Appendix

V

Appendix V

Urban design, landscape character and visual impact

January 2020

Roads and Maritime Services

Western Harbour Tunnel and Warringah Freeway Upgrade

Technical working paper: Urban Design, Landscape Character and Visual Impact Assessment

January 2020

Prepared for

Roads and Maritime

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Contents

Table of contents 2

Executive Summary 3

1. Introduction 5
1.1 Overview 5
1.2 The project 7
1.3 Key construction activities 9
1.4 Project location 10
1.5 Purpose of report 10
1.6 SEARs 10
1.7 Structure of report 12
1.8 Design development 12

2. Policy, planning and urban context 13
2.1 Urban design policy 13
2.2 Landscape and visual amenity policy 14
2.3 Urban context 17

3. Strategic urban design framework 19
3.1 Context 19
3.2 Urban design vision 19
3.3 Project objectives 20
3.4 Urban elements 27

4. Precinct assessment 37
4.1 LCVIA methodology 38
4.2 Landscape character assessment 39
4.3 Visual impact assessment 39
4.4 Photomontages 40
4.5 Key methodology reference documents 40
4.6 Rozelle precinct 41
4.7 North Sydney precinct 59
4.8 Artarmon precinct 125

5. Construction support sites 139
5.1 Approach 139
5.2 Victoria Road (WHT2) 141
5.3 White Bay (WHT3) 147
5.4 Yurulbin Point (WHT4) and Sydney Harbour south cofferdam (WHT5) 153
5.5 Sydney Harbour north cofferdam (WHT6) and Berrys Bay (WHT7) 163
5.6 Ridge Street north (WHT9) 175
5.7 Construction support sites - Visual impact summary 181

6. Mitigation strategy 183
6.1 Purpose 183
6.2 Construction phase mitigation measures 183

Executive summary

The project

The Western Harbour Tunnel and Beaches Link program of works is proposed to provide additional road network capacity across Sydney Harbour and to improve transport connectivity with Sydney's northern beaches

Roads and Maritime Services is seeking approval under Division 5.2, Part 5 of the Environmental Planning and Assessment Act 1979 to construct and operate the Western Harbour Tunnel and Warringah Freeway Upgrade, comprising two main components:

+ A new crossing of Sydney Harbour involving twin tolled motorway tunnels connecting the M4-M5 Link at Rozelle and the existing Warringah Freeway at North Sydney (the Western Harbour Tunnel)
+ Upgrade and integration works along the existing Warringah Freeway, including infrastructure required for connections to the Beaches Link and Gore Hill Freeway Connection project (the Warringah Freeway Upgrade).

This report

This report has been prepared to support the environmental impact statement for the project and to address the environmental assessment requirements of the Secretary of the Department of Planning, Industry and Environment. The report includes:

+ A strategic urban design framework for the project
+ A landscape character and visual impact assessment (LCVIA) that considers the potential impacts that are likely to occur as a result of the project
+ Mitigation measures and design recommendations to avoid, minimise or improve potential landscape character and visual impacts.

Urban design strategy

Sydney has a complex motorway network that traverses the rolling topography of the Sydney basin and reaches out to suburban and rural areas throughout the state.

A distinctive aspect of the Western Harbour Tunnel and Warringah Freeway Upgrade, setting it apart from the rest of the motorway network, is its unique relationship to the geography of Sydney.

This relationship between the road alignment, the water of Sydney Harbour, local green spaces either side of the corridor and the sandstone geology of North Sydney have been explored through the project's urban design elements, aiming to increase the legibility of the road network.

The urban design of the project has been developed to tie all components of infrastructure together and integrate them thoughtfully into this existing urban fabric, creating a high quality user experience, enhanced local amenity value and a distinct 'whole of corridor' identity.

Urban design objectives have been developed as the basis of the ongoing strategic urban design development for the project.

The objectives seek to:

+ Shape the project narrative established in the vision as a concept of transition from city to suburb, underneath the waters of Sydney Harbour
+ Ensure the project is well integrated into the geography of the region, the motorway system and its surrounding landscape and urban context
+ Deliver infrastructure elements that define and give meaning to the user experience in a way that is evocative of the unique local context.

Precinct assessment

The report includes specific urban design strategies as well as landscape character and visual impact assessment for precincts and construction support sites along the corridor alignment.

Rozelle

This precinct is focused on the future interchange between the Western Harbour Tunnel and M4-M5 Link at Rozelle. The precinct is situated immediately to the west of the ANZAC Bridge and its approaches.

Overall, the landscape character and visual impacts of the project on the Rozelle precinct have been found to be minimal. The following key points have been noted within the assessment:

+ Limited magnitude of change related to the project in this location due to the relatively small scope of works and presence of existing industrial and large scale road infrastructure (including the yet to be built M4-M5 link works as part of Westconnex)
+ Vegetation and topography restrict the visual catchment of the project from many viewpoints including parts of Glebe Foreshore Parklands and Easton Park.

North Sydney

The North Sydney precinct encompasses the project connections between the Western Harbour Tunnel, Warringah Freeway Upgrade, Beaches Link and Gore Hill Freeway Connection project..

The precinct includes the residential neighbourhoods of Cammeray, Neutral Bay and North Sydney.

The landscape character and visual impacts of the project on the North Sydney precinct vary across the study area. The following key points have been noted within the assessment:

+ The presence of heritage conservation areas in close proximity to the project works has increased the sensitivity of several viewpoints and Landscape Character Zones (LCZs)
+ The presence of an existing major infrastructure corridor (Warringah Freeway) within the precinct reduces the magnitude of change associated with some of the project works, as well as the sensitivity of some nearby receivers
+ Landscape character impacts would be largest on directly impacted areas of open space (Cammeray Golf Course) as well as residential development in North Cremorne and Neutral Bay that border the proposed infrastructure
+ The Western Harbour Tunnel ventilation outlet and facility would be the most visible elements of the project with visibility above the treeline from several areas within the precinct
+ The largest visual impacts would be experienced by residential and public open space receivers in close proximity to the motorway facilities within Cammeray Golf Course, as well as those that have direct views of the ventilation outlet, motorway facilities and new/replacement bridge structures along Alfred Street North
+ The presence of screening vegetation along the boundary of Cammeray Park assists in filtering or blocking many views of the motorway facilities from street level
+ While the proposed bridge structures and ventilation outlet would be greater in scale and bulk than existing elements within the Warringah Freeway corridor, the majority of works are generally congruous within the context of a major road environment.

Artarmon

Artarmon is a mixed-use urban area located to the north west of North Sydney. The precinct is centred on the Gore Hill Freeway/ Lane Cove tunnel, which cuts through the precinct in an east/west direction. Project works in this precinct are limited to the construction of the Motorway Control Centre at Waltham Street.

The following key points have been noted within the assessment:

+ Landscape character and visual impacts are limited within the precinct. The presence of light industrial/commercial development and existing large scale road infrastructure has reduced the sensitivity of the landscape and visual receivers to change
+ A well designed motorway control centre would likely be congruous with the existing Gore Hill Freeway road corridor and industrial nature of the precinct. The building has the potential to improve the landscape character and visual amenity of the local area.

Construction support sites

Victoria Road (WHT2)

The land identified for temporary construction use is located in the inner western suburb of Rozelle and comprises 138 - 172 Victoria Road (the site of the former Balmain Leagues Club). The site is currently unoccupied and in a state of disrepair.

The following key points have been noted within the assessment:

+ The dilapidated nature of the existing site reduces the sensitivity of receivers to change in the visual scene
+ Post construction, there are unlikely to be any ongoing impacts. The appropriate resurfacing of the site may lead to Beneficial impacts to visual amenity.

White Bay (WHT3)

The land identified for construction is located at White Bay, an industrial maritime area surrounded by the suburbs of Balmain and Rozelle in the Inner West of Sydney. The site is currently occupied by a mixture of commercial and industrial premises.

The following key points have been noted within the assessment:

+ Visual accessibility to the site extends to the residential edges of Balmain and Rozelle in the north and west, as well as Pyrmont in the east, including several foreshore parks in this area
+ Parkland with views towards the site includes Pirrama Park and Waterfront Park in Pyrmont, which are both backed by residential towers
+ The industrial nature of the site ensures a reduced magnitude of change. The construction works would likely be in keeping with the existing busy foreshore industrial uses of the site
+ Post construction, there are unlikely to be any ongoing impacts as the site would be returned to existing condition.

Yurulbin Point (WHT4) and Sydney Harbour south cofferdam (WHT5)

The land identified for construction use is a neighbourhood foreshore park and adjacent waterway which sits at the end of Birchgrove peninsula in a residential area. The park is used largely for passive recreation, with a small public car park and access to the Birchgrove ferry wharf.

The following key points have been noted within the assessment:

+ The park has a high sensitivity to visual change due to its heritage listing and dramatic Harbour views
+ Views from waterfront areas within the park are extensive and extend southeast across Sydney Harbour to the CBD and north to North Sydney and Balls Head
+ Local views into the park are limited to several residential properties on Louisa Road, the park itself and the adjacent open water
+ Temporary High visual impacts are expected on park users and nearby residents on Louisa Road as park access is restricted, vegetation removed and site hoardings erected
+ Temporary Moderate/High visual impacts are expected on Wharf Road dwellings, with a visible increase in built form (including the acoustic shed) and reduced vegetation visible within the park
+ Temporary Moderate visual impacts are expected on Birchgrove park
+ Post construction, it is expected that Yurulbin Park would be returned to its pre existing condition
+ The loss of vegetation during the construction period is likely to continue to impact the visual amenity of surrounding receivers during the operational phase of the project. This impact would be discernible until replacement vegetation has matured.

Sydney Harbour north cofferdam (WHT6)

The Sydney Harbour north cofferdam site is found on the western side of Waverton peninsula, adjacent to a former industrial area known as the Coal Loader.

The following key points have been noted within the assessment:

+ Visual accessibility to the cofferdam site extends across the water to the north, south and west
+ Visibility from the east is restricted by the elevated topography of the Waverton peninsular
+ The most visible element of the Balls Head construction support site would be the crane structure above the cofferdam
+ A temporary Moderate visual impact is expected on the public space associated with the Coal Loader Centre for Sustainability, which would have direct views of the construction support site
+ Post construction, there would be no ongoing visual impact.

Berrys Bay (WHT7)

The land identified for temporary construction use is located within the Berrys Bay maritime area. Berrys Bay has a long standing maritime heritage, having been the berthing location for large ships visiting the former BP oil terminal and the site of a busy and historic shipyard. The BP oil terminal site was converted into Carradah Park in 2005.

The following key points have been noted within the assessment:

+ The visual accessibility of the Berrys Bay construction support site is relatively limited from many locations due to the enclosed nature of the bay
+ The acoustic and barge sheds are likely to be the most visible elements at the Berrys Bay construction support site, as well as the discernible removal of vegetation
+ Temporary Moderate/High visual impacts are limited to receivers that would have local views of the site, including Carradah Park and several residential dwellings off Larkin Street and Balls Head Road
+ Temporary Moderate to Moderate/Low impacts on visual amenity are expected from more distant areas of public open space and residential development such as Sawmillers Reserve and Dumbarton Street
+ Temporary Moderate visual impacts are expected on recreational watercraft utilising the Berrys Bay waterway
+ Negligible visual impacts are expected post construction once the site is reinstated with native planting and this vegetation matures.

Ridge Street north (WHT9)

St Leonards Park is a nineteenth century area of parkland that covers approximately 15 hectares. The park is one of North Sydney's largest and oldest parks, established in 1867.

A temporary construction support site associated with Western Harbour Tunnel is proposed to be located in the south eastern corner of the park.

The following key points have been noted within the assessment:

+ The south eastern corner of the park has a mostly open character with expansive panoramic views of the harbour and Sydney CBD
+ Private domain views into this section of the park are limited to dwellings off Ridge Street within the Walker/Ridge Street heritage conservation area
+ A temporary High level of visual impact is expected on the immediate park area surrounding the construction support site as the area becomes inaccessible and site hoarding is erected, blocking views to the south east
+ A temporary Moderate/High level of visual impact is expected on several dwellings along Ridge Street within the heritage conservation area. These dwellings would have views of site hoardings, increased vehicle movement and a reduction in vegetation along the Warringah Freeway
+ A temporary Moderate/High visual impact is expected on the visual amenity of receivers using the North Sydney Bowling Club. Site hoardings would be located in close proximity to the club, potentially blocking views south and south east
+ All receivers studied may experience Moderate night time visual impacts due to an increase in light sources as part of the construction works.
+ Once construction is complete, the park would be returned to the pre-existing condition
+ Moderate ongoing impacts may remain until replacement vegetation has matured to the size of existing plants, creating visual separation from the Warringah Freeway.

1. Introduction

This chapter provides an overview of the Western Harbour Tunnel and Warringah Freeway Upgrade (the project), including its key features and location. It also outlines the Secretary's environmental assessment requirements addressed in this technical working paper.

1.1 Overview

The Greater Sydney Commission's Greater Sydney Region Plan – A Metropolis of Three Cities (Greater Sydney Commission, 2018) proposes a vision of three cities where most residents have convenient and easy access to jobs, education and health facilities and services. In addition to this plan, and to accommodate for Sydney's future growth the NSW Government is implementing the Future Transport Strategy 2056 (Transport for NSW, 2018), a plan that sets the 40 year vision, directions and outcomes framework for customer mobility in NSW. The Western Harbour Tunnel and Beaches Link program of works is proposed to provide additional road network capacity across Sydney Harbour and to improve transport connectivity with Sydney's northern beaches. The Western Harbour Tunnel and Beaches Link program of works include (refer Figure 1.1):

+ The Western Harbour Tunnel and Warringah Freeway Upgrade project which comprises a new tolled motorway tunnel connection across Sydney Harbour, and an upgrade of the Warringah Freeway to integrate the new motorway infrastructure with the existing road network and to connect to the Beaches Link and Gore Hill Freeway Connection project
+ The Beaches Link and Gore Hill Freeway Connection project which comprises a new tolled motorway tunnel connection across Middle Harbour from the Warringah Freeway and Gore Hill Freeway to Balgowlah and Killarney Heights and including the surface upgrade of Wakehurst Parkway from Seaforth to Frenchs Forest and upgrade and integration works to connect to the Gore Hill Freeway at Artarmon.

A combined delivery of the Western Harbour Tunnel and Beaches Link program of works would unlock a range of benefits for freight, public transport and private vehicle users. It would support faster travel times for journeys between the Northern Beaches and south, west and north-west of Sydney Harbour. Delivering the program of works would also improve the resilience of the motorway network, given that each project provides an alternative to heavily congested harbour crossings.

SYDNEY HARBOUR WITH YURULBIN PARK AND BALLS HEAD IN THE FOREGROUND

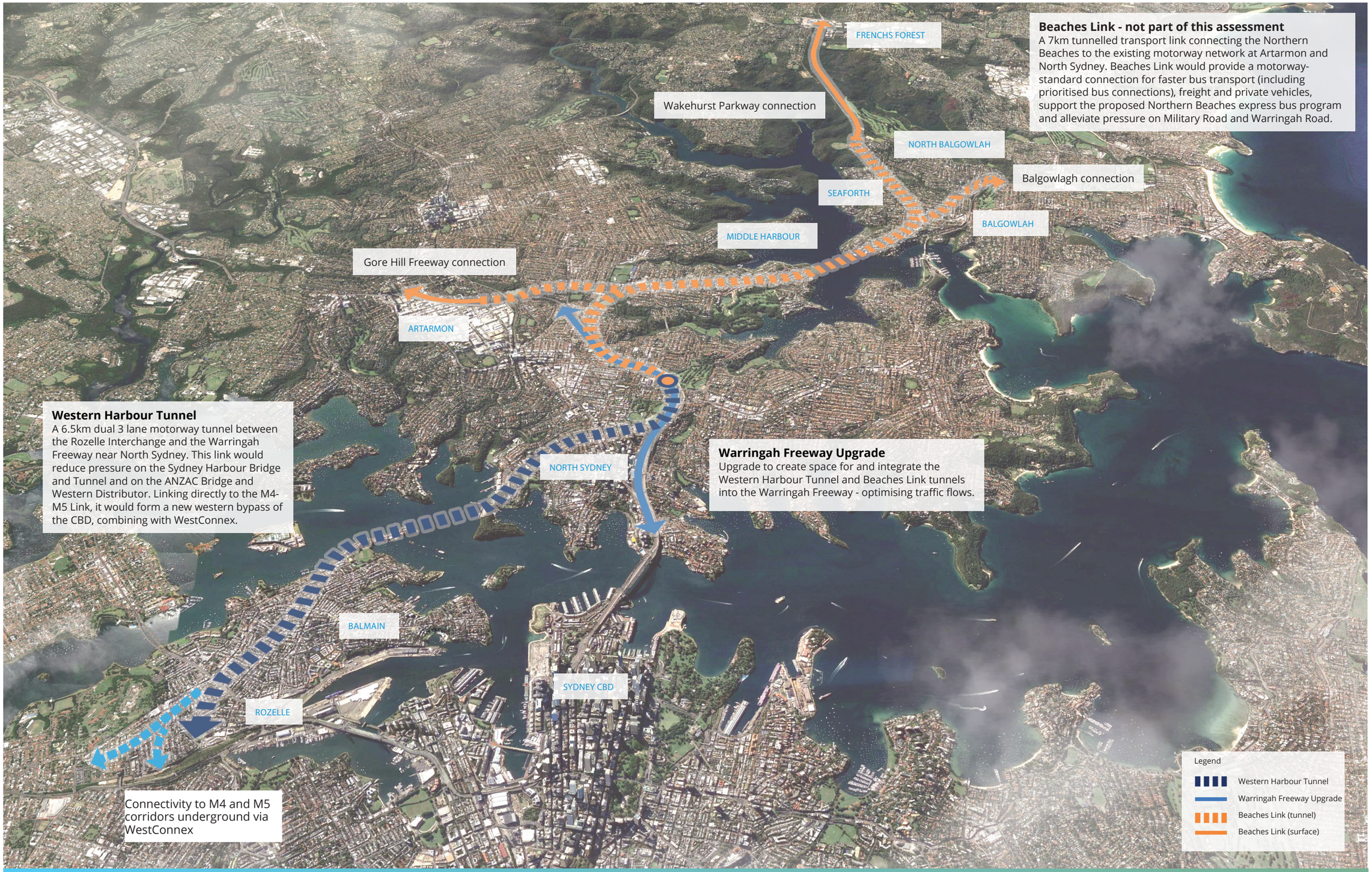


FIGURE 1.1 - PROJECT SUMMARY - INCLUDING BOTH WESTERN HARBOUR TUNNEL/WARRINGAH FREEWAY UPGRADE AND BEACHES LINK SCOPE

1.2 The project

Roads and Maritime Services (Roads and Maritime) is seeking approval under Division 5.2, Part 5 of the Environmental Planning and Assessment Act 1979 to construct and operate the Western Harbour Tunnel and Warringah Freeway Upgrade, which would comprise two main components:

+ A new crossing of Sydney Harbour involving twin tolled motorway tunnels connecting the M4-M5 Link at Rozelle and the existing Warringah Freeway at North Sydney (the Western Harbour Tunnel)
+ Upgrade and integration works along the existing Warringah Freeway, including infrastructure required for connections to the Beaches Link and Gore Hill Freeway Connection project (the Warringah Freeway Upgrade).

1.2.1 Western Harbour Tunnel

Key features of the Western Harbour Tunnel component of the project are shown in Figure 1.2 and would include:

+ Twin mainline tunnels about 6.5 kilometres long and each accommodating three lanes of traffic in each direction, connecting the stub tunnels from the M4-M5 Link at Rozelle to the Warringah Freeway and to the Beaches Link mainline tunnels at Cammeray. The crossing of Sydney Harbour between Birchgrove and Waverton would involve a dual, three lane, immersed tube tunnel
+ Connections to the stub tunnels at the M4-M5 Link project in Rozelle and to the mainline tunnels at Cammeray (for a future connection to the Beaches Link and Gore Hill Freeway Connection project)
+ Surface connections at Rozelle, North Sydney and Cammeray, including direct connections to and from the Warringah Freeway (including integration with the Warringah Freeway Upgrade), an off ramp to Falcon Street and an on ramp from Berry Street at North Sydney
+ A ventilation outlet and motorway facilities (fitout and commissioning only) at the Rozelle Interchange
+ A ventilation outlet and motorway facilities at the Warringah Freeway in Cammeray
+ Operational facilities including a motorway control centre at Waltham Street, within the Artarmon industrial area and tunnel support facilities at the Warringah Freeway in Cammeray
+ Other operational infrastructure including groundwater and tunnel drainage management and treatment systems, signage, tolling infrastructure, fire and life safety systems, lighting, emergency evacuation and emergency smoke extraction infrastructure, CCTV and other traffic management systems.

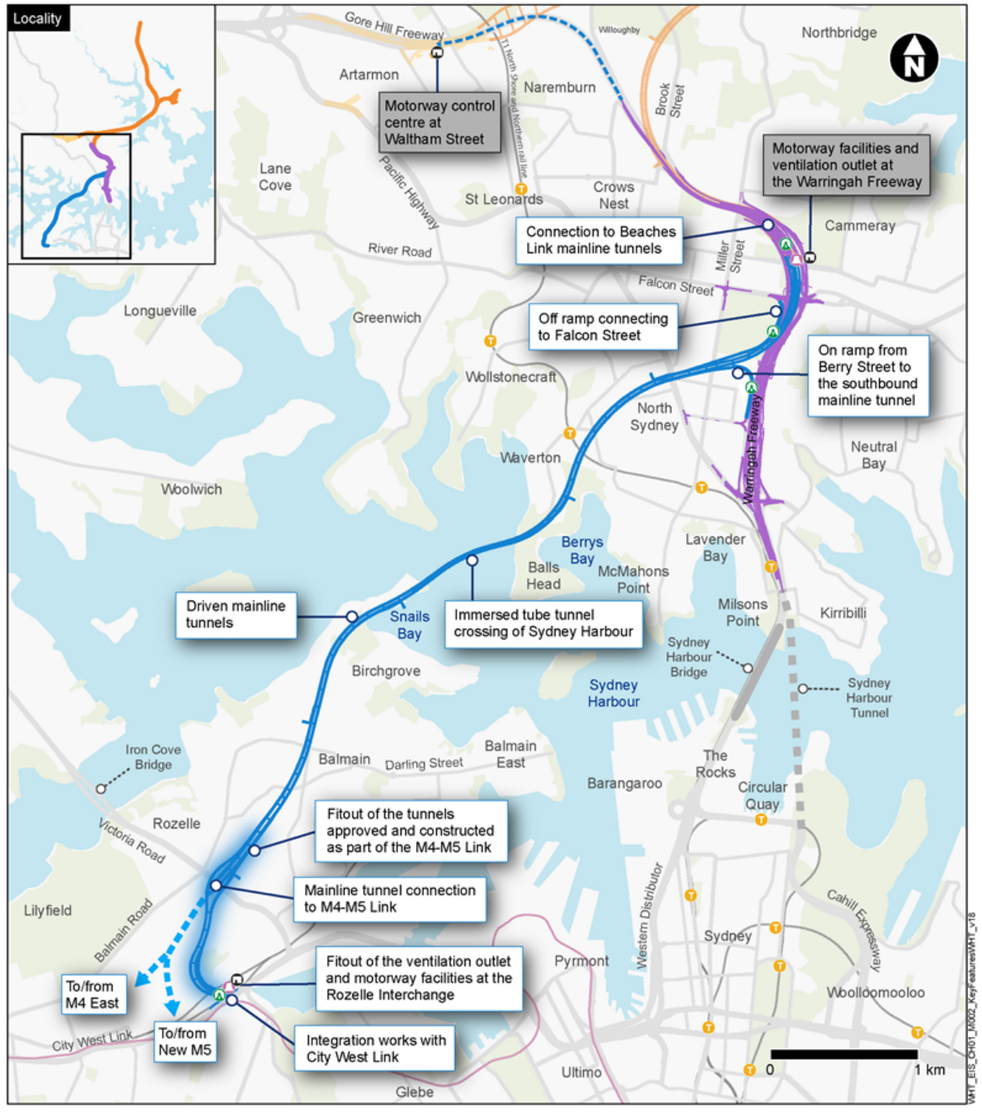


FIGURE 1.2 - KEY FEATURES OF THE WESTERN HARBOUR TUNNEL COMPONENT OF THE PROJECT

1.2.2 Warringah Freeway Upgrade

Key features of the Warringah Freeway Upgrade component of the project are shown in Figure 1.3 and would include:

+ Upgrade and reconfiguration of the Warringah Freeway from immediately north of the Sydney Harbour Bridge through to Willoughby Road at Naremburn
+ Upgrades to interchanges at Falcon Street in Cammeray and High Street in North Sydney
+ New and upgraded pedestrian and cyclist infrastructure
+ New, modified and relocated road and shared user bridges across the Warringah Freeway
+ Connection of the Warringah Freeway to the portals for the Western Harbour Tunnel mainline tunnels and the Beaches Link tunnels via on and off ramps, which would consist of a combination of trough and cut and cover structures
+ Upgrades to existing roads around the Warringah Freeway to integrate the project with the surrounding road network
+ Upgrades and modifications to bus infrastructure, including relocation of the existing bus layover along the Warringah Freeway
+ Other operational infrastructure, including surface drainage and utility infrastructure, signage, tolling, lighting, CCTV and other traffic management systems.

A detailed description of the project is provided in Chapter 5 (Project description) and construction of the project is described in Chapter 6 (Construction work) of the environmental impact statement.

