankments.	Streetscape enhancements to screen and soften proposed portal areas along western side of Kelvin Grove Road.

Vantage Point: KG4

IMAGE VIEW:

INTEGRATED VIEW:

VISUAL PERCEPTION:

VISUAL ASSESSMENT

VANTAGE POINT	VISUAL DISTANCE	VIEW PERIOD	VIEW SENSITIVITY	VIEW IMPACT	MITIGATION
KG4	0 - 50m	Moderate	★★★☆☆	★★☆☆☆	★★★★☆
Musk Avenue intersections with Kelvin Grove Road, and Lower Cliffton Terrace heading outbound from the City in a northerly direction.	Immediate streetscape and topography upon transition zone and portal areas.	Vehicles in motion, pedestrians, cyclists, heavy regular commuter and transport traffic	Due to changed elevated views with proposed portal area and associated infrastructure works.	Noticeable deterioration of view due to transition zone and tunnel portals.	Streetscape enhancements to screen and soften proposed portal areas along western side of Kelvin Grove Road.

6. Conclusion

The key urban design, landscape and visual aim for the Northern Link Project is to assist with the integration of tunnel and surface infrastructure with the existing environment and where possible provide increased cultural, economic and environmental benefits to the local community and the city as a whole.

This report has addressed the ToR by describing and illustrating the following:-

- The potential impacts of the EIS Reference Design on each key location through observation and analysis; and,
- The mitigation measures which were based on the urban landscape and visual guidelines with reference to the principles, goals and objectives for the project and the BCC City Plan 2000 in combination with Living in Brisbane 2026.

This has resulted in the preparation of urban design and landscape concepts to achieve a high quality urban outcome to ensure the integration of:

- The tunnel infrastructure;
- The tunnel operation infrastructure;
- Surface works into existing surface movement networks;
- Surface works into existing commercial centres; and,
- New open spaces as a result of project works.

The concepts have achieved this by following the urban design, landscape and visual guidelines relating to sustainable design principles, goals and objectives set out sections 2.4 & 2.3 respectively. Tenderers will apply their own urban design and landscape approach, however they must adopt the project principles, goals, objectives and guidelines set out in this report.

In accordance with the ToR, the concepts relate to the key locations affected by the tunnel surface works at the Western Connection, the Toowong Connection, the Kelvin Grove Connection and the Northern Connection. The following is a summary of the key issues and mitigations in each connection.

6.1 The Western Connection

The main impacts on Western Connection are the 800m long transition structures which extend along the Western Freeway and require the construction of embankment cuttings into the existing vegetated hills of Brisbane Forest Park. This will be mitigated by planting appropriate species on the cuttings and medians to retain the integrity of this gateway experience. The existing pedestrian/cycle route along the southern edge of the Western Freeway will be re-aligned to the southern side of the southern transition structure, and connected to the new pedestrian/cycle bridge across the Western Freeway to Mt. Coot-tha. The ventilation outlet and station will be located in between the Botanic Gardens and the Western Freeway; the base of which will be screened to maintain minimal visual impact on surrounding residential areas. The other key impact is the location of the worksite in between the Botanic Gardens and the Western Freeway with a spoil conveyor running through Brisbane Forest Park to the Mt. Coot-tha Quarry. This corridor will be rehabilitated and revegetated with a species palette reflecting the biodiversity of this area of Brisbane Forest Park. The worksite next to the Botanic Gardens will be rehabilitated in consultation with the Botanic Gardens to provide for a portion of their expansion aims.

Whilst the horizontal width and scale of the Western Freeway will increase, the low level nature of the constructed elements such as the transition structure and the portals means that there will be little increase in the vertical scale. The perceived width of project in this location will be mitigated by the planting of mature trees in the medians.

6.2 The Toowong Connection

The main impacts on the Toowong Connection are the two elevated structures, associated portals and reinforced earth structures over Milton Road before the Frederick Street roundabout. This requires the resumption of properties below Valentine Street and the southern side of Milton Road. The opportunity exists to treat the elevated structures with lighting effects and a strong planted edge with the indigenous stately Hoop Pine to reinforce the curve of the box girder design. The open space south of Valentine presents valuable habitat and screening opportunities for the residents above and a high visual amenity for pedestrians, cyclists, public transport and motorists on Milton Road. The project resumes most of the unusable land within Quinn Park leaving a flat open area which is currently used as a neighbourhood park. The opportunity exists to strengthen the existing design of the park in consultation with stakeholders. The park's interface with the project will be mitigated through the planting of suitable species on the southern side of the walled edge to the park; pedestrian/cycle access is encouraged through the middle of the park along an accessible pathway thereby improving surveillance. Pedestrian/cycle movements on road through the area in general remains challenging, the north/south connections to and from the Brisbane River will be facilitated through the Milton Road intersection. However the opportunity exists to connect the two communities either side of Milton Road by a pedestrian/cycle bridge off the Croydon Street elevated structure from Morley Street into Quinn Park.

