Roads and Maritime Services/Sydney Airport Corporation Limited

Sydney Gateway Road Project

Environmental Impact Statement/ Preliminary Draft Major Development Plan

Technical Working Paper 13

Urban Design, Landscape Character and Visual Impact Assessment

November 2019

Sydney Gateway Road Project Technical Paper 13

Urban Design, Landscape Character + Visual Impact Assessment

Rev 09 | 06 November 2019

Transport Roads & Maritime Services

SYD

tonkinzulaikhagreer ARCHITECTS

spackman mossop michaels

Acknowledgement of Country

The Sydney Gateway is located on Country on which members and Elders of the local Indigenous community and their forebears have been custodians for many centuries and on which Aboriginal people have performed age-old ceremonies of celebration, initiation and renewal.

We acknowledge the Kameygal Tribe of the Eora/Dharug Nation as the Traditional Owners of Country and recognise their continuing connection to land, waters and culture. We acknowledge their living culture and their unique role in the life of the region. We pay our respects to their Elders past, present and emerging.

Prepared for

Transport Roads & Maritime Services

SYD

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List of Acronyms

Acronym	Meaning
ACHAR	Aboriginal Cultural Heritage Assessment Report (Technical Working Paper 10)
AHD	Australian Height Datum
AHIMS	NSW Aboriginal Heritage Information Management System
Airports Act	Commonwealth *Airports Act 1996*
ARTC	Australian Rail Transport Corporation
ASS	Acid sulfate soils
BC Act	NSW *Biodiversity Conservation Act 2016*
BDAR	Biodiversity Development Assessment Report (Technical Working Paper 14)
CASA	Civil Aviation Safety Authority
CPTED	Crime Prevention Through Environmental Design
CM Act	NSW *Coastal Management Act 2016*
CMP	Conservation Management Plan
CM SEPP	NSW *State Environmental Planning Policy (Coastal Management) 2018*
CoS	City of Sydney
DPIE	NSW Department of Planning, Industry and Environment
DPI	NSW Department of Primary Industries
EEC	Endangered Ecological Community
EIS	Environmental Impact Statement
EP&A Act	NSW *Environmental Planning and Assessment Act 1979*
EPBC Act	Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*
FM Act	NSW *Fisheries Management Act 1994*
G2SJV	Gateway to Sydney Joint Venture
HIAL	High intensity approach lighting

Acronym	Meaning
ISLUS	Integrated Speed and Lane Use sign
IWC	Inner West Council
LCZ	Landscape Character Zone
LEP	Local Environmental Plans
LGA	Local Government Area
LUMS	Lane Use Management System
MDP	Major Development Plan
OLS	Obstacle limitation surface
PANS-OPS	Procedures for air navigation services – aircraft operations surface
RailCorp	Rail Corporation New South Wales
Roads and Maritime	Roads and Maritime Services
RNE	Register of the National Estate
s170 register	Government agency Heritage and Conservation Register as required by section 170 of the NSW *Heritage Act 1977*
Sydney Airport	Sydney Airport Corporation
SEARs	Secretary's Environmental Assessment Requirements
SFR	Social and family recreation
SoHI	Statement of Heritage Impact (Technical Working Paper 9)
SMM	Spackman Mossop Michaels
SREP33	Sydney Regional Environmental Plan No 33 — Cooks Cove
SSI	State Significant Infrastructure
TZG	Tonkin Zuleika Greer

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CHAPTER 1

Introduction

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1.1 OVERVIEW

1.1.1 Sydney Gateway and the project

Sydney Kingsford Smith Airport (Sydney Airport) and Port Botany are two of Australia's most important infrastructure assets, providing essential domestic and international connectivity for people and goods. Together they form a strategic centre, which is set to grow significantly over the next 20 years. To support this growth, employees, residents, visitors and businesses need reliable access to the airport and port, and efficient connections to Sydney's other strategic centres.

The NSW and Australian governments are making major investments in the transport network to achieve this vision. New road and freight rail options are being investigated to cater for the forecast growth in passengers and freight through Sydney Airport and Port Botany. Part of this solution is Sydney Gateway, which comprises the following road and rail projects:

- Sydney Gateway road project (the subject of this assessment)
- Botany Rail Duplication.

Sydney Gateway will expand and improve the road and freight rail networks to Sydney Airport and Port Botany to keep Sydney moving and growing. The Sydney Gateway road project forms part of the NSW Government's long-term strategy to invest in an integrated transport network and make journeys easier, safer and faster.

Roads and Maritime and Sydney Airport Corporation propose the Sydney Gateway road project (the project). The project comprises new direct high capacity road connections linking the Sydney motorway network at St Peters interchange with Sydney Airport's terminals and beyond. It involves constructing and operating new and upgraded sections of road connecting to the airport terminals, four new bridges over Alexandra Canal, and other operational infrastructure and road connections.

The project and its location is shown on **Figure 1**.

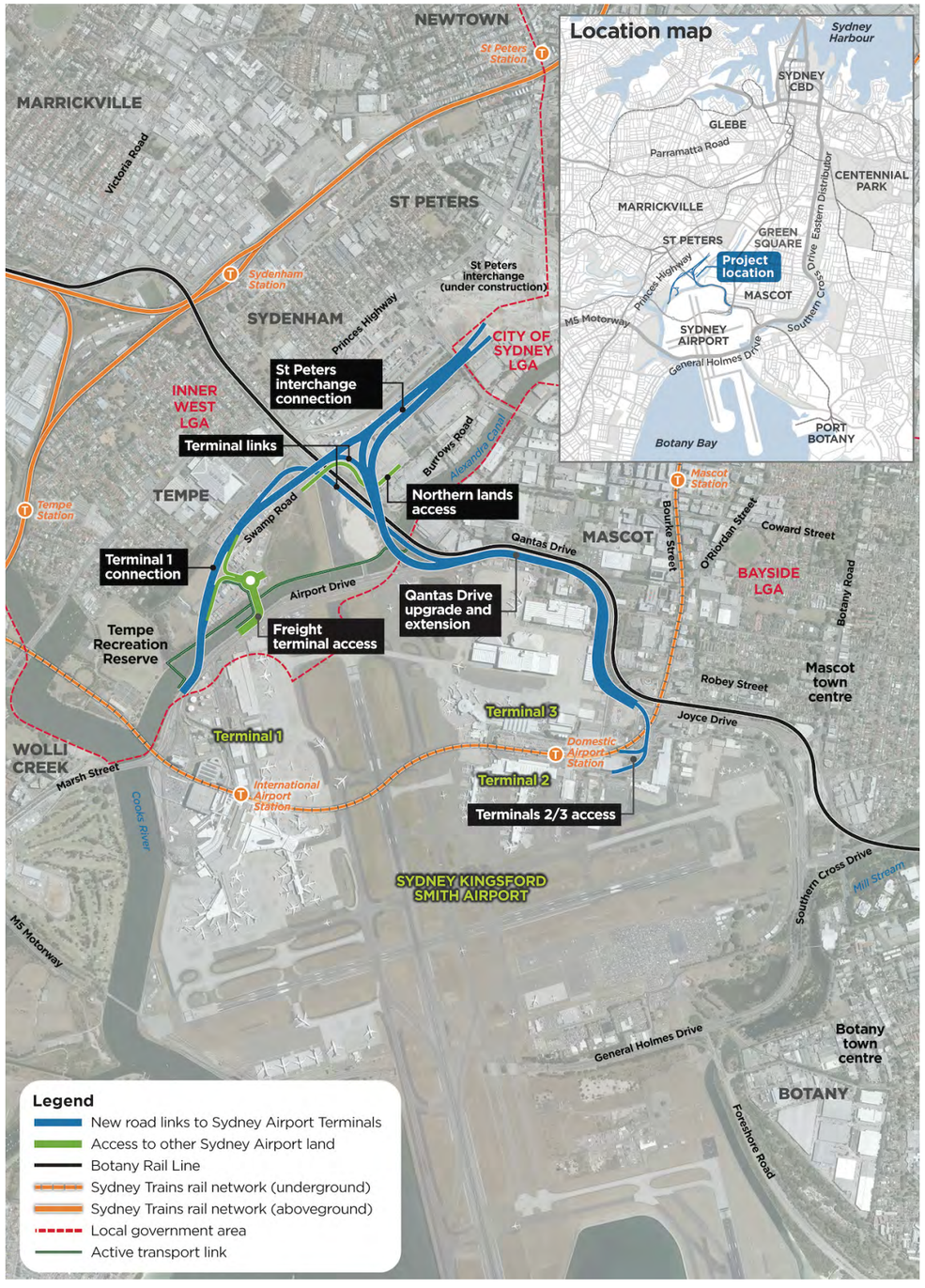

Figure 1. Project location

1.1.2 Overview of approval requirements

The project is subject to approval under NSW and Commonwealth legislation. Parts of the project located on Commonwealth-owned land leased to Sydney Airport (Sydney Airport land) are subject to the Commonwealth *Airports Act 1996* (the Airports Act). In accordance with the Airports Act, these parts of the project are major airport development. A major development plan (MDP), approved by the Australian Minister for Infrastructure, Transport and Regional Development, is required before a major airport development can be undertaken at a leased airport.

Parts of the project located on other land are State significant infrastructure in accordance with the NSW *Environmental Planning and Assessment Act 1979* (EP&A Act). As State significant infrastructure, these parts of the project require approval from the NSW Minister for Planning and Public Spaces. An environmental impact statement (EIS) is required to support the application for approval for State significant infrastructure under the EP&A Act.

An integrated EIS and preliminary draft MDP is being prepared to:

- Support the application for approval of the project in accordance with NSW and Commonwealth legislative requirements
- Address the environmental assessment requirements of the Secretary of the Department of Planning, Industry and Environment (the SEARs), issued on 15 February 2019
- Address the MDP requirements defined by section 91 of the Airports Act.

1.2 PURPOSE AND SCOPE OF THIS REPORT

This report was prepared by Spackman Mossop Michaels (SMM) and Tonkin Zuleika Greer (TZG), on behalf of Roads and Maritime and Sydney Airport Corporation to support the EIS/preliminary draft MDP.

This report presents the *Urban Design, Landscape Character and Visual Impact Assessment* for the Sydney Gateway road project.

The purpose of this report is to:

- Contribute to the environmental assessment of the project by reporting on the potential landscape character and visual impacts of constructing and operating the project
- Inform the project design process by identifying potential landscape character and visual impacts early in the design phase, so that they can be reduced or avoided in ongoing design refinement
- Set out the urban design principles adopted during project development
- Document the urban and landscape design and place making outcomes of the project.

In doing so, the report informs Roads and Maritime, other agencies and the community about:

- The potential landscape character and visual impacts of the project
- What avoidance, management and mitigation strategies would be implemented or further investigated in future design stages.

The report also addresses the relevant SEARs, and the requirements of relevant agencies, as outlined in **Table 1**.

MDP requirements relevant to this assessment are addressed in **Table 2**.

Table 1. Secretary's Environmental Assessment Requirements

Requirement	Summary response	Report section(s) for further information
Key Issue: Place Making and Urban Design		
Desired Performance Outcomes: ▪ The proposal design complements the amenity, character and quality of the surrounding environment. ▪ The proposal contributes to the accessibility and connectivity of communities. ▪ The proposal contributes to an increase in tree canopy for greater Sydney. *Specific Assessment Requirements:*		
1. The Proponent must identify how functional 'place' outcomes of public benefit will be achieved, including design principles and strategies that:		
(a) Consider areas identified for future urban renewal	Urban renewal areas in proximity of the project are the Mascot Town Centre and Wolli Creek. Landscape character and visual impacts on these areas have been assessed in Chapter 7 and Chapter 8 respectively. The assessment found that parts of Wolli Creek would be affected by visual changes. Both renewal areas would benefit from reduced through traffic once the project is in operation, in particular a reduction in freight traffic on local roads. The Mascot Town Centre is not located within the project's visual envelope and would not be affected by visual changes.	▪ Section 4.2 ▪ Section 1.3.2 ▪ Chapter 7 ▪ Section 7.3 ▪ Chapter 8 ▪ Section 8.3 ▪ Section 8.2 ▪ Section 8.3
(b) Identify areas of reduced traffic volumes and reduction of traffic permeation, particularly in and around commercial and community centres	Commercial and community centres surrounding the project include Mascot, Tempe and Wolli Creek. They are comprised of employment, warehousing, light industrial, bulky goods retailing areas, hospitality and other commercial businesses, as well as residential communities. Open space areas are also important community destinations. By providing a direct connection to the Sydney motorway network and by removing shipping container storage areas from Tempe, the project once in operation would result in a reduction of traffic volumes through Mascot, as well as along the Princes Highway, benefiting local centres in Mascot, Tempe and Wolli Creek, as well as further beyond.	▪ Section 4.2 ▪ Section 4.3.3 ▪ Section 4.4 ▪ Section 1.3.2 ▪ Section 7.3 ▪ Technical Working Paper 1 – Transport and Traffic
(c) Avoid locating infrastructure, including ancillary facilities, adjoining residential areas and other sensitive receivers, and justify where this cannot be achieved	Infrastructure has been located to minimise impacts on sensitive receivers within the constraints of the project site. Much of the project is located in existing brownfield sites including container storage and heavy industrial areas, or within existing road corridors, and adjoining the rail corridor or other light industrial and employment lands. The exception is the Terminal 1 connection, the freight terminal link and associated bridges. They partly traverse the Tempe Lands, affecting existing open space and the landscape setting of heritage listed Alexandra Canal. These sensitive areas were not able to be avoided, due to Sydney Airport's need to incorporate areas east of Alexandra Canal, including the existing Airport Drive, into airside lands.	▪ Section 1.3.3 ▪ Section 4.2 ▪ Section 4.4 ▪ Section 4.9 ▪ Section 7.3 ▪ Chapter 7 of the EIS/ preliminary draft MDP ▪ Chapter 8 of the EIS/ preliminary draft MDP
(d) Achieve high quality landscape design, streetscapes, architecture and design	**High quality streetscapes and landscape design** The project offers limited potential for high quality streetscapes and new vegetation due to: ▪ Space constraints within the operational boundary ▪ Airport operational constraints including the obstacle limitation surface and the need to reduce the risk of bird strike ▪ Environmental constraints including contaminated fill in the Tempe Lands and saline soils. Two emplacement mound design options and associated landscape concepts were assessed as part of this report. They would be subject to further review and refinement during detailed design to address aviation matters, minimise the volume of material excavated from the former Tempe landfill, maximise open space and community opportunities and avoid disturbance outside the project boundary. The optimisation process would occur in consultation with Sydney Airport Corporation, appropriate aviation stakeholders, and federal, state and local government agencies. **High quality architecture and design** Chapter 6 and Chapter 9 respectively provide a series of urban design precedents and recommendations for achieving high quality architecture and design outcomes for the project.	▪ Section 2.4.4 ▪ Section 6.6 ▪ Section 6.7.3 ▪ Section 4.7.1 ▪ Table 2 ▪ Section 4.3.1 ▪ Section 4.3.2 ▪ Section 6.7.3 ▪ Chapter 7 of the EIS/ preliminary draft MDP ▪ Technical Working Paper 5 – Contamination and Soils ▪ Section 7.3 ▪ Section 8.3 ▪ Section 2.5.1 ▪ Section 6.3 ▪ Section 6.4 ▪ Section 6.5 ▪ Section 6.7 ▪ Chapter 9

Requirement	Summary response	Report section(s) for further information
(e) Identify and incorporate urban design strategies and identify opportunities that will enhance healthy, cohesive and inclusive communities, including in relation to accessibility and connectivity	Opportunities to enhance communities include the creation of new parklands on current container storage areas in the Tempe Lands, subject to open space being the preferred use for residual lands based on the priorities of local and regional strategic planning and IWC. There are also opportunities to enhance existing open space to better meet community needs and expectations through a future master plan process planned by IWC for the Tempe Lands. Two emplacement mound design options and associated landscape concepts were assessed as part of this report. They would be subject to further review and refinement during detailed design to address aviation matters, minimise the volume of material excavated from the former Tempe landfill, maximise open space and community opportunities and avoid disturbance outside the project boundary. The optimisation process would occur in consultation with Sydney Airport Corporation, appropriate aviation stakeholders, and federal, state and local government agencies. Further opportunities not currently included in the project are discussed as part of the recommended mitigation measures. They include opportunities to enhance active transport connectivity.	▪ Section 2.4.4 ▪ Section 6.6.2 ▪ Section 6.7.3 ▪ Chapter 7 ▪ Section 7.3 ▪ Section 8.3 ▪ Chapter 9
(f) Consider 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	Generally, residual land is limited, as land between the project and Alexandra Canal would be incorporated into Sydney Airport landside areas in the Northern Lands. A portion of the Tempe Lands adjoining the Northern lands would become available for community recreation use - also refer response to SEAR 1(g). This is consistent with existing recreational use of the area and adjoining lands. The creation of additional parklands contiguous with existing open space is considered to enhance the future character of the area. Inner West Council plans to develop a Master Plan for the site. Ongoing consultation with Inner West Council would ensure the final landscape design integrates with Council's Master Plan to ensure consistency of project outcomes with the desired future character of the area.	▪ Section 6.6 ▪ Chapter 7 ▪ Section 8.2.1 ▪ Chapter 19 of the EIS/ preliminary draft MDP ▪ Chapter 20 of the EIS/ preliminary draft MDP ▪ Technical Working Paper 11 – Social Impacts and Technical Working Paper 12 – Business Impacts
(g) Identify opportunities to utilise surplus or residual land, particularly for the provision of community space (passive and recreational) and the process for determining ongoing maintenance of the lands	Generally residual land within Sydney Airport land is limited. Any proposed land treatments/uses would be determined by Sydney Airport Corporation and would be consistent with uses outlined in the Sydney Airport Master Plan 2039. However, upon completion of the project, up to 10 hectares of residual land would be available for use in the area. This would consist of land temporarily required during construction, including about four hectares currently occupied by recreational facilities within Tempe Lands, and land currently occupied by Tyne Container Services. Potential future uses could include open/space recreation, or other future uses such as industrial or employment, in accordance with the priorities of local and regional strategic planning and IWC.	▪ Section 6.6 ▪ Section 6.7.3 ▪ Section 7.3 ▪ Section 8.3 ▪ Chapter 19 of the EIS/ preliminary draft MDP ▪ Chapter 20 of the EIS/ preliminary draft MDP ▪ Technical Working Paper 11 – Social Impacts and Technical Working Paper 12 – Business Impacts
(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.	Project elements including active transport links have been designed to maximise safety through natural surveillance, landscape design that maximises sightlines and casual surveillance and lighting where appropriate and where it would not interfere with airport operation constraints including restrictions to external lighting. This is illustrated in a series of urban design cross sections.	▪ Section 4.7.1 ▪ Section 6.5 ▪ Section 6.7.2 ▪ Section 6.7.3
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	The project would not alter existing public transport services. All routes currently accessing Sydney Airport or using the arterial road network around Sydney Airport would be able to continue to operate via the Terminal 1 connection, terminal links and the upgraded Qantas Drive. The project would facilitate improved public transport access to Sydney Airport, consistent with Sydney Airport Master Plan 2039.	▪ Section 1.3.2 ▪ Section 4.7.4 ▪ Chapter 5 ▪ Chapter 9 of the EIS/ preliminary draft MDP ▪ Technical Working Paper 1 – Transport and Traffic
(b) Impacts on cyclists and pedestrian access, amenity and safety across and adjoining the proposal, including the relocation of cycle routes and delivery of new cycleways around the airport and Alexandra Canal	The project relocates the existing Alexandra Canal cycleway to the western side of Alexandra Canal, including a new bridge to connect to the existing cycle path near the Qantas Drive bridge. This would maintain the existing cycle link along the canal. The project would result in a reduced level of active transport connectivity including: ▪ Removal of the pedestrian cycle link between Tempe Recreation Reserve and Link Road ▪ Removal of the ability to cycle along Qantas Drive. This would remove a fast and efficient route along an arterial road that is used by experienced cyclists as an east-west link around Sydney Airport. The project does not currently make provision for this link to be reinstated. The project does not deliver any new cycle routes around the airport. The project makes provision for a future active transport link along the St Peters interchange connection. The project would improve the footpath along Robey Street. Further opportunities not currently included in the project are discussed as part of the recommended mitigation measures.	▪ Section 1.3.2 ▪ Section 2.4.4 ▪ Section 4.7.5 ▪ Chapter 5 ▪ Section 6.7.2 ▪ Section 7.3 ▪ Chapter 9
(c) Opportunities to integrate and enhance accessibility including the provisions public and active transport infrastructure as a result of the proposal.	Refer response to SEAR 2(b) and 2(a) above.	▪ Refer SEAR 2(b) and 2(a) above ▪ Chapter 9 of the EIS/ preliminary draft MDP ▪ Technical Working Paper 1 – Transport and Traffic

Requirement	Summary response	Report section(s) for further information
3. The Proponent must:		
(a) Estimate the number of trees to be cleared by the proposal (a tree is defined by Australian Standard (AS) 4970 Protection of trees on development sites) that will not be covered by a biodiversity offset strategy	The *Sydney Gateway Road Project – Tree Assessment Technical Note* prepared by G2SJV identified that a minimum of 1,300 trees not covered by a biodiversity offset strategy would be removed for the project, including a large number trees with high amenity landscape values.	▪ Section 4.3.3 ▪ Section 6.7.3 ▪ G2SJV 2019, *Sydney Gateway Road Project – Tree Assessment Technical Note*
(b) For those trees to be cleared, describe how the proposal will achieve a net increase in tree canopy within or adjacent to the construction footprint.	The project offers limited potential for new tree cover due to: ▪ Space constraints within the operational boundary ▪ Airport operational constraints including the obstacle limitation surface and the need to reduce the risk of bird strike ▪ Environmental constraints including contaminated fill in the Tempe Lands and saline soils. The project design currently provides for a total of 416 replacement trees, representing a net loss of 884 trees across the whole project site (construction footprint area) including a net loss of ▪ 377 trees on Commonwealth land ▪ 507 trees within the remainder of the construction footprint. There is therefore a need to develop a strategy to identify how the required net increase in tree cover can be achieved. The aim of the strategy would be to ensure that trees that would be removed by the project would be replaced and to provide for a net increase in tree canopy. Trees that cannot be replaced within the project footprint, due to potential aviation hazards, would be replanted in areas identified in Sydney Airport Corporation's offset program. Roads and Maritime is also committed to replanting trees that would be removed at the former Tempe landfill. The final location of replacement trees would be confirmed in consultation with Inner West Council and Sydney Airport Corporation to ensure consistency with Council's proposed Master Plan and Sydney Airport Corporation's Wildlife Management Program	▪ Section 6.6 ▪ Section 6.7.3

Requirement	Summary response	Report section(s) for further information
Visual Amenity		
Desired Performance Outcomes: ▪ The proposal minimises adverse impacts on the visual amenity of the built and natural environment (including public open space) and capitalises on opportunities to improve visual amenity.		
Specific Assessment Requirements:		
4. The Proponent must assess the visual impact of the proposal and any ancillary infrastructure on:		
(a) Views and vistas	The project would impact on a range of views and vistas, both within the project site, and to the project site from surrounding areas. Identified impacts include: ▪ Interruption of the vista along Alexandra Canal, affecting the landscape setting and heritage values ▪ Introduction of road infrastructure into views where there was previously none, including replacement of open space and vegetation with road infrastructure ▪ Opening up of new views through tree clearing to exposure views of the road corridor where they do not currently exist ▪ Changes in three dimensional form as a result of earthworks, retaining walls and emplacement mounds, altering spatial qualities and the outlook across the project area.	▪ Section 4.8 ▪ Chapter 7 ▪ Chapter 8 ▪ Chapter 6
(b) Streetscapes, key sites and buildings (including existing landscape works, greenspace and tree canopy)	The project would have a number of impacts on streetscapes, key sites and buildings. Key impacts include: ▪ Tree removal, including removal of a large number of high amenity and retention value trees along existing road corridors, with no scope for reinstatement ▪ Open space impacts through the loss of private undeveloped green areas and through changes to the Tempe Lands, including beneficial impacts resulting from the creation of new parklands on existing container storage areas ▪ Loss of cycle connectivity between the Alexandra Canal cycleway and Qantas Drive, including loss of the ability to cycle along Qantas Drive ▪ Removal of buildings within the airport's north-east sector, identified as contributing to the airport's heritage significance as their arrangement expresses part of the airport's historic evolution.	▪ Section 4.3.3 ▪ Chapter 6 ▪ Chapter 7 ▪ Chapter 8

Requirement	Summary response	Report section(s) for further information
(c) Heritage items including Aboriginal places and environmental heritage	The project would have a number of impacts on heritage items including: ▪ Disruption of the open sky and open landscape setting that make an important contribution to the heritage values of both Sydney Airport and Alexandra Canal ▪ Removal of sections of Alexandra Canal's walls and a number of additional perforations for stormwater outlets ▪ Removal of buildings within the airport's north-east sector, identified as contributing to the airport's heritage significance as their arrangement expresses part of the airport's historic evolution.	▪ Section 4.5 ▪ Chapter 8 ▪ Chapter 9 ▪ Technical Working Paper No. 9 - Statement of Heritage Impact ▪ Technical Working Paper No. 10 - Aboriginal Cultural Heritage Assessment Report
(d) The local community.	Community impacts are captured by responses to SEAR 4(a), 4(b) and 4(c) above. Opportunities to improve visual amenity are identified in the urban and landscape concept in Chapter 6 and in the mitigation measures in Chapter 9.	Refer to SEAR 4(a), 4(b) and 4(c).
5. The Proponent must provide visual representations of the proposal from key receiver locations to illustrate the proposal and its visual impacts and how the proposal has responded to the visual impact through urban design and landscape works.	15 photomontages are included as part of the visual impact assessment, illustrating the project urban and landscape design. Further opportunities to reduce visual impacts are identified in the mitigation measures in Chapter 9.	▪ Chapter 6 ▪ Section 8.3 ▪ Chapter 9

Table 2. MDP requirements relevant to this assessment

MDP key issues	Requirements	Where addressed in this report
Assessment of environmental impacts	(d) if a final master plan for the airport is in force—whether or not the development is consistent with the final master plan	▪ Section 1.2.1
	(h) the airport-lessee company's assessment of the environmental impacts (landscape character and visual impacts) that might reasonably be expected to be associated with the development.	▪ Chapter 7 ▪ Chapter 8
Plans for dealing with environmental impacts	(j) the airport-lessee company's plans for dealing with the environmental impacts (landscape character and visual impacts) mentioned in paragraph (h) (including plans for ameliorating or preventing environmental impacts).	▪ Chapter 6 ▪ Chapter 9

1.2.1 Consistency with Sydney Airport Master Plan and Environment Strategy

The project was assessed against the commitments outlined in the *Sydney Airport Masterplan 2039* and *Sydney Airport Environment Strategy 2019-2024* that are of relevance to the urban and landscape design and landscape character and visual impact assessment. The aim of the assessment was to determine whether the project would be consistent with the Master Plan and Environment Strategy. The findings of the assessment are presented in Table 3.

Table 3. Consistency with Sydney Airport documents

Issue	Section	Commitment	Discussion	Complies Y/N	Further information
Sydney Airport Master Plan 2039					
LANDSCAPE AND BIODIVERSITY					
Tree cover	E4 4.1 Consistency with State environmental planning policies	Management of vegetation at the airport is carried out in accordance with DIRDC's land clearing guidelines and the airport's replanting offset program. As part of the five year biodiversity action plan in the Environment Strategy 2019-2024, Sydney Airport Corporation proposes to develop an airport wide vegetation strategy which incorporates biodiversity offsets.	The vegetation strategy is yet to be developed. One aim of the strategy would be to ensure that trees that would be removed by the project would be replaced and to provide for a net increase in tree canopy. Trees that cannot be replaced within the project footprint, due to potential aviation hazards, would be replanted in areas identified in Sydney Airport Corporation's offset program. Roads and Maritime is also committed to replanting trees that would be removed at the former Tempe landfill. The final location of replacement trees would be confirmed in consultation with Inner West Council and Sydney Airport Corporation to ensure consistency with Council's proposed Master Plan and Sydney Airport Corporation's Wildlife Management Program	N/A	▪ Section 6.7.3
Environmentally significant trees	14.6.7 Heritage	Environmentally significant remnant fig trees remain within the area and would be subject to management plan for the fig trees and the Sydney Airport Wetlands, located in the South East Sector.	The remnant fig trees in the South East Sector identified as environmentally significant would not be affected by the project.	Y	N/A
SUSTAINABILITY AND LANDSCAPE SYSTEMS					
Water sensitive urban design	8.7; 10.7 Sustainability Initiatives to 2039	Incorporation of water sensitive urban design in the development of landside facilities to improve local water quality and reduce burden on local infrastructure	The Sydney Gateway project would not constitute a landside facility in the context of the Master Plan.	N/A	N/A
	12.5.1 New stormwater infrastructure	The potential role of water sensitive urban design and rainwater harvesting will be considered as part of sustainability initiatives for future developments. This will allow Sydney Airport to meet the following water cycle commitments: ▪ The quantity of key pollutants discharged to stormwater is reduced when compared to untreated stormwater	Potential for water sensitive urban design and rainwater harvesting have been considered for the project. Technical investigations found that, due to groundwater contamination in the project site, the inclusion of water sensitive urban design in the project is not feasible.	Y	▪ Section 6.7 ▪ Technical Working Paper 5 – Contamination and Soils
ACTIVE TRANSPORT					
	11.5.3 Roads - Active Transport	Sydney Airport is working with Roads and Maritime and other stakeholders to determine viable options for Alexandra Canal cycleway replacement cycle connections. These options will be assessed by Roads and Maritime as part of the environmental impact assessment process for Sydney Gateway which will include public consultation. The approved cycle connection plans will then be integrated into Sydney Airport's Five-Year Ground Transport Plan.	The project relocates the Alexandra Canal cycleway to the northern side of Alexandra Canal. It further includes a strategy for temporary replacement routes during construction, through the Tempe Lands and Northern Lands. Further consultation would take place as part of the public exhibition of the project.	Y Y Y	▪ Chapter 5 ▪ Section 6.7.2 ▪ Section 7.3 -

Issue	Section	Commitment	Discussion	Complies Y/N	Further information
	11.7.1 Sustainable transport and movement	Creating efficient pedestrian, bicycle and vehicle linkages internally and connections to surrounding urban development (particularly to and from public transport stops, community services and major traffic generators)	The project does not include any measures to improve active transport connectivity or access to the airport precinct. Sydney Airport would investigate opportunities for enhanced active transport, including fir a cycle facility between Terminal 1 and Terminals 2/3, as part of future Master Plans, outside of the project.	N	▪ Section 4.7.5 ▪ Chapter 5 ▪ Section 6.7.2 ▪ Section 7.3
	11.7.4 Active transport	Further improvements include measures to improve access to and connectivity of the active transport network at Sydney Airport. We are investigating potential inter-terminal and sub-regional links with TfNSW and local councils, which will improve access to the airport precinct from surrounding transport nodes and major centres.			
	14.2 Key points (environment)	Major road and ground access improvements will include measures to increase pedestrian, cycling and sustainable transport connections to and from the airport			
PUBLIC TRANSPORT					
	14.6.3 Air quality	Encourage staff and passengers travelling to and from the airport to use public transport or other sustainable modes of transport	The project would improve road access to all terminals, benefiting public transport (bus) access.	Y	▪ Chapter 5 ▪ Technical Working Paper 1 – Transport and Traffic
Sydney Airport Environment Strategy 2019-2024					
LANDSCAPE AND BIODIVERSITY					
Tree cover	3.8.3 Management	Replanting offset program – replacing vegetation lost through development. This follows on from an offset planting to compensate for vegetation lost through development as part of previous environment strategies	Space and operational constraints preclude the replanting of the trees removed as part of the project on much of airport land. The project currently falls 276 trees short of replacing all trees removed as part of the project on Commonwealth land. This would be addressed by a revegetation/offset strategy that would be developed to ensure that trees that would be removed by the project would be replaced. Trees that cannot be replaced within the project footprint, due to potential aviation hazards, would be replanted in areas identified in Sydney Airport Corporation's offset program. The final location of replacement trees would be confirmed in consultation with Inner West Council and Sydney Airport Corporation to ensure consistency with Council's proposed Master Plan and Sydney Airport Corporation's Wildlife Management Program	N	▪ Section 4.7.1 ▪ Section 6.7.3 ▪ Chapter 9
	3.8.5 Biodiversity five year action plan	Develop an airport wide vegetation strategy which incorporates biodiversity offsets (long term)	The strategy is yet to be developed.	N/A	N/A

1.3 THE PROJECT

1.3.1 Location

The project is located about eight kilometres south of Sydney's central business district and to the north of Sydney Airport on both sides of Alexandra Canal. The northern extent of the project is located at St Peters interchange, which is currently being constructed to the north of Canal Road in St Peters. The western extent of the project is located near the entrance to Sydney Airport Terminal 1 on Airport Drive, to the north of the Giovanni Brunetti Bridge and south-west of Link Road. The eastern extent of the project is located near the intersection of Joyce Drive, Qantas Drive, O'Riordan Street and Sir Reginald Ansett Drive.

The project is located mainly on government owned land in the suburbs of Tempe, St Peters and Mascot, in the Inner West, City of Sydney and Bayside local government areas.

1.3.2 Key design features

The project provides a number of linked road connections to facilitate the movement of traffic between the Sydney motorway network, Sydney Airport Terminal 1 (Terminal 1) and Sydney Airport Terminals 2 and 3 (Terminals 2/3). The project would connect Terminal 1 and Terminals 2/3 with each other and with the Sydney motorway network. The project would also facilitate the movement of traffic towards Port Botany via General Holmes Drive. It would provide three main routes for traffic:

- Between the Sydney motorway network and Terminal 1, and towards M5 motorway and Princes Highway
- Between the Sydney motorway network and Terminals 2/3, and towards General Holmes Drive, Port Botany and Southern Cross Drive
- Between Terminal 1 and Terminals 2/3.

The key features of the project include - refer **Figure 1**:

- Road links to provide access between the Sydney motorway network and Sydney Airport's terminals, consisting of the following components:
  - St Peters interchange connection – a new elevated section of road extending from St Peters interchange to the Botany Rail Line, including an overpass over Canal Road.
  - Terminal 1 connection – a new section of road connecting Terminal 1 with the St Peters interchange connection, including a bridge over Alexandra Canal and an overpass over the Botany Rail Line.
  - Qantas Drive upgrade and extension – widening and upgrading Qantas Drive to connect Terminals 2/3 with the St Peters interchange connection, including a high-level bridge over Alexandra Canal
  - Terminal links – two new sections of road connecting Terminal 1 and Terminals 2/3, including a bridge over Alexandra Canal.
  - Terminals 2/3 access – a new elevated viaduct and overpass connecting Terminals 2/3 with the upgraded Qantas Drive.
- Road links to provide access to Sydney Airport land:
  - New section of road and an overpass connecting Sydney Airport's northern lands either side of the Botany Rail Line.
  - New section of road, including a signalised intersection with the Terminal 1 connection and a bridge connecting Sydney Airport's existing and proposed freight facility either side of Alexandra Canal.
- An active transport link approximately 1.3 kilometres in length along the western side of Alexandra Canal to maintain connections between Sydney Airport and the city and Mascot.
- Intersection upgrades or modifications at Link Road/Airport Drive, Lancastrian Road/Qantas Drive, Robey Street/Seventh Street/Qantas Drive and Shiers Avenue/Sir Reginald Ansett Drive.
- Provision of operational ancillary infrastructure including maintenance bays, new and upgraded drainage infrastructure, signage and lighting, retaining walls, noise barriers, flood mitigation basin, utility works and landscaping.

The project is shown on **Figure 1**. More detail about the project design is provided in **Chapter 5, Chapter 6** and **Chapter 7**.

Other infrastructure and works proposed includes new drainage, lighting and road signs, retaining walls and utility works. The project would also require temporary facilities during construction, including compounds, work areas and site access.

Further information on the project is provided in **Chapter 7 of the EIS/preliminary draft MDP.**

1.3.3 Construction overview

A conceptual construction methodology has been developed based on the preliminary project design to be used as a basis for the environmental assessment process. Detailed construction planning, including programming, work methodologies, staging and work sequencing would be undertaken once construction contractor(s) have been engaged.

Timing and work phases

Construction of the project would involve four main phases of work. The indicative construction activities within each phase are outlined below:

Phase	Indicative construction activities
Enabling works	Construction of the temporary active transport link, Modification of various road intersections to facilitate main construction works.
Site establishment	Installing site fencing, hoarding and signage, Establishing construction compounds, work areas and site access routes.
Main construction works	Clearing/trimming of vegetation, Removal (or partial removal) of a number of buildings and other existing infrastructure e.g. concrete hardstand areas, drainage infrastructure, sheds, advertising structures, containers, etc, Roadworks, including bridge and viaduct construction and drainage works, Utility works.
Finishing works	Erecting lighting, signage and street furniture, landscaping works and site demobilisation and rehabilitation in all areas.

Specific construction issues which will require careful planning and management and close co-ordination with relevant stakeholders include:

- Works within the prescribed airspace of Sydney Airport
- Works interfacing with the Botany Rail Line
- Piling in the vicinity of the T8 Airport and South Line underground rail tunnels
- Works within the former Tempe landfill and Alexandra Canal which are subject to remediation orders and specific management plans

› Excavation, storage and handling of contaminated soils generally within the project site and contaminated groundwater from the Botany Sands aquifer.

It is anticipated that construction would start in mid 2020 and take about three and a half years to complete. Detailed construction planning would be confirmed once construction contractor(s) have been engaged.

The project would include work undertaken during recommended standard hours as defined by the *Interim Construction Noise Guideline* (DECC, 2009):

› Monday to Friday: 7am to 6pm

› Saturday: 8am to 1pm

› Sundays and public holidays: no work.

It would also include work outside these hours (out-of-hours work) to minimise the potential for aviation and rail safety hazards.

Construction footprint

The land required to construct the project (the construction footprint) is shown on **Figure 2**. The construction footprint includes the land needed to construct the proposed roadways, bridges and ancillary infrastructure and land required for the proposed construction compounds. Utility works to support the project would generally occur within the construction footprint; however, some works (such as connections to existing infrastructure) may be required outside the footprint.

Compounds, access and resources

Construction would be supported by five construction compounds located to support the main construction works (shown on **Figure 2**). Construction compounds would include site offices, staff amenities, storage and laydown areas, workshops and workforce parking areas.

Materials would be transported to and from work areas via construction haul routes, which have been selected to convey vehicles directly to the nearest arterial road.

The construction workforce requirements would vary over the construction period based the activities underway and the number of active work areas. The workforce is expected to peak at about 1,000 workers for a period of about 13 months, indicatively from the fourth quarter of 2021. Either side of this peak, workforce numbers are expected to reduce to about two thirds.

Figure 2. Construction footprint and facilities

1.4 REPORT STRUCTURE

This report has been prepared in accordance with Roads and Maritime policy, as set out in *Environmental Impact Assessment Practice Note. Guideline for Landscape Character and Visual Impact Assessment (EIA-N04)* (Roads and Maritime Services 2018).

The structure and content of this report is outlined below.

- Chapter 1: Introduction
  Provides a brief project overview, report purpose and assessment requirements
- Chapter 2: Legislative and Policy Context
  Provides a brief overview of the legislative and policy context relevant to the urban design and landscape character and visual assessment.
- Chapter 3: Methodology
  Explains the methodology used in the urban design development and in the landscape character and visual impact assessment
- Chapter 4: Existing Environment
  Describes the project's urban and landscape setting and character, and how they have informed the design and assessment process. Defines distinct landscape character zones based on the built, natural, visual and community context
- Chapter 5: Project Description
  Describes the major project elements in more detail
- Chapter 6: Urban Design and Place Making Strategy
  Presents the urban design and place making strategy for the project including an urban design vision, objectives and principles that derive from the contextual analysis
- Chapter 7: Urban and Landscape Design Concept
  Describes and illustrates the project and provides concepts for major built elements such as bridges and retaining walls. The urban design concept addresses how the project fits into the surrounding area, how it supports the local connections and how it contributes to the built and natural setting
- Chapter 8: Landscape Character Impact Assessment
  Assesses the project's impacts on the identified landscape character zones by analysing how well the project fits into the built, natural and community landscape
- Chapter 9: Visual Impact Assessment
  Identifies the areas from where the project would be visible. Assesses how well the design responds to what people see from key viewpoints
- Chapter 10: Recommended Mitigation Measures
  Outlines the recommended safeguards and mitigation measures to be adopted to reduce the identified impacts, should the project proceed to detailed design
- Chapter 11: Conclusion
  Provides a summary of the outcomes the community can expect from the project including urban and landscape design outcomes, the likely level of landscape character and visual impacts, and how they could be further reduced through the application of mitigation measures and safeguards in future project phases.
- References
  Lists documents that were used in the preparation of this report.

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CHAPTER 2

Legislative and Policy Context

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2.1 CHAPTER OVERVIEW

This chapter provides a brief overview of the legislative and policy context relevant to the urban design and landscape character and visual assessment. This includes key Commonwealth and state legislation, NSW government policies including Roads and Maritime policies and local government statutory environmental planning instruments. A select number of documents are discussed in more detail as they contain important information that has:

- Shaped the project urban design outcomes
- Highlighted important factors to consider in the assessment of the project's potential landscape character and visual impacts.

2.2 COMMONWEALTH LEGISLATION

2.2.1 Airports Act 1997 and associated regulations

The project site includes areas of Commonwealth-owned land leased by Sydney Airport. The *Airports Act 1997* (the Airports Act) and associated regulations provide the assessment and approval process for development on Commonwealth-owned land for the operation of Sydney Airport.

Section 89 of the Airports Act specifies types of development that constitute 'major airport development'. A major development plan (MDP) approved by the Australian Minister for Infrastructure, Transport and Regional Development is required before major airport development can be undertaken at a leased airport.

The Airports Act and regulations are the statutory controls for ongoing regulation of development activities on Commonwealth-owned land leased from the Australian Government for the operation of Sydney Airport. Section 70 of the Airports Act requires there to be a final master plan for the airport that has been approved by the Australian Minister for Infrastructure, Transport and Regional Development.

Part 5 of the Act also requires that each airport develop an environment strategy which is included in its master plan. Once approved, Sydney Airport Corporation and all persons who carry out activities at the airport are obliged to take all reasonable steps to ensure compliance with the environment strategy.

2.2.2 Airports (Environment Protection) Regulations 1997

The objective of the *Airports (Environment Protection) Regulations 1997* (the regulations) is to establish a system of regulation for activities at airports that generate or have potential to generate pollution or excessive noise. The regulations impose a general duty to prevent or minimise environmental pollution and have as one of their objects the promotion of improved environmental management practices at Commonwealth-leased airports.

The regulations contain detailed provisions setting out:

- Definitions, acceptable limits and objectives for air, water and soil pollution, and offensive noise
- General duties to prevent or minimise pollution, preserve significant habitat and cultural areas, and to prevent offensive noise
- Monitoring and reporting requirements for existing pollution

Part 2 of the regulations defines pollution in relation to air (including odour), water, soil and offensive noise. Schedules 1-4 of the regulations provide the acceptable limits of pollutants and offensive noise, which, in conjunction with other national environment protection measures, provide the system of environmental regulation at airports.

2.2.3 Environment Protection and Biodiversity Conservation Act 1999

The *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) is administered by the Australian Department of the Environment and Energy and provides a legal framework to protect and manage nationally important flora, fauna, ecological communities and heritage places defined as 'matters of national environmental significance' (MNES).

Under the EPBC Act, proposed actions (i.e. activities or projects) with the potential to significantly impact matters protected by the EPBC Act must be referred to the Australian Minister for the Environment to determine whether they are controlled actions, requiring approval from the Minister. The following matters are defined as protected matters by Part 3 of the EPBC Act:

- Matters of national environmental significance
- The environment of Commonwealth land
- The environment in general if they are being carried out by an Australian Government agency.

2.2.4 Sydney Airport Master Plan 2039 and Environment Strategy 2019-2024

Sydney Airport Master Plan

As part of the planning framework established by the Airports Act, airport operators are required to prepare a master plan for the coordinated development of their airport. *Sydney Airport Master Plan 2039* (Master Plan 2039) outlines the strategic direction for Sydney Airport's operations and development over the next 20 years. It acknowledges that the continued growth of Sydney Airport is vital to achieving local, state and national employment, tourism and development objectives. In accordance with the requirements of the Airports Act, *Sydney Airport Master Plan 2039*:

- Establishes the strategic direction for efficient and economic development at the airport over the planning period
- Provides for the development of additional uses of the airport site
- Indicates to the public the intended uses of the airport site
- Reduces potential conflicts between uses of the airport site, to ensure that uses of the airport site are compatible with the areas surrounding the airport
- Ensures that operations at the airport are undertaken in accordance with relevant environmental legislation and standards
- Establishes a framework for assessing compliance at the airport with relevant environmental legislation and standards
- Promotes continual improvement of environmental management at the airport.

The consistency of the project with the existing and proposed master plans and respective planning objectives is considered in **Chapter 3 of the EIS/preliminary draft MDP**.

Sydney Airport Environment Strategy

The *Sydney Airport Environment Strategy 2019-2024* forms part of *Sydney Airport Master Plan 2039*. Section 71(2)(h) of the Airports Act defines the requirements for an environment strategy, which include:

- Objectives for environmental management of the airport
- Areas within the airport site considered to be environmentally significant
- Measures to be carried out to prevent or control the environmental impact associated with airport operations.

The *Environment Strategy 2019-2024* provides strategic direction for the environmental performance and management of Sydney Airport. The purpose of the *Environment Strategy* is to:

- Establish a framework for assessing compliance and ensuring that all operations at Sydney Airport are undertaken in accordance with relevant environmental legislation and standards
- Promote the continual improvement of environmental management and performance at Sydney Airport and build on the achievements and goals of previous strategies
- Realise improvements in environmental sustainability, by minimising Sydney Airport's environmental footprint and working towards a more efficient and resilient airport.

To this end, the strategy includes environmental action plans for the following key issues:

- Sustainability and environmental management
- Climate change and energy management
- Water management
- Air quality
- Ground-based noise
- Ground transport
- Biodiversity and conservation management
- Heritage
- Waste and resource management
- Soil and land management
- Spills response and hazardous materials.

Of particular relevance to this report are the biodiversity management commitments of the *Environment Strategy 2019-2024*. They include a commitment to replace vegetation lost through development through a replanting offset program (p. 79).

The consistency of the project with the *Sydney Airport Environment Strategy 2019-2024* is considered in Chapter 3 of the EIS/preliminary draft MDP.

2.3 NSW LEGISLATION

Key pieces of legislation from an urban and landscape design and place-making point of view are the:

- EP&A Act
- NSW *Coastal Management Act 2016* (CM Act).

Further detail is provided in the following sections.

In addition to the EP&A Act and the CM Act, there are a number of acts that interface with urban design considerations, including legislation governing biodiversity and heritage. These acts are discussed in the relevant technical working papers and specialist assessments.

2.3.1 Environmental Planning and Assessment Act

The EP&A Act is the umbrella piece of legislation for the NSW planning system. It regulates both planning and the environmental assessment process for development proposals.

In 2017 the EP&A Act was amended to include new objectives of relevance to place making and urban design. They are (clause 1.3) to promote:

- *Good design and amenity of the built environment*
- *The sustainable management of built and cultural heritage (including Aboriginal cultural heritage*).

Other objectives of relevance to this technical working paper are:

(a) To promote the social and economic welfare of the community and a better environment by the proper management, development and conservation of the State's natural and other resources

(b) To facilitate ecologically sustainable development by integrating relevant economic, environmental and social considerations in decision-making about environmental planning and assessment

(e) To protect the environment, including the conservation of threatened and other species of native animals and plants, ecological communities and their habitats.

There is a need for the project to demonstrate how it contributes to the overarching objectives for planning and development as set out by the EP&A Act.

In addition, the SEARs are issued under the EP&A Act and inform the scope of this assessment - refer section 1.4.1.

2.3.2 Coastal Management Act

Parts of the project site fall within the NSW Coastal Zone as defined by the CM Act. The CM Act defines four types of coastal management areas two of which are represented in the project area by land along the Cooks River and Alexandra Canal:

- The *Coastal Environment Area* identifies the environmental features of the coastal zone such as state waters, estuaries and lagoons. It also includes land adjoining those features - refer to Figure 3
- The *Coastal Use Area* is land adjacent to coastal waters where development may be carried out - refer to Figure 4. The Coastal use area represents some of the most environmentally, economically and socially valuable land in the state.

Objectives for the Coastal Environment Area

The management objectives for this area under the CM Act include (clause 8):

- *To protect and enhance the coastal environmental values and natural processes [...]*
- *Enhance natural character, scenic value, biological diversity and ecosystem integrity*
- *To reduce threats to, and improve the resilience of, coastal waters [...]*
- *To maintain and improve water quality and estuary health*
- *To support the social and cultural values of coastal waters [...]*
- *To maintain and, where practicable, improve public access, amenity and use [...].*

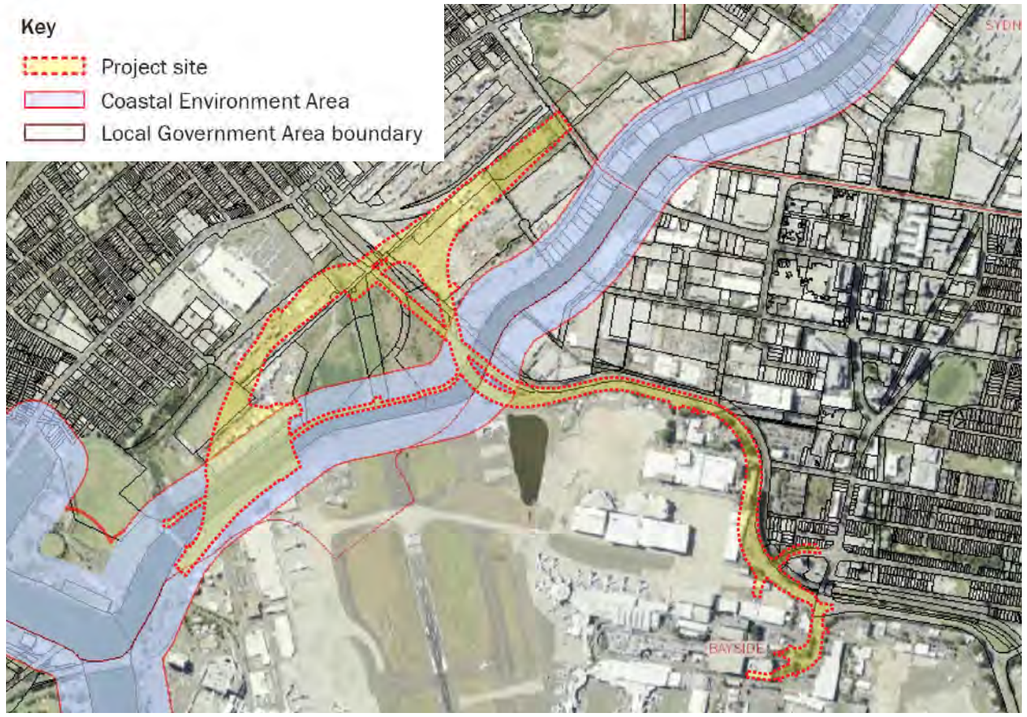

Figure 3. The *Coastal Environment Area* in the project area

Source: Imagery © Department of Finance, Services & Innovation Basemap © OpenStreetMap via Planning Viewer: http://webmap.environment.nsw.gov.au/PlanningHtml5Viewer/?viewer=SEPP_CoastalManagement, accessed 04.12.18

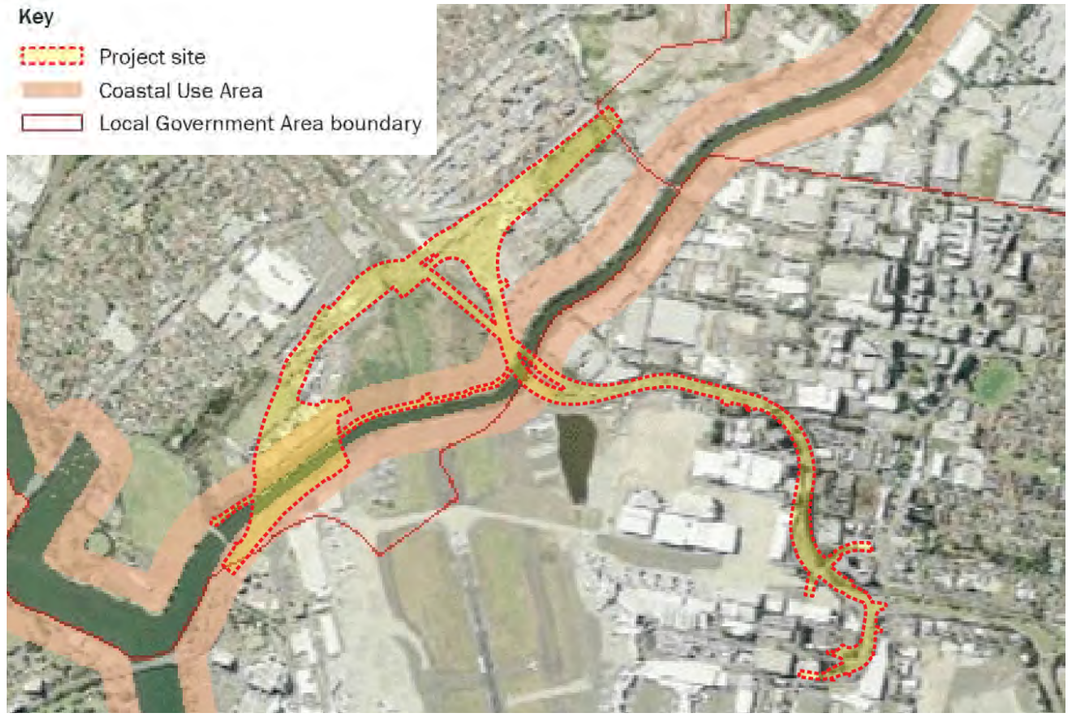

Figure 4. The *Coastal Use Area* in the project area

Source: Imagery © Department of Finance, Services & Innovation Basemap © OpenStreetMap via Planning Viewer: http://webmap.environment.nsw.gov.au/PlanningHtml5Viewer/?viewer=SEPP_CoastalManagement, accessed 04.12.18

Objectives for the Coastal Use Area

The management objectives for this area under the CM Act are to accommodate both urbanised and natural stretches of coastline and to protect and enhance the scenic, social and cultural values of the coast by ensuring that (clause 9):

- *The type, bulk, scale and size of development is appropriate for the location and natural scenic quality [...]*
- *Adverse impacts of development on cultural and built environment heritage are avoided or mitigated*
- *Urban design, including water sensitive urban design, is supported and incorporated into development activities*
- *Adequate public open space is provided, including for recreational activities and associated infrastructure.*

State Environmental Planning Policy (Coastal Management) 2018

State Environmental Planning Policy (Coastal Management) 2018 (CM SEPP) complements the CM Act and guides development in Coastal Zone management areas through specific development controls. It also identifies areas of protected coastal wetland - refer **Figure 6** - and sets out additional consent requirements for development in or near wetland areas.

The following summarises specific requirements for the two management areas that are relevant to urban design and place making.

Coastal Environment Area requirements

Development controls for the *Coastal Environment Area* aim to protect the processes and values of coastal waters and the natural features on the adjoining land. Controls identify the need to avoid, minimise and manage impacts of development on (clause 13(1)):

- The integrity and resilience of the environment
- Coastal environmental values and natural coastal processes
- The water quality of the marine estate
- Native flora and fauna and their habitats including marine vegetation and rock platforms
- Existing public open space including public access to and along the foreshore for members of the public, including people with a disability
- Aboriginal cultural heritage, practices and places.

Coastal Use Area requirements

Development in the *Coastal Use Area* must maintain and improve the scenic, social and cultural values of the coast for

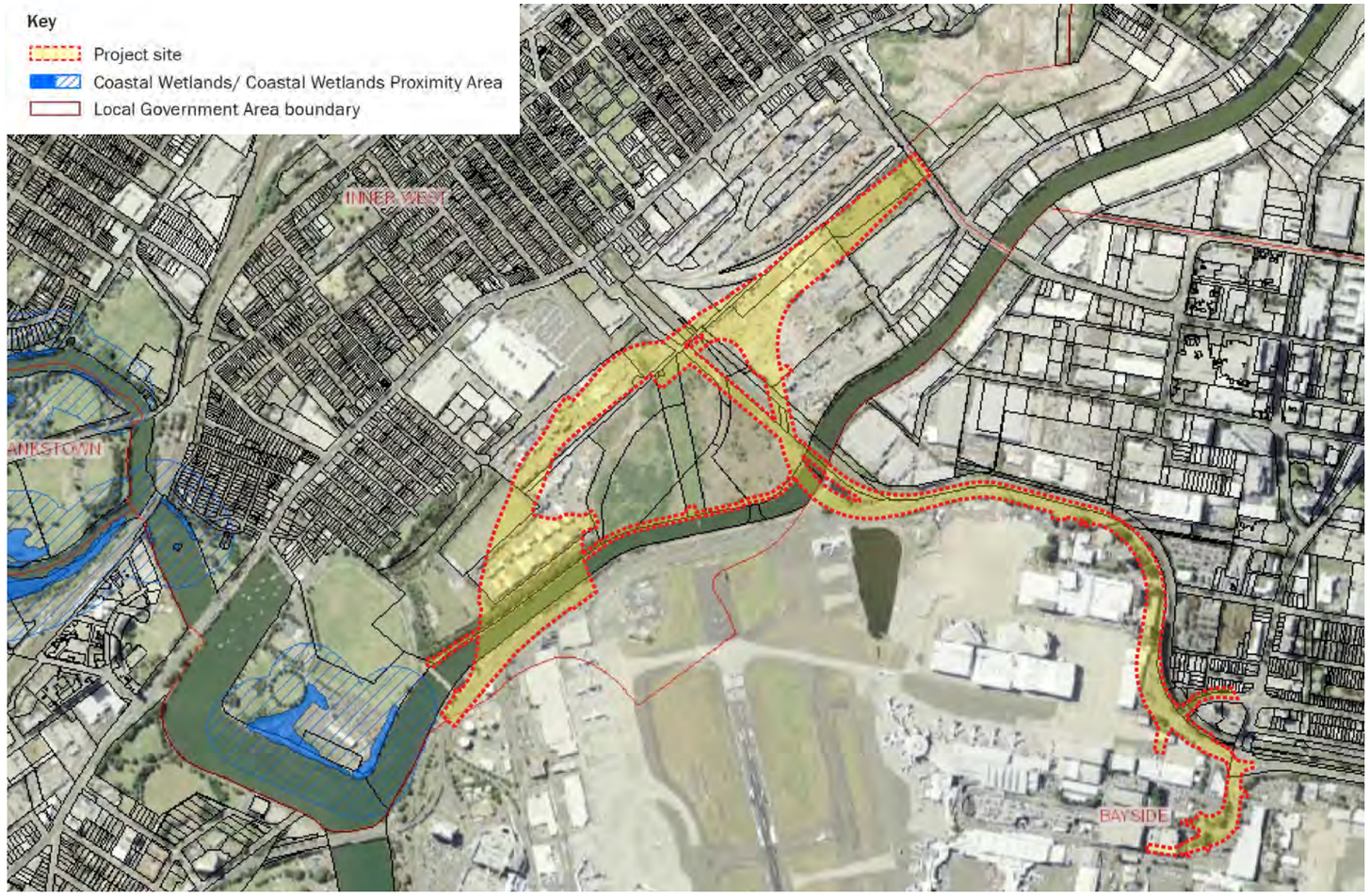

Figure 5. State Environmental Planning Policy (Coastal Management) 2018 protected wetlands

Source: Imagery © Department of Finance, Services & Innovation Basemap © OpenStreetMap via Planning Viewer http://webmap.environment.nsw.gov.au/PlanningHtml5Viewer/?viewer=SEPP_CoastalManagement, accessed 04.12.18

the enjoyment of current and future generations. Development proposals must address public interest and built form criteria to avoid, minimise or mitigate impacts on (clause 14(1)):

- Existing, safe access to and along the foreshore for members of the public, including persons with a disability
- Overshadowing, wind funnelling and the loss of views from public places to foreshores
- The visual amenity and scenic qualities
- Aboriginal cultural heritage, practices and places
- Cultural and built environment heritage.

Coastal wetlands

The CM SEPP identifies two protected coastal wetlands in proximity to the project site, in Tempe Recreation Reserve. One of these wetlands is located along the western shore of Alexandra Canal, opposite the project's southern tie-in - refer **Figure 5**. Any development must *not significantly impact on [...] the biophysical, hydrological or ecological integrity of the adjacent coastal wetland* (clause 11) and *the quantity and quality of surface and ground water flows*. These concerns are beyond the scope of this report. They are addressed by other technical working papers prepared in support of the project.

Why is this important for urban design?

The CM Act and CM SEPP highlight the importance of

- Public open space along the coast, in this instance along Alexandra Canal - now and in the future
- Public access to Alexandra Canal from surrounding areas through appropriate publicly accessible links
- Native vegetation
- Archaeology and Aboriginal and European heritage
- Public amenity including:
  - Visual amenity
  - Scenic qualities
  - Over-shadowing
  - Wind tunnelling.

These considerations have contributed to the development of the urban and landscape design for the project - also refer **section 4.3.2**. The issues raised have also informed the landscape character and visual impact assessment to the extent that they represent formal recognition through the planning system of the importance and value of public access, visual/scenic qualities and physical comfort and amenity for the general public.

2.4 NSW POLICY CONTEXT

There are a number of planning and policy documents of relevance to the urban design and visual assessment of the project. They include road design policies and guidelines published by Transport for NSW and Roads and Maritime and reference documents nominated by the SEARs.

2.4.1 Road design specific publications

As required by Roads and Maritime policy and the SEARs, the key document guiding the development of the design is *Beyond the Pavement – Urban design policy procedures and design principles* (Roads and Maritime Services, 2014).