The project alignment at the Rozelle Interchange shown in Figure 1-1 and Figure 1-3 reflects the arrangement presented in the environmental impact statement for the M4-M5 Link, and as amended by the proposed modifications. The project would be constructed in accordance with the finalised M4-M5 Link detailed design (refer to Section 2.1.1 of Chapter 2 (Assessment process) of the environmental impact statement for further details).

The project does not include ongoing motorway maintenance activities during operation or future use of residual land occupied or affected by project construction activities, but not required for operational infrastructure. These would be subject to separate planning and approval processes at the relevant times.

Subject to the project obtaining planning approval, construction is anticipated to commence in 2020 and is expected to take around six years to complete.

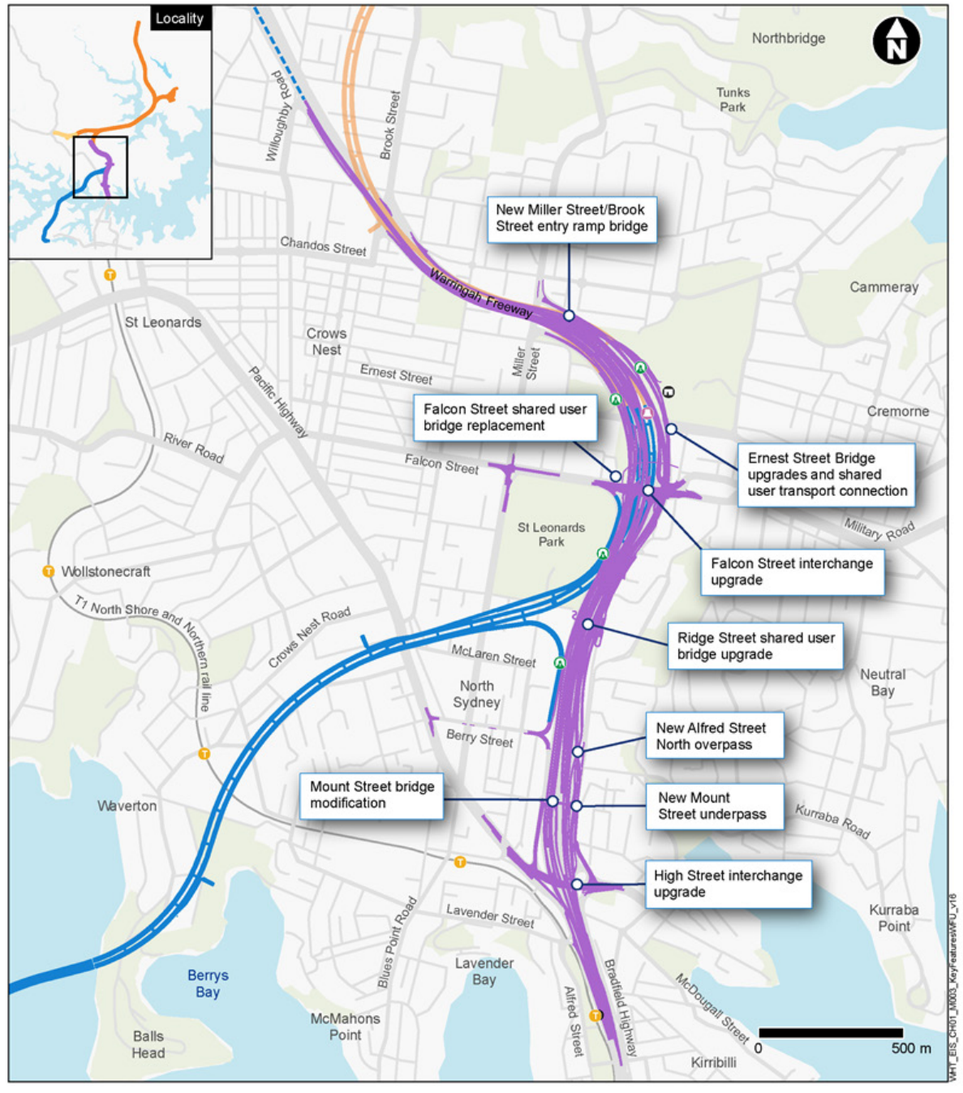


FIGURE 1.3 - KEY FEATURES OF THE WARRINGAH FREEWAY UPGRADE COMPONENT OF THE PROJECT

1.3 Key construction activities

The area required to construct the project is referred to as the construction footprint. The majority of the construction footprint would be located underground within the mainline tunnels. However, surface areas would be required to support tunnelling activities and to construct the tunnel connections, tunnel portals and operational ancillary facilities.

Key construction activities would include:

+ Early works and site establishment, with typical activities being property acquisition and condition surveys, utilities installation, protection, adjustments and relocations, installation of site fencing, environmental controls (including noise attenuation and erosion and sediment control) and traffic management controls, vegetation clearing, earthworks and demolition of structures, establishment of construction support sites including acoustic sheds and associated access decline acoustic enclosures (where required), construction of minor access roads and the provision of property access, temporary relocation of pedestrian and cycle paths and bus stops, temporary relocation of swing moorings within Berrys Bay and relocation of the historic vessels
+ Construction of Western Harbour Tunnel, with typical activities being excavation of tunnel construction accesses, construction of driven tunnels, cut and cover and trough structures and construction of cofferdams, dredging activities in preparation for the installation of immersed tube tunnels, casting and installation of immersed tube tunnels and civil finishing and tunnel fitout
+ Construction of operational facilities comprising of a motorway control centre at Waltham Street in Artarmon, motorway and tunnel support facilities and ventilation outlets at the Warringah Freeway in Cammeray, construction and fitout of the project operational facilities that form part of the M4-M5 Link Rozelle East Motorway Operations Complex, a wastewater treatment plant at Rozelle and the installation of motorway tolling infrastructure
+ Construction of the Warringah Freeway Upgrade, with typical activities being earthworks, bridgeworks, construction of retaining walls, stormwater drainage, pavement works and linemarking and the installation of road furniture, lighting, signage and noise barriers
+ Testing of plant and equipment, and commissioning of the project, backfill of access declines, removal of construction support sites, landscaping and rehabilitation of disturbed areas and removal of environmental and traffic controls.

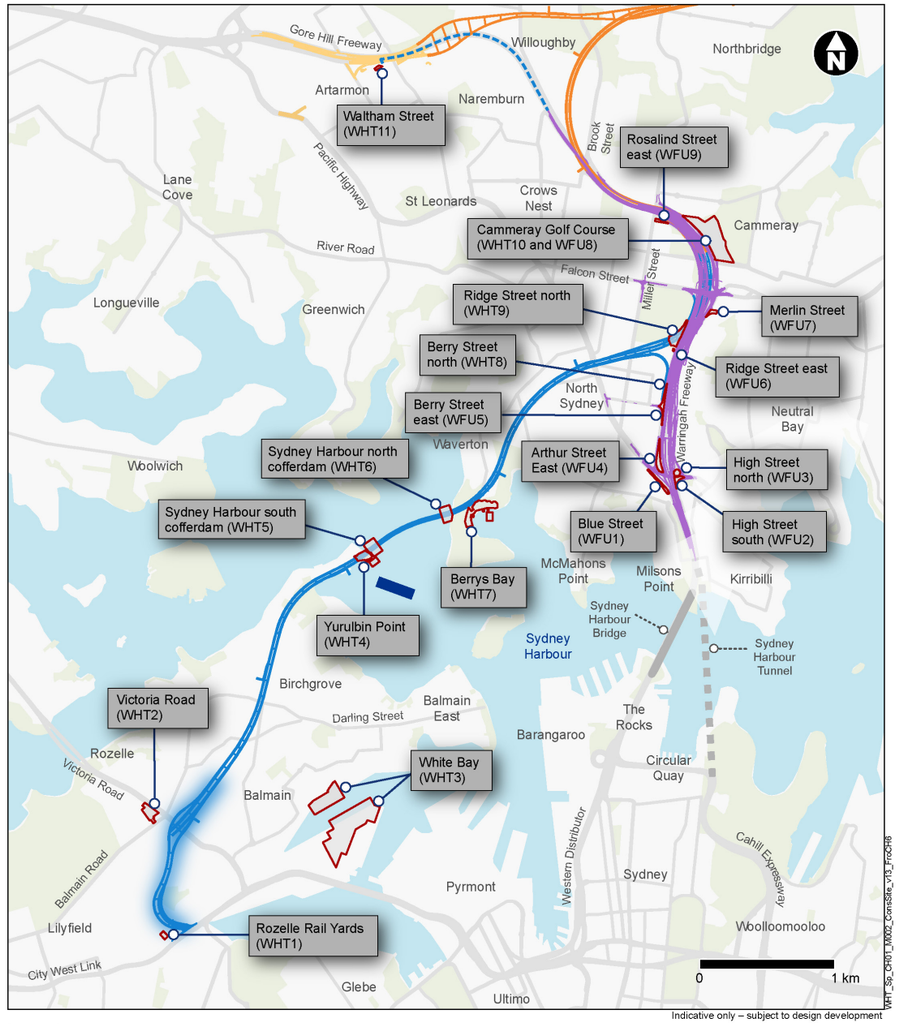
Temporary construction support sites would be required as part of the project (refer to Figure 1.4), and would include tunnelling and tunnel support sites, civil surface sites, cofferdams, mooring sites, wharf and berthing facilities, laydown areas, parking and workforce amenities. Construction support sites for Western Harbour Tunnel would include:

+ Rozelle Rail Yards (WHT1)
+ Victoria Road (WHT2)
+ White Bay (WHT3)
+ Yurulbin Point (WHT4)
+ Sydney Harbour south cofferdam (WHT5)
+ Sydney Harbour north cofferdam (WHT6)
+ Berrys Bay (WHT7)
+ Berry Street north (WHT8).
+ Ridge Street north (WHT9)
+ Cammeray Golf Course (WHT10)
+ Waltham Street (WHT11).

During the construction of the Warringah Freeway Upgrade, smaller construction support sites would be required to support the construction works (as shown on Figure 1.4). These include:

+ Blue Street (WFU1)
+ High Street south (WFU2)
+ High Street north (WFU3)
+ Arthur Street east (WFU4)
+ Berry Street east (WFU5)
+ Ridge Street east (WFU6)
+ Merlin Street (WFU7)
+ Cammeray Golf Course (WFU8)
+ Rosalind Street east (WFU9).

A detailed description of construction works for the project is provided in Chapter 6 (Construction work) of the environmental impact statement.



Legend

Construction features

- Western Harbour Tunnel
- Warringah Freeway Upgrade
- Communications cable for motorway control centre
- Fit out and commissioned as part of Western Harbour Tunnel, constructed as part of WestConnex M4-M5 Link
- Construction support sites
- Mooring site

Connecting projects

- Beaches Link
- Gore Hill Freeway Connection

FIGURE 1.4 - OVERVIEW OF CONSTRUCTION SUPPORT SITES

1.4 Project location

The project would be located within the Inner West, North Sydney and Willoughby local government areas, connecting Rozelle in the south with Naremburn in the north.

Commencing at the Rozelle Interchange, the mainline tunnels would pass under Balmain and Birchgrove, then cross Sydney Harbour between Birchgrove and Balls Head. The tunnels would then continue under Waverton and North Sydney, linking directly to the Warringah Freeway to the north of the existing Ernest Street bridge.

The motorway control centre would be located at Waltham Street, Artarmon, with a trenched communications cable connecting the motorway control centre to the Western Harbour tunnel along the Gore Hill Freeway and Warringah Freeway road reserves.

The Warringah Freeway Upgrade would be carried out on the Warringah Freeway from around Fitzroy Street at Milsons Point to around Willoughby Road at Naremburn. Upgrade works would include improvements to bridges across the Warringah Freeway, and upgrades to surrounding roads.

1.5 Purpose of report

This report has been prepared to support the environmental impact statement for the project and to address the environmental assessment requirements of the Secretary of the Department of Planning, Industry and Environment (formerly Department of Planning and Environment) ('the Secretary's environmental assessment requirements' or SEARs).

The Beaches Link project would be subject to a separate environmental impact statement process.

This specialist report addresses the SEARs related to Visual Amenity, Placemaking and Urban Design, providing:

+ A strategic urban design framework for the project. The framework:
  - Provides a high level vision, objectives and principles to guide the future urban design of the project
  - Identifies project urban design outcomes that have been achieved during the initial concept design stage
  - Provides requirements for future design of infrastructure elements to ensure the project exhibits outcomes of a quality and level of amenity that are consistent and readily associated with the project's transport functions
  - Acknowledges the strategic directions and urban design strategies as directed by Roads and Maritime's Centre for Urban Design and NSW Government Architects.
+ A landscape character and visual impact assessment (LCVIA) that considers the potential impacts (adverse and beneficial) that are likely to occur as a result of the project
+ Mitigation measures and design recommendations to avoid, minimise or improve potential landscape character and visual impacts.

1.6 Secretary's Environmental Assessment Requirements

The Secretary's environmental assessment requirements relating to Visual Amenity, Placemaking and Urban Design and where these requirements are addressed in this report are outlined in Table 1.1 and 1.2.

SEARS - PLACEMAKING AND URBAN DESIGN (VISUAL AMENITY REQUIREMENTS)		
	Requirement	Where addressed in report
3.	The Proponent must assess the visual and landscape impacts of the proposal, including ancillary infrastructure on:	
	a) views and vistas	Chapter 4 - Precinct assessment Chapter 5 - Construction support sites
	b) streetscapes, key sites and buildings	Chapter 4 - Precinct assessment Chapter 5 - Construction support sites
	c) landscaping, green spaces and existing trees and tree canopy including an assessment of likely magnitude of impacts to trees and need for removal to be carried out by an arborist, including the provision of measures to minimise and offset impacts	Refer separate specialist report within Appendix W - Arboricultural Impact for assessment of likely magnitude of impacts to trees and need for removal. The arborist report findings have been taken into account within the landscape character and visual impact assessment. Mitigation measures to reduce impacts to trees are discussed within Chapter 6
	d) heritage items including Aboriginal places, environmental heritage and areas of heritage sensitivity	Chapter 4 - Precinct assessment Chapter 5 - Construction support sites
	e) the local community.	Chapter 4 - Precinct assessment Chapter 5 - Construction support sites
4.	The Proponent must provide artist impressions and perspective drawings of the proposal from key receiver locations to illustrate the proposal and its visual impacts.	Visualisations of the project are incorporated throughout Chapter 4.

TABLE 1.1 - SECRETARY'S ENVIRONMENTAL ASSESSMENT REQUIREMENTS - VISUAL AMENITY REQUIREMENTS

SEARs - PLACEMAKING AND URBAN DESIGN		
	Requirement	Where addressed in report
1.	The Proponent must identify how functional 'place' outcomes of public benefit would be achieved, including design principles and strategies that:	
	a) consider areas identified for future urban renewal	+ High level principles that cover the project's potential as a driver of urban renewal are discussed within section 3.3.5 'Urban renewal and liveability'. + Specific future urban renewal opportunities are discussed within the relevant precinct chapter and include: - Rozelle precinct - visual connectivity with the future renewal of Rozelle Rail Yards parkland, wider Bays Precinct and M4-M5 Link - North Sydney precinct - connectivity with future North Sydney Metro stations and improved linkages across the Warringah Freeway to Cammeray Park.
	b) capitalise on reduced traffic volumes and the reduction of traffic permeation, particularly in and around commercial and community centres	+ High level principles and project opportunities that highlight the potential to capitalise on reduced traffic volumes as a result of the project are discussed within section 3.3.4 'Connectivity and legibility'. + Future investigations and design work by others would consider improved place outcomes along adjacent movement corridors that may be facilitated as a result of the project's impact on traffic flow.
	c) avoid locating infrastructure, including ancillary facilities, adjoining residential areas and other sensitive receivers, and justify where this cannot be achieved	+ High level principles and requirements that guide the future design of project infrastructure and urban elements are covered within sections 3.3.3 'Integrated design' and 3.4 'Urban elements' + The justification for the location of ancillary facilities is provided in Chapters 4 and 5 of the EIS.
	d) achieve high quality landscaping, streetscapes, architecture and design	+ High level principles and requirements that guide the future design of project infrastructure, urban elements and landscape treatments are covered within sections 3.3.2 'Identity', 3.3.3 'Integrated design' , 3.3.6 'Living environments' and 3.4 'Urban elements' These draw on published design guidelines by Roads and Maritime and The NSW Government Architects Office. + Specific opportunities and strategies are discussed within the relevant precinct chapter and indicated on the rendered concept plans.
	e) identify urban design strategies and opportunities that would enhance healthy, cohesive and inclusive communities, including in relation to accessibility and connectivity	+ High level principles and project opportunities that cover the project's potential to enhance healthy, cohesive and inclusive communities are discussed within sections 3.3.3 'Integrated design' , 3.3.4 'Connectivity and legibility', 3.3.5 ' Urban renewal and liveability' and 3.3.6 'Living environments'. + Specific opportunities and strategies are discussed within the relevant precinct chapter and include: - North Sydney precinct - potential upgrades to St. Leonards Park (refer section 5.6.7), improved cycle and pedestrian infrastructure at High Street, Ridge Street and Ernest Street, as well as new public open space along the Ernest Street shared user bridge - Berrys Bay - potential upgrade to public open space (refer section 5.5.7) - Yurulbin Park - potential upgrade to public open space (refer section 5.4.6).
	f) consider resulting residual land treatments, and demonstrate how the proposed hard and soft urban design elements of the proposal would be consistent with the existing and desired future character of the area traversed or affected by the proposal	+ High level principles and project opportunities that cover residual land treatments are discussed within section 3.3.5 'Urban renewal and liveability.' + Specific treatments are discussed within the relevant precinct chapter and indicated on the rendered concept masterplans.
	g) identify opportunities to utilise surplus or residual land, particularly for the provision of community space (passive and recreational) and utilise key structures (such as ventilation outlets) for multiple uses i.e. integration with other structures	+ High level principles and project opportunities that cover residual land treatments are discussed within section 3.3.4 'Integrated Design' and 3.3.5 'Urban renewal and liveability'. + Specific treatments and strategies are discussed within the relevant precinct chapter and indicated on the concept masterplans. Opportunities include: - Ernest Street shared user bridge - strip of public open space along length of bridge linking to Cammeray and ANZAC Park - Potential for future upgrades to open space of St Leonards Park and Yurulbin Park post construction - Alfred Street North overpass - opportunity to investigate the use of the residual space underneath the overpass as public open space.
	h) explore the use of Crime Prevention Through Environmental Design (CPTED) principles during the design development process, including natural surveillance, lighting, walkways, signage and landscape.	+ High level principles that cover CPTED are discussed within section 3.4 'Urban elements'. + At the current design resolution, specific CPTED principles are not yet been resolved although the need for their consideration is highlighted with the precinct urban design sections
2.	The Proponent must describe the accessibility elements of the proposal including relevant accessibility legislation and guidelines, including:	
	a) Impacts on public transport infrastructure and services	+ High level principles and requirements that cover public transport infrastructure are discussed within section 3.3.4 'Connectivity and legibility'.
	b) impacts on pedestrian and cyclist access and safety across and adjoining the proposal	+ High level principles and requirements that cover pedestrian and cyclist access are discussed within section 3.3.4 'Connectivity and legibility' + Specific strategies are discussed within the relevant precinct chapter.
	c) opportunities to integrate and enhance accessibility including the provisions public and active transport infrastructure as a result of the proposal.	+ High level principles that cover public and active transport infrastructure are discussed within section 3.3.4 'Connectivity and legibility'. + Specific opportunities are discussed within the relevant precinct chapter and include: - North Sydney precinct - Improved cycle and pedestrian infrastructure at High Street, Ridge Street and Ernest Street, as well as along the Warringah Freeway as part of the North Shore Link Cycleway (NSLC).

TABLE 1.2 - SECRETARY'S ENVIRONMENTAL ASSESSMENT REQUIREMENTS - PLACEMAKING AND URBAN DESIGN REQUIREMENTS

1.7 Structure of report

Chapter 1- Introduction

Provides an overview of the project and report including project description, report purpose, structure and SEARs.

Chapter 2 - Policy, planning and urban context

Describes the state and local policy/legislation relevant to the urban design and landscape character/visual amenity of the project, as well as the physical characteristics of the site.

Chapter 3 - Strategic urban design framework

In response to the SEARs, this section describes the high level urban design philosophy, vision and objectives of the project.

Each project objective is explored in more detail to describe the functional and experiential drivers that must be followed in order to deliver successful project integration and a quality user experience.

The 'Urban elements' section outlines the design principles for relevant project infrastructure items before identifying the design requirements to achieve a high quality urban design outcome.

Chapter 4 - Precinct assessment

In response to the SEARs, this section describes the project design within each precinct in more detail including location specific urban design outcomes, principles and future design requirements.

This is followed by a detailed landscape character and visual impact assessment of the project's infrastructure on surrounding receivers.

Chapter 5 - Construction support sites

In response to the SEARs, this section provides urban design requirements and a landscape character and visual impact assessment for the project's temporary construction support sites.

Chapter 6 - Mitigation strategy

In response to the SEARs, this section describes relevant mitigation measures to be applied to the project to reduce the identified visual and landscape character impacts.

1.8 Design development

1.8.1 Ongoing design development

As the project's landscape and urban design concept is subject to ongoing development (refer Figure 1.5), it is crucial that an ongoing review process is maintained. This would ensure that the urban design framework is reviewed through subsequent further design development and procurement stages to maintain relevance.

The urban design vision, objectives and principles developed within the environmental impact statement phase would continue to apply in subsequent design iterations.

The updated version of the project design should be subject to the continued review and endorsement of the Urban Design Review Panel.

The Urban Design Review Panel, chaired by the Roads and Maritime Centre for Urban Design has convened several times to support the current environmental impact statement phase design of the project.

The panel is supported by suitably qualified and appropriately skilled professionals from the fields of architecture, urban design and landscape architecture.

Their ongoing review role in the design process would ensure that as the design of individual components develops, they are delivered in accordance with the urban design principles and guidelines contained within the environmental impact statement.

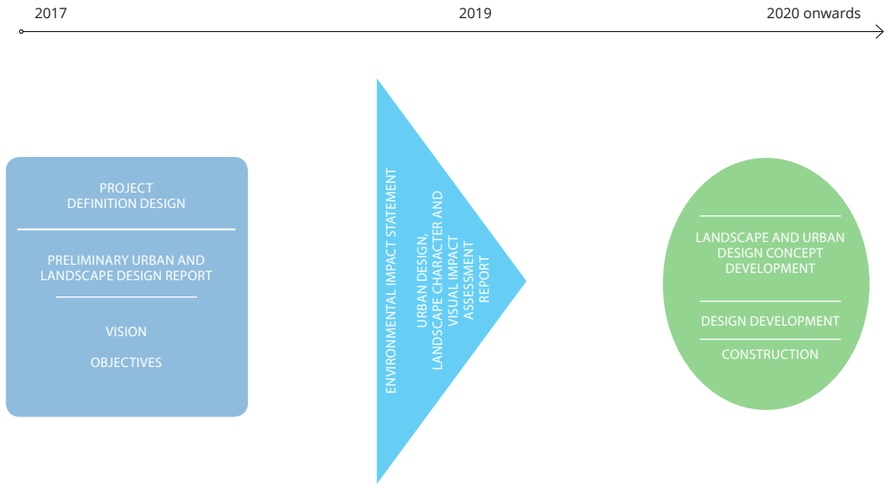


FIGURE 1.5 - PROJECT PROCESS DIAGRAM

2. Policy, planning and urban context

2.1 Urban design policy

2.1.1 Beyond the Pavement

The strategic urban design for the project has been prepared with reference to the urban design principles of:

+ Beyond the Pavement (Roads and Maritime Services, January 2014).

This document helps set the urban design direction for road projects within NSW, defining project outcomes and the criteria for success.

The principles found within Beyond the Pavement are discussed further within Chapter 3 of this report.

2.1.2 Roads and Maritime Services guidelines

The following Roads and Maritime guidelines have also influenced the project design (refer Figure 2.1):

+ Biodiversity guidelines: Protecting and managing biodiversity, September 2011
+ Bridge aesthetics: Design guidelines to improve the appearance of bridges in NSW, February 2019
+ Designing to minimise vandalism, November 2008
+ Guideline for batter surface stabilisation using vegetation, April 2015
+ Landscape design guideline: Design guideline to improve the quality, safety and cost effectiveness of road corridor planting and seeding, February 2017
+ Noise wall design guideline, March 2016
+ Shotcrete design guidelines, March 2016
+ Tunnel urban design guideline, May 2017
+ Water sensitive urban design guideline, March 2016
+ Landbridge draft discussion paper - Re-stitching the built environment, 2017.

2.1.3 Architecture guidelines

Better Placed is the NSW Government Architect's policy to provide direction for high quality design of the urban environment in NSW.

The document aims to place good design at the centre of all development process from concept to construction and maintenance.

This document has helped guide the urban design direction for the project, and should guide future urban design requirements for the project buildings, public domain and open space.

2.1.4 Local policy

Where relevant, local council urban design policies and guidelines have been considered within the urban design of the project. The following documents should continue to guide future design stages of the project:

+ North Sydney Council Public Domain Style Manual and Design Codes
+ North Sydney Signage and Wayfinding Strategy
+ North Sydney Open Space Provision Strategy 2009
+ North Sydney Street Tree Strategy 2006
+ North Sydney Public Amenities Strategy & Action Plan, June 2016.

"Achieving positive urban design outcomes for our customers and the community requires working together."