Whilst the horizontal width and scale of the Milton Road and Croydon Street will increase, the perceived width of project road infrastructure in this location can be mitigated by the planting of mature trees in the medians.

6.3 The Northern Connection

The main impacts on the Northern Connection are within the existing landscaped open space adjacent to the ICB, which will be mitigated by the extensive replanting of suitable species to provide landscape for both the residents of Normanby Terrace and the users of the ICB. Another key impact is the widening of the ICB to accommodate a portal entrance to the tunnel; this will cut into the open space on the northern edge of the ICB. At present this edge contains a pedestrian/cycle pathway and a gully draining water to York's Hollow further to the east. Both of these uses will remain functional at operational stage. Overall, the mitigation opportunities at this connection centres around connecting pedestrian/cycle into new and existing routes, and providing high amenity landscape planting to the edge of the ICB.

6.4 The Kelvin Grove Connection

The main impacts on the Kelvin Grove connection is due to the widening of Kelvin Grove Road which removes two significant heritage listed figs in Marshall Park and two significant figs in Mc Caskie Park. The other key impacts are the property resumptions on the western side of Kelvin Grove Road to accommodate the tunnel infrastructure. This also creates the challenge of providing pedestrian and cycle connections safely along this edge. The opportunity exists to provide areas of high landscape amenity by planting mature trees over the

majority of open space created. The land below the wall at Lower Clifton Terrace will become a green edge to the busy Hale Street and Kelvin Grove Road; it is proposed that access to this land is limited because of the low surrounding surveillance. The existing access to this area is replaced by an overpass connection off the ICB pedestrian/cycle bridge straight to Lower Clifton Terrace. Further west along Kelvin Grove Road above and beside the portal exit (opposite Musk Avenue) is a newly created open space with topographical challenges. This presents opportunities to create a dramatic and sculptural series of landscaped terraces to counterpoint the 'Artspace' billboard across the road at Kelvin Grove Urban Village. The terraces also act as pedestrian/cycle pathway connecting the community of Kelvin Grove Urban Village with the community of Red Hill at Upper Clifton Terrace. The space above the portal exit will also link this space to Marshall Park by way of a tree lined pathways with ramps in order to traverse the steeply sloping terrain. All of these green spaces connect people to places in a safe manner.

Two of the tunnel portals are situated in Kelvin Grove Road which increases the scale of this road. The mitigations will reduce the perceived width of project road infrastructure by the planting of mature trees in the medians.

7. References

'The Guidelines for Landscape and Visual Impact Assessment' (LI and IEMA, 2002)

BCC City Plan 2000

Living In Brisbane 2026

Lynch, K., The Image of the City, The Mit Press, 1960.

Woods, G. W., Townscape, Oxford University Press, 1997.

Bentley, I. et al. (eds), Responsive Environments, Oxford Books, 1997.

Austroads, Standards Australia, Guide to Traffic Engineering Practice, Bicycles, Part 14