Complementing *Beyond the Pavement*, there are a number of Roads and Maritime guideline documents for road infrastructure projects that have a bearing on urban and landscape design

outcomes. Key guideline documents include the following, listed in alphabetical order:

- *Biodiversity Guidelines - Protecting and managing biodiversity on RTA projects*, September 2011
- *Bridge Aesthetics, Design guideline to improve the appearance of bridges in NSW*, February 2019
- *Guideline for Batter Surface Stabilisation using vegetation*, April 2015
- *Guideline for Landscape Character and Visual Impact Assessment. Environmental Impact Assessment Practice Note EIA-N04,* version 2-1, December 2018
- *Landscape Guideline: Design Guideline to improve the quality, safety and cost effectiveness of green infrastructure in road corridors,* December 2018
- *Noise wall design guideline. Design guideline to approve the appearance of noise walls in NSW*, March 2016
- *NSW Bicycle Guidelines*, July 2005
- *Shotcrete Design Guidelines. Design guidelines to avoid, minimise and improve the appearance of shotcrete*, 2016
- *Water Sensitive Urban Design Guideline*, 2017
- WestConnex Motorway. Urban Design Framework. WestConnex – "City Shaping Infrastructure". Final Draft (Roads and Maritime, 2013).

The relationship between these publications and this technical working paper is illustrated in **Figure 6**.

2.4.2 SEARs nominated reference documents

The SEARs identify a number of documents as relevant guidelines in meeting the assessment requirements:

- Australian Standard *AS4282-1997 Control of the obtrusive effects of outdoor lighting*
- *Better Placed. An integrated design policy for the built environment of New South Wales* (Government Architect NSW, 2017) - also refer **section 2.4.4**
- *Crime prevention and the assessment of development applications* (Department of Urban Affairs and Planning (DUAP), 2001)
- *Crime Prevention through Environmental Design* (Queensland Government, 2007)
- *Cycling Aspects of Austroads Guides* (Austroads, 2017)
- *Disability (Access to Premises – Buildings) Standard*s (Building Professionals Board 2010)
- *Healthy Urban Development Checklist* (NSW Health, 2009)
- *Planning Guidelines for Walking and Cycling* (Department of Infrastructure, Planning and Natural Resources (DIPNR), 2004)
- *Urban Green Cover in NSW. Technical Guideline* (Office of Environment and Heritage (OEH), 2015)
- *Sustainable Design Guidelines Version 4.0 (*Transport for NSW).

2.4.3 NSW Government policy

A number of NSW Government policy documents are closely linked to the SEARs nominated reference documents, or of relevance because they deal with the provision of infrastructure in NSW. They are:

- Greater Sydney Commission *Eastern City District Plan*. Provides the subregional planning framework including desired future outcomes for the project area - refer **section 2.4.4**
- *Sydney's Cycling Future. Cycling for everyday transport* (Transport for NSW, 2013).
  This document outlines key cycling outcomes and routes across Sydney - refer **section 2.4.4**
- *Greener Places. Establishing an urban Green Infrastructure policy for New South Wales. Draft for discussion* (Government Architect NSW, 2017).
  The policy requires the integration of green infrastructure with other urban infrastructure, making it of relevance to the project - also refer **section 2.4.4**
- *Sydney Green Grid. Spatial framework and project opportunities* (DPIE 2017). This framework is of relevance as it underpins *Greener Places*
- *Good urban design. Strategies for realising Better Placed objectives in the design of the built environment. Draft* (Government Architect NSW, 2018).
  This document is of relevance as it is directly related to *Better Placed* - refer **section 2.4.2** and **section 2.4.4**
- *Future Transport Strategy 2056* (Transport for NSW, 2018).

2.4.4 Summary of key documents

Eastern City District Plan

The *Eastern City District Plan* covers the Bayside, Burwood, City of Canada Bay, City of Sydney, Inner West, Randwick, Strathfield, Waverley and Woollahra local government areas. It is a 20-year plan to manage growth in the context of economic, social and environmental matters to achieve the 40-year vision for Greater Sydney. It outlines the planning priorities and actions for implementing the Greater Sydney Region Plan, *A Metropolis of Three Cities*, at a district level.

A Metropolis of Three Cities has been prepared concurrently with the NSW Government's *Future Transport Strategy 2056* and Infrastructure NSW's *State Infrastructure Strategy 2018–2038* to integrate land use, transport and infrastructure across the region.

The Eastern District Plan identifies the Planning Priorities to achieve a liveable, productive and sustainable future for the District based on the objectives, strategies and actions from *A Metropolis of Three Cities*.

In undertaking strategic planning processes, and/or preparing or considering planning proposals, planning authorities must give effect to the District Plan, specifically the planning priorities and actions.

A number of planning priorities outlined in the plan are of relevance to the project, and have informed the urban design and place-making approach for the project. They are:

- Planning Priority E1. Planning for a city supported by infrastructure
- Planning Priority E4. Fostering healthy, creative, culturally rich and socially connected communities
- Planning Priority E6. Creating and renewing great places and local centres, and respecting the District's heritage
- Planning Priority E9. Growing international trade gateways
- Planning Priority E10. Delivering integrated land use and transport planning and a 30-minute city
- Planning Priority E14. Protecting and improving the health and enjoyment of Sydney Harbour and the District's waterways
- Planning Priority E15. Protecting and enhancing bushland and biodiversity

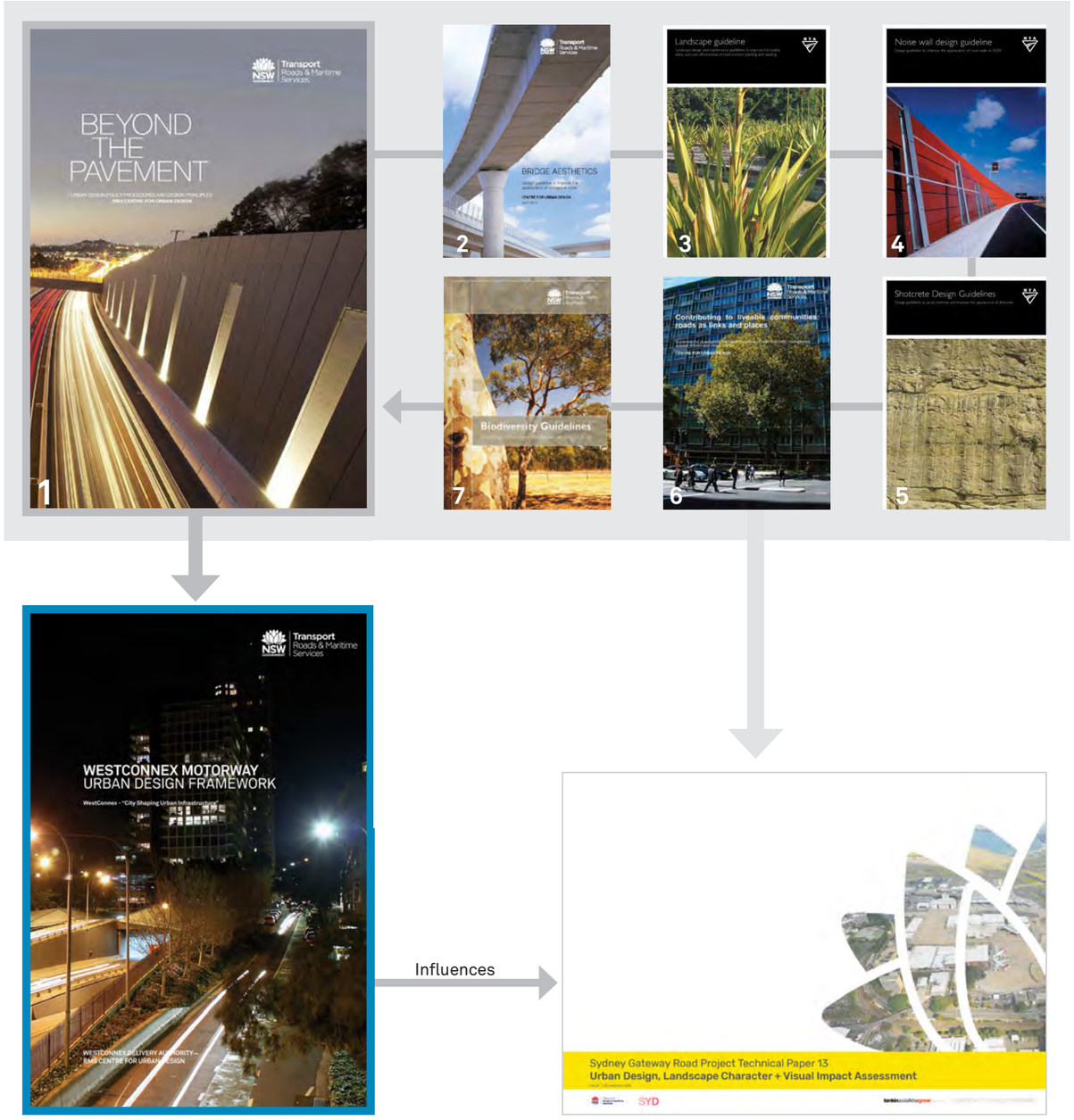

Figure 6. Relationships between key Roads and Maritime publications and this technical working paper

PRINCIPLE ONE Contributing to urban structure and revitalisation	› Consider the role of networks in the structuring of towns, cities and regions. › Consider the role of road and maritime transport infrastructure in revitalizing and transforming areas. › Consider both transport and community needs in planning and designing road networks and hierarchies. › Create streets and boulevards that provide a sense of place. › Consider the potential opportunities of a reduction in traffic volume.
PRINCIPLE TWO Fitting into the built fabric	› Keep the road footprint to the minimum possible to achieve a good design outcome. › Integrate noise control into road corridor and project design. › Avoid adverse visual impacts in the planning and design of roads and wharfs. › Consider the potential use of adjoining land.
PRINCIPLE THREE Connecting modes and communities	› Consider connectivity into and through surrounding environments. › Consider connectivity between modes. › Consider where people want to cross and the quality of crossing points along a busy road.
PRINCIPLE FOUR Fitting with the landform	› Form a road in response to topography and landform. › Consider slope stabilisation design as part of the project.
PRINCIPLE FIVE Responding to natural pattern	› Integrate natural patterns and systems into road design. › Ensure physical continuity of natural systems. › Use natural characteristics in the road's landscape design.
PRINCIPLE SIX Incorporating heritage and cultural contexts	› Integrate historic buildings and precincts into design of transport infrastructure. › Adapt and reuse heritage infrastructure in projects. › Protect and incorporate Aboriginal heritage in road design. › Recognise European cultural plantings. › Protect bridges of heritage significance within their setting. › Preserve roads that provide a sense of history.
PRINCIPLE SEVEN Designing an experience in movement	› Enhance the view from the road. › Provide visual stimuli within the road corridor. › Create a progressive sequence of visual events.
PRINCIPLE EIGHT Creating self-explaining road environments	› Distinguish between the different functions and speeds of roads by differentiating their appearance. › Improve the legibility of roads.
PRINCIPLE NINE Achieving integrated and minimal maintenance design	› Use robust durable materials fit for purpose and place. › Provide a self-reliant and minimal maintenance natural landscape. › Avoid opportunities for vandalism. › Create a simple, coordinated and neat composition of road elements along a corridor. › Consider the design quality of major road and maritime components and individual built elements.

Figure 7. Urban design principles and considerations

Source: *Beyond the Pavement* p. 37

- Planning Priority E16. Protecting and enhancing scenic and cultural landscapes
- Planning Priority E17. Increasing urban tree canopy cover and delivering Green Grid connections
- Planning Priority E18. Delivering high quality open space.

Beyond the Pavement

Since 1999, *Beyond the Pavement. Urban Design Policy Procedures and Design Principles* has been Roads and Maritime's urban design policy for road infrastructure projects, and its commitment to develop and deliver projects using an urban design approach. The purpose of the policy is to embed urban design thinking into road and maritime infrastructure projects by providing guidance for project managers and teams responsible for the design implementation of these projects in order to deliver safe, efficient and high quality infrastructure.

The document is the over-arching control for urban design within Roads and Maritime, defining define best practice for road infrastructure projects in NSW. *Beyond the Pavement* outlines the goals, expectations, process and responsibilities for urban design for Roads and Maritime projects, to ensure an integrated engineering and urban design outcome.

Through *Beyond the Pavement* Roads and Maritime commits to providing excellent outcomes for the people of NSW, governed by nine over-arching urban design principles that lead to an integrated urban design and engineering outcome, and include both physical outcomes and performance based principles, namely:

1. Contributing to urban structure and revitalisation
2. Fitting with the built fabric
3. Connecting modes and communities
4. Fitting with the landform
5. Responding to natural pattern
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.

The content of these principles is illustrated in Figure 8.

WestConnex Urban Design Framework

The WestConnex urban design framework is designed to unify and shape the different stages of the WestConnex program of works, including the Sydney Gateway road project, with common objectives, principles and design elements. Each of these objectives guides the project design and is used to review the outcomes. Each of the objectives is supported by design principles and guidelines.

At the front of the framework there is a broad scale analysis of context to in form the design and ongoing visual and landscape character assessment. Towards the back of the framework there is a section on design elements which sets a benchmark and flavour for the desired outcomes.

Since 2013, the WestConnex urban design framework has provided an urban design vision and sets the design direction to maximise the outcomes associated with the WestConnex program of works to realise its city-shaping potential, as follows:

The WestConnex motorway shall be a sustainable, high quality and transformational project for the people of Sydney and NSW. Exhibiting design excellence as a whole and in all constituent parts, it should be sensitively integrated into the natural and built environment, help build communities and contribute to the future livability of the city - Australia's 'Global City'.

As well as providing the vision to guide the project, the urban design framework seeks to unify and shape the different stages of the project with common objectives, principles and design elements. Six objectives have been developed to implement the vision and create a project that best benefits both the road users and the community.

The objectives are:

1. Leading edge environmental responsiveness
   Planning, design, construction and long term management is to be based upon a natural systems approach which is responsive to the environment and promotes the highest levels of sustainability.
2. Connectivity and legibility
   Build connectivity across the city, within and beyond the boundaries of the motorway corridor, and promote increased legibility of places, buildings, streets and landmarks.
3. Place making
   Create beautiful places, streets, structures and landscapes that draw their form, colour, character and materiality from local context and the intrinsic natural and cultural qualities of each locale.
4. Livability and urban renewal
   Enable opportunities for urban renewal and provide high levels of urban amenity and livability.
5. Memorable identity and a safe, pleasant experience
   Provide a memorable project identity and experiences for road users and adjacent stakeholders which are safe, convenient and enjoyable.
6. A new quality benchmark
   Provide design and construction quality of world class standard. WestConnex shall establish a new benchmark for integrated sustainability, engineering, art, architecture and urban design.

These objectives guide the project design and are supported by design principles and guidelines, as well as a section on design elements that sets a benchmark and flavour for the desired outcomes.

The WestConnex urban design framework vision, objectives, principles and guidelines have formed the basis for the development of the Sydney Gateway road project's urban and landscape design and place-making concept.

Sydney's Cycling Future. Cycling for everyday transport

Sydney's Cycling Future. Cycling for everyday transport (Sydney's Cycling Future) is the NSW Government's plan for active transport. It outlines how the NSW Government intends to improve the bicycle network and ensure that the needs of bike riders are built into the planning of new transport and infrastructure projects. Its overarching aim is to make cycling a safe, convenient and enjoyable transport option for short trips.

The plan was developed based on the NSW Transport Master Plan to:

- Make cycling safer and more convenient, especially for short trips
- Deliver better connected cycling infrastructure
- Coordinate and prioritise planning and investment
- Link cycling to urban growth.

The plan identifies cycling trends and customer expectations in Sydney, followed by principles to guide the integration of cycling into the wider transport system.

It outlines opportunities and priorities for creating connected cycleways that are within five kilometres of major activity centres and public transport interchanges, and supplementing them with appropriate supporting facilities.

The plan also outlines a series of strategies to promote cycling and to engage with stakeholders and partners such as local councils to assist in the implementation of its aims and delivery of priority routes.

The plan is of relevance to the project as it identifies Sydney Airport as one of the key activity centres to be better connected by cycleways. It notes that about half of Sydney Airport

Figure 8. Sydney Airport links priority cycleway project

Source: Transport for NSW 2013, p.18

employees live within cycling distance of the airport. Accordingly, the completion of missing links in bike routes from surrounding areas in St George, the Eastern Suburbs, Inner Sydney and the Inner West is one of the nominated priority cycleway projects.

This *Sydney's Cycling Future* priority project identifies the need for an extension of the existing Alexandra Canal cycleway to Green Square, and to the east along Qantas Drive and Joyce Drive, connecting to Terminals 2/3, Mascot and Wentworth Avenue. In addition to enhanced airport access, it would improve connections with residential growth areas such as Wolli Creek, Mascot and Green Square - refer **Figure 8**.

Better Placed

Better Placed. An integrated design policy for the built environment of New South Wales (Better Placed) outlines outlining the NSW Government's position on design in the built environment. It is a policy for enhancing all aspects of the urban environment, to create better places, spaces and buildings, and thereby better cities, towns and suburbs. The policy places good design at the centre of all development processes from the project definition to concept design and through to construction and maintenance.

Through *Better Placed*, the NSW Government recognises the importance and establishes the value of good design, and identifies key concepts, good process, and objectives for good design outcomes to make cities and towns even more appealing, liveable and successful for the communities that live there. The policy responds to stakeholders requests for clarity in relation to what is meant by good design and the process to achieve it. In doing so, it provides clarity on what 'good design' means, not just how a place looks, but how it works and feels for people. The policy has also been developed to support the inclusion of a new Design Object in the EPA as part of the review of the Act.

Better Placed identifies the following key outcomes for well-designed built elements, including each building, area or space:

- **Healthy** for all members of the community, promoting physical activity and walkable environments, social cohesion, and community safety and security to support people's well-being
- **Responsive** to the needs and aspirations of local people, now and into the future, inviting innovative use and habitation, interaction, productivity and enjoyment
- **Integrated**, by drawing together the relationships between parts and elements, considering interfaces at multiple scales, and working to common goals and aspirations
- **Equitable** by presenting opportunities for all segments of our community so residents and visitors have access to and can move about freely between public domain, infrastructure, open space and buildings
- **Resilient** to the dynamic, challenging conditions of our time, to adapt and evolve while retaining essential qualities and values.

As the project would be a major built element if built, these outcomes are of relevance to the project.

While a large focus of the policy is on the process of realising good design outcomes, it also identifies seven distinct objectives to define the key considerations in the design of the built environment:

1. Better fit: contextual, local and of its place
2. Better performance: sustainable, adaptable and durable
3. Better for community: inclusive, connected and diverse
4. Better for people: safe, comfortable and livable
5. Better working: functional, efficient and fit for purpose
6. Better value: creating and adding value
7. Better look and feel: engaging, inviting and attractive.

The objectives are key to ensure that cities and towns, the public realm, landscapes and buildings are healthy, responsive, integrated, equitable, and resilient. To this end they are relevant to the Sydney Gateway and complement *Beyond the Pavement*.

Greener Places

Greener Places. Establishing an urban Green Infrastructure policy for NSW (Greener Places) is the draft NSW green infrastructure policy. It has been developed to provide a strategic approach for the planning, design and management of green infrastructure, and to deliver connected urban ecosystems across NSW, building on the *Sydney Green Grid* - the NSW Government's strategy to create a network of high quality green areas that connect town centres, public transport networks and major residential areas

Green infrastructure redefines the concept of infrastructure to include an essential green component. Green infrastructure

therefore complements the development of other types of infrastructure projects. It is seen as essential in ensuring our communities retain a high quality of life and in helping our cities remain sustainable, both now and into the future. Therefore, green infrastructure is as crucial to the city as transport, cultural and communications infrastructure.

Further, the development of green infrastructure is seen as essential in addressing a number of key challenges facing NSW including environmental, health, growth and climate challenges. *Greener Places* identifies four key principles for addressing these challenges and creating healthier cities, namely:

- Integration: combine green infrastructure with urban development and grey infrastructure
- Connectivity: create an interconnected network of open space
- Multifunctionality: deliver multiple ecosystem services simultaneously
- Participation: involve stakeholders in development and implementation.

Implementation of these principles is expected to deliver a range of environmental, social and economic benefits such as:

- Healthy living
- Mitigating flooding
- Improving air and water quality
- Cooling the urban environment
- Encouraging walking and cycling and enhancing biodiversity and ecological resilience
- Absorbing and transforming waste.

2.5 LOCAL GOVERNMENT

The project spans three local government areas: Bayside Council, Inner West Council (IWC) and the City of Sydney (CoS), with the vast majority of the project located on Bayside Council and IWC land.

The following provides a brief description of local planning provisions of relevance for the urban and landscape design and visual assessment.

2.5.1 Botany Bay Local Environmental Plan 2013

Botany Bay Local Environmental Plan 2013 (Botany Bay LEP 2013) remains the relevant environmental planning instrument for the part of the project located east of Alexandra Canal in the Bayside Council area.

Part 6 contains a number of specific local provisions. The applicable provisions of relevance to this report are:

- Alexandra Canal is identified as a "Foreshore Area". Clause 6.7 *Limited development on foreshore area* applies to development in the foreshore area
- Part of the project site falls within the "Mascot Station Precinct" which requires assessments under clause 6.16 *Design excellence*.

Clause 6.7 Limited Development in the foreshore area

The aim of this clause is to ensure that *development in the foreshore area will not impact on natural foreshore processes or affect the significance and amenity of the area* (6.7(1)).

Development in the foreshore area must (clause 6.7(3)):

- Have an appearance, from both the waterway and adjacent foreshore areas, that is compatible with the surrounding area
- Not cause congestion or generate conflict between people using open space areas or the waterway
- Not compromise opportunities to provide continuous public access along the foreshore and to the waterway
- Maintain the historic, scientific, cultural, social, archaeological, architectural, natural or aesthetic significance of the land and of surrounding land
- Consider sea level rise or change of flooding patterns as a result of climate change.

In deciding whether or not to approve development in the foreshore area, Council must also consider the extent to which the development encourages (clause 6.7(4)):

- Continuous public access to and along the foreshore through or adjacent to the proposed development
- Public access to link with existing or proposed open space
- Guaranteed future public access through appropriate covenants, agreements or other instruments registered on the title to land
- Public access above the mean high water mark
- Reinforcement of the foreshore character and respect for existing environmental conditions.

The provisions of this clauses are relevant for the project because:

- The foreshore area includes land along Alexandra Canal
- The foreshore area has potential to be affected by climate change and sea level rise
- The clauses provide guidance on a range of important urban design considerations including:
  - The visual quality and appearance of the project and its compatibility with surrounding areas
  - Public access to and along the canal
  - The natural, built and community context including natural and cultural values such as archaeology, heritage and aesthetics/visual values.

These considerations have shaped the development of the urban and landscape design for the project. They have also informed the landscape character and visual impact assessment to the extent that they highlight the importance of the project's appearance.

Clause 6.16 Design excellence

The aim of this clause is to *deliver the highest standard of sustainable architectural and urban design* (clause 6.16(1)) for land in the Mascot Station Precinct which includes the part of the project site along Qantas Drive and Joyce Drive, east of Coleman Street, Mascot.

Development in the Mascot Station Precinct must demonstrate design excellence, defined as follows:

- The standard of architectural design, materials and detailing is high and appropriate to the building type and location
- The form and external appearance of the project will improve the quality and amenity of the public domain
- The development does not detrimentally impact on view corridors
- The principles of ecologically sustainable development are achieved.

These considerations have shaped the development of the urban and landscape design for the project. They have also informed the

landscape character and visual impact assessment to the extent that they require the consideration of impacts on existing view corridors.

2.5.2 Marrickville Local Environmental Plan 2011

Marrickville Local Environmental Plan 2011 (Marrickville LEP 2011) remains the relevant environmental planning instrument for the portion of the project located on IWC land.

Part 6 contains a number of specific local provisions. The applicable provisions of relevance to this report are:

- Terrestrial biodiversity (clause 6.4)
- Foreshore building line (clause 6.7)
- Development on the foreshore must ensure access (clause 6.8).

Clause 6.4 Terrestrial biodiversity

This clause applies to all land bound by the Cooks River, Alexandra Canal, Smith Street and the Princes Highway, including the Tempe Lands and the Tempe Recreation Area. It aims to maintain terrestrial biodiversity by:

(a) *Protecting native fauna and flora, and*

(b) *Protecting the ecological processes necessary for their continued existence, and*

(c) *Encouraging the conservation and recovery of native fauna and flora and their habitats.*

The clause requires Council to consider whether or not the development may:

- Adversely impact on the condition, ecological value and significance of the fauna and flora on the land
- Fragment, disturb or diminish the biodiversity structure, function and composition of the land, and
- Have any adverse impact on the habitat elements providing connectivity on the land.

Where adverse environmental impacts cannot be avoided, a development must be designed to minimise impacts, or to mitigate impacts.

The provisions of clause 6.4 are relevant for the project because:

- Dense planted native vegetation in the Tempe Lands is part of the identified biodiversity area and would be partly removed by the project. This would fragment existing habitats and may result in a loss of connectivity between habitat elements on the land
- There is a need to mitigate the impacts. This may suggest reinstatement of lost habitat as well as measures to enable terrestrial fauna to access vegetation fragmented by the project.

Biodiversity impacts are considered in detail in the *Sydney Gateway Motorway Technical Report 14 – Biodiversity Development Assessment Report*.

Clause 6.7 Foreshore building line

The objectives of clause 6.7 aim to ensure that development in the foreshore area:

- Will not impact on natural foreshore processes or affect the significance and amenity of the area
- Will not compromise opportunities to provide continuous public access along the foreshore and to the waterway
- Will maintain any historic, scientific, cultural, social, archaeological, architectural, natural or aesthetic significance of the land and of surrounding land
- Will not have an adverse impact on the amenity or aesthetic appearance of the foreshore, and
- Has considered sea level rise or change of flooding patterns as a result of climate change.

Clause 6.8 Development on the foreshore must ensure access

This clause aims to ensure public access to the foreshore. In deciding whether or not to approve development in the foreshore area, Council must consider the extent to which the development encourages the following:

- Continuous public access to and along the foreshore
- Public access to link with existing or proposed open space
- Guaranteed future public access through appropriate covenants, agreements or other instruments registered on the title to land
- Whether public access is located above the mean high water mark
- Reinforcement of the foreshore character and respect for existing environmental conditions.

The provisions of clauses 6.7 and 6.8 are relevant for the project because:

- The foreshore area includes land along both the eastern and western side of Alexandra Canal
- The foreshore area has potential to be affected by climate change and sea level rise
- The clauses provide guidance on a range of important urban design considerations including:
  - Amenity
  - The provision of public access to and along Alexandra Canal
  - The need for public linkages to the canal from existing and proposed open space areas in surrounding areas
  - The natural, built and community context including cultural values such as heritage and aesthetics/visual values of the foreshore setting.

These considerations have shaped the development of the urban and landscape design for the project. They have also informed the landscape character and visual impact assessment to the extent that they highlight the importance of the existing amenity, broad range of existing values and of the visual character of the foreshore.

2.5.4 Rockdale Local Environmental Plan 2011

Rockdale Local Environmental Plan 2011 (Rockdale LEP 2011) remains the relevant environmental planning instrument for the western portion of Bayside Council.

Rockdale LEP has a number of local provisions. A review of these provisions has indicated that they do not provide specific guidance in respect of this report. It is noted that there are a number of local provisions of relevance to the project that are addressed by other technical working papers supporting the EIS/ preliminary draft MDP.

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CHAPTER 3

Methodology

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3.1 PURPOSE OF THIS CHAPTER

This chapter provides a brief overview of both the urban design process and the landscape character and visual impact assessment process. In doing so, it explains the relationship between the two processes, and how they work together to ensure good project outcomes - refer Figure 9.

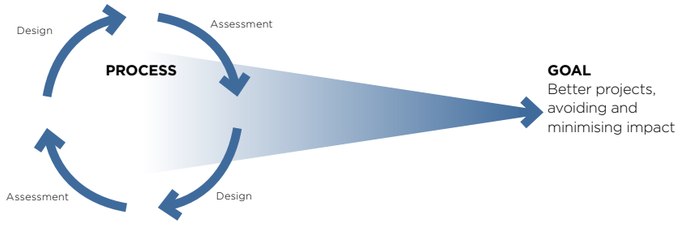

Figure 9. Iterative design and assessment leads to better outcomes

Source: *Beyond the Pavement*, p. 1

3.2 WHAT IS URBAN DESIGN?

Urban design is both a process and a product and is integral to the shaping of cities.

Urban design focuses on the public realm. It is underpinned by a concern for the quality and liveability of urban environments. It draws on and integrates artistic and technical disciplines including architecture, landscape architecture and engineering, and focuses on outcomes across boundaries and ownership divisions. Urban design is closely related to planning but focuses on three-dimensional design with consideration of the human experience. It aims to create an orderly, logical, and aesthetically consistent composition of all project elements in order to deliver an integrated user experience.

3.2.1 Urban design on road projects

Roads and Maritime through *Beyond the Pavement* is committed to providing high quality infrastructure for the people of NSW. It recognises that the process of providing physical design direction to the development of a project should lead to good physical, functional and aesthetic design outcomes.

Urban design for road projects addresses how a project:

- Fits into an area
- Supports the local connections
- Contributes to the quality of the public domain.

This recognises that road projects play a role in shaping cities: physically, visually and by providing for transportation and movement. The experience of travelling along a road also influences how people see and understand the surrounding environment and its inherent values.

Beyond the Pavement stipulates that a project provides excellent outcomes if it:

- Fits sensitively with the landform and the built, natural and community environment of the area
- Contributes to the accessibility and connectivity of communities and of movement through the area
- Contribute to the overall quality of the public domain for the community, including transport users.

A project that achieves these outcomes would be considered to make a positive contribution to the liveability of towns, cities and regions, including their productivity and attractiveness for investment.

3.2.2 Urban design methodology

The preferred steps for developing a project's urban design is set out in *Beyond the Pavement* (also refer section 2.4.4). It is summarised below and illustrated in Figure 10.

Step 1: Appreciating transport role

The role that the project would play in the area and as part of the road network must be clearly articulated. This includes the project's intended purpose, function and scope, scale and relevant road design standards.

Step 2: Contextual analysis

The analysis and understanding of context is the foundation of urban design and a good design outcome. This is the reason why the urban design sections of this report are preceded by an analysis of the existing environment.

The purpose of such an analysis is to develop a full understanding of the character and functioning of the project area and surrounds. This includes analysing the characteristics of the landform, the nature and quality of the built, natural, visual and community setting to understand how these environments function for communities

The analysis leads to an understanding of the values of the area, that is what is:

- Appreciated
- Important to protect and respect.

The contextual analysis highlights both constraints and opportunities for the project. The vision and objectives for the design would follow from this understanding.

Step 3: Vision, objectives and principles

The vision and objectives outline the desired direction for the design, while the design principles provide guidance for realising them. They are typically translated into physical aspects of the design.

A project's vision is a statement of the desired future character based on both the contextual analysis and consideration of the project's transport purpose. It summarises how the project is to:

- Function
- Look and to fit into its built, natural and community environment
- Contribute to the future of the corridor.

Urban design objectives articulate what needs to be done to achieve the vision and govern the overall quality of the outcome. Similarly to the vision, they are a response to the constraints and opportunities identified in the contextual analysis and the project's transport role. They may also consider community expectations.

Urban design principles in general link a project's vision and objectives to the concept design development. Their purpose is to set down the broad approach, ideas, themes and guidelines that define the project. They are often further elaborated on in

an overall urban design strategy accompanied by a drawing illustrating the overall approach, themes and ideas.

Step 4: Design development

The concept design translates the urban design principles into the preferred design solution, working together with the engineers and other specialists to integrate the range of projects constraints and requirements. The environmental assessment also informs this step - refer section 3.3.

Step 5: Implementation

Once a preferred concept design is accepted and has received approval, the work can proceed to implementation.

3.3 THE LINK BETWEEN DESIGN AND ENVIRONMENTAL ASSESSMENT

Central to the urban design process described above is the recognition that design is not strictly sequential and linear but a cyclical and iterative process. It interacts with both the contextual analysis and the landscape character and visual impact phases of the project. This interaction is further described in Roads and Maritime's guideline *Environmental Impact Assessment Practice Note. Guideline for Landscape Character and Visual Impact Assessment (EIA-N04)* (Roads and Maritime Services 2018), and summarised below and in section 3.4 and 3.5.

The link between concept design development and environmental assessment is critical to a sound urban design process. Environmental assessment is not a separate undertaking based on a finalised design. Instead, landscape character and visual impact assessment is carried out early in the design process, and in parallel with other areas of environmental assessment. This allows for early identification of potentially undesirable impacts so that they can be raised with stakeholders and agencies and appropriately 'designed out', continually improving the project as it develops.

The diagram in Figure 10 shows the relationship between concept design and the landscape character and visual impact assessment tasks. It illustrates the iterative nature of design and assessment and how the integrated process and good design work together to avoid and minimise impact.

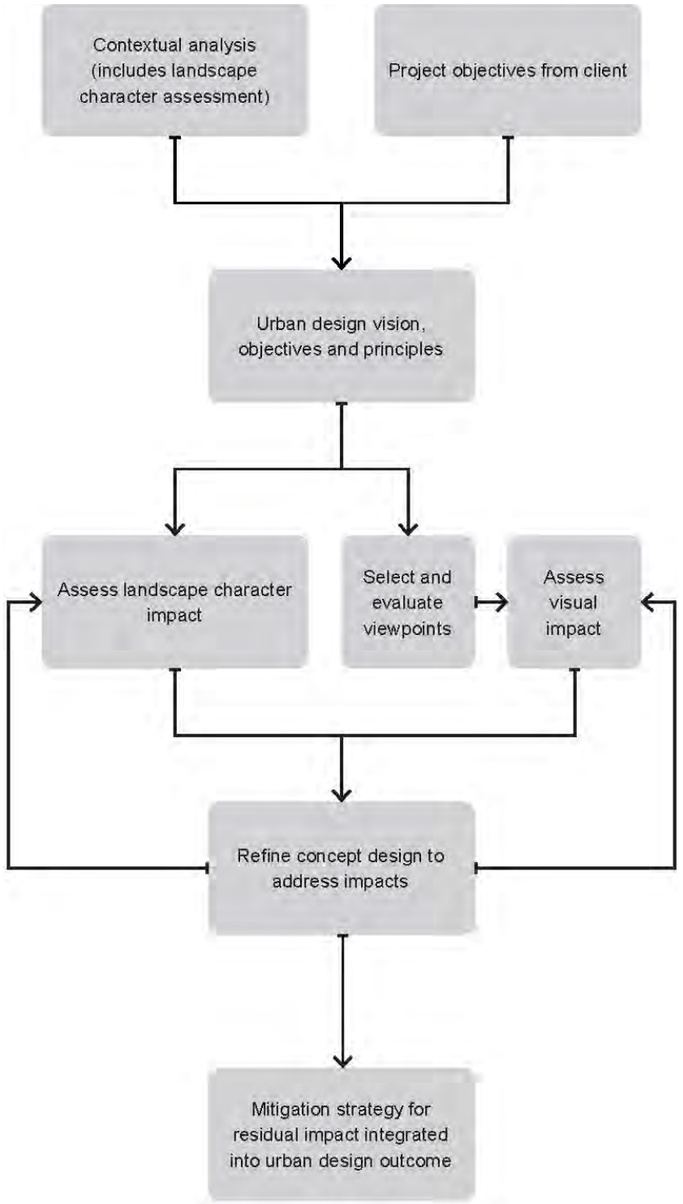

Figure 10. Urban design methodology and the relationship between design development and environmental assessment

Source: Roads and Maritime 2013b, p. 6

3.4 LANDSCAPE CHARACTER AND VISUAL IMPACT ASSESSMENT

3.4.1 Purpose

As per the *Guideline for Landscape Character and Visual Impact Assessment*, the landscape character and visual impact assessment has several purposes:

1. To measure and report on how well the design fits into the built, natural and community landscape and how well it responds to what people see
2. To inform the development of the concept design so the project can avoid and minimise impact up front as described above
3. To inform Roads and Maritime, other agencies and the community about the landscape character impact and visual impacts of the project
4. To identify the avoidance, management and mitigation strategies:
   - Embedded in the project design
   - To be implemented if the project was approved.

The landscape character and visual impact assessment therefore provides important information to influence the design development of a project.

3.4.2 The difference between landscape character impact and visual impact

Landscape character assessment and visual impact assessment are discrete but equally important in improving design outcomes. The following explains the role of the two types of assessment.

Landscape character impact assessment is the assessment of impact on the aggregate of the project area's built, natural and cultural character and sense of place. The sense of place is what people think about a place and how society values it, even when they are not there.

Visual impact assessment is the assessment of a project's impact on views in the area. It helps define the day to day visual effects of a project on what people see when they are there.

3.4.3 Landscape character impact assessment method

Early on in the project a contextual analysis is undertaken that identifies a number of distinct landscape character zones (LCZ). The LCZs are generally based on the interplay between natural, built and community elements such as land use, vegetation cover, topography, heritage or scenic values to identify areas of distinct character. The purpose of dividing the study area into character zones is to make the assessment process easier to undertake and understand.

Within each LCZ the landscape character impact is derived based on the sensitivity of the zone and the magnitude of the project in that zone:

- Sensitivity refers to how sensitive the existing character of the setting is to the proposed change. This can also be understood as the setting's inherent capacity to absorb change. For example, a pristine natural environment would be more sensitive to change than an industrial area. Sensitivity is influenced by both professional judgement and objective measures. For example an area's listing on a high level heritage register would mean a higher level of sensitivity.
- Magnitude refers to the physical size and scale of the project. For example, a large intersection would have a greater magnitude than a localised road widening, and therefore have a greater impact on the landscape character
- The combination of sensitivity and magnitude provides the rating of the landscape character impact (refer to **Figure 11**).

3.4.4 Visual impact assessment method

The extent of area from where the project would be able to be seen is referred to as the visual catchment or visual envelope. It is largely defined by the landform of the study area. Direction of travel or of the view is another factor influencing visibility of the project. Factors such as built structures or vegetation need to be considered where they limit or obscure views. Vegetation, while often blocking potential views, is not considered a permanent obstruction as it can be relatively easily removed.

Distance is an important factor. With increased viewing distance, the project may appear smaller and less detail that can be made out. For this reason, very large visual catchments are often defined by zones or bands of proximity from the project, for areas within 100 metres of the project, up to 300 metres from the project and beyond.

Within the visual catchment a number of viewpoints are identified at varying locations and view directions, both within and outside the project site. They are selected to represent views from residential properties, public buildings and spaces, heritage items, businesses and the road corridor itself. The visual impact of the project is assessed by considering both the sensitivity of the view and the magnitude of the project within that view:

- Sensitivity refers to the quality of the view and how it would be affected by the project. It is measured by assessing the composition of the view, its capacity to absorb change by identifying sensitive or visually valuable elements in the view, and the length of exposure to the view
- Magnitude refers to the physical character, size and scale of the proposed works and their proximity relative to the viewer. For example, a development situated one kilometre from the viewpoint would have a much reduced visual impact relative to one 100 metres away. Magnitude also considers overshadowing during the day and lighting at night.
- The combination of sensitivity and magnitude provides the rating of the visual impact (refer to **Figure 11**).

SENSITIVITY \ MAGNITUDE	High	Moderate	Low	Negligible
High	High impact	High to Moderate	Moderate	Negligible
Moderate	High to Moderate	Moderate impact	Moderate to Low	Negligible
Low	Moderate	Moderate to Low	Low	Negligible
Negligible	Negligible	Negligible	Negligible	Negligible

Figure 11. Landscape character and visual impact grading matrix

Source: Adapted from Roads and Maritime 2018

3.4.5 Qualitative assessment

For the purposes of this report, the study identifies the existing urban and landscape character and the capacity of the study area to absorb the changes associated with the project. In the process, the likely magnitude and sensitivity of viewers have been described in a qualitative manner.

This has been based on the authors' experience as landscape architects and urban designers specialising in the field of landscape character and visual assessment for major road infrastructure projects including assessment of a larger number of projects of a similar nature.

3.4.6 Implications of higher impact ratings

A landscape character assessment or visual impact assessment containing a predominance of high or high-moderate ratings does not automatically mean that the project should not be approved.

It offers valuable information to the project team, highlighting that there are issues with the project that need further investigation and refinement. It allows for the exploration of alternative design solutions before the design is finalised, to avoid or reduce potential impacts.

It also provides transparency and clarity about the potential impacts, relative to the overall project benefits to the community, so that the approver of the project can make an informed decision.

3.5 MITIGATION MEASURES

Mitigation measures are a series of strategies, principles or treatments recommended to ameliorate the identified landscape character and visual impacts of the project. They include ways to lessen the magnitude or visual effect of the proposed works, and to maximise integration with the surrounding setting. They may also include treatments near critical view areas to reduce the visual impact.

Mitigation measures include:

- Mitigation measures integrated into the concept design as part of the iterative design and assessment process

- A strategy and principles to mitigate landscape character and visual impact during detailed design and construction.

The latter are carried forward as safeguards or management measures and are opportunities for investigation by detailed design teams. The strategy to mitigate adverse impacts is a series of commitments for fulfilment in the project's delivery phase.

The mitigation strategy can range from a series of measures to screen visual impact such as planting or mounding to particular design techniques to help integrate the proposal into its setting and make it visually attractive instead of jarring. All mitigation measures are integrated with the overall design of the project.

CHAPTER 4

Existing Environment

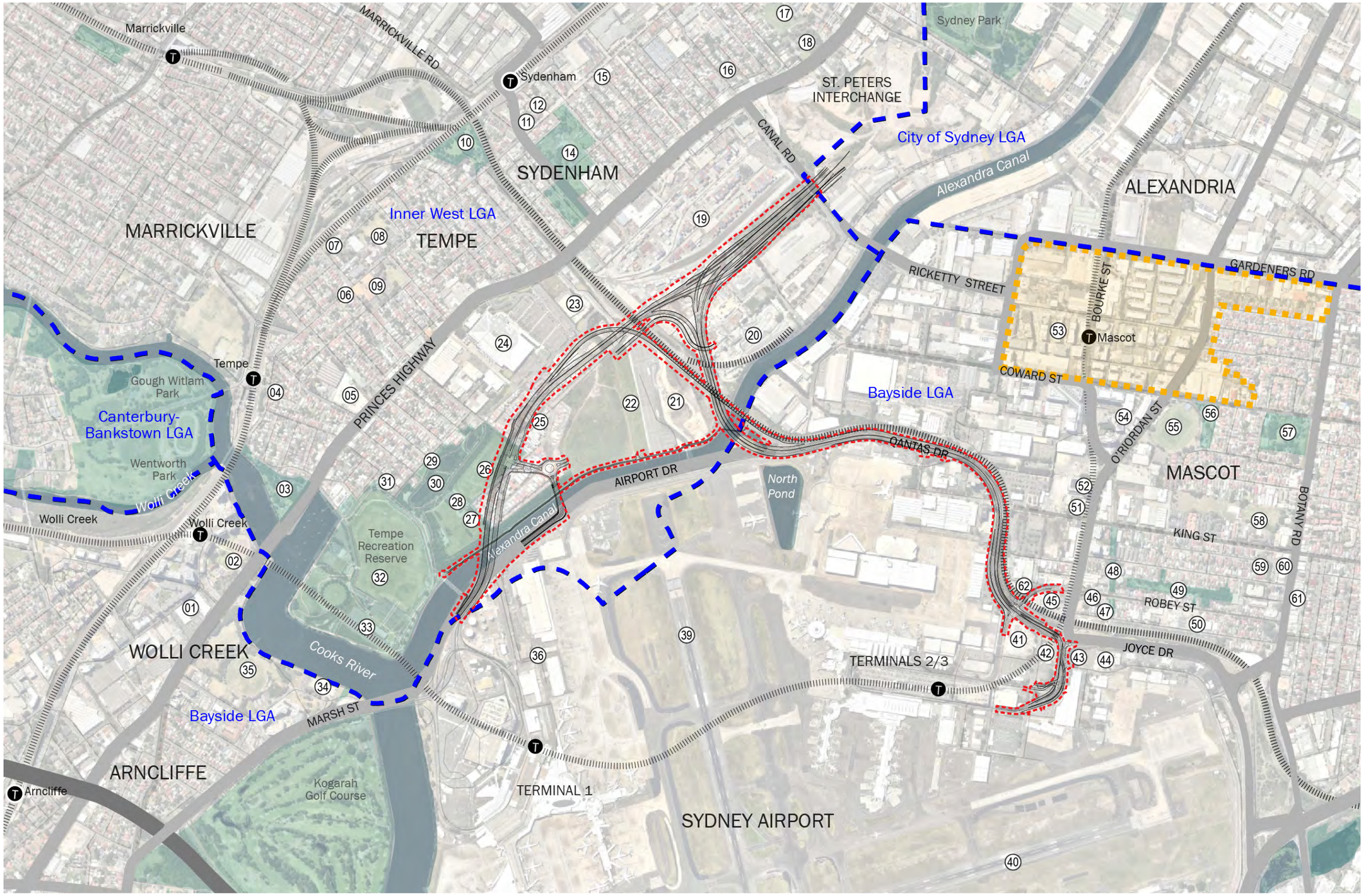

Figure 12. Local context

Key to Figure 12

- Proposed project
- Project site
- Primary road (State road)
- Rail line
- Local government area boundary
- Mascot Town Centre Precinct

Places of interest

01 Woolworths Wolli Creek
02 Discovery Park
03 Kendrick Park
04 Green Street Park
05 Sydney Buses depot
06 Uniting Church Tempe - Siaola Congregation
07 Toyer Street Reserve
08 Tempe High School
09 Tempe Public School
10 Tillman Park
11 Memory Reserve
12 St Peters Library/ Town Hall
14 Sydenham Green
15 Francis Playground
16 Rowswell Payground
17 St Peter Public School
18 St Peters Anglican Church
19 Cooks River Intermodal Terminal
20 Boral St Peters Concrete and Recycling
21 Northern Lands car park
22 High Intensity Approach Lighting (HIAL)
23 Salvos Store
24 IKEA
25 Tyne Container Services
26 Tempe Driving Range and Academy
27 Off-leash dog area
28 Tempe Lands
29 Lori Short Reserve
30 Tempe Wetlands
31 High Street Reserve
32 Tempe Recreation Reserve
33 Robyn Webster Sports Centre
34 St George Rowing Club/ "Rowers on Cooks River"
35 Cahill Park
36 Freight terminal
39 Main Runway
40 Cross Runway
41 Future Hotel development site
42 AMG Sydney
43 Mantra Hotel at Sydney Airport
44 Ibis Budget Sydney Airport
45 Stamford Plaza Sydney Airport
46 Quest Mascot (Hotel)
47 Felix Hotel
48 High Street Reserve
49 John Curtin Reserve
50 The Banksome Hotel and Residences
51 Ibis Sydney Airport
52 Pullman Sydney Airport
53 Woolworths Mascot
54 Citygate Fellowship Church
55 Mascot Oval
56 Lionel Bowen Park
57 Mascot Memorial Park
58 Mascot Public School
59 Mascot Library
60 Mascot Medical and Dental Centre
61 IGA Mascot
62 Coleman Reserve

4.1 PURPOSE OF THIS CHAPTER

This chapter describes and assesses the existing character of the project area using both text and images. As outlined in **Chapter 3**, this provides an understanding of the project context including its character, how it functions, its values and what is valuable. The analysis highlights both constraints and opportunities and provides the foundation for the project urban design.

4.2 LOCAL CONTEXT

The project is located in a highly urbanised setting generally following the northern perimeter of Sydney Airport and on both sides of Alexandra Canal. The bulk of the project is located within the Inner West and Bayside LGA, in the suburbs of Tempe, St Peters and Mascot. The part of the project north of Canal Road is located in the City of Sydney LGA.

Tempe, St Peters and Mascot are inner suburbs with a diverse and continually evolving mix of land uses including a strong residential, and employment component drawing on their proximity to the Sydney CBD, Sydney Airport and good public transport connections.

The project site is comprised of Airport Drive, parts of the Tempe Lands, land occupied by Tyne Container Services, Sydney Airport's Northern Lands, parts of the Boral's St Peters facility, vacant land on Canal Road, Qantas Drive, parts of Robey Street, O'Riordan Street and Joyce Drive, and roads within the Terminals 2/3 precinct.

In the study area immediately adjoining the project site are open space areas in the Tempe Lands and Tempe Recreation Reserve to the west, and bulky goods retailing, employment, industrial and commercial business areas to the north and east, and Sydney Airport to the south.

Figure 12 provides an overview of the project site and surroundings, identifying major features and places of interest.

4.3 THE PHYSICAL SETTING

4.3.1 Geology and soils

The project area's natural soils developed in freshwater swamps in the drowned estuaries of the Cooks River and Shea's Creek. Since European settlement natural soils have been extensively disturbed through:

- Removal or burial of original soils
- Placement of fill
- Disposal of demolition rubble, industrial and household waste in the former Tempe landfill
- Dredging of estuarine sand and mud
- Building construction
- Vegetation clearing.

The extent of modified soils or 'disturbed terrain' is shown on Figure 13.

Figure 13. Soil profiles of the project area

Source: Artefact 2019a, p 18

Acid sulfate soils

Acid sulfate soils (ASS) contain naturally occurring iron sulfides. Exposure of these soils to air leads to oxidisation and ultimately to the release of metals in toxic quantities, corroding and damaging built structures and harming waterways or killing animals and plants.

The CSIRO Australian Soil Resource Information System (ASRIS) indicates that there is a low probability of acid sulfate soils (ASS) occurrence in the project site except for bottom sediments in Alexandra Canal - refer Technical Working Paper 5 – Contamination and Soils.

The depth of acid sulfate soils in the project area varies from the surface to less than two metres below. This means there is a risk of disturbing ASS through building or excavation activities. Typically this risk is managed through an acid sulfate soil management plan.

Contamination

Soils and groundwater within the project site, as well as the bed of Alexandra Canal, are either known or expected to be highly contaminated as a result of:

- Rubbish disposal in the former Tempe landfill.
- Past industrial waste discharge into Shea's Creek and subsequently Alexandra Canal
- Surface runoff from surrounding land uses including industries and roads.

Contaminated sediments in Alexandra Canal are known to present a significant risk to human health and the environment (G2SJV 2019, p 69).

Why is this important for urban design?

- The project area is not a pristine natural environment but has been heavily modified over time. This presents an opportunity to:
  - Interpret both the natural and cultural landscape
  - Create awareness of the changes over time
  - Shape the landscape and user experience
- Acid sulfate soils and contamination present risk factors and challenges that need to be managed during both construction and ongoing operations to ensure human and environmental health:
  - Contaminated soils impose limitations on the landscape design especially tree planting
  - Any contaminated areas disturbed by the project would need to be remediated to be safe for their intended future use, with generally more stringent requirements for recreational use areas
  - Because highly contaminated sediment in Alexandra Canal must not be disturbed, new bridges need to fully span Alexandra Canal to avoid disturbing contaminated sediments.

4.3.2 Landform and hydrology

Landform

The project area is relatively flat and gently sloping. Elevation ranges from near sea levels to 30 metres above - refer Figure 14. The land generally rises from Alexandra Canal to a gentle ridge line near the Princes Highway. The highest point of the project site is between IKEA and Swamp Road. East of Alexandra Canal is Sydney Airport, much of which is built on reclaimed land and close to sea level - also refer section 4.4.1.

The original landform of the project area has been extensively modified since the beginning of European settlement through:

- Drainage works
- Reclamation of the swamps, estuaries and wetlands that once surrounded Botany Bay
- Cut, fill and levelling works to facilitate urban, industrial, transport and airport development
- Filling and rubbish disposal including at the former Tempe landfill.

As a result, there are very few remaining areas of natural ground. The extent of changes over time can be gleaned from an early map of the area in Figure 51.

Drainage systems

The project area is within in the Botany Bay catchment which includes the Cooks River as one of its major tributaries. Alexandra Canal is a heritage listed drainage channel (also refer section 4.4.2) that flows into the Cooks River to the south of the project site.

Botany Bay is located about 2.3 kilometres south of the project site. It is an important waterway for public recreation such as swimming and boating. It is also an important ecological area.

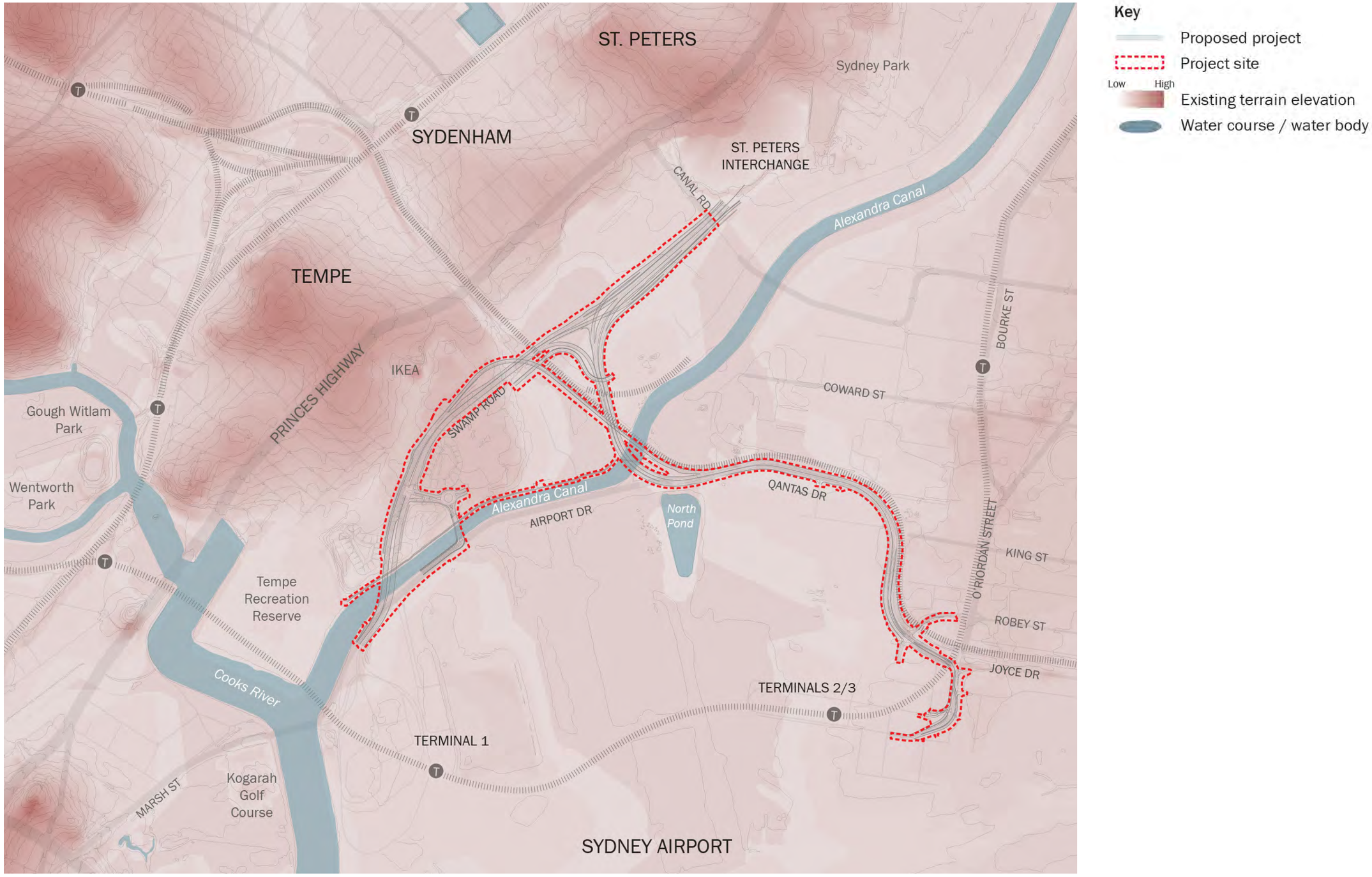

Figure 14. Landform of the project area showing height above sea level

Natural drainage patterns have been significantly altered over time through (also refer section 4.4.1):

- Straightening and channelising the meandering and marshy Shea's Creek into a 60 to 80 metres wide artificial channel - the Alexandra Canal - commencing in the 1880s
- Channelising the Cooks River with concrete embankments, starting in the 1930s
- Moving the mouth of the Cooks River to a location 1.6km further west from its natural location in 1948, to build two new runways - refer Figure 15.

Flooding

Low-lying areas around watercourses are at risk of flooding, including short-term 'flash flooding' due to overland flow. Early flood models indicates that during a rare major storm event significant flooding would occur:

- On the western side of Alexandra Canal:
  - North of the Botany Rail Line: up to one metre in depth
  - South of the Botany Rail Line and near the Northern Lands carpark: up to 0.8 metre in depth
  - Northern runways, taxiways and aprons: up to 0.5 metre in depth
- Tempe Wetlands: up to one metre in depth
- North and west of Tempe Recreation Reserve: up to 0.9 metre in depth

Figure 15. The 1947 course of the Cooks River and tributaries overlaid on a recent photo, showing the extent of modifications to watercourses

Source: Gatenby 2014

More information on flooding is provided in Technical Working Paper 6 - Flooding.

Foreshore and coastal constraints

As discussed in section 2.3.2, the coast - which includes the Alexandra Canal foreshore - is valuable from an ecological, hydrological, heritage, scenic/visual and recreation point of view. There is therefore a need to protect these values, and where possible, integrate opportunities for improvements.

Why is this important for urban design?

- There is a need to protect the downstream water quality of Botany Bay for recreational and ecological reasons. There may therefore be a need to treat project run-off prior to entering Alexandra Canal
- There is a need to design structures such as bridges in a way that does not obstruct the flow of water during floods, or increase upstream flooding
- There is a need to ensure flood free access to the airport while the airport is operating
- There is a need to maintain or enhance the level of flood immunity for active transport
- The project needs to maintain existing public access to the foreshore along Alexandra Canal
- The project needs to ensure that it does not preclude increased public access to the foreshore in the future, in areas where it doesn't currently exist
- The project needs to consider opportunities to provide improved foreshore access through new linkages from existing and proposed open spaces in the project area.

4.3.3 Open space and vegetation

The project area features important open space, wetlands and other vegetation that contribute to the character, experience and functioning of the local environment - refer Figure 16.

Public open space

There are a number of important open spaces in the area including:

- The Tempe Lands, partly within the project site
- Tempe Recreation Reserve, immediately adjoining the Tempe Lands to the south, outside the project site
- Open space systems along Alexandra Canal and the Cooks River, connecting parks in the project area with other important open spaces including Sydney Park, Cahill Park, the privately owned Kogarah Golf Course, the Cooks River Parklands and Wolli Creek Regional Park.

The New M5 project will provide additional open space around the St Peters interchange, adjoining the project site north of Canal Road. It is the first part of a new north-south green infrastructure corridor extending south from Sydney Park.

Tempe Lands

The Tempe Lands are located on the site of the former Tempe landfill and comprised of Tempe Park, Lori Short Reserve and the Tempe Wetlands, further discussed in Wetlands below.

Tempe Park is characterised by an elevated flat plateau surrounded by steep embankments that are densely vegetated with native vegetation interspersed with weeds - refer Figure 19. Uses of the elevated plateau include:

- A golf driving range, the Tempe Golf Range and Academy
- A fenced dog park used by individuals and professional dog walkers
- Car parking and an access road
- Open turfed areas that are generally underutilised
- A small council depot and leachate treatment plant.

Lori Short Reserve

Lori Short Reserve constitutes the interface of the Tempe Lands with South Street. It is a small reserve with open lawns catering for local play and gatherings - refer Figure 17.

Tempe Recreation Reserve

Tempe Recreation Reserve is an important open space and recreation area catering for formal indoor and outdoor sport with

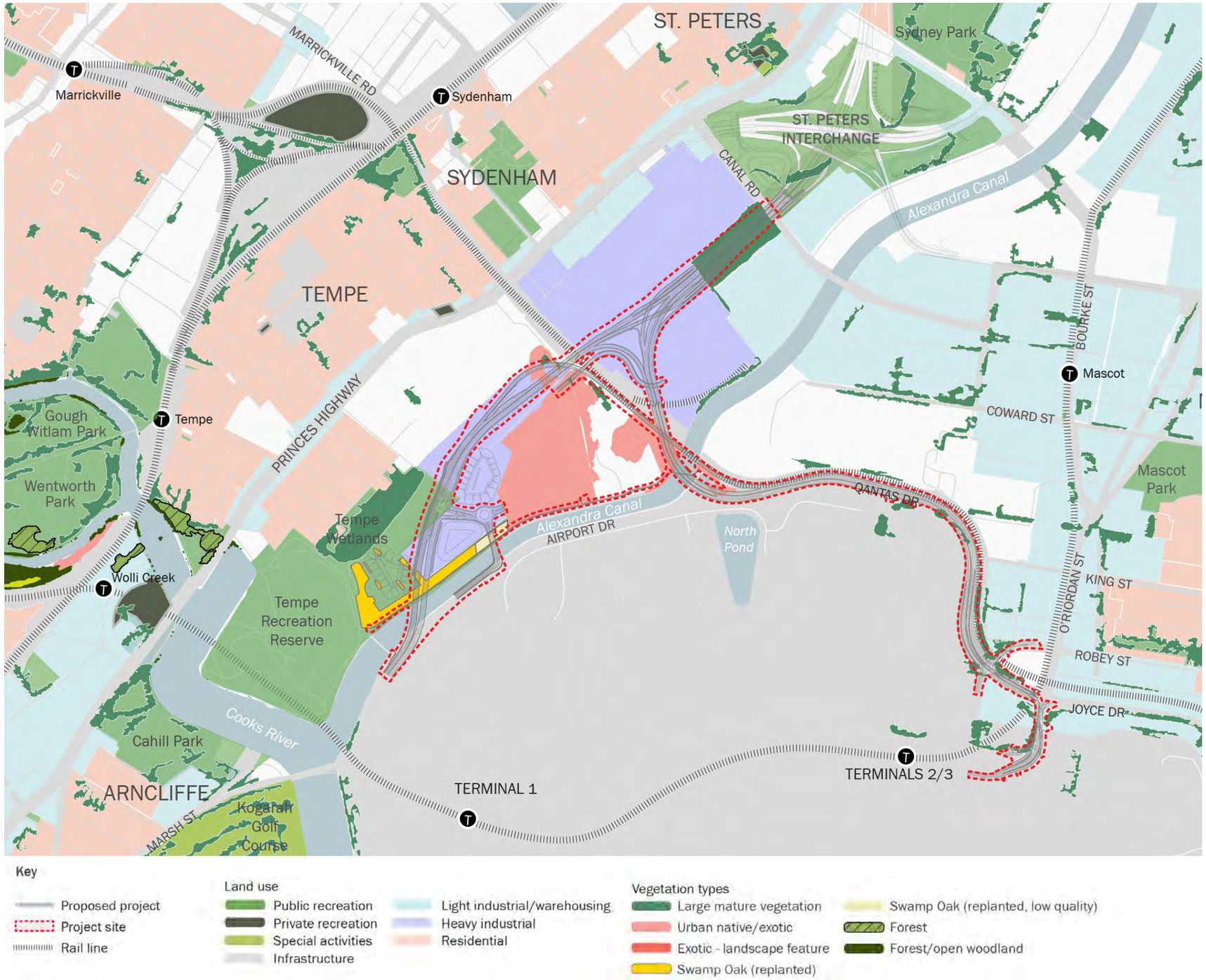

Figure 16. Open space, vegetation and land use

a multi-purpose hall and extensive playing fields. It also caters for informal social and family recreation (SFR) with a playground, barbecues and picnic areas and walking tracks. With large open spaces, the reserve has a distinct spatial character and good sight lines towards the project - refer **Figure 18**.