Beyond the Pavement, Roads and Maritime

FIGURE 2.1 - ROADS AND MARITIME GUIDELINES

2.2 Landscape character and visual amenity policy

2.2.1 Regional

The following regional planning and policy documents have a broad bearing on the landscape character and visual impacts of the project.

Sydney Harbour Catchment Regional Environmental Plan 2005 (REP)

The REP is the principal environmental planning instrument applicable to proposed development both above and below the mean high water mark (refer Figure 2.2).

It applies to all of Sydney Harbour including the Rozelle Bay, White Bay, Coal Loader and Berrys Bay areas. It defines and applies specific provisions for strategic foreshore sites and heritage items.

Planning Principles

Part 2 of the REP presents planning principles to be considered and achieved where possible. Key relevant principles relating to visual or landscape character issues include:

13 - Sydney Harbour Catchment

+ The natural assets of the catchment are to be maintained and, where feasible, restored for their scenic and cultural values and their biodiversity and geodiversity
+ Development that is visible from the waterways or foreshores is to maintain, protect and enhance the unique visual qualities of Sydney Harbour
+ The number of publicly accessible vantage points for viewing Sydney harbour should be increased.

14 - Foreshores and Waterways Area

+ Development along the foreshore and waterways should maintain, protect and enhance the unique visual qualities of Sydney Harbour and its islands and foreshores.

15 - Heritage Conservation

+ The natural, scenic, environmental and cultural qualities of the Foreshores and Waterways Area should be protected
+ Significant fabric, settings, relics and views associated with the heritage significance of heritage items should be conserved

25 - Foreshore and waterways scenic quality

+ The scale, form, design and siting of any building should be based on an analysis of:

(i) the land on which it is to be erected, and

(ii) the adjoining land, and

(iii) the likely future character of the locality,

+ Development should maintain, protect and enhance the unique visual qualities of Sydney Harbour and its islands, foreshores and tributaries,
+ The cumulative impact of water-based development should not detract from the character of the waterways and adjoining foreshores.

Sydney Harbour Foreshore Area Development Control Plan (DCP)

The DCP supports the REP and provides detailed design guidelines and criteria to support the assessment of development within the regulated area.

The visual and landscape character impact of proposed developments is required to be considered by the consent authority. The DCP states that the visual impact of a development would vary depending on:

+ The nature of the proposal - its height, siting, scale, colour, reflectivity and function
+ The landscape setting in which it is proposed
+ The degree of change created - whether it would be minimal or not
+ The ability of the proposal to integrate with the landscape character.

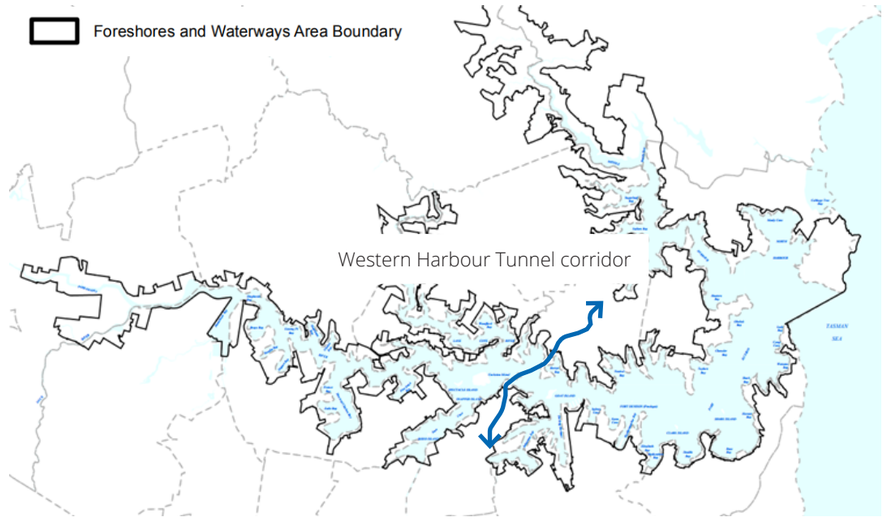


FIGURE 2.2 - SYDNEY HARBOUR CATCHMENT MAP (SOURCE REP 2005)

2.2.2 Local

At a local level, there are a number of LGA and precinct-specific policy and planning documents that articulate the desired future character for different areas within the project footprint (refer Figure 2.3).

Local government planning documents which contain policy objectives regarding visual and landscape amenity include the Local Environmental Plans (LEPs) and Development Control Plans (DCPs) of the Councils affected by the project.

LEPs are statutory instruments which set out land use zones, development standards and controls for development in Council areas. DCPs supplement the corresponding LEP with more detailed planning controls.

It should be noted that LEPs are not directly relevant to State Significant Infrastructure projects such as Western Harbour Tunnel and Warringah Freeway Upgrade, however they do articulate planning intent and so reference to them has been included within this report.

The controls and objectives relevant to landscape and visual issues found within the LEP and DCPs are discussed in more detail within each precinct chapter.

The affected councils include:

+ Inner West Council (previously Leichhardt, Ashfield and Marrickville Councils)
+ North Sydney Council
+ Willoughby Council.

Bays Precinct Strategic Plan

Of relevance to the Rozelle precinct, a strategic planning process is currently being led by Urban Growth NSW for The Bays Precinct.

The Bays Precinct comprises 5.5 kilometres of harbour frontage, around 95 hectares of largely government owned land and around 94 hectares of waterways in Sydney Harbour.

A Transformation Plan has been developed to provide a blueprint to transform The Bays Precinct into a hub of enterprise, activity and open spaces. Sections relevant to the project works in the precinct include:

+ Rozelle Rail Yards: potential to reconnect areas to the north and south of the Rozelle Rail Yards, and to improve connections from Lilyfield to the water
+ Rozelle Bay and Waterways: potential to integrate a viable mix of new land and maritime uses including a mix of commercial, open space and other living uses, with working harbour industries and on-water recreation facilities.

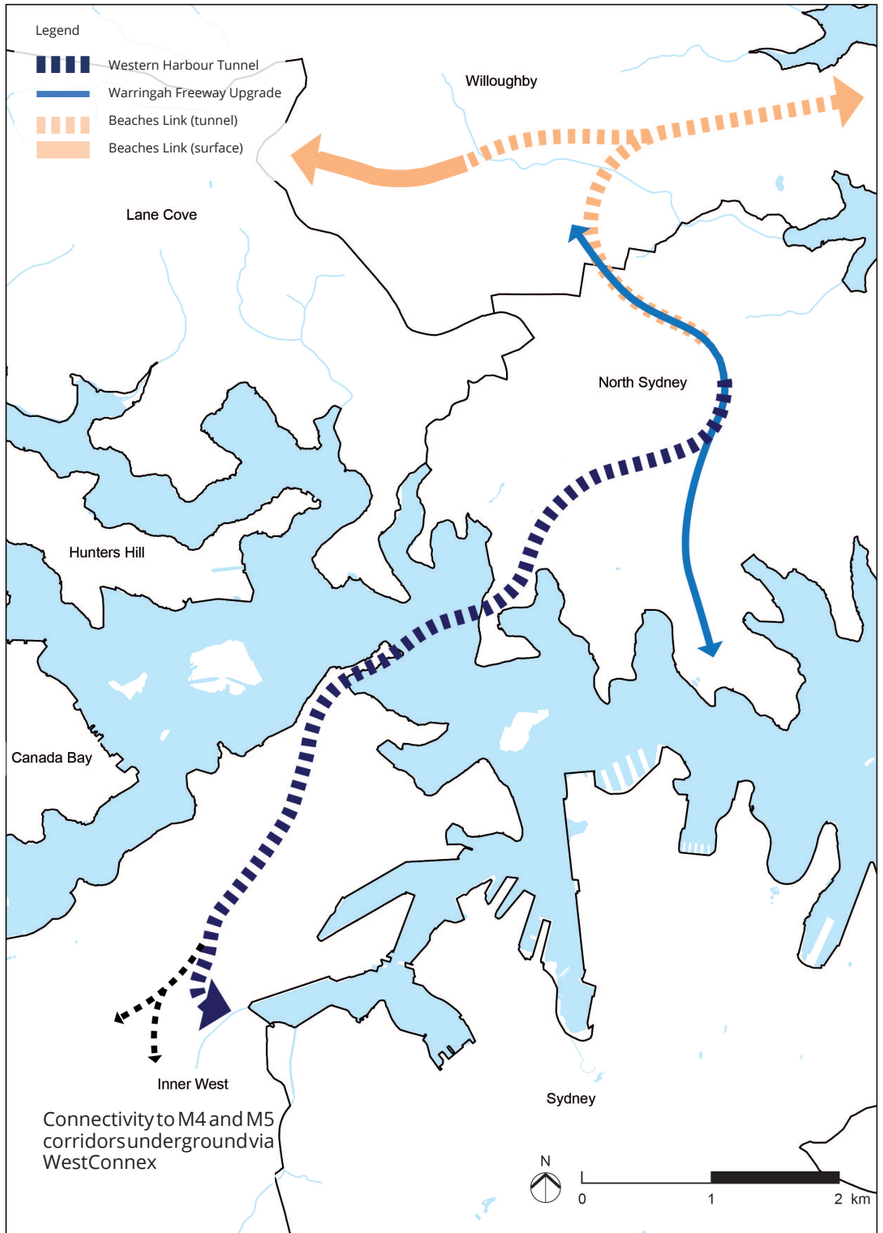


FIGURE 2.3 - MAP OF SYDNEY LOCAL GOVERNMENT AREAS (LGAS) AND THE PROJECT CORRIDOR

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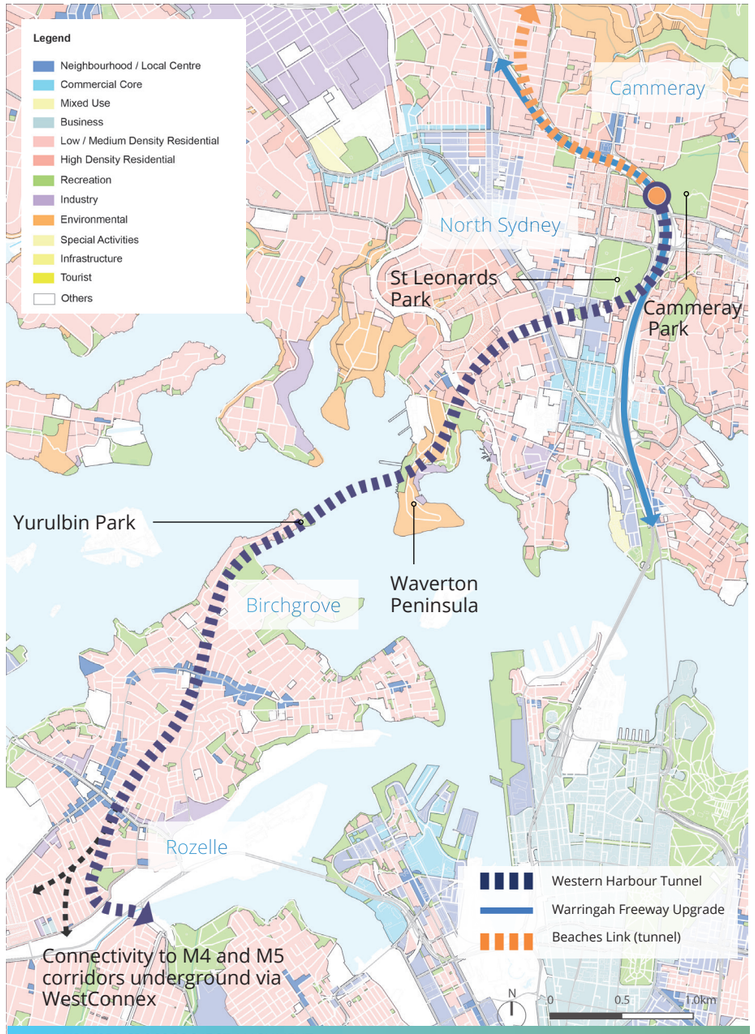
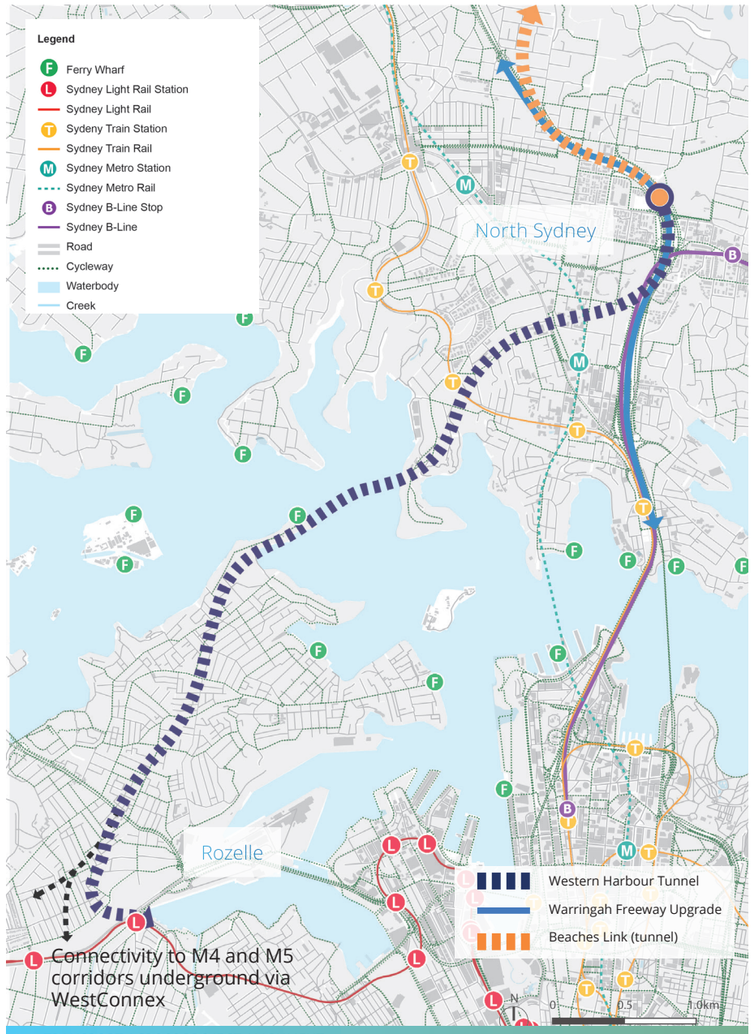
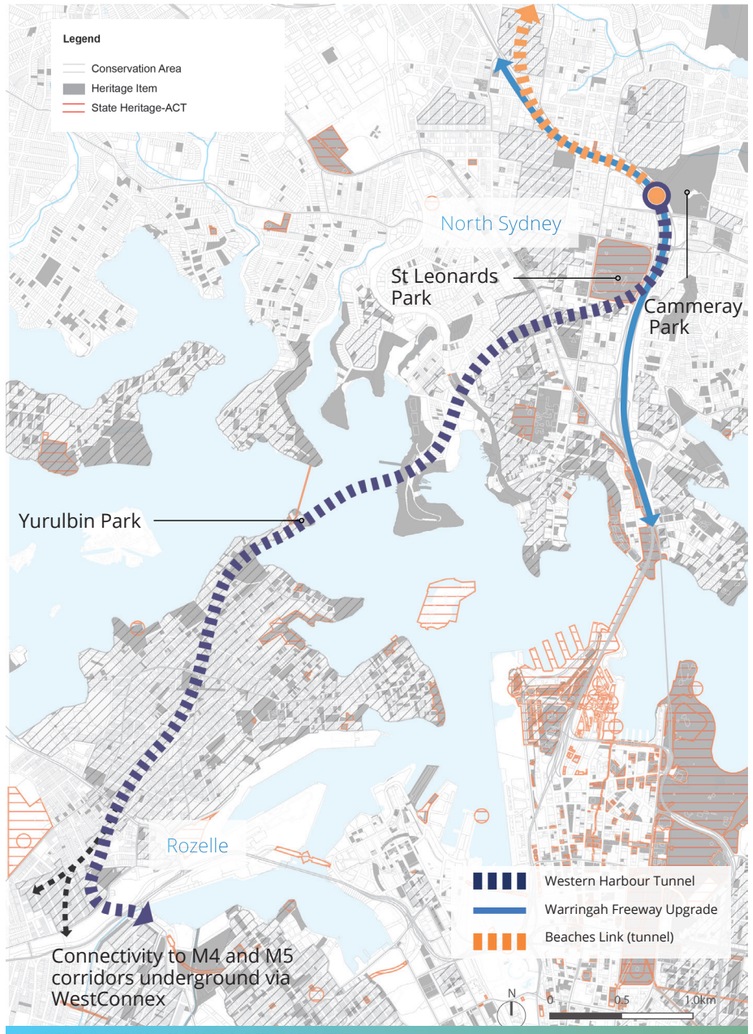


2.4 - LAND USE ACROSS PROJECT ALIGNMENT



2.5 - TRANSPORT ACROSS PROJECT ALIGNMENT



2.6 - HERITAGE ITEMS ACROSS PROJECT ALIGNMENT

2.3 Urban context

2.3.1 Land use

The Western Harbour Tunnel and Warringah Freeway Upgrade project alignment passes through and underneath a wide variety of land use types (refer Figure 2.4). Much of the project corridor consists of low, medium and high density residential zoning including the suburbs of Rozelle, Birchgrove, North Sydney and Cammeray. These areas are interspersed by industrial and commercial cores such as the North Sydney CBD.

Surface interactions occur within or adjacent to areas of public recreation, including Yurulbin Park, Waverton peninsula, St Leonards Park and Cammeray Park. This patchwork of land uses includes potentially sensitive residential and open space landscape character zones that have been carefully assessed within this report.

2.3.2 Transport

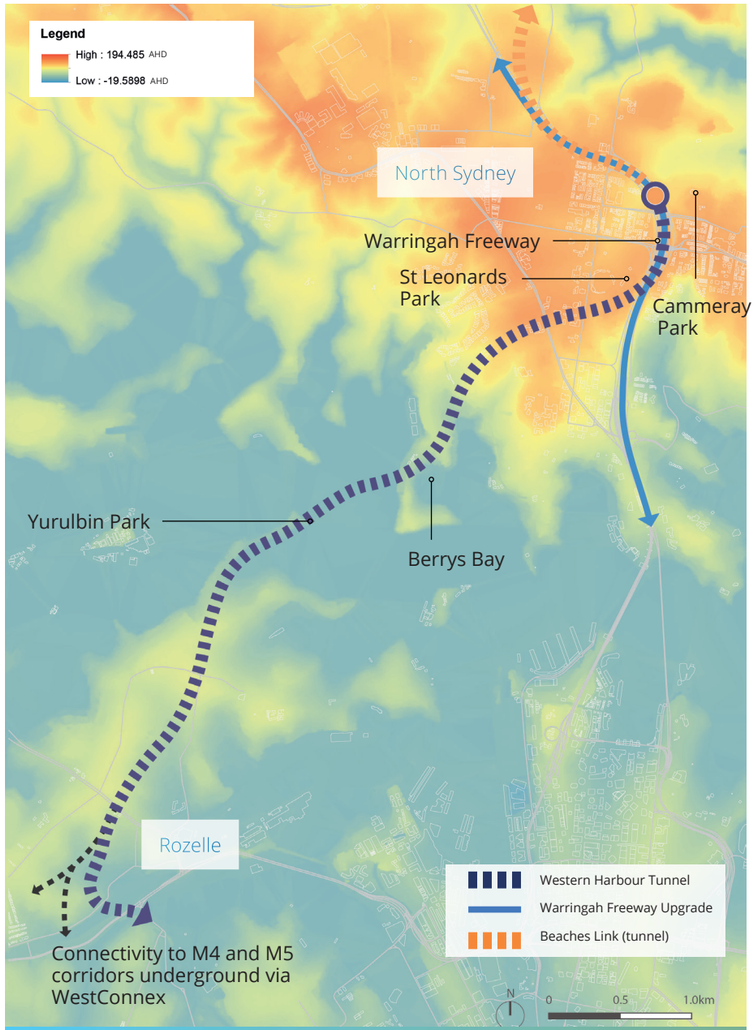
The current road experience travelling north from the Sydney CBD is limited to surface roads and one motorway corridor across the Harbour, characterised by congestion and major traffic flows. There is limited cycle connectivity along the corridor and many locations where pedestrian connectivity is restricted across existing road alignments. The rail network is connected from north to south by Sydney Habour Bridge, moving north from the CBD to North Sydney and St Leonards. Ferry wharfs are situated to the north and south of the Sydney Harbour, serving the city and surrounding suburbs.

The Western Harbour Tunnel/Warringah Freeway Upgrade project would interact with the new express bus services between the Northern Beaches and North Sydney, the CBD and the Northwest, as well as facilitating access to North Sydney, enabling interchange with existing rail and proposed metro services. This presents the opportunity to reduce the number of buses accessing the CBD and improve the reliability of cross Harbour bus trips (refer Figure 2.5).

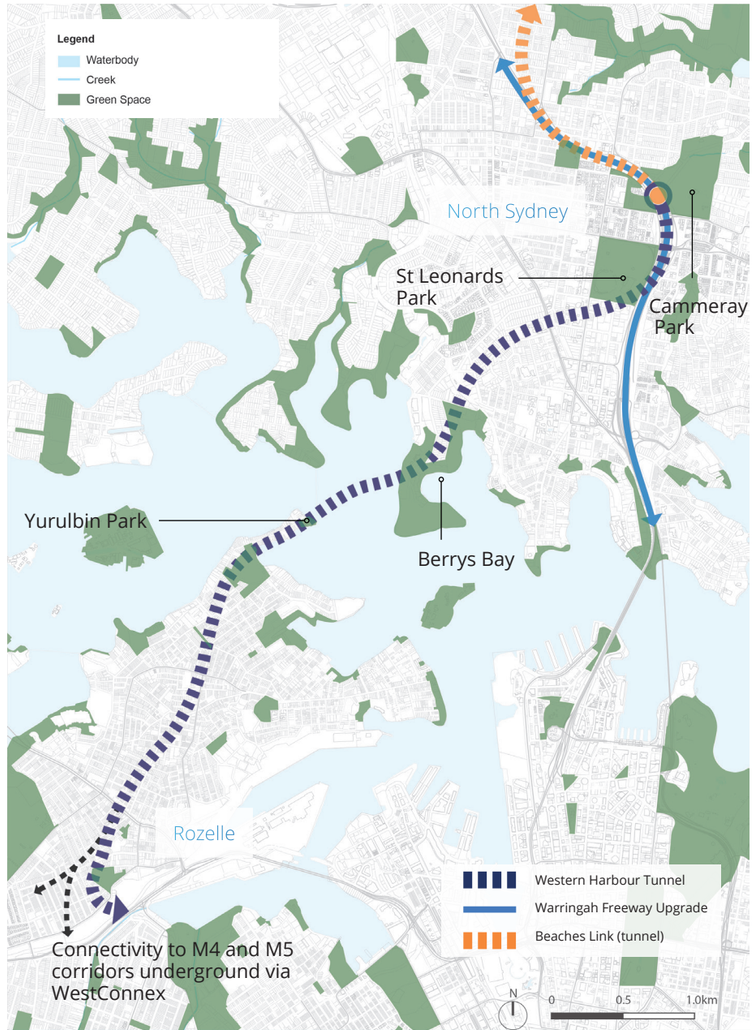
2.3.3 Heritage

Numerous local and several state heritage items can be found in proximity to the project alignment, as well as varied heritage conservation areas (refer Figure 2.6). Heritage conservation areas interfacing with the project are spread across the alignment, focused on residential areas of Birchgrove, North Sydney and Cammeray.

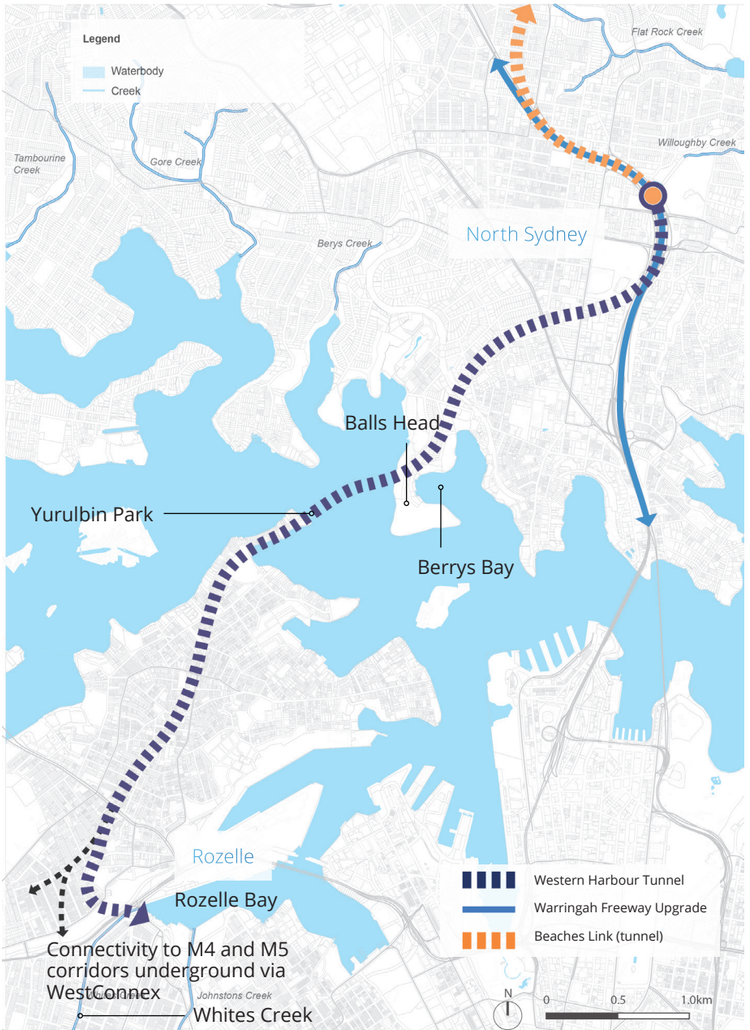
The only state heritage item directly impacted by the works is St Leonards Park.