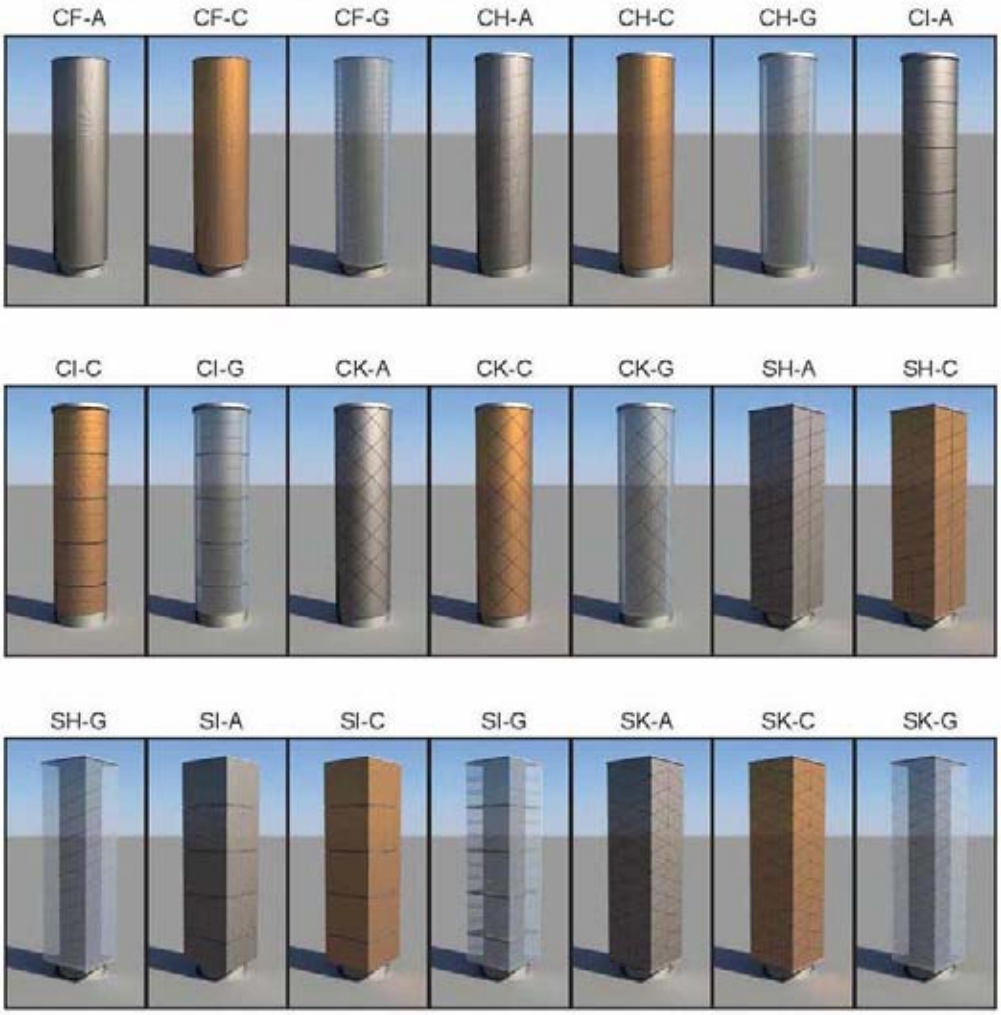
Crime Prevention through Environmental Design Guidelines for Queensland Part A: Essential features for safer places. 2007'

8. Appendix

8.1 Examples of Potential Treatments of Tunnel Infrastructure

Ventilation Outlet Design Exploration

The following is a range of options to explore treatments to these Urban Design Elements.



-A: Alpolic panels fixed on steel structure surrounding concrete stack
-C: Copper panels fixed on steel structure surrounding concrete stack
-G: Glass panels fixed on steel structure surrounding concrete stack

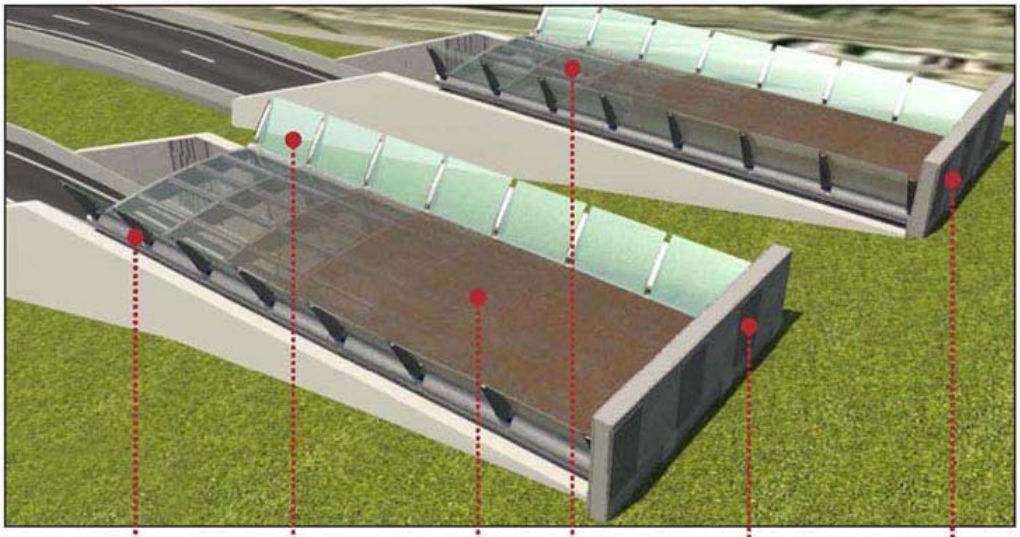
CF series:	Circular Frame-less	Alpolic | Copper | Glass panel options
CH series:	Circular Helix Frame	Alpolic | Copper | Glass panel options
CI series:	Circular Indented Frame	Alpolic | Copper | Glass panel options
CK series:	Circular Double-Helix Frame	Alpolic | Copper | Glass panel options
SH series:	Square Helix Frame	Alpolic | Copper | Glass panel options
SI series:	Square Indented Frame	Alpolic | Copper | Glass panel options
SK series:	Square Double-Helix Frame	Alpolic | Copper | Glass panel options