Vegetation cover

The project area retains little of its original vegetation cover. It features both planted native and exotic vegetation - refer **Figure 16**.

Native vegetation

There are two native vegetation communities - their biodiversity and ecosystem classifications are (also refer to **Biodiversity and ecosystem classifications** below):

- Mangrove Forests
- Swamp Oak floodplain swamp forest.

Mangrove forests are found in small patches within the Boral's St Peters facility and in Tempe Recreation Reserve, north of the footbridge. They are protected marine vegetation under the NSW *Fisheries Management Act 1994* (FM Act).

Swamp Oak floodplain swamp forest is generally dispersed but includes two more extensive stands:

- Dense planting carried out as part of remediation, located on the embankments of the former Tempe landfill in the Tempe Lands - refer **Figure 19**
- A fairly continuous stand lining Alexandra Canal, from north of Nigel Love Bridge to Canal Road - refer **Figure 19**. It creates the effect of a green ribbon along the waterway and provides visual relief and a welcome contrast in this densely developed area - refer **Figure 35** and **Figure 36**.

Vegetation in undeveloped private land

There are two pieces of undeveloped private land that include vegetation that contributes to the character of the project area:

- The triangular piece of land between Airport Drive, Alexandra Canal and the Botany Rail Line. This land is turfed with scattered groups of trees and shrubs around a small pond that holds Sydney Airport runoff prior to release into Alexandra Canal - refer **Figures 29-30**.

Figure 17. Lori Short Reserve in South Street, Tempe

Figure 18. Much of Tempe Recreation Reserve is shaped by active recreation use and associated large open spaces

Figure 19. Swamp Oak Forest planting on the embankments of the former Tempe landfill

Figure 20. Open water bodies in the Tempe Wetlands

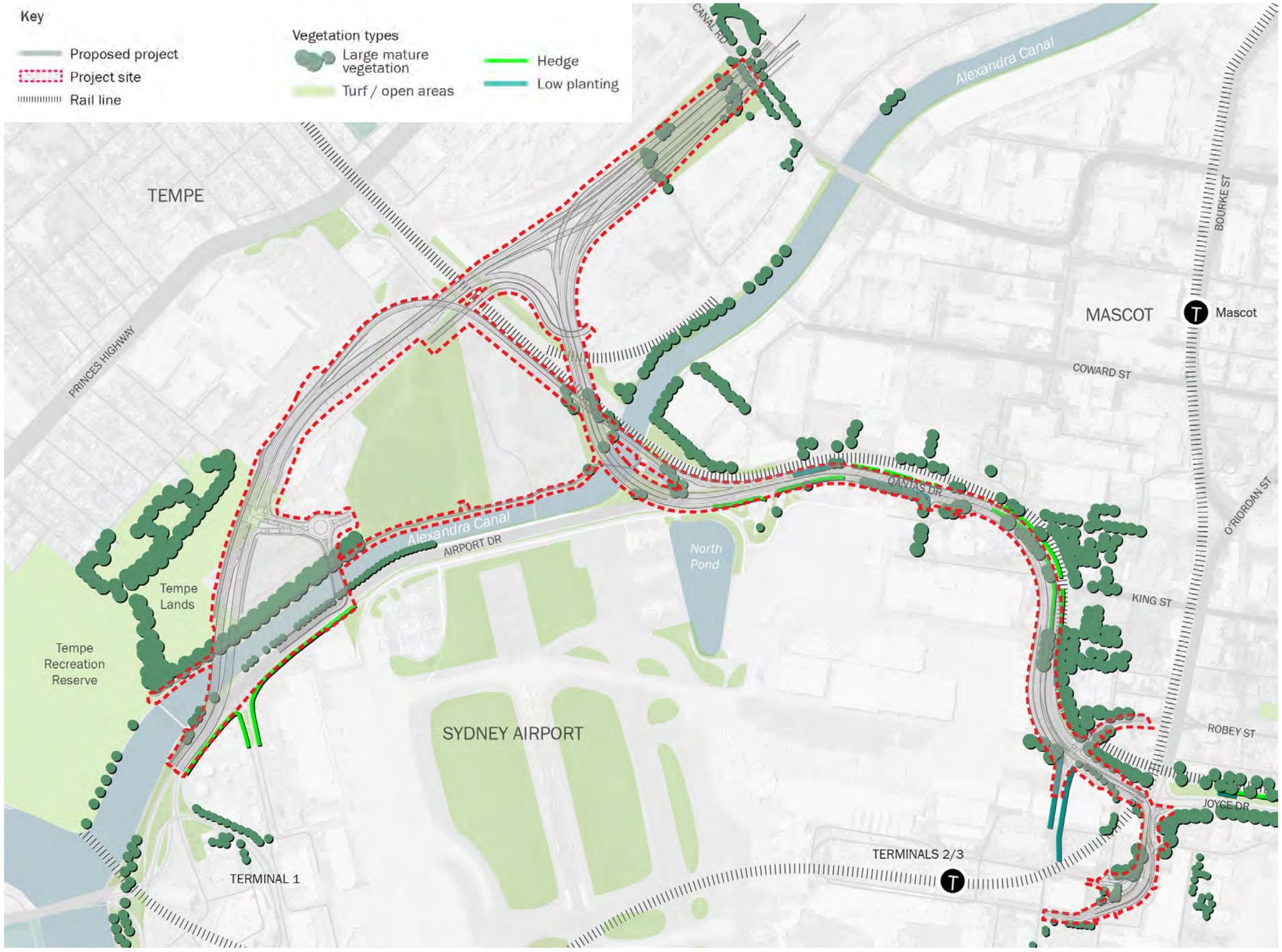

Figure 21. Vegetation influencing the character of the project site

- Land on Canal Road, between the Goodman St Peters Business Park and the Cooks River Intermodal Terminal. There are steep embankments towards Canal Road that are heavily vegetated with native trees and shrubs - refer **Figure 35**. Large trees and shrubs are also scattered throughout the site, particularly in the northern half and along the south-western perimeter.

Other vegetation

Other vegetation in the area includes planted native and exotic vegetation in open space areas and along the local street system.

Trees along the road network hold important visual value and are integral to both the character of the area and the arrival experience at Sydney Airport - refer **Figure 21** and **section 4.7.2**. They include:

- Large mature trees along much of Qantas Drive. Trees include several very large fig trees (*Ficus microcarpa var. hillii*) and groves of mature eucalypts and paperbarks that have important visual value - refer **Figures 23-26**.
- Large mature trees in the Terminals 2/3 precinct, with notable stands along Sir Reginald Ansett Drive, Keith Smith Avenue, Ninth Street and Shiers Avenue - refer **Figures 31-33**.

Palm trees and manicured hedges are used around the airport perimeter and as entrance feature planting at Terminals 2/3 - refer **Figures 28, 29** and **33**.

Existing tree cover is further discussed in the following section.

Existing tree cover

The *Sydney Gateway Road Project – Tree Assessment Technical Note* prepared by G2SJV assessed trees within the project site (construction boundary) that are not covered by a biodiversity offset strategy. The aim of the assessment was the identification of:

- Trees that would be removed or impacted by the project
- Trees that would be able to be retained
- Measures to protect those trees that would be able to be retained during construction activities
- Trees with high landscape value that may be suitable for transplanting to a new location.

The assessment surveyed a total of 2,667 trees throughout the project site, comprised of a mixture of indigenous species (originally occurring in the area), other native species and exotic ornamental specimens. Trees were mapped, summarised and recorded in a detailed tree schedule.

High value tree cover

The assessment identified the following as trees possessing high amenity landscape value:

- **Hill's Weeping Figs** (*Ficus microcarpa var. hillii*)
  Growing along the margins of Qantas Drive, these are the largest and possibly oldest trees within the project site. All specimens are in good health and form. They have significant landscape value, providing screening and general visual amenity - refer **Figures 25-26**
- **Planted thickets of trees**
  Growing along sections of the northern side of Qantas Drive provide these mature trees provide screening (including of the railway easement and bridges) and soften the appearance of large billboards and tall buildings. Trees include lines of River Oaks (*Casuarina cunninghamiana subsp. cunninghamiana*) and Eucalypts - refer **Figure 25**
- **Paperbark trees near Robey Street**
  A line of planted Broad-leaved Paperbark (*Melaleuca quinquenervia*) growing in turf below the rail line embankment that is planted with River Oak and Tallowood, adjacent to the Robey Street intersection. Broad-leaved Paperbark is indigenous to south-east Sydney. The trees have landscape value because of their size, vigour and form, and because their white paperbark contrasts with the dark background of the tree thicket on the adjacent batter - refer **Figure 24**
- **Eucalypts on the western side of Canal Road**
  These trees provide a softening visual influence along a section of busy road in an industrial part of St Peters - refer **Figure 34**
- **Cabbage Palms planted on Airport land**
  The groups of Cabbage Palms (*Livistona australis*) that have been planted at various sites near the airport entrance are early-mature specimens, mostly in good health and form and comprise landscape features at several places adjacent to Sir Reginald Ansett Drive and the intersection with Qantas Drive - refer **Figure 28** and **Figure 33**
- **Trees on the southern side of Alexandra Canal**
  Small groups of trees and shrubs grow along the southern banks of Alexandra Canal
- **Trees on the banks of the former Tempe l**andfill
  A complete, continuous stand of planted trees and shrubs on a sloping batter along the northern banks of Alexandra Canal that provide some screening of the adjacent container compounds. Species include indigenous trees such as Forest Red Gum (*Eucalyptus tereticornis*), Rough-barked Apple (*Angophora floribunda*), Spotted Gum (*Corymbia maculata*) and Swamp Oak (*Casuarina glauca*). This stand has become self-sustaining to some extent, with Eucalypt seedlings and Swamp Oak suckers, as well as self-recruited Port Jackson Figs (*Ficus rubiginosa*), although self-recruited invasive species are also present
- **Plantings along Qantas Drive (southern side)**
  Plantings of hedges (refer **Figure 29**) and trees along the southern property boundaries also provide softening influences. They include specimen trees (*Ficus benjamina* - refer **Figure 23**) and Eucalypts at the entrance to the Qantas Jet Base.

Summary of project impacts on existing tree cover

The existing tree cover of the project site is summarised in **Table 4**. The table also includes an estimate of the number of trees that would be removed for the project.

While it is difficult to know with certainty which trees would be removed as part of construction of the project, based on the current design, the *Tree Assessment Technical Note* provides an estimate based on the trees where the trunks would be located within the project alignment footprint. It is noted that:

- Tree retention numbers in the table have assumed that Cabbage Tree Palms affected by the project would be transplanted within the project site, in suitable locations
- Disturbance of the root zone by construction works would occur for a number of additional trees. Disturbance of the root zone by construction may lead to damage that could in turn affect tree health and may necessitate removal for either tree health or safety reasons.

Tree species other than the Cabbage Tree Palms were assessed as not suitable for transplanting to new locations.

Table 4. Summary of tree cover in the project site

Tenure	Total number of trees	Native species	Non-indigenous native species	Exotic trees
EXISTING TREES				
Airport land	993	417	470	106
Other tenure	1,674	1,171	400	103
Totals	**2,667**	**1,588**	**870**	**209**
TREES REMOVED FOR THE PROJECT				
Airport land	573	210	304	59
Other tenure	727	518	156	53
Totals	**1,300**	**728**	**460**	**112**
TREES THAT MAY BE ABLE TO BE RETAINED *				
Airport land	420	207	166	47
Other tenure	947	653	244	50
Totals	**1,367**	**860**	**410**	**97**

* Subject to mitigation measures and construction practices

Recommended mitigation

In addition to relocation of the palm trees, the *Tree Assessment Technical Note* recommends compensatory planting to offset the removal of other trees with high landscape amenity values in the project site. Recommended replacement tree species include rapid-growing species such as:

- Swamp Gum (*Eucalyptus robusta*)
- Bangalay (*Eucalyptus botryoides*)
- Blackbutt (*Eucalyptus pilularis*)
- Broad-leaved Paperbark (*Melaleuca quinquenervia*)
- Cheese Tree (*Glochidion ferdinandi var. ferdinandi*)
- Brush Cherry (*Syzygium australe*)
- Lilly Pilly (*Acmena smithii*)
- Coastal Banksia (*Banksia integrifolia subsp. integrifolia*)
- Port Jackson Fig (*Ficus rubiginosa*).

Finally, the *Tree Assessment Technical Note* recommends a series of on-site processes and protective measures to ensure trees identified for retention are appropriately protected during construction, to ensure they would be retained.

Figure 22. Intimate bushland tracks around the Tempe Wetlands provide a sense of seclusion and nature in the city

Figure 23. Mature fig trees along Qantas Drive

Figure 24. Mature eucalypt and paperbark grove along Qantas Drive, east of Robey Street

Figure 25. Grove of mature eucalyptus trees on the northern side of Qantas Drive

Figure 26. Large fig tree on the corner of Qantas Drive and Seventh Street

Figure 27. Disturbed ecosystems in the Northern Lands offer limited habitat but provide a valuable green outlook

Figure 29. Formal hedges around the airport perimeter

Figure 28. Vegetation framing the entrance to Terminals 2/3, including formal plantings

Figure 30. The park-like character of the area between Airport Drive, Alexandra Canal and the Botany Rail Line with its mix of open turf and clumps of trees

Figure 31. Mature planting along Sir Reginald Ansett Drive

Figure 35. Mature figs and Cabbage Palms at the eastern end of Shiers Avenue

Figure 32. Vegetation lining the Alexandra Canal, as seen from the Canal Road bridge

Figure 34. Avenue of mature fig trees along Keith Smith Avenue

Figure 36. Vegetated embankments along Canal Road

Figure 33. Vegetation along the Alexandra Canal creates a green ribbon through this densely developed inner city area

It is noted that depending on space constraints, manoeuvrability and other factors during construction, the implementation of the recommended tree protection zones and measures may not be practical and the total number of trees removed for the project may increase.

A mix of native, planted vegetation and weeds occurs on swampy ground within the Northern Lands - refer Figure 27 and Figure 43. Open turf areas occur along parts of Alexandra Canal and in the runway zone. Both contribute to a sense of greenery and nature, and are fundamental to the area's character as they allow for expansive views across the landscape.

Wetlands

There are a number of wetlands systems in the area that feed into Botany Bay and its aquifer. They include:

- Tempe Wetlands in the Tempe Lands immediately west of the project site has no overland flow connection but feeds the Botany aquifer
- Two CM SEPP wetlands in Tempe Recreation Reserve (refer section 2.3.2 and Figure 5)
- The Eve and Marsh Streets wetlands that form part of the Rockdale Wetlands Corridor south of the Cooks River
- The Botany Wetlands.

The Rockdale Wetlands and Botany Wetlands are located at some distance to the project site and would not be impacted by the project. Similarly, the two CM SEPP wetlands are located outside the project site.

A swampy, low-lying area is located within Sydney Airport's Northern Lands but is not classed as a wetland.

Tempe Wetlands

The Tempe Wetlands immediately adjoin the project site. They have important hydrological, ecological, educational and visual functions. The wetlands are constructed and comprise of open water bodies surrounded by narrow stands of bushland. Vegetation includes planted eucalypts, swamp oak, native understorey species and emergent reeds.

A series of narrow tracks provide public access. They are intimately scaled and provide a sense of 'wild' nature in the city. The wetlands area provides respite and relief from the surrounding densely developed urban areas - refer Figure 21 and Figure 23.

Biodiversity and ecosystem classifications

From a biodiversity point of view, the vegetation of the project site is considered to hold minimal value, as it is comprised primarily of urban planted vegetation that includes a mix of native and exotic species. Patches of Swamp Oak forests are not considered threatened ecological communities (G2SJV 2019).

The majority of the vegetation that would be removed for the project is not remnant native vegetation but comprised of exotic plants or planted native species on fill material, including non-indigenous native species. For more information on biodiversity classifications and values, *Technical Working Paper 14 - Biodiversity Development Assessment Report* (BDAR) should be referred to.

The BDAR also assesses the likelihood of threatened flora to occur or to re-establish within the project site as low.

Why is this important for urban design?

- Vegetation in and surrounding the project site makes an important contribution to the landscape character of the area and provides important visual relief, irrespective of biodiversity classifications.
- The community is likely to be sensitive to the loss of vegetation
- The western and southern portions of the project site derive much of their landscape character from open space and vegetation on land outside the project site. The project would be able to benefit from this setting to provide a pleasant outlook, a connection to place and a positive motorist experience
- The project presents an important opportunity to extend the north-south green infrastructure corridor initiated by the New M5 project from Sydney Park and the St Peters interchange through the project area and south to the Cooks River and Botany Bay
- In the eastern part of the project site, significant landscape and visual values are derived from mature trees within the road corridor. There is little or no borrowed landscape that the project can rely on to provide visual relief and interest, or to mitigate the scale of adjoining development and infrastructure
- Almost half of the existing mature tree cover in the project site would be removed, including large number of high amenity trees with significant landscape and visual value. There is potential for this number to increase depending on construction processes and constraints
- A small number of palm trees in the Terminals 2/3 precinct are recommended for relocation, based on high landscape value. This needs to be reflected in the landscape design
- There is a need for planting of suitable fast-growing species in the landscape design for the project, to compensate for the loss of tree cover generally, and for the loss of high visual and landscape value tree cover in particular
- There is a need to consider how visual relief in the form of mature vegetation can be maintained or reinstated as part of the project, to maintain:
  - The landscape setting
  - The sense of place
  - A sense of connection to nature.
- Existing vegetation types and communities provide an indication of what works and grows well. This can guide the selection of the planting species for the project
- There is a need to protect sensitive adjoining areas such as the Tempe Wetlands to ensure existing values and functions are maintained and protected
- The project would not impact on any threatened vegetation species or communities, or their ability to re-establish
- The successful establishment of native tree cover over the former Tempe landfill indicates that remediation and land fill capping does not preclude the re-instatement or establishment of substantial tree cover
- Private land that has remained undeveloped retains an open space character and features vegetation that contributes to the landscape character of the area.

4.3.4 Fauna

Terrestrial habitats

The wider project area and the Botany Bay catchment are known to be rich in biodiversity, being home to many threatened and migratory species (Sydney Airport 2018c, p. 74), despite high levels of development.

Habitats within the project site are limited but include:

- Stands of Mangrove Forest and planted vegetation including Swamp Oak Floodplain Forests - refer **section 4.3.3**
- Isolated mature trees that provide some feeding and roosting resources for wildlife - refer **Figure 37**
- Planted vegetation
- Urban exotic grasslands
- Thickets of Lantana and other weeds
- Aquatic habitat in Alexandra Canal.

The Tempe Wetlands constitute better quality fauna habitats. They are located within land mapped as a wildlife corridor by the Marrickville LEP 2011 that extends along the Cooks River (refer **section 2.5.2**). Sydney Metro Catchment Management Authority also identified the vegetation between the Botany Rail Line and Alexandra Canal as part of a biodiversity corridor (G2SJV 2019). The wetlands are said to be home to up to 110 different bird species (Barwell 2017).

Figure 37. Corellas in Tempe Recreation Reserve

Terrestrial fauna species

The BDAR recorded a total of 60 species in the project site. They were generally species typical of urban environments and wetlands and included:

- 45 bird species
- Seven mammals species
- Four reptile species
- Four frog species
- Two threatened species:
  - Eastern Bentwing-bat (*Miniopterus schreibersii oceanensis*)
  - Grey-headed Flying-fox (*Pteropus poliocephalus*)
- Six introduced species.

For more information on the fauna of the project site, the BDAR should be referred to.

Aquatic habitat

The project site crosses Alexandra Canal and is located near the Cooks River which is identified as key fish habitat. Other areas of potential aquatic habitat include the Tempe Wetlands immediately adjoining the project site.

Alexandra Canal

Alexandra Canal is mapped as key fish habitat by the Department of Primary Industries (2007) despite its highly disturbed and artificial form and contaminated sediment bed.

Habitats include mangroves on mudflats, Swamp Oaks on the banks and planted rushes on the sandstone walls adjacent to Tempe Recreation Reserve.

Tempe Wetlands

Tempe Wetlands is disconnected from Alexandra Canal and the Cooks River. It is therefore considered unlikely to provide habitat for native fish.

Aquatic species

A number of species were observed in Alexandra Canal:

- Oysters are present in the mudflats and on the sandstone and concrete edges
- Bream
- Juvenile fingerlings of unknown species
- Jellyfish.

A range of other common fish are likely to occur.

Why is this important for urban design?

- Even though the project area is a highly modified urban ecosystem, it offers a range of habitats supporting a number of species including mammals, birds, amphibians and reptiles. There is a need for the project landscape design to consider how to best support native fauna through suitable habitats and species, while minimising potential safety risks
- The presence of mammals and other land-based animals highlights the need to consider and plan for animal movement to maintain access between different habitats and feeding areas (also refer **section 2.5.2**)
- There is need to an ensure fauna habitats are not extended into areas where there would be potential for conflict with airport operations. The presence and movement of fauna, in particular birds, has potential to lead to safety risks for aircraft through wildlife/bird strike. This risk would be managed through adherence to the Sydney Airport landscaping policy, which is part of Sydney Airport's *Wildlife Management Plan* (Sydney Airport 2018c).

4.4 LAND USE AND URBAN FORM

There are a number of land uses that shape the character of the area surrounding the project, and will influence the experience of the project if approved. They include land uses within the construction footprint of the project (the project site) and land uses in the surrounding area - refer **Figure 16**.

The major land uses in the project site are:

- Sydney Airport
- Industrial and employment areas
- Open space as discussed in **section 4.3.3**
- Advertising
- Car parking
- Utility infrastructure
- Undeveloped land

The major land uses in the surrounding area include:

- Industrial and employment areas
- Residential
- Bulky goods retailing
- Public open space (refer **section 4.3.3**)
- Private open space

The above land uses are described in more detail in the following sections.

4.4.1 Sydney Airport

Sydney Airport is a major land use, influencing adjoining land uses, transport networks and built form. The airport is divided into six major functional zones four of which are partially located within the project site and have a number of different land uses within them - refer **Figure 38** and **39**:

- North-west sector:
  - Includes the passenger terminal T1, the freight terminal, logistics, maintenance, fuel storage and other associated functions
  - Built form is highly variable ranging from single to multi-storey structures used for a variety of purposes including terminal buildings, freight/logistics, office space, car parking, fuel storage and the Rydges Sydney Airport Hotel
- Runway sector:
  - Includes the main runway and cross runway and the adjoining portion of Airport Drive
  - Characterised by an open landscape with large paved areas associated with the runway and taxing and interspersed with large turfed areas
- North-east sector:
  - Includes passenger terminals T2/3, catering, aeroplane maintenance, training and other facilities
  - Built form is highly variable ranging from double-storey to multi-storey structures used for a variety of purposes including terminal buildings, car parking, and airport support services and supporting businesses.
- Northern Lands Sector:
  - Includes employee parking in the Northern Lands car park, scrubby swamp lands adjoining the Tyne Container site and clear areas with high intensity approach lighting (HIAL) under the main runway approach - refer **Figure 40**.

More information on Sydney Airport is provided in **section 4.7.1**.

4.4.2 Industrial and employment areas

Heavy industry

Heavy industrial uses include:

- Container services and storage in Tempe and St Peters including the Cooks River Intermodal Terminal managed by NSW Ports - also refer **section 2.3.9**
- Boral's St Peters facility which is comprised of a recycling facility and concrete batching plant.

Heavy industries occupy large land parcels between Alexandra Canal and the Princes Highway and there are generally limited permanent built structures. The most visually prominent structure is the Boral concrete batching plant which stands out as a tall structure in the flat low-lying landscape - refer **Figure 43**.

Shipping containers are prominent colourful structures. While their arrangement continually varies, their presence is permanent. They stand out in the landscape, especially where stacked three or four containers tall - refer **Figure 41, Figure 42** and **Figure 43**.

Light industry

Light industry includes employment and commercial uses such as warehousing, freight and logistics services such as:

- A number of Qantas training, supply, catering and other supporting businesses
- Warehousing and logistics including Woolworths, the Toll Group, DSV, Deutsche Post
- Other airport-related services including numerous hotels and car hire businesses concentrated along O'Riordan Street and the AMG car dealership between Sir Reginald Ansett Drive and Ninth Street.
- Business parks including the Goodman St Peters Business Park and small manufacturing businesses along Burrows Road and Alexandra Canal.

The built form associated with these uses is generally limited to one or two storey buildings with varying floor plates based on lot sizes. Building heights tend to increase towards the eastern end of the project area, consistent with land uses such as hotels, service providers or white collar businesses.

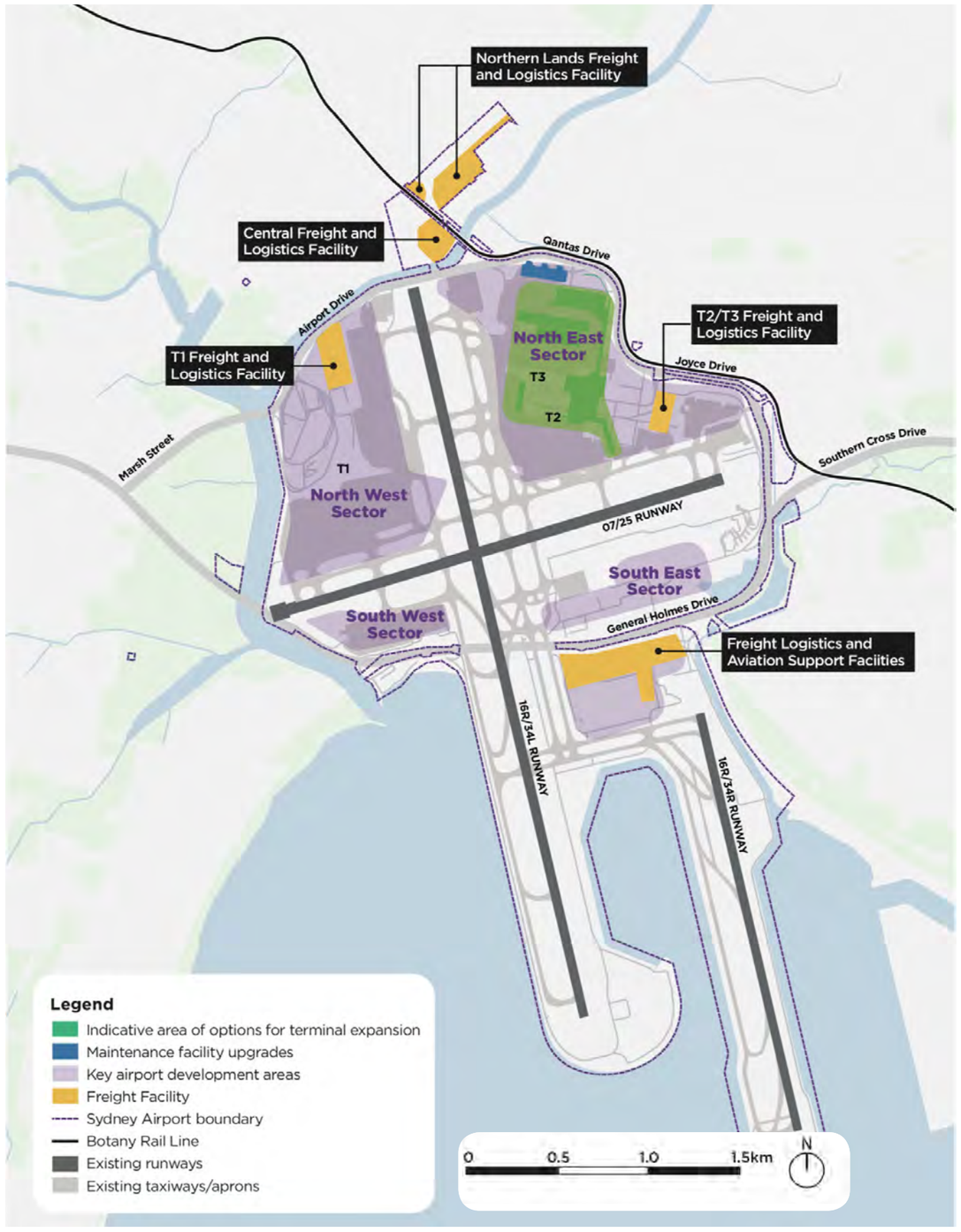

Figure 38. Airport development plan showing airport sectors

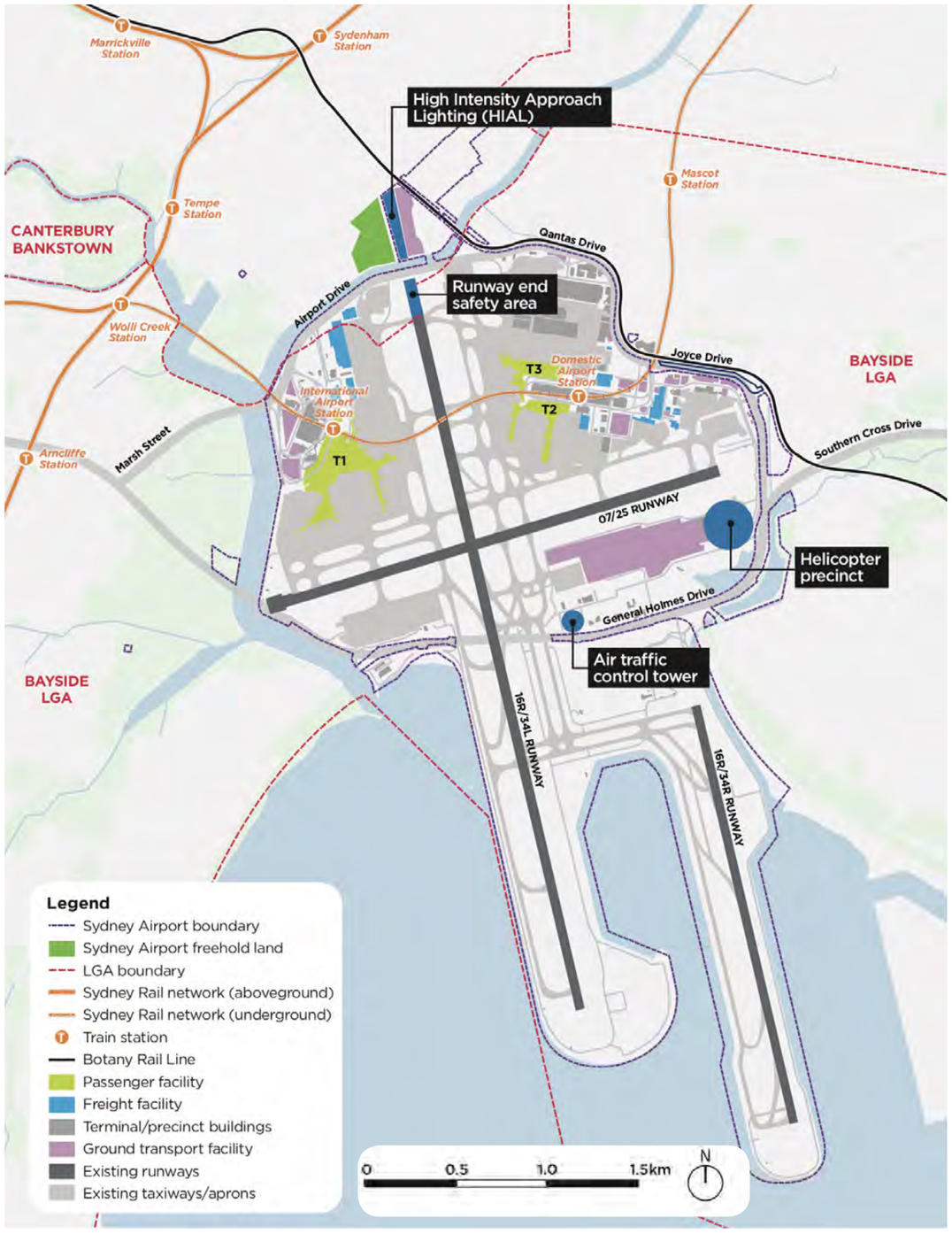

Figure 39. Key facilities at Sydney Airport

Figure 40. The Northern Lands with high intensity approach lighting on the main runway approach

Figure 41. Shipping containers as seen from the IKEA car park. They are a colourful and ever-changing feature in the landscape

Figure 42. Shipping containers as seen from Airport Drive

Figure 43. The Boral concrete batching plant stands out as a tall structure in a flat landscape

4.4.3 Bulky goods retailing

Bulky goods retailing is generally located between the various container storage sites and the Princes Highway. Retailers include IKEA, The Good Guys, Decathlon and the Salvos Store.

4.4.4 Residential

Suburban residential areas are located east of O'Riordan Street in Mascot, a traditional low-density suburb around a commercial strip along Botany Road.

The 'Mascot Station Town Centre Precinct' is the part of Mascot located generally west of O'Riordan Street. The precinct has been undergoing a process of urban renewal and densification since around 2012 when it was identified as a future town centre with the potential to accommodate a large share of the housing and employment targets set by the NSW Government - also refer section 2.5.1.

Further residential areas are located in Sydenham, west of the Princes Highway, and in Tempe, west of the Tempe Lands. Both are characterised by a mix of one and two storey detached, semi-attached and terrace housing.

Multi-storey and high rise residential buildings are located in Wolli Creek and Arncliffe on the southern side of the Cooks River. They are set back behind the open space areas of Discovery Park, Cahill Park and Kogarah Golf Club.

4.4.5 Advertising

Advertising is a visually prominent secondary land use of the road corridor in a number of locations:

- Along Qantas Drive and Joyce Drive.
  Large steel frames separate the road from the Botany Rail Line and support advertising billboards - refer **Figures 45 and 46.** Together with mature vegetation, the billboards largely block views of the rail line and adjoining built form from Qantas Drive - also refer **section 4.8.3**
- Terminals 2/3 Precinct
  Along Qantas Drive between Robey Street and O'Riordan Street, and along Sir Reginald Ansett Drive free-standing billboards provide advertising - refer **Figure 46 and Figure 47**

› Airport Drive
Large cantilevered signs are used between Airport Drive and Alexandra Canal, in the area near the footbridge to Tempe Recreation Reserve. They, too, are visually highly prominent - refer **Figure 48**.

Advertising is regulated and managed under existing long-term contracts. Termination of the contracts would require compensation in accordance with the *Land Acquisition (Just Terms Compensation) Act 1991*.

4.4.6 Car parking

The area surrounding the project is also notable for large areas of land dedicated to car parking. They include at grade and multi-storey car parking at Terminal 1, employee parking at Sydney Airport's Northern Lands car park, large at grade car parks east of Qantas Drive and between Seventh and Ninth Street, and multi-storey car parks at Terminals 2/3.

4.4.7 Utility infrastructure

Utility services are important infrastructure elements that are often visually prominent, especially when located above ground.

Within the project site, major above ground utilities include:

› A large Sydney Water desalination pipeline along the western side of Alexandra Canal, extending from Tempe Reserve to the Northern Lands - refer **Figure 49**.

› Tempe Water Tower is located on Sydney Airport land in Old Street, Tempe. It used to provide water to Sydney Airport - refer **Figure 50**.

There are a number of other major utilities that are below ground and therefore not visible. Both above and below ground utilities often play a major role in influencing the location and design of structures and landscape works due to the need to prevent the risk of damage or service disruptions and the need for maintenance access.

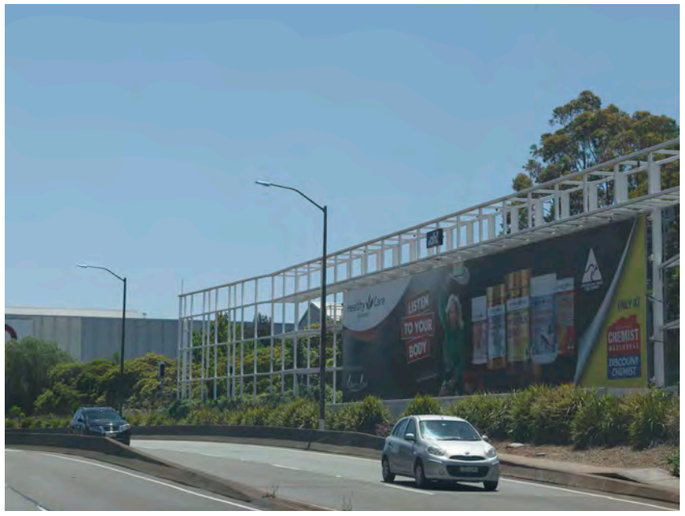

Figure 44. Advertising structures and associated ground cover planting along Qantas Drive

Figure 45. Advertising structures along Joyce Drive, near O'Riordan Street

Figure 46. Billboards on the northern side of Qantas Drive, east of O'Riordan Street

Figure 47. Billboard in Sir Reginald Ansett Drive

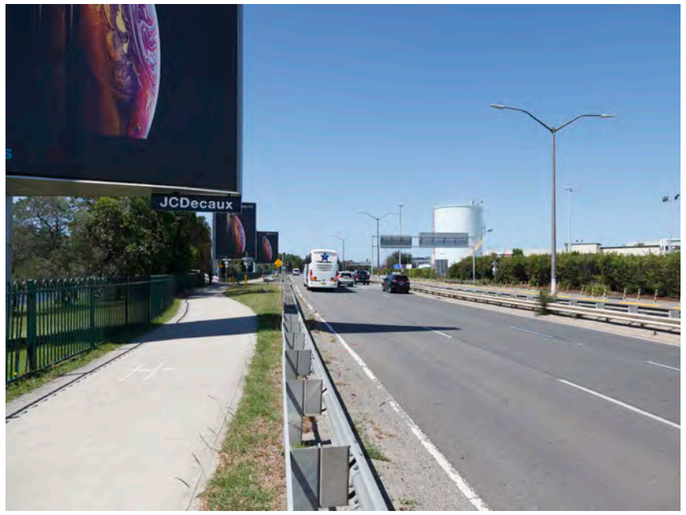

Figure 48. Advertising gantries along the eastern side of Airport Drive

Figure 49. The Sydney desalination pipeline along Alexandra Canal

Figure 50. Tempe Water Tower

4.4.8 Undeveloped land

Undeveloped areas remain in the following locations, all of which are on Sydney Airport land:

- Between the Goodman St Peters Business Park and the Cooks River Intermodal Terminal in Canal Road. Glimpses of this land are possible from Canal Road but it is not possible to perceive the large size of the undeveloped land from public areas.
- Within the Northern Lands
- In the triangle between Airport Drive, the Botany Rail Line and Alexandra Canal - also refer section **4.3.3**.

4.4.9 Private open space

Kogarah Golf Club is privately owned open space located south of the Cooks River. Parts of the golf course are currently used as an ancillary site for New M5 construction works. The majority of the site will be returned to the golf club following completion of construction.

Why is land use important for urban design?

- Adjoining land uses and built structures influence decisions about the project design to ensure the best fit
- The locations and types of buildings and their use influence decisions about active transport provision and connections, to ensure safety and consistency with user needs
- Neighbouring land uses are affected by the project requiring careful consideration of the project interface to manage potential issues including noise, pollution, over-shadowing and changes to the visual outlook, safety and security:
  - There is a need to respond to sensitive land uses such as residential and open space by considering visual mitigation, privacy and noise attenuation
  - Consider screening detracting land uses such as the recycling facility
  - Acknowledge the port setting and the importance of freight through strategic views of container storage areas and rail infrastructure
  - Integrate security requirements such as Sydney Airport land or Botany Rail Line fencing with the design of primary project structures to minimise clutter
- The project would impact on existing open spaces. There is therefore a need to consider how:
  - Open spaces can continue to perform current functions such as providing places of quiet and escape, visual relief and respite, and access to nature
  - Existing recreational uses and amenity are maintained or enhanced
  - Visual and spatial character are maintained or enhanced
  - Open spaces can be made safe and accessible
- The project derives much of its experiential character from its visual relationship with surrounding land uses. Views of nearby built form and landscape elements is an important consideration because they contribute to the motorist's experience moving along the project:
  - The open landscape in the western project area provides for a landscape setting
  - The eastern project area is more highly built up immediately adjoining the project site. There are no surrounding open space areas that the project could rely on for similarly attractive outlook
- There is an opportunity to shape interfaces with adjoining land uses to support the project's function as a major gateway and positively shape the visual sequence and experience of arriving and departing from the airport:
  - Allow views of the landscape setting in the western project area including of Sydney Airport and Botany Bay, to enhance the sense of arrival
  - To support Sydney's image as a green city, there is a need for new landscape and vegetation in the eastern project area to act as a buffer between the project and nearby built form, and to mitigate scale, heat, pollution and noise that may be generated.

4.5 HERITAGE AND ARCHAEOLOGY

Technical Working Paper 9 - Statement of Heritage Impact (SoHI) prepared for the project identifies six distinct phases of European occupation:

1. Early occupation and land use (circa 1796-1830)
2. Industrial and agricultural activities including flour mills, tanneries and market gardens and scattered residential development (1830-1880)
3. Establishment of Alexandra Canal, residential development and market gardens (1880-1919)
4. Establishment of Sydney Airport and the Botany Rail Line (1919-1946)
5. Expansion of Sydney Airport, deviation of the Botany Rail Line and establishment of the former Tempe landfill (1946-1990)
6. Contemporary Land Use (1990-present)

The following provides a brief overview of the history of the project area.

4.5.1 Brief history of the area

The area around Botany Bay and the Cooks River has been inhabited by Dharug Aboriginal people for at least 10,000 years, including the Kameygal or Camerigal along the banks of the Cooks River and on the northern shores of Botany Bay, and the Cadigal west of the Cooks River.

In the 1890s the butchered bones of a six thousand-year-old dugong were discovered during the construction of Alexandra Canal (refer **Figure 53).** They testify to Aboriginal occupation and provide evidence of a changing climate and environment as sea levels rose.

Following European settlement, Botany Bay played an important role in Sydney's water supply through the Botany aquifer, and in the evolution of early industries which included lime-burning, fishing and salt production.

The mid 1850s saw an industrial boom in the area around Shea's Creek, based on its proximity to water and the city, and a scarcity of residential properties. With increasing job opportunities, agricultural uses disappeared and terrace houses spread to create industrial suburbs.

Urban development also took place on current Sydney Airport land. The estate of Laurieston Park was located between Ninth Street and Sir Reginald Ansett Drive. From the early 1900s on it became a working class village that is still visible in 1951 aerial photography. The Ascot Racecourse was located south-east of the estate. Large fig trees near Ross Smith Avenue lined to the former entrance and are the only remaining physical elements.

Heavy pollution from industry, sewage and chemicals, combined with the sluggish winding nature of Shea's Creek led to the decision to construct Alexandra Canal (refer **section 4.5.2**), to send water more efficiently to Botany Bay.

The aviation history of the area began in 1911 when aviator Joseph Hammond chose Ascot Racecourse as his landing field. In 1919 Nigel B. Love established an aircraft manufacturing facility at Mascot. The 'Mascot Aerodrome' was officially declared in 1920. In 1921, it was chosen as the site for Sydney Kingsford Smith Airport, leading to the establishment of regular overseas flights. Since, the airport has gone through successive waves of expansion. They included the diversion of the Cooks River in the 1940s to allow for the construction of two new runways, and completion of a third runway in 1994.

The Botany Rail Line dates back to the 1920s when it was established as a dedicated goods line from industrial sites in Marrickville to a newly established shipping port at Port Botany.

The airport and port became two key elements shaping the urban and economic landscape and bringing both growth and, at times, controversy.

4.5.2 European heritage and archaeology

The SoHI found that there are no items on the World heritage list located within or close to the project site. However there are a number of items with Commonwealth, state and local heritage listings, both within the project site and in the surrounding project area - refer **Figure 53**. For listing details the SoHI should be referred to.

Figure 51. Atlas of the suburbs of Sydney - St Peters 1868-1888

Source: Ringer 2013

Items of heritage significance within the project site

The following listed items are located wholly or partially within the project site:

- Items listed at Commonwealth and local level:
  - Sydney (Kingsford Smith) Airport Group
- Items listed at the state and local level:
  - Alexandra Canal (including sandstone embankment)
- Items listed on state agency Heritage Registers of local significance include:
  - Mascot (Shea's Creek) Underbridge
  - Mascot (O'Riordan Street) Underbridge
  - Mascot (Robey Street) Underbridge
  - Cooks River Intermodal Terminal and associated items.

Alexandra Canal and Sydney (Kingsford Smith) Airport are also listed on the Register of the National Estate (RNE). It is noted that the RNE no longer constitutes a statutory list.

Items of heritage significance within 150 metres of the project site

There are nine additional items with heritage significance within the study area's 150 metre buffer zone:

- Items listed at the state and local level:
  - Cooks River Container Terminal: Electrical Overhead Travelling Crane - NSW Ports s.170 register
  - Cooks River Container Terminal: Lay Down Points Lever - NSW Ports s.170 register
  - Cooks River Container Terminal: Former Yard Administration Building - NSW Ports s.170 register
  - Cooks River Container Terminal: Pre Cast Concrete Hut 1 - NSW Ports s.170 register
  - Cooks River Container Terminal: Pre Cast Concrete Hut 2 - NSW Ports s.170 register
- Locally listed items:
  - Morton Bay Fig Tree, 43 South Street, Tempe
  - Mature Ficus, 112 High Street, Mascot
  - House—"Daktari", 114 High Street, Mascot
  - Cooks River Container Terminal.

In addition, the SoHI has assessed the unlisted Botany Rail Line as having local significance.

Items of heritage significance within the project area

In the wider project area, there are a number of items with heritage significance, listed at either the state or local level. They are shown in Figure 53.

Overview of heritage items

The following section contains more information on listed heritage items that are located wholly or partially within the project site, as relevant to this report. For more detail and remaining items the SoHI should be referred to.

Sydney Airport

Sydney Airport was first established in 1911. It was opened as an aerodrome in 1919 and expanded gradually over time, especially after WWII and with the growing popularity of long-haul passenger flights. Various landscapes, structures, features and elements contribute to its heritage significance. Those within the project site include the main runway and cross runway, and various ornamental plantings and street layouts.

Figure 52. Excavation of Dugong remains in Sheas [sic] Creek 1896

Source: Australian Museum [AMS351/V9817] via Ringer 2013

Landscape character and visual values

The heritage *Statement of Significance* for Sydney Airport notes:

- The "physical environment of the airport has considerable aesthetic presence as a 'big sky' landscape which, with the added aesthetic impacts of the plane movements, dominates the local area"
- The "expanses of largely undeveloped, flat grass, distinctive elements such as the control towers" are identified as having "notable aesthetic prominence", identifying as a particular value the degree to which Sydney Airport dominates the landscape through both its physical presence on the ground and through the visual and acoustic presence of planes moving people and cargo.

Built and social/cultural values

Sydney Airport is noted as having:

- Considerable value for its ongoing influence on the physical, social and economic development of the area
- Social heritage values that extend beyond the project area due to the airport's importance as:
  - A place of arrival and departure for millions of passengers annually
  - The primary portal for international migration since the 1960s.
- Social heritage value to members of the local plane-spotting community.

Alexandra Canal

Alexandra Canal is owned and managed by Sydney Water. It was built from 1887 to 1905, originally with the intention to provide a shipping route between Botany Bay and Sydney Harbour, as well as to drain local swamps to enable development.

Replacing the former Shea's Creek, Alexandra Canal extends from south of Huntley Street in St Peters to the Cooks River at Tempe. The canal varies in width from about 60 to 80 metres and consists of an open concrete channel in various stages of intactness. Its heritage curtilage includes the canal's stone walls and the area up to three metres above the canal. Heritage impacts should be considered for any new construction within ten metres of the Canal.

Key

- Proposed project
- Project site
- General item
- Landscape item
- State heritage item
- Heritage conservation area
- Potential archaeological area
- Rail line

Heritage Items

01 Alexandra Canal
02 Cooks River Container Terminal
03 Mascot (Shea's Creek) underbridge
04 Mascot (O'Riordan Street) underbridge
05 Mascot (Robey Street) underbridge
06 Sydney (Kingsford Smith) Airport group, Airport Drive
07 St Peters Brickpit Geological Site
08 Sydney Airport.
09 Tempe House and St Magdalene's Chapel, Wolli Creek
10 Kendrick Park, View Street, Tempe
11 Tempe Railway Station group, Griffiths Street, Tempe
12 Morton Bay fig tree, 43 South Street, Tempe
13 Westpac Stores Department and former Penfolds Wine Cellars, 688 and part 728 Princes Highway (now part of IKEA)
14 Electricity substation No 200, 589A Princes Highway, Tempe
15 Potential archaeological site (including sandstone wall facing Berne Street), 370 Princes Highway, Tempe
16 Service garage, 316 Princes Highway, Tempe
17 Southern Cross Hotel, 340 Princes Highway, Tempe
18 Mature Ficus, 112 High Street, Mascot
19 House—"Daktari", 114 High Street, Mascot
20 Timber slab cottage, 44 Barden Street, Tempe
21 Commonwealth Water Pumping Station and Sewage Pumping Station No 38, General Holmes Drive, Mascot (west of Engine Pond, within the boundary of Sydney Airport)
22 Ruins of the former Botany Pumping Station on Sydney Airport land
23 Southern and Western Suburbs Ocean Outfall Sewers 1 and 2 (Rockdale to Malabar), Marsh and Eve Streets, Arncliffe
24 Southern and Western Suburbs Ocean Outfall Illawarra Sewer, Eve Street, Arncliffe
25 Western Outfall Main Sewer - including original Brick Barrel Section and Original Open Trough Section, Valda Avenue, Arncliffe.

Figure 53. Heritage items and potential archaeological areas

A Conservation Management Plan (CMP) was prepared for Alexandra Canal by the NSW Government Architect's Office in 2004. The CMP provides an overall framework for the conservation and management of the canal and its curtilage, based on its significance and Sydney Water requirements.

The canal is most visible from Marsh Street, Airport Drive, North Precinct Road, Ricketty Street, the Canal Road overbridge and the Alexandra Canal cycleway.

Landscape character and visual values

The heritage *Statement of Significance* for Alexandra Canal notes:

- The canal is of high aesthetic significance
- Original sections of the canal provide "a textured and coloured finish which is aesthetically valuable in the cultural landscape"
- The canal "is a major landmark and dramatic component of the industrial landscape of the area, particularly as viewed from the Ricketty Street Bridge and along Airport Drive".

The CMP outlines the following management policies:

- The existing landscape setting is important. *Any new development should be of a small enough scale so as to not overwhelm the existing landscape, in terms of form, scale or height* - refer to policy 36
- Open air space over the canal is important and *should be retained as far as possible. Bridges over the canal should be restricted* - refer to policy 37
- Pedestrian access along the banks is important to contribute to future use and understanding of the canal, as well as its conservation. It must be maintained as part of any new or replacement crossings or bridges - refer policies 21 and 40
- Views along the canal from road crossings are important and should be retained - refer to policy 53
- View corridors to and from the canal are important and should be retained - refer to policy 54.

Built and social/cultural values

- Alexandra Canal strongly influenced the subdivision and land use characteristics of surrounding areas
- The canal is associated with "bridges that cross it which provide a layering of images of an unusual industrial urban landscape"
- Open space along the Canal's edges is an important and unique design feature and contributes to the cultural landscape
- The canal is important as one of only two navigable canals built in NSW.

Mascot (O'Riordan Street) Underbridge

The O'Riordan Street Underbridge was constructed in 1924-1925. It serves the Botany Rail Line, constructed in the early 20th century as an extension of the Metropolitan Goods Lines.

The bridge is a two span, single track, reinforced concrete girder bridge. The original western span is 14.33 metres long and supported on brick abutments with angled wing walls and central brick pier. In 1982, an additional eastern span was added to the bridge and the original western span was widened to accommodate future duplication of the line. As part of these works, the east abutment was converted to a central pier and new track abutments and crib walls incorporated into the structure.

Built and social/cultural values

- The O'Riordan Street Underbridge is a rare example of a reinforced concrete girder railway bridge constructed within the NSW rail network, and the second reinforced concrete structure used for railway lines.

Mascot (Robey Street) Underbridge

The Robey Street Underbridge was constructed in 1960 and also serves the Botany Rail Line. It was completed in 1960 and consists of a single span, double track, welded steel half-through plate web girder, with a 24.38 metre span between concrete abutments.

Built and social/cultural values

- The Robey Street Underbridge was the first welded steel plate web girder bridge on the New South Wales railway network, and built for future duplication of the line.
- The bridge's construction marks the change from riveted to welded steel construction of railway bridges in NSW.

Why is this important for urban design?

The area is rich in history and there a numerous established heritage values that are integral to the project's cultural context. Particular elements and values of importance to this report include:

- The landscape character of the area is sensitive to change
- Considerable value is associated with visual aspects of the landscape setting including:
  - The aesthetic presence of the airport
  - The aesthetic significance of Alexandra Canal
  - The visual prominence and landmark nature of Alexandra Canal as a dramatic component of the industrial landscape of the area
  - The importance of the "big sky" landscape as integral to the Sydney Airport setting, including the way in which the flat undeveloped landscape gives prominence to airport structures
  - The importance of open air space over Alexandra Canal
  - Open views along, to and from Alexandra Canal
- There is a long history of the area being shaped by major infrastructure projects, including the Alexandra Canal, the Botany Rail Line and Sydney Airport. In this context the project represents a new phase in shaping the physical, social and economic landscape through infrastructure
- The physical fabric of Alexandra Canal is important and there is a need to keep new penetrations to the canal walls to an absolute minimum
- The project area has a history of innovation in bridge design and construction. There is an opportunity for the project to honour heritage values through continued innovation
- Bridges and other structures need to be designed to maintain the navigability of Alexandra Canal as well as the opportunity for people to move along the canal, as both are considered integral to the canal's values
- The ability to interpret the history and development of Sydney Airport from its street layouts, vegetation patterns and view corridors is integral to its heritage value and needs to be retained
- The history and heritage of the area offers many opportunities for interpretation including natural features and elements,

different cultures (Aboriginal, Chinese, European), industry and development including Sydney Airport, engineering and transport, residential history.

For more information on heritage items, potential impacts and proposed mitigation measures, the SoHI should be referred to.

4.5.3 Aboriginal heritage and archaeology

Technical Working Paper 10 - Aboriginal Cultural Heritage Assessment Report (ACHAR) prepared for the project found that the project site is generally highly disturbed. Much of it has been assessed as having nil or low Aboriginal archaeological potential. No specific aesthetic, historic or social values were found to be associated with the project site. It is noted that the Shea's Creek dugong archaeological site was located in close proximity to the project.

Historical aerial photographs and maps identified that two areas within the project site were not subject to major disturbance at depth: Investigation Area 1 and Investigation Area 2 - refer **Figure 54**. Geotechnical investigations found that conditions in the two investigation areas are very similar to those in which the dugong remains were recovered.

The ACHAR concludes that it is possible that archaeological deposits are present within the project site, and could potentially contain rare and significant Aboriginal archaeological deposits buried under a layer of disturbed fill. On this basis, the investigation areas are considered to have a moderate archaeological potential and moderate-high scientific significance.

The two investigation areas would be affected by drainage culvert and bridge construction works for the project. The ACHAR identifies as particular issues the location, as well as depth of excavations, with deeper excavations more likely to disturb potentially archaeologically sensitive deposits.

Any archaeological remains would be rare and have the potential to add to knowledge of Aboriginal occupation of the area during periods of landscape change. The investigation areas also have significant research potential to provide information on the impact of changing sea levels on the archaeological record.

The ACHAR outlines a methodology for salvaging any archaeological remains or objects, should they be encountered during construction of the project.

Why is this important for urban design?

Due to the limited areas and likely depth of where Aboriginal remains or deposits might reasonably be expected to be found, they would not pose a constraint to the landscape and urban design. There are opportunities for the project to integrate existing knowledge or any new finds into the place making strategy through interpretation, art, signage or similar means to facilitate broader community knowledge and understanding of Aboriginal life.

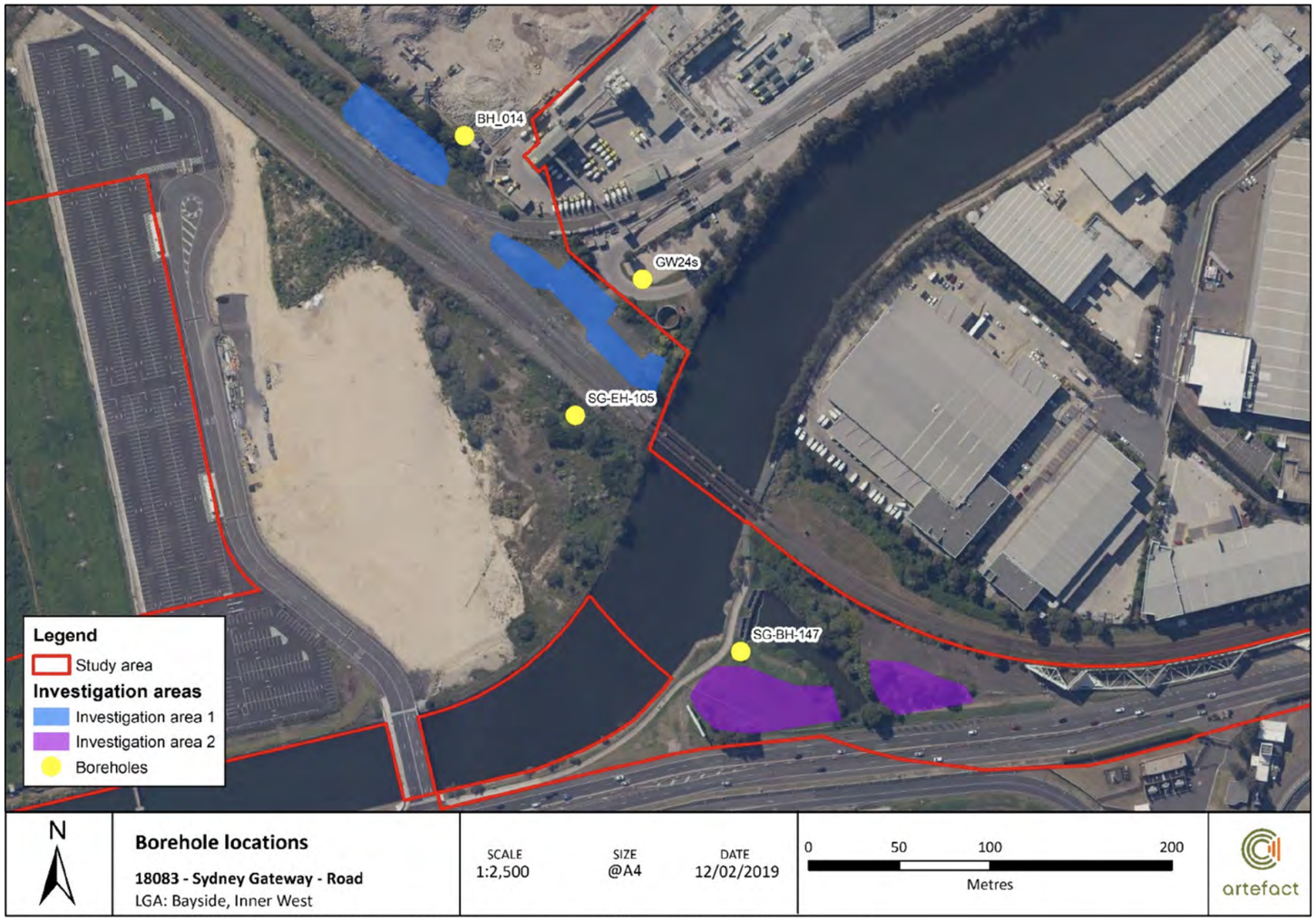

Figure 54. Investigation areas for Aboriginal archaeological potential, including bore hole locations

Source: Artefact 2019a, p 33

4.6 LAND OWNERSHIP

The vast majority of the project site is owned by IWC and the Commonwealth of Australia - refer Figure 55. There are also a number of other government land owners including Sydney Water (Alexandra Canal), Roads and Maritime (St Peters interchange), and the Rail Corporation New South Wales (RailCorp). Sydney Airport Corporation holds a lease over Commonwealth-owned land for the purposes of operating Sydney Airport.

Surrounding the project site main land owners include the Qantas Group (lands adjoining Qantas Drive), Sydney Airport (the Northern Lands) and the NSW Government (Crown land in Tempe Recreation Reserve). NSW Ports holds a 99-year lease over 17.2 hectares of state-owned land containing the Cooks River Intermodal Terminal.

4.7 TRANSPORT NETWORKS

A number of transport systems and networks are present in the area, namely:

- Aviation
- The road network
- Port Botany and Botany Rail Line
- Public transport including passenger rail and buses
- Active transport networks for walking and cycling

The following sections provide more detail on these systems.