2.7 - TOPOGRAPHY ACROSS PROJECT ALIGNMENT



2.8 - GREEN SPACE ACROSS PROJECT ALIGNMENT



2.9 - HYDROLOGY ACROSS PROJECT ALIGNMENT

2.3.4 Topography

The project alignment passes over and beneath the varied topography of central and northern Sydney, part of the wider Sydney geological basin (refer Figure 2.7). The surface topography of the alignment is characterised by a general increase in elevation as the route travels northward from the tunnel portals at Rozelle (approx. 4m AHD) to the Warringah Freeway that cuts into the North Sydney ridgeline (approx. 85m AHD).

This ridge forms a significant feature within the North Sydney precinct, contributing to its landscape character and offering commanding views south towards the Sydney CBD and Harbour. The Warringah Freeway sandstone cuttings form a visible interaction between the road corridor and topography.

2.3.5 Green space

A diverse range of green space can be found across the area surrounding the project alignment (refer Figure 2.8). The project interacts with several areas of public open space including sports facilities, reserves and parkland. This patchwork of green space presents both physical constraints to transformation but also opportunities to retain and improve the environmental assets that interface with the project.

Significant areas of public open space that interface with the project include Yurulbin Park, Berrys Bay, St. Leonards Park and Cammeray Golf Course. Many of these areas are associated with high levels of public amenity, being used for recreation such as dog walking, cycling, walking or sporting activities. Parks and reserves also provide a significant green edge to parts of the surface alignment along the Warringah Freeway.

2.3.6 Hydrology

Proximity to water is a major feature of the project alignment (refer Figure 2.9). Surface elements of the project have direct or indirect interfaces with Sydney Harbour at Rozelle Bay, Yurulbin Park, Balls Head and Berrys Bay.

Creek lines and riparian corridors in proximity to the project are limited. Whites Creek is located close to the project works in Rozelle.

3. Strategic urban design framework

3.1 Context

Sydney's motorways, local roads, tunnels and streets all form part of the character of the built environment, directly influencing the quality of the landscape, townscape and public domain through which they pass.

As transport networks develop, it is important to ensure that road infrastructure and transport solutions follow quality urban design principles to ensure their success as enduring pieces of infrastructure.

Roads and Maritime Services commitment to good urban design, the Centre for Urban Design, have produced the design guideline and policy document *'Beyond the Pavement'*.

The following principles from this document have informed the strategic urban design for the project:

1. Contributing to urban structure and revitalisation
2. Fitting with built fabric
3. Connecting modes and communities
4. Fitting with the landform
5. Responding to natural patterns
6. Incorporating heritage and cultural contexts
7. Designing roads as an experience in movement
8. Creating self-explaining road environments
9. Achieving integrated and minimal maintenance design.

3.2 Urban design vision

Sydney has a complex motorway network that traverses the rolling topography of the Sydney basin and reaches out to suburban and rural areas throughout the state.

Due to the city's constrained geographical conditions and the challenge of securing surface road corridors, tunnels are becoming increasingly prevalent within the road network.

A distinctive aspect of the Western Harbour Tunnel and Warringah Freeway Upgrade, setting it apart from the rest of the motorway network, is its unique relationship to the geography of Sydney.

The project connects the historic industrial suburb of Rozelle, diving beneath Parramatta River before emerging near the topographic ridge of North Sydney adjacent to major areas of open space.

This relationship between the road alignment, the water of Sydney Harbour, local green spaces either side of the corridor and the sandstone geology of North Sydney would be explored through the project's urban design elements, increasing the legibility of the network.

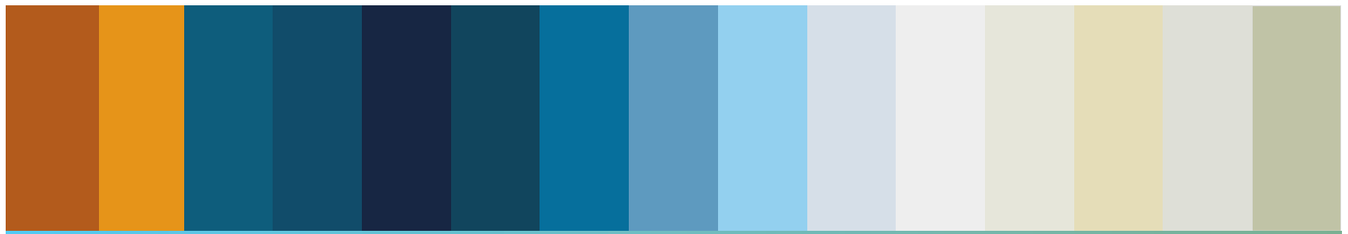
The urban design of the project, including the public domain that it interacts with, would be developed to provide a high quality user experience, enhanced local amenity value and form a distinct 'whole of corridor' identity.

URBAN DESIGN VISION

The Western Harbour Tunnel and Warringah Freeway Upgrade provides a distinctive motorway experience that, through a series of undulating subterranean journeys, provides a connection across Parramatta River to the urban centre of North Sydney and on towards the northern suburbs.

It is a transition between tunnel and surface environments, a connection across the Harbour and a link from city to suburb. It would provide enhanced green connections, improved pedestrian and cyclist amenity and facilitate local places to return to local communities.

Rozelle | North Sydney | Warringah Freeway



CONTEXTUAL COLOUR PALETTE

3.3 Project objectives

3.3.1 Purpose

Drawing on the vision for the project, the following urban design objectives form the basis of the ongoing strategic urban design development for Western Harbour Tunnel and the Warringah Freeway Upgrade.

The objectives provide a design structure that resolves to tie all components of infrastructure together with one identity and integrate them thoughtfully into the existing urban fabric.

The objectives seek to:

+ Shape the project narrative established in the vision as a concept of transition from city to suburb, underneath the waters of Sydney Harbour
+ Ensure the project is well integrated into the geography of the region, the motorway system and its surrounding landscape and urban context
+ Deliver infrastructure elements that define and give meaning to the user experience in a way that is evocative of the unique local context.

The objectives should be used to evaluate the success of future project design development.

1. Identity and user experience

Objective: Develop a theme that references Sydney's unique geography and place to provide a user experience that enhances the journey, encourages awareness of the living environment, enables orientation and enhances safety.

2. Integrated design

Objective: Provide an integrated urban design approach that thoughtfully seams the Western Harbour Tunnel and Warringah Freeway Upgrade to their surrounding urban and landscape interfaces.

3. Connectivity and legibility

Objective: Provide connectivity between areas beyond the boundaries of the motorway corridor and promote increased legibility of places, buildings, streets and landmarks.

4. Urban renewal and liveability

Objective: Unlock potential for urban regeneration, landscape improvements and active transport upgrades along the project corridor. These urban renewal opportunities would provide high levels of urban amenity and liveability.

5. Living environments

Objective: Ensure the design, planning, construction and management of the project responds to the living environment. Infrastructure interventions would reflect a natural systems approach which is responsive to the environment and promotes the highest levels of sustainability.

6. Sustainability

Objective: Embed sustainability considerations into the design and delivery of the project in order to minimise environmental and social impacts while delivering positive economic outcomes for the people of NSW.

WELL CONSIDERED DETAILING OF INFRASTRUCTURE ELEMENTS IMPROVES DRIVER EXPERIENCE (CROSS CITY TUNNEL, SYDNEY) SOURCE: HASSELL STUDIOS

3.3.2 Identity

Objective

Develop a theme that references Sydney's unique geography and place to provide a user experience that enhances the journey, encourages awareness of the living environment, enables orientation and enhances safety.

The identity of the project has been built upon the road alignment's relationship to Sydney Harbour, local green spaces either side of the corridor and the sandstone geology of North Sydney. These unique qualities help inform an unconscious understanding of place, location and navigation.

Experience

The experience of an infrastructure project is built from movement, local context and the aesthetics of urban elements. The project's urban design addresses two scales of experience:

The user experience: moving along the linear corridor of the motorway.

The user experience through the mainline tunnels and daylight portals is one of continuous movement through varied space and sequential elements.

The surface experience: moving through the residential, commercial and open spaces alongside and across the project alignment.

The surface experience is one of slower and more separated movement of pedestrians, local drivers and cyclists, interacting with the project as individual elements within a complex and varied landscape of urban and suburban character.

The urban design of the project has been progressed to:

+ Ensure the journey is articulated through a selection of appropriate contextual materials and finishes
+ Utilise the broad scale geography and surrounding landscape to influence the project's material palette, architectural responses and overall identity
+ Provide a unified architectural design of motorway facilities in Cammeray Golf Course and ventilation outlet within Warringah Freeway.

Project opportunities

+ Arrival experience at Rozelle and entrance gateway to Western Harbour Tunnel
+ Sydney gateway experience southbound on Warringah Freeway within North Sydney
+ Exposed sandstone geology of Warringah Freeway
+ Decision points at either end of Western Harbour Tunnel
+ Transition zones between tunnels and surface portals
+ Junction of Western Harbour Tunnel and Beaches Link mainline tunnels
+ Unified design of noise walls along Warringah Freeway.

Urban design requirements

+ Develop the road narrative experience around the concept of a transition from an inner city environment, that considers the natural form of the Harbour, to the suburban northern areas
+ Investigate the development of a project motif that references the unique natural and urban qualities of the alignment
+ Ensure a unified urban design approach to the whole project corridor is established and fostered through adherence to common strategies for buildings and structures, finishes, accessibility, legibility and wayfinding
+ Articulate the journey through a considered selection of appropriate contextual materials and finishes
+ Provide a varied and stimulating travel experience using urban design elements to avoid lengthy and monotonous tunnel conditions
+ Utilise local endemic species that reflect local ecology and habitats to guide the landscape palette
+ Use wayfinding elements such as feature landscape design and distinct architectural design at key intersections and entry/exit points to create a self explaining road environment.

ARTICULATE THE JOURNEY THROUGH SELECTION OF APPROPRIATE CONTEXTUAL MATERIALS AND FINISHES TO SUPPORT IDENTITY (HUNTER EXPRESSWAY, NSW) SOURCE: ROADS AND MARITIME

"By designing the tunnel as a journey experience rather than solely as an underground bypass... the construction of new tunnels will result in a positive contribution for both road users and the surrounding communities."

Tunnel Guidelines, Roads and Maritime Services, 2016

3.3.3 Integrated design

Objective

Provide an integrated urban design approach to join Western Harbour Tunnel and the Warringah Freeway Upgrade to their surrounding urban and landscape interfaces.

The application of urban design to the project's infrastructure can be understood as supporting either lateral or linear integration.

Linear integration

Supported by design elements experienced continuously along the surface motorway and tunnels that combine to create project identity along the corridor:

+ Noise walls
+ Retaining walls
+ Portals and trough structures
+ Cladding panels and tunnel linings
+ Shared user paths and lighting.

Lateral integration

Supported by design elements experienced at the surface which provide a contextual response to local place:

+ Motorway facilities and outlet
+ Motorway control centre
+ Road and shared user bridges
+ Local public open space
+ Screening landscape
+ Landscape treatments that ensure the project is environmentally integrated.

The exploration of colour and material selection strategies would be further developed during subsequent design stages to reinforce either linear or lateral integration related to individual project elements.

The urban design of the project has been progressed to:

+ Develop a high level concept design for the Cammeray Golf Course motorway facilities and Artarmon motorway control centre that seeks to reduce the perceived scale of the infrastructure and aid its integration with the surrounding context (refer 'Urban elements' and specific precinct chapter section for more detail)
+ Locate landscape treatments to best screen and integrate project elements including:
  - Planting within medians and above portals within Warringah Freeway corridor
  - Screen planting to motorway facilities within Cammeray Golf Course
  - Re-establishment of appropriate vegetation along disturbed areas of the alignment.
+ Locate shared user facilities where they can maximise connectivity, including:
  - Improved shared user path connections across Warringah Freeway including High Street, Ridge Street and Ernest Street.

Project opportunities

+ Further design development to integrate the motorway facilities and motorway control centre into their local context at Cammeray Golf Course and Artarmon
+ Further design development to integrate the ventilation outlet with Ernest Street bridge
+ Further design development to integrate the portals within the Warringah Freeway corridor.

Urban design requirements

+ Develop a 'whole-of-corridor' design that reinforces the Western Harbour Tunnel identity within the broader transport network
+ Ensure project urban elements sensitively reflect and fit with local places
+ Ensure urban elements along the length of the project are designed as a recognisable suite of architectural responses
+ Utilise a selection of colours and materials that support the project identity along the route (linear integration), while responding to local context (lateral integration) such as local landscape character, materiality and heritage
+ Ensure all proposed urban structures (such as bridges, motorway control centre and motorway facilities) are designed to integrate with their surrounding context
+ Ensure screening vegetation to infrastructure elements, especially adjacent to residential receivers
+ Ensure facilities located close to the motorway create a strong visual tie with the road corridor and make the purpose of the facility buildings apparent to the public
+ Ensure existing pedestrian and cycle path connections are strategically connected to proposed shared user paths.

DESIGN AND LOCATE STRUCTURES TO TAKE INTO ACCOUNT IMPORTANT LOCAL VIEWS, VISTAS AND VALUED PLACES (BRISBANE AIRPORT LINK)

3.3.4 Connectivity and legibility

Objective

Provide connectivity between areas beyond the boundaries of the motorway corridor and promote increased legibility of buildings, streets and landmarks.

The current experience travelling north from the city centre is limited to surface roads and one motorway corridor across Sydney Harbour. The experience is characterised by congestion at key points and major traffic flows along arterial roads with CBD collector/ distributors fulfilling access and bypass functions.

The project has the potential to transform the experience of road users travelling across Sydney Harbour, as well as reduce traffic on surface roads, improving the communities through which they pass.

It is intended that with a recognisable linear identity, the project's surface motorway and tunnels would provide self-explanatory roads and aid way-finding.

Simple and refined urban treatments to tunnel entry and exits, portals and facilities have been recommended to ensure an enjoyable and legible journey for motorists.

Well designed active transport links would provide connectivity between areas beyond the boundaries of the motorway corridor.

New and upgraded pedestrian and cycle links are a key part of the project, ensuring benefits extend beyond just motorists and enable permeability across the project alignment.

The urban design of the project has been progressed to:

+ Ensure the motorway and tunnels are easy to navigate with appropriate road gradients, clear sightlines, and consistent road architecture across the project
+ Ensure the Cammeray Golf Course and Artarmon motorway facilities and outlet are designed to read as coherent parts of the surrounding built environment
+ Ensure active transport is a priority transport solution that prioritises people's health and wellbeing, including:
  - Warringah Freeway cycle path, supporting the aims of the North Shore Link Cycleway to connect Naremburn with the Sydney Harbour Bridge
  - Upgraded shared user infrastructure at Falcon Street, Ernest Street, Ridge Street and High Street providing improved access to the North Sydney CBD and future Metro stations
  - Improved links from Cammeray Park across a new Ernest Street shared user bridge, connecting to ANZAC Park.

Project opportunities

Capitalising on wider transformation opportunities would require coordination with local authorities and stakeholders.

Opportunities exist for others (such as local government) within the suburbs of Rozelle, Crows Nest, St Leonards and Neutral Bay to:

+ Return local centres to local activities while reconnecting them with their surrounding communities
+ Improve local centre amenity with more protected footpaths and potential kerb side parking.

Urban design requirements

+ Enhance legibility through the provision of visual stimuli within the tunnels to create a progressive sequence of visual events for the motorist
+ Break up tunnel lengths to vary the driver experience and heighten awareness of geographical location
+ Provide a unified design of project elements across the North Sydney precinct to improve legibility. Ensure a simple and consistent language of built elements and components to minimise visual clutter and create visual unity and clarity
+ Use wayfinding elements such as feature landscape design and distinct architectural design at key intersections and entry/ exit points to create a self explaining road environment
+ Provide safe dedicated pedestrian and cycling infrastructure, where feasible, which caters for the needs of existing and un-captured community and connects to the existing and planned future cycle network
+ Integrate cycle paths with the precinct-wide movement strategy to attract more users by connecting with regional and local government bicycle strategies
+ Provide consistent and continuous paths with consistent materials, surfaces and arrangements across all precincts to avoid uncertainty for users
+ Provide Disability Discrimination Act (DDA) compliant paths that are accessible
+ Reduce conflicts between pedestrians and cyclists where feasible
+ Maintain adequate vertical clearance under signage for people movement, particularly those on bikes and provide additional canopy cover along shared user paths where feasible.

ENSURE A SIMPLE AND CONSISTENT LANGUAGE OF BUILT ELEMENTS TO MINIMISE VISUAL CLUTTER

PROVIDE DEDICATED CYCLE INFRASTRUCTURE WHERE FEASIBLE SOURCE: CITY OF SYDNEY

3.3.5 Urban renewal and liveability

Objective

Unlock potential for urban regeneration, landscape improvements and active transport upgrades along the project corridor. These urban renewal opportunities would provide high levels of urban amenity and improved liveability.

Urban renewal

As Sydney continues to grow, there would be increased demand for additional dwellings and public open space, including sporting facilities.

These demands would be partly provided through urban renewal around new and existing infrastructure, land release and infill developments.

Major infrastructure developments such as Western Harbour Tunnel and the Warringah Freeway Upgrade provide key opportunities to improve local places that interact with their alignment.

Liveability

Liveability is broadly defined as the well-being of a community and represents the characteristics that make a place where people want to live now and in the future. It is the sum of the aspects that add up to the quality of life of a place, including economy, amenity, accessibility, sustainability, health and wellbeing.

The project's urban design outcome has a role in creating well-connected, walkable places that build on local strengths, enhancing the quality of the public domain and improving liveability along the corridor.

The urban design of the project has been progressed to:

+ Minimise the project footprint where feasible
+ Consider the remediation and renewal of project sites with solutions that respect existing landscape, heritage and community needs
+ Provide safe and comfortable transitions and connectivity between local streets, commercial centres and transport interchanges
+ Provide widened shared user paths to improve amenity for pedestrians and cyclists, including:
  - Improved cycle path connection along Warringah Freeway, supporting the aims of the North Shore Link Cycleway to connect Naremburn with the Sydney Harbour Bridge
  - Upgraded shared user infrastructure at Falcon Street, Ernest Street, Ridge Street and High Street including wide footpaths
+ Provide a landscape treatment that assists in integrating the infrastructure and improves the public domain, including:
  - Planting within medians and above portals within Warringah Freeway corridor to aid integration of infrastructure
  - Screen planting to motorway facilities within Cammeray Golf Course to reduce visual impact
  - Replacement planting along edges of Warringah Freeway
  - Improved pedestrian and cyclist amenity across the proposed Ernest Street shared user bridge including shade tree planting, seating opportunities and look outs.

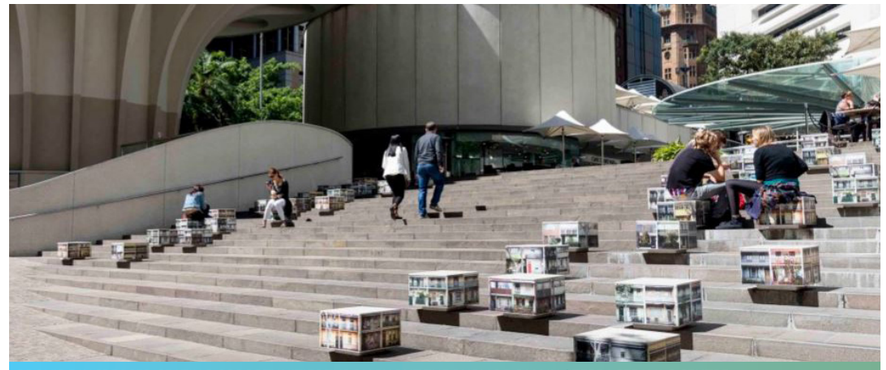
Project opportunities

+ Potential to utilise residual space underneath Alfred Street North underpass as open space
+ Opportunities to upgrade Yurulbin Park and Berrys Bay open space
+ Preservation and potential improvement of Sydney Harbour views from key locations such as St. Leonards Park, Ridge Street lookout and shared user bridge.

Urban design requirements

+ Utilise durable and high-quality materials and finishes to ensure the project contributes to the public domain for years to come
+ Develop public spaces that are accessible for the entire community, including streetscapes, parks and urban elements such as shared user bridges
+ Provide increased seating opportunities throughout the public domain
+ Consider public art opportunities along the project alignment
+ Ensure the project aids walkability and connectivity through provision of wide shared user paths
+ Ensure the quality and accessibility of public open spaces is maintained or improved
+ Ensure there is no net loss in public open space where feasible
+ Ensure scenic and cultural landscapes are protected and enhanced, such as key views to Sydney Harbour and boundaries of National Parks
+ Ensure landscape treatments address safety-in-design and Crime Prevention Through Environmental Design issues.

ENSURE PLENTIFUL TREE PLANTING ALONG SHARED USER PATHS TO IMPROVE PEDESTRIAN AMENITY (WINDSOR PLAZA, MELBOURNE) SOURCE: ASPECT STUDIOS



PROVIDE INCREASED SEATING OPPORTUNITIES THROUGHOUT THE PUBLIC DOMAIN ('TERRACED' MLC CENTRE, SYDNEY) SOURCE: AIMEE CROUCH PHOTOGRPAHY / BRESIC WHITNEY

ENSURE THE PROJECT AIDS WALKABILITY AND CONNECTIVITY THROUGH PROVISION OF WIDE SHARED USER PATHS (SOURCE: UNSPLASH)

3.3.6 Living Environments

Objective

Ensure the design, planning, construction and management of the project responds to the living environment. Infrastructure interventions would reflect a natural systems approach which is responsive to the environment and promotes the highest levels of sustainability.

Daily immersion in living environments plays a key role in enabling individual and community wellbeing.

Landscape treatments that are well integrated with the public realm are fundamental to achieving locally relevant streets and spaces with high amenity value. Proposed infrastructure must be developed to respect existing natural environments and their systems.

The urban design of the project has been progressed to:

+ Maintain vegetated screening along the project alignment by reducing existing vegetation loss where feasible and minimising project footprint
+ Enhance existing vegetation and proposed screening along the road corridor and around ventilation and motorway facilities, including:
  - Planting within medians and above portals within Warringah Freeway corridor to aid integration of infrastructure
  - Screen planting to motorway facilities within Cammeray Golf Course to reduce visual impact
  - Replacement planting along edges of Warringah Freeway.
+ Provide planting on infrastructure, along roads and shared user paths where feasible to achieve tree canopy cover for shade, shelter and habitat creation, including:
  - Tree and shrub planting along Ernest Street shared user bridge.

Project opportunities

+ Reinstatement and potential embellishment of Yurulbin Park and Berrys Bay open space.

Urban design requirements

+ Incorporate green infrastructure initiatives into landscape treatments where feasible to enable the objectives of the NSW Governments Architect's policy 'Greener Places'
+ Increase urban tree canopy where feasible
+ Incorporate tree planting of endemic species for shade and shelter to shared user paths
+ Provide screen planting to soften form of infrastructure elements where feasible
+ Trim rather than remove trees where feasible in consultation with a qualified Arborist
+ Ensure appropriate species selection in consultation with relevant Councils and other stakeholders. Utilise local and endemic species where appropriate to ensure seamless integration with existing landscape character
+ Consider green roof treatments to facility buildings where feasible
+ Ensure landscape treatments and species palettes are designed to survive the harsh conditions encountered within motorway boundaries
+ Ensure existing bushland and biodiversity is protected and enhanced where feasible
+ Ensure environmentally sensitive areas and waterways are protected
+ Ensure landscape treatments address safety-in-design and Crime Prevention Through Environmental Design (CPTED) issues
+ Ensure planting and maintenance proposals address land ownership and asset management considerations.

INTEGRATE LANDSCAPE TREATMENT INTO INFRASTRUCTURE ELEMENTS (SUCH AS WALLS) WHERE FEASIBLE

CONSIDER GREEN ROOF TREATMENTS TO FACILITY BUILDINGS WHERE FEASIBLE

INTEGRATE LANDSCAPE TREATMENT INTO INFRASTRUCTURE ELEMENTS (SUCH AS SHARED USER BRIDGES) WHERE FEASIBLE

3.3.7 Sustainability

Objective

Embed sustainability considerations into the design and delivery of the project to minimise environmental and social impacts while delivering positive economic outcomes for the people of NSW.

Sustainable development aims to ensure that the needs of the present are met without compromising the ability of future generations to meet their own needs.

A separate sustainability framework has been developed for the project that contains a sustainability vision, policy, objectives and targets that cover public open space, community benefit, active transport, carbon emissions, climate change resilience, heritage and water use.

This section of the report highlights key sustainability requirements and opportunities related to landscape and urban design treatments.

The urban design of the project has been progressed to:

+ Incorporate natural landscape features into the urban environment through considered landscape treatments
+ Provide urban cooling through increase of tree canopy
+ Minimise vegetation clearing where feasible
+ Suggest reuse of site materials where feasible
+ Locate facilities below ground where feasible to free up surface open space.