These preliminary designs are based on a conjectural height of 30m and an approximate ventilation area of 50m² above existing ground level and do not represent confirmed Engineering specifications or outcomes.

Note: Location, extent, height, thickness and structural framing to Engineering plans and specifications. Conceptual and Preliminary only.
Not For Construction

Portals Design Exploration

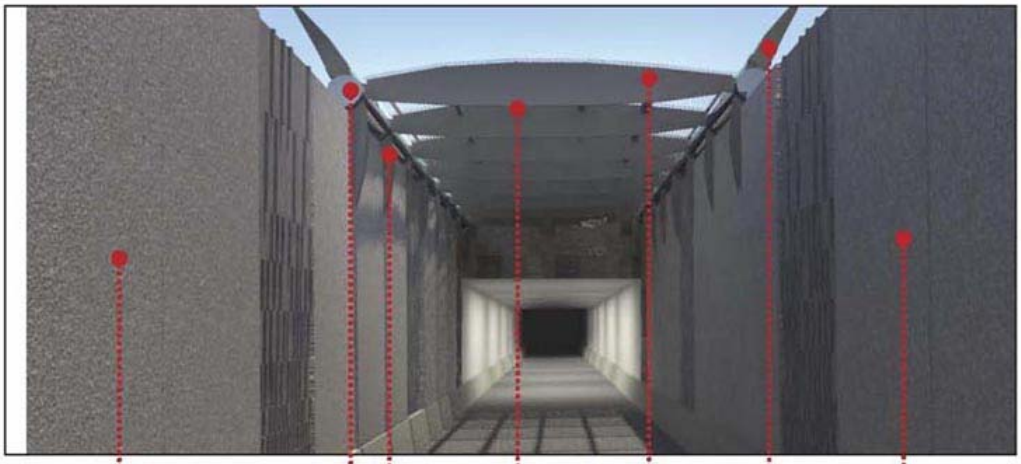
The following is a range of options to explore treatments to these Urban Design Elements.



Noise Barriers
Clear panels on steel frame
These work also as throw barriers depending the relative location of portal levels.

Canopy cover
Multi perforated cooper sheets with placemaking themes patterns to filter light for entering and exiting vehicles. Clear panels to steel frame allow for natural light.

Safety and Throw Barriers
Solid concrete textured panels applied on to structural portal walls.



CHS to engineers details. Allows for storm water collection and reuse.

Steel purlins and channel sections across to frame and panelling support.

Steel beams and brackets inspired in tree leaf cross section

Abstract texture patterns to precast concrete panel walls
Combination of honed, coarse textures.

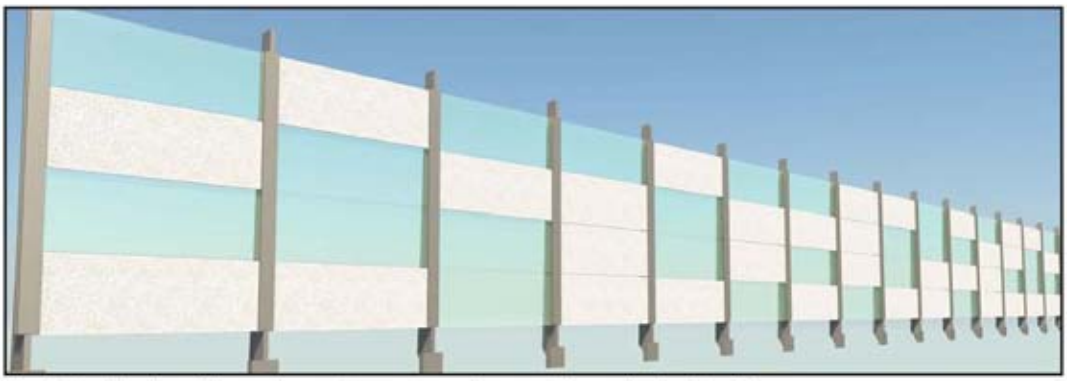
Brackets are scaled, spaced and placed to visually link the canopy to the walls presenting a sense of design unity and consistent visual language for the portal areas.