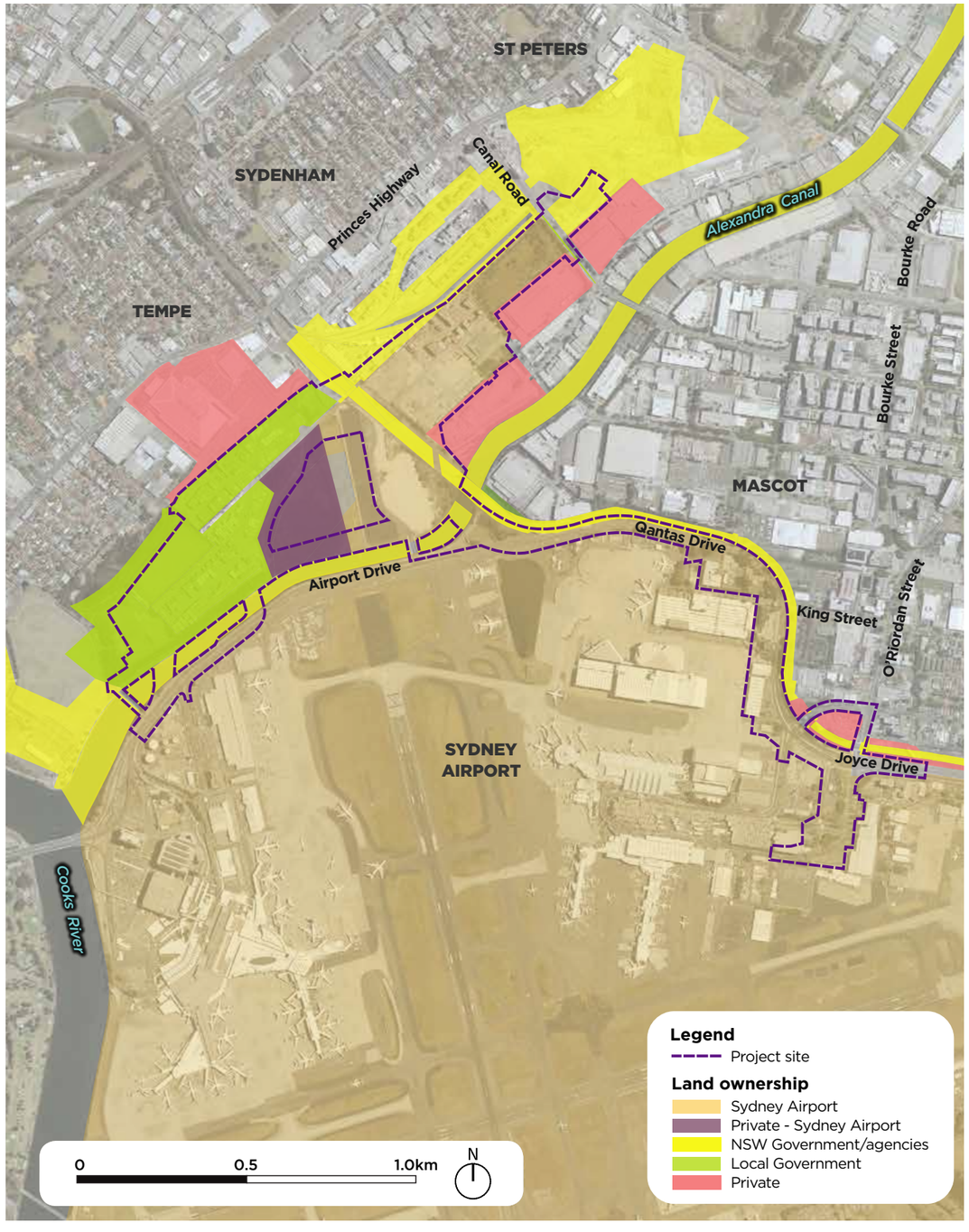

Figure 55. Land ownership

4.7.1 Aviation

Sydney Airport is Australia's largest transport and logistics hub. It services the largest network of intrastate, interstate and international passenger and freight routes. It also functions as an interchange between air, sea and land freight, and is therefore central to exports and imports. The airport is at the heart of a closely knit network of supporting businesses including freight/logistics, catering, engineering, vehicle rental and accommodation businesses.

Directly and indirectly, Sydney Airport generates and facilitates close to 7 per cent of NSW economic activity and 340,000 jobs, 30,900 of which are located on Sydney Airport land (Sydney Airport 2018a). The continued growth of the airport is seen as vital to achieving local and state based employment, tourism and development objectives.

Airport operational constraints

The safe operation of the airport poses constraints to development in surrounding areas, including restrictions on the heights of buildings and other structures within the 'prescribed airspace', as provided for by the Airports Act and associated regulations. Key constraints are:

- Protected airspace restrictions:
  - Obstacle Limitation Surface
  - Procedures for air navigation services – aircraft operations
- Restrictions to external lighting.

The following sections provide additional detail as it is of relevance to this report.

Obstacle limitation surface

The obstacle limitation surface (OLS) defines the airspace surrounding an airport that must be protected from obstacles to ensure aircraft flying in good weather during the initial and final stages of flight, or in the vicinity of the airport, can do so safely. The OLS associated with Sydney Airport is shown in **Figure 58**.

Procedures for air navigation services – aircraft operations surfaces

Procedures for air navigation services – aircraft operations surfaces (PANS-OPS) are established to protect take-off, landing or aircraft manoeuvring at time of poor or no visibility. PANS-OPS include a series of surfaces that are not to be infringed upon. They are shown in **Figure 56**.

Restrictions to external lighting

Australia's Civil Aviation Safety Authority (CASA) has established guidelines on the location and permitted intensities of ground lights within a 6km radius of airports, to ensure they do not cause confusion or distraction from glare to pilots. Ground light sources affected by these guidelines include external advertising, sports field floodlighting and street lighting.

Figure 57 shows the lighting intensity guidelines with respect to Sydney Airport's runways.

Other surfaces

Other surfaces are defined to ensure structures or obstacles do not interfere with signals from ground-based air navigation equipment (such as radar) or obscure airport safety lights such as approach lights. Interference with radar signals may result in pilots receiving inaccurate information about the location of the aircraft in relation to the airport. If approach lighting is obscured, particularly in low visibility conditions when it is most needed, a pilot may lose sight of the runway just before touch down. Both scenarios pose an obvious risk to safety

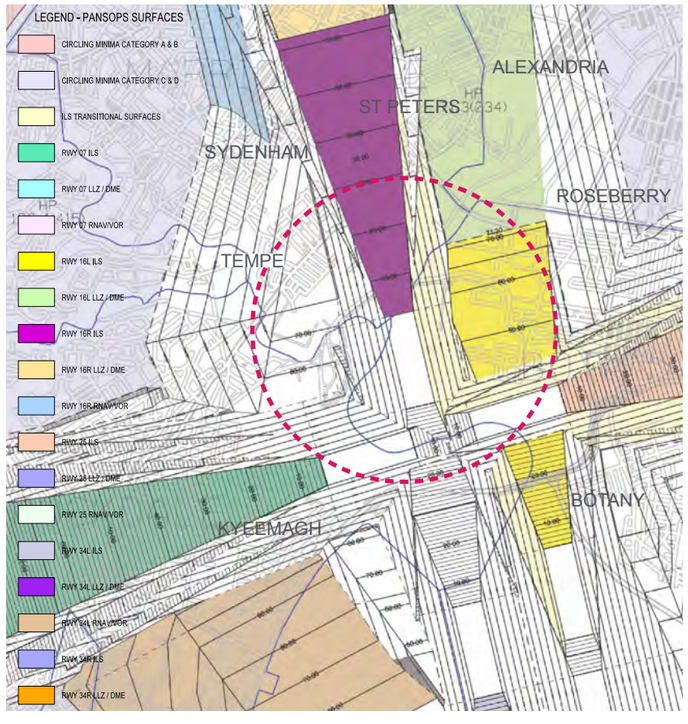

Figure 56. Procedures for air navigation services – aircraft operations surfaces

Source: Sydney Airport 2015

4.7.2 Road network

Roads within the project site

The public road network in the project site is limited, reflecting the large land parcels and land ownership. Canal Road is a state road and currently the only classified road.

The road network of the project area

In the wider project area there are several important regional and arterial roads including the Princes Highway, Marsh Street, Flora Street, West Botany Street, General Holmes Drive, Southern Cross Drive, Botany Road, Wentworth Avenue, Joyce Drive, Robey Street, O'Riordan Street, King Street, Bourke Road, Coward Street,

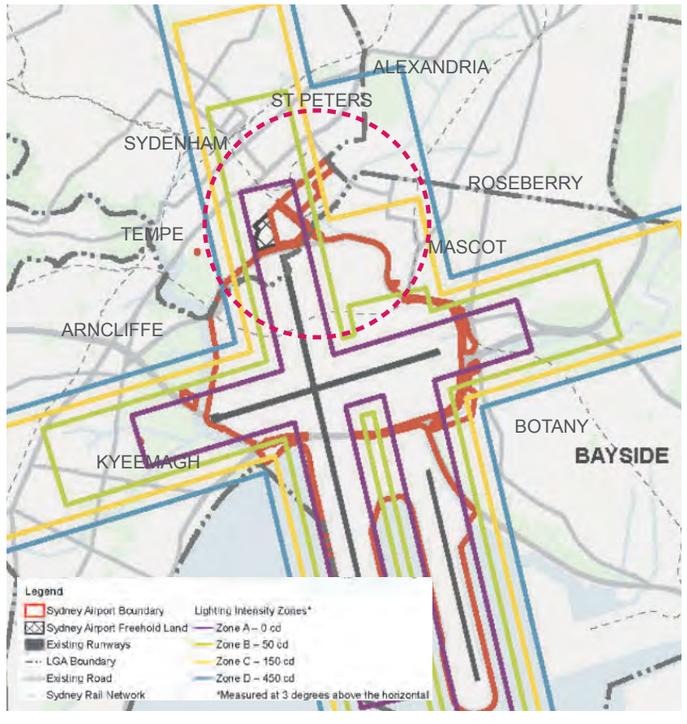

Figure 57. Restricted lighting plan showing project site location

Source: Adapted from Sydney Airport 2018a, p. 263

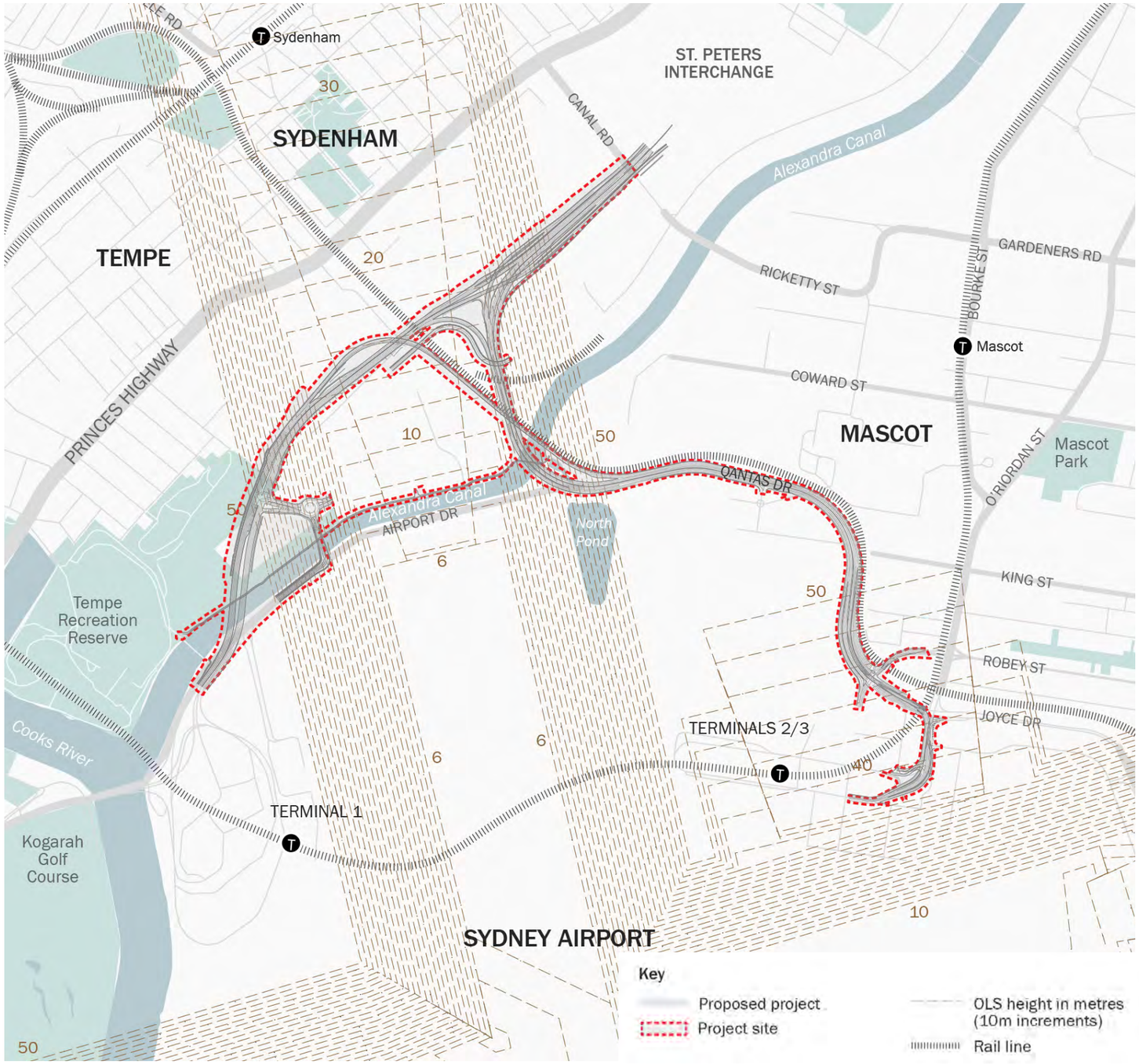

Figure 58. Sydney Airport Obstacle Limitation Surface (OLS)

Kent Road, Gardeners Road, Burrows Road and Railway Road - refer **Figure 59**.

Airport Drive and Qantas Drive are important roads providing access to Sydney Airport for passengers, employees and supporting businesses, and linking Terminal 1 and Terminals 2/3. Airport Drive runs parallel to Alexandra Canal, resulting in a close physical and visual association that contributes to the experience of driving around and accessing Sydney Airport.

The M5 motorway is an important route connecting inner city areas with Sydney's south-west and beyond. The closest interchange to the project site is the Marsh Street interchange which currently provides access to the airport from the west.

Classified roads are complemented by a finer grain network of local roads in Mascot, Tempe and St Peters.

Sydney Airport access

Road access to Sydney Airport relies heavily on the arterial road network, with no current direct freeway or motorway access - refer to **Figure 60**, contributing to congestion on the surrounding road network, in particular during peak times.

It is noted that neither Airport Drive not Qantas Drive are classified public roads. While they function like classified arterial roads, they are located on Commonwealth land and are part of the lease to Sydney Airport.

Relationship to the Sydney motorway network

There is currently no direct connection from the Sydney motorway network to the airport. Roads and Maritime are working on completing the network through the provision of a number of missing links.

The Sydney Gateway (item 6 on **Figure 60**) is one of these links and would integrate Sydney Airport with the motorway network via the St Peters interchange constructed as part of the New M5 project (item 4 on **Figure 60**).

<u>New M5 project</u>

The New M5 project is a component of the WestConnex program of works. It will provide a link between the M4 Motorway at Parramatta to the M5 Motorway at Kingsgrove, duplicating the M5 East from King Georges Road Interchange to a new interchange

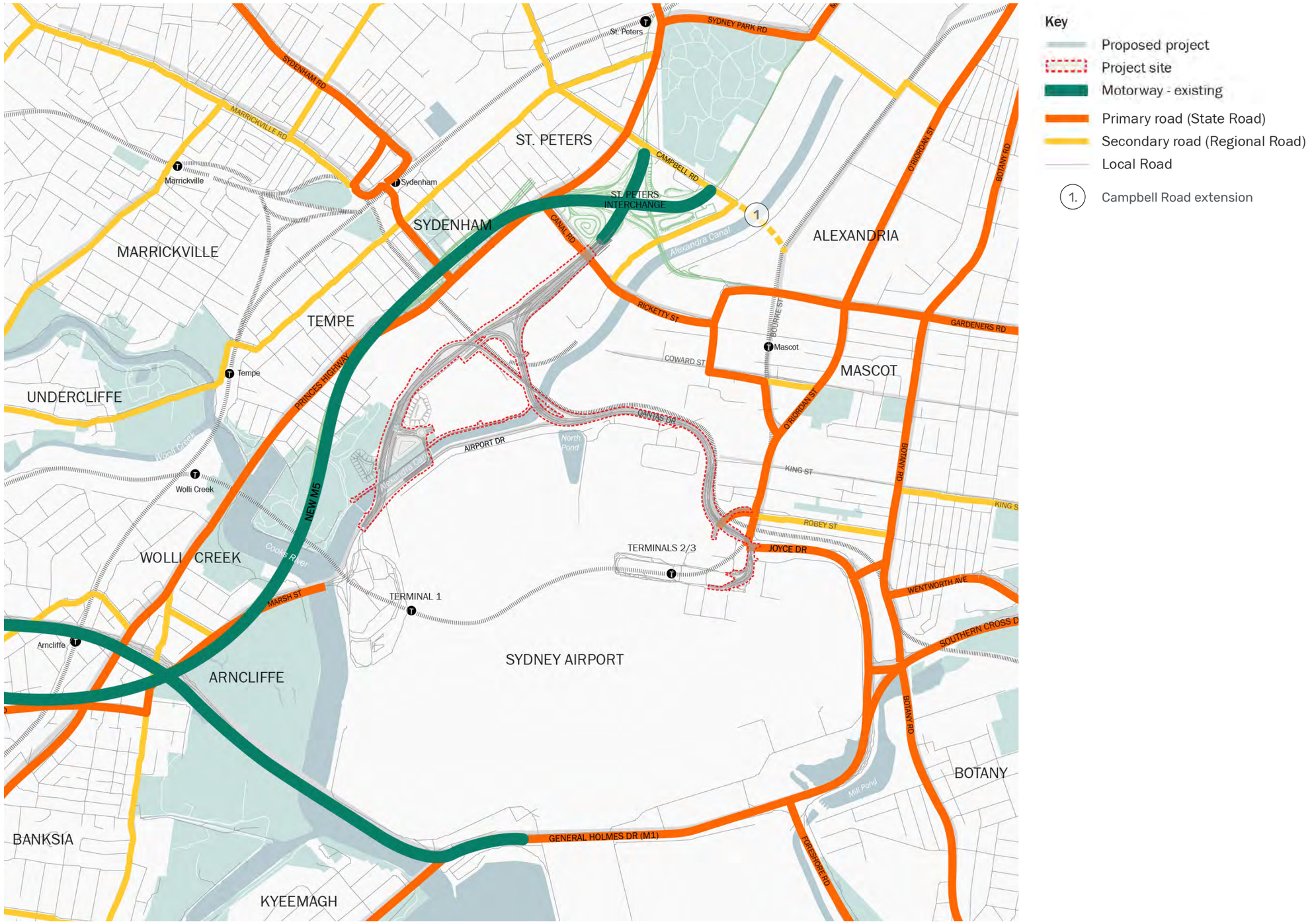

Figure 59. Road network in the project area

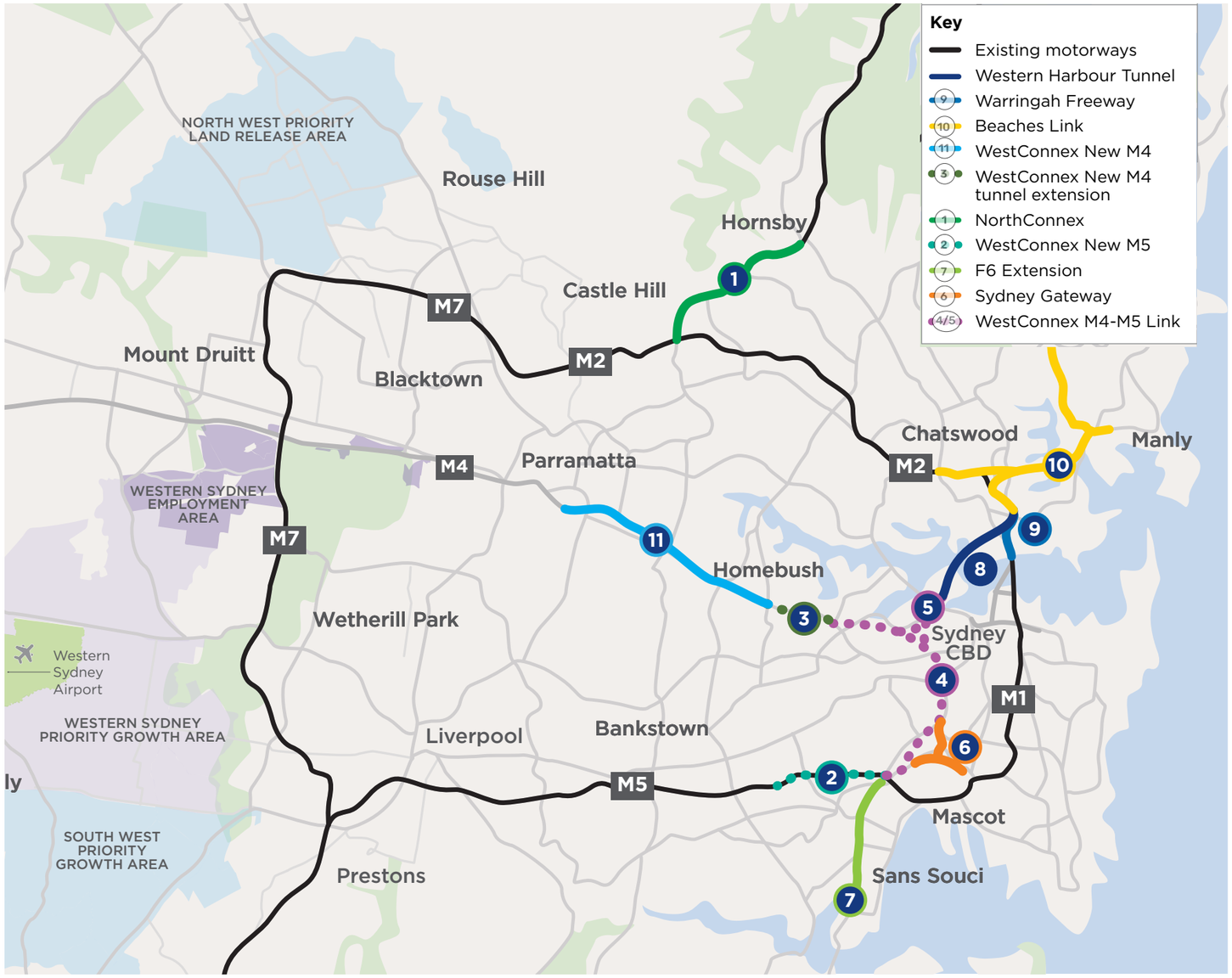

Figure 60. The Sydney motorway network showing projects portfolio as of August 2018

Source: Roads and Maritime Services 2018, pp 12-13

at St Peters, located on land bound by Canal Road, the Princes Highway, Campbell Road and Burrows Road - refer Figure 60.

The project involves augmentation of the existing arterial and local road network including the extension of Campbell Road across Alexandra Canal to provide an additional east-west link between the Inner West and the Sydney Airport precinct in Mascot - refer Figure 59.

4.7.3 Port Botany and Botany Rail Line

Port Botany is one of NSW's primary import and export gateways. It is strategic economic assets managed by Ports NSW. The port is located approximately eight kilometres south-east of the project site on the north-eastern shore of Botany Bay. The primary vehicular access route is via Foreshore Drive.

The Botany Rail Line is a dedicated freight rail line that connects Port Botany to major intermodal facilities at Tempe and Enfield, the Cooks River Intermodal Terminal and Enfield Intermodal Logistics Centre respectively. The Botany Rail Line runs parallel to Joyce and Qantas Drives and extends north-west through the centre of the project site towards Sydenham - refer Figure 62.

NSW Ports Master Plan 2030 anticipates a four-fold growth in container movements by rail. This demand is being met by duplication of the line under the Sydney Gateway rail project.

The Cooks River Intermodal Terminal directly adjoins the project site. It operates 24 hours per day, seven days a week and utilises rail to transfer containers to and from Port Botany and regional NSW. It also provides for empty container storage facility and a range of other container-related services.

4.7.4 Public transport

Public transport in the area includes - refer Figure 61:

- Sydney Trains suburban rail services
- State Transit (Sydney Buses) services.

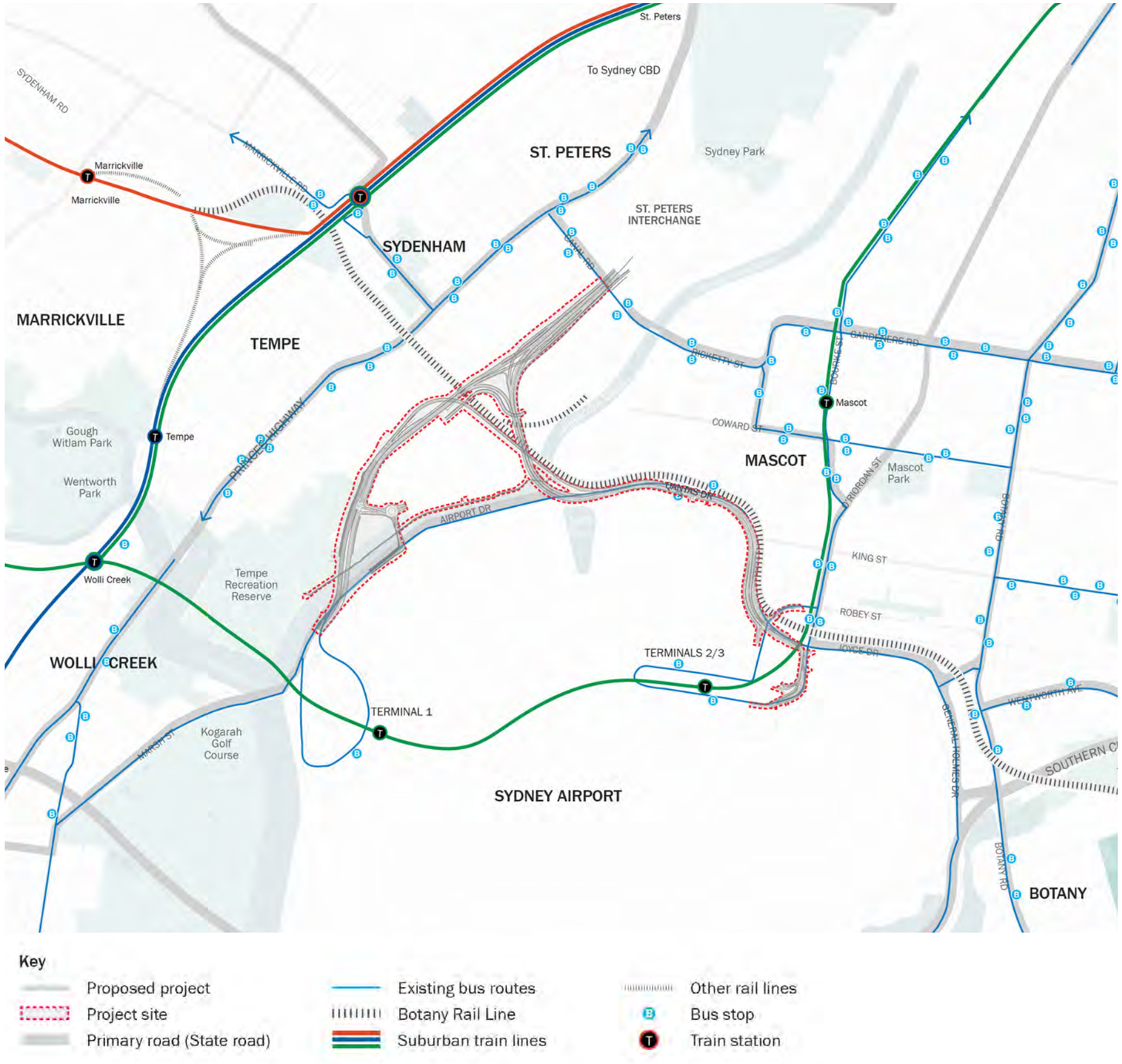

Figure 61. Freight and public transport network in the project area

Suburban trains

Three rail lines service the project area:

- The T3 Bankstown Line
- The T4 Eastern Suburbs and Illawarra Line
- The T8 Airport and South Line.

The T3 line connects the Sydney CBD with Lidcombe and Liverpool via Bankstown and the Inner West. Sydenham and St Peters are the closest stations to the project site. Sydenham station is an important interchange with both the T4 and T8 lines as well as Sydney Buses.

The T4 line connects the Illawarra and Sutherland Shire with the Sydney CBD and eastern suburbs. Wolli Creek is an interchange where passengers can change from the T4 to the T8 line, as well as Sydney Buses.

The T8 line connects the Sydney CBD with Campbelltown and Macarthur via East Hills, with stations at both Terminal 1 and Terminals 2/3. It passes under the project site (underground) near O'Riordan Street.

Sydney buses

The project area is well serviced by a network of bus routes connecting the airport and surrounding suburbs to the Sydney CBD, Eastern Suburbs, Inner West and Inner South. A number of these routes directly interface with the project site. They are:

- *420 Eastgardens to Burwood via Sydney Airport & Rockdale*, travelling along Airport Drive and Qantas Drive to access Terminal 1 and Terminals 2/3
- *400 Bondi Junction to Sydney Airport via Eastgardens*, using the same route as the 420 to travel around the airport, connecting the airport terminals with the eastern suburbs
- *418 Kingsford to Burwood via Mascot, Sydenham & Dulwich Hill*, travelling along Canal Road.

Sydney Airport has identified the opportunity to increase the provision of public buses servicing the airport, to further increase the attractiveness and competitiveness of public transport as a mode of access.

4.7.5 Active transport (pedestrian and cycle paths)

What is active transport?

Active transport refers to human powered forms of transport involving physical activity, namely walking and cycling. It is an increasingly popular transport option for shorter trips.

Existing active transport provision

Cycleways and shared pedestrian cycle paths

The only existing cycleway in the project site is the Alexandra Canal cycleway. It is an important route connecting southern Sydney with inner Sydney and the CBD.

In the wider project area, there is a series of on and off road cycle paths. The major off-road routes include - refer to **Figure 62**:

- The Alexandra Canal Cycleway
  Tempe Recreation Reserve to Coward Street in Mascot, to connects with the Bourke Road Cycleway. It also extends south along Marsh Street to connect with the M5 East Cycleway - refer **Figures 69 to 72**. A new elevated link from the cycleway to Terminal 1 has recently been completed and provides improved staff cycle access - refer **Figure 73**
- Routes incorporating the Alexandra Canal cycleway:
  - State Bicycle Route SBR06
    Glebe to Hurstville via Johnstons Creek, Newtown, Erskineville, Sydney Park, Alexandra Canal and Arncliffe
  - State Bicycle Route SBR10
    Edgecliff to Carinbgah via Centennial Park, UNSW, Mascot and Alexandra Canal
  - Regional Bike Route RBR21
    Camperdown to Mascot via Newtown, Enmore, Canal Road and Alexandra Canal
- Routes connecting to the Alexandra Canal cycleway:
  - Regional Bike Route RBR26
    Alexandra Canal to Maroubra Beach via Sydney Airport, Mascot shops, Eastgardens Shopping Centre and Maroubra Junction
  - The Cooks River Cycleway
    From the Cooks River around the perimeter of Tempe Recreation Reserve to connects to the Alexandra Canal Cycleway
  - The Cook Park Trail/Botany Bay Trail
    Along the foreshores of Botany Bay south of the project site

Notable for their absence are:

- A direct dedicated cycle link between Terminal 1 and Terminals 2/3. As a result, some people cycle along Qantas Drive which is an unsafe route (refer **Figure 63**)
- A dedicated cycleway linking the Coward Street cycle route from Bourke Road to Terminals 2/3.

It is noted that the existing Coward Street cycle link that connects Mascot to the Alexandra Canal cycleway is an on-road path of poor built quality. It is relatively unsafe due to high volumes of traffic, narrow path width and the many driveway crossings involved, making it a slow route for both commuters and recreational users.

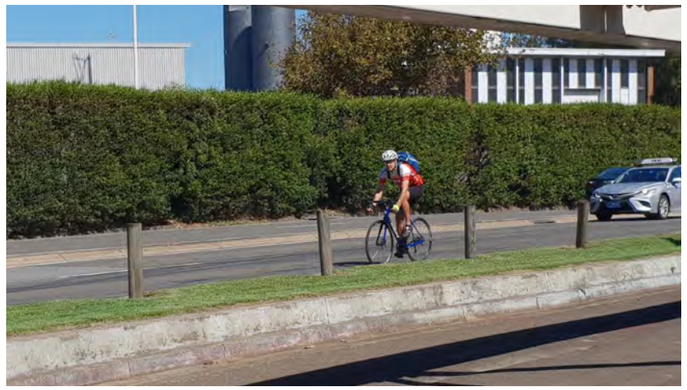

Figure 62. Cyclist riding east along the shoulder of Qantas Drive between T1 and T2/3

Footpaths

There is limited path provision within the project site, reflecting its location partly along physically constrained arterial roads and partly outside of existing road corridors.

Footpaths within the project site include along Robey Street, O'Riordan Street, Sir Reginald Ansett Drive and along the northern side of Qantas Drive.

The paths along Robey Street and O'Riordan Street fall short of present-day requirements in respect of paths widths and quality. Pavements are uneven and there is a the lack of shade and separation from busy arterial roads - refer **Figures 66, 67, 90** and **92**. The path along Qantas Drive is substandard for much of its length, being very narrow. At the southern end of the project area, footpaths over the Giovanni Brunetti Bridge, along Link Road and across the Alexandra canal footbridge at Tempe Recreation Reserve are busy pedestrian routes, used by airport employees, travellers and the general public.

There have been a number of recent footpath upgrades in the airport precinct including a new path along the western side of Seventh Street, the eastern side of Sir Reginald Ansett Drive, between O'Riordan Street and Robey Street along the southern side of Qantas Drive, and about 250 metres along the northern side of Qantas Drive east of O'Riordan Street. These path are sufficiently wide and accessible, yet they produce high levels of glare and lack amenity such as shade - refer **Figure 68** and **89**. The new path along the northern side of Qantas Drive connects to an existing narrow path that enables foot access between Robey Street and Alexandra Canal including for maintenance of advertising gantries - refer **Figures 65**.

Beyond the immediate project site, opportunities for walking are generally associated with public open space and residential areas, as well as employment areas in Mascot.

There are a number of hotels servicing Sydney Airport that are within walking distance of 800 metres or a ten minute walk to airport terminals, both in Mascot and in Arncliffe - refer to **Figure 64**. The limited and poor quality footpath provision undermines the potential for Sydney Airport to be a walk-to destination for passengers and crew staying at these hotels.

Planned active transport provision

New M5 project

The New M5 project includes an access and circulation strategy that will deliver the following active transport links in the vicinity of the project site - refer **Figure 63**:

- A separated shared path along the Campbell Road extension, providing a new east west connection between Bourke Road in Alexandria and May Street, St Peters
- A shared path along Euston Road between Campbell Road and Sydney Park Road
- Shared paths through the St Peters interchange connecting Sydney Park to Canal Road

- New footpaths to all streets surrounding the St Peters interchange.

Sydney Airport Master Plan 2039

A number of active transport improvements are planned at Sydney Airport, including:

- T1 planned improvements:
  - Provision of an elevated cycle path from the P7 multi-storey car park to Cooks River Drive and the Alexandra Canal Cycleway, including provision of bike storage and change rooms for staff (completed) - refer **Figure 73**
  - Marsh Street widening (by Roads and Maritime) including an additional dedicated cycle land (completed)
  - Future crossing at Link Road and Airport Drive to incorporate links to the Alexandra Canal Cycleway
- Terminals 2/3 planned improvements:
  - Improved access from Qantas Drive/Robey Street with shared crossings to the western and southern legs of the intersection
  - Widened footpaths and additional bike racks (completed)
- Inter-terminal and subregional links:
  - Pedestrian and/or cycle links between Alexandra Canal, the Qantas Jet Base and Robey Street to upgrade existing formal and informal paths (subject to funding and input from external parties including TfNSW and local councils for access to non-airport lands)
  - Potential inter-terminal and sub-regional links to improve access to and connectivity of the active transport network at Sydney Airport, in conjunction with TfNSW and local councils
  - Linkages to local councils' current and planned cycleways, including eventual links to the Princes Highway and improved access from Marsh Street to the Alexandra Canal Cycleway - refer **Figure 63**.

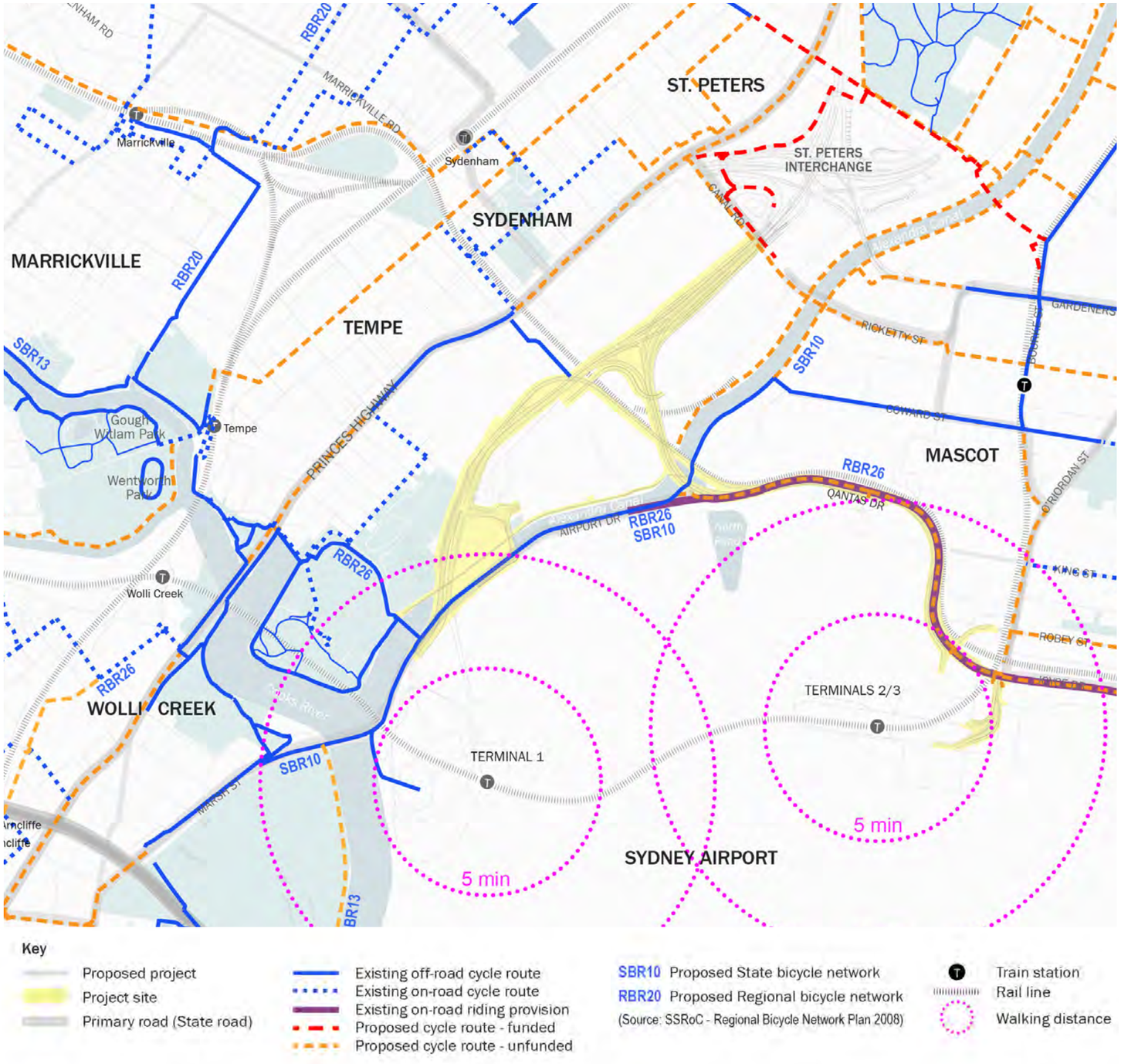

Figure 63. Active transport routes in the project area

Figure 64. The narrow footpath along Qantas Drive provides for maintenance access and a pedestrian link between Robey Street and Alexandra Canal

Figure 67. Recently upgraded footpaths such as along Sir Reginald Ansett Drive emit high levels of glare and lack pedestrian amenity

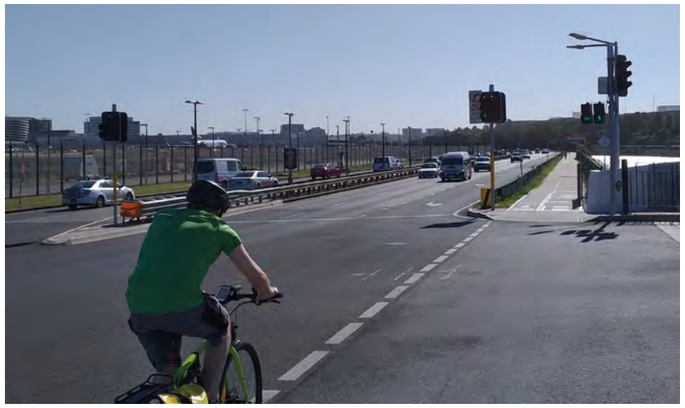

Figure 70. The Alexandra Canal cycleway at the Nigel Love bridge

Figure 65. The footpath along O'Riordan Street is uneven and poorly designed in terms of tree placement and unsafe driveway crossings

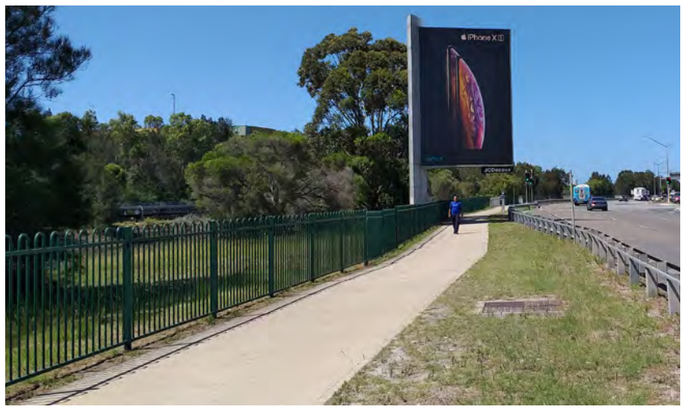

Figure 68. Alexandra Canal cycleway along Airport Drive

Figure 71. The Alexandra Canal cycleway at Shea's Creek underbridge

Figure 66. The footpath under the O'Riordan Street rail bridge is narrow and feels unsafe

Figure 69. Alexandra Canal cycleway south of Canal Road

Figure 72. New terminal link cycleway bridging over Cooks River Avenue

4.7.6 Why are transport networks important for urban design?

Aviation

- Airport operational and safety requirements result in a number of constraints on the locations and heights of built structures and vegetation, as well as in restrictions on external lighting
- The airport is a major employer, in particular for people in surrounding areas and the Sutherland Shire. There is a need to provide for ease of access with a range of transport options and modes including:
  - Improved vehicular access with reduced congestion
  - Increased public bus access including a greater number of services accessing the airport
  - Improved active transport access and connections to the surrounding local council cycle networks.

The road network

- The project provides a direct connection between the Sydney Motorway network and the airport
- The existing road network is integral to the experience of arriving at and departing from Sydney Airport. Yet, there is no single defined arrival point with people using a variety of routes depending on the origin of their journey and the terminal accessed. The project provides an opportunity to positively shape the arrival sequence along a defined route, to support a positive image of Sydney and Australia
- Local road network changes associated with the New M5 project are expected to improve east-west connectivity between the Inner West and the airport precinct in Mascot. This may result in increased traffic approaching Terminals 2/3 from O'Riordan Street. The visual experience of people accessing the airport along this route would need to be carefully considered in the development of the design
- The project needs to consider the ongoing need for ease of access via the existing arterial road network for people travelling to the airport from inner city areas, the Eastern suburbs, Inner South and Inner West:
  - The intersection of Qantas Drive, O'Riordan Street and Joyce Drive would remain a major point of arrival for many people from the inner city, Inner West and Eastern Suburbs
  - Marsh Street and the Giovanni Brunetti Bridge would continue to remain important gateways for people travelling to the airport from the Inner South/St George and Canterbury Bankstown areas.

Port Botany and Botany Rail Line

- The integrity of the Botany Rail Line is integral to the state's economy and must not be impacted by the project. The project would need to integrate operational, safety and other constraints associated with the rail line, including during project construction
- The proximity of the Botany Rail Line creates space constraints for the upgrade of Airport Drive and Qantas Drive respectively
- The duplication of the Botany Rail Line would result in a widened footprint. The interface between the rail and road upgrade projects along Qantas Drive would shape the physical form and visual appearance of the Sydney Gateway road project. The interface would therefore need to be carefully considered to ensure good urban design and visual outcomes, befitting to the "gateway" nature of the project.

Public transport

- The project would not affect train services to the airport. The underground alignment of the T8 Airport and South Line poses a design and construction constraint around O'Riordan Street. Consultation with Sydney Trains (and the operator of the line) would be required to seek details of specific requirements to protect rail tunnels
- Public transport by bus is an important and affordable transport option to the airport, in particular for travellers and staff. There is a need to preserve easy and convenient bus access, including connections from the arterial road network to the terminals and employment areas such as the Qantas Jet Base
- There is a need to ensure access to bus transport by planning for the provision of bus stops along the route to meet future demand. Examples for consideration include additional stops at the Tempe Lands or at Swamp Road (IKEA/Decathlon).

Active transport

- The section of Alexandra Canal Cycleway along Airport Drive is an integral component of a number of existing cycle routes, as well as facilitating connections between a number of other routes. There is a need to maintain existing cycle connectivity and convenience, to increase cycling as a transport option for short trips as per the *Sydney's Cycling Future* (also refer section 2.4.4)
- The project offers the opportunity to implement a strategic cycle link as per *Sydney's Cycling Future* (refer section 2.4.4)
- The upgrade of Qantas Drive would remove the cycle connection from the Alexandra Canal cycleway to Qantas Drive. However Qantas Drive is currently a poor cycle route option with very limited use
- There is a need to improve cyclist and pedestrian connectivity to and around the airport and in particular to Terminals 2/3, from Mascot, Tempe and the St George Area:
  - The project may offer potential to investigate opportunities for a northern cycle link around the airport in parallel to Qantas Drive, consistent with existing policy documents. Such a link would provide a second east-west connection around Sydney Airport that would avoid the need for cyclists to use road tunnels such as the runway underpass at General Holmes Drive. Provision of this link would provide a safe, viable, efficient and convenient route between the western and eastern parts of the project area, including between Terminal 1 and Terminals 2/3, to airport employment areas, as well as the wider regional cycle network
  - The Coward Street cycle link in its existing form is unsuitable as a major link to the airport due to its poor built form and indirect route
  - The project highlights the need to investigate and integrate provision for a dedicated cycle facility from Terminals 2/3 to the Coward Street cycle path at Bourke Road, as a means to improve access to inner city areas
  - There is a need to maintain existing footpath connections such as the path to the Qantas Jet Base along Qantas Drive, and the link between Tempe Recreation Reserve and the freight terminal via the Alexandra Canal footbridge/Link Road pedestrian crossing
  - There is a need to improve pedestrian connections between nearby hotels servicing the airport, both in Mascot and in Wolli Creek, to provide a high quality and amenity link to Terminal 1 and Terminals 2/3 respectively
- There is a need to consider and plan for safe and convenient access to shared paths from the surrounding road system.

4.8 THE VISUAL SETTING

4.8.1 Views and view corridors

Views are shaped by the interplay of landform, built structures and vegetation - refer Figure 73.

Eastern project area

The eastern project site is largely enclosed by buildings, the Botany Rail Line, advertising billboards and adjoining vegetation cover. As a result, views tend to be limited to areas along the road corridor - refer Figure 73. A notable exception is the long-distance view through Sydney Airport from Joyce Drive to the Tempe Water Tower - refer Figure 74.

Western project area

The western project site is generally more open, with expansive views along and across Alexandra Canal and the expanse of the airport's runway sector and largely undeveloped Northern Lands.

Views from the project site

Airport Drive currently affords views in all directions. They include views along and across Alexandra Canal towards Tempe Recreation Reserve, the Tempe Lands, container storage areas and the airport's Northern Lands, all of which include a notable landscape component - refer Figure 18, Figure 19, Figure 27 and Figures 40-43. Sydney Airport features strongly in the view, but views are highly variable along the length of Airport Drive, owing to the changing land uses and built form within the airport. Long-distance views are possible along the main runway through airport boundary fencing - refer Figure 73. Similarly, North Precinct Road provides for views in all directions. However, access is limited to Sydney Airport staff.

Views of and across the project site

Elevated areas along the Princes Highway have panoramic views across the flat and low-lying land around Sydney Airport including long-distance views ranging from the Sydney CBD to Bondi Junction, Randwick and Botany - refer Figure 73.

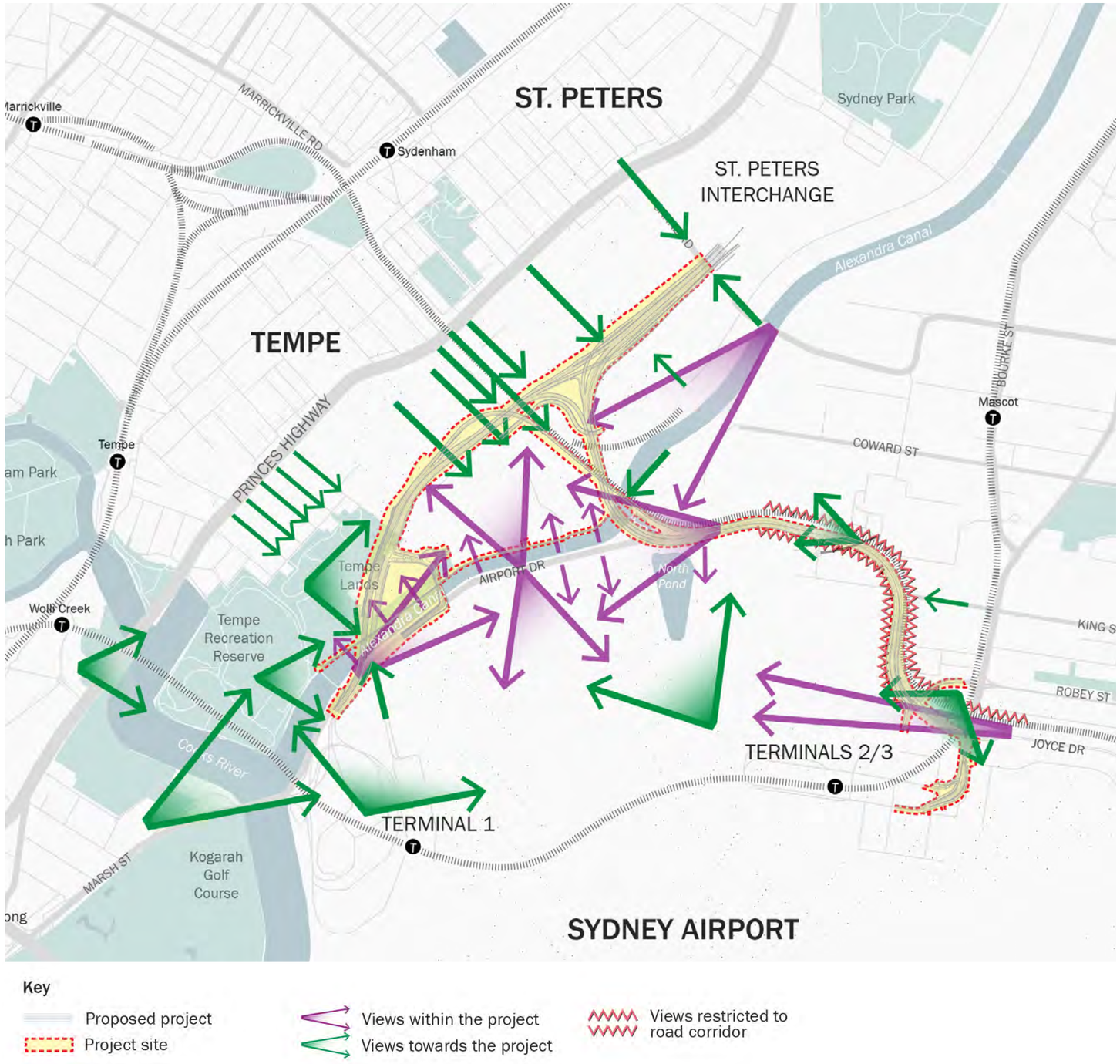

Figure 73. Important views in the project area

4.8.2 Views of the project

The project would be visible from within the project site, as well as from a number of places in the wider project are:

- Public roads within the project site:
  The project would be visible from Airport Drive (refer **Figure 76**), Qantas Drive, Joyce Drive, Swamp Road, North Precinct Road and Canal Road (refer **Figure 33**)
- Roads surrounding the project site:
  Roads with views of the project include southern Airport Drive and Marsh Street/the Giovanni Brunetti Bridge (refer **Figure 81**), Link Road (refer **Figure 218**) North Precinct Road (refer **Figure 224**), the Princes Highway (refer **Figure 223**), Bellevue Street, Talbot Street, the unnamed road opposite George Street in St Peters, Burrows Road South and the Canal Road/ Ricketty Street bridge over Alexandra Canal (refer **Figure 35**)
- Public open space:
  The project would be visible from the Tempe Lands (refer **Figure 220**), Tempe Recreation Reserve (refer **Figure 217**) and Cahill Park, as well as from the Alexandra Canal cycleway (refer **Figure 79**)
- Residential areas and hotels:
  Existing safety fencing associated with the Tempe Golf Range and Academy is visually prominent in nearby residential streets including Station, Hart, Wentworth, Fanning, Barden and Smith Streets. This suggests that the project may potentially be visible from these areas. It would also be visible from high-rise apartments and hotels in Arncliffe, Wolli Creek and Mascot.
- Other places:
  - The IKEA store and parts of the car park (refer **Figure 76**)
  - The Qantas Heritage Collection on Level 1 of Terminal 3 (refer **Figure 77**)
  - Multi-storey car parks within Terminal 1 precinct (refer **Figure 78**)
  - Employment areas including at Sydney Airport and businesses in surrounding areas, including their staff and customers.

Why are views important for urban design?

The visibility of the project from surrounding areas has informed the selection of viewpoints for the assessment of the project's potential visual impacts - refer **Chapter 8**.

Figure 74. View from Joyce Drive towards the Tempe Water Tower

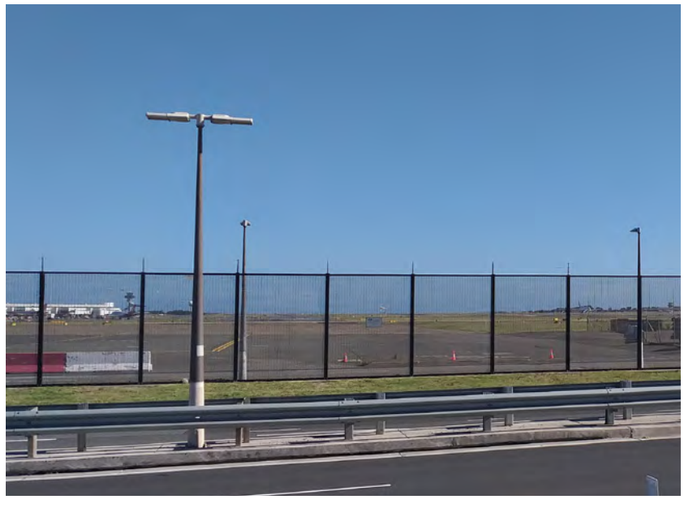

Figure 75. View of the runway from Airport Drive

Figure 76. View towards the project site from the IKEA upstairs foyer

Figure 77. View towards the project site from the Qantas Heritage Collection

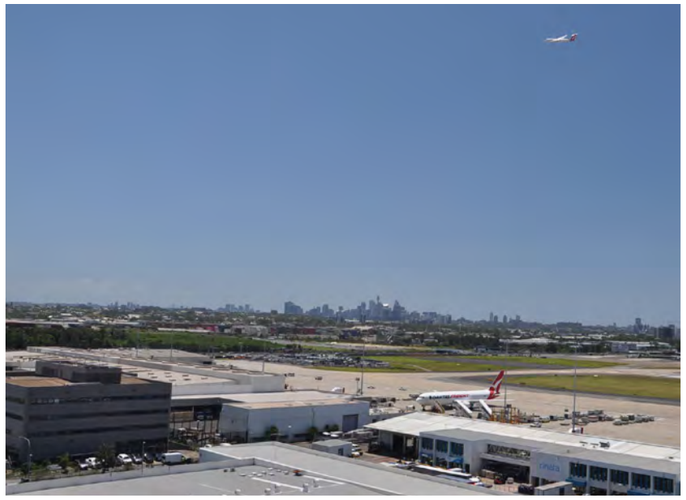

Figure 78. View towards the project site from the P2 car park, a popular plane spotting location

Figure 79. View of the project site from the Alexandra Canal cycleway crossing at Tempe Recreation Reserve

4.8.3 The visual experience

The project area plays a significant role as the gateway to and from Sydney, and Australia. Wrapping around the airport, the project would be experienced from the air and from the ground, by passengers, visitors, employees and commuters - refer **Figure 80**.

The visual experience from the air

The experience of the project area from the air is an important consideration. Sydney Airport estimates that in 2017, it conveyed some 43.3 million plane passengers. This number is expected to increase to 65.6 million in 2039, 52 per cent of whom are anticipated to be international travellers (Sydney Airport 2018a).

A defining component of the arrival experience is the approach over the Pacific Ocean, either from the north crossing Sydney Harbour, or from the south across Botany Bay. The interaction of the water body, its transition into the smaller waterways of the Cooks River and Alexandra Canal, and the relationship to the green bodies of vegetation and open space as well as to the suburbs through which they form defined ribbons, is a key contributor to this experience. It provides the first impression of Australia for the arriving visitor and returning residents, or their final impression as they depart Sydney.

The project provides a unique opportunity to both strengthen and shape this experience through interventions at the ground that can be understood both when travelling in the air and moving along on the ground.

The visual experience from surrounding roads

Sydney Airport estimates that the number of arriving and departing passengers in 2018 was up to 145,000 on a busy day. 15 per cent of these passengers connect with another flight, while the remainder travels to or from Sydney Airport via land. In 2018, up to 93,670 passengers per day, or 27.78 million passenger per year, travel to the airport via the public road network, using a combination of cars, taxis, ride share, coaches, mini-buses, shuttles and public buses (Sydney Airport 2018a). This number does not account for other visitors to the airport, including those meeting and farewelling travellers, or the 30,900 staff working on airport grounds and commuting to and from work every day.

The current road network and its visual character is therefore crucial in shaping the experience of arriving at and departing from Sydney Airport, including for significant numbers of international visitors.

As described in **section 4.7.2** and illustrated in **Figure 80**, the primary access routes to the airport are via Marsh Street, Joyce Drive and O'Riordan Street, combined with Qantas Drive/Airport Drive to access either Terminal 1 or Terminals 2/3.

The current visual experience of travelling along these routes to arrive in the project site is described in the following sections.

Marsh Street

Traffic from the south and south-west converge on Marsh Street to access Sydney Airport. Despite roadworks to reduce congestion, Marsh Street experiences significantly congestion and delays during peak times, including on Sunday mornings when traffic at the M5 interchange is often managed by the police.

From a visual point of view, Marsh Street provides an interesting and diverse experience. It is shaped by the contrast between the infrastructure environment of the road corridor, residential housing in Arncliffe and public open space on both sides of the road corridor including Marsh Street Reserve, Cahill Park and Kogarah Golf Club.

While the parts of Kogarah Golf Club adjoining Marsh Street is currently used as a temporary works area for construction of the New M5, the golf course ordinarily provides a large expanse of green space with an attractive combination of fairways separated by rows of trees and ponds.

On the eastern side of Marsh Street is a combination of traditional single-storey suburban housing and multi-storey apartments and hotels north of Innesdale Road that limit views to the west.

Views open out dramatically north of the Marsh Street turn-off to Kogarah Golf Club, where the road rises up towards the Giovanni Brunetti Bridge over the Cooks River - refer **Figure 81**. The combination of the width of the river and adjoining parklands with limited built structures provides expansive views to the west over the Cooks River and Tempe Recreation Reserve, north along Alexandra Canal towards the Sydney CBD, and east along the Cooks River and towards the airport. Airport buildings in the North

West sector feature prominent in the view including multi-storey car parks and the Rydges Hotel.

Qantas Drive/Airport Drive

Marsh Street becomes Airport Drive at the Giovanni Brunetti Bridge. Airport Drive in turn becomes Qantas Drive where the alignment becomes parallel with the Botany Rail Line.

Qantas Drive and Airport Drive tie the precinct together to link around the airport, connecting Terminal 1 and Terminals 2/3. They also carry significant commuter traffic. The experience of the route around the airport therefore shapes the perception of both travellers and local or regional traffic passing through the area.

Despite the seamless transition between the two roads, Airport and Qantas Drives offer a distinct visual experience.

Airport Drive

Airport Drive is characterised by a generally open environment. The open water body of Alexandra Canal allows for long-distance and often panoramic views, both along and across the canal. Open space and undeveloped areas in the Northern Lands feature prominently and the Sydney CBD can be seen in the background - refer **Figure 27**, **Figure 33**, **Figure 40**, **Figure 42**, **Figure 43**, **Figure 49**, **Figure 79** and **Figure 82**.

On the southern side of Airport Drive Sydney Airport is a constant presence. Perimeter hedges somewhat limit ground-level views into the North-West Sector although airport buildings and structures are easily seen above the hedges - refer **Figure 48**. More elevated viewers such as truck drivers or bus or coach passengers would likely have more open views into airport lands.

In the section north of Qantas Freight and within the runway sector, the airport perimeter is marked by visually transparent security fencing that allows for open panoramic views both along and across the runway and taxing areas to the terminals, cargo and maintenance facilities surrounding the runway - refer **Figures 66** and **Figure 75**. The overall impression is of a vast open landscape where the sky predominates.

The constant presence of Alexandra Canal is a key element that defines the experience of Airport Drive. In combination with utilities, built elements and the presence of aeroplanes provides for a visually diverse and exciting environment that is well balanced between infrastructure and natural elements.

Figure 80. Main access routes to Sydney Airport

Qantas Drive

The experience of Qantas Drive is in contrast with Airport Drive: Views along Qantas Drive are contained by built structures and vegetation along the edges of the road corridor. Combined with the winding road alignment, only short sections of the road corridor can be viewed at any one time. The view is constantly changing as the motorist travels around bends and new elements are revealed in the view - refer **Figures 23** to **26, Figure 44 and Figure 83**.

Roadside vegetation on the southern side includes a mix of native and exotic species in an almost continuous band adjacent to the west-bound carriageway. It includes a large number of mature trees including species of *Eucalyptus*, *Casuarina* (she oak) and *Melaleuca* (paperbarks), as well as a number of very large Hills Weeping Fig trees (*Ficus microcarpa var hillii*) near the Qantas Jet Base and Flight Training Centre - refer **Figure 23**. A large fig tree is also located on the corner of Seventh Street and makes an important contribution to the streetscape - refer **Figure 26**.

The dense planting along the southern side of Qantas Drive gives the road an almost domestic character and shapes the experience of travelling along it. Roadside trees and vegetation:

- Provide a visual buffer that is effective in concealing and mitigating the height of adjoining buildings, some of which are in excess of six storeys tall
- Provide visual relief and an attractive green counterpoint to the built environment within and surrounding the airport.
- Form a green backdrop to the road corridor
- Mitigate the scale of the road corridor and advertising gantries
- Reduces the visual prominence of the Lancastrian Bridge - refer **Figure 83**).