Project opportunities

+ Reuse of site materials including topsoil from the Cammeray Golf Course construction support site (WHT10 and WFU8) where feasible
+ Reuse tunnel spoil for select pavement layers under motorway pavements
+ Reuse mulched vegetation for landscaping works where feasible
+ Reuse of site materials within reinstatement of Yurulbin Park where feasible
+ Water Sustainable Urban Desing (WSUD) treatment to detention basin within Cammeray Golf Course
+ Rain water capturing and passive irrigation along Ernest Street land bridge
+ Replacement tree planting along Warringah Freeway corridor.

Urban design requirements

Urban ecology

+ Provide a long-term maintenance plan for vegetation assisting in increasing the likelihood of delivering well performing landscapes
+ Ensure shared user paths and open space connect with surrounding green corridors to create a connected green network
+ Conserve vegetation where feasible by further minimising project footprint
+ Ensure vegetation and canopy removal is offset by replacement planting
+ Ensure trees, shrubs and groundcover are climate resilient, provide shade and ameliorate potential heat island effects, to provide valuable amenity for the broader community
+ Ensure maintenance and irrigation requirements are kept to a minimum with the use of native species in 'natural' informal planting arrangements as the predominant plant matrix.

Urban soil

+ Provide a soil management plan in conjunction with landscape construction plans to ensure the project life cycle of soil management is achieved
+ Protect, store and reuse existing topsoil where feasible
+ Ensure all urban elements with integrated landscape treatments allow for adequate soil volume for root growth
+ Ensure tree pits size and specification have been designed to increase soil volume that would support good root growth and improve tree health conditions.

Urban water

+ Ensure passive storm water quality solutions are integrated into the design where feasible such rain gardens, bio-retention and detention basins. This should include both temporary and permanent sites to improve water quality run off
+ Reduce run off by exploring alternative surface materials such as permeable pavement for paths or carparks
+ Capitalise on opportunities to capture and reuse water for passive irrigation
+ Integrate green infrastructure into the project to mitigate peak flows and reduce associated flooding risk, erosion and pollutant loads.

Innovation

+ Explore alternative and new technologies during the urban design process that are cost effective and aim to provide solutions to reduce waste and materials, reduce energy consumption, improve water quality and habitat connectivity.

INCORPORATE WSUD INITIATIVES INTO STREETSCAPES (JELLICOE STREET, AUCKLAND) SOURCE: WRAIGHT + ASSOCIATES

PROVIDE DROUGHT RESISTANT PLANTING (LIZARD LOG, WESTERN SYDNEY PARKLANDS) SOURCE: MCGREGOR COXALL

INTEGRATE GREEN INFRASTRUCTURE INTO THE PROJECT TO MITIGATE PEAK WATER FLOWS

3.4 Urban elements

The built elements of the project must contribute to creating desirable public spaces by providing a high quality experience for users and a balanced, contextually responsive approach.

This section provides requirements for developing the detailed design of the project within and surrounding the road corridor. It seeks to establish a 'whole-of-corridor' approach by adopting consistent and robust design principles for all infrastructure elements.

+ Earthworks
+ Noise Walls
+ Retaining Walls
+ Tunnel portals and trough structures
+ Mainline tunnels
+ Motorway facilities, vent outlets and motorway control centres
+ Road bridges
+ Shared user bridges
+ Landscape treatments
+ Materials and Finishes
+ Safety in Design and Crime Prevention Through Environmental Design (CPTED)

Each section includes:

Principle - of each design guideline
Project opportunity/ Key project locations - specific areas of the project relevant to each urban element. Refer to the individual precinct sections for more information.
Requirements - describes best practice design response that must be achieved during design development
Examples – illustrates examples of the intended guideline using images and sketches as visual representation of the requirments.

WELL CONSIDERED DETAILING OF INFRASTRUCTURE ELEMENTS IMPROVES DRIVER EXPERIENCE (CROSS CITY TUNNEL, SYDNEY) SOURCE: KI STUDIO

3.4.1 Earthworks

Principle

Visually integrate earthworks into their landscape setting as much as possible, keeping engineered structures to a minimum.

Description

Earthworks consist of fill and cut embankments across the project corridor. Some embankments would be located in close proximity to sensitive residential and open space receivers.

Their form and visual appearance would be critical in successfully integrating the new infrastructure into the surrounding landscape and urban form.

Key project locations

+ Fill batters in the vicinity of High Street, North Sydney
+ Reinstatement of south east corner of St Leonards Park
+ Earthworks within Cammeray Park.

Urban design requirements

+ Design earthworks to sit lightly in their context, exhibiting a 'natural fit' within their landscape setting wherever feasible
+ Gently round out all formations at both top and bottom of slopes, and at each end of each formation to achieve a 'natural' transition into adjacent landforms
+ Utilise project fill where feasible to minimise imported fill material that could otherwise be sourced onsite
+ Stabilise earthworks in accordance with the information within 'Guideline for Batter Surface Stabilisation using vegetation, Roads and Maritime Centre for Urban Design 2015'
+ Integrate temporary and permanent (landscape) stabilisation solutions by applying compatible cover crop and enduring species
+ Ensure landscape treatments on embankments are suitable for the gradient.

ENSURE LANDSCAPE TREATMENTS ON EMBANKMENTS ARE SUITABLE FOR THE GRADIENT. (HUNTER EXPRESSWAY)
SOURCE: DH HOLLAND CONSTRUCTIONS

3.4.2 Noise Walls

Principle

Visually integrate noise walls into the road corridor and urban/landscape setting as part of a coordinated whole-of-corridor design.

Description

As a highly visible element, noise walls can play an important role in orienting the driver along the route and connecting them to the surrounding context.

The requirement for noise walls provides an opportunity to enhance the driver experience and contribute to a considered journey along the project corridor, while improving the amenity for sensitive receivers adjacent to the road infrastructure.

Noise walls should attempt to knit into adjacent landscape formations and/or infrastructure elements.

Key project locations

New permanent noise walls are likely to be required and/or existing noise walls enhanced in the following locations:

+ Adjacent to road corridor and residential receivers along the Warringah Freeway, North Sydney - refer North Sydney precinct chapter for further details.

Urban design requirements

+ Design noise walls to be part of a 'whole of project' aesthetic strategy while also place specific and responsive to their surroundings
+ Reduce apparent scale and visual impact of noise walls with careful planting, even when space is limited. Provide sufficient space for screen planting to both sides of wall where feasible and allow adequate maintenance access
+ Consider architectural treatment to noise walls where feasible
+ Ensure consistent design approach similarly applied to other road elements, creating a considered palette of design elements, materials and colour
+ Use robust, vandal resistant materials
+ Use a noise wall composition that is resilient to damage by adjacent planting
+ Provide transparent noise walls where view retention and solar access is desirable, such as adjacent to residential dwellings
+ Use simple, monochromatic, modular planar panels, of consistent height, with a horizontal top edge that is generally parallel with its supporting ground plane. All vertical posts should be of consistent height and set out
+ Use neutral colours with non-reflective finishes
+ Design gradual transitions so that top of wall is a smooth flowing line
+ Review all joints, fixings and panels so they are coordinated and integrated within the three-dimensional design.

ENSURE A HIGH QUALITY FINISH TO NOISE WALLS, SOFTEN WITH PLANTING WHERE FEASIBLE

PROVIDE TRANSPARENT NOISE WALLS WHERE LIGHT AND VIEWS ARE IMPORTANT

3.4.4 Retaining Walls

Principle

Visually integrate retaining walls into the road corridor and urban/landscape setting as part of a coordinated whole-of-corridor design.

Description

Retaining walls would be a key visual element throughout the project for both road users, adjacent residential properties, pedestrians and cyclists.

The design of retaining structures should be carried out in consideration of all other elements such as bridges, noise walls and landscape works to provide a cohesive and unified design outcome.

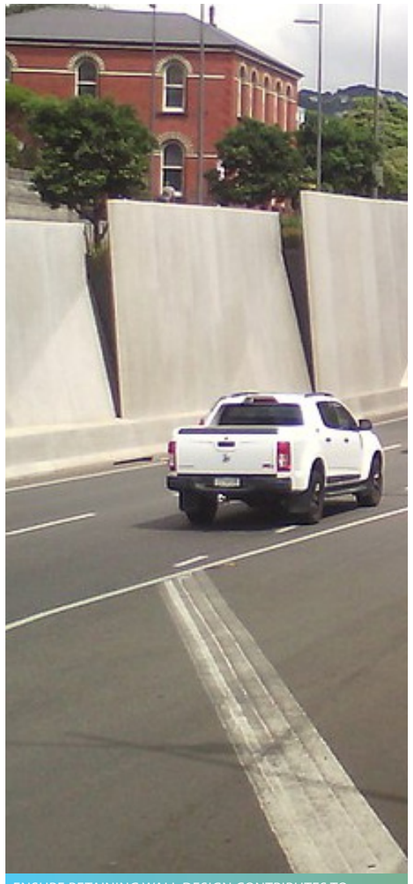
Retaining walls should attempt to knit into adjacent landscape formations and/or infrastructure elements.

Key project locations

+ Numerous locations along the Warringah Freeway corridor including the trough structures of each portal.

Urban design requirements

+ Design retaining walls to be part of a 'whole of project' aesthetic strategy while also place specific and responsive to their surroundings
+ Accommodate adequate space for landscape planting to front of walls to assist visual integration where appropriate
+ Use robust, vandal resistant materials
+ Fully coordinate retaining structures with other structural elements, barriers, lighting landscape and drainage and particularly noise walls and fencing. For example, cladding systems and/or form work should match the panel size, proportions and joint set out of associated wall and fence systems
+ Use good quality, pre-cast modular concrete fascia or cladding systems where appropriate to increase the aesthetic appeal of retaining walls, introducing a pattern, rhythm and reducing their apparent scale and impact
+ Design retaining walls to be simple structures free of embellishments. The face of all walls should be flat and consistently true throughout in accordance with AS3610
+ Design tops of wall to be be consistently horizontal and true. If they cannot be horizontal, the top of each wall in elevation should be finished to a long, gradual, consistent horizontal curve rather than sudden steps or changes in level
+ Vary retaining wall typology in response to the underlying rock strata. In some areas, underlying rock may be suitable to form natural rock cuts. In these locations the rock should be cut back as near as possible to a clean uniform face as directed by the geotechnical engineer
+ Ensure temporary and permanent safety fencing that is unobtrusive, discrete and diminishes into the landscape setting.



ENSURE RETAINING WALL DESIGN CONTRIBUTES TO THE QUALITY OF THE OVERALL ROAD ENVIRONMENT ARRAS TUNNEL, WELLINGTON

3.4.5 Mainline tunnel and tunnel ramps

Principle

Deliver a tunnel that makes a positive contribution to the journey experience through intuitive wayfinding and a varied and stimulating driver environment.

Description

The project includes long sections of mainline tunnel, as well as the potential for users to connect to other planned road tunnel projects, leading to subterranean journeys of unprecedented length.

Long tunnels require an emphasis on driver experience due to the potential for a repetitive and monotonous driving environment, disconnection from the above ground environment and difficulty wayfinding, including successfully navigating tunnel entry, exit and merge points.

Key project locations

+ 6.5km dual 3 lane motorway tunnel between the Rozelle portal and Warringah Freeway, North Sydney.

Urban design requirements

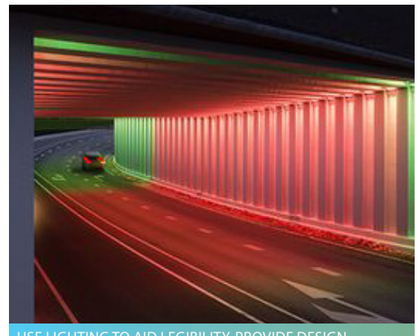
+ Ensure mainline tunnels and ramps are designed in accordance with the Roads and Maritime Tunnel urban design guideline
+ Provide a varied and stimulating travel experience, without being distracting
+ Avoid extended monotonous tunnel conditions, to support driver attention and contribute to safe tunnel design
+ Use light colours for the interior tunnel walls to maximise light reflection and generate a feeling of spaciousness
+ Use simple, logical graphics to indicate the driver's progress within the tunnel.

Wayfinding

+ Design easily distinguishable tunnel-ramp merge and diverge zones to assist in identifying different entry and exit points
+ Use panelling with designs to denote approaching tunnel merges and diverges
+ Use signage within tunnel to identify progression of user and distance travelled
+ Clearly identify interface between tunnels when entering and/or exiting each asset to assist operators and customers to quickly understand location. This would be useful for identification and response to incidents where tunnel systems control changes between operators.

Lighting

+ Use ambient lighting to improve the visual experience of the tunnel and reduce any potentially oppressive feeling of being underground.



USE LIGHTING TO AID LEGIBILITY, PROVIDE DESIGN FEATURES AND IMPROVE DRIVER EXPERIENCE WITHIN THE TUNNEL

3.4.6 Tunnel portals and trough structures

Principle

Deliver portals and trough structures that are visually appealing, sensitive to their context, reflect the above ground environment and provide a legible, self-explaining journey which enables awareness of location.

Description

The project includes tunnel portals and associated trough structures across the alignment.

Their design should focus on establishing contextual elements that emphasise simple, uncomplicated and consistent detailing and finishes. The portals should form a series of integrated elements in the landscape that assist in road legibility.

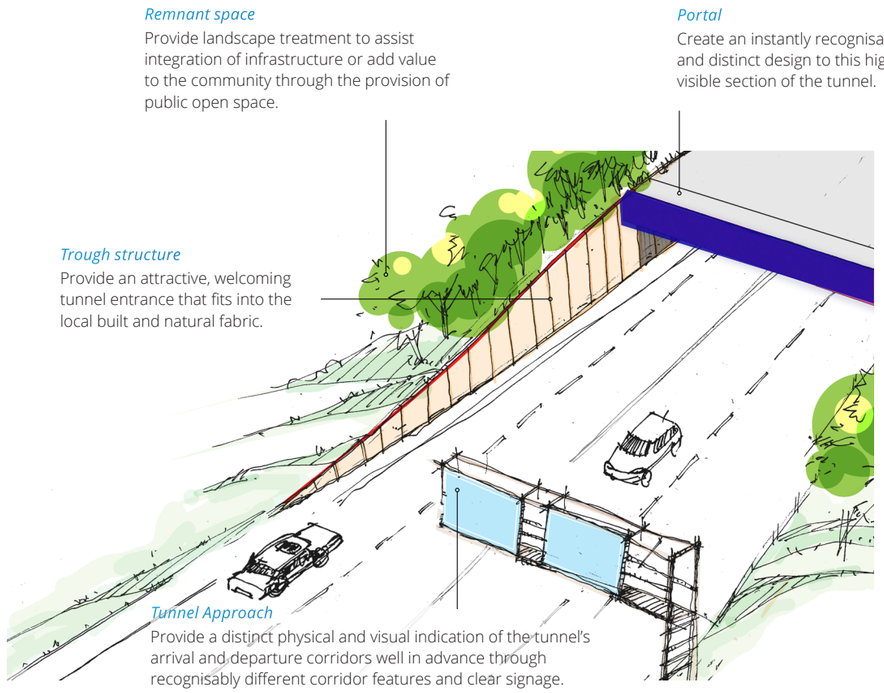
The retaining walls, lighting and safety barriers leading to the portals should be designed as a simple, robust and integrated series of elements.

Key project locations

+ Rozelle trough structure
+ Portals and trough structures that daylight within and alongside Warringah Freeway corridor including portal at Berry Street and portal at Falcon Street.

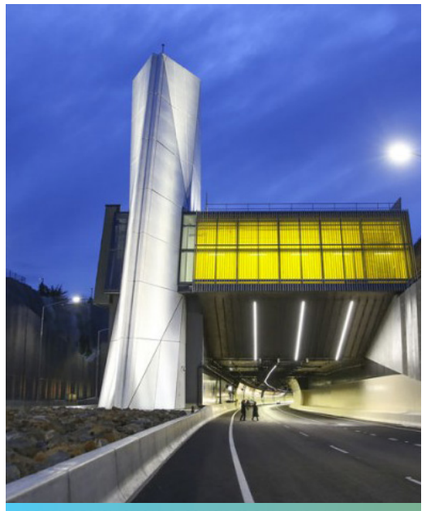
Urban design requirements

+ Ensure portals and trough structures are designed in accordance with the Roads and Maritime Tunnel urban design guideline
+ Design all tunnel features as a suite of elements with distinct 'whole of project' identity
+ Provide attractive, welcoming tunnel entrances that fit into the local built and natural fabric
+ Include the use of texture, colour and external feature lighting to visually reduce the bulk and mass of the portal area and incorporate some design variance
+ Design portal areas to add value to the community through the provision of open space, improved connectivity for local vehicles, cyclists and pedestrians and green infrastructure where feasible
+ Provide neat, simple and refined design features and the considered integration of design elements, to avoid 'clutter'
+ Design tunnel transitions to reduce sudden contrasts in light conditions
+ Provide a distinct physical and visual indication of the tunnel's arrival and departure corridors well in advance through recognisably different corridor features and clear signage
+ Effectively integrate signage to avoid a cluttered tunnel entrance
+ Retain or reinstate vegetation, trees or other green infrastructure as part of the approach corridor, trough structure and portal area to maximise the user's experience of the landscape before entering the tunnel.



TUNNEL REQUIREMENTS

PROVIDE NEAT, SIMPLE AND REFINED DESIGN FEATURES TO TUNNEL ENTRANCE (M4 WATTLE ST TUNNEL PORTAL) SOURCE: WESTCONNEX



PORTAL DESIGN SHOULD CONSIDER DAY AND NIGHT AESTHETICS (IMAGE SOURCE: NZTA.GOVT.NZ)

3.4.7 Motorway facilities, vent outlets and motorway control centres

Principle

Minimise the physical footprint and visual impact of these structures while ensuring they are designed as high quality pieces of well integrated architecture.

Description

The project consists of several key support elements that include motorway facilities, outlet, motorway control centre and associated ancillary facilities such as car parks and water tanks.

As indicated by the visualisations contained within Chapter 5 of this report, a representative concept design has been progressed for the motorway facilities at Cammeray Golf Course and Artarmon.

This high level architectural concept design seeks to reduce the perceived scale of the infrastructure and aid its integration with the surrounding context through:

+ Contextual selection of material colour and finish to reflect local place and support either recessive or prominent intent of the facility
+ Articulation of building elevations and ventilation outlet profile
+ Cladding that breaks up form and provides visual interest through shadow lines and reflection of light
+ Recessive and complimentary design of supporting infrastructure (such as substations, water tanks etc.) to ensure they read as part of the main structure

This design is based on the fundamental urban design and architectural requirements listed opposite and is intended to provide an example as to how these requirements may be developed. The motorway facilities design is expected to evolve as the project progresses.

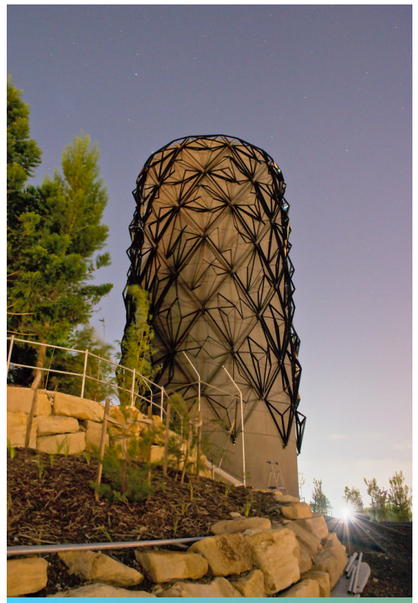
The future facility design should be progressed holistically based on the element's surrounding context, visual experience, topography and function.

Key project locations

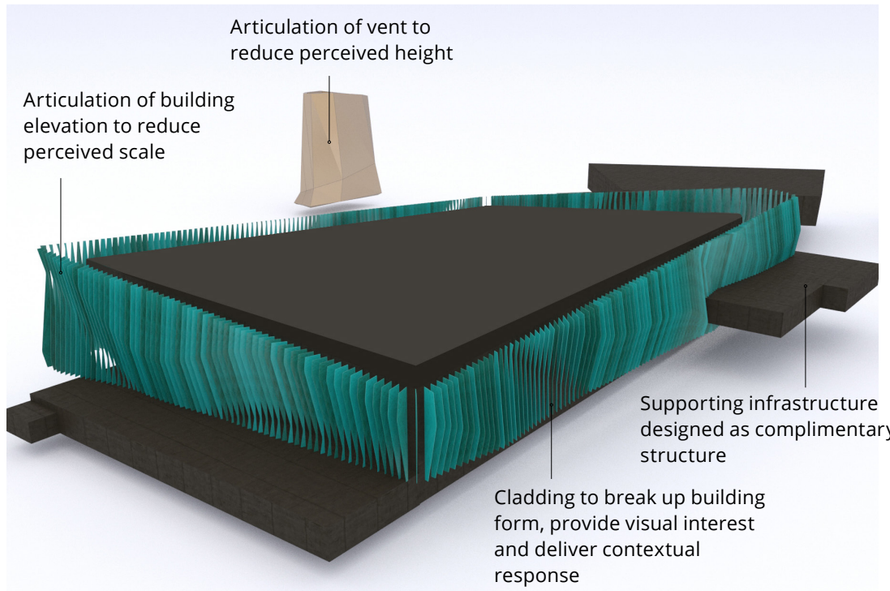
+ Western Harbour Tunnel ventilation outlet within Warringah Freeway corridor
+ Western Harbour Tunnel motorway facilities and supporting infrastructure within Cammeray Golf Course
+ Western Harbour Tunnel motorway control centre at Artarmon
+ Integration with fit-out of the Rozelle motorway facilities being constructed as part of M4-M5 Link.

Urban design requirements

+ Ensure facilities located close to the motorway create a strong visual tie with the road corridor and make the purpose of the facility buildings apparent to the public
+ Ensure any residual land surrounding the facilities is given back as public open space where feasible and not fenced off
+ Provide walking and cycling connections to facilities to encourage an active commute
+ Ensure the architectural design of all facilities follows the guidelines set out in 'Better Placed' Chapter Five: Urban design and architecture for buildings (GA NSW)
+ Design vents to consider the visual impact of these structures. Design treatments should work to visually minimise the mass and bulk of the outlet and should be sensitive to the local built fabric, important local views and valued places
+ Use different materials and the layering of façade elements to reduce their visual scale
+ Use landscape planting to help screen facilities and soften scale and mass. Integrate safety fencing within landscape design
+ Minimise opportunities for vandalism by selecting appropriate finishes and landscape treatments.



DESIGN VENTS TO CONSIDER THE VISUAL IMPACT OF THE STRUCTURES AND MINIMISE SCALE AND BULK



STRATEGIC CONCEPT DESIGN ADOPTED FOR PROJECT MOTORWAY FACILITIES

ENSURE MOTORWAY CONTROL CENTRES CONTRIBUTE TO THE BUILT CHARACTER OF THEIR LOCATION (M5 WEST MOTORWAY CONTROL CENTRE) SOURCE: STRUCTUS

3.4.8 Road bridges

Principle

Deliver elegant road bridges that integrate all architectural and engineering systems requirements while minimising visual impacts.

Description

The project involves the construction of new bridges, as well as the modification of existing bridges.

The proposed road bridges would form considerable new built form elements within the project corridor and careful consideration would need to be given to their appearance.

Key project locations

+ Modifications to High Street bridge to accommodate new lanes
+ New bridge at Alfred Street carrying southbound Warringah Freeway traffic over the southbound bus lane and the northbound traffic from Mount Street to Alfred Street North
+ Modifications and widening of the Falcon Street bridge over the Warringah Freeway
+ Provision of a bridge carrying southbound traffic entering the Warringah Freeway from Miller Street over the southbound bus lane.

Urban design requirements

+ Ensure further design development of bridges is in accordance with the information contained within 'Bridge Aesthetics, Roads and Maritime Centre for Urban Design 2019'
+ Design holistic, coherent and symmetrical road bridge structures considering the proportion of all elements of the structure
+ Design with smooth, clean lines and a minimum structural depth that is consistent with bridge spans and method of construction
+ Design a slender, symmetrical, visually uncluttered and well-ordered profile that incorporates additional elements such as protection screens, barriers, lighting elements and fencing as part of the overall elevation composition
+ Design a strong, horizontal form with visual emphasis of concrete retaining structures associated with the road bridge
+ Minimise traffic signage and apply this strategy consistently to all bridges
+ Design bridge upgrades to compliment existing bridge design language.

ENSURE BRIDGE BARRIER, PIERS AND SAFETY SCREEN POSTS ARE ALIGNED AND INTEGRATED TO CREATE A COHESIVE DESIGN (NABIAC, PACIFIC HIGHWAY). SOURCE: RMS

DESIGN BRIDGES AS A COHESIVE SUITE OF ELEMENTS THAT WORK TOGETHER TO FORM AN INTEGRATED WHOLE (YELGUN INTERCHANGE, PACIFIC HIGHWAY) SOURCE: RMS

3.4.9 Shared user bridges

Principle

Deliver well designed and attractive pedestrian bridges that provide safe access for all pedestrians and cyclists.

Description

The project consists of several new and replacement shared user bridges. These would cater for increased pedestrian and cycle movements across the project corridor.

The shared user bridges should respond to local character, functioning as journey markers along the transit corridor and celebrating local and district views.

Key project locations

+ Replacement Ridge Street pedestrian and cycle bridge. New bridge would provide separated pedestrian and cycle paths
+ Replacement Falcon Street shared user bridge
+ New shared user bridge adjacent to the existing Ernest Street road bridge.