Pigmentation and aggregates to be based on an earthy hue pallete.

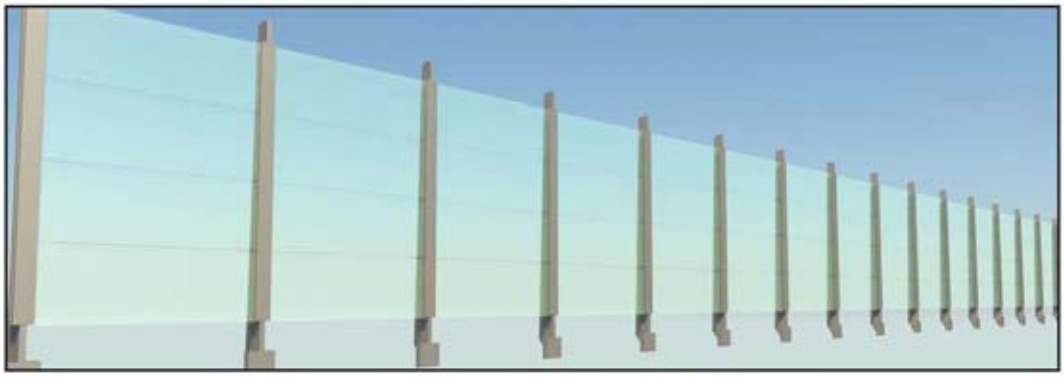
Note: Location, extent, height, thickness and structural framing to Engineering plans and specifications Conceptual and Preliminary only. Not For Construction

Noise Barriers Design Exploration

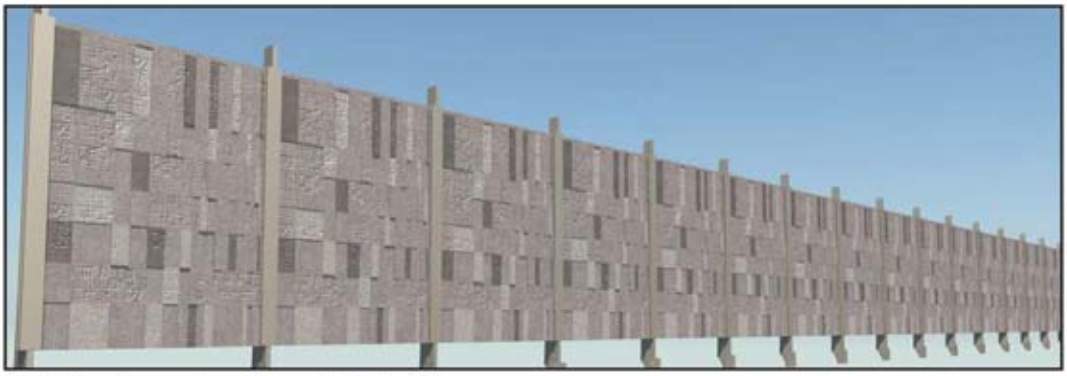
The following is a range of options to explore treatments to these Urban Design Elements.



Type 1: Combination of clear and precast concrete panels mounted on galvanised steel frames
Located where vistas and visual access is required or beneficial
Concrete coarse finish incorporating texture patterns



Type 2: Clear panels mounted on galvanised steel frame
Located where vistas and visual access is required or beneficial