Roadside vegetation along the northern side of Qantas Drive includes of mature and semi-mature trees that alternate with large advertising structures (also refer **section 4.4.5**) with low groundcover planting at their base. The combination of advertising billboards and planting conceals the presence of the Botany Rail Line, which is only discernible when a train is passing by.

Between King Street and Robey Street, advertising structures and billboards are less frequent. Instead, dense vegetation grows between the east-bound carriageway and the rail line - refer **Figure 24 and Figure 25**.

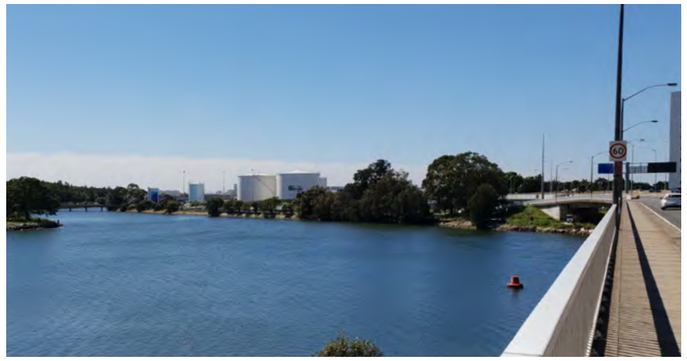

Figure 81. The approach to Sydney Airport from Marsh Street - Giovanni Brunetti Bridge

Figure 82. View towards the Sydney CBD and into airport land from Airport Drive

Figure 83. Mature figs overhang Qantas Drive and partially conceal the Lancastrian Road overpass

Figure 84. The expansive landscape along Joyce Drive is punctuated by tall buildings and advertising structures

Figure 85. O'Riordan Street looking towards the Botany Rail Line and Terminals 2/3

Figure 86. O'Riordan Street dips below the Botany Rail Line before the airport comes into view

Overall, it is the mix of built structures alternating with mature trees that characterises the experience of Qantas Drive: the viewer's eye is drawn from one group of trees to the next as they are revealed along the winding alignment of the corridor.

Joyce Drive

Traffic approaching Sydney Airport from the north and east converges on Joyce Drive. Like Qantas Drive, the northern side of Joyce Drive is lined by steel advertising frames that together with low hedges, tall shrubs and trees separate the road corridor from the Botany Rail Line. They increase in height from General Holmes Drive towards O'Riordan Street. The generally lower vegetation cover north of the rail line results in a more open character where the sky is a larger component of the view, punctuated by multi-storey buildings in Mascot and the airport's North-East sector, as well as by the large billboard that spans across the rail line on the approach to O'Riordan Street - refer **Figure 84**.

The southern side of Joyce Drive is relatively open with a mix of fast food outlets and other businesses with large parking areas that allow for views towards airport lands. Advertising for fast food outlets is prominent. There are multi-storey buildings near the intersection with Sir Reginald Ansett Drive, including the Ibis and Mantra Hotels. Visual relief is provided by a group of gum trees, followed by formal palm tree and hedge planting at the entrance to Terminals 2/3 - refer **Figure 28**.

An important component of the experience of Joyce Drive within the project site is the long-distance view through airport lands and towards the Tempe Water Tower - refer **Figure 74**.

O'Riordan Street

The experience of O'Riordan Street is characterised by the highly urban setting containing a variety of land uses and development intensities. South of High Street and within the project site, there is very limited landscape, resulting in a harsh and unmitigated urban environment, lacking architectural and functional cohesion.

The harsh character is further exacerbated by ongoing construction activities both within and adjoining the road corridor, creating noise, visual clutter and dust that further reduce the visual and physical amenity of O'Riordan Street - refer **Figure 86**. Construction within the road corridor is part of the Airport North Precinct Upgrade and is changing the section south of Robey Street from two-way to one way south-bound.

Views from O'Riordan Street are largely contained within the road corridor and terminated by the advertising structures associated with the Botany Rail Line bridge over O'Riordan Street. The Stamford Plaza Airport Hotel is a visually prominent multi-storey building on the western side - refer **Figure 85**. As a result of the advertising structures on the rail bridge, there are no visual clues as to the physical proximity of the airport. The airport only comes into view after passing under the rail bridge, when the Terminals 2/3 welcome gantry and landscaped entrance markers are suddenly visible - refer **Figure 28**.

Passing under the rail bridge, the vertical alignment of O'Riordan Street dips lower. Below the bridge, O'Riordan Street takes on an almost tunnel-like character and is experienced as a pinch point - refer **Figure 86**. The openness created by the wide expanse of Joyce Drive on the southern side of the bridge is in stark contrast.

Sir Reginald Ansett Drive/Keith Smith Avenue

Sir Reginald Ansett Drive is the entrance to Terminals 2/3. It has recently been reconfigured into a five lane one-way road to the terminals. The entrance is marked by a mix of formal and informal planting with sandstone feature walls, gantries with welcome and directional signage and the AMG Mercedes Benz car dealership - refer **Figure 28**.

Advertising and wayfinding signage are important visual elements, as is the mature vegetation along the edges of the road. It strongly shapes the arrival experience by framing views, and screening and mitigating nearby built structures - refer **Figure 87**. Vegetation consists of formal and informal planting with a strong Sydney character including fig trees, Cabbage Palms, magnolias and eucalyptus species - refer **Figure 31, Figure 32** and **Figure 33**. The result is a strong experience of landscape until the Terminals 2/3 parking stations come into view at the junction with Ninth Street and Keith Smith Avenue.

Seventh Street

Seventh Street is the exit route from the Terminals 2/3 precinct. It comprises five north-bound travelling lanes increasing to six lanes at the intersection with Qantas Drive.

The overall character of the road corridor is utilitarian. The multi-storey terminal car park building is a large structure on the western side. Land to the east is planned for a future hotel development and currently used for car parking, allowing for views to multi-storey buildings in Mascot. In the open setting, advertising, wayfinding gantries and structure such as a mobile phone tower are visually prominent. Visual relief is provided by mature vegetation associated with the Botany Rail Line, that provides a green backdrop at ground level- refer **Figure 88**.

Robey Street

Robey Street is the main route for vehicular traffic heading north towards the inner southern suburbs after leaving Terminals 2/3. The experience of Robey Street within the project site is defined by the Robey Street underbridge (also refer **section 4.5.2**), vegetation in Coleman Reserve and along the railway embankment, and the Stamford Plaza Airport Hotel.

The clearance under the rail bridge is low with poor visual and physical amenity under the bridge - refer **Figure 91**. Vegetation on the rail embankments and in Coleman Reserve provides some visual relief - refer **Figure 89**. The northern end of Robey Street is characterised by a harsh open streetscape character, only partially mitigated by mature palm trees associated with the Stamford Plaza Hotel arrival plaza - refer **Figure 90**. At the time of writing this report, the site to the north of Robey Street is undergoing redevelopment.

4.8.4 Why is this important for urban design?

- The project site shapes the first - or last - impression for people arriving or departing from Sydney:
  - Careful consideration needs to be given to how the project presents to viewers in the air
  - The design of elements within the road corridor itself, as well as that of adjoining structures, plays a crucial role in the experience of the motorist, and the degree to which it would be a positive experience
- Greencover and open space provide important visual relief and an attractive backdrop that positively contributes to shape the "gateway" experience
- Built structures such as advertising billboards can be used strategically to frame views and to visually separate the road corridor, to reduce the perceived scale of the infrastructure environment
- Strategically located mature trees have the potential to frame views, mitigate the scale of built structures and provide visual relief to balance the infrastructure environment and create a positive experience.

Figure 87. Stands of mature fig trees and cabbage palms between Sir Reginald Ansett Drive and Shiers Avenue are an important streetscape element

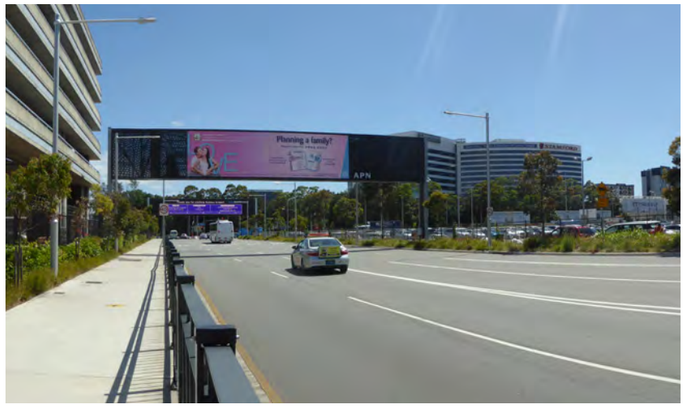

Figure 88. Looking north along Seventh Street

Figure 89. Robey Street looking north, showing Coleman Reserve and the narrow poor quality footpath against the kerb

Figure 90. Landscaping at the entrance to the Stanford Plaza Airport Hotel in Robey Street

Figure 91. The Robey Street rail bridge

4.9 LANDSCAPE CHARACTER ZONES

The landform and vegetation, views, settlement pattern and built structures in the wider project area combine to define the landscape character. Based on the analysis in the preceding sections, a number of distinct landscape character zones (LCZ) are identified. They are:

1. Terminal precincts
2. Greenspace
3. Alexandra Canal
4. Runway precinct
5. Freight and industrial
6. Residential
7. Warehousing and employment
8. Motorway
9. Airport support

The LCZs are illustrated in **Figure 92** and described in the following sections.

Landscape Character Zone 1: Terminal precincts

This LCZ is comprised of the Terminal 1 and Terminals 2/3 precincts, constituting the major built up areas of Sydney Airport land. Their urban form with terminal buildings, multi-storey car parks, freight and logistics buildings, fuel and maintenance facilities organised by a network of roads is distinct from airport lands associated with the runways. The western terminal precinct is further characterised by its close physical and visual association with Airport Drive and Alexandra Canal. The low-lying open landscape would be sensitive to any changes, as they would be visible from a large area.

The terminal precincts are associated with significant heritage values, as is Sydney Airport in general (refer **section 4.5.2**). They include landscape and visual values derived from the flat open "big sky" landscape, contrasting built form and plane movements, as well as social values derived from the airport's ongoing influence on the physical, social and economic development of the surrounding area.

The Robey Street underbridge and O'Riordan Street underbridge are two further, state-level listed, heritage items in this zone.

The combination of a high level of heritage significance and the large number of people experiencing this zone, either for work or travel, results in a high level of sensitivity.

The sensitivity of LCZ 1 is **high**.

Landscape Character Zone 2: Greenspace

The Greenspace LCZ is characterised by public open space including Tempe Recreation Reserve, the Tempe Lands, St Peters interchange, Sydney Park, Cahill Park and Kogarah Golf Course. With the exception of the more enclosed and densely vegetated Tempe Wetlands, public parks are characterised by large open turf areas dedicated to recreational activities. Open areas are punctuated by tree planting including both specimen planting and mass plantings. The generally flat and open setting allows for expansive views including of Alexandra Canal, resulting in a close physical and visual relationship between LCZ 2 and LCZ 3, and the western LCZ 1.

LCZ 2 also includes planned public open space within the St Peters interchange, undeveloped land adjoining the Goodman St Peters business park and the triangular piece of vacant land between Airport Drive, Alexandra Canal and the Botany Rail Line. While this land is not public, it has a park-like character with a mix of open grass areas and stands of trees.

Greenspace provides important recreation facilities and opportunities for access to nature. Within the intensely developed surrounding urban environment, it provides important visual relief and respite.

The sensitivity of LCZ 2 is **high**.

Landscape Character Zone 3: Alexandra Canal

This LCZ includes Alexandra Canal, its embankments and associated strip of greenspace including on privately owned land. Alexandra Canal is an important heritage item with a range of well documented visual, physical and scientific values including its unique cultural landscape. Key attributes from a landscape character perspective are the wide open water body, mature trees and other vegetation that give the canal a green edge, the vistas along the canal, and the open air space above. The setting contrasts strongly with surrounding precincts with their dense built form that punctuates the sky and limits views, providing visual relief and a sense of access to nature. The heritage-listed

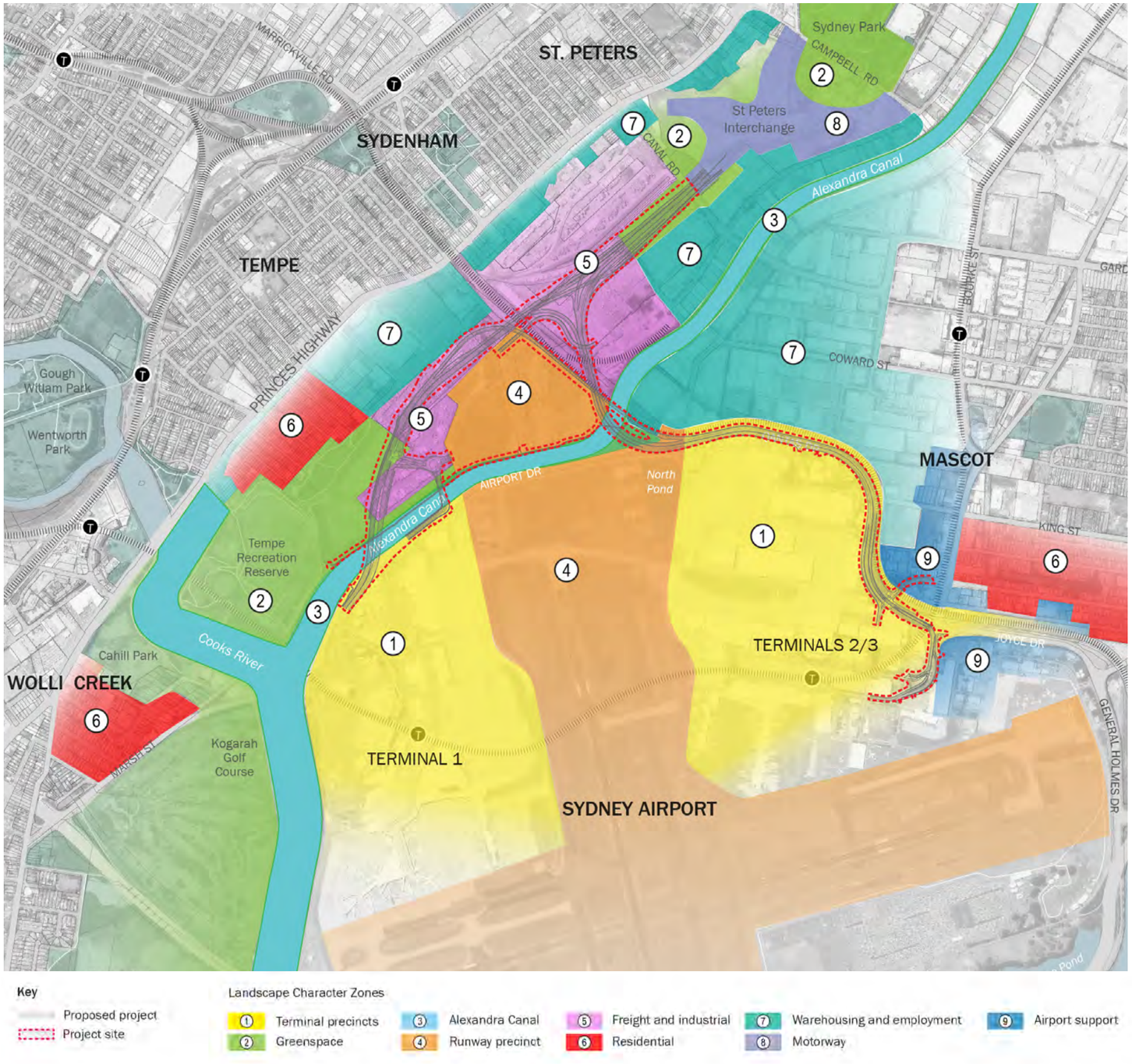

Figure 92. Landscape character zones

Shea's Creek underbridge is also located in this zone (refer section 4.5.2).

The sensitivity of LCZ 3 is high.

Landscape Character Zone 4: Runway precinct

The runway precinct comprises the main runway, the Northern Lands and the cross runway. The zone is characterised by the flat and low-lying topography and a general lack of vertical form due to airspace limitations, with the exception of minor elements such as fencing and HIAL.

The ground plane is variable consisting of large paved areas for taxing, take-off/landing and car parking, as well as turfed areas between runway and taxing areas, and low-growing vegetation in the Northern Lands. The wide open sky is a key character element against which planes can be observed taking off and landing.

As noted in section 4.5.2, Sydney Airport has a range of heritage values that include both the contemporary airport and its stages of history and development. The runways are identified as the most aesthetically distinctive part of the airport by the heritage Statement of Significance which also identifies the importance and aesthetic presence of the 'big sky' landscape.

Despite high levels of heritage significance, the zone retains an industrial and somewhat unkempt character. It is experienced by a large number of people travelling through the zone, either for work or travel, resulting in an overall moderate level of sensitivity.

The sensitivity of LCZ 4 is moderate.

Landscape Character Zone 5: Freight and industrial

This zone is characterised by heavy freight and industrial uses including the Cooks River Intermodal Terminal, the Boral St Peters facility, the Tyne container storage site and the Botany Rail Line. Much of this zone provides a backdrop to and contrast with the runway precinct in LCZ 4, derived from both the rising landform and three dimensional structures that include the concrete batching plant in the Boral St Peters facility, and stacked shipping containers within the Cooks River Intermodal Terminal and the Tyne Container storage site. Shipping containers are a colourful and ever-changing element in the landscape that act as a reminder of the nearby port functions. Built elements also include a number of sheds and other buildings in the Cooks River Intermodal Terminal, a number of which are identified as having heritage significance.

While the zone has a heavy industrial character, its heritage values and shipping containers are signifiers of important port activities. Together with the colourful contribution they make to the character of the surrounding area, combine to a moderate level of sensitivity.

The sensitivity of LCZ 5 is low.

Landscape Character Zone 6: Residential

The primary residential area near the project is a series of residential streets off the Princes Highway in Tempe that terminate at the Tempe Lands. They feature primarily single family traditional dwellings on small blocks. Despite the proximity to major transport corridors such as the Princes Highway and the airport itself, this neighbourhood is relatively quiet, being buffered from the Princes Highway by a strip of commercial premises and with very little through traffic. The zone also benefits from the adjoining greenspace areas, with views along the streets terminated by dense vegetation in the Tempe Lands, increasing the sense of seclusion.

Other residential areas include Wolli Creek, south of the Cooks River. Wolli Creek is an urban renewal area and features many medium and high rise buildings, as well as hotels overlooking the project site, surrounding waterways and open space.

Finally, there are areas of traditional single dwelling houses near the Botany Rail Line and east of O'Riordan Street in Mascot.

Owing to its fine grain residential neighbourhood character framed by vegetation in greenspace areas, the sensitivity of this zone is high.

Landscape Character Zone 7: Warehousing and employment

Warehousing and employment is a large character zone that interfaces with the project in a number of areas. The zone is comprised of employment areas in Tempe and Mascot including manufacturing and light industrial, business parks, warehousing, car parking, catering, logistics and freight, and a range of business linked either directly or indirectly to Sydney Airport. The zone also includes a number of large retail warehouses including IKEA, The Good Guys, the Salvos Store and Decathlon. Situated in an elevated location along the Princes Highway, they enjoy an outlook over the low-lying areas within Sydney Airport and its perimeter, including over LCZs 1, 3, 4 and 5.

The unifying characteristics of the zone are the large subdivision pattern, its employment focus and associated vehicle volumes servicing the various businesses. Despite intense development, the zone retains significant tree cover along the lot boundaries and street frontages, defining views within the area. Mature trees have remained a constant form in a precinct that is undergoing significant urban change and redevelopment in response to the changing economic and business landscape.

Overall, the sensitivity of this zone is considered to be low.

Landscape Character Zone 8: Motorway

LCZ 8 is the area associated with road infrastructure in the St Peters interchange, currently under construction. This zone is specifically dedicated to providing improved road transport. It is therefore designed to accommodate the changes that would result from the project.

The sensitivity of this zone is low.

Landscape Character Zone 9: Airport support

The airport support zone is a small character zone at the eastern end of the project. It is characterised by land uses that directly service the airport or passing traffic, being located along arterial roads with high traffic volumes. Uses include primarily commercial and accommodation such as hotels, serviced apartments, park and fly, logistics, car sale and hire businesses and food outlets as strip development with visual exposure to Joyce Drive. The quality of the public domain is mixed with low levels of amenity and vegetation north of the Botany Rail Line, and higher levels of amenity and presentation around the Terminals 2/3 precinct. Built form is highly variable and continually changing in response to economic needs, undermining a clear sense of place or identity in the area north of the Botany Rail Line. The majority of the environment is designed to meet the needs of vehicular through traffic: the arterial road setting and prominent advertising are the major unifying features.

Overall, the sensitivity of this zone is considered low.

CHAPTER 5

Project Description

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5.1 CHAPTER OVERVIEW

The project description provided in this chapter represents the preferred concept design for the project. The key features of the project are described based on this design. The concept design defines a constructible project that provides a sound basis for developing the detailed design to the standard required to support project delivery. Sufficient flexibility has been provided to allow for the design to be refined during the detailed design stage, where relevant, to improve performance, minimise impacts on the community and the environment, and in response to feedback from the community and stakeholders.

5.2 THE PROJECT

The project would comprise new and upgraded sections of road linking the Sydney motorway network at the St Peters interchange with Sydney Airport's terminals. It would include new bridges over Alexandra Canal and other ancillary infrastructure and road connections.

5.2.1 Key features

Key features of the project, as shown on **Figure 93** include:

- Road links to provide access between the Sydney motorway network and Sydney Airport's terminals, consisting of the following components:
  - **St Peters interchange connection** – a new elevated section of road extending from St Peters interchange to the Botany Rail Line, including an overpass over Canal Road.
  - **Terminal 1 connection** – a new section of road connecting Terminal 1 with the St Peters interchange connection, including a bridge over Alexandra Canal and an overpass over the Botany Rail Line.
  - **Qantas Drive upgrade and extension** – widening and upgrading Qantas Drive to connect Terminals 2/3 with the St Peters interchange connection, including a high-level bridge over Alexandra Canal
  - **Terminal links** – two new sections of road connecting Terminal 1 and Terminals 2/3, including a bridge over Alexandra Canal.

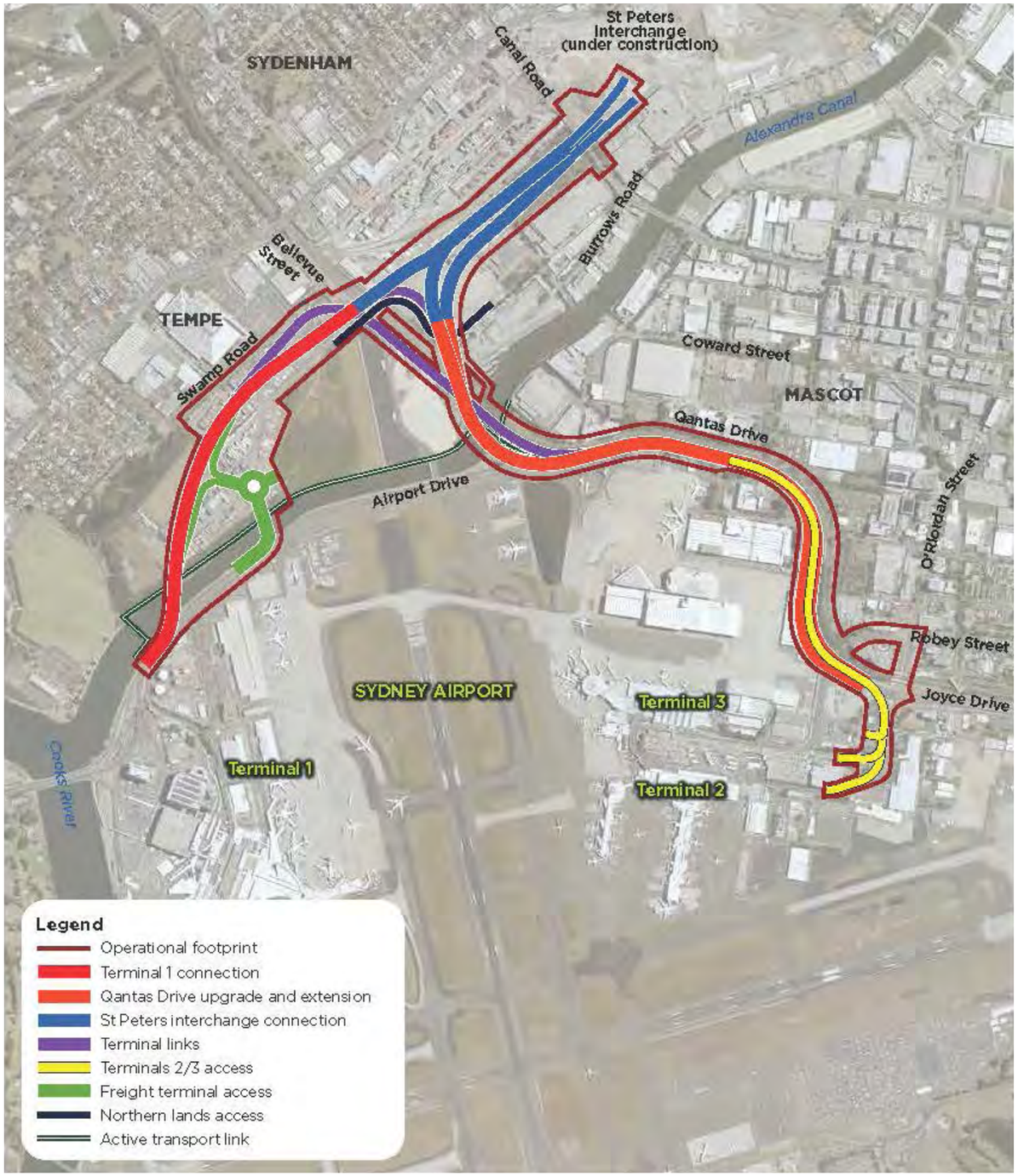

Figure 93. Project operational layout

  - **Terminals 2/3 access** – a new elevated viaduct and overpass connecting Terminals 2/3 with the upgraded Qantas Drive.
- Road links to provide access to Sydney Airport land:
  - New section of road and an overpass connecting Sydney Airport's northern lands either side of the Botany Rail Line.
  - New section of road, including a signalised intersection with the Terminal 1 connection and a bridge connecting Sydney Airport's existing and proposed freight facility either side of Alexandra Canal.

The key features are described in more detail in the following sections. They are also illustrated on the urban design plans in **Chapter 7**.

Other features, ancillary infrastructure and works are also proposed and include:

- **Active transport facilities**
  An active transport link about 1.3 kilometres in length along the western side of Alexandra Canal to maintain connections between Sydney Airport, the city and Mascot.
- **New drainage infrastructure**
  This includes road drainage. New and upgraded drainage outlets at Alexandra Canal and treatment devices to minimise water quality impacts. Drainage works are described in more detail in **Chapter 7 of the EIS/preliminary draft MDP**
- **Signs and lighting**
  This includes road lighting and signage and is described in more detail in **Chapter 7 of the EIS/preliminary draft MDP**
- **Retaining walls**
  Retaining wall structures are proposed which would generally support sections of road across elevation changes. They are described in detail in **Chapter 7 of the EIS/preliminary draft MDP**, as well as in **Chapter 7**
- **Headlight glare and anti-throw screens**
  Anti-glare screens would be installed along the Qantas Drive bridge to avoid potential impacts on aviation safety. Anti-throw screens attached to all bridges and overpasses. They are described in detail in **Chapter 7 of the EIS/preliminary draft MDP**, as well as in **Chapter 7**
- **Emplacement mound options**
  Excavation, re-placement and capping of waste currently contained below the former Tempe landfill site capping layer.

  These works are described in detail in **Chapter 7 of the EIS/preliminary draft MDP**, as well as in **Chapter 7**
- **Utility adjustments**
  Works to utilities include protection, relocation or realignment. These works are described in detail in **Chapter 7 of the EIS/preliminary draft MDP**
- **Advertising structures**
  Advertising structures including and removing/adjusting existing advertising structures. They are described in detail in **Chapter 7 of the EIS/preliminary draft MDP**, as well as in **Chapter 7**
- **Maintenance**
  Provision for ongoing maintenance including maintenance access bays. These works are described in detail in **Chapter 7 of the EIS/preliminary draft MDP.**
- **Landscaping**
  Landscaping within the project's operational footprint, in the Tempe Lands and as required to make good areas disturbed during project construction. For more detail refer to **Chapter 6**
- **Noise attenuation**
  Provision of noise attenuation to minimise noise impacts during operation of the project. For more detail refer to **section 6.7.1** (subsection on noise walls) and **Figure 156**.

5.2.2 Bridges and overpasses

As noted above, the key features include four new bridges to facilitate access to Sydney Airport across Alexandra Canal. The project also includes seven new overpasses over roads and the corridor for the Botany Rail Line (the rail corridor). The bridges and overpasses proposed as part of the project are listed in **Table 5**. Further information on the bridges and overpasses is provided in **Chapter 7 of the EIS/preliminary draft MDP**. The names used are indicative reference names applied for the purposes of the EIS/preliminary draft MDP. The final names would be determined during future stages of the project.

Table 5. Proposed bridges and overpasses

Key feature	Bridge/overpass	Role
Terminal 1 connection	Terminal 1 connection bridge	Provides access across Alexandra Canal for traffic travelling to/from Terminal 1.
	Terminal 1 connection rail overpass	Provides access across the rail corridor for traffic using the Terminal 1 connection.
Qantas Drive upgrade and extension	Qantas Drive bridge	Provides access across Alexandra Canal, rail corridor and the new Burrows Road extension for traffic travelling to/from Terminals 2/3.
St Peters interchange connection	Northern overpass	Provides access across the lanes connecting Qantas Drive to the New M5 for traffic traveling from Terminal 1 to the St Peters interchange.
	Southern overpass	Provides access across the lanes between the St Peters interchange and Terminals 2/3 for traffic travelling Terminal 1 to the St Peters interchange.
	Canal Road overpasses	Provides access across Canal Road for traffic travelling to/from the St Peters interchange connection.
Terminal links	Terminal link bridge	Provides access across Alexandra Canal for traffic using the eastbound terminal link to travel to Terminals 2/3.
Freight terminal access	Freight terminal bridge	Provides access across Alexandra Canal for traffic travelling to/from the existing freight terminal near Terminal 1, and access between the existing freight terminal and land proposed for freight facilities.
Northern Lands Access	Burrows Road extension rail overpass	Provides access across the Botany Rail Line for traffic travelling between the northern lands and Burrows Road.

5.2.3 Connectivity and access

The project would connect Sydney Airport Terminals 1, 2 and 3 with each other and the Sydney motorway network. It would connect to the New M5, the M4 and M5 (via St Peters interchange) and the M1 (via Joyce and General Holmes drives). It would also provide a connection between the Sydney motorway network towards Port Botany.

The primary role of the project's key features in terms of access and connectivity is summarised in Table 6.

Table 6. Access role/connections for project features

Project feature	Role
Terminal 1 connection	Provide access between Terminal 1 and the Sydney motorway network by connecting Terminal 1 with St Peters interchange (via the St Peters interchange connection). Provide access between Terminal 1 and areas to the east (including Terminals 2/3) by connecting Terminal 1 with the Qantas Drive upgrade and extension (via the terminal links).
Qantas Drive upgrade and extension	Provide access between Terminals 2/3 and the Sydney motorway network by connecting with Terminals 2/3 (via the Terminals 2/3 access) with St Peters interchange (via the St Peters interchange connection). Provide access between Terminals 2/3 and Terminal 1 via the terminal links and the Terminal 1 connection. Improve access between the Sydney motorway network/M1 (via Joyce and General Holmes drives) and Terminal 1 (via the Terminal 1 connection and terminal links). Provide access between the Sydney motorway network (via St Peters interchange) and Port Botany (via Joyce and General Holmes drives and Foreshore Road).
St Peters interchange connection	Connect the Qantas Drive upgrade and extension and the Terminal 1 connection with St Peters interchange.
Terminal links	Provide access between Terminal 1 and Terminals 2/3 by connecting the Terminal 1 connection with the Qantas Drive upgrade and connection: Westbound terminal link – access to Terminal 1 from Terminals 2/3 Eastbound terminal link – access to Terminals 2/3 from Terminal 1.
Terminals 2/3 access	Provide access to/from Terminals 2/3 and the Qantas Drive upgrade and extension, including access to future proposed facilities at Terminals 2/3 (such as the proposed ground transport interchange).
Freight terminal access	Provide access to/from the existing freight terminal next to Terminal 1, the proposed freight facilities and the Terminal 1 connection.
Northern Lands Access	Provide access to/from Burrows Road (on the northern side of the rail corridor) and land on the southern side of the line, to replace the existing access via Swamp Road (which would be severed as a result of the project).
Active transport facilities	An active transport link about 1.3 kilometres in length along the western side of Alexandra Canal to maintain connections between Sydney Airport, the city and Mascot..The active transport link is shown in Figure 94.

5.3 DESCRIPTION OF KEY FEATURES

5.3.1 Terminal 1 connection

Overview

The Terminal 1 connection would be about 1.3 kilometres long, extending between the St Peters interchange connection in the north (see section 7.5) and Airport Drive/Terminal 1 in the south. Features of the Terminal 1 connection include the following:

- Two carriageways with generally four lanes in each direction
- A tie-in to Airport Drive just north of the existing access to Terminal 1
- A new bridge over Alexandra Canal (the Terminal 1 connection bridge)
- An intersection with the freight terminal access
- An overpass over the rail corridor (the Terminal 1 connection rail overpass).

The Terminal 1 connection would replace the existing access to Terminal 1 from the east via Airport Drive. Once the Terminal 1 connection (and the freight terminal access) is operational, Airport Drive would be closed to the east of the freight terminal access.

Further information is provided in Chapter 7 of the EIS/ preliminary draft MDP.

Lane configuration

North of Airport Drive, the eastbound and westbound carriageways would comprise four lanes in each direction. A typical cross-section of the Terminal 1 connection is shown In Figure 103. The lanes would be between 3.5 and 3.7 metres wide, with outside shoulder widths of one metre and inside shoulder widths of 0.5 metres.

At the freight terminal access intersection additional lanes would be provided on both carriageways to facilitate turning traffic.

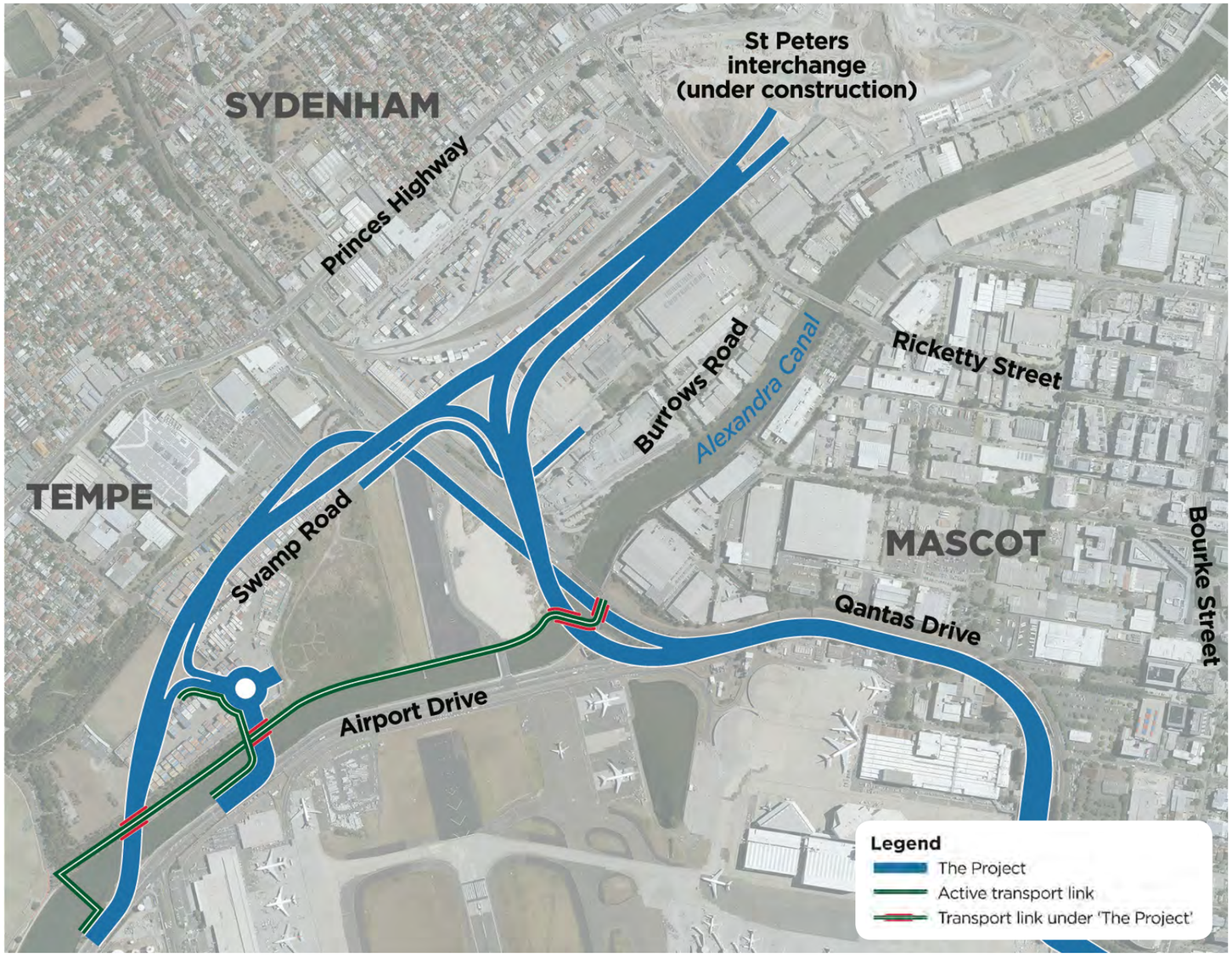

Figure 94. Proposed active transport link

5.3.2 Qantas Drive upgrade and extension

Overview

The Qantas Drive upgrade and extension would consist of a new and upgraded section of road and bridge to connect Terminals 2/3 with the Sydney Motorway Network (described in section 7.5). The features include:

Qantas Drive upgrade

Qantas Drive would be upgraded for a distance of about 220 metres east of the Alexandra Canal to the intersection of O'Riordan Street/Sir Reginald Ansett Drive/Joyce Drive. It would include:

- Widening the road to provide three lanes in each direction beneath the existing Qantas catering overbridge
- Realigning the eastbound and westbound carriageways to the east for provision of the proposed Terminals 2/3 access (described in section 7.7)
- Modifying the intersection with Robey Street, Lancastrian Street, O'Riordan Street, Seventh Street, Sir Reginald Ansett Drive and Joyce Drive
- A tie-in with Joyce Drive, Robey Street and O'Riordan Street at the eastern end.

Figure 114 shows a typical cross-section for the Qantas Drive extension.

Qantas Drive extension

Qantas Drive would be extended for a distance of about 600 metres across Alexandra Canal to the St Peters interchange connection and westbound terminal link. It would include the following:

- Three carriageways with two lanes in each direction, generally providing four lanes in the northbound direction and two lanes in the southbound direction.
- A new bridge over Alexandra Canal: the Qantas Drive bridge.

Further information is provided in **Chapter 7 of the EIS/ preliminary draft MDP**.

Lane configuration

Qantas Drive upgrade

The upgraded section of Qantas Drive would consist of four lanes eastbound and three lanes westbound. East of Lancastrian Street, three lanes would be provided in both directions until about King Street.

Between Alexandra Canal and the Lancastrian Road intersection, the upgraded section of Qantas Drive would consist of four lanes eastbound and three lanes westbound. East of Lancastrian Road, three lanes would be provided in both directions until about King Street.

Four westbound lanes would be provided to the west, with two lanes providing access to St Peters interchange and two heading towards Terminal 1. Two eastbound lanes from the St Peters interchange connection would merge with two lanes from the eastbound terminal link at the upgraded section of Qantas Drive. All lanes would generally be a minimum of 3.3 metres wide.

Qantas Drive/Lancastrian Road – existing traffic signals would be removed and turning movements would be limited to left-in and left-out from the westbound carriageway of Qantas Drive:

- Qantas Drive/Robey Street/Seventh Street – the intersection would be upgraded. Refer to **Chapter 7 of the EIS/preliminary draft MDP** for further information.
- Qantas Drive/O'Riordan Street/Sir Reginald Ansett Drive – the existing median would be removed and an additional through lane provided to Sir Reginald Ansett Drive.

The intersection with O'Riordan Street would be subject to minor modifications, including removing the existing median and adding an additional channelised through lane to Sir Reginald Ansett Drive.

All lanes would be generally a minimum of 3.3 metres wide; however, the width of the lanes would increase along the eastern part of the upgrade.

Figure 116 and **Figure 116** show typical cross-sections for the Qantas Drive upgrade.

Qantas Drive bridge

The Qantas Drive extension would include two lanes in each direction. In the westbound direction, the extension would also include two additional lanes, which would connect Qantas Drive to the westbound terminal link and the Terminal 1 connection. The lanes would be generally 3.3 metres wide.

5.3.3 St Peters interchange connection

Overview

The St Peters interchange connection would consist of a new multi-lane section of road to connect the Sydney Airport Motorway Network (St Peters interchange) with Terminal 1 connection and Qantas upgrade extension. Features of the St Peters interchange connection include the following:

- Two main carriageways to and from the St Peters interchange (M4-M5 Link) with generally two lanes in each direction
- Two secondary carriageways to and from the St Peters interchange (New M5) with generally one lane in each direction
- Overpasses over Canal Road
- Overpasses over other roadways being constructed as part of St Peters interchange/the New M5 project (the northern and southern overpasses).

Further information is provided in **Chapter 7 of the EIS/preliminary draft MDP**.

7.5.3 Lane configuration

Figure 110 and **Figure 111** show typical cross-sections of the St Peters interchange connection.

The carriageways would generally consist of one or two lanes and carriageways merging or diverging depending on the location and connection provided.

The lanes would be about four metres wide in the single lane sections. In other locations, the lanes would be about 3.5 metres wide.

More detail on the proposed lane configurations is provided in **Chapter 7 of the EIS/preliminary draft MDP**.

5.3.4 Terminal links

Overview

The two terminal links would consist of two new sections of road to facilitate access between Terminal 1 and Terminals 2/3. The westbound link would facilitate access to Terminal 1 from Terminals 2/3. It would be a short one-way section of road that would extend between the north-west end of Qantas Drive upgrade and the north-eastern end of the Terminal 1 connection.

More detail is provided in **Chapter 7 of the EIS/preliminary draft MDP**.

Lane configuration

The terminal links would consist of two lanes of about 3.5 metres wide and road shoulders would vary from about 0.5 to one metre wide. Typical cross-sections are shown on **Figure 106** and **Figure 107**.

5.3.5 Terminal Link Bridge

Overview

A new bridge would cross Alexandra Canal about 10 metres south of the existing rail bridge and about 60 metres north of the proposed Qantas Drive bridge. It would consist of a single steel arch structure with one span, and would have a width of about 12 metres and a total length of about 90 metres.

The bridge deck would be about 7.5 metres above the canal. The overall height of the bridge would be about 20 metres above the canal.

5.3.6 Terminals 2/3 access

Overview

The Terminals 2/3 access would consist of a new elevated road (viaduct) structure to provide access from Qantas Drive to Terminals 2/3. It would separate eastbound traffic travelling to Terminals 2/3 from through traffic, including east–west traffic travelling along Joyce Drive and Qantas Drive, and north–south

traffic travelling between Robey and O'Riordan streets and Sir Reginald Ansett Drive.

The Terminals 2/3 access would extend from Qantas Drive (near the western end of Ewan Street) into Terminals 2/3. It would include:

- An elevated viaduct structure into the Terminals 2/3 precinct
- Adjustments to Sir Reginald Ansett Drive and Shiers Avenue

The new viaduct structure would have a maximum height of about 10 metres above Qantas

Further information is provided in **Chapter 7 of the EIS/ preliminary draft MDP**.

Lane configuration

Viaduct structure

From Qantas Drive, the viaduct would be two lanes. A third lane would be added to the viaduct where the viaduct leaves Qantas Drive onto Sir Reginald Ansett Drive. At Ross Smith Drive, the viaduct would split into two small viaducts, the western viaduct and the eastern viaduct. The western viaduct would then split into two lanes, with one lane turning right to the future ground transport interchange and one ramping down to Sir Reginald Ansett Drive where it would merge with one Sir Reginald Ansett Drive lane. Both lanes would then connect with the departures ramp along Keith Smith Avenue.

The eastern viaduct would consist of a single lane which would ramp down to Sir Reginald Ansett Drive and merge with one Sir Reginald Ansett Drive lane. Both lanes would then connect with the arrivals lanes (on ground level) along Keith Smith Avenue.

Lane widths on the viaduct would generally be 3.3 metres wide with lane widths increasing in some locations to about 3.6 metres.

Typical sections for the proposed viaduct along Qantas Drive, Sir Reginald Ansett Drive north of Ross Smith Avenue and south of Ross Smith Avenue are shown respectively on **Figure 117, Figure 120** and **Figure 121**.

Sir Reginald Ansett Drive

At the intersection with Qantas and Joyce drives, Sir Reginald Ansett Drive would consist of two lane which would continue along the existing alignment before merging with the two single lanes which would come off the western and eastern viaducts. The left hand lane on Sir Reginald Ansett Drive would provide access to the arrivals road at Terminals 2/3, while the right hand lane would provide access to the departures road at Terminals 2/3.

Three turning lanes would be provided from Joyce Drive into Sir Reginald Drive, with two of these lanes connecting to the two above-mentioned lanes, while the third would turn into a third lane south of the intersection. This lane would provide access to Ross Smith Avenue (both in and out), providing access into the taxi staging area south of Sir Reginald Ansett Drive next to Terminal 2.

Shiers Avenue realignment

The realigned Shiers Avenue would consist of a lane in each direction. A slip right turn lane would be provided into Shiers Avenue off Sir Reginald Ansett Drive to provide access to Ninth Avenue. A single right turn lane on to Sir Reginald Ansett Drive would also be provided. This lane would merge with the right hand Sir Reginald Ansett Drive lane.

5.3.7 Freight terminal access

The freight terminal access would be about 450 metres long, extending between the Terminal 1 connection, land proposed for future freight facilities on the western side of Alexandra Canal, and the existing freight terminal on Airport Drive. Features of the freight terminal access would include the following:

- A single carriageway with two lanes in each direction
- An intersection with the Terminal 1 connection
- A roundabout east of the Terminal 1 connection
- A new bridge over Alexandra Canal
- A tie-in to Airport Drive to the north-east of Terminal 1 connection, including modifying the lanes along Airport Drive in this area
- A stub road off the roundabout to provide future access to the Northern Lands.

Further information is provided in **Chapter 7 of the EIS/draft MDP**.

Once the Terminal 1 connection and the freight terminal access are operational, the existing Airport Drive would be closed to the east.

Lane configuration

At the Terminal 1 intersection, two lanes would be provided for both the entry and exit from the access road, with single slip lanes also provided for left turns into and out of the freight terminal. Lanes within the freight terminal access would be generally 3.5 metres wide; however, the width would change at some locations to provide space for heavy vehicles.

Two traffic lanes would go around the roundabout.

5.3.8 Northern lands access

The northern lands access would consist of a new section of road and overpass to provide access between the parts of the northern lands located to the north and south of the rail corridor (including the existing Sydney Airport Corporation car park). The new access would extend between industrial land near Burrows Road and land on the southern side of the rail corridor. It would include:

- A single carriageway with two lanes in each direction
- A new overpass over the rail corridor.

Lane configuration

Two 3.5 metre wide lanes would be provided, with one lane in each direction.

Northern lands access rail overpass

The new overpass would cross the rail corridor and the eastbound terminal link about 40 metres to the east of the proposed Terminal 1 connection rail overpass.

The maximum height of the overpass deck would be about eight metres above ground level. This would provide for the required minimum clearance of 5.4 metres over the Botany Rail Line and the eastbound terminal link, while remaining below the OLS and high intensity approach lighting surfaces at this location. The overall height would be about 12 metres above ground level including roadside barriers and anti-throw screens.

5.3.9 Access changes and permanent land requirements

For more information of access changes and permanent land requirements refer to **Section 7.11 Chapter 7 of EIS/preliminary draft MDP**.

CHAPTER 6

Urban Design and Place Making Concept

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6.1 CHAPTER OVERVIEW

This chapter presents the urban design and place making strategy for the project. It is summarised in an overarching urban design vision, complemented by an explanation of what the experience of the Sydney Gateway would be, followed by urban design objectives and principles for the project based on the WestConnex Urban Design Framework and that are derived from the contextual analysis in Chapter 4. The objectives and principles guide the project as outlined in Chapter 3. They address the key areas of landscape and visual quality; design of the motorway and its structures; heritage and cultural values; user connectivity, urban form, place making and public domain.

This chapter also gives an explanation of what the experience of the Sydney Gateway would be. It describes and illustrates the urban and landscape design for the whole project site. It provides design concepts for major built elements such as bridges and retaining walls. In addition, it documents a range of measures such as active transport connections, place making opportunities including public art and heritage interpretation, landscaping, and improvements to open space to ensure a high quality public domain as a key community benefit of the project.

6.2 INTRODUCTION

The Sydney Gateway road project provides a rare opportunity to reshape the road journey to and from Sydney Airport, and to provide an experience of landscape and place that is unique in its form and character to Sydney. In doing so, the unparalleled experience of arrival from the air is extended to the ground at the threshold to Sydney and Australia for domestic and international travellers.

The urban design and place making strategy outlines the urban design vision, objectives, principles and framework to guide the development of Stages 1 and 3 of the Sydney Gateway road project.

The strategy is based on:

- The project's overall aims and objectives as described in Chapter 1
- The policy and reference documents described in Chapter 2, including the metropolitan, district and local planning framework, NSW Government and Transport for NSW policies and guidelines
- The contextual analysis including constraints and opportunities identified through the assessment of the existing environment in Chapter 4
- The urban design response to the current engineering designs
- Current urban design best practice.

6.3 URBAN DESIGN VISION

The urban design vision for the Sydney Gateway road project defines a vision that is steeped in the unique landscape setting, function and values of surrounding areas. The urban design vision for the project is:

Sydney Gateway will be a memorable arrival and departure point that befits Sydney's stature as a vibrant global city and major entry point to Australia. It will be an exciting threshold experience that combines the highest quality engineering, landscape, architecture and art. It will celebrate the unique qualities of the place and contribute positively to the local community and environment.

6.4 URBAN DESIGN OBJECTIVES AND PRINCIPLES

A central component of the design process is the identification of urban design objectives. These objectives cover the full range of elements associated with the project's design, to minimise the potential for poor visual outcomes and to also achieve a project outcome which is sensitively integrated, taking into account not only the corridor itself, but also its relationship with surrounding areas.

There is no urban design framework for the proposed Sydney Gateway to guide the desired project outcome. The project ties in with WestConnex Stage 2, New M5 at St Peters interchange which is subject to the *WestConnex Urban Design Framework* (Roads and Maritime and WestConnex Delivery Authority, Sept 2013), and is the starting point to deliver urban design outcomes for the project. The urban design objectives from the *WestConnex Urban Design Framework* have been adopted for the project and the principles have been modified to suit the contextual environment of Sydney Gateway. These objectives and principles would be implemented in accordance with *Beyond the Pavement* performance themes of safety, cost effectiveness and sustainability (refer section 2.4.1).

The objectives and principles are:

Objective 1: Leading edge environmental responsiveness
Ensure environmental practices respond to the natural systems of the area and promotes sustainability

Design principles

Existing vegetation

- Maximise the retention of existing vegetation, especially trees and maximise opportunities for additional planting to enhance green links, including large marker trees

Protect and enhance waterways

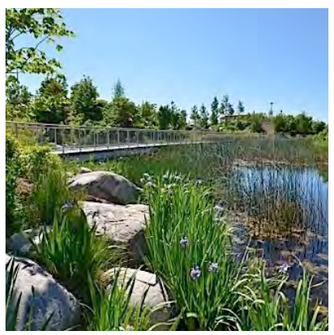
- Incorporate water sensitive urban design to protect the ecological, visual and recreational values of receiving waterways and Botany Bay

Landscape restoration

- Increase appropriate biodiversity through revegetation and habitat creation where possible given airport operational and safety constraints

Green infrastructure

- Integrate natural patterns and ecology into the design, protect watercourses and retain physical continuity of natural systems
- Contribute to the creation of a north-south green infrastructure corridor, linking Cooks River, Botany Wetlands, Tempe, St Peters and Sydney Park.



Objective 2: Connectivity and legibility
The project will improve multi-modal connectivity and legibility between the project site and surrounds

Design principles

Connectivity

- Improve road access to Sydney Airport
- Improve pedestrian and cyclist connectivity, wayfinding and amenity and provide enhanced links to and through the airport precinct from local networks and regional routes
- Ensure that pedestrian and cyclist facilities are fully integrated with the overall design for the project

Amenity

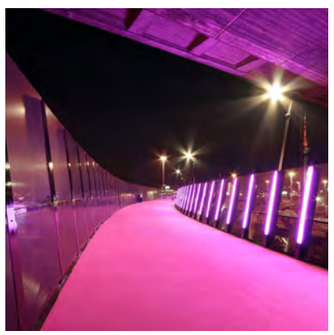
- Design cycling infrastructure with a high level of amenity to encourage cycling as an alternative mode of transport

Accessibility

- Integrate the project with adjacent upgrades including St Peters interchange, Airport East and Airport North works

Wayfinding

- Design road elements and lighting that provide legible and self explanatory wayfinding and rationalise regulatory signage to reduce visual clutter.



Objective 3: Placemaking
To create and support a sense of place drawing on the character of the local area

Design principles

Placemaking

- Create a sense of arrival for passengers to complement spectacular views experienced from the air, in particular when approaching over Sydney Harbour. Curate a series of artworks integrated with built structures and the landscape that strengthen the sense of place and provide a contemporary and vibrant expression of the story of the land including aviation and 'Connection to Country', with the potential to evolve over time
- Enhance the amenity of the local environment through new high quality facilities for the community that are easily accessible and resonate culturally with existing land uses
- Respond to identified heritage values and provide meaningful interpretation experiences at appropriate locations
- Use a palette of materials and finishes, and lighting that respond to and celebrate the landscape, urban and historical context.

Views

- Frame views to the surrounding landscape to provide a unique travel experience steeped in the sense of place and to foster a sense of arrival and anticipation of the air-side journey
- Celebrate visual connections to the airport, port and associated activities including the runways.

Existing natural context

- Use site specific planting of substantial size and density to provide a lush landscape setting appropriate to the 'Gateway to Sydney'.

Objective 4: Urban renewal and livability
Fit the project sensitively into the unique natural, built and cultural environment of the airport landscape and its urban surrounds in a way that promotes improved urban amenity

Design principles

Improved streetscapes

- Use vegetation as a unifying design element and to counterbalance the character of the roadway and surrounding urban, infrastructure and industrial context
- Provide additional tree planting for shade and shelter and to address the urban heat island effect.

Improved connectivity

- Provide improved pedestrian and cycle access from existing residential streets to the new public facilities.

Safety and security

- Integrate Crime Prevention Through Environmental Design (CPTED) guidelines in the design of adjacent public spaces, pedestrian and cyclist facilities to ensure they are safe and comfortable to use at all times
- Design to minimise the potential for conflict between the different modes of transport
- Avoid the creation of vacant under bridge spaces, narrow underpasses, areas that are difficult to access for maintenance and highly used spaces that are vulnerable to vehicle access.

Objective 5: Memorable identity and safe, enjoyable experience
Create a memorable sense of arrival and departure that enhances the image of global Sydney

Design principles

Motorway experience

- Create a memorable identity for the Sydney Gateway through the design of a meaningful, unique and cohesive experience to and from the Sydney Airport terminal buildings
- Design the sequence of experiences taking into consideration the relationship to the adjacent St Peters interchange and WestConnex tunnels, culminating at the Terminal 1 and Terminals 2/3 entry and exit points.

Equitable experience

- Ensure that key design features can be experienced and appreciated during the day and at night, from the ground and in the air
- Ensure that the ‘‘Gateway’’ experience is available to all users – motorists, pedestrians and cyclists, as well as visually to travellers flying in and out of the city.

Progression

- Provide a sequence of unifying design elements in the progression of the travellers’ experience.

Views

- Provide strategic views to landmarks including Sydney Airport, Botany Bay and the Sydney CBD including through the framing of views as appropriate.

Objective 6: A new quality benchmark
Achieve a well designed, durable and sustainable environment

Design principles

High quality integrated design

- Ensure that the forms and detailed resolution of the built elements are elegant, refined and work together to create a unified and well composed journey experience
- Fully integrate engineering, architecture and art in the design of structures
- Ensure that the security requirements of the airport, port and other critical infrastructure are met in a visually sensitive way.

Durability

- Use materials that are robust and fit for purpose
- Avoid the use of easily vandalised materials.

6.5 SYDNEY GATEWAY URBAN DESIGN AND PLACE MAKING STRATEGY

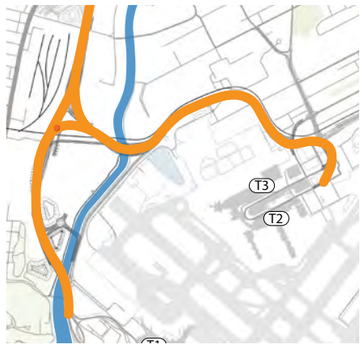
An urban design and place making strategy has been developed to guide the concept design development for the Sydney Gateway road project and all its constituent elements. The strategy considers the travel experience created by the interaction between the essential infrastructure, the roadside elements, and the landscape and urban context, to craft a memorable journey at the threshold to Sydney for international and domestic visitors. It also considers views from the air, both day and night, for those arriving or departing Sydney.

The key features of the urban design and place making strategy are illustrated in Figure 96.

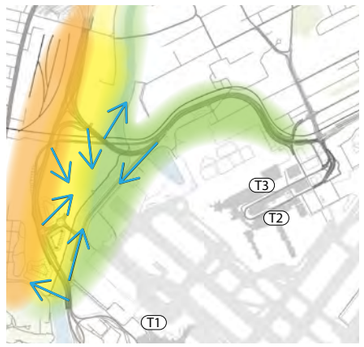
6.5.1 The Sydney Gateway experience

The experience of the Sydney Gateway would be firmly grounded in the landscape and cultural context it is situated in, that is, it would be shaped by the landscape and built form, the cultural history of the area, the airport, the structures and spaces that are needed for the road infrastructure, and the community and users themselves, as outlined in the following figures:

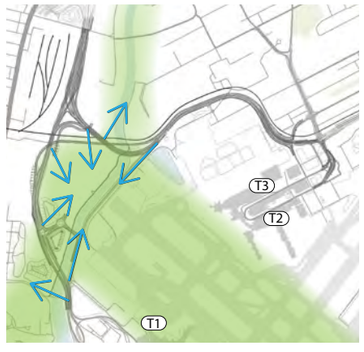
The landscape and built form



Water
The Sydney Gateway is intertwined with Alexandra Canal, the major non indigenous element at the heart of the Sydney Gateway landscape.



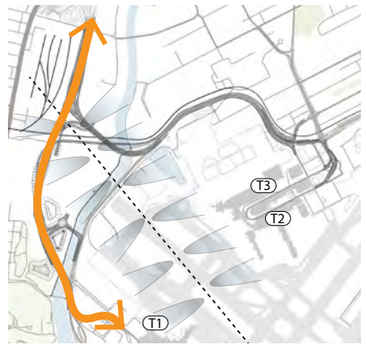
Topography and views
The topography slopes from the Princes Highway to the airport, providing views in all directions as a core experience of the Sydney Gateway landscape.



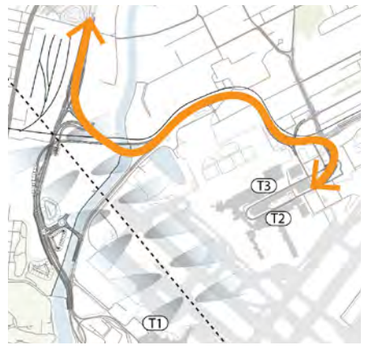
Borrowed landscape
The vertical elevation of the project provides for views across the larger landscape setting, effectively "borrowing" land outside the project site to shape the motorists' experience. This includes views of the main runway, adding a sense of arrival and excitement.

Corridor landscape
The motorway is framed by landscape areas of varying scales that shape the experience and direct views to other open space areas adjoining the motorway.

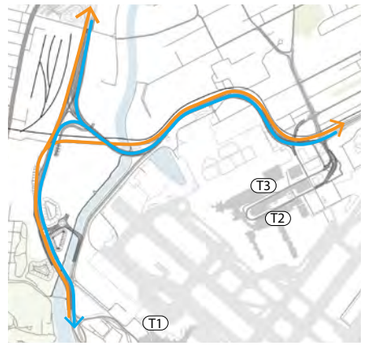
The users



International passengers
The route for international passengers is shaped by extensive corridor and borrowed landscapes with views along and across the Alexandra Canal.



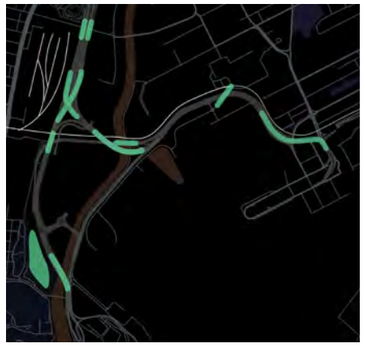
Domestic passengers
The route for domestic passengers is shaped by the contrast between the expansive canal and runway landscape and the highly constrained and intensely developed corridor between the airport and the rail line.



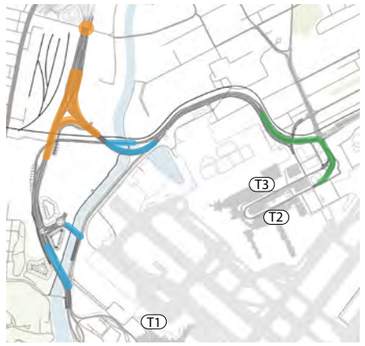
Through traffic
A large number of motorists using the Sydney Gateway would be commuters bypassing the airport on the arterial road system. Their journey would be shaped by the relationship between the motorway and the canal.

Active transport
The experience of pedestrians and cyclists as they access existing and new destinations is shaped by the interactions with water - the blue ribbon, landscape and open space areas - the green ribbon and the major vehicular connectors.