It should be noted that the replacement Ridge Street and Falcon Street shared user bridges would be constructed prior to demolition of the existing shared user bridges, apart from potential temporary closures required to tie-in the new structures.

Urban design requirements

General

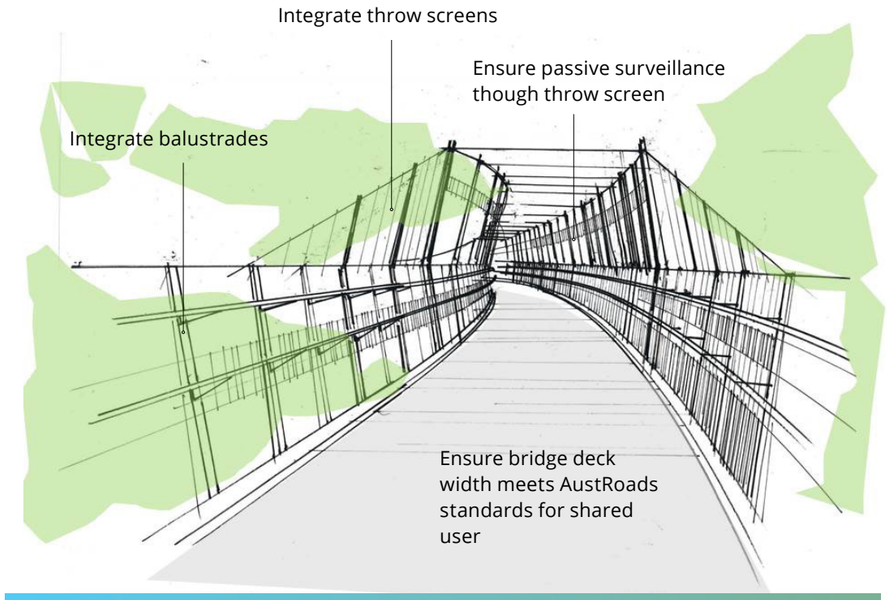
+ Ensure further design development of bridges is in accordance with the information contained within 'Bridge Aesthetics, Roads and Maritime Centre for Urban Design 2019'
+ Design bridges as light weight structures in order to minimise visual impact
+ Use materials and a design that provides a high quality aesthetic, while capitalising on any potential views from the bridge
+ Design all aspects of bridges to comply with relevant accessibility codes including AS1428
+ Design safety screens to be integrated, and not restrict views from the bridge and allow passive surveillance of bridge deck.

Ramps, stairs and lifts

+ Integrate ramp, stairs and lifts with bridge design appearance
+ Ensure ramps do not dominate views or detract from the overall bridge composition
+ Incorporate approved non-slip surfacing to all steps and ramps
+ Ensure ramp, stair and lift access avoids hidden or secluded spaces. Spaces beneath ramps and stairs should be designed to prevent unwanted access, while providing for inspections and maintenance.

Lighting

+ Ensure amenity lighting meets the required safety and security standards and be considered as part of the overall night time composition for each bridge
+ Ensure light-spill does not impact upon neighbours.



SHARED USER BRIDGE REQUIREMENTS

CONSIDER DETAILING ON BRIDGE THROW SCREEN AND PIER SHAPE TO IMPROVE OVERALL APPEARANCE (FALCON STREET BRIDGE, SYDNEY)

ENSURE SAFETY SCREENS ARE WELL INTEGRATED, DO NOT RESTRICT VIEWS FROM THE BRIDGE AND ALLOW PASSIVE SURVEILLANCE OF BRIDGE DECK

3.4.10 Landscape Treatments

Principle

Provide new and reinstated landscapes that are appropriate to the local conditions, consistent with the existing varied character of the project, provide opportunities to increase canopy cover wherever possible and provide improved public realm amenity.

Description

The project provides landscape opportunities both within and outside the road corridor including areas associated with portals, motorway facilities, the motorway control centre and reinstated temporary project sites.

Where opportunities exist by others to embellish existing and proposed open space post-construction, they are highlighted within the relevant precinct chapter of this report.

Key project locations

+ Replacement planting and landscape embellishments within St Leonards Park, Cammeray Park, ANZAC Park, Berrys Bay and Yurulbin Park
+ Replacement and amenity planting along the Warringah Freeway road corridor including to front of noise walls, within medians and above portals
+ Proposed planting along Ernest Street shared user bridge.

Urban design requirements

Proposed landscape treatments

+ Ensure landscape design is guided by the Roads and Maritime Landscape design guideline
+ Ensure trees, shrubs and groundcover are climate resilient, provide shade and ameliorate potential heat island effects, to provide valuable amenity for the broader community
+ Design landscape treatments to provide a strong, legible and structured plantings that reinforce spatial connectivity with adjacent areas and enhance environmental quality, visual continuity, identity and landscape character
+ Ensure maintenance and irrigation requirements are kept to a minimum with the use of native species in 'natural' informal planting arrangements as the predominant plant matrix
+ Ensure landscape treatments address safety-in-design and CPTED issues
+ Ensure all planting maintains clear sight lines at road intersections, is compliant with safe stopping distances, clear zones and is offset from road elements
+ Employ screen planting to help mitigate the visual impact of retaining structures, noise walls, ventilation and motorway facilities as required
+ Design landscape to ensure functionality of other infrastructure including lighting, CCTV surveillance systems and above/ underground utilities
+ Ensure planting and maintenance proposals address land ownership and asset management considerations.

Tree planting

+ Use frangible tree species along road corridors within clear zones
+ Provide trees within road medians where appropriate
+ Increase tree canopy cover wherever possible outside frangible zones and sightline distances
+ Source tree species from local council approved species lists
+ Procure tree stock in advance to ensure good root growth prior to planting periods
+ Specify large trees sizes where feasible and appropriate
+ Select trees with appropriate scale and amenity for the surrounding environment
+ Use trees to shade walking and cycle connections as much as possible, with a safe and appropriate offset from the path edge.

Existing vegetation

+ Retain and protect existing vegetation where feasible, particularly vegetation identified as having significant value, or where it makes a significant contribution to visual impact mitigation or open space character
+ Protect and conserve buffer areas around ecologically sensitive locations, such as identified Endangered Ecological Communities
+ Preserve and enhance existing natural systems along the project corridor and precincts, including vegetation communities and fauna habitats
+ Design vegetation seamlessly to integrate planting edges with adjacent existing vegetation
+ Re-vegetate all areas of the project to the extent of the disturbance boundary where not treated with hardscape surface treatments.

TREES SHOULD BE LOCATED OUTSIDE CLEAR ZONES, IDENTIFIED SIGHTLINES, AWAY FROM UTILITIES AND SHOULD NOT OBSCURE EXPANSIVE VIEWS

TREES SHOULD BE PROVIDED IN THE MEDIAN IF THEY ARE OUTSIDE OF CLEAR ZONE, SIGHTLINES AND FRANGIBLE ZONES

3.4.11 Materials and finishes

Principle

Deliver a road corridor and associated infrastructure/public domain that presents a consistent palette of high quality materials representative of the project image and local context.

Description

The material palette for the project should be developed in line with the project identity and integrated design objectives to assist linear and lateral integration, enabling project elements to fit, connect and provide a meaningful user experience relevant to their surroundings.

Key project locations

As an inner city urban link, The Western Harbour Tunnel and Warringah Freeway material palette should reflect the urban nature and sometimes industrial past of the Rozelle precinct, as well as the varied urban, landscape and geological character of the North Sydney precinct.

Key opportunities for application of specific materials and finishes include:

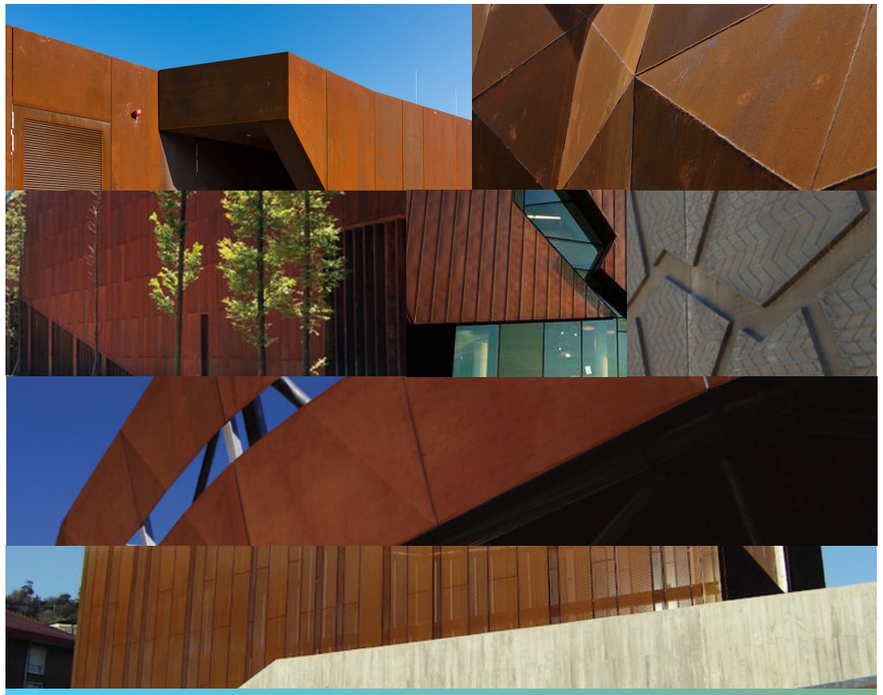
+ Mainline and ramp tunnel lining
+ North Sydney precinct portals and trough structures
+ North Sydney precinct noise and retaining walls
+ Ernest Street shared user bridge
+ Replacement Ridge Street shared user bridge
+ Replacement Falcon Street shared user bridge
+ Cladding to ventilation outlet within Warringah Freeway corridor, motorway facilities and Artarmon motorway control centre
+ Alfred Street and Miller Street overpass bridges
+ Widening and additions to existing bridge structures along the Warringah Freeway.

It should be noted that materials and finishes within the Rozelle precinct should compliment M4-M5 Link urban design strategy already established.

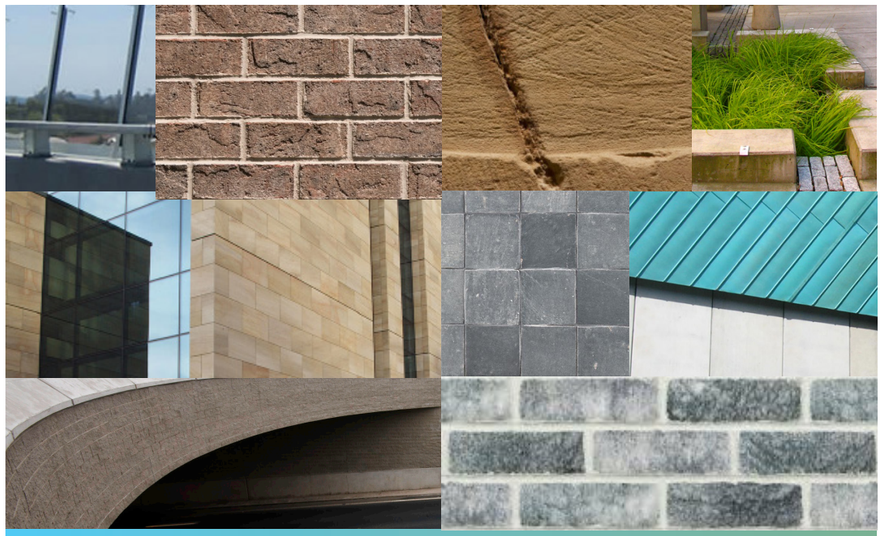
The ongoing future design development of materials and finishes should reflect the desired visibility and prominence of infrastructure elements.

Urban design requirements

+ Select materials that achieve an identifiable and legible urban character for the project
+ Use colour/texture to assist in legibility and wayfinding, within the context of the immediate precinct and public realm
+ Utilise a materials palette that includes a consistent suite of treatments that relate to local settings, adjacent developments and wider project design elements. Variations for precincts may respond to their existing urban fabric and established palettes
+ Select form and shape of accent materials to carry a similar design language across the project to provide for linear integration
+ Minimise visual clutter by avoiding the use of unnecessary elements, variety of materials and colour in the public domain
+ Develop the materials palette with reference to all relevant local council public domain requirements and materials guidelines
+ Select materials and finishes that are robust and durable, readily maintained and proven to withstand high usage over the required design life. Materials and finishes shall meet all functional requirements such as customer interface, component and services integration
+ Select materials that address the requirements of the project's sustainability framework
+ Reuse site won materials in landscaped areas where feasible, including local stone for retaining walls and cut batters.



MATERIAL PALETTE REFERENCE IMAGERY FOR ROZELLE PRECINCT



MATERIAL PALETTE REFERENCE IMAGERY FOR THE NORTH SYDNEY AND ARTARMON PRECINCT

3.4.12 Safety in Design and Crime Prevention Through Environmental Design (CPTED)

Principle

Provide a corridor that allows all users, including motorists, pedestrians, cyclists and maintenance and management people to manage a safe and responsive journey.

Description

Safety in Design allows the integration of control measures early in the design process to eliminate or, if this is not reasonable and practicable, minimise risks to health and safety throughout the life of the project.

CPTED is a multi-disciplinary design approach that aims to find solutions that deter criminal behaviour and unsafe situations, specifically in an urban environment. CPTED strategies rely upon the ability to influence offender decisions that precede criminal acts.

Adherence to Crime Prevention Through Environmental Design CPTED principles within the design and public domain interfaces would ultimately help to activate the public domain, supports passive surveillance and creates safe and comfortable places for all.

CPTED principles fall under the following core categories:

+ Passive surveillance
+ Natural access control
+ Territorial Reinforcement
+ Maintenance.

Key project locations

+ Ensure passive surveillance of Ridge Street, Falcon Street and Ernest Street shared user bridges
+ Ensure clear zones and sightlines are maintained along the Warringah Freeway corridor (North Sydney)
+ Ensure CPTED compliant design to any open space upgrades or reinstatements including Yurulbin Park, Berrys Bay and Cammeray Park.

Urban design requirements

+ Ensure collaboration between professions and technical advisors via Safety in Design and CPTED workshops that explore safety aspects of all design elements.

Public domain

+ Ensure allowance for natural surveillance that keeps potential intruders under observation where feasible
+ Ensure tree species selection and landscape treatments maximise clear sightlines within areas of high public use (foliage lower than 500mm and canopies higher than 2000mm)
+ Design public realm as a clutter-free environment
+ Ensure effective lighting to public spaces that eliminates dark spaces
+ Ensure lighting is consistent and of a lux level to enhance CCTV imagery and designed to Australian Standards
+ Ensure the design of all public spaces avoids blind/dark corners which may provide hiding or ambush spots
+ Ensure the design allows for easy maintenance to upkeep a high level of amenity that discourages unwanted behaviour.

Road corridor

+ Ensure urban and landscape treatments are placed and located outside of clear zones and maintain sightlines
+ Use wire rope or other barrier systems to allow planting in closer proximity to road corridor
+ Ensure all structures are designed to incorporate easy maintenance access where required.

USE ROAD BARRIER SYSTEMS WHERE FEASIBLE TO ALLOW PLANTING IN CLOSER PROXIMITY TO ROAD CORRIDOR

ENSURE TREE PLANTING ALLOWS FOR CLEAR SIGHTLINES AND PASSIVE SURVEILLANCE

4. Precinct assessment

Precincts

The project corridor traverses a patchwork of precincts with varied local context, built form elements, natural characteristics and land uses. They have been arranged within this chapter for assessment running from south to north along the project alignment.

This section describes specific urban design principles and requirements relevant to each precinct, before assessing the landscape character and visual impacts of the project. The identified precincts are (refer Figure 4.1):

+ Rozelle precinct (Western Harbour Tunnel)
+ North Sydney precinct (Western Harbour Tunnel and Warringah Freeway Upgrade)
+ Artarmon precinct (Western Harbour Tunnel).

Construction support sites

There are several locations along the Western Harbour Tunnel and Warringah Freeway Upgrade alignment that would only be impacted temporarily, during the construction phase of works (refer Figure 4.1).

These sites have been identified for remediation/making good post construction. Chapter 5 of this report assesses the visual and landscape character impacts of the key construction support sites:

+ Rozelle Rail Yards (WHT1 - assessed within Rozelle precinct chapter)
+ Victoria Road (WHT2)
+ White Bay (WHT3)
+ Yurulbin Point (WHT4)
+ Sydney Harbour south cofferdam (WHT5)
+ Sydney Harbour north cofferdam (WHT6)
+ Berrys Bay (WHT7)
+ Ridge Street north (WHT9)
+ Cammeray Golf Course (WHT10 - assessed within North Sydney precinct chapter)
+ Waltham Street (WHT11 - assessed within Artarmon precinct chapter).

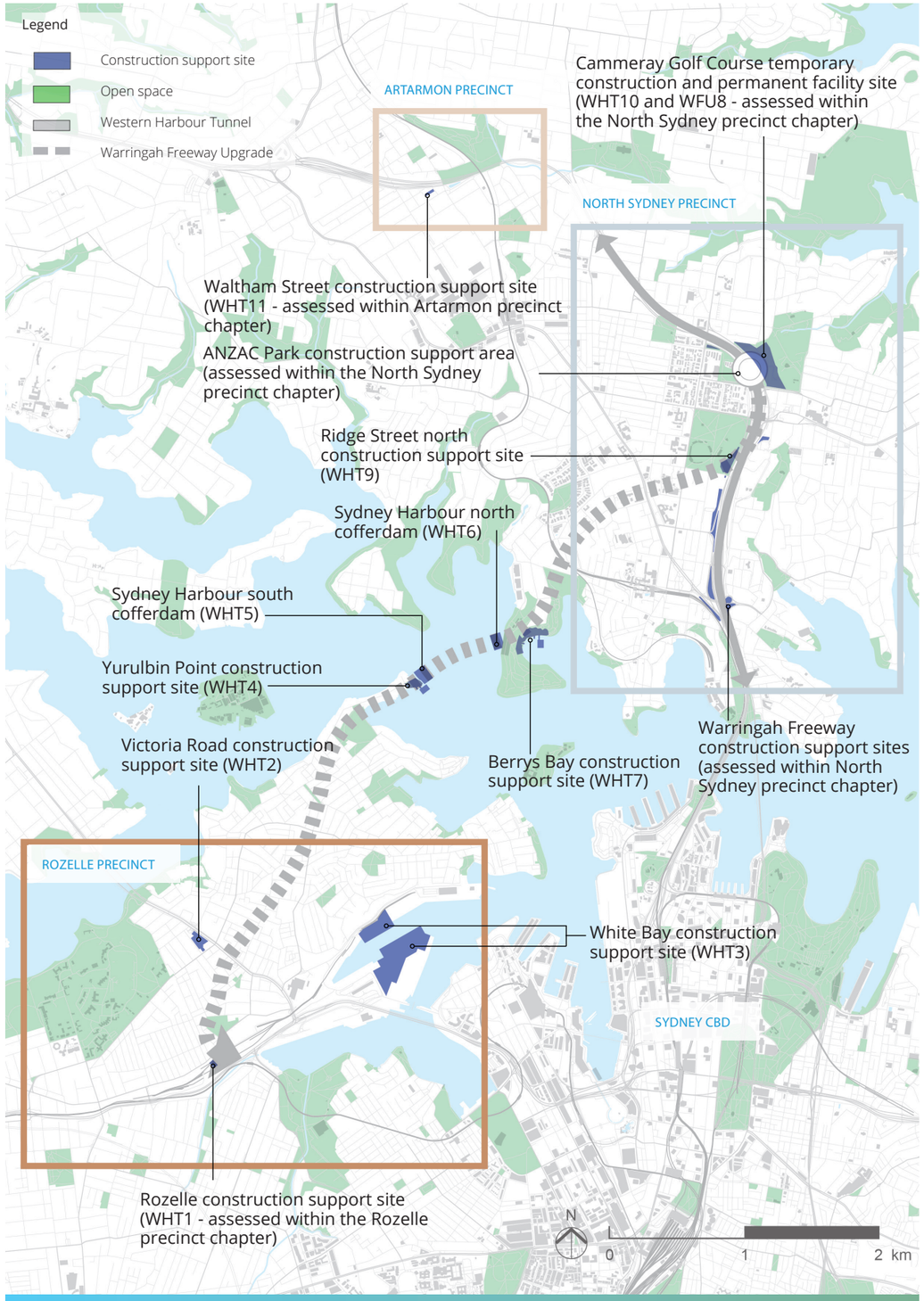


FIGURE 4.1 - PROJECT PRECINCTS AND TEMPORARY CONSTRUCTION SUPPORT SITES

4.1 LCVIA Methodology

4.1.1 Assessment rationale

LCVIA takes into account all effects of change that may arise from the project in the landscape and visual scene that may impact visual amenity and landscape character.

It is concerned with how the surroundings of individuals or groups of people may be specifically affected both quantitatively (with regards to the physical extent of change) and qualitatively (with regards to the change to the qualities of the view or landscape).

Judgement as to the level of the effects is arrived at by a process of reasoning, based upon analysis of the baseline conditions, identification of landscape character zones and visual receivers (viewers of the scene) and assessment of their sensitivity. This is combined with an assessment of the magnitude and nature of change that may result from the project.

This assessment is an objective report and is based on a professional analysis of the visual and landscape environment and the project at the time of writing.

4.1.2 Guidelines

Given the subjective nature of an individual's appreciation of any given scene, landscape character and visual assessment is by its nature not an exact science and consequently methodologies for preparing LCVIAs vary both in Australia and overseas.

Potentially subjective assessment material and differences of opinion about how to best assess visual characteristics, qualities, degrees of alteration and viewer sensitivity often arise.

As a consequence, and as identified by the NSW Land and Environment Court, the key to a robust process is to explain clearly the criteria upon which an assessment is made:

"The outcome of a qualitative assessment would necessarily be subjective. However, although beauty is inevitably in the eye of the beholder, the framework for how an assessment is undertaken must be clearly articulated. While minds may differ on outcomes of such an assessment, there should not be issues arising concerning the rigour of the process."

Land and Environment Court - Rose Bay Marina Pty Limited v Woollahra Municipal Council, 2013

The guidance utilised for this assessment is:

+ WIA-N04 - Guidelines for Landscape character and Visual Impact Assessment as published by the Roads and Maritime Service (Roads and Maritime).

This document sets out a clear and systematic approach in documenting the baseline conditions, impacts and mitigation.

4.1.3 Land and Environment Court Planning Principles

The Land and Environment Court of New South Wales was established in 1980 by the Land and Environment Court Act 1979. Relevant planning principles have been developed in visual assessment case judgments over the years to guide future decision-making in development appeals.

These include separate but related principles for private and public domain views. The principles set out a process for assessing the acceptability of impact. The two most relevant cases to this project are:

+ Public domain views - Rose Bay Marina Pty Limited v Woollahra Municipal Council (2013)
+ Private views - Tenacity Consulting v Warringah Council (2004).

The framework for a planning principle concerning impacts on views enjoyed from the public domain (Rose Bay Marina) is broadly consistent with (but not identical to) the matters raised for consideration in Tenacity. The process must account for reasonable development expectations as well as the enjoyment of members of the public of outlooks from public places.

The principles established by the Court from both cases have been integrated into the approach and discussion found within this LCVIA.

4.1.4 Key assumptions

This assessment of potential landscape and visual impacts has been carried out on the project design as described within the project environmental impact statement description.

Proposed landscape treatments are assessed as being at an early stage of growth (day 1 of project operation) to ensure a reasonable, conservative approach to any beneficial effects of vegetative screening on the project.

For the purposes of this assessment and in accordance with the Roads and Maritime guidelines, the basic project concept - its location, form and key elements - has been assessed.

It can be expected that the landscape character and visual impact assessment ratings derived within this report would improve when:

+ Buildings and infrastructure are architecturally designed and rendered in accordance with the guiding principles identified within the urban design requirements of this report
+ The project landscape works mature
+ Mitigation measures are put in place.

4.2 Landscape character assessment

Landscape character can be defined as the aggregate of built, natural and cultural aspects that make up an area and provide a sense of place. It includes all aspects of a tract of land – built, planted and natural topographical and ecological features.

4.2.1 Landscape character zones

To enable the assessment of impacts on landscape character, landscape character zones are determined for the relevant area of study.

Landscape character zones (LCZ) are defined as areas having a distinct, recognisable and consistent pattern of elements making one landscape character zone different from another.

4.2.2 Heritage

Heritage elements can, in their own right, define distinctive landscape character zones within the broader urban context. Alternatively, recognition of their presence within a LCZ is considered as these may provide added weight when assessing sensitivity to project impacts.

Following consideration of the planning framework, this report has identified relevant state and locally listed Aboriginal and non-Aboriginal heritage items and conservation areas located within identified LCZs.

4.2.3 Impact rating

The overall impact rating of the project on any given LCZ is based on themes of magnitude and sensitivity.

The severity of these impacts are calculated using matrix Table 4.1, taken from the Roads and Maritime Guidelines for Landscape Character and Visual Impact Assessment.

Sensitivity - the degree to which a particular landscape type can accommodate change arising from a development, without detrimental effects on its character.

Sensitivity includes factors such as:

+ Existing land use
+ The pattern and scale of the landscape
+ Visual enclosure, openness of views and distribution of visual receivers
+ The value placed on the landscape.

Areas with a high sensitivity to change include zones with important landscape features, landscape types with inherent natural values and landscapes with heritage or cultural values. Lower sensitivity is often associated with built up urban environments such as industrial areas.

Magnitude - the magnitude of the effects of the development within the landscape.