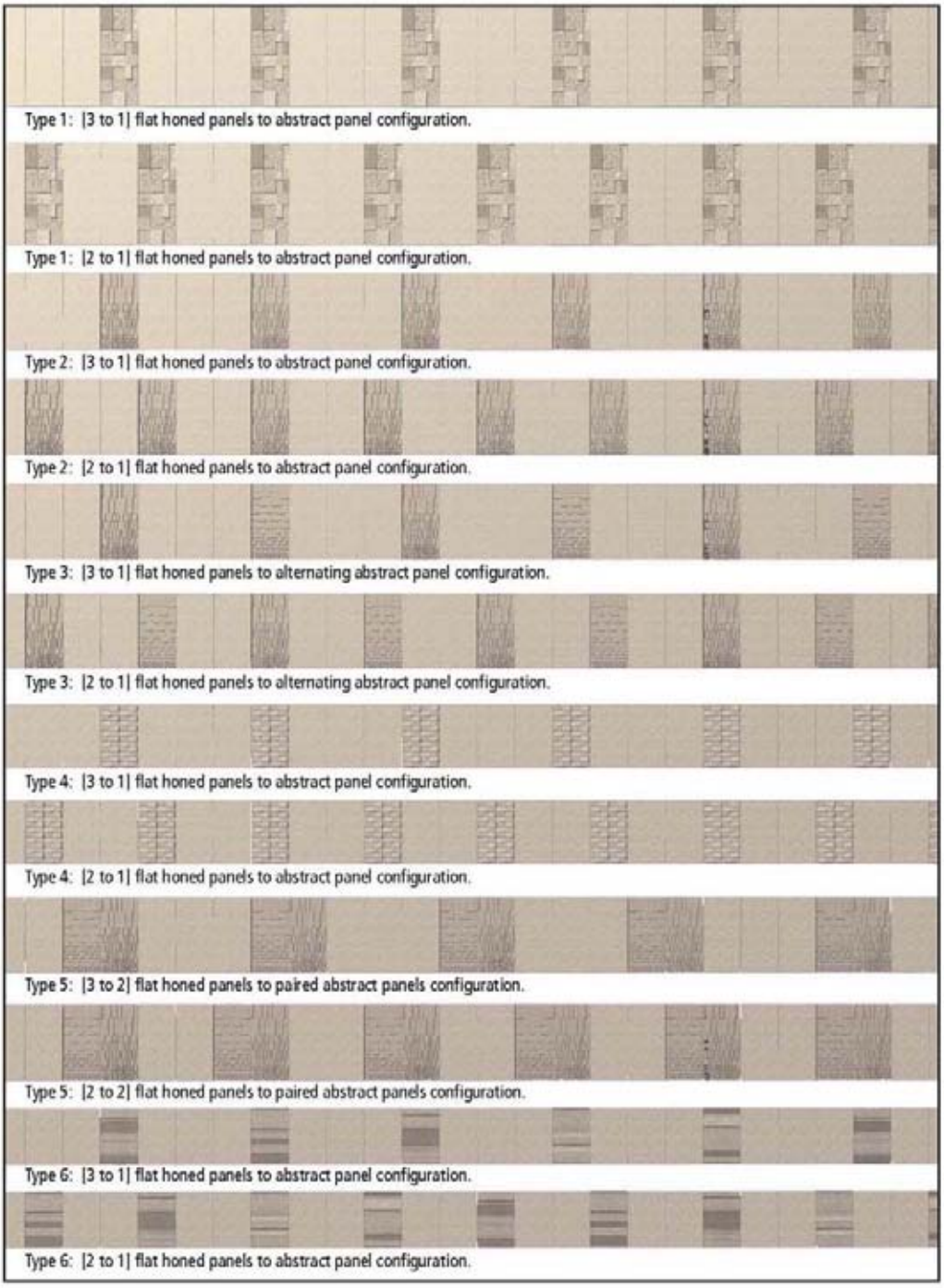


Type 3: Precast concrete panels mounted on steel frames
Located where vistas or visual access is not required
Concrete coarse finish incorporating texture patterns

Note: Location, extent, height, thickness and structural framing to Engineering plans and specifications. Conceptual and Preliminary only.
Not For Construction

Wall Panels Design Exploration

The following is a range of options to explore treatments to these Urban Design Elements.



Note: Location, extent, height, thickness and structural framing to Engineering plans and specifications. Conceptual and Preliminary only. Not For Construction

Refer to Engineers
igs for noise wall
cations and locations.
nsparent material to
ers specifications
noise walls interupt
or sunlight.
PLACE
verge
URBAN LANDSCAPE ARCHITECTURE
Noise Barrier
Nordhavn Link
TOOWONG CONNECTION: NOISE BARRIERS
APPENDIX 8.1

Note: Refer to Engineers drawings for noise wall specifications and locations.

Use transparent material to engineers specifications where noise walls interupt views or sunlight.

It is recommended that the noise barrier along the ICB be modified to enhance the lanscape values for residents and motorists in this location.

PLACE PLANNING DESIGN ENVIRONMENT

SKM Connell Wagner JOINT VENTURE

verge URBAN LANDSCAPE ARCHITECTURE

Note: Refer to Engineers drawings for noise wall specifications and locations.

Use transparent material to engineers specifications where noise walls interupt views or sunlight.

It is recommended that the noise barrier along Marshall Park be modified to protect the lanscape values of this location.

8.2 Planting Palette