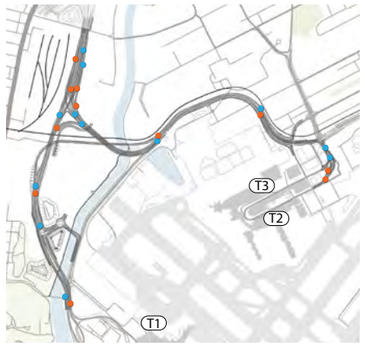
The motorway



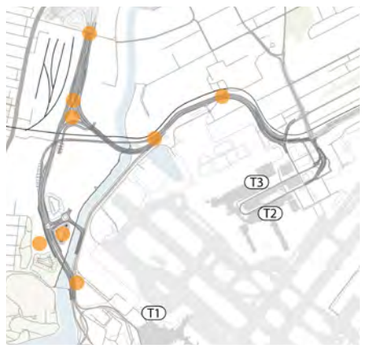
Lighting
Feature lighting would help to create an existing night-time experience for the motorist and those viewing from the air. It would assist in wayfinding and compliment art installations.



Structures
Navigating the topography and crossing the canal would require large structures such as bridges, viaducts and retaining walls. They would become important elements shaping the experience of the journey.

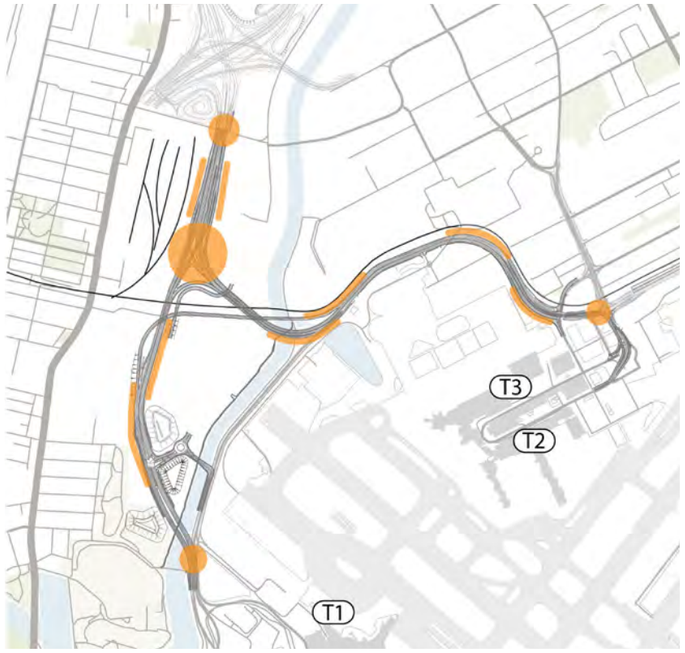


Wayfinding
Providing intuitive and legible decision points along the route would facilitate a positive 'Gateway' experience.



Art
Public art opportunities along the motorway corridor can enrich the journey for the motorist, creating a series of 'Gateway' moments and also provide visual interest from the air.

6.5.2 A 'Gateway sequence'



The multiple destinations and routes facilitated by the Sydney Gateway road project are unified by the landscape setting. Rather than consisting of one single element, the Sydney Gateway would consist of a collection of distinct yet integrated elements that are spread across the road network, tied together with overarching unifying elements such as wall and parapet treatments and lighting. Structures would be predominantly low level forms that would work with the landscape setting to capitalise on the opportunity for multiple 'Gateway', or marker elements. These elements would be connected and expressed through shared design themes and components that are steeped in the history and culture of the project area. The main 'Gateway' treatments would occur south of St Peters interchange, at the precinct entry and exit, and at Terminal 1 and Terminals 2/3.

Shared design themes and components would include:

- Landscape - the water, vegetation and landform
- Lighting
- Colour
- Cultural expression, story-telling and interpretation
- Aviation history

6.5.3 Design approach

The overarching design approach that ties the project together includes the notion of the 'Gateway' sequence tied together by three 'ribbons'. Their interplay shapes the Sydney Gateway and the various experiences along its route (refer to **Figure 108**). The themes for the ribbons are:

1. Arrival and celebration of aviation and exploration
2. Connection to country
3. Celebration of water and non-indigenous heritage.

Arrival and celebration of aviation and exploration

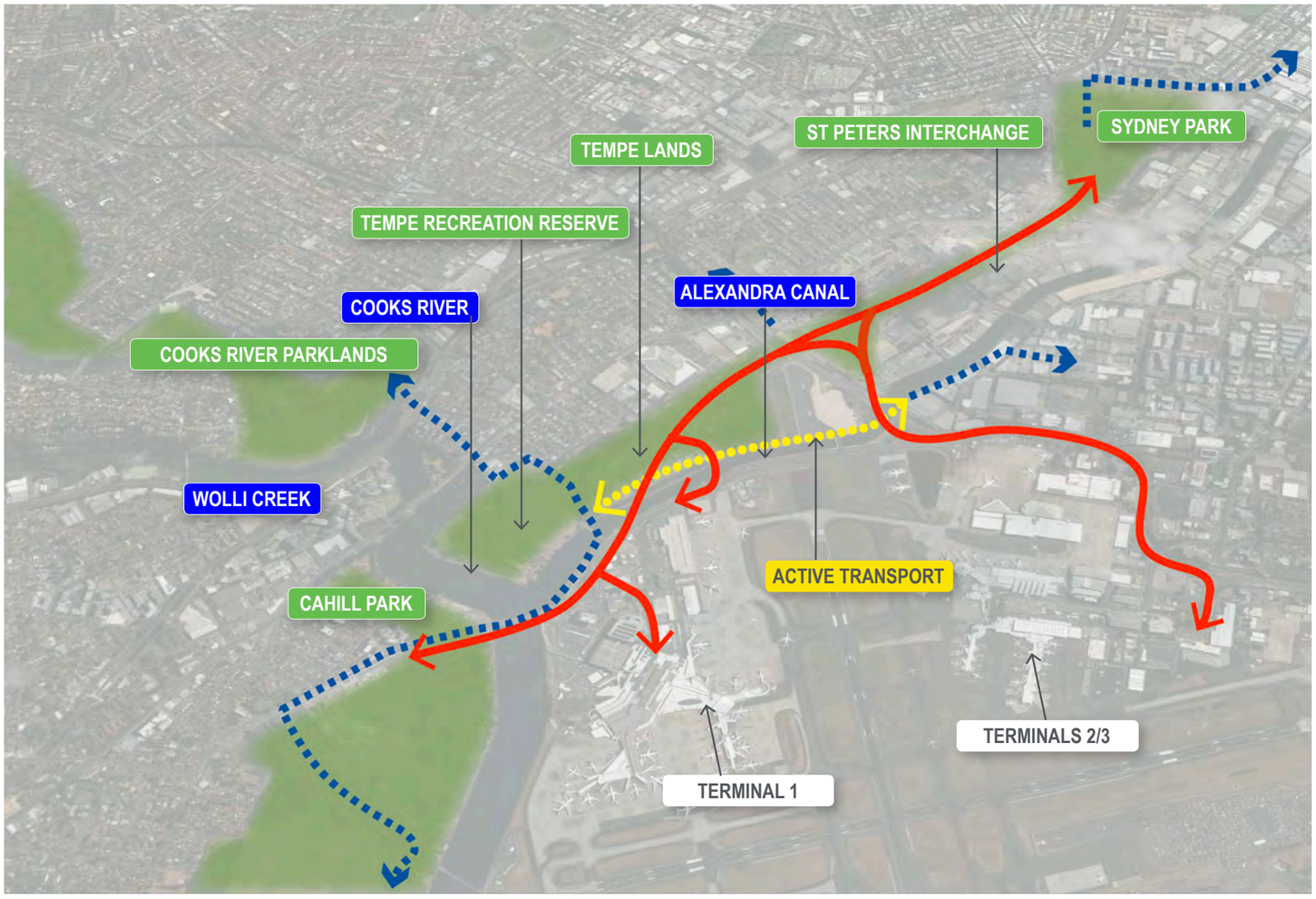
The curvilinear road connections, ramps, wall, lighting, parapets and bridges would be designed to celebrate the arrival and departure experience into Sydney and would provide a connection to the transport/aviation heritage of the airport, in particular the arrival and departure points at Terminal 1 and Terminals 2/3.

Connection to country

The project provides the opportunity to connect the city to Botany Bay, linking major existing green spaces, from Sydney Park via the new St Peters interchange, the proposed parklands on the former Tempe landfill site, Tempe Recreation Reserve, Cahill Park and beyond. Within the project, pedestrian and cycle paths would activated by public art celebrating indigenous culture, and enhanced tree cover would link these sites together.

Celebration of water and non-indigenous heritage

Alexandra Canal provides a link to the areas non-indigenous and industrial heritage. The design of the suite of new bridges would consider this heritage and complement the existing bridges over the canal.



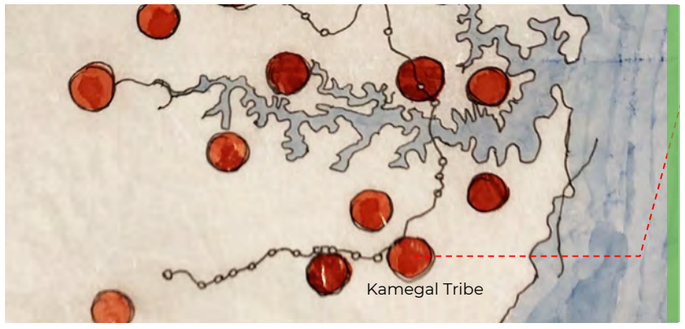


Figure 95. The three ribbons are key design themes for the project

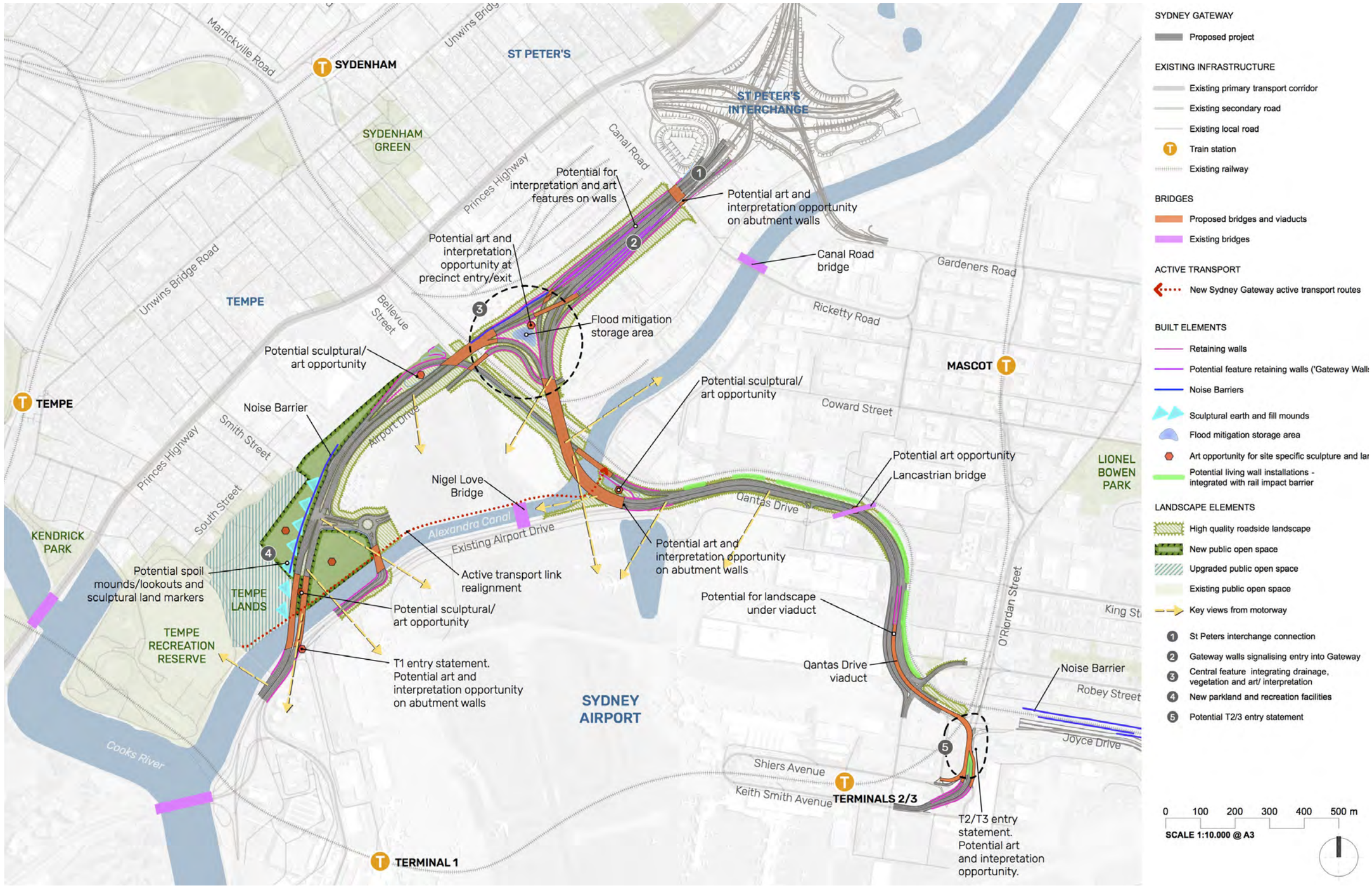


Figure 96. Sydney Gateway urban design and place making strategy plan

6.6 DESIGN PRECINCTS

The experience of the Sydney Gateway is shaped by the interplay of the project and its elements with the project area, its existing features and the various constraints they pose on the design of the project. This results in a number of distinct conditions along the route. They have been identified as design precincts, each of which warrants a corresponding unique design response. They are described as they would be experienced when travelling from west to east along the road.

The design precincts are (refer Figure 97):

1. Terminal 1 interface
2. Tempe Lands
3. Central interchange
4. St Peters interchange connection
5. Qantas Drive extension
6. Qantas Drive upgrade
7. Terminals 2/3 connection.

The following sections provide a brief overview of the key design outcomes for each precinct.

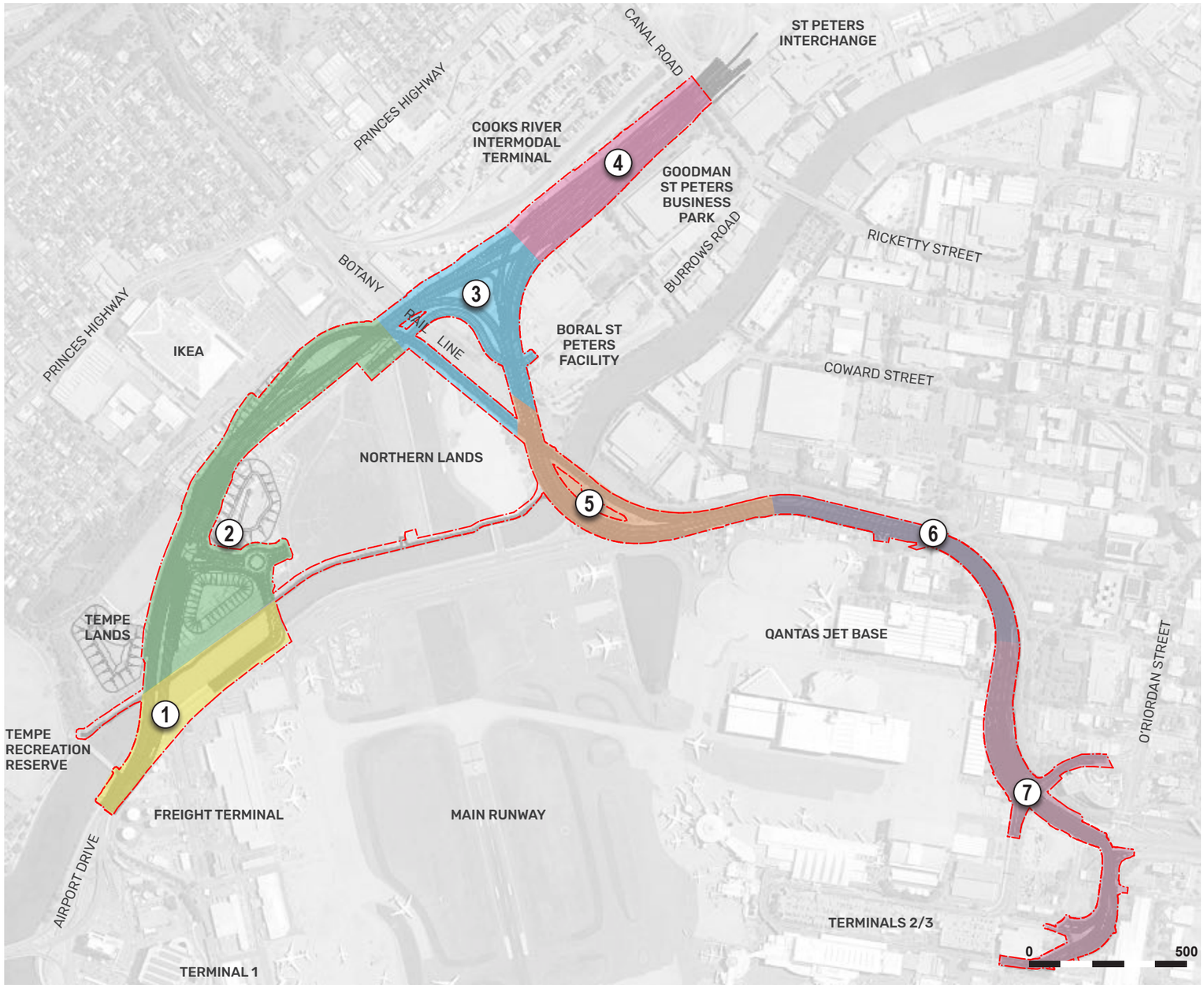


Figure 97. Design precincts

Urban and Landscape Design Concept Legend

VEGETATION
- Existing Trees to be removed
- Existing Trees to be retained
- Proposed Large Trees
- Small Trees
- 1 Large Shrubs
- 2 Small to Medium Shrubs
- 3 Riparian Reeds and Grasses
- 4 Golden Grasses
- 5 Groundcovers & Grasses
- 6 Turf

DRAINAGE
- 7 Concrete Open Channels
- 8 Turfed Open Channels
- 9 Exposed Aggregate Concrete Basin
- Culvert

LANDFORM
- Proposed Feature Mound

HARDSCAPE
- Roads
- 10 Shared Path
- 11 Concrete Footpath
- Existing Path
- Concrete Retaining Walls
- Noise Barrier

WAYFINDING
- Site Specific Aboriginal Art Opportunity

OBSTACLE LIMITATION SURFACE
- OLS heights

6.6.1 Precinct 1: Terminal 1 interface

The Terminal 1 interface is characterised by the space constraints imposed by the location between Terminal 1 and Alexandra Canal. The area is important as it is located at the interface between the Sydney Gateway project and Terminal 1, thereby playing an important role in shaping the arrival or departure experience.

The following key design features to enhance the gateway function of this precinct would include:

- Feature native tree planting on both sides of the road
- Locations for sculpture/art to denote the entry to Terminal 1
- Artistic treatments to bridge abutments or potential walls using colour, patterning, relief and lighting
- Improved pedestrian and cycle access from Tempe Lands and the northern side of Alexandra Canal to tie in with the existing shared path to Terminal 1.

The precinct also plays a role in providing access to the freight terminal. This function, while equally important, differs from the terminal access in that it is discrete and not a public destination. A key consideration for this precinct is therefore the separation in both physical and visual terms of the airport's public destination and address at Terminal 1, and its freight and logistics centre around Link Road.

The crossing of Alexandra Canal provides an attractive outlook across the landscape, taking advantage of surrounding open space areas to positively shape the experience of this section of the motorway.

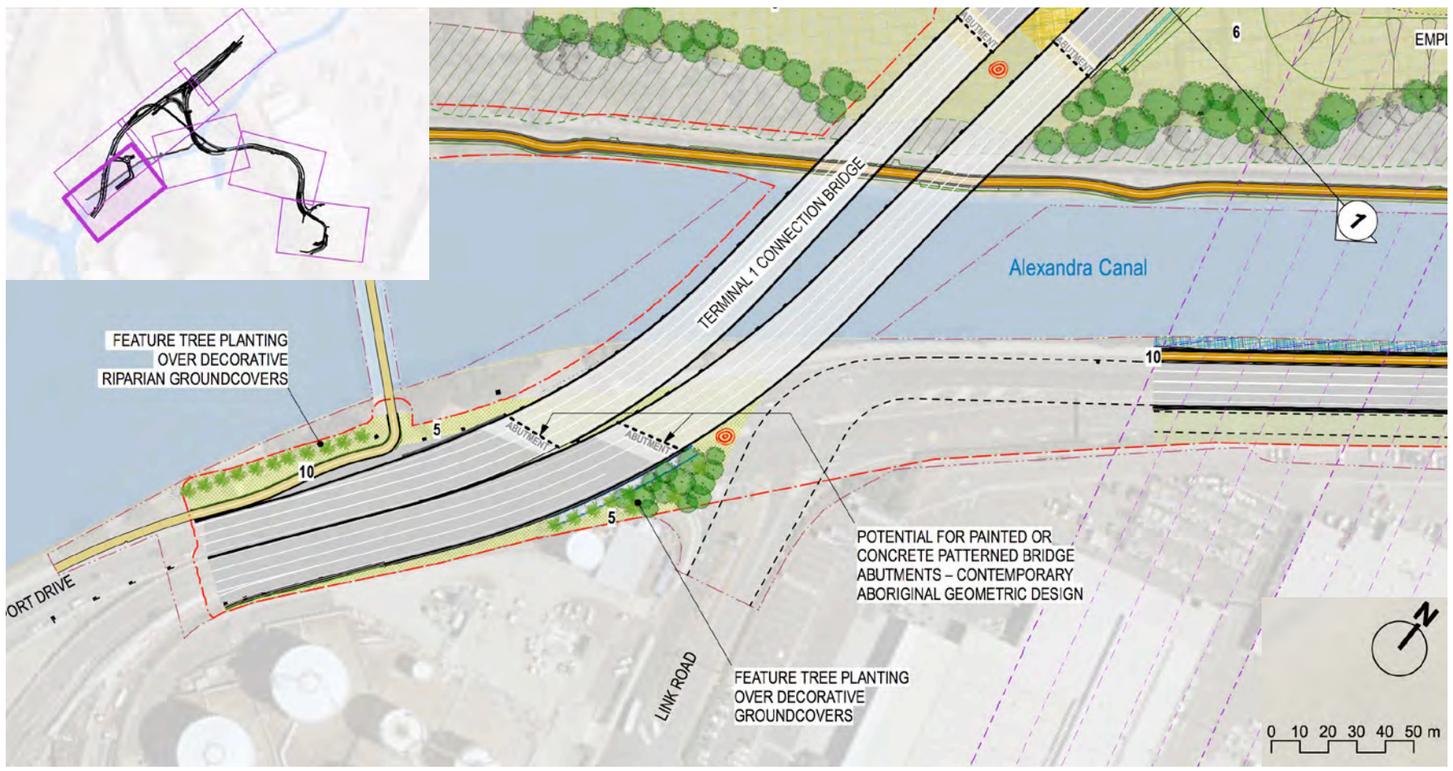


Figure 98. Urban and Landscape Design Concept plan - Precinct 1: Terminal 1 interface

6.6.2 Precinct 2: Tempe Lands

The Tempe Lands are an existing open space area that currently caters to limited users. The project would result in the permanent loss of around one hectare of land within Tempe Lands. This area includes land currently occupied by the Tempe Golf Range and Academy and the off-leash dog exercise area.

However, upon completion of the project, up to 10 hectares of residual land would be available for use in this area. This would consist of land temporarily required during construction, including about four hectares currently occupied by recreational facilities within Tempe Lands, and land currently occupied by Tyne Container Services.

Potential future uses could include open/space recreation, or other future uses in accordance with the priorities of local and regional strategic planning and Inner West Council.

Within the Tempe Lands there are two potential design opportunities to the project - refer **Figure 101**:

1. To provide a regional parkland with a range of quality active and passive recreation opportunities, to better meet the needs of the community
2. To provide a "parkway" setting for the project that would provide a memorable and attractive experience along the route.

The design for the Tempe Lands extends existing open space to the north and east to provide public open space on both sides of the Terminal 1 connection.

IWC is planning to prepare a Master Plan for the site. The design for the new open space could potentially includes passive and active recreation uses and facilities such as hard and soft landscaping, pedestrian and cycle connections and supporting facilities such as car parking - refer below and **Figures 99 to 101**. The final range of uses and facilities and their location would ultimately be Council's decision. Roads and Maritime would continue to consult with Council in the development of the Master Plan for the Tempe Lands to ensure the project landscape design integrates with the Master Plan. Any impacts to existing open space or recreational uses from the project including any replacement of existing facilities would be addressed through the Master Plan process and compensated Roads and Maritime as part of the property negotiations.

The concepts shown in this section have identified that the link between the open space and Alexandra Canal is important in reinforcing the landscape setting of the canal, and providing opportunities for views and interpretation through elements such as lookouts, arts and sculpture. Similarly, integration of the parklands with the active transport system of the project site and surrounding context is a key consideration, to maximise access to the parklands as well as connectivity through the project area.

Enhancement of the Tempe Lands therefore provides an important opportunity in creating a landmark setting that would provide a range of benefits to be enjoyed by both locals and visitors, as well as people travelling through the area along the project.

Emplacement mound options

There is a possible need for the project to retain surplus excavated material within the project site, including potentially contaminated material excavated from the former Tempe landfill. This material would be contained within "emplacement mounds" that would be capped and managed to ensure human and environmental health.

The material would be placed within the construction footprint of the project in the form of mounds which would be located as follows:

1. One mound would be located in the area bound by the Terminal 1 connection, freight terminal access and the western side of Alexandra Canal
2. Two options are being considered for the placement of a second mound either:
   a) North of the freight terminal access
   b) West of the Terminal 1 connection.

Options for mound placement are assessed as part of the landscape character impact assessment in **Chapter 7**, and as part of the visual impact assessment in **Chapter 8**. For ease of reference, mound placement options throughout this report are referred to as:

- "Option One", for the combination of mound one and mound two option "a" - refer **Figure 99**
- "Option Two", for the for the combination of mound one and mound two option "b" - refer **Figure 100**.

It should be noted the design of emplacement mounds would be subject to further design investigations and development during future design phases. This would include further consultation with Sydney Airport and IWC and would be based on the following performance outcomes:

- Complies with aviation safety
- Minimises the volume of excavated material from Tempe Lands
- Maximises community open space
- No vegetation clearing beyond the project boundary.

Emplacement mound design may also include investigation of a "no mounds" option. The final design adopted may therefore differ from the options shown in this report.

For the purposes of the assessment in **Chapter 7** and **Chapter 8** of this report, "Option One" and Option Two" were analysed with regard to a range of performance criteria including access/ connectivity, usage, amenity and 'Gateway'/landmark. Based on the result of the comparative assessment, a preferred arrangement was identified and is reflected in the following concept for the Tempe Lands. The final design would be developed in consultation with IWC, noting council is preparing a Master Plan for the site.

Desired outcomes for the Tempe Lands

The establishment of an expanded parkland on the Tempe Lands would provide a substantial area of public open space for residents from nearby areas - refer **Figure 101**, subject to open space uses being confirmed as the preferred land use. The parkland would have the potential to function as a higher order recreation facility, when combined with Tempe Recreation Reserve. Noting that IWC is preparing a Master Plan for the site, the concept design has the potential to reference the pre-European landform and topography of the land around Sydney Airport with its coastal sand dunes and low lying estuaries of the Cooks River and the former Shea's Creek, contributing to the overall place making strategy for the project.

<u>Potential recreation facilities</u>

The parklands could potentially provide for a range of passive and active recreational uses through facilities such as:

- Sculptural landforms with pedestrian paths leading to lookout sites from which to observe the airport activities and the surrounding landscape

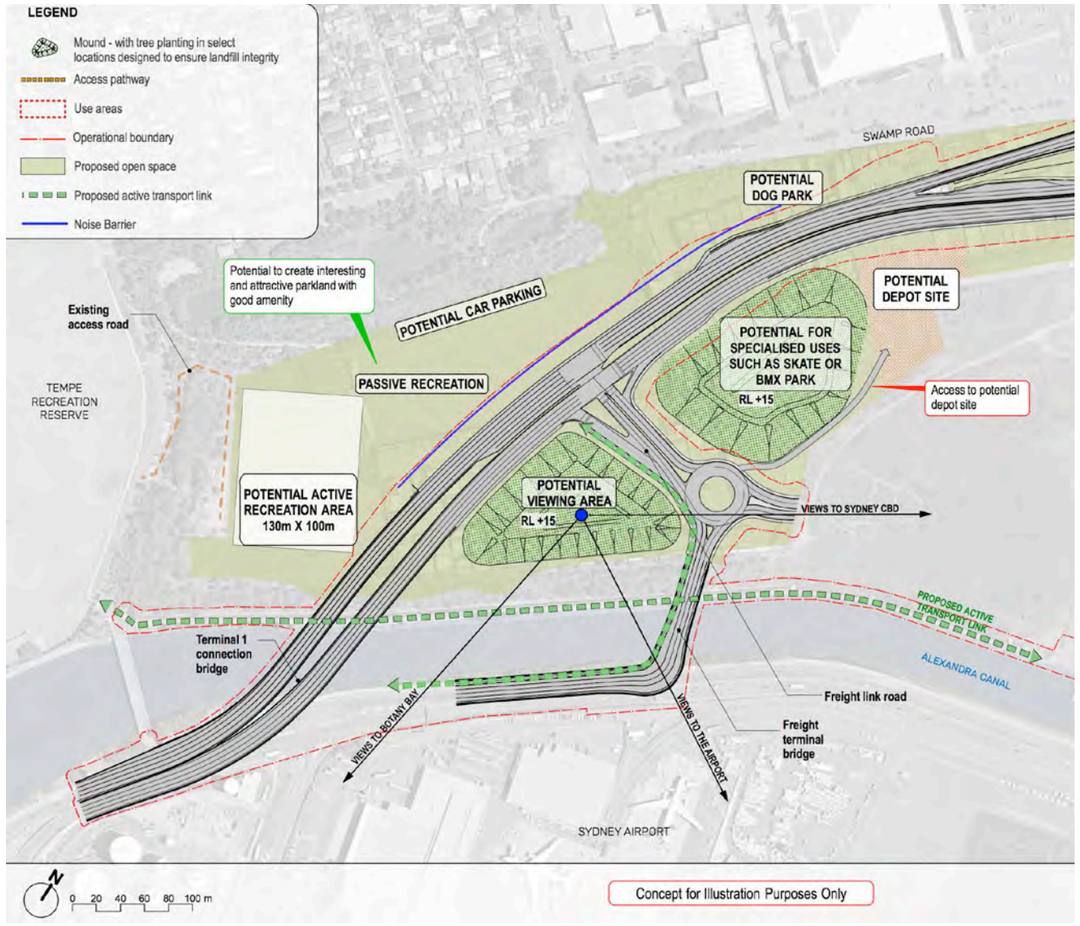


Figure 99. Emplacement mound design "Option One"

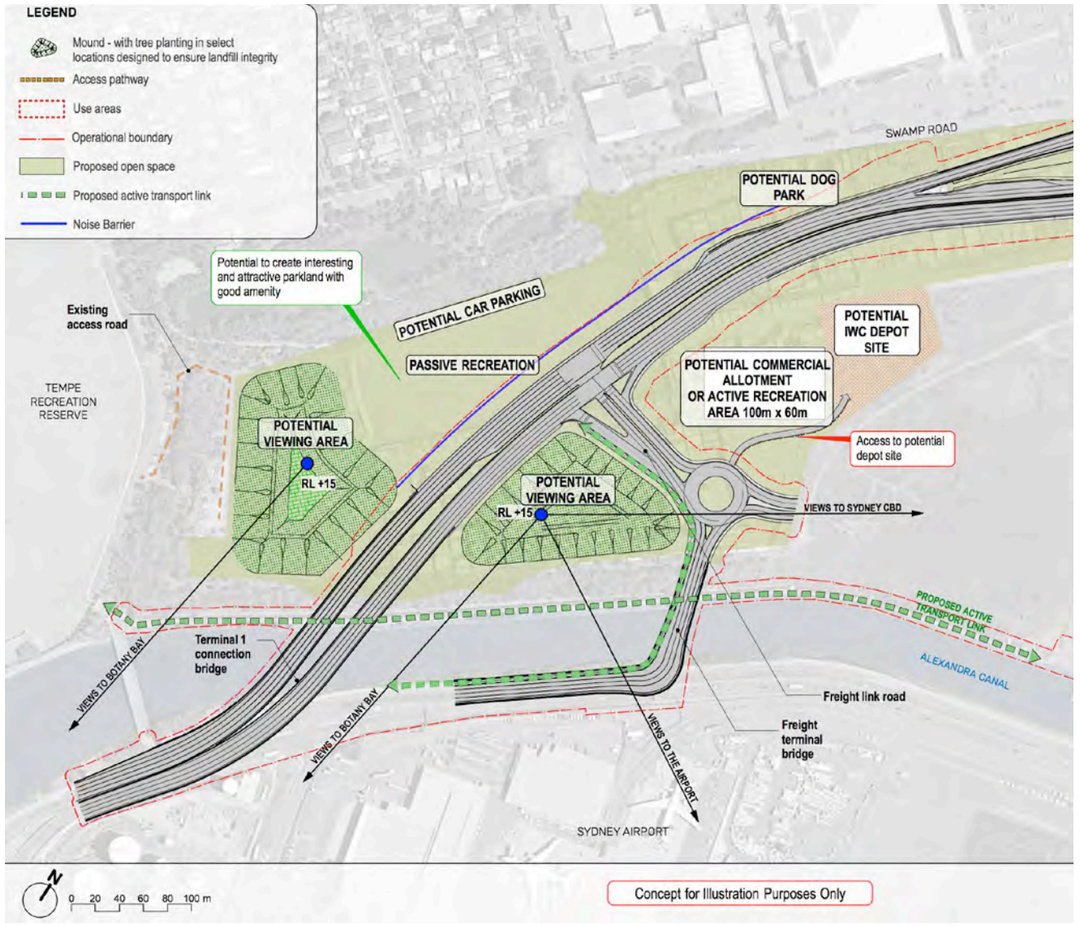


Figure 100. Emplacement mound design "Option Two"

- Picnic areas and facilities
- Play opportunities and equipment including adventure or nature play
- Off-leash dog exercise areas
- Public art including sculpture, installations and land art
- Sports facilities such as sports fields, courts or specialised facilities such as skate or BMX parks
- Informal play areas
- Tree planting (including compensatory tree planting for trees that need to be removed for the project) and other vegetation, subject to land fill and airport operational constraints
- Supporting infrastructure such as paths, furniture and lighting, car parking and shade structures.

The final range of recreational facilities would be determined by IWC as part of the Master Plan, and any impact to recreational facilities by the project compensated as outlined above.

Noise attenuation

An approximately five metre tall noise barrier would be provided along the western side of the project. It would mitigate potential noise impacts from the project on park users and nearby residents, to ensure a high level of amenity. The noise barrier would be designed to maximise passive surveillance of the parklands, consistent with the principles of *Crime Prevention Through Environmental Design* (CPTED) - also refer **section 6.7.1**.

Active transport connections

The recreation facilities on either side of the project would be accessed by active transport links via Tempe Recreation Reserve, using the existing access road to the Tempe Lands and the relocated active transport link on the western side of Alexandra Canal.

Figure 101. Urban and Landscape Design Concept plan - Precinct 2: Tempe Lands

Landform

The urban design approach to the emplacement mounds is to draw on the opportunity to create interesting and sculptural landforms that enhance the experience of both the parklands and the motorway. They would also provide opportunities to provide increased soil depth above land fill capping layers, to facilitate tree growth for heat mitigation, shade, spatial definition and visual interest and amenity, subject to satisfying aviation matters - also refer Figure 102.

Reflecting emplacement mound option 3, two emplacement mounds acting as landform markers would be located on the eastern side of the road, west of Alexandra Canal. They would allow for extensive views over the parkland and adjoining areas including Sydney Airport. Vegetated with a combination of native grasses and trees in select locations (managed to prevent penetration into capped and contaminated waste), they would provide an impressive visual feature travelling to and from the Terminal 1 precinct.

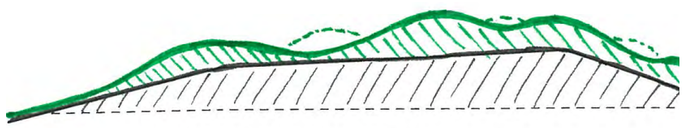


Figure 102. Sketch indicating sculptural mounding above capped emplacement mounds, to create interesting landforms and as one possible way to provide sufficient soil depths for tree growth in select locations

Vegetation

The plant selection strategy for the park would build on the existing vegetation species in the Tempe Lands and adjacent wetlands to the north. The approach is to reinstate vegetation communities endemic to the area, and to supplement these with native and feature trees at specific locations, as appropriate to support the 'Gateway' experience and enhance the "green ribbon". This would also consider aviation safety requirements including the need to minimise the risk of wildlife strike through appropriate species selection.

Materials

Facilities within the park would likely be constructed of robust, hard-wearing materials, with some premium materials in key locations and at focal points. This would be determined by IWC through its Master Plan process, in consultation with stakeholders as appropriate, and would also determine the most suitable range and locations for park furniture. The latter could include drinking fountains, seating, shelters, bins and bicycle racks, depending on IWC standards, the size of the park, the expected number of users and the outcomes of the Master Plan process. The path network could potentially allow for controlled maintenance vehicle access.

Other facilities

Car parking if required would be provided to cater for the expected patronage of the parklands. North east of the roundabout would be potential for an area of 4,000m^2 for IWC maintenance facilities.

The roadway

It is proposed to create a 'parkway' setting for the road through this precinct. This would be achieved by providing:

- Low mounding and vegetation to the roadside where possible
- Planting in the median where possible
- Bespoke roadside lighting.

These elements would aid in reducing the perceived visual scale of the road.

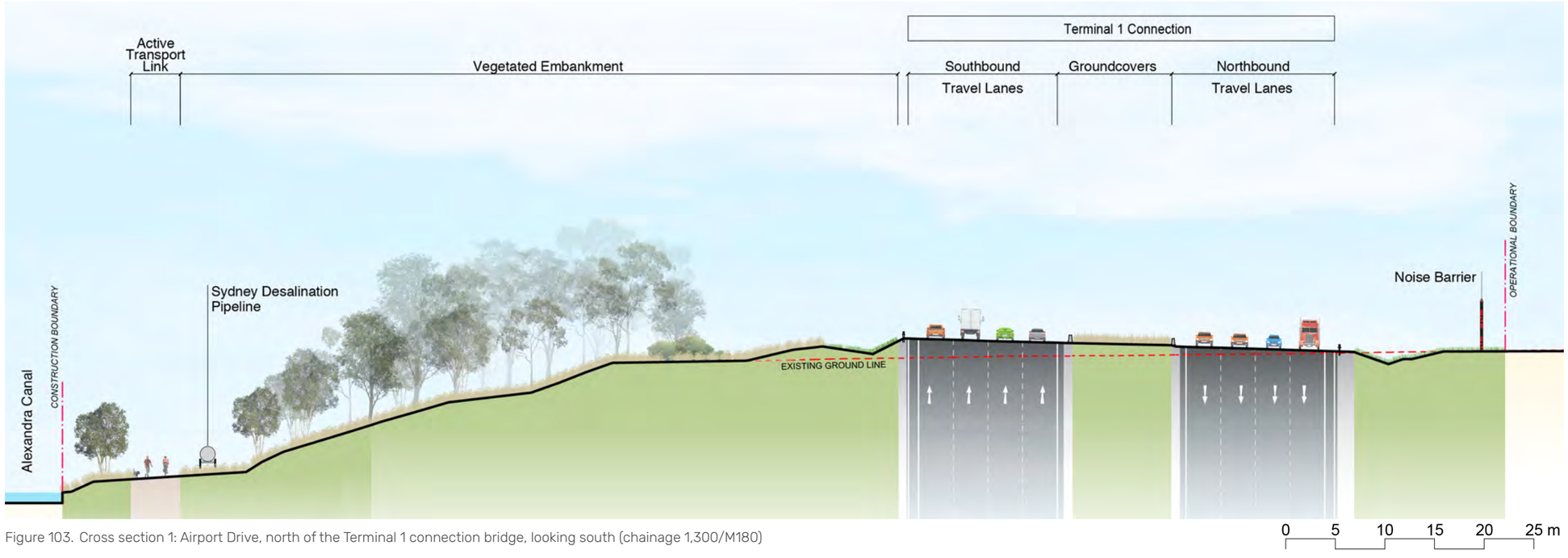


Figure 103. Cross section 1: Airport Drive, north of the Terminal 1 connection bridge, looking south (chainage 1,300/M180)

6.6.3 Precinct 3: Central interchange

This precinct is comprised of a triangular site at the heart of the project. Its key function is as the major entry into the airport precinct for those travelling to the airport, and entry to the wider WestConnex network for those leaving the airport. As such, intuitive wayfinding and simplicity of design using materials and lighting are key outcomes to assist motorists in navigating this part of the journey.

Another important design consideration for this precinct is the opportunities for views towards Sydney Airport and the low-lying landscape around Botany Bay, as the first major opportunity for motorists approaching from St Peters interchange to glimpse their destination.

Finally, the precinct plays a key role in drainage, flood mitigation and water management generally. Due to the low lying and flat nature of the site, efficient drainage solutions are required. However, there are opportunities to integrate land art or structures inspired by traditional Aboriginal land management and hunting techniques such as fish traps, thereby integrating engineering, landscape and art/culture to re-establish a connection to country. These elements would be visible from the air and would signify this important entry point to Australia and Sydney for international and domestic visitors.

The following key design features would be considered to enhance the important entry function of this precinct:

- Large trees species to signify the entry into the precinct from St Peters interchange
- Opportunities for sculpture/art and light to assist with wayfinding
- Extensive shrub and groundcover planting to screen industrial buildings and drainage structures
- Gaps in tree planting to allow views to the airport precinct.

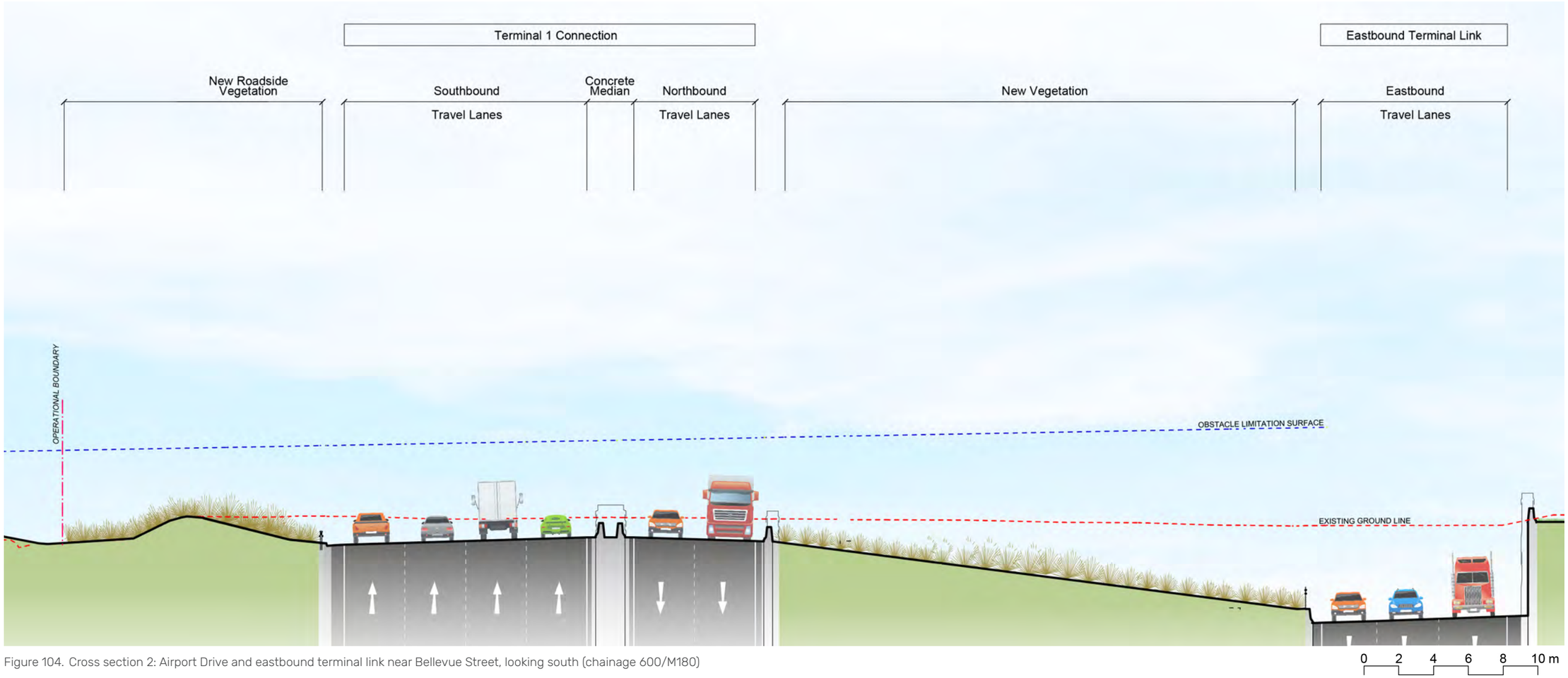


Figure 104. Cross section 2: Airport Drive and eastbound terminal link near Bellevue Street, looking south (chainage 600/M180)

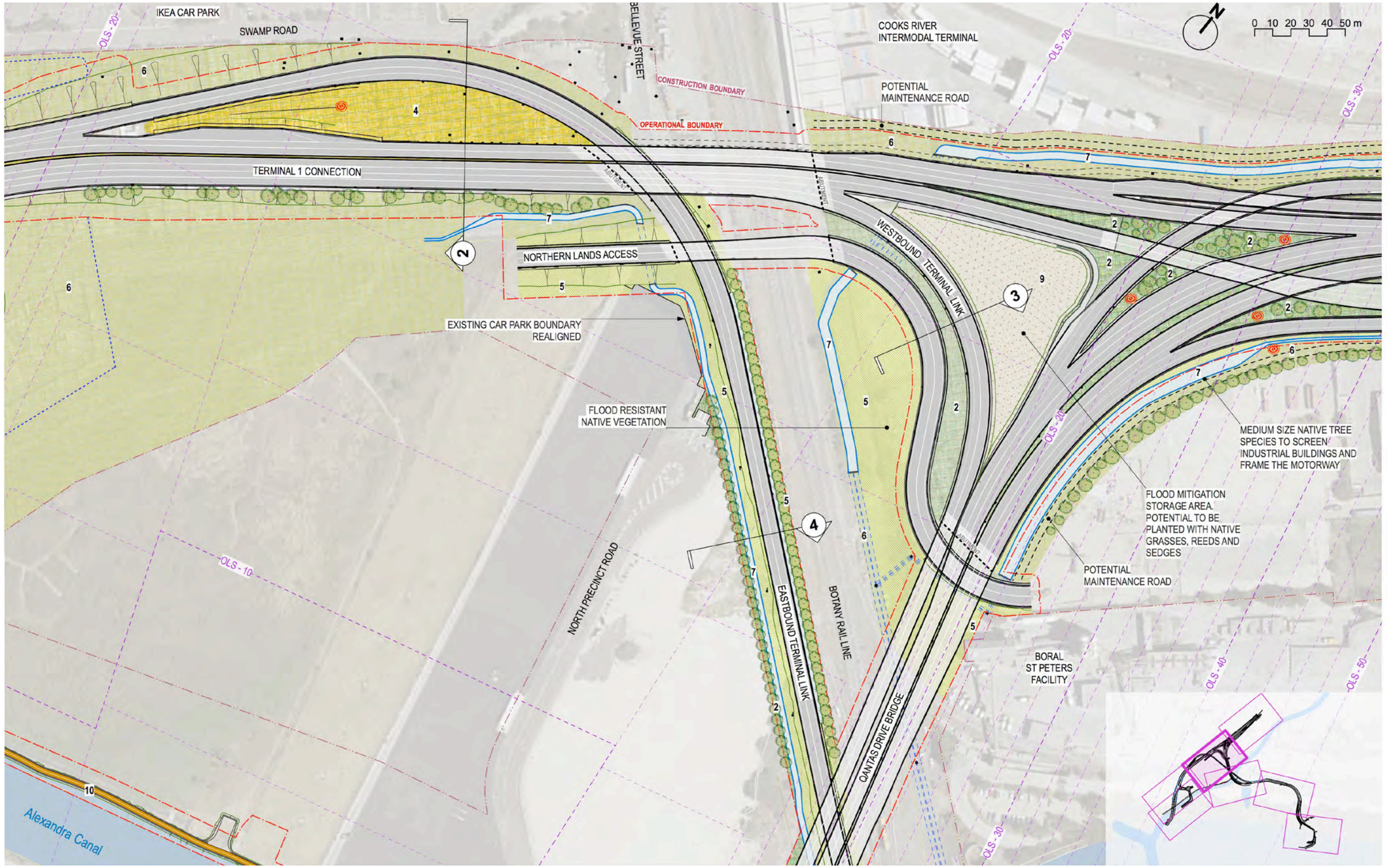


Figure 105. Urban and Landscape Design Concept plan - Precinct 3: Central interchange

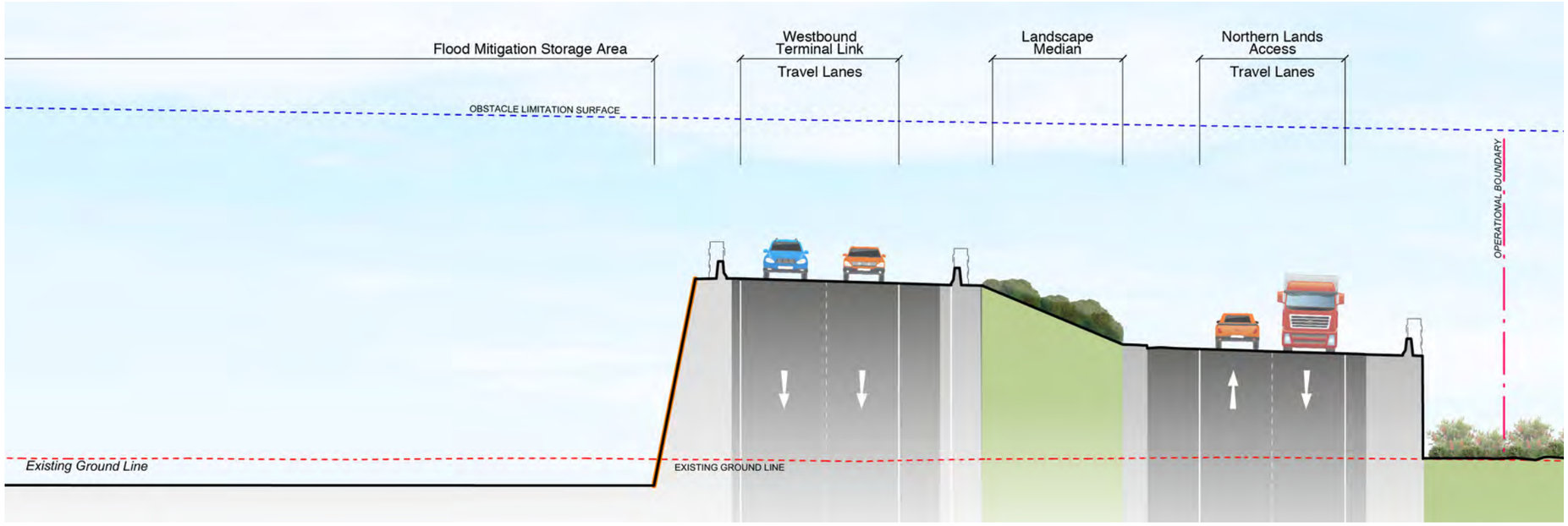


Figure 106. Cross section 3: Northern Lands access and westbound terminal link, looking south (chainage 150/M1J0)

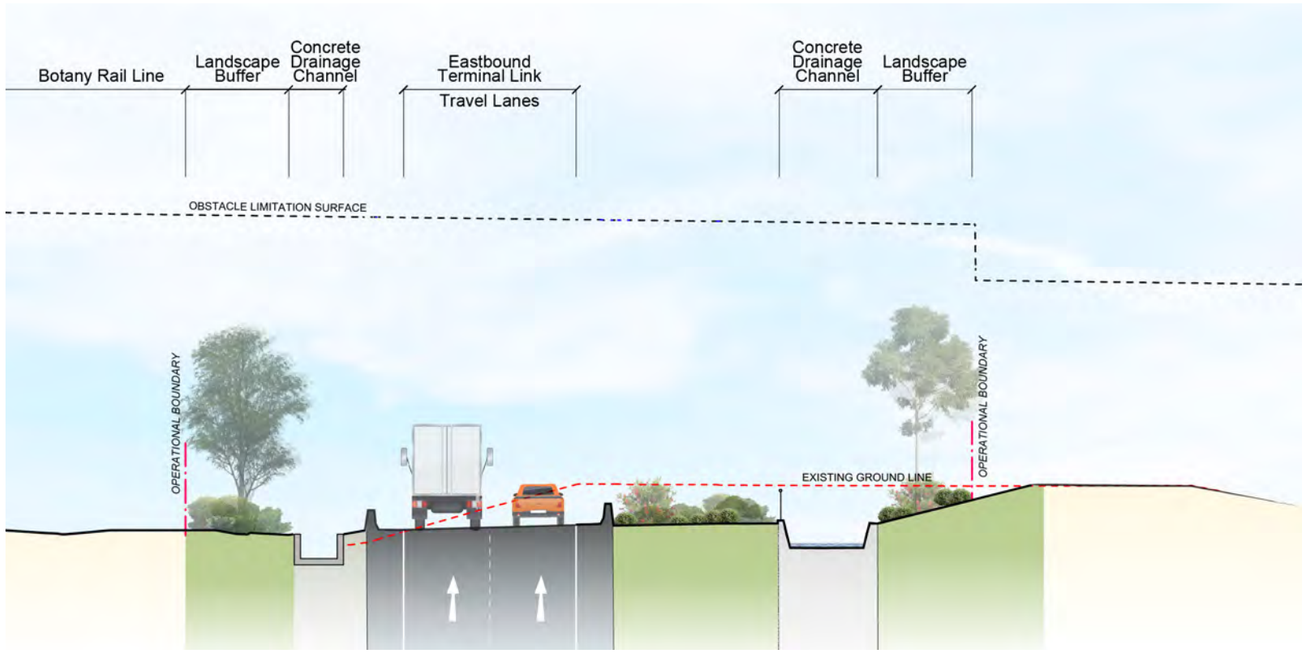


Figure 107. Cross section 4: Eastbound terminal link, looking east (chainage 600/M1H0)

Figure 108. Artist impression of the central interchange precinct when seen from Bellevue Street, Tempe

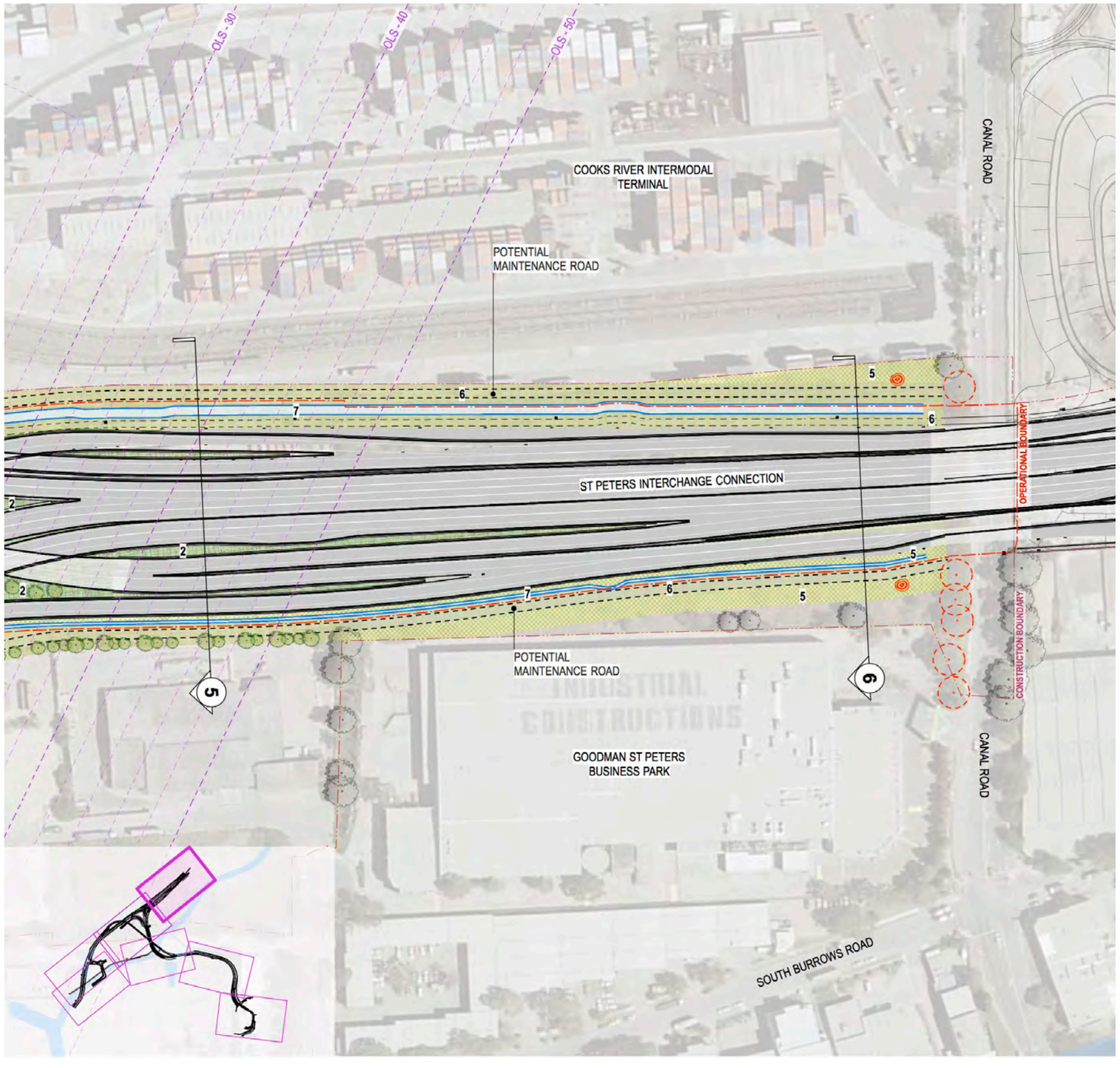


Figure 109. Urban and Landscape Design Concept plan - Precinct 4: St Peters interchange

6.6.4 Precinct 4: St Peters interchange connection

The St Peters interchange connection is a linear precinct that is constrained in its width. Its primary function is the transition from the St Peters interchange to the Sydney Gateway. Similar to the central interchange precinct, wayfinding is a key consideration, requiring intuitive design solutions to enable motorists to easily find the correct route amongst a number of options. The design would support this through a restrained response utilising walls as a key element complementing a restrained suite of bridges.

Key design considerations for this precinct include:

- Coloured cladding and lighting to assist with wayfinding
- Opportunities for sculpture/art to signify the transition from WestConnex into the Sydney Airport precinct
- Roadside vegetation would be carefully located to frame or screen views as appropriate to enhance the sense of place and journey
- The landscape design integrates maintenance access requirements by carefully selecting and locating species to ensure maintenance access to major project elements including retaining walls, bridges and drainage structures.

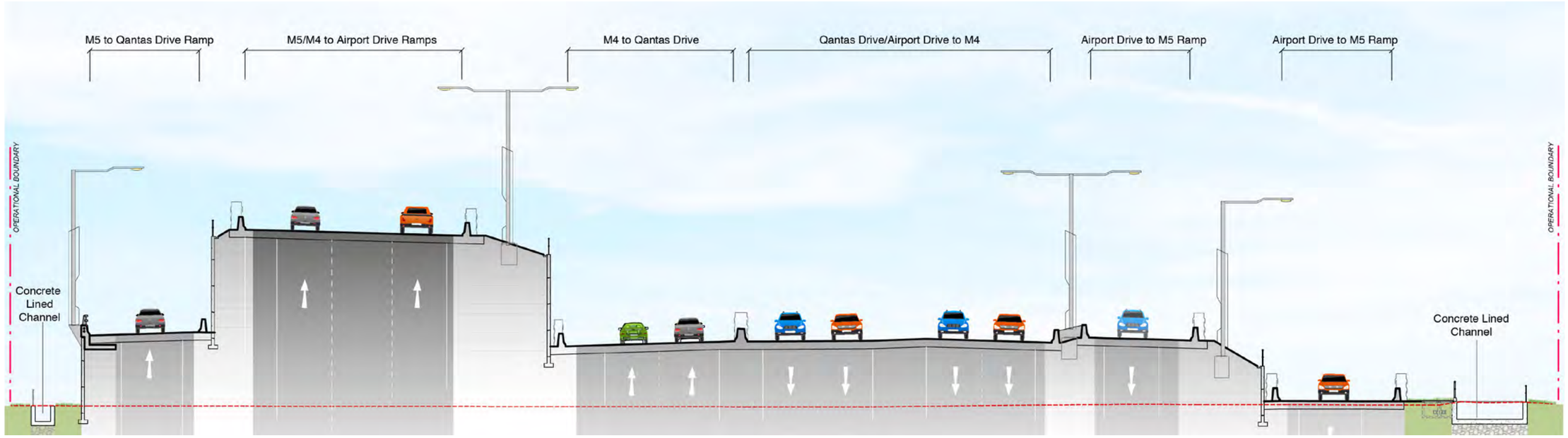


Figure 110. Cross section 5: St Peters interchange connection near central interchange, looking south (chainage 1,250/M130)

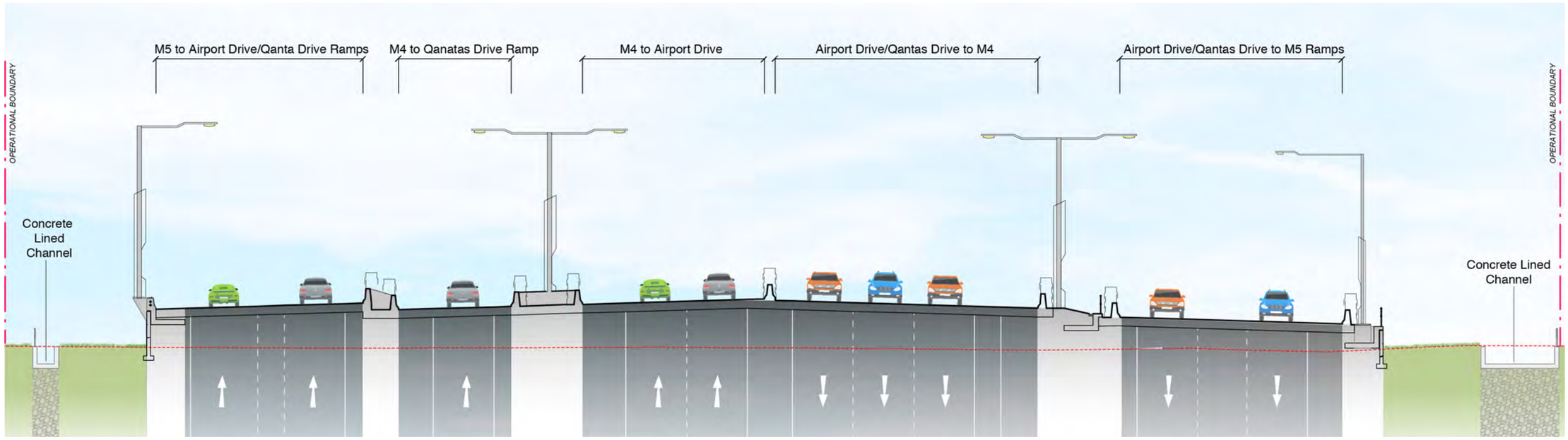


Figure 111. Cross section 6: St Peters interchange connection near Canal Road, looking south (chainage 800/M120)

6.6.5 Precinct 5: Qantas Drive extension

This precinct is characterised by a complex series of road links in an open setting as they cross over Alexandra Canal, as well as over one another. Therefore much of the design is focused on the experience of crossing the canal and of the "big sky" landscape that characterises this precinct and much of Sydney Airport.

Landscaping below the structures would complement the open, low-lying landscape setting, maintaining key views along and across Alexandra Canal while assisting in mitigating the scale of the project. Important Sydney Airport water storage and treatment functions on land adjacent Alexandra Canal would be maintained in re-configured ponds that integrate sedges for improved water filtration outcomes and enhance the experience along the active transport link.

Key design considerations for this precinct include:

- Ensuring the design of bridges considers the heritage of Alexandra Canal
- The use of coloured cladding and lighting, including the integration of headlight screens on the bridges, to aid in wayfinding
- Artistic treatments to bridge abutments using colour, patterning, relief and lighting
- Balance views with the need for headlight glare screening
- Provision of an attractive active transport crossing of Alexandra canal below the proposed bridges
- Attractive landscaped area between bridges incorporating a reshaped pond.

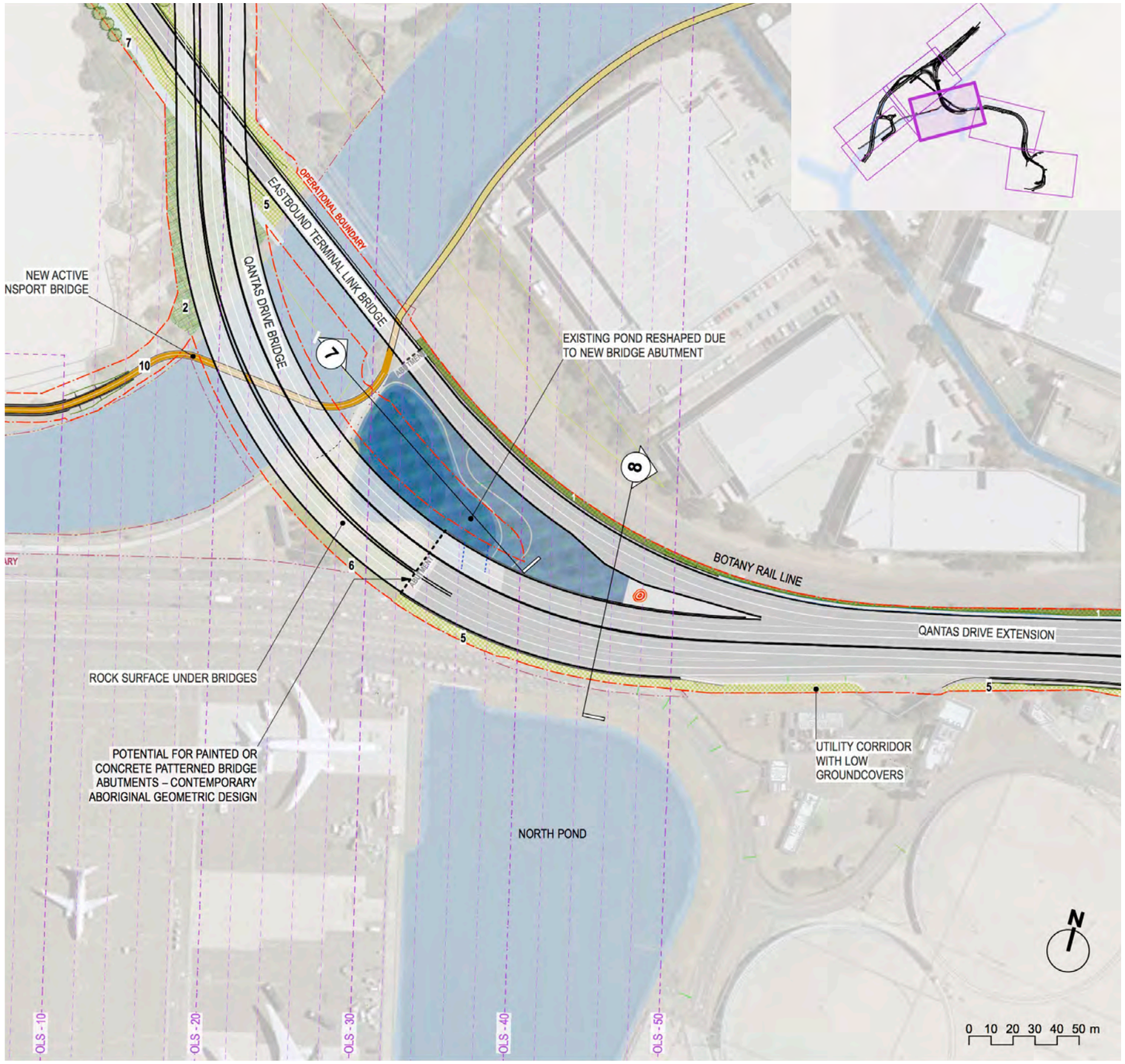


Figure 112. Urban and Landscape Design Concept plan - Precinct 5: Qantas Drive extension

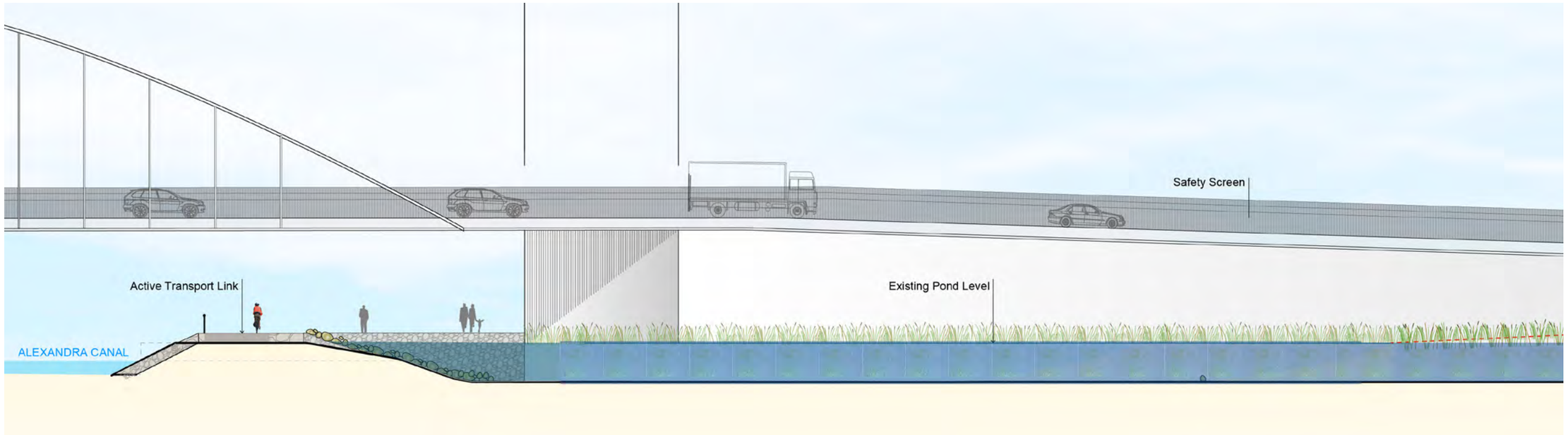


Figure 113. Cross section 7: Alexandra Canal cycleway south of the terminal link bridge

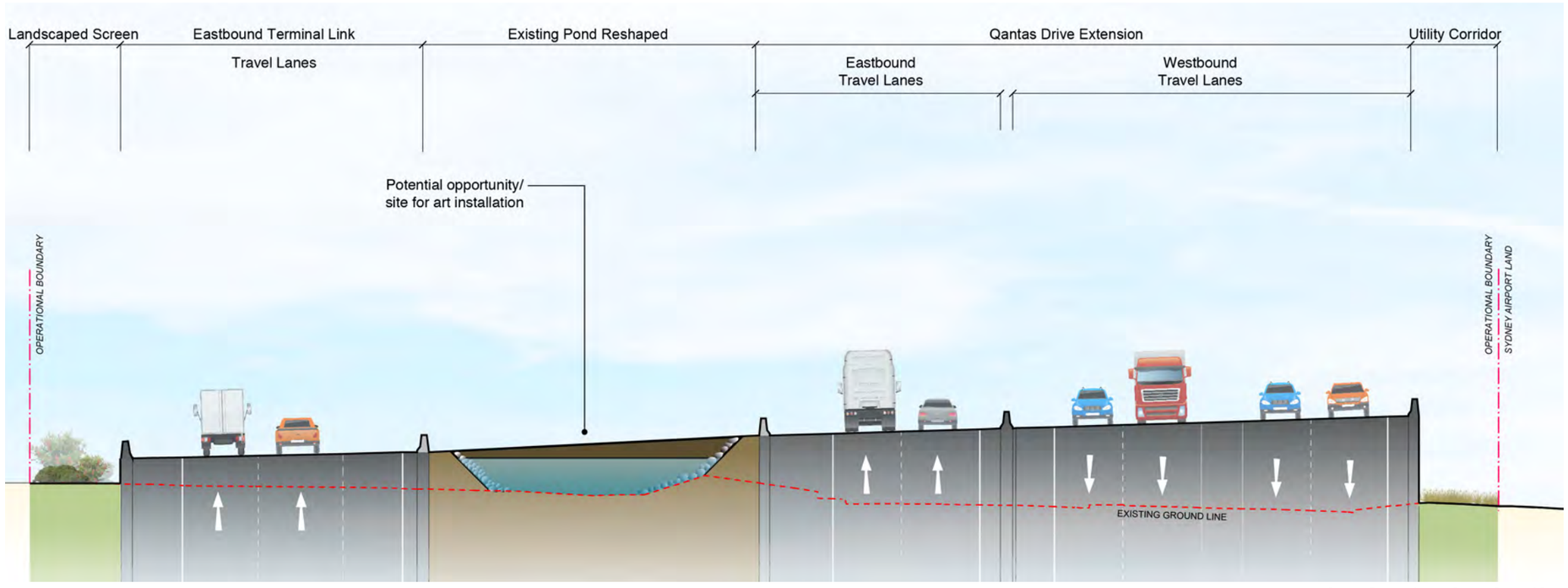


Figure 114. Cross section 8: Eastbound terminal link and Qantas Drive near North Pond, looking east (chainage 1,900/M130)

Figure 115. Aerial view of the Qantas Drive bridge with headlight screens with the terminal link bridge behind. Note: orange tones are used for clarity of illustration only

6.6.6 Precinct 6: Qantas Drive upgrade

This precinct is characterised by its highly constrained setting between the Botany Rail Line and Sydney Airport's north-east sector. Recognising that the precinct is located at the interface to Sydney Airport, the design seeks to provide an attractive address to Sydney Airport. Within the confines of the project footprint, the design utilises the road verges to frame the widened roadway in a way that reduces the visual prominence of the carriageways, making the journey efficient yet visually appealing to support the arrival and 'Gateway' experience.

Key design considerations for this precinct include:

- The used of coloured cladding and lighting to assist with wayfinding
- Provision of sculptural native planting to aid in the transition to the Terminals 2/3 precinct.

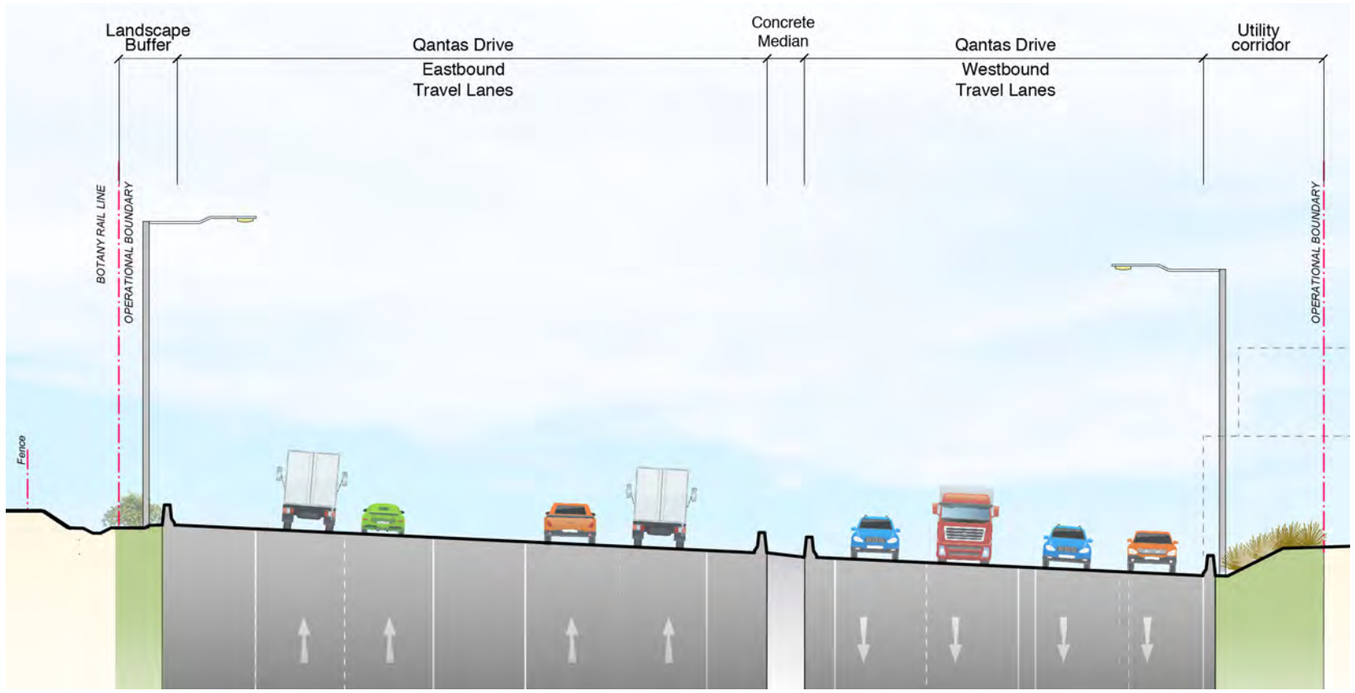


Figure 116. Cross section 9: Qantas Drive south of King Street, looking east (chainage 600/M3A0)

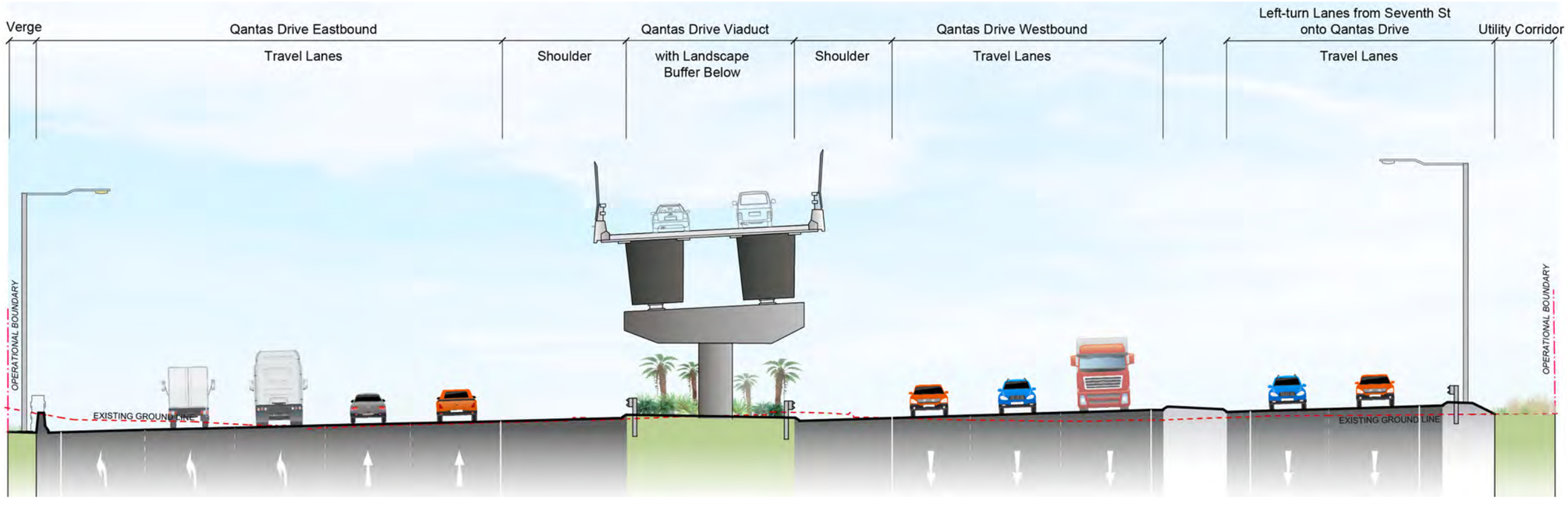


Figure 117. Cross section 10: Qantas Drive south of Ewan Street, looking east (chainage 800/M3A0)

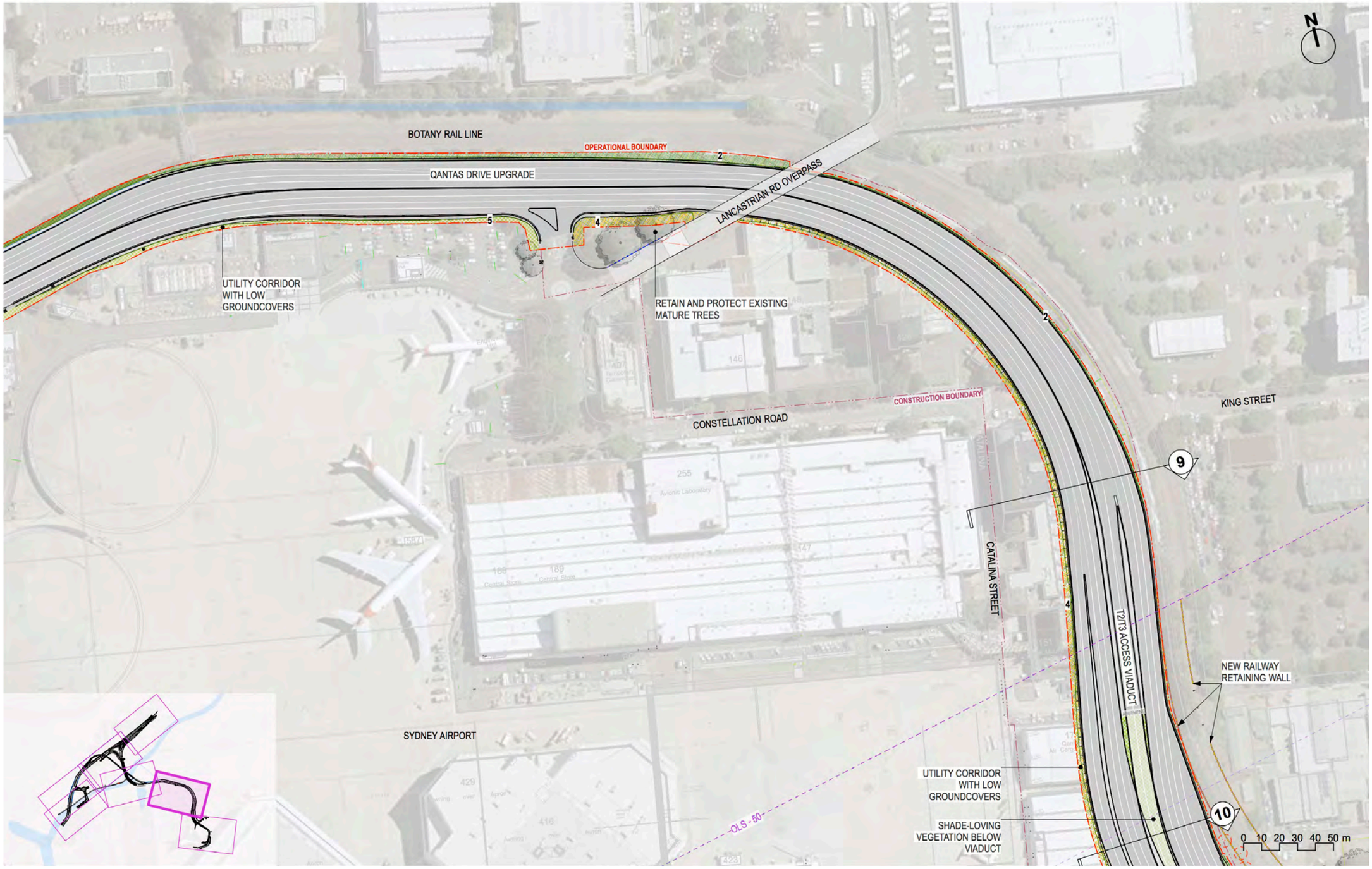


Figure 118. Urban and Landscape Design Concept plan - Precinct 6: Qantas Drive upgrade

Figure 119. Artist impression of the Qantas Drive upgrade precinct when seen from the vicinity of King Street, Mascot

6.6.7 Precinct 7: Terminals 2/3 connection

The role of this precinct is to facilitate entry into and exit out of Terminals 2/3. Similar to the Qantas Drive upgrade precinct, it is spatially constrained but plays a key role in shaping a positive arrival sequence to and from Sydney Airport. This is achieved through a refined urban design approach to the access viaduct, creating an elegant overhead structure that visually separates the carriageways to take the focus off the large road width.

The following key design features to enhance the gateway function of this precinct would include:

- Existing tree planting to be retained and supplemented with native trees and palms
- Artistic treatments to retaining walls using colours, patterning, relief and lighting
- Potential inclusion of airport welcome sign
- Locations for sculpture/art to announce arrival at Terminals 2/3
- New accessible open space with shade planting between Keith Smith Avenue and Shiers Avenue.

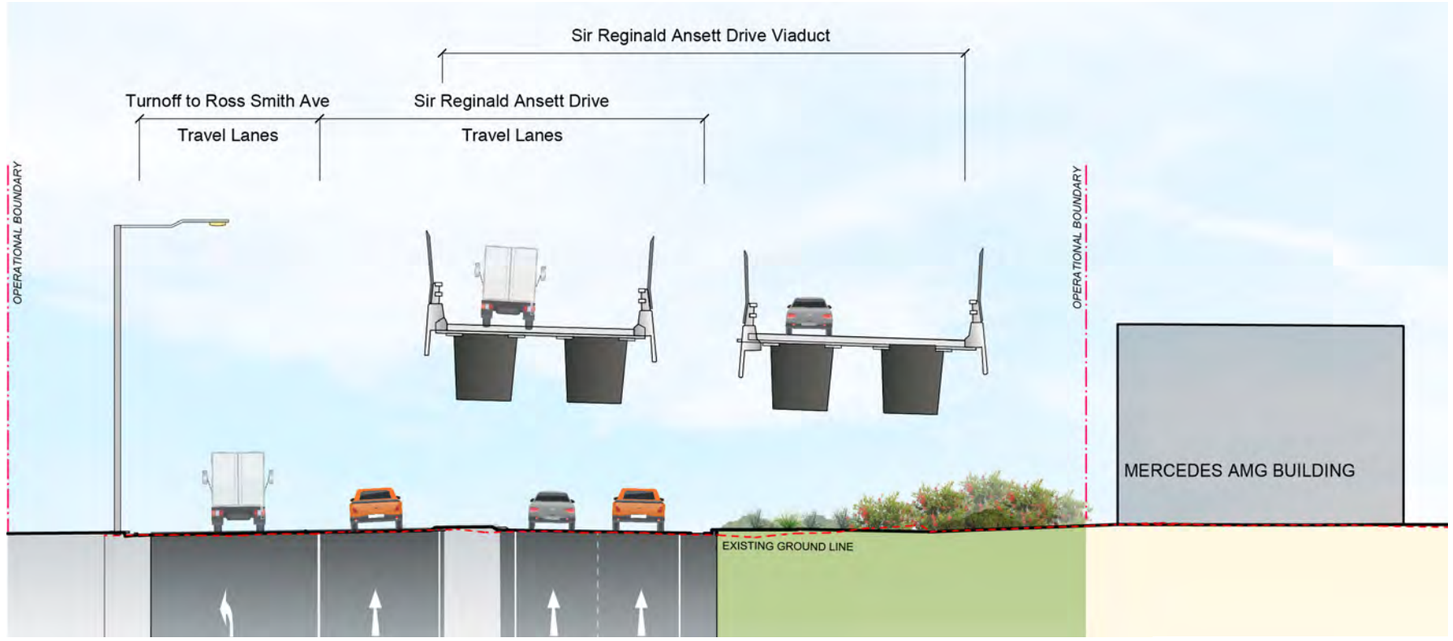


Figure 120. Cross section 11: Sir Reginald Ansett Drive near Ross Smith Avenue, looking south (chainage 1,200/M3A0)

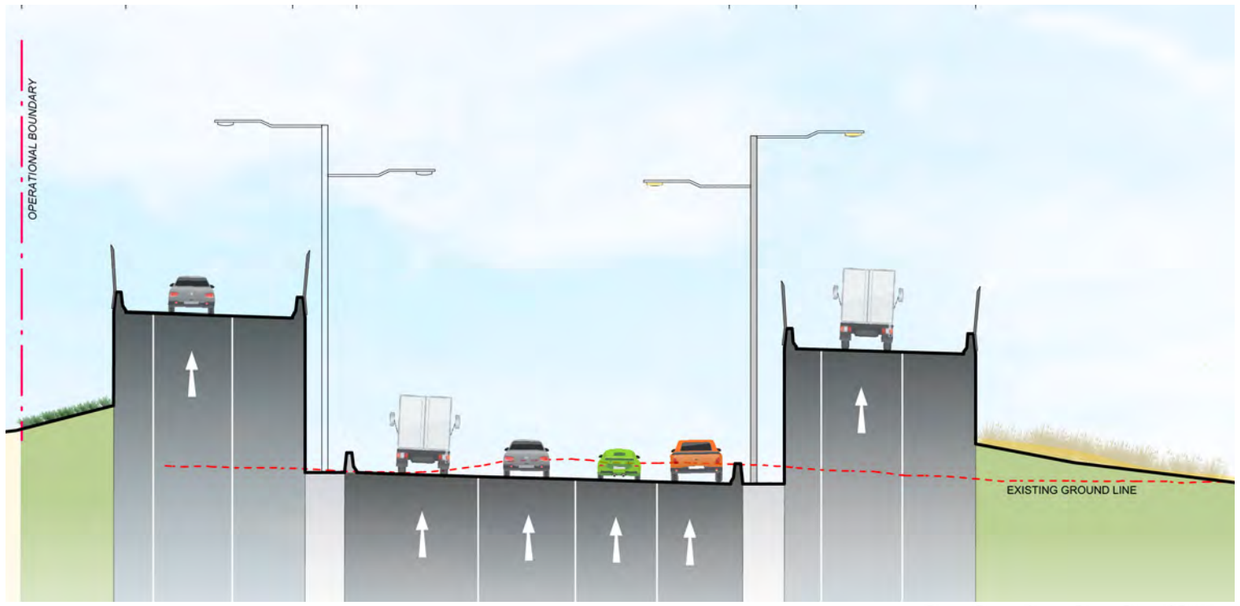


Figure 121. Cross section 12: Sir Reginald Ansett Drive near Shiers Avenue (chainage 1,300/M3A0)

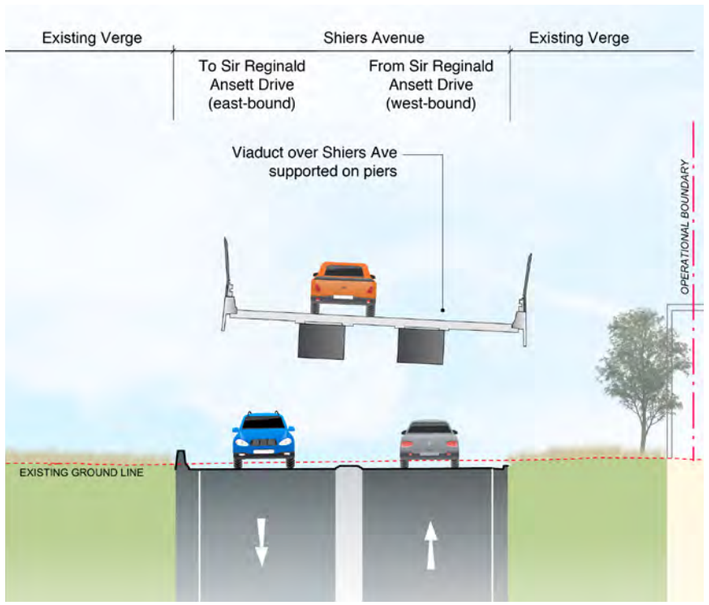


Figure 122. Cross section 13: Shiers Avenue (chainage 1,285/M3Q0)

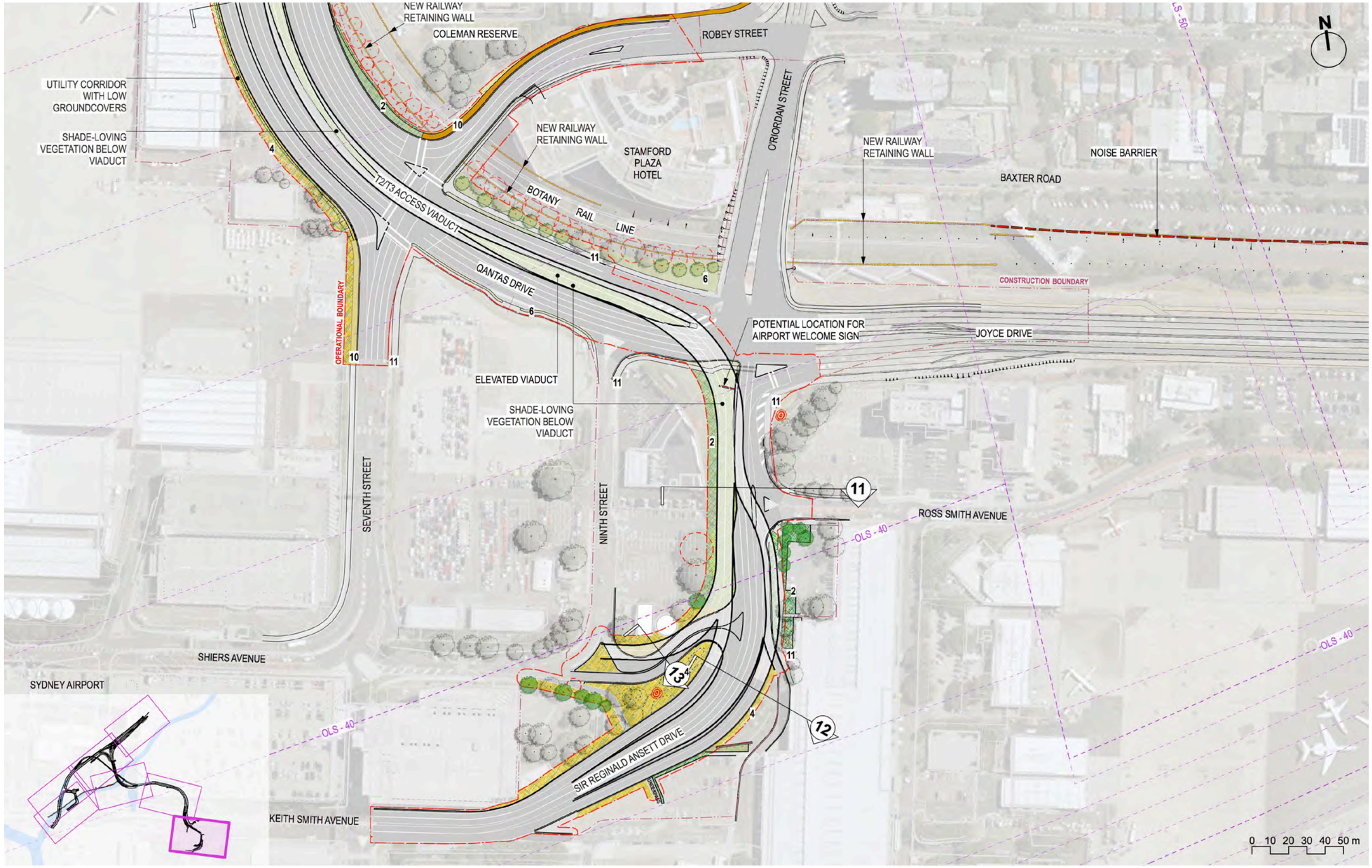


Figure 123. Urban and Landscape Design Concept plan - sheet 7

6.7 DESIGN ELEMENTS

The essential project infrastructure would be comprised of four major components: structures, place making elements, landscape elements and roadside elements.

A series of themes are introduced into all four components to ensure that the notion of 'Gateway' or a sense of place (of arriving or leaving Sydney) would be established across the project. Colour, materials and lighting would be an integral component in achieving an identity for the Gateway and as part of a wayfinding system for motorists. Design elements introduced on structural components such as bridges, would be identifiable on retaining walls. Each component would communicate to the next as one travels through the Sydney Gateway.

Public art and historic and cultural interpretation are woven into the landscape and place making elements to reinforce the thematic experience. At the heart of realising this outcome is a cohesive design approach across multiple disciplines.

The following are recommendations for implementing the urban and landscape design concept through the essential four components of infrastructure and urban design elements below:

- Structures:
  - Bridges and viaducts
  - Retaining walls
  - Noise walls
- Connections and placemaking:
  - Feature lighting
  - Pedestrian and cycle connections
  - Public art and interpretation
  - Indigenous design approach
- Landscape elements:
  - Public open space
  - Roadside landscape
  - Vegetation
  - Drainage structures
- Roadside elements:
  - Headlight screens
  - Gantries.

6.7.1 STRUCTURES

BRIDGES AND VIADUCTS

Bridges would be important physical and visual elements along the Sydney Gateway road project. They offer an excellent opportunity to shape the visual identity of the project and promote a sense of place on the journey to and from the airport.

Guiding principles

Based on the review of Roads and Maritime policy documents (refer section 2.4) and contemporary bridges, the following series of guiding principles has been identified:

- Structural systems are to be elegant and efficient
- Bridge forms and elements are to be shaped, refined and integrated for aesthetic benefit, including deck edges, soffits, headstocks, piers and above deck structures
- All bridge types are capable of aesthetic refinement
- Steel bridges generally offer the best aesthetic outcomes
- Use lighting to create symbolic qualities and wayfinding
- Use colour for memorable visual effects and wayfinding
- Identify and design for where the bridges would be viewed from, including aeroplane windows.

Bridge types

The project's bridges can be divided into three categories, based on their location, size, visibility and opportunity to contribute to the 'Gateway 'experience:

- Canal bridges – low-lying structures facilitating memorable views of the landscape setting to create a sense of excitement, anticipation and arrival. These structures would be simple and visually unobtrusive
- Road bridges – a family of refined structures that enhance the motorist experience and carefully integrate with the larger landscape setting
- The Qantas Drive viaduct - a distinct structure.

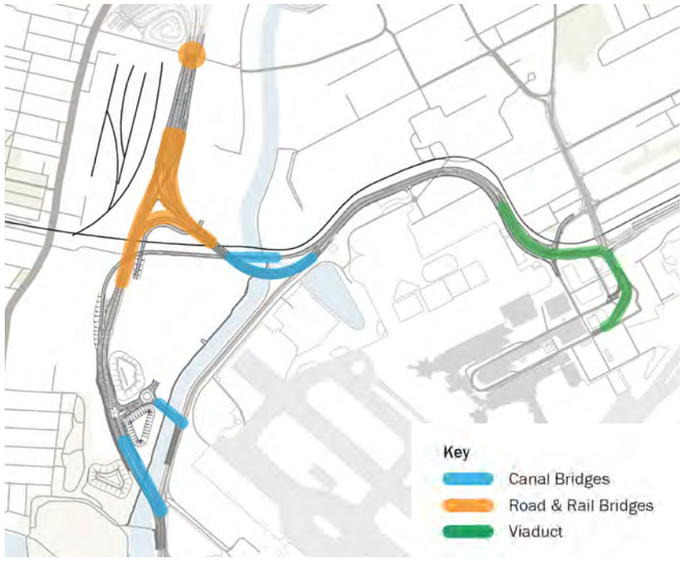


Figure 124. Locations and categories of bridges - key plan

The design of the bridges supports the notion that the landscape setting with its expansive views over Sydney Airport provides the key 'Gateway' experience that is complemented by the engineering structures.

The location of different bridge types is shown in Figure 120.

Figure 125. Examples of integrating Indigenous design into bridge abutment wall with colour and pattern

Design intent

A variety of structural types are proposed for the bridges, due to the complex and varied physical, planning, and operational constraints present at each site.

The overall design intent is to create a coherent visual connection between all bridges, and between bridges and design elements, to produce the thematic visual 'Gateway' experience for the motorist and fleetingly for aeroplane passengers:

- Consistency - use consistent form of expression and finish to tie together all bridges within each category of bridges, irrespective of structural or construction differences
- Refinement – considered design and detailing of the bridge to realise an outcome that supports the notion of the 'Gateway'
- Façade – investigate opportunities for adding form, texture, and colour through façade elements above the parapet that are visually striking, extending for the length of the bridge
- Lighting - investigate opportunities for facade lighting or feature lighting that would enhance the night-time experience, making the 'Gateway' perceptible during the day and night while complying with airport safety requirements
- Colour - include striking colour, particularly in conjunction with lighting, to capture noteworthy moments such as major entry points, and create striking visual effects
- Pattern - investigate opportunities to integrate aviation art and/or Aboriginal cultural symbols or patterning into the design of walls, abutments and the like, to contribute to interpretation and story-telling and enhance the sense of place consistent with the urban design strategy
- Walls – integrate shape, materiality, colour, and textural expression of piers and abutments to visually connect related structures when experienced from surrounding areas, tell the Sydney Gateway story and deter graffiti
- Frame - framing views of the landscape setting where possible
- Light posts - use light posts as an integral element of the whole composition and to create rhythm and support the sense of dynamic movement
- Screen – mediate unsightly views through colour, pattern, and translucency
- Maintenance - integrate and conceal service access.

Canal bridges

Canal bridges would make an important contribution to the visual experience of the Sydney Gateway road project due to their location within the road network. The primary role of these bridges is to facilitate the experience of the landscape by providing low and visually unobtrusive crossings over Alexandra Canal, maximising the retention of the open landscape character with views along the canal. Canal bridges may also have a secondary function in directing, framing or screening views, to shape the sequence of views experienced along the journey in support of the telling of the Sydney Gateway story.

The canal bridges are - refer **Figure 123**:

- Qantas Drive bridge
- Terminal link bridge
- Terminal 1 connection bridge
- Freight Terminal bridge.

Urban design approach for canal bridges

- Each bridge is to be an exemplary work of integrated engineering, architecture and urban design, contributing to good design and amenity of the built environment, as per clause 1.3 of the EP&A Act (refer **section 2.3.1**)
- Each bridge is to be designed with consideration for where it would be viewed from, including from aeroplane windows
- Structural systems are to be elegant and efficient and provide a single clear span across the canal and maximise visual openness and transparency above and below the bridge to facilitate views across the canal and broader landscape setting from both the bridge and other parts of the Sydney Gateway road and active transport network
- Bridge forms and elements are to be shaped and refined for aesthetic benefit, particularly deck edges, soffits and piers
- The composition of bridge elements is to be well considered to create a unified and integrated design that respects the curtilage and conservation management requirements of the canal - also refer **section 4.5.2**
- Twin balanced cantilever concrete bridges generally offer the best aesthetic outcomes due to their low, visually unobtrusive form
- Feature lighting to be used to create symbolic qualities, taking into account the airport runway visibility requirements
- Colour is integral to the creation of memorable visual effects
- The design of spaces beneath the bridges would:
  - Consider the experience from underneath to create well scaled, visually appealing, safe and usable spaces
  - Maintain the potential for future pedestrian links along the canal, consistent with the CM Act (refer **section 2.3.2**), statutory planning documents (refer **section 2.5.1**) and conservation management policies (refer **section 4.5.2**)
- The proportion between deck overhang and girder depth would be carefully considered
- Horizontal forms would be accentuated
- Spill through abutments are preferred as they result in a more open character that maximises views along the canal
- Integrate a welcome statement to Terminal 1 on the airport side of the Terminal 1 connection bridge.

Figure 127. Elegant above deck structure, Cittadella Bridge, Alessandria, Italy

Figure 126. Refined superstructure with integrated parapet, Mandurah Bridge, Western Australia

Figure 128. An elegant and striking structural system can be lit to provide memorable visual effects, Robert Schuman Bridge, Lyon, France

Figure 129. Baakenhafenbrucke, Hamburg at night with integrated light posts

Figure 130. Nigel Love Bridge over Alexandra Canal

Figure 131. Artists impression looking west along the terminal link bridge with the same colour tone to the underside of the arches as that on the headlight screens on Qantas Drive bridge

Figure 132. Bleichinselbrucke, Heilbronn, Germany has a minimal superstructure and visually light fencing

Road bridges

Road bridges are the project's urban bridges that are visible along the journey to and from the airport, or by the public or residents from the surrounding urban context. These bridges are an important component of the project's visual identity and need to be designed to a high aesthetic standard, consistent with the WestConnex Urban Design Framework requirement for '*design and construction quality of world class standard*' (refer **section 2.4**), as well as statutory requirements, NSW and Roads and Maritime policy (refer **sections 2.3 - 2.5**).

The urban road bridges are - refer **Figure 123**:

- Three Canal Road overpasses
- St Peters interchange connection to northern overpass
- St Peters interchange connection southern overpass
- Terminal 1 connection rail overpass
- Northern sector lands access rail overpass
- Cycle connection bridge.

Urban design approach for road bridges

- Create a 'family' of bridges, with similar detailing based on bridge type (underbridge, overbridge, flyover, underpass, canal crossing) to unify the expression of bridge structures throughout the project
- All bridge types are capable of aesthetic refinement
- The composition of bridge elements is to be well considered to create a unified and integrated design
- Structures should be simple, efficient, refined and elegant with minimal piers and abutments
- Bridge forms and elements are to be shaped and refined for aesthetic benefit, particularly deck edges, piers and soffits
- Accentuate horizontal forms
- Provide good proportions between deck overhang and girder depth
- Open spill through abutments are preferred
- Where the bridge crosses a roadway or publicly accessible space, consider the experience from underneath and create well scaled, visually appealing, safe and usable spaces beneath the bridge
- Portal and underpass interiors to be welcoming and have architectural merit, appropriate to the context and setting
- Use colour and feature lighting for visual effect where appropriate.

Figure 133. A shaped and coloured parapet provides for a mix of open and closed views from the bridge, as well as a sense of dynamism for motorists and viewers in adjoining areas

Figure 134. The Baakenhafenbrücke provides an example an elegant superstructure and a simple, elegant and open parapet that maximises views from the bridge to the surrounding landscape

Figure 135. The Gallipoli Underpass in Adelaide is a good example of the use of striking colour and of integration between the parapet and wall design

Figure 136. Integration of indigenous design patterning on the bridge parapet

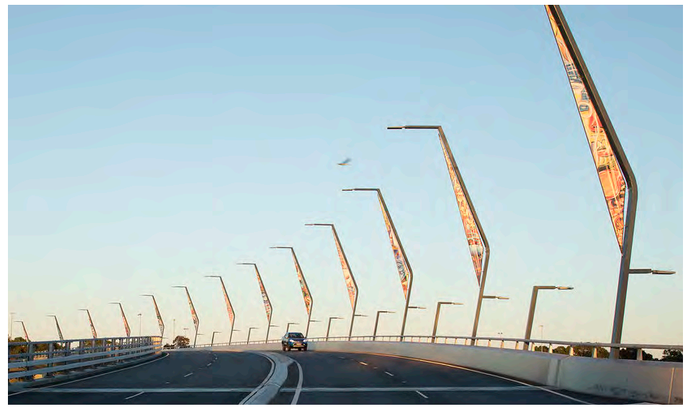


Figure 137. Integrated lighting provides opportunities for placemaking

Qantas Drive viaduct

The Qantas Drive viaduct is located on the Qantas Drive upgrade and extension, on the approach to Terminals 2/3 - refer **Figure 123**. It is approximately 362 metres long and carries two traffic lanes centrally above Qantas Drive and Sir Reginald Ansett Drive. The structural design for the viaduct is for composite steel box girders with concrete piers. Long retaining wall abutments are required at either end of the viaduct, prominently located at the centre of Qantas Drive and along either side of Sir Reginald Ansett Drive.

The viaduct would be a highly visually prominent due to its scale, elevated alignment and location at the entry and exit to Terminals 2/3. As such, it is designed as a landmark structure on the approach to Sydney Airport.

Urban design approach for the viaduct

- Develop a high quality structure including materials and detailing appropriate to the gateway location and of a form and external appearance that would improve the quality and amenity of the public domain, consistent with the requirements of clause 1.3 of the EP&A Act (refer **section 2.3.1**), the WestConnex Urban Design Framework requirement for '*design and construction quality of world class standard*' (refer **section 2.4**) and clause 6.16 of the Botany Bay LEP (refer **section 2.5.1**)
- The vertical alignment of the viaduct must consider how it would be appear in relation to adjacent built form and landscape, and how it would viewed from the surrounding road system, public domain, hotels and from the motorway below
- Consider how the design of the viaduct is to be integrated with the design and visual appearance of the existing viaducts in the Terminals 2/3 precinct, to achieve a considered composition and transition
- Investigate opportunities for façade cladding to the bridge soffit and parapets to create a unified and memorable shape to the viaduct, similar to the soffits in Terminals 2/3. The soffit in particular would be the most visually significant component of the structure, as it would be viewed by motorists, pedestrians and cyclists passing under the bridge exiting the Domestic Airport, as well as those travelling adjacent to the viaduct on Qantas Drive
- Investigate opportunities to integrate art and interpretation into the design of the soffit
- The design of abutment retaining walls if required is to carefully consider materiality, finish and detailing
- The design of the visible structural elements including the shape of the piers and their connection to the superstructure is to be carefully designed to create an integrated composition
- Feature lighting is to be included to emphasise select elements, particularly the soffit
- Investigate opportunities for landscape integration to soften the appearance of the piers, provide visual separation between the carriageways and create an attractive arrival experience that compensates for the loss of mature trees and other vegetation along Qantas Drive
- The design of the viaduct is to be cognisant of the new nearby railway bridges at Robey Street and O'Riordan Street, and the need for a visually harmonious relationship.

Figure 138. The BP Bridge in Chicago as another example of a refined soffit that is integrated with the parapet

Figure 139. The viaduct at Singapore airport provides a good example of a refined and elegant soffit

Figure 140. The Zwolle public transport bridge in Delft by ipv Delft is an elegantly designed structure with a well detailed soffit

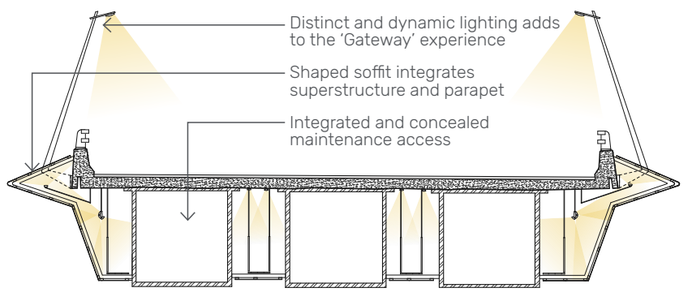


Figure 141. Cross section of a potential sample soffit treatment that would achieve the desired outcomes for the Qantas Drive viaduct. There is the potential to integrate colours, texture or finishes and lighting with those of the retaining walls of the Airport Distributor

Figure 142. The viaduct in the Terminals 2/3 precinct features a well-designed and attractive soffit

Figure 143. The skybridge at Singapore's Changi Airport

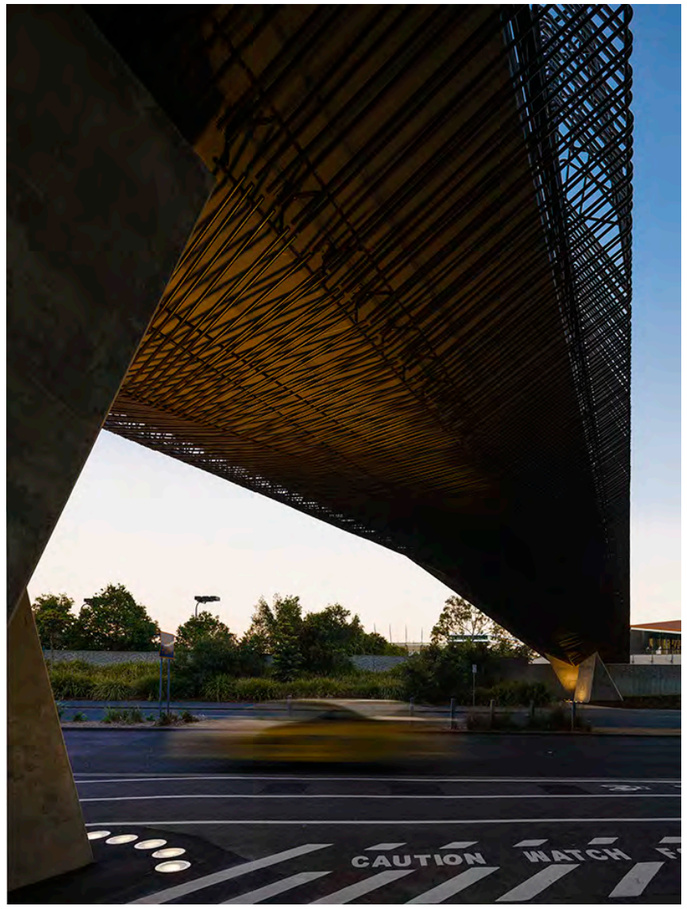


Figure 144. The design of the soffit on the Tanderrum Bridge in Melbourne by John Wardle Architects gives the structure a light and soft appearance

Figure 145. Ceiling artworks in the Musée due Quai, Branly as an example of Indigenous design that could inform the viaduct soffit

Figure 146. Via Verde is a project in Mexico City that is converting at least 1,000 highway pillars into vertical gardens that absorb pollution and smog, as well as creating a more attractive public domain

Figure 147. Shade-loving vegetation could visually divide carriageways and re-introduce landscape in a highly constrained corridor

Figure 148. Light patterning to the underside of a viaduct in Madrid

RETAINING WALLS

The Sydney Gateway road project includes substantial retaining walls reflecting the complexity of topography, road geometry and airport operational constraints. The number and scale of the retaining walls provides an opportunity to create memorable visual experiences that enhance the 'Gateway' function of the project. In particular, the many parallel roadside retaining walls at the St Peters interchange connection are an opportunity to create a dynamic roadside architectural statement of 'Gateway walls' at the northern threshold to the project.

Urban design approach to retaining walls

- Design all walls as a family of elements to reinforce the Sydney Gateway identity and experience and to reinforce Sydney Airports identity
- Express movement and flow to relate to the experience of travelling into and leaving from Sydney
- To create a continuous vertical element that ties together with other project design elements to produce a thematic visual 'Gateway' experience. The strong vertical elements tie together with the horizontal elements of the bridges
- Create a memorable roadside landscape of feature retaining walls at the St Peters interchange connection, considering the incorporation of dynamic forms, pattern, texture, colour and public art
- Provide high quality robust walls of architectural merit and detail to all locations that are visible from either the motorway, surrounding roads and transport links, open space users or residents
- Investigate opportunities for integrating interpretation, site-specific art and story-telling into the vertical surfaces of walls through digital, temporary or permanent artworks that draw on:
  - The culture and symbols of the local and wider Indigenous community
  - The history of the area including establishment of the colony in nearby Botany Bay, local history, change and development (also refer **section 4.5**) and Sydney Airport as the country's major entry and departure portal today
- Investigate opportunities to combine materiality, lighting and customised profiles and textures to express artistic works and create a memorable sense of arrival and departure
- Investigate opportunities for a layered surface that could be backlit as a tool for generating memorable 'moments' along the road network and communicating the 'Gateway' significance day and night
- Incorporate colour for striking visual effect where appropriate
- Differentiate the back and front sides of each wall to assist with orientation
- Balance wall heights to maximise planting opportunities
- No shotcrete is to be visible to the public, motorists or residents; cover with facing panels or avoid shotcrete altogether
- Retaining walls not visible to the public or residents can have plain utilitarian finishes.

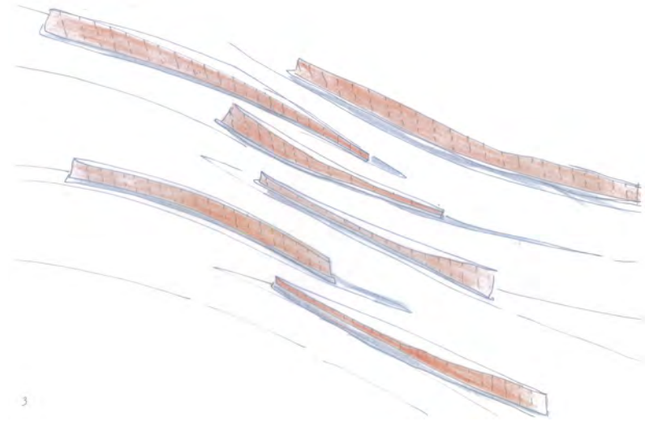


Figure 149. Indicative sketch of architectural walls providing separation

Figure 151. Locations of retaining walls - key plan

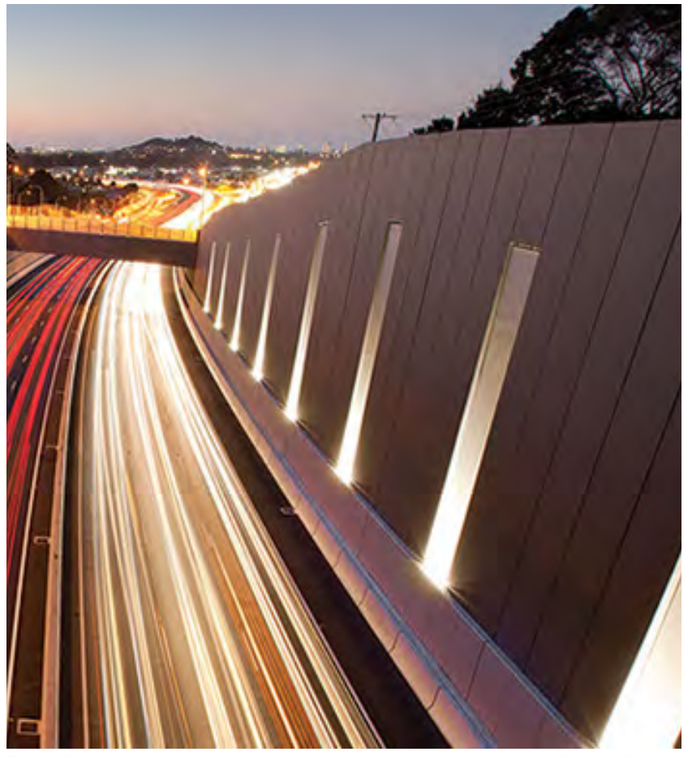


Figure 150. Lighting is a striking addition to these retaining walls at the Banora Point Bypass

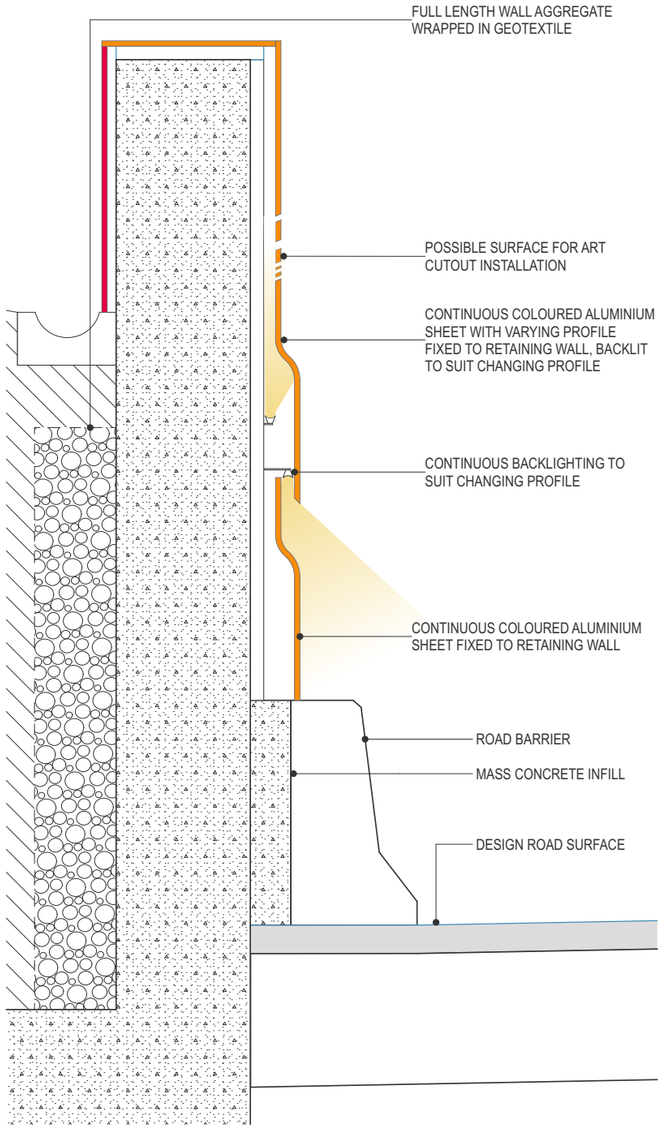


Figure 152. An example of a wall cladding integrating colour, texture and lighting. A similar treatment would be able to be applied to traffic safety barriers and other vertical elements to tie together the 'Gateway'

Example of retaining walls using Indigenous design as surface treatment.

Indigenous Landscape design for pedestrian areas

Language and Aboriginal place names used to connect people to Country

Figure 153. Indigenous design potential for motorway projects: sketch illustrating potential for pattern, language and space design on engineering structures and surrounding areas

Figure 154. Artist impression of the view from the St Peters interchange connection looking south, with retaining walls and barriers shown in two colour tones for clarity

Figure 155. Strong colours and high quality robust design used on the M80 Ring Road upgrade in Melbourne

NOISE WALLS

Two locations for noise walls have been identified to mitigate noise impacts on nearby residents and businesses. They are located in the following locations (refer to **Figure 155**):

- NW02 Tempe Lands 398m long, 5m high
- NW03 Baxter Road 279m long, 4.5m high

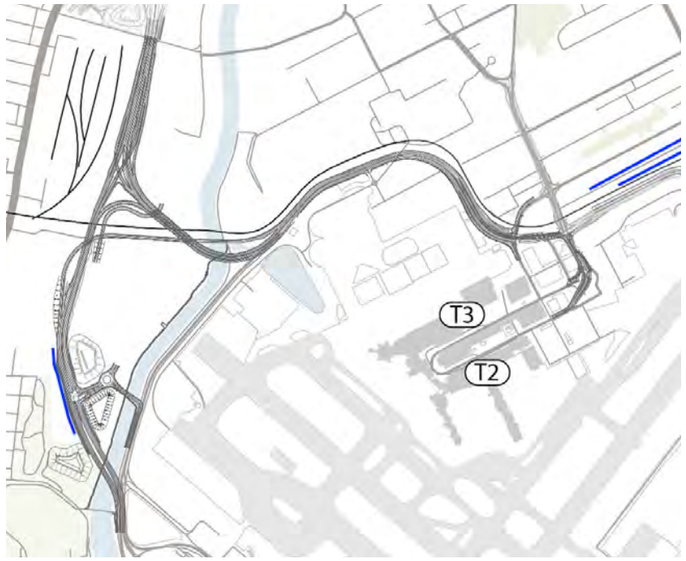


Figure 156. Locations of noise walls - key plan

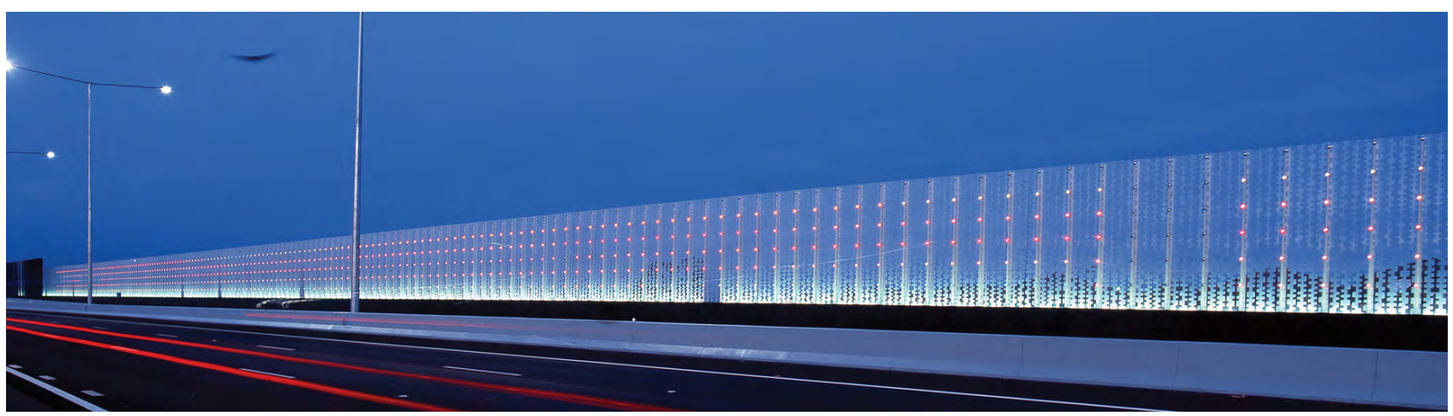


Figure 157. LED lighting integrated with patterned transparent noise wall provides a striking night time visual effect. Craigieburn Bypass, TZG, Melbourne

Urban design recommendations for noise walls:

- Noise walls should read as part of the thematic visual 'Gateway' experience
- Aim to reduce the height and extent of noise walls through the development of the design
- A transparent panel would be used along the Tempe Lands interface to allow views to be opened up from the road corridor and provide better visual connection to the surrounding context, and to maximise passive surveillance. These panels would be constructed using a slender steel post and may be coloured.
- Solid noise walls, or portions of noise walls, are to have high quality, robust finishes and include integrated patterns/artwork designed to respond to the Sydney Gateway experience or the local context
- Proposed noise wall finishes should respond to the wider context through the retention of existing views or the screening of sensitive receivers.

Figure 158. Sculptural forms to solid noise wall. Craigieburn Bypass, TZG, Melbourne

Figure 159. East Link Freeway, Wood March, Melbourne

Figure 160. East Link Freeway, Wood March, Melbourne

Examples of coloured transparent noise walls that allow views into and out of the road corridor

6.7.2 CONNECTIONS AND PLACEMAKING

FEATURE LIGHTING

Feature lighting can create a dynamic night time identity for the Sydney Gateway that can be appreciated from both the ground and the air, as an integral component of the place making and public art strategy. By highlighting key elements within the road corridor, feature lighting can create symbolic qualities, visual interest and assist with wayfinding.

Urban design recommendations:

- Provide feature lighting to create an artistic effect, articulate urban forms of walls and bridges, and amplify the night-time experience of the Sydney Gateway
- Provide a comprehensive decision making strategy using materials and lighting to assist in wayfinding and to aid legibility
- Use feature lighting at landmark structures to create or enhance symbolic qualities
- Feature lighting needs to be energy efficient
- Ensure there is no adverse light spill, and no interference with airport operations as a result of feature lighting
- Investigate options to ensure provision of feature lighting is balanced with other needs and constraints including cost, safety, and maintainability.

Figure 162. Elizabeth Quay Bridge Arup Associates, Perth

Figure 163. Potential use of light to road walls for night time wayfinding guidance

Figure 164. Potential under deck lighting opportunities

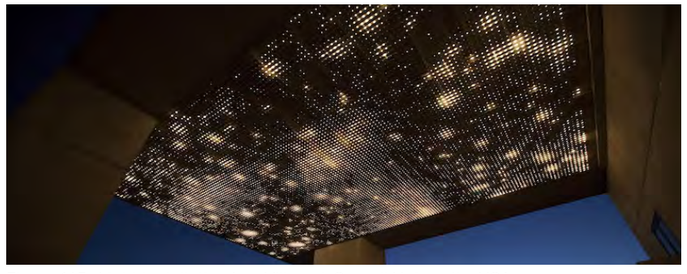


Figure 165. Light installation Leo Villareal, Cornell University, USA

Figure 166. Sound Tube Bridge, DCM, Melbourne

Figure 167. Gates of Light, Studio Roosegaarde, Afsluitdijk, Netherlands

Figure 161. LAX Tom Bradley Terminal, Los Angeles

PEDESTRIAN AND CYCLIST CONNECTIONS

The project provides a singular opportunity to improve connectivity and the quality of access to and around the airport for pedestrians and cyclists. In doing so, the project also offers the opportunity to improve regional connectivity by integrating with existing active transport routes.

While the preferred route for a shared path between Terminal 1 and Terminals 2/3 would be along Qantas Drive, the project presents spatial and operational constraints. The project would relocate the existing Alexandra Canal cycleway to the western side of the canal alternative route is being considered via the Alexandra Canal, using the existing cycle route along Coward and Robey Streets to connect to Mascot. The relocated cycle link and existing connections are shown in Figure 168. In addition, the project provides for a potential for a future active transport link to St Peters interchange, along the western side of the St Peters interchange connection.

Urban design recommendations:

- Provide a continuous and appropriately scaled shared path system throughout the project
- Include regular 'breakout' spaces and stopping points along the shared paths to provide respite, shade and a place to take in the views
- Provide regular connections from shared paths back to existing pedestrian/cyclist paths and the local road and open space network - also refer section 2.3.2, section 2.4 (WestConnex Urban Design Framework) and section 2.5
- Investigate the need for lighting to key routes to support 24 hour usage, particularly for shift workers at the airport and for visual effect
- Design pedestrian and cycle connections based on CPTED principles to ensure pedestrian and cyclist safety.

Figure 168. An example of a suspended shared user path bridge under a road bridge

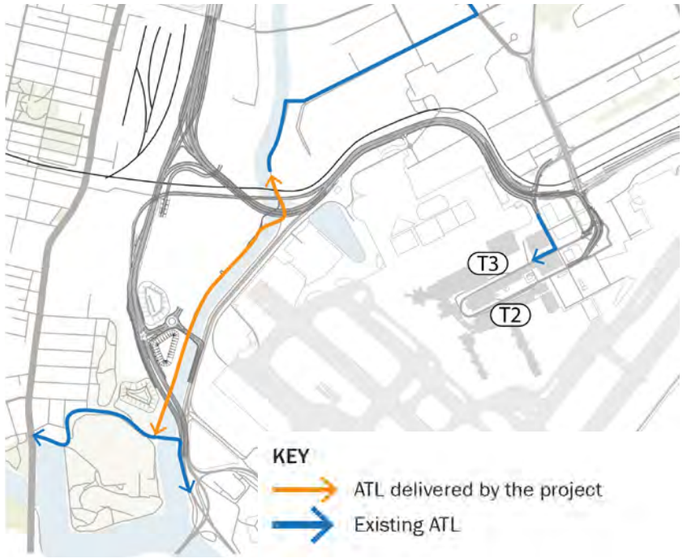


Figure 169. Locations of active transport links - key plan

Figure 170. Cycling along the waterfront Bays Precinct, Glebe

Figure 171. Proposed Kings Park Link, Perth

Figure 172. The open design under this sequence of bridges provides for an attractive shared path experience along the Buffalo Bayou Promenade in Houston, USA

Figure 173. Nelson Street Cycleway Monk Mackenzie Architects, Auckland uses colour for wayfinding and light integrated with safety screening

Figure 174. Nelson Street Cycleway Monk Mackenzie Architects, Auckland

PUBLIC ART AND INTERPRETATION

The project establishes the opportunity for a series of integrated artworks, to unify the Sydney Gateway road project elements, the landscape and lighting, as part of telling our unique stories. The integration of public art and interpretation throughout the Sydney Gateway road project would:

- Assist in the creation of a sense of place and a 'Gateway'
- Enrich the journey experience
- Provide additional visual interest both from the air and from the ground.

Many stories can be told in a suite of artworks of different styles and created by a range of artists, from indigenous to European to immigrant perspectives and stories of urban growth, infrastructure development, aviation and engineering.

Urban design recommendations:

- Incorporate site-specific public art and interpretation with the design of the essential infrastructure and within the landscape setting of the project site
- Establish a number of thematic artwork principles that range from literal to abstract across a series of sites and project elements including the main structural elements of bridges, retaining walls, the viaduct, headlight screens and drainage infrastructure. Themes may include: history (indigenous and non-indigenous), migration, aviation, travel, threshold, welcome/welcome to Country
- Showcase numerous artists to a very broad audience, working within the themes described above. The project has the opportunity to generate indigenous community engagement, employment and develop skills not only in art but also in infrastructure and construction more broadly
- Include a broad range of media and exhibition time frames including temporary, seasonal and permanent artworks
- Integrate digital art boards and explore opportunities for flexible billboards displaying a combination of digital artworks and advertising, and creating an ever-changing art landscape that remains "fresh", exciting and relevant
- Establish a public art fund for the Sydney Gateway road project to commission site specific public art
- Work with Councils and Sydney Airport to integrate with and complement existing public art strategies and initiatives.

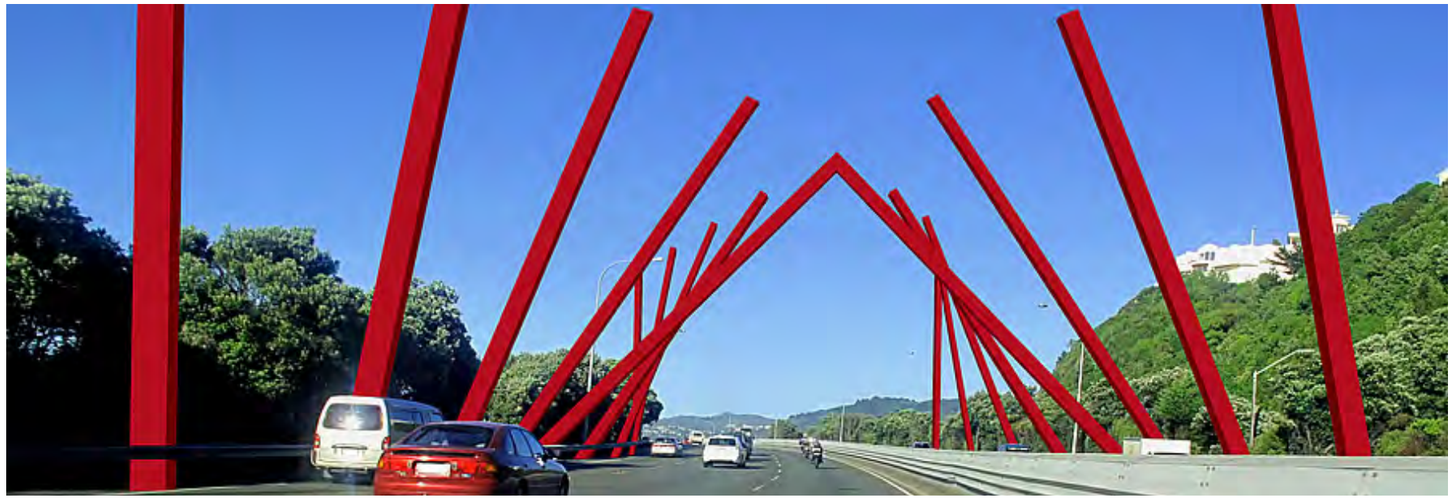


Figure 175. Wellington Gateway Paul Rolfe Architects, New Zealand

Figure 176. Earth sculptures, The Australian Garden, TCL, Cranbourne

Figure 177. Gateway Western Australia TZG, Perth

Figure 178. Jonathan Jones' "Barrangal dyara" installation at the Royal Botanic Gardens Sydney

Figure 179. *Field of Light* installation at Uluru by artist Bruce Munro

INDIGENOUS DESIGN APPROACH

The project area is on Kameygal Land which are part of the Eora/ Dharug language group. While there is crossover and blurring of boundaries between the tribes and the individual project sites, all projects are on land that is traditionally owned by the people of the Eora/Dharug Nation.

Each project has the potential to engage with local Aboriginal design knowledge and history in a variety of ways within the scope of the project's urban, landscape and structures design. They include:

- Image: telling the story of the Country and its people
  Using Aboriginal imagery is used to communicate and acknowledge that the project is located on Kameygal Country, and to tell the Aboriginal story of the study area. It may involve permanent or temporary surface treatments using local Aboriginal design knowledge, commissioned from Aboriginal artists, or developed by urban designers with engagement and approval from the community. Examples include signage, surface treatments, wall finishes
- Space:
  Providing spaces where Indigenous culture is celebrated, and shared. Examples include Indigenous planting, 'yarning' circles, weaving/healing gardens, cultural land management practices such as firestick farming, daisy yam propagation or fish traps
- Language:
  Sharing Eora language as a means to keeping it alive, such as through its use in the built environment, for example place names, descriptions, poetry.

Implementation

Consultation with Aboriginal people would be a key component of implementing the Sydney Gateway place-making strategy. This would be guided by the *WestConnex Remedial Action Plan*, noting that the following strategies are key to furthering Indigenous participation.

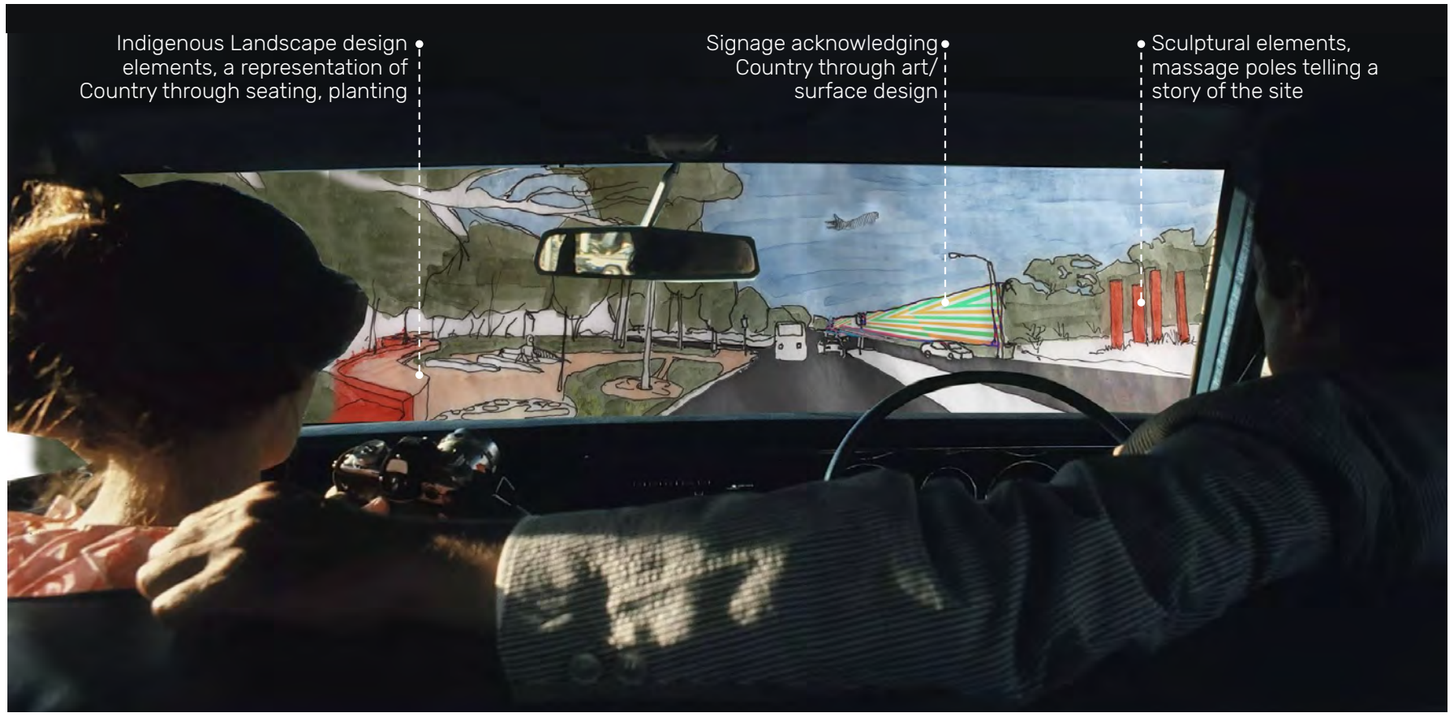


Figure 180. Sketch illustrating how Indigenous design might be experienced from the car

1. Consultation with Eora elders

The use of Indigenous patterns and motifs must be done with approval - and hopefully involvement - from the elders and community. The Urban Design and Place-making Strategy can begin these conversations.

We need to ask:

- Can we use your countries' patterns?
- Do you want to make patterns for the project?
- How would you like to be involved?

2. Engage Aboriginal artists and designers

Aboriginal artists should be engaged when and where suitable, either Eora, or others who are from different Countries but can still acknowledge Eora Country in their designs. Ideally, propositions would be sought from a range of artists and curated across the project site to carefully shape the experience and the message that is communicated to visitors and road users.

Principles for working with Aboriginal knowledge

For respectful and authentic outcomes with Aboriginal people, the following principles should be followed when engaging with Aboriginal design knowledge.

- Indigenous leadership
  Indigenous people (designers, elders etc) should be leading or co-leading the Indigenous elements in the design
- Community involvement
  The local Indigenous community is to be engaged in this process to establish: Can we use their patterns? Can they design patterns for the project?
- Appropriate use of Indigenous design
  All Indigenous design elements must be approved by involved Indigenous people/community/elders. If approval is not given, the knowledge would not be used in the project.

6.7.3 LANDSCAPE ELEMENTS

PUBLIC OPEN SPACE

The proposed road alignment would impact existing public open space and recreation facilities in the Tempe Lands including the Tempe Golf Range and Academy and the enclosed dog off-leash facility. The alignment would also create residual lands from existing industrial sites, the largest of which is the Tyne Container site - also refer **section 6.6.2**. This provides an opportunity to create compensatory or new public open space to benefit both the local and wider community - refer **Figure 180**.

Urban design approach to public open space

The desired future outcome for the Terminal 1 connection would be for a 'Parkway', that is, a road set amongst a parkland setting to provide a first impression of Sydney's landscapes, and the striking balance between built form and natural elements for which Sydney is famous for.

The parklands would envelope the road infrastructure, reducing the visual presence of the road between Terminal 1 and the central interchange, by providing an attractive outlook that positively contributes to the visitors' first impression of Sydney.

The parkland would be a key element in the "green ribbon" that is the interconnected series of open spaces linking the foreshores of Botany Bay, the Cooks River and Alexandra Canal to connect to Sydney Park and other inner urban open spaces and active transport links. The green ribbon and parkland would be visible and recognisable by passengers from the air, and make an important contribution in reinforcing Sydney's reputation as an attractive green city of generous parks and open spaces.

Urban design recommendations:

The following principles are recommended for consideration in the ongoing design development of the parklands in order to realise the Sydney Gateway place making strategy. It is noted that IWC intends to prepare a Master Plan for the former Tempe landfill site. This process may produce a series of complementary or alternative recommendations or principles to guide the design, in order to ensure the parklands are consistent with the desired future character for the area.

Figure 181. Locations of large landscape areas and public open space - key plan

Figure 182. Sculptural mounding presents the opportunity for lookouts, Northala Fields, London

Figure 183. Wootten Road Reserve native grassland, Melbourne, as an example of an Indigenous inspired landscape, source D Echberg

Figure 184. An example of the sculptural use of landform at Crissy Field, San Francisco

Figure 185. An example of the sculptural use of landform at Jupiter Art Land, Edinburgh

- Design open spaces to contribute to the 'Gateway' experience:
  - Design open spaces with art and interpretation opportunities that integrate and complement the recreational, visual and play opportunities
  - Design open spaces to contribute to the gateway experience as seen by visitors arriving by air
- Design public open spaces to provide a net benefit to the wider community:
  - Ensure that there is no net loss of public open space as a result of the project
  - Maximise the amount of usable public open space
- Design open space to be accessible and well connected:
  - New public open spaces should be contiguous with existing public open spaces or connected by high quality and amenity pedestrian and cyclist links that maximise safe active transport access for people in surrounding areas
  - New public open space is to be designed to meet applicable Australian Standards and best practice for access for all users and abilities
- Create open spaces that are legible, exciting and enjoyable from above and on the ground:
  - Consider year-round usability and comfort, including the need for shade
  - Integrate opportunities for urban cooling/heat mitigation and dust/pollution mitigation through large-scale tree planting

Figure 186. Robust materials used for the for lookout and picnic facilities at Devils Back Ridge, Western Sydney Regional Park

- Public open spaces and new public open spaces are to be designed in consultation with IWC and to improve access, landscape quality, amenity and recreation opportunities:
  - Integrate a wide range of uses and activities from informal parkland to organised sporting facilities
  - Integrate spoil and investigate the opportunity to create interesting landforms that are visually engaging and provide lookouts and viewing points of the airport, Alexandra Canal, Botany Bay and the Sydney CBD
  - Design public open space as safe and secure places consistent with CPTED principles to maximise community use and positive experiences.

Figure 187. Pathways, picnic shelters and indigenous planting at Western Sydney Regional Park

Figure 188. Accessible paths lead to lookout mounds, Devils Back Ridge, Western Sydney Regional Park

Figure 189. An example of the sculptural use of landform at Land Art Park Buitenschot, Amsterdam's Schiphol Airport, The Netherlands

Figure 190. Shade and informal walking paths in Centennial Park

Figure 191. Shade and seating opportunities, Redfern Park

ROADSIDE LANDSCAPE

The landscape of the road corridor is imagined as an integral part of the visual identity of the Sydney Gateway. It would contribute to and enhance the sense of place for road users, and improve the environmental outcomes of the project. Areas of roadside landscape are shown in Figure 191.

Urban design approach

- Maximise retention of existing mature trees
- Compensate for the loss of mature trees by reinstating at least the same number of trees, to achieve a net gain in canopy cover
- Provide a generous landscape curtilage for vegetation (including tree cover), landform and public art to create a memorable landscape setting for the motorway, consistent with the place making strategy to:
  - Support the sense of arrival at Sydney/the airport
  - Recognise and enhance local identity
- Create a continuous 'green edge' to the roadway, comprised of vegetation at differing heights, taking into consideration important views, sight line requirements, airport operational constraints and requirements
- Install trees in verges wherever possible to help minimise the visual scale of the road infrastructure, mitigate heat generated by large pavements, and assist in the absorption of dust and noise to enhance the amenity of both the road corridor and adjoining areas
- Provide shade and maximise amenity for users of active transport links
- Where space and airport operational requirements permit, investigate opportunities for feature landforms to create visual interest and provide deep soil to support the growth of feature trees
- At key locations install plants that are substantial in size and planted in dense arrangements, for immediate effect at project completion
- Provide visual separation to the Botany rail corridor, including an attractive green interface to replace existing mature vegetation that would require removal for the project.
- Selection vegetation species consistent with the aim of providing a 'Gateway' landscape.

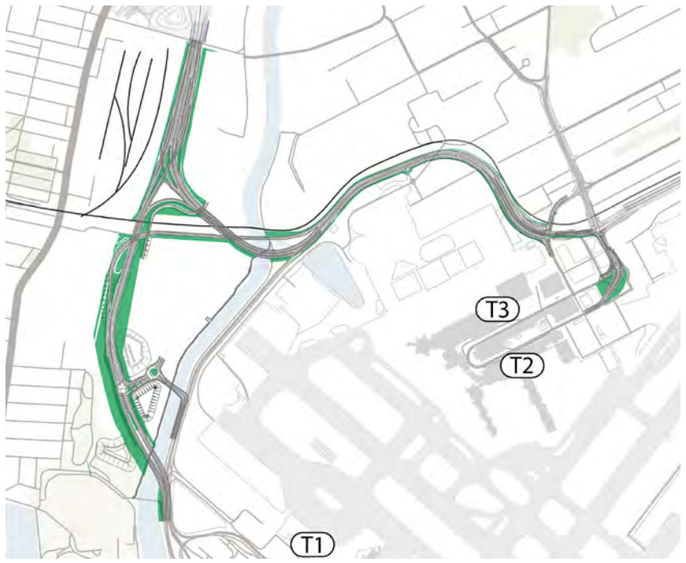


Figure 196. Roadside landscape - key plan

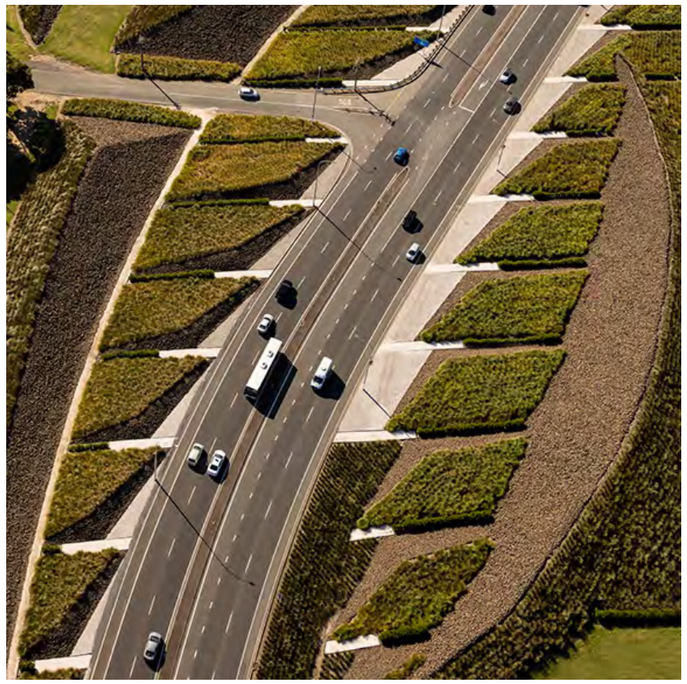


Figure 195. Auckland Airport Gateway Surface Design, Auckland, New Zealand


Figure 192. Gentle slopes and generous planting provide a parkway experience


Figure 193. Feature Fig tree planting along Anzac Parade


Figure 194. Tree planting reduces the apparent scale of the roadway

Living Walls

The vertical face of the rail impact wall at the Botany Rail Line interface provides a unique opportunity to integrate landscape into a space-constrained and narrow verge. The wall, together with the space between the wall and the project, provides an opportunity to integrate a vertical landscape into the project corridor. The vertical landscape would have a minimal footprint, and mitigate the visual and amenity impacts of both the wall itself and the greatly increased road footprint, both of which would result in removal of visually important mature vegetation along the road corridor.

Urban design approach

- To soften the harsh environment of concrete roads, noise and high volume traffic by creating a visually interesting living landscaped wall along Qantas Drive that:
  - Reintroduces greenery to the roadside environment
  - Mitigates the loss of existing mature trees and landscaping
  - Absorbs noise, reducing noise impacts that may otherwise result from traffic noise reflecting off the rail impact wall
  - Mitigates the visual impacts that would derive from the combination of a very wide road corridor framed by the rail impact wall
  - Potentially mitigates heat gain from wide pavements
  - Assists in dust/particle absorption
  - Shapes a positive motorist experience through an enhanced visual character of the road corridor
  - Uses a number of different vegetation species, providing different layers and depth along the wall to create an interesting and visually refreshing statement, taking advantage of the south-facing nature of the wall to integrate a variety of shade-loving species while minimising maintenance requirements
  - Enhance amenity for cyclists/active transport users
  - Takes advantage of the verge between the wall and the carriageway to provide maintenance access
  - There is the potential to investigate new technologies and systems for both vegetation installation and maintenance, to work within the constrained space. They include green wall and facade systems that require minimal maintenance and space for access..

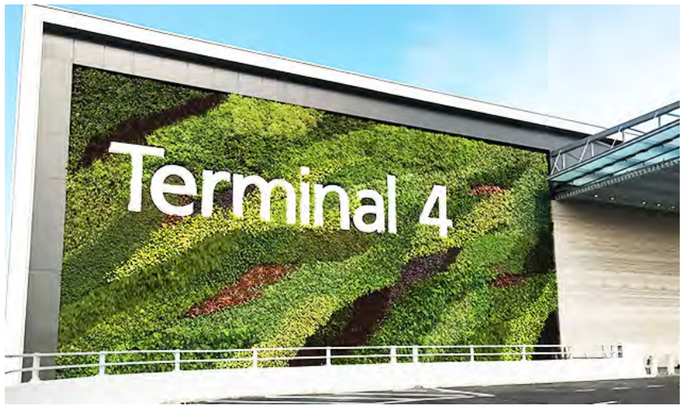


Figure 198. Example of a roadside living wall at Changi Airport's Terminal 4 in Singapore

Figure 197. Example of a roadside living wall at Yahoo Commuting Coop, Lockport, New York State, USA

Figure 199. Vertical gardens and facade systems at One Central Park, Haymarket, attests to the potential for living walls to thrive in harsh conditions, and where maintenance access is restricted

VEGETATION

Vegetation provided as part of the project is integral to the place making strategy and has a number of purposes:

- Contribute to the experience of the 'Gateway'
- Create the "green ribbon" that is the string of continuous green/open space between Botany Bay and Sydney Park
- Support the local ecology and biodiversity
- Contribute to the visual and landscape character of the area, by supporting and strengthening the sense of place, celebrating culture, history and ecology
- Shape the user experience by directing or screening views as appropriate
- Compensate for the loss of trees removed as a result of the project
- Select and locate trees and other vegetation in consideration of airport operational constraints, including the Obstacle Limitation Surface and the need to reduce the risk of bird strike
- Mitigate the potential the visual and landscape character impacts of the project.

The planting design approach for the project is based on generally endemic species, overlaid with cultural plantings derived from nearby parks and streetscapes. Vegetation would also include a broader range of native vegetation and select exotic species, to support and express the 'Gateway' function of the project, as the point of arrival to Sydney, as well as Australia.

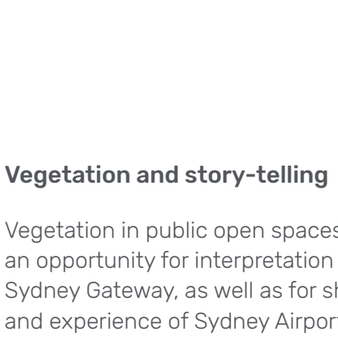
Figure 200. Paperbarks within the Swamp Oak floodplain plant association

Vegetation and story-telling

Vegetation in public open spaces and roadside areas provides an opportunity for interpretation of the Aboriginal story of the Sydney Gateway, as well as for shaping the arrival sequence and experience of Sydney Airport, consistent with the airport's landscape strategy.

Plants were an important source of nutrition for Aboriginal peoples with numerous species utilised for food, manufacture and medicinal purposes, for example:

- The flower-cones of Banksias were soaked in water to extract the nectar to make sweet drinks
- The hearts of grass tree stems were eaten and the nectar from the spike flowers was also collected and eaten. They could also be utilised for making tools such as spears, shafts and handles for stone implements, as well as carrying vessels of bark and woven fibre, digging sticks and a variety of other items utilitarian and non-utilitarian
- The dry flower-stems of the smaller grass tree species were used for spears.



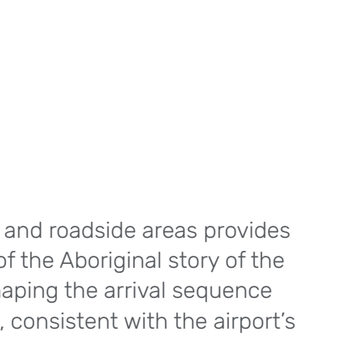


Figure 201. Rough-barked Apple (left) and Scribbly Gum (right)

Figure 202. Plants used in Indigenous culture

Indicative vegetation species

Refer to **Figure 202** to **Figure 205** for a preliminary schedule of potential plant species.

The species nominated in this report are indicative and would be further refined through consultation with appropriate stakeholders including IWC, Bayside Council and Sydney Airport. On Sydney Airport land the planting palette would be in accordance with Sydney Airport's Master Plan framework.

Urban design approach

The overall urban design approach would be to use vegetation that corresponds to the typography, hydrology and soil conditions of the area, to provide for a thriving and sustainable landscape along the project. Connecting to original vegetation communities, the broad approach is as follows:

- Along Alexandra Canal, species from the Swamp Oak floodplain forest vegetation community would be used, such as Swamp Oak (*Casuarina glauca*) and Broad-leaved Paperbark (*Melaleuca quinquinervia*), with an understorey of riparian grasses and reeds
- To to provide screening of the adjacent industrial lands, a range of species typically found in gullies or on higher ground would be used, depending on airport operational constraints. Tree species might include Smooth-barked Apple (*Angophora costata* - refer **Figure 200**), Spotted Gum (*Corymbia maculata*), Sydney Blue Gum (*Eucalyptus saligna*) and Forest Red Gum (*Eucalyptus teretecornis*)
- Along Qantas Drive and the Terminals 2/3 access, space constraints limit planting opportunities. However, the proposed planting palette builds on existing species such as Cabbage Tree Palm (*Livistona australis*) at the Terminals 2/3 entry and Moreton Bay Fig, Hill's Weeping Fig and Port Jackson Figs (*Ficus macrophylla, Ficus microphylla var Hillii* and *Ficus rubiginosa*) along the southern sections of Qantas Drive.

Tree clearing and replacement

The *Sydney Gateway Road Project - Tree assessment Technical Note* (Leonard and Tipping, 2019) has identified that a minimum of 1,300 trees not covered by a biodiversity offset strategy would be removed for the project.

Due to a number of site constraints, including spatial and aviation safety constraints with the airport site, as well as environmental constraints on land fill areas, locations outside the project footprint would be need to be further investigated for compensatory plantings. Depending on the location/s, alternative species to the listed ones might also be appropriate.

Due to the above constraints, the number of replacement trees provided as part of the project are relatively limited. The project

	BOTANICAL NAME	COMMON NAME
	LARGE TREES	
101	*Angophora floribunda*	Rough-barked apple
102	*Araucaria cunninghamii*	Hoop Pine
103	*Corymbia citriodora*	Lemon scented gum
104	*Corymbia maculata*	Spotted Gum
105	*Eucalyptus botryoides*	Bangalay
106	*Eucalyptus haemastoma*	Scribbly Gum
107	*Eucalyptus moluccana*	Grey Box
108	*Eucalyptus paniculata*	Grey Ironbark
109	*Eucalyptus pilularis*	Blackbutt
110	*Eucalyptus robusta*	Swamp Gum
111	*Eucalyptus saligna*	Sydney Blue Gum
112	*Eucalyptus tereticornis*	Forest Red Gum
113	*Ficus Macrophylla*	Moreton Bay Fig
114	*Ficus rubiginosa*	Port Jackson Fig
115	*Livistona australis*	Cabbage Palm Tree
116	*Lophostemon confertus*	Brushbox
117	*Melaleuca quinquinervia*	Broad-leaved Paperbark
118	*Melaleuca styphelioides*	Picky-leaved Paperbark
119	*Syncarpia glomulifera*	Turpentine Tree
120	*Syzigium australe*	Brush Cherry

Figure 203. Indicative plant species - large trees

landscape design currently estimates that a total of 416 trees would be able to be reinstated, including:

- 196 trees on Commonwealth land
- 220 trees in other areas.

	BOTANICAL NAME	COMMON NAME
	SMALL-MEDIUM TREES	
201	*Acacia pycnantha*	Golden Wattle
202	*Acmena smithii*	Lilly Pilly
203	*Banksia integrifolia*	Coast Banksia
204	*Brachychiton acerifolius*	Illawarra Flame Tree
205	*Eucalyptus torquata*	Coral Gum
206	*Glochidion ferdinandi var ferdinandi*	Cheese Tree
	LARGE SHRUBS	
207	*Acacia terminalis subsp. terminalis*	Sunshine Wattle
208	*Banksia ericifolia*	Heath Banksia
209	*Bursaria spinosa*	Native Blackthorn
210	*Kunzea ambigua*	Tick Bush
211	*Callistemon citrinus 'Endeavour'*	Endeavour bottlebrush
212	*Callistemon Kings Park Special*	Kings Park Special
213	*Callistemon viminalis 'Captain Cook'*	Bottlebrush
214	*Dodonaea triquetra*	Hop Bush
215	*Grevillea 'Robyn Gordon'*	Robyn Gordon Grevillea
216	*Indigofera australis*	Australian Indigo
217	*Melaleuca linariifolia*	Snow in Summer
	SMALL - MEDIUM SHRUBS	
218	*Banksia Spinulosa*	Hairpin Banksia
219	*Ozothamnus diosmifolius*	Rice Bush
220	*Persoonia hirsuta*	Hairy Geebung
221	*Pultenaea retusa*	Blunt Bush-pea

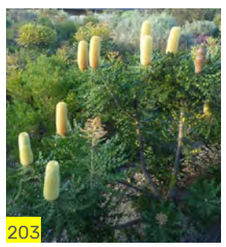


Figure 205. Indicative plant species - shrubs

This represents a total net loss of 884 trees as a result of the project, including a net loss of 377 trees on Commonwealth land and a net loss of 507 trees in other areas.

Due to the conceptual native of the design, the final number of trees installed as part of the project may vary and might be higher than currently estimated.

	BOTANICAL NAME	COMMON NAME
	GROUNDCOVERS/GRASSES	
301	*Blechnum cartilagineum*	Gristle Fern
302	*Carpobrotus glaucescens*	Pigface
303	*Dampiera linearis*	Common Dampiera
304	*Gahnia sieberiana*	Red-fruit saw-sedge
505	*Gazania tomentosa*	Silver Gazania
306	*Hardenbergia violacea*	Purple Twining-Pea
307	*Hibbertia scandens*	Climbing Guinea-flower
308	*Microlaena stipoides*	Weeping Grass
309	*Senna acclinis*	Brush Senna
310	*Stypandra glauca*	Blind Grass
311	*Xanthorrhoea australis*	Grass Tree
312	*Pennisetum alopecuroides*	Nafray
313	*Poa labillardieri*	Tussock Grass
	TURF	
314	*Cynodon dactylon (L.) Pers. var. dactylon*	Green Couch
315	*Microlaena stipoides var. Griffin*	Griffin Weeping Grass Lawn
316	*Pennisetum clandestinum*	Kikuyu grass
317	*Wintergreen Couch*	Couch

Figure 204. Indicative plant species - groundcovers, grasses and turf

In order to ensure the project would achieve the desired net increase in tree cover a tree replacement strategy would be developed. The strategy would seek to ensure that trees removed by the project would be replaced and augmented with additional trees to ensure there is a net increase in tree canopy, recognising the multiple benefits that would be derived from an increase in

	BOTANICAL NAME	COMMON NAME
	RIPARIAN TREES	
401	*Allocasuarina littoralis*	Black She-oak
402	*Casuarina glauca*	She-oak
403	*Cryptocarya laevigata*	Glossy Laurel
404	*Elaeocarpus reticulatus*	Blueberry Ash
405	*Melaleuca biconvexa*	Biconvexa Paperbark
406	*Melaleuca linariifolia*	Snow in Summer
407	*Melaleuca quinquenervia*	Broad-leaved Paperbark
408	*Syzygium paniculatum*	Lilly Pilly
409	*Tristaniopsis laurina*	Water Gum
410	*Trochocarpa laurina*	Tree Heath
	RIPARIAN GRASSES/REEDS	
411	*Carex appressa*	Tall Sedge
412	*Crinum pedunculatum*	Swamp Lily
413	*Dianella caerulea*	Blue Flax-Lily
414	*Ficinia nodosa*	Knobby Club Rush
415	*Gahnia clarkei*	Tall saw-sedge
416	*Helmholtzia glaberrima*	Stream Lily
417	*Juncus kraussii*	Salt Marsh Rush
418	*Juncus usitatus*	Common Rush
419	*Muehlenbeckia florulenta*	Tangled Lignum
420	*Triglochin striata*	Streaked Arrow Grass

Figure 206. Indicative plant species - riparian trees and grasses

tree cover such as enhanced amenity of adjoining streetscapes, increased shade and reduced urban heat island effects.

Trees that cannot be replaced within or adjacent to the project footprint, due to potential aviation hazards, would be replanted in areas identified in Sydney Airport Corporation's offset program. Roads and Maritime is also committed to replanting trees that would be removed at the former Tempe landfill. The final location of replacement trees would be confirmed in consultation with Inner West Council and Sydney Airport Corporation to ensure consistency with Council's proposed Master Plan and Sydney Airport Corporation's Wildlife Management Program.

DRAINAGE STRUCTURES

Due to the generally flat, low lying nature of the existing landscape, drainage is an important site issue. An integrated system of WSUD devices may not be possible due to groundwater contamination issues. WSUD devices such as swales, ponds and basins should be further investigated during detailed design.

Where possible, future investigations for the design for drainage should be underpinned by the following two layers:

- Natural
- Cultural.

The location of major drainage elements is shown in **Figure 205**.

Figure 207. The Brewarrina fish traps are at least 40,000 years old and a prime example of Aboriginal resource management and engineering that can be reinterpreted in the landscape design surrounding drainage structures

Figure 208. Locations of key drainage infrastructure elements - key plan

Natural

Strategies should be adopted during detailed design to effectively deal with stormwater naturally, while addressing a number of constraints within the site, including the:

- Presence of contaminated soils
- Relatively flat terrain
- Large peak flow volumes require wide open channels.

Figure 209. Drainage as art and interpretation opportunity drawing on the history of Aboriginal engineering

The approach to WSUD should be informed by Roads and Maritime's *Water Sensitive Urban Design Guideline*:

- Natural hydrological patterns have been used to enhance amenity, revegetation and WSUD strategies
- Rainfall within the new Tempe Lands Park would be captured in grassed swales with subsurface drainage to provide improved discharge water quality.

Cultural

The landscape design surrounding drainage channels seeks to "break up" the strictly linear drainage channel walls to achieve physical and visual integration with the surrounding landscape without obstructing the flow of water. The design is inspired by Aboriginal engineering technology employed in the construction of fish traps. Small rock-pitched basins and ponds would be vegetated with native riparian species, to assist in water filtration and absorption where ground conditions permit. They would change the appearance of the drainage channel from a harsh concrete canal into a green infrastructure element that blends into the landscape. This integrated cultural interpretation and green infrastructure approach transforms the drainage channel into an element integral to the place making strategy.

The majority of water captured on the site and its surrounds would be temporarily stored in a large retention basin in the central interchange precinct. The approach for the basin mirrors that of the drainage channel, integrating art, place making, engineering and landscape. Water in other areas would be captured within vegetated swales where possible.

Urban design approach

- Concrete or shotcrete should be minimised in drainage channels that are visible. The use of natural materials as drainage channel stabilisation materials, including stone in wire mattresses, should be maximised in these situations
- Implement best-practice WSUD measures where feasible, to increase the environmental performance of the project
- Integrate patterns or designs drawing from Aboriginal culture and engineering such as fish traps and integrate interpretation opportunities

- Integrate natural vegetation communities and green infrastructure. All plant species would be selected in consultation with Sydney Airport. Species chosen should minimise the potential for bird strike
- Respect the heritage significance of Alexandra Canal by minimising disturbance of the canal walls.

6.7.4 ROAD ELEMENTS

HEADLIGHT SCREENS

Headlight screens provide an opportunity to create a coherent visual connection between bridges, retaining walls and other barriers. Screens would be distinctive and tie together with other project elements to produce a distinctive, thematic visual 'Gateway' experience.

Urban design approach to headlight screens

- Design that expresses movement, flow and travel (arriving into and leaving from Sydney)
- Establish a link between the suite of bridges and other project elements by using striking colour in conjunction with lighting to contribute a visual feature across the Gateway. Consistency is particularly important for the Qantas Drive bridge and the terminal link bridge which are located in close proximity of each other
- Maintain a visual connection with the adjacent terminal link bridge
- Continue the visual theme experienced when driving through the Airport Distributor and its unique design elements on retaining walls with the headlight screen on Qantas Drive bridge
- Apply a similar treatment of the retaining walls on the Airport Distributor to the face of the headlight screens
- Investigate opportunities for patterned façade elements above the parapet that are visually striking
- Investigate opportunities for feature lighting that would change the overall presence and complexion of the project at night

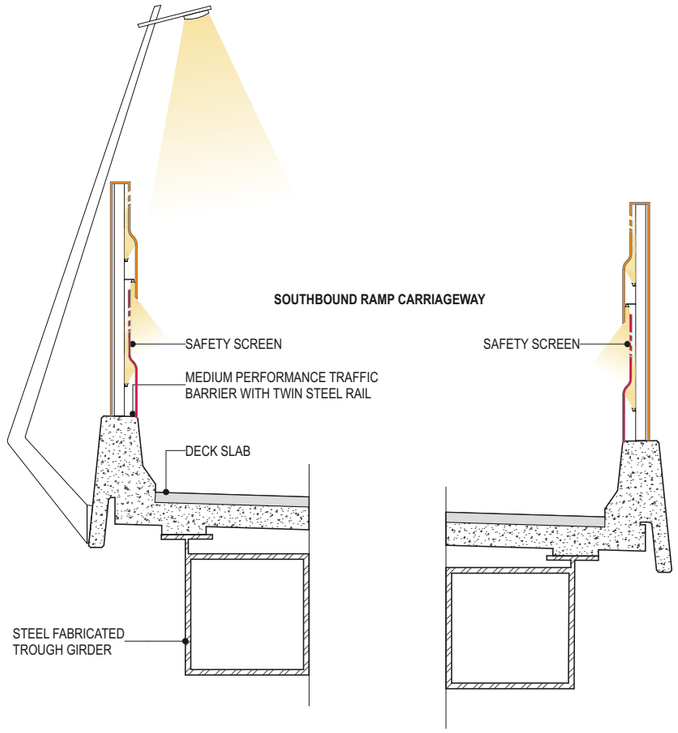


Figure 210. An example of a possible headlight screen and lighting solution on the Qantas Drive bridge

Figure 211. Conceptual LUMS gantry design for M4 Managed Motorway, Sydney

- Develop a lighting solution that shields areas above the road surface to prevent headlight glare from infringing on safe airport operations including:
  - The height of light poles is constrained by the obstacle limitation surface
  - Lights are located to shine light away from Sydney Airport
- Investigate opportunities to integrate headlight barriers into throw screens.

GANTRIES

Lane Use management System (LUMS) gantries would be a highly visible built element for motorists travelling on the Gateway. They would be located to achieve a safe and well guided road environment along the length of the road, however, would always be in the view of motorists as they travel along the road at speed.

Urban design recommendations:

The principles to develop and to guide further development of the gantries include:

- Develop a gantry that allows a range of components to be integrated in a systematic way, allowing the mounting of various accessories in an organised fashion
- Aim at integrating the various components within the built form envelope of the gantry
- Introduce colour to add interest and promote the identity of the Gateway
- Limit the extent of bright colours to minimise impacts beyond the corridor
- Introduce clean lines and reinforce the horizontal dimension of the structure
- Consider piers that accommodate various situations
- Consider a pier form that adds character to the structure and relates to other built form elements
- Consider safety and maintenance access
- Minimise visual clutter.

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CHAPTER 7

Landscape Character Impact Assessment

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7.1 INTRODUCTION

This chapter provides an assessment of the likely impact of the project on the existing landscape character, based on the landscape character zones identified in section 4.9. The landscape character is the combination of the area's built, natural and cultural features and values that make the area unique. By describing the impact of the project on the landscape character zones, the landscape character assessment provides a measure of the project's impact overall and on the area's existing sense of place.

The Landscape Character Assessment is based on the project description in Chapter 5, the urban and landscape concept design in Chapter 6, the assessment method described in Chapter 3 and the sensitivity of landscape character zones as identified in section 4.9.

There are three parts to this assessment:

1. Construction impacts: these are the impacts that would be experienced during construction of the project
2. Operational impacts: these are the ongoing impacts of the project once construction works are completed
3. Cumulative impacts with other major projects in the area.

7.2 LANDSCAPE CHARACTER IMPACTS DURING CONSTRUCTION

Landscape character impacts during construction would result from:

- Construction footprint
- Construction activities including site preparation and construction of project elements
- Ancillary facilities and other construction areas
- Construction-related traffic movements.

The following section provides more detail on the likely impacts on the landscape character zones of the project area.

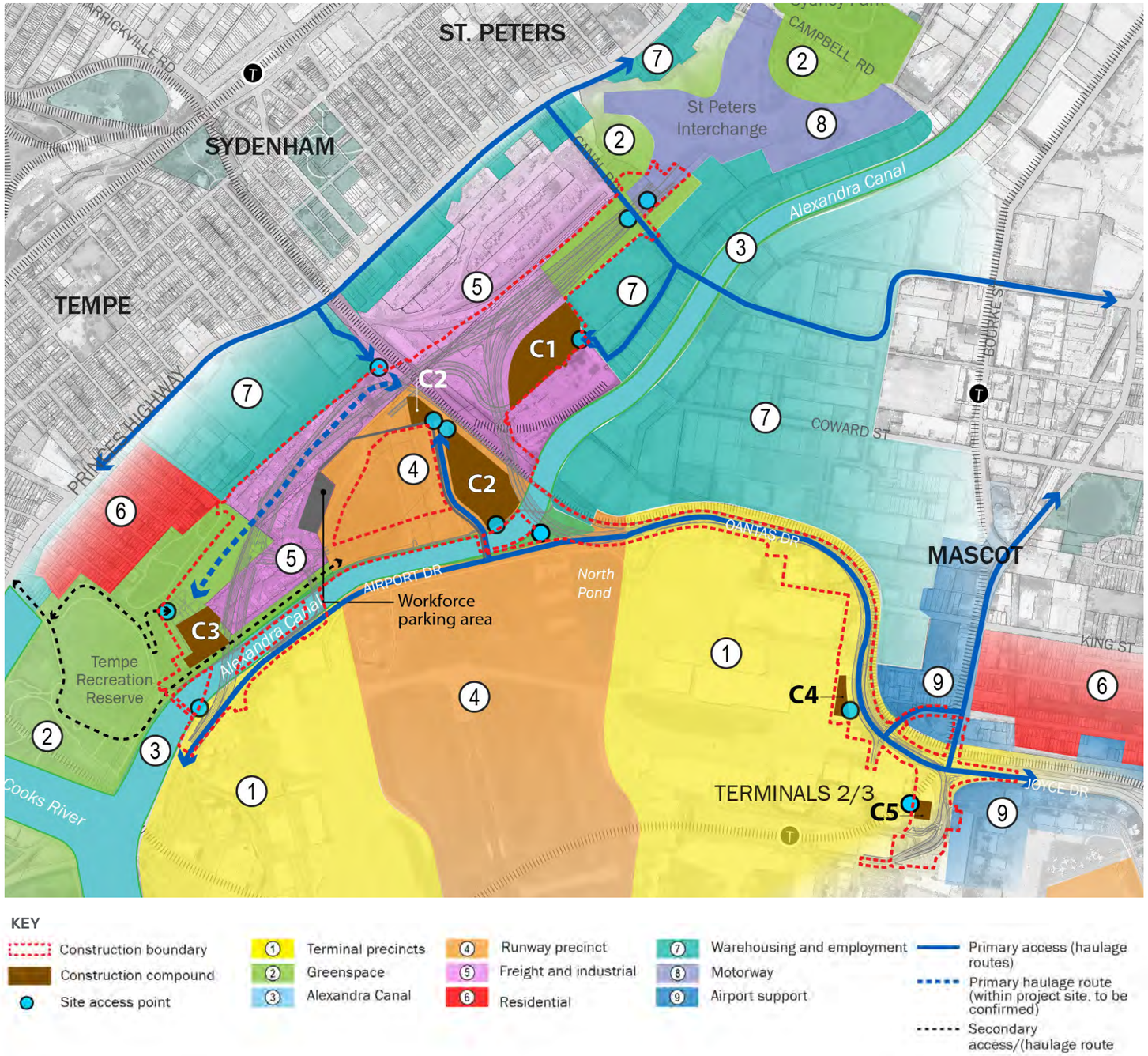

Figure 212. Project construction footprint, ancillary facilities, preliminary access routes and access points relative to landscape character zones

7.2.1 Construction footprint

In order to construct the project, additional land outside the project site would be required:

- To construct the proposed roadways, bridges and ancillary infrastructure
- For the proposed construction compounds - refer below.

Utility works to support the project would generally occur within the construction footprint. However, some works (such as connections to existing infrastructure) may be required outside the identified construction footprint.

The additional land required for construction is described as the construction footprint and is illustrated in Figure 212.

Likely impacts

Areas within the construction footprint would not be accessible to the general public or existing uses. The construction footprint extends across all landscape character zones, resulting in temporary restrictions to use and access, and therefore temporary landscape character impacts. The temporary use of this land during construction would be subject to lease agreements to be developed following further consultation with landowners. Further information on temporary land requirements is provided in Chapter 19 of the EIS/preliminary draft MDP.

While land owners would be compensated for the temporary loss of access through lease agreements, restrictions on access would also impact on land ordinarily available for public access, and therefore on the ability of the public to access and enjoy this land.

The most heavily impacted zone would be LCZ 2 - Greenspace. A large portion of the Tempe Lands would be within the construction footprint and about four hectares of open space in the Tempe Lands would therefore not be available for recreation during the approximately 3.5 year construction period, including the existing off-leash dog exercise area.

Other publicly accessible areas impacted by temporary access restrictions as a result of construction would be the Alexandra Canal cycleway and the pedestrian cycle bridge between Tempe Recreation Reserve and the Alexandra Canal cycleway.

There would also be a loss of buildings and facilities within Sydney Airport's north-east sector. Sydney Airport has been working towards replacement of these facilities as part of its master plan. Potential property impacts are discussed in more detail in Chapter 19 of the EIS/preliminary draft MDP.

Impact mitigation measures

Construction staging and traffic management would be designed to minimise any impacts and maintain cycle connectivity throughout the construction period. This would involve temporary re-routing of the cycleway - refer Figure 213 and Chapter 8 of the EIS/preliminary draft MDP for more information.

A temporary off-leash dog exercise area would be provided as close as possible to the existing off-leash dog exercise area. The exact location would be confirmed in consultation with IWC. The proximity to a construction compound may result in some users preferring to use other off-leash dog areas, such as in Wolli Creek or Sydenham (around 1.4 kilometres and three kilometres away respectively). Alternatively, some users may prefer to use the southern part of Tempe Recreation Reserve and Kendrick Park to exercise their dogs (on-leash).

The intention for all land within the construction footprint would be to rehabilitate areas as soon as possible after they are no longer required for the construction operations. This would minimise the extent and duration of temporary impacts.

Land would be rehabilitated based on the following principles:

- Establish land owner and stakeholder requirements and identify rehabilitation objectives
- Identify the location context and amenity requirements
- Integrate rehabilitation with adjacent landform, topography and land use

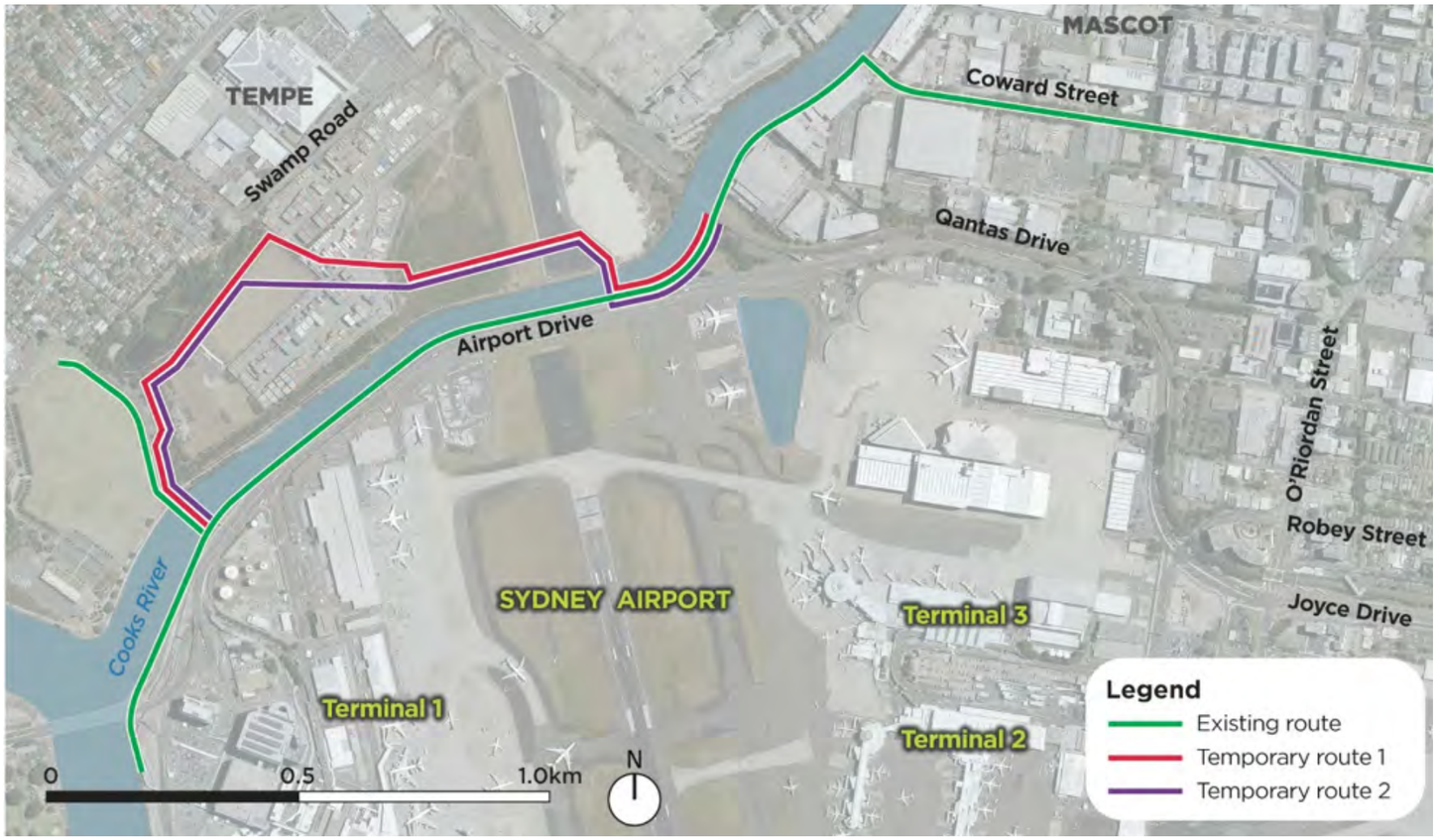

Figure 213. Temporary routes for the Alexandra Canal cycleway during project construction

› Apply landscape treatments consistent with the urban design vision and objectives (refer Chapter 6) to ensure an integrated outcome.

On privately owned land the rehabilitation works would be in accordance with agreements reached with the respective property owners. Rehabilitation works would meet all relevant environmental requirements.

7.2.2 Construction activities

Construction would generally involve four main phases of work:

1. Enabling works: activities carried out before the start of substantial construction
2. Site establishment: activities include establishment of fencing, environmental protection measures, construction compounds, traffic management measures and the like
3. Main construction works: activities involved in the construction of the project such as removal of buildings and structures, earthworks, road widening and construction, bridge and overpass works, retaining walls and drainage works
4. Finishing and post-construction rehabilitation

An indicative construction methodology and program is outlined in Chapter 8 of the EIS/preliminary draft MDP.

Likely impacts

General construction impacts

Construction activities would take place in all landscape character zones, with the exception LCZ 7. All zones including LCZ 7 will experience indirect visual impacts from works within other zones.

Construction activities including indicative construction resources, workforce, transport and access arrangements, and utility works are described in detail in Chapter 8 of the EIS/preliminary draft MDP. They would involve temporary traffic diversions or other traffic management measures to maintain traffic flow and connectivity during the construction period. They would impact on access and connectivity in the landscape character zones directly affected by construction. LCZ 1 would be most affected due to the need to maintain traffic flow along Qantas Drive and Airport Drive throughout the construction period.

Construction activities would also result in temporary visual impacts as a result of work activities and the use of machinery and equipment. Tall equipment and temporary structures such as cranes would temporarily alter the three-dimensional form of the area. They may also alter the heritage sensitive skyline, as well as views and vistas within the project area.

Potential impacts on prescribed airspace

Sydney Airport's prescribed airspace extends over much of the project site. Construction activities involving the use of tall plant and equipment may result in temporary intrusions into the obstacle limitation surface and other protected surfaces, with the potential to affect aviation safety.

Works with the potential to intrude into the prescribed airspace would need to be undertaken outside Sydney Airport's standard operating hours (i.e. between 11 pm and 6 am). This would lead to additional landscape character impacts as a result of night works including extended work hours and associated traffic, noise and vibration as well as potential light spill impacts from the use of flood lights.

Potential impacts on prescribed airspace and the approval requirements for works that may affect the prescribed airspace are described in more detail in EIS/preliminary draft MDP chapters 8 and 3 respectively.

Potential impacts on rail operations

Due to the proximity of the project to the Botany Rail Line, construction activities would have the potential to enter the rail corridor's 'danger zone'. The danger zone is defined as areas within three metres horizontally from the nearest rail.

The Botany Rail Line and associated sidings are generally used 24 hours a day, seven days a week. Any works that encroach into the danger zone would only be able to be undertaken during scheduled possession periods that would be agreed with the Australian Rail Transport Corporation (ARTC). Depending on the timing of possession periods, additional or extended landscape character impacts may result, similar to those discussed in Potential impacts on prescribed airspace.

Impact mitigation measures

General construction impacts would be minimised through a construction staging strategy. The guiding principles for the strategy are outlined in Chapter 8 of the EIS/preliminary draft MDP.

Potential impacts on airport operations through intrusion into prescribed airspace would be avoided by undertaking work outside standard operating hours. Similarly, impacts on rail operations would be avoided through the scheduling of possession periods in consultation with ARTC and through consultation with City Rail to avoid potential impacts on the Airport Line tunnel (also refer section 4.7). For more detail refer to Chapter 8 of the EIS/preliminary draft MDP. The potential impacts resulting from extended work hours would be managed and minimised through the preparation of construction management plans.

7.2.3 Ancillary facilities

Ancillary facilities are required to support construction. They include construction compounds, crane pads, work platforms and workforce parking areas. Their distribution across the landscape character zones is summarised in Table 7 and shown in Figure 211.

Five sites are identified as for construction compounds (also refer Figure 2 in section 1.3.3). All compounds would surrounded by temporary fencing and include the following facilities:

› Site offices
› Staff and workforce amenities
› Stores and laydown areas
› Workshops and maintenance facilities
› Workforce parking.

Some compounds may include additional facilities such as sheds, storage areas, machinery and plant stores, crushing and grinding

Landscape character zone		Ancillary facilities
8	Motorway	Nil
9	Airport support	Nil

areas and the like. Refer to **Chapter 8 of the EIS/preliminary draft MDP** for detailed descriptions and indicative layout plans.

Table 7. Landscape character zones and proposed ancillary facilities

* Facility proposed to be located on Commonwealth land
ˆ Facility potentially located on Commonwealth land

Landscape character zone		Ancillary facilities
1	Terminal precincts	▪ Compound C4* ▪ Compound C5* ▪ Crane pad near the Terminal 1 connection bridgeˆ ▪ Crane pad near Qantas Drive and Sir Reginald Ansett Drive to lift viaduct sections for the Terminals 2/3 access*
2	Greenspace	▪ Compound C3 ▪ Working platform near North Pond* ▪ Crane pad for the Canal Road overpassˆ
3	Alexandra Canal	Crane pads for construction of ▪ The freight terminal bridgeˆ ▪ The terminal link bridgeˆ ▪ The Qantas Drive bridge*
4	Runway precinct	▪ Compound C2* ▪ Acces to