Magnitude refers to the physical scale of the development, how distant it is and the contrast it presents to the existing condition.

Consideration is given to:

+ Existing built form in the landscape and how closely the development matches this in mass, scale and form
+ The scale or degree of change to the landscape resource
+ The nature of the effect and its duration including whether it is permanent or temporary.

4.3 Visual impact assessment

4.3.1 Zone of Visual Influence (ZVI)

Zone of Visual Influence (ZVI) is a helpful tool for providing an overview as to the extent to which project elements may, or may not be visible from the surrounding study area, assisting the site work.

A ZVI study was first used to identify the theoretical areas of the landscape from which the most prominent built form elements of the project would potentially be visible - the ventilation outlets.

The ZVIs produced take into account topography and built form. The ZVI's do not take into account natural landscape features above ground level that affect visibility such as trees, hedgerows or fences due to the variability of these elements. The results are therefor a worse case scenario and have been used as a tool to inform site investigation. The ventilation outlets would hence not be visible from many of the locations indicated on the ZVI plans.

4.3.2 Viewpoint selection

Following a thorough desktop study and site visits, representative viewpoints with the potential to be visually affected by some element of the project are identified and selected for further analysis. Viewpoints were selected to illustrate:

+ A range of receiver types including public and private domain views (residents, motorists and users of public open space)
+ A range of view types including elevated, panoramic and filtered views
+ A range of viewing distance from the project
+ Key or protected views identified within the planning literature.

Viewpoints have been assessed for both the construction and operational stages of the project, as well as for potential night time impacts.

Limitations

It should be noted that selected viewpoints are by no means an exhaustive list of all receivers that might be impacted by the project. They have been selected to be representative of the spread and type of receivers throughout the study area.

Site access

For residential receivers, access was not always possible to the property itself and so accordingly a site assessment was made from the closest accessible public location with views towards the project. In these instances, the description of visual impact was estimated from the main dwelling area of the property.

4.3.3 Impact rating

The overall impact rating of the project on any given viewpoint is based on themes of magnitude and sensitivity. The severity of these impacts are calculated using matrix Table 4.1, taken from the Roads and Maritime Guidelines for Landscape Character and Visual Impact Assessment.

Sensitivity - the quality of the existing view and how sensitive the view is to the proposed change. Each visual receiver type has an inherent and varied sensitivity to change in the visual scene based on their personal context in which the view is being experienced. Views from public reserves and open space are often given the highest weighting due to the increased number of viewers impacted.

Magnitude - a measure of the magnitude of the visual effects of the development within their setting. A series of quantitative assessments are studied to give an overall magnitude rating.

Consideration is given to:

+ Distance from development - taken from the closet project component to the viewpoint (unless otherwise specified in assessment table)
+ Quantum of view - openness of the view and the receiver's angle of view to the scene. A development located in the direct line of sight has a higher impact than if it were located obliquely at the edge of the view. Whether the view of the project is filtered by vegetation or built form also affects the impact, as does the nature of the view (panoramic, restricted etc.). A small element within a panoramic view has less impact than the same element within a restricted or narrow view
+ Period of view - the length of time the visual receiver is exposed to the view. The duration of view affects the impact of a development on the viewer - the longer the exposure the more detailed the impression of the proposed change in terms of visual impact
+ Scale of change - assessment of the change in compositional elements of the view. If the proposed development is largely similar in nature and scale to that of existing elements in the vicinity, the scale of change is low. If the development radically changes the nature or composition of the elements in the view, the scale of change is high.

		MAGNITUDE			
		HIGH	MODERATE	LOW	NEGLIGIBLE
SENSITIVITY	HIGH	HIGH	HIGH - MODERATE	MODERATE	NEGLIGIBLE
	MODERATE	HIGH - MODERATE	MODERATE	MODERATE/LOW	NEGLIGIBLE
	LOW	MODERATE	MODERATE/LOW	LOW	NEGLIGIBLE
	NEGLIGIBLE	NEGLIGIBLE	NEGLIGIBLE	NEGLIGIBLE	NEGLIGIBLE

TABLE 4.1 - IMPACT RATING AS A COMBINATION OF SENSITIVITY AND MAGNITUDE
SOURCE: ROADS AND MARITIME GUIDELINES FOR LANDSCAPE CHARACTER AND VISUAL IMPACT ASSESSMENT

4.3.4 Assessment of night lighting impacts

A broad assessment of the impacts of night lighting during the operation phase of the project was carried out, as well as at the major construction support sites during the construction phase of the project.

The following assumptions are made with regard to the assessment process:

+ The assessment of night lighting impacts is not based on a lighting design, but rather assumptions have been made with regard to the types and extent of lighting likely to be installed for both the construction and operational phases, consistent with applicable guidelines
+ There is no assessment of existing or proposed luminance levels
+ No detailed information regarding night lighting within construction support sites is available at this stage of the assessment, however the proposed operating hours at each construction support site has been considered
+ Construction vehicles entering and leaving the facilities has been discussed in the assessment
+ Operational lighting during construction is assumed to be in operation seven days a week and at levels sufficient to meet work occupational health and safety levels, and security levels.

4.4 Photomontages

Photomontages have been provided for selected viewpoints, providing a representation of the operational phase infrastructure within its setting.

The site team was responsible for taking the site photography and a point cloud scan at each location which were positioned by a surveyor to the correct survey grid and aligned to Australian Height Datum (AHD).

4.4.1 Methodology

Multiple images were taken at each location using both a full sensor camera with a 50mm fixed lens as well as a cropped sensor camera with an 18mm lens.

The photos were taken at a fixed height above natural surface level (approximately 1.4 meters) using a tripod and landscape orientation. As much as practically possible, the photos were taken with no tilt.

The location of the tripod was picked up within the point cloud scan to ensure accurate positioning of the virtual camera within the 3d model.

Viewpoint Survey Specifications

The point cloud scan was carried out at each location using a Trimble TX5 3d Laser Scanner

To position the data a Leica GNSS rover (Global Navigation on Satellite System) was used to locate the scanner position as well as ground control points within the scanned area. These ground control points were then used to align the scan to the appropriate survey grid system.

Modelling, Rendering and Composition

The 3d design models and 3d assets have been imported, textured, rendered and composited using the following software;

+ Modelling – Autodesk 3ds Max Design 2016
+ Render engine and materials – V-Ray Adv for 3ds Max 2016 for x64. Version 3.6
+ Adobe Photoshop CC 2015.

Modelling Process

The 3d design models generated in 12d and 2d elements generated in AutoCad were imported into 3ds Max and were split up by design package

The units for all models were set to metres and were located in the appropriate survey grid system. Models are then broken down into elements and appropriate textures are applied.

The textured models are then referenced into a Master Scene which contains a daylight system and a virtual camera specific to every viewpoint location. The daylight system is set to replicate the location, date and time the photo was taken.

Camera Matching

Camera matching is achieved by positioning a virtual camera (with adjustable settings which allow replication of real world camera settings) to the surveyed point of each camera position.

3d Model Assumptions

Some elements of the design have not yet been modelled in 3d and are subject to further design resolution during future design stages, such as the full lighting and signage design.

Landscape treatments are shown as an indicative representation of operational phase day 1 vegetation maturity, as well as 10 years after opening.

2d Photoshop Assumptions

Where existing elements are removed from the photo the image has been manipulated to the show the background. This background is a representation only.

4.5 Key methodology reference documents

+ Guidelines for Landscape character and Visual Impact Assessment, WIA-N04, Roads and Maritime Services
+ Environmental Planning and Assessment Act, 1979 (NSW)
+ Land and Environment Court - Tenacity Consulting v Warringah Council, 2004
+ Land and Environment Court - Rose Bay Marina Pty Limited v Woollahra Municipal Council, 2013.

4.6 Rozelle precinct

VIEW FROM THE CRESCENT NORTH EAST OVER ROZELLE BAY TOWARDS ANZAC BRIDGE

4.6.1 Precinct context

This precinct is focused on the future interchange between the Western Harbour Tunnel and M4-M5 Link at Rozelle. The precinct is situated immediately to the west of the ANZAC Bridge and its approaches (refer Figure 4.2).

Adjacent areas include the residential neighbourhoods of Balmain, Lilyfield and Annandale. The Bays Precinct, scheduled for regeneration, is located to the east of Victoria Road and comprises the largest area of transformation in the precinct.

Land use

This inner city precinct is dominated by relatively low density residential development and remnant industrial areas, slated for future development as part of the Bays precinct.

The precinct has a large section of shoreline and strong visual links with the Harbour. There are several key areas of public open space including Glebe Foreshore Parklands and Easton Park.

The existing abandoned and inaccessible Rozelle Rail Yards is proposed to be converted into an area of future public open space as part of the WestConnex Rozelle Interchange project.

Traffic flow

The precinct encompasses traffic flows to and from the CBD. Current traffic flows include major movements to and from the ANZAC Bridge and the western parts of the city.

Cycle and pedestrian network

Pedestrian movements across Victoria Road and the City-West Link Road are compromised by heavy traffic flows. Significant topography isolates Balmain from the Bays precinct. Quirk Street is identified as a cycle route while off road shared user paths occur on Victoria Road and the ANZAC Bridge. A shared user bridge at Lilyfield Road crosses Victoria Road.

4.6.2 Local policy and planning

Inner West Council

The recent merger of the former Leichhardt, Ashfield and Marrickville Councils has created the Inner West Council.

Currently, the LEP and DCPs of the former Councils still apply, and where relevant, are discussed within the visual impact assessment section for this precinct.

The Bays Precinct strategic plan is discussed in more detail within the 'Local planning policy' chapter of this report.

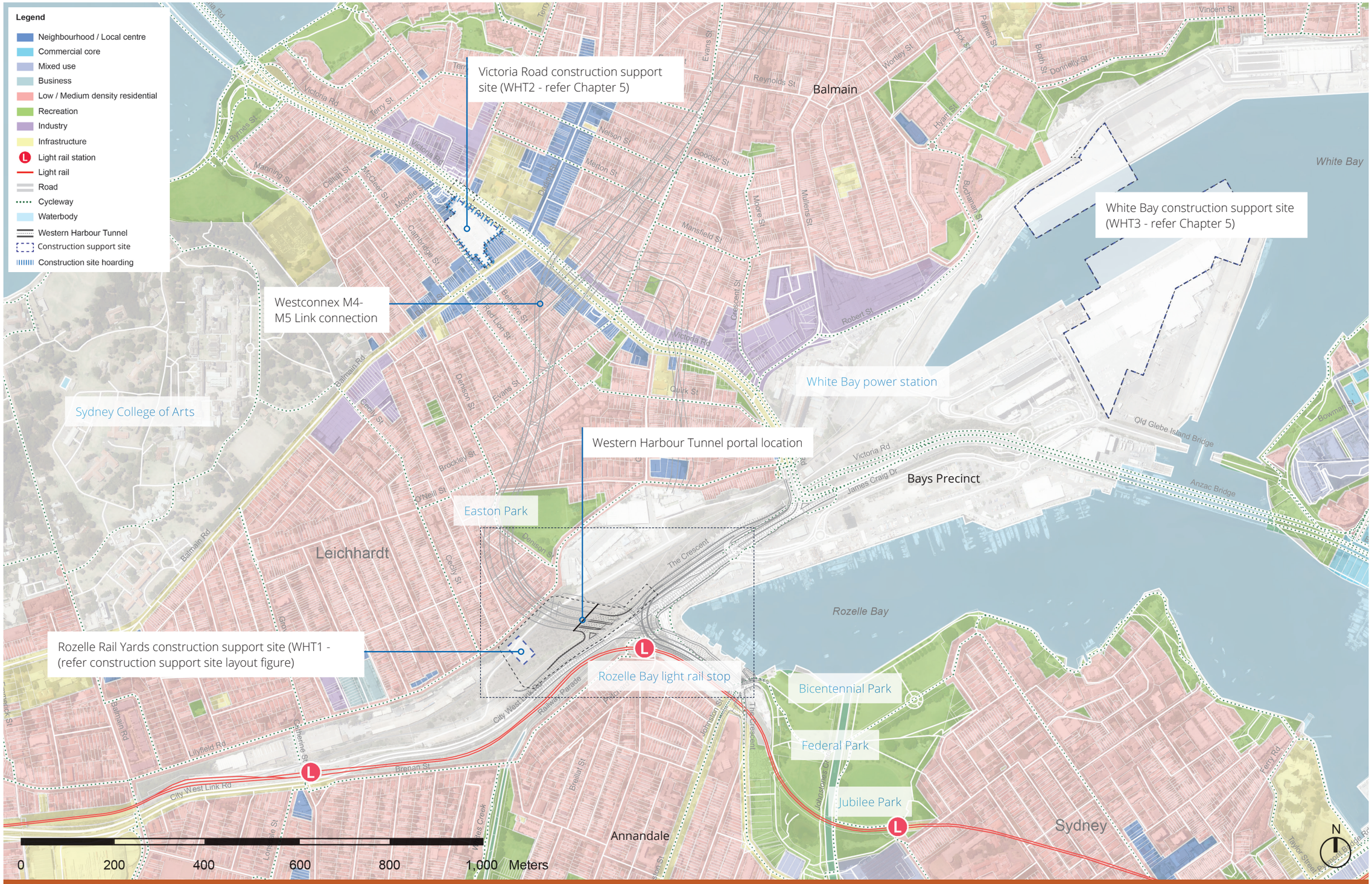


FIGURE 4.2 - ROZELLE PRECINCT - CONTEXT PLAN

4.6.3 Project elements

M4-M5 Link

The Rozelle Interchange forms part of the approved M4-M5 Link project. It also includes infrastructure to enable future connection and operation of the Western Harbour Tunnel.

The WHT project would include the fitout and commissioning of this infrastructure only with the civil construction to be carried out as part of the M4-M5 Link project

In addition to the core scope of the Rozelle Interchange, the following Western Harbour Tunnel infrastructure would be delivered as part of the Rozelle Interchange project:

+ All major surface works required to integrate the WHT and Rozelle Interchange into the existing road network
+ The cut and cover structure and connection through to surface
+ The WHT ventilation outlet and ancillary facilities
+ Underground tunnel connections between the WHT and the M4 and M5 corridors (via WestConnex).

For the purposes of this assessment, it has been assumed that all elements relating to the M4-M5 Link have been included within the baseline environment operational scenario for landscape character and visual impact analysis.

It should be noted, however, that not all M4-M5 Link elements would have been constructed by the time Western Harbour Tunnel construction commences.

Western Harbour Tunnel

The Western Harbour Tunnel scope assessed within this report includes:

+ Fitout of tunnel and ramps from Western Harbour Tunnel to City West Link
+ Temporary construction support site within Rozelle Rail Yards to facilitate the above (refer Figure 4.3).

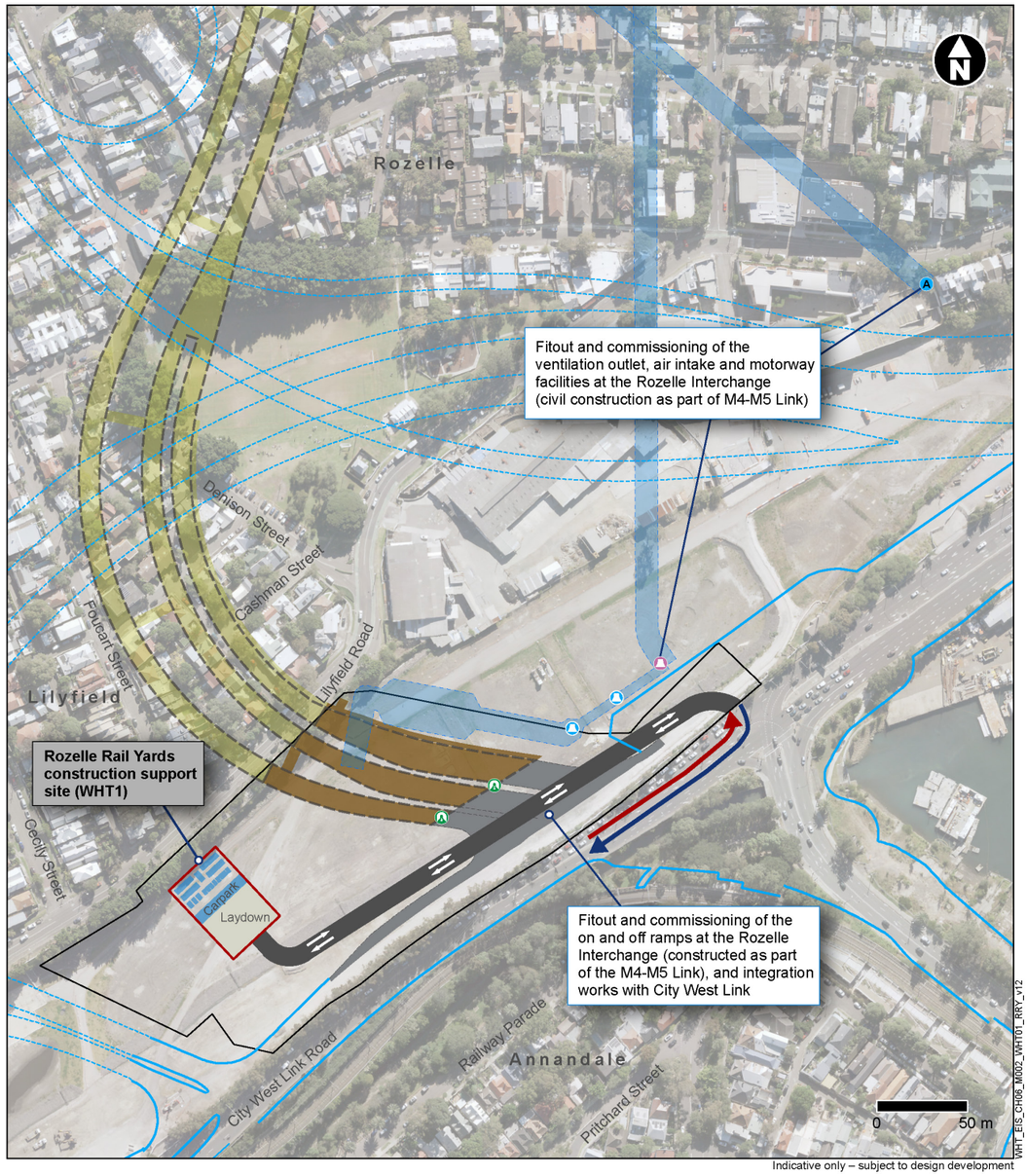


FIGURE 4.3 - ROZELLE RAIL YARDS CONSTRUCTION SUPPORT SITE (WHT1) (WHT1) LAYOUT

4.6.4 Urban design principles

The following key principles within Table 4.2 have been identified for the Rozelle precinct:

Principle	Project urban design outcome
+ Develop the Western Harbour Tunnel urban design with consideration to established M4-M5 Link urban design principles at Rozelle Interchange. Design of both projects to work towards a cohesive and holistic precinct design language.	+ Opportunities have been identified to ensure that all Western Harbour Tunnel infrastructure is complimentary to the established M4-M5 Link design.
+ Celebrate the strong industrial history of the area	+ Opportunities have been identified to reference industrial heritage within urban design treatment/materiality of retaining walls and portal design
+ Provide a memorable gateway to Rozelle and the Western Harbour Tunnel	+ Opportunities have been identified to highlight the transition between the Western Harbour Tunnel and M4-M5 Link mainline tunnels

TABLE 4.2 - ROZELLE PRECINCT URBAN DESIGN PRINCIPLES

4.6.5 Urban design requirements

Mainline tunnel and portal

+ Incorporate tunnel finishes that are complimentary yet distinct from M4-M5 Link, utilising signature patterning and colour to provide a separate identity for Western Harbour Tunnel, aid wayfinding and improve driver experience
+ Integrate the portal and open space above within the Rozelle Rail Yards parkland precinct.

MATERIAL PALETTE REFERENCE IMAGERY FOR ROZELLE PRECINCT

Rozelle Precinct - Landscape character assessment

4.6.6 Existing landscape character

The Rozelle precinct has a distinctly industrial character with working maritime foreshore activities to the east and the unoccupied White Bay Power Station to the west. This area is scheduled for future redevelopment as part of the Bays precinct.

Residential development is located to the north and south of the project works with a varied mix of housing types.

Rozelle Bay forms a major element within the precinct, providing a foreshore edge and open character to much of the eastern and southern section of the precinct.

The precinct has some well vegetated streetscapes, including mature tree plantings along both edges of Victoria Road and The Crescent.

4.6.7 Landscape character zones

The following key LCZs have been identified within the Rozelle precinct for further analysis (refer Figure 4.4):

+ Easton Park residential
+ Rozelle Rail Yards
+ Transport corridors.

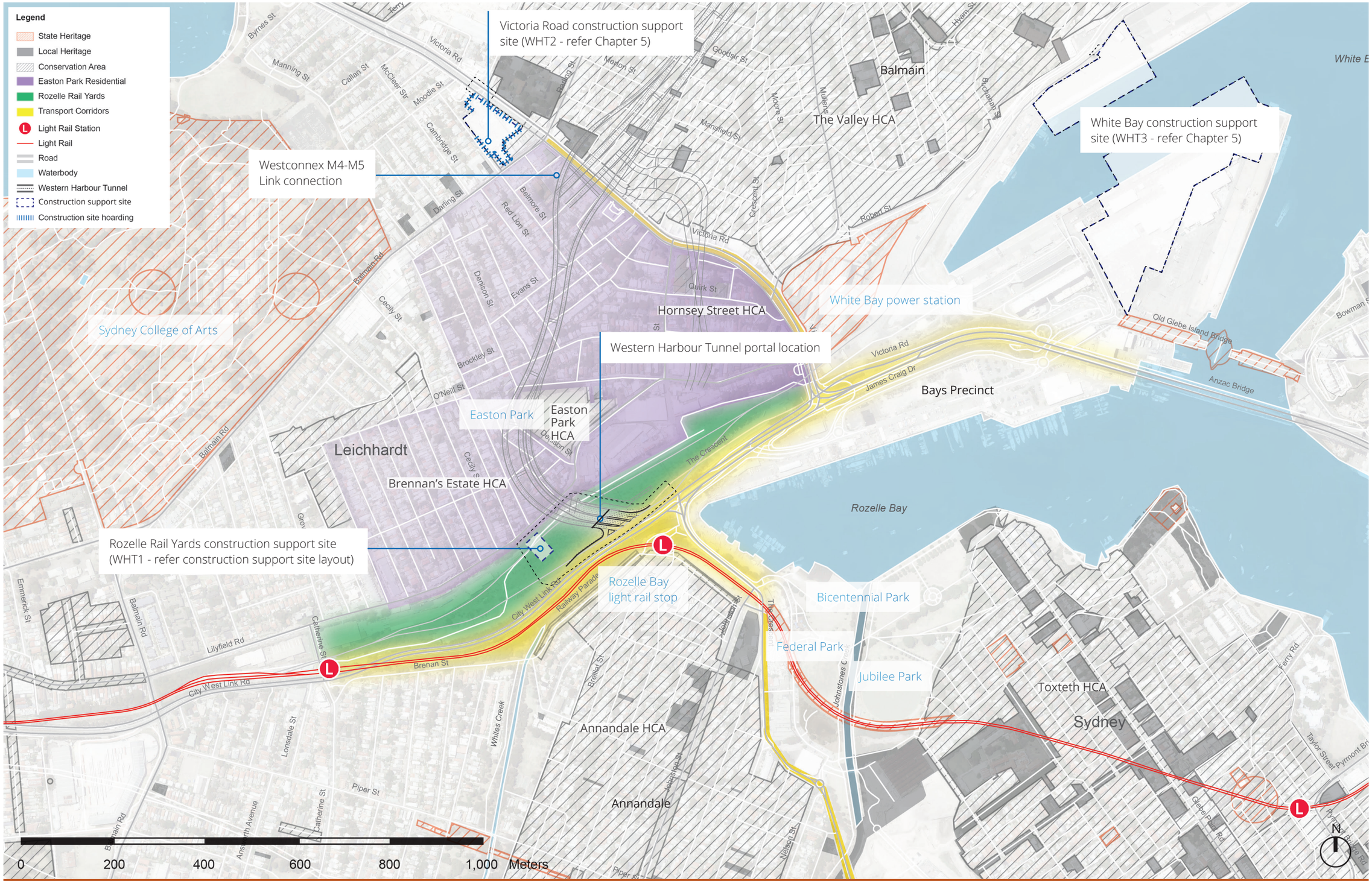
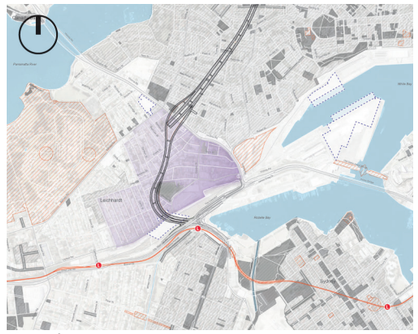


FIGURE 4.4 - ROZELLE PRECINCT - LANDSCAPE CHARACTER PLAN


Key plan

4.6.8 Easton Park residential

This LCZ is located at the south-eastern corner of the precinct. It is strongly defined by its topography, with views across a valley to Annandale and Glebe towards the south and east. Easton Park itself has dense mature figs that border its northern, eastern and western edges.

The LCZ is primarily residential in character and the current and original scale of development is predominately single storey, free standing cottages.

Heritage

Key heritage conservation areas and heritage items located within this LCZ are listed below. There are no registered Aboriginal heritage sites located within this LCZ.

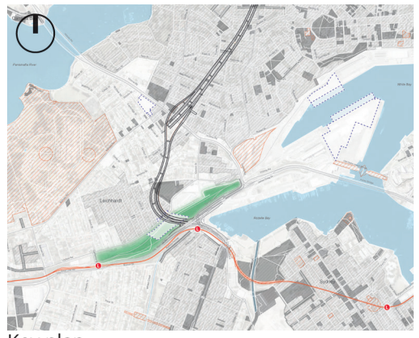
+ Easton Park heritage conservation area, Local Leichhardt LEP 2013
+ Hornsey Street heritage conservation area, Local Leichhardt LEP 2013
+ Brennan's Estate heritage conservation area, Local Leichhardt LEP 2013
+ Easton Park, Local Leichhardt LEP 2013.

Project effects

The project is located immediately adjacent to the LCZ along Lilyfield Road and would have limited direct effects on this LCZ. Works adjacent to the LCZ comprise:

+ Temporary construction support site associated with fitout of tunnel, portal and trough structure within Rozelle Rail Yards. Post-construction, the majority of this area would become part of the wider Rozelle Rail Yard parklands.

Sensitivity	Magnitude (operation phase)	OPERATION PHASE Landscape character impact	CONSTRUCTION PHASE Landscape character impact
The sensitivity of this LCZ to the project is considered to be Moderate, due to the following: + Presence of existing large scale infrastructure (M4-M5 and Western Harbour Tunnel motorway facilities) in proximity to the LCZ + The LCZ incorporates several heritage conservation areas + The precinct is of community importance, providing Easton Park and other small parks for recreation.	The magnitude of impact arising from the project is considered to be Negligible, due to the following: + The spatial character of the Easton park is unlikely to be adversely impacted by the project with most parts of the LCZ being isolated from the project site by existing planting and topography.	Negligible	Magnitude (construction phase): Low There may be temporary increased impacts on the landscape character of this LCZ during the construction stage due to presence of nearby construction equipment and activities.
Moderate	Negligible	Negligible	Moderate/Low


Key plan

4.6.9 Rozelle Rail Yards

Future character

This LCZ is located primarily in parallel to City-West Link Road and falls within the bounds of a broader strategic planning area known as The Bays Precinct. The area is scheduled to be developed as part of Westconnex into open space known as the Rozelle Rail Yards parkland.

This would form a major new area of public open space with associated sporting facilities and is considered to be the baseline operational scenario for assessment.

The Westconnex scope within this LCZ include:

+ Removal of industrial/commercial buildings along Lilyfield Road
+ New infrastructure including:
  - Motorway facilities and three ventilation outlets
  - Water treatment plant
  - Substation and pump house
  - Constructed wetland
+ Naturalised stormwater drainage channels
+ New areas of public open space, including tree cover, areas suitable for sports fields and contiguous connection with Easton Park
+ Replacement of street trees removed from along Lilyfield Road.

Heritage

There are limited heritage items within this LCZ. They include:

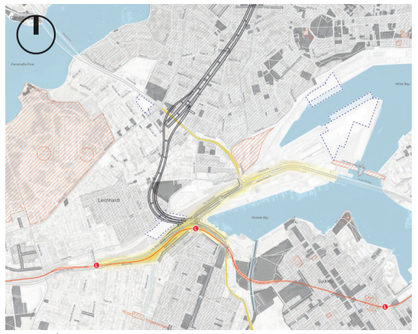
+ Lilyfield stormwater canal, Local SREP 26.

Project effects

The Western Harbour Tunnel project would have direct effects on this LCZ, comprising:

+ Temporary construction support site associated with fitout of tunnel, portal and trough structure. Post-construction, the majority of this area would return to the wider Rozelle Rail Yard parkland.

Sensitivity	Magnitude (operation phase)	OPERATION PHASE Landscape character impact	CONSTRUCTION PHASE Landscape character impact
The sensitivity of this LCZ to the project is considered to be Moderate, due to the following: + The future Rozelle Rail Yards parkland is likely to comprise a valued new open space setting, although the presence of the M4-M5 infrastructure and motorway facilities would reduce its sensitivity to change from development of a similar nature.	The magnitude of landscape character change arising from the project is considered to be Negligible, due to the following: + Although a major new piece of infrastructure, the tunnel portal and associated retaining walls would sit beneath the parklands. Once the construction support site has been rehabilitated, an impact on the parkland's character is not expected.	Negligible	Magnitude (construction phase): Low There would likely be a slightly greater temporary impact on this LCZ during the construction stage, with a section of the Rail Yards being utilised as a construction support site, before being returned to open space.
Moderate	Negligible	Negligible	Moderate/Low


Key plan

4.6.10 Transport corridors

This LCZ comprises the main light rail and road corridors in proximity to the project - The Crescent, City-West Link Road and Inner West light rail line.

City-West Link Road is the major arterial motorway in the area which connects the Inner West of Sydney to the city centre. It is characterised by high volumes of traffic travelling from the western end of ANZAC Bridge to Balmain Road, Leichhardt.

The Crescent and City-West Link Road are dominated by transport infrastructure including signage, paved surfaces and vehicular traffic.

The western end of the roadway currently has noise walls and intermittent screening vegetation, providing a sense of visual enclosure, with the exception of a brief view across the Rozelle Rail Yards when travelling eastbound.

The M4-M5 future works would see the widening of City-West Link Road, including the introduction of a portal to the Westconnex tunnel.

The light rail corridor forms part of the Inner West Rail line, which runs from Central to Dulwich Hill. It is currently characterised by a linear rail line structure with dense self seeded vegetation along either side of the corridor, serving to generally screen views to and from adjacent residential areas.

Heritage

There are no known heritage sites located within this LCZ.

Project effects

The project would be located within and adjacent to this LCZ, forming an additional part of the City-West Link Road corridor.

Works would comprise:

+ Temporary construction support site associated with fitout of tunnel, portal and trough structure within Rozelle Rail Yards adjacent to City-West Link Road and The Crescent intersection.

Sensitivity	Magnitude (operation phase)	OPERATION PHASE Landscape character impact	CONSTRUCTION PHASE Landscape character impact
The sensitivity of this LCZ to the project is considered to be Low, due to the following: + The inherent landscape value of this LCZ is low within the context of its major arterial road/rail function and the limited landscape value of the intermittent corridor of tree planting.	The magnitude of landscape character change arising from the project is considered to be Negligible, due to the following: + The presence of existing infrastructure within the area of a similar nature (including the M4-M5 Link works) + The tunnel portal would form a new element adjacent to the road corridor, although would likely be congruous with the existing busy road environment.	Negligible	Magnitude (construction phase): Low There are likely to be temporary increased impacts on the landscape character of this LCZ during the construction stage due to the presence of construction equipment and altered traffic conditions.
Low	Negligible	Negligible	Low

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Rozelle Precinct - Visual impact assessment

4.6.11 Existing visual environment

The precinct features major transport infrastructure including the corridors of City-West Link Road and The Crescent.

Rozelle Bay forms a highly visible element to the eastern side of the precinct with extensive views from the road corridor across the water towards the city skyline. Travelling north, the ANZAC Bridge forms an iconic gateway marker to the city.

The expansive Glebe Foreshore Parklands to the east of the precinct forms a green edge to Rozelle Bay and an important area of public recreation with iconic views east towards Sydney CBD.

Key relevant view corridors within the precinct include:

+ Panoramic Harbour and Sydney CBD views from Glebe Foreshore Parklands
+ Local views along the precinct's major road corridors
+ Leafy district views from residential dwellings in Easton Park and east from Lilyfield Road.

4.6.12 Local policy and planning policy

The recent merger of the former Leichhardt, Ashfield and Marrickville Councils has created the Inner West Council. The original council LEP and DCP planning documents are still current and where relevant, are discussed further below.

Leichhardt LEP 2013

The Leichhardt LEP sets the following objectives in relation to views.

Protect and enhance:

+ Views and vistas of Sydney Harbour, Parramatta River, Callan Park and Leichhardt and Balmain civic precincts from roads and public vantage points
+ Views and view sharing from and between private dwellings.

Leichhardt DCP 2013

The Leichhardt DCP sets the following objectives for development regarding views:

Objectives

+ Protect vistas and views from the public domain
+ Recognise value of existing views from private dwellings and allow for the reasonable sharing of views between private properties.

In addition to the above, the Leichhardt DCP Urban Framework Plans identify significant views to be maintained and enhanced. These include views of the water and significant landmarks such as Sydney Harbour, Sydney Harbour Bridge, ANZAC Bridge and the City skyline.

Due to the location and nature of the proposed works within the precinct, none of these key views are expected to be impacted.

The DCP also identifies several distinct neighbourhoods which have specific objectives and controls which consider views.

The following distinct neighbourhoods have been identified as having the potential to be affected by the project.

+ Easton Park
+ Catherine Street
+ Young Street
+ Annandale Street

Controls relevant to these distinct neighbourhoods (and where they are assessed within this report) are indicated in Table 4.3.

Sydney Regional Environmental Plan 26

The plan provides high level planning principles for the entire Bays Precinct development area. Of relevance, the plan states that the siting and form of development must consider creating, retaining and enhancing views and vistas from the water and public domain.

4.6.13 Selected viewpoints

After a site visit, the following key viewpoints were selected for further analysis (refer Figure 4.5):

1. Easton Park (public)
2. Dwellings off Lilyfield Road (private)
3. The Crescent (public)
4. The Crescent/City-West Link Road intersection (public)

Distinct neighbourhood	Relevant controls	Relevant viewpoint in report
Easton Park	+ Ensure the availability of views and glimpses of local and distant landmarks as well as scenic vistas from public places. + Ensure the optimal sharing of views from privately owned land.	Viewpoint 1
Catherine Street	+ Preserve and enhance the availability of views, particularly towards the City.	View not impacted by project
Young Street	+ Conserve and enhance the existing residential townscape by preserving views out (applies to the Crescent sub-area referenced within the Leichhardt DCP 2013).	View not impacted by project
Anandale Street	+ Preserve and enhance both public and private views out over Rozelle Bay, Annandale and the City skyline (applies to the Kentville Estate sub-area referenced within the Leichhardt DCP 2013).	View not impacted by project

TABLE 4.3 - LEICHHARDT COUNCIL DCP DISTINCT NEIGHBOURHOODS PLANNING CONTROLS

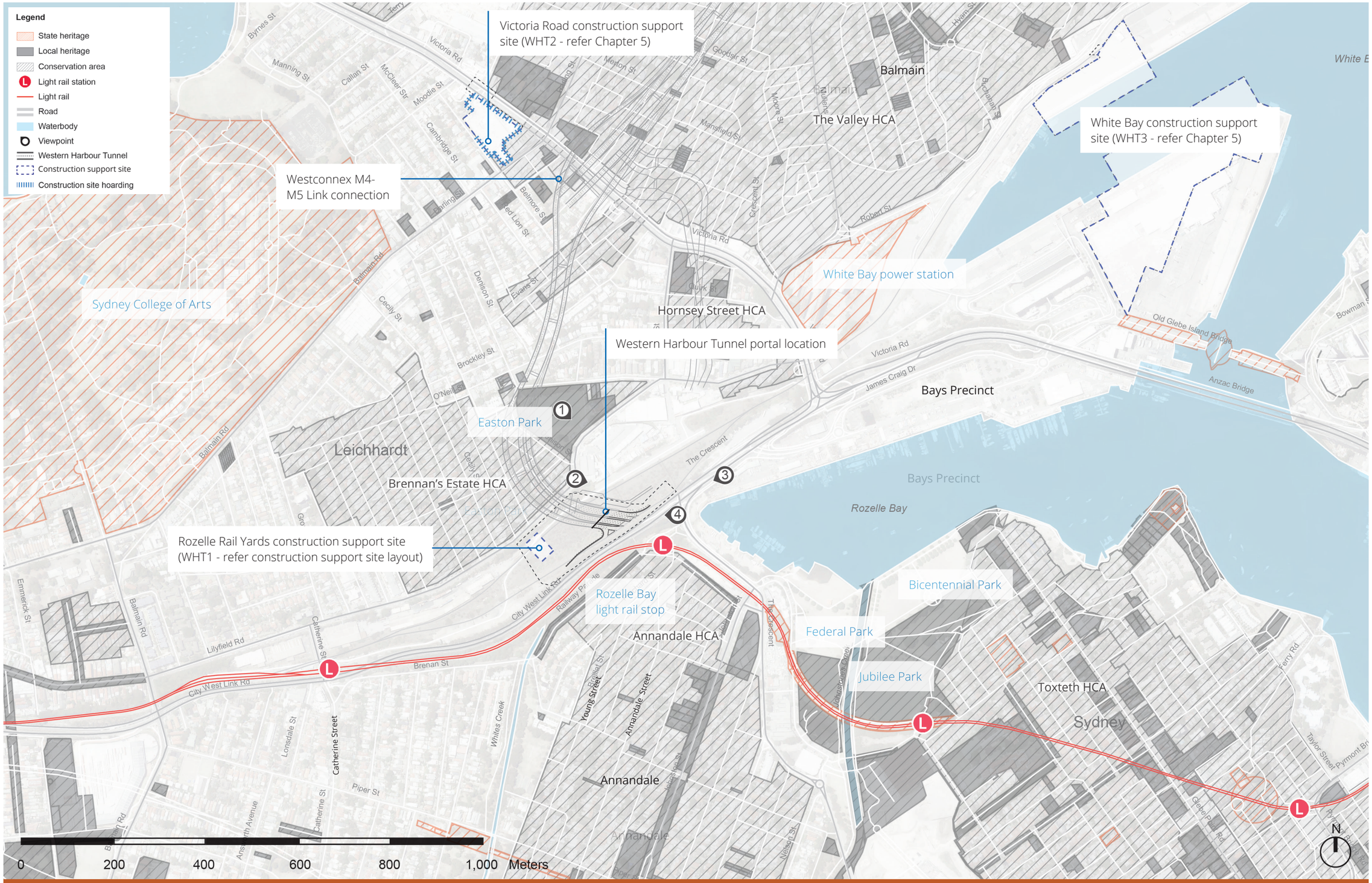
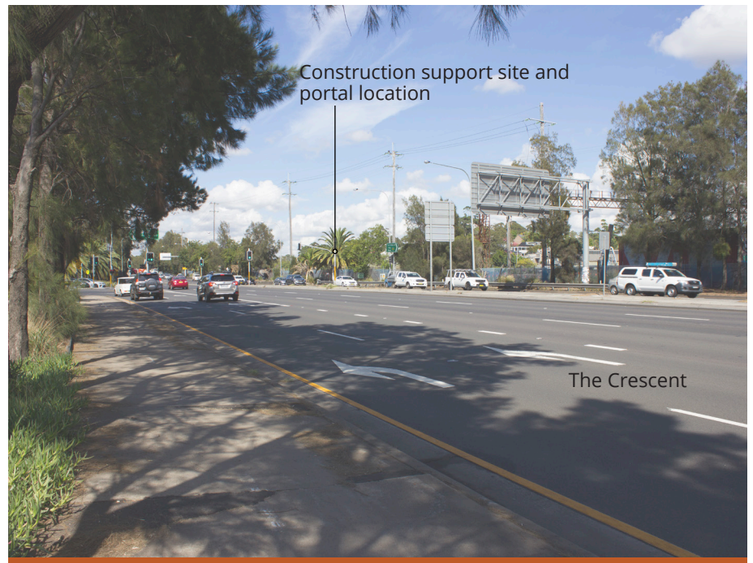


FIGURE 4.5 - ROZELLE PRECINCT - VIEWPOINT LOCATION PLAN

DESCRIPTION				VISUAL IMPACTS			
Viewpoint	Viewpoint description	Sensitivity	Magnitude (operation phase)	OPERATION	OPERATION - NIGHT		CONSTRUCTION
Viewpoint 1 Easton Park Type Public Distance 170m No. of viewers Moderate	Receivers are users of Easton Park, a large area of public open space to the north west of the project site. The existing view east looks across a turf sports pitch towards Rozelle Rail Yards. Highly filtered views towards the Sydney CBD are available through tree planting on the park's boundary. It should be noted that once constructed, the three ventilation outlets associated with M4-M5 link and Western Harbour Tunnel would be visible within the centre of the viewframe.	The sensitivity of these receivers to the project is considered to be Moderate, due to the following: + Area of locally heritage listed, public open space + Existing major infrastructure visible within the viewframe, including three ventilation outlets (once M4-M5 Link/Western Harbour Tunnel vent constructed). Moderate	The magnitude of impact arising from the project is considered to be Negligible, due to the following: + Foreground vegetation would screen the majority of views towards the project site + The presence of existing infrastructure within the viewframe of a similar scale (once M4-M5 Link constructed). Negligible	Overall, a Negligible visual impact is expected once the project is operational. The visual character of the park is unlikely to alter. Negligible	The number of viewers would reduce during hours of darkness and impacts on night time visual amenity are not expected in this location. Negligible		Magnitude (construction phase): Low A Moderate/Low visual impact is expected to these receivers during the construction period. Construction activities and equipment may be visible from this viewpoint, leading to slightly increased visual impact. Moderate/Low
Viewpoint 2 Dwellings off Lilyfield Road Type Private Distance 200m No. of viewers Moderate	Receivers are residents of dwellings along Lilyfield Road, both to the east and west of Easton Park. Where available, extensive east facing views extend across Rozelle Rail Yards and Rozelle Bay to the ANZAC Bridge and Sydney CBD. It should be noted that once constructed the three ventilation outlets associated with M4-M5 link and Western Harbour Tunnel would be visible within the centre of the viewframe.	The sensitivity of these receivers to the project is considered to be Moderate, due to the following: + These dwellings have extensive panoramic views east, although sensitivity is reduced by the presence of existing large scale infrastructure elements within the view frame. Moderate	The magnitude of impact arising from the project is considered to be Negligible, due to the following: + Limited visibility of the project works post construction + The presence of existing infrastructure within the viewframe of a similar scale (once M4-M5 Link constructed). Negligible	Overall, a Negligible visual impact is expected once the project is operational. The visual character of the park is unlikely to alter. Negligible	Increased lighting may be required around the portal and overpass. Due to the presence of numerous existing local light sources of a similar nature, an impact on night time visual amenity is not expected. Negligible		Magnitude (construction phase): Low A Moderate/Low visual impact is expected to these receivers during the construction period. Construction activities and equipment may be visible from this viewpoint, leading to slightly increased visual impact. Moderate/Low
Viewpoint 3 The Crescent Type Public Distance 100m No. of viewers High	Receivers are pedestrians, cyclists and motorists traveling both west and east bound on The Crescent. The existing view is dominated by the foreground junction and flanked by the Rozelle Rail Yards to the north and Rozelle Bay to the south.	The sensitivity of these receivers to the project is considered to be Low, due to the following: + Existing major road infrastructure visible within the viewframe (including M4-M5 Link once constructed). Low	The magnitude of impact arising from the project is considered to be Negligible, due to the following: + The portal may be visible from this viewpoint, forming an element to the edge of the viewframe, however the presence of existing infrastructure (including M4-M5 Link, once constructed) would ensure the portal is likely congruous within the road corridor setting + View is experienced in a transient manner with a short duration of view. Negligible	Overall, a Negligible visual impact is expected once the project is operational. The new infrastructure elements would generally fit within the context of the major intersection. Negligible	Increased lighting may be required around the portal. Due to the presence of numerous existing local light sources of a similar nature, an impact on night time visual amenity is not expected. Negligible		Magnitude (construction phase): Low A Low visual impact is expected to these receivers during the construction period. Construction activities and equipment may be visible from this viewpoint, leading to slightly increased visual impact. Low

VIEWPOINT 1 - VIEW EAST FROM EASTON PARK

VIEWPOINT 2 - VIEW EAST OVER ROZELLE RAIL YARDS FROM LILYFIELD RD TOWARDS SYDNEY CBD



VIEWPOINT 3 - VIEW SOUTH WEST OVER THE CRESCENT TOWARDS CITY-WEST LINK

DESCRIPTION				VISUAL IMPACTS			
Viewpoint	Viewpoint description	Sensitivity	Magnitude (operation phase)	OPERATION	OPERATION - NIGHT		CONSTRUCTION
Viewpoint 4 The Crescent and City-West Link Road intersection Type Public Distance 40m No. of viewers High	Receivers are pedestrians, cyclists and motorists at the intersection of The Crescent and City-West Link Road. The existing view is dominated by the foreground road corridor with the Rozelle Rail Yards behind. Patchy informal vegetation can be seen along the road corridor boundary. The proposed, indicative operational views from viewpoint 4 would be constructed by the M4-M5 project, in accordance with the approved M4-M5 Link project design. The Western Harbour Tunnel component of the project would carry out some finishing works (tunnel fitout and line marking adjustments).	The sensitivity of these receivers to the project is considered to be Low, due to the following: + Existing major road infrastructure visible within the viewframe (including M4-M5 Link once constructed).	The magnitude of impact arising from the project is considered to be Negligible, due to the following: + The portal would likely be visible from this viewpoint, forming an element to the edge of the existing road corridor, however the presence of existing infrastructure (including M4-M5 Link, once constructed) would ensure the portal is likely congruous within the busy road corridor setting + View is mostly experienced in a transient manner with a short duration of view.	Overall, a Negligible visual impact is expected once the project is operational. The new infrastructure elements would generally fit within the context of the major road corridor.	Increased lighting may be required around the portal. Due to the presence of numerous existing local light sources of a similar nature, an impact on night time visual amenity is not expected.		Magnitude (construction phase): Low A Low visual impact is expected to these receivers during the construction period. Construction activities and equipment may be visible from this viewpoint, leading to slightly increased visual impact.
		Low	Negligible	Negligible	Negligible		Low

VIEWPOINT 4 - VIEW SOUTH WEST FROM CORNER OF THE CRESCENT AND CITY-WEST LINK ROAD

VIEWPOINT 4 - PROPOSED (DAY 1 OF OPERATION) INDICATIVE VIEW OF WHT PORTAL AT ROZELLE INTERCHANGE, LOOKING NORTH FROM THE INTERSECTION OF THE CRESCENT AND CITY-WEST LINK ROAD

VIEWPOINT 4 - PROPOSED (YEAR 10 OF OPERATION) INDICATIVE VIEW OF WHT PORTAL AT ROZELLE INTERCHANGE, LOOKING NORTH FROM THE INTERSECTION OF THE CRESCENT AND CITY-WEST LINK ROAD

Rozelle precinct summary

4.6.14 Key findings

Overall, the landscape character and visual impacts of the project on the Rozelle precinct have been found to be minimal.

The following key points have been noted within the assessment (refer Table 4.4 and 4.5):

+ Limited magnitude of change related to the project in this location due to the relatively small scope of works and presence of existing industrial and large scale road infrastructure (including the yet to be built M4-M5 link works as part of Westconnex)
+ Vegetation and topography restrict the visual catchment of the project from many viewpoints including parts of Glebe Foreshore Parklands and Easton Park.

4.6.15 Landscape character

Operational Phase

While the majority of assessed LCZs have recorded a Moderate sensitivity rating, the project falls outside the geographical boundaries of most character zones, limiting any impacts to discrete sections of the LCZ that border the project works.

The operational phase of the project is unlikely to impact Easton Park or the City-West Link/The Crescent road corridors due to the limited magnitude of change.

The section of the future Rozelle Rail Yards parkland impacted by the project would be returned to public open space post construction, ensuring no lasting effects on its landscape character.

Construction Phase

Impacts on landscape character are likely to temporarily increase slightly due to the presence of construction equipment and activities, altered traffic conditions and increased vehicular movements.

4.6.16 Visual impact

Operational Phase

Negligible operational phase visual impacts have been recorded for all viewpoints studied.

Users of The Crescent/City-West Link road corridors would likely have direct views of the proposed portal and trough structure. Despite the works forming new elements within these viewframes, the presence of existing large scale road infrastructure ensures that the elements would be congruent with the existing busy road environment.

No visual impacts are expected from Easton Park or dwellings off Lilyfield Road as the project elements are unlikely to be visible.

Construction Phase

The construction phase of the project would likely increase visual impacts slightly for the viewpoints studied due to the presence of construction equipment and activities, altered traffic conditions and increased vehicular movements.

Night lighting

The presence of numerous existing light sources within the precinct ensures that any incremental increase in light emissions are not anticipated to adversely alter the existing night time visual environment.

DESCRIPTION			LANDSCAPE IMPACT		LANDSCAPE IMPACT
Landscape Character Zone	Sensitivity	Magnitude (operation phase)	OPERATION		CONSTRUCTION
Easton Park residential	Moderate	Negligible	Negligible		Moderate/Low
Rozelle Rail Yards	Moderate	Negligible	Negligible		Moderate/Low
Transport corridors	Low	Negligible	Negligible		Low

TABLE 4.4 - ROZELLE PRECINCT - LANDSCAPE CHARACTER IMPACT SUMMARY TABLE

DESCRIPTION					VISUAL IMPACTS			
No.	Viewpoint	Type	Sensitivity	Magnitude (operation phase)	OPERATION	OPERATION - NIGHT		CONSTRUCTION
1	Easton Park	Public	Moderate	Negligible	Negligible	Negligible		Moderate/Low
2	Dwellings off Lilyfield Road	Private	Moderate	Negligible	Negligible	Negligible		Moderate/Low
3	The Crescent	Public	Low	Negligible	Negligible	Negligible		Low
4	The Crescent and City-West Link Road intersection	Public	Low	Negligible	Negligible	Negligible		Low

TABLE 4.5 - ROZELLE PRECINCT - VISUAL IMPACT SUMMARY TABLE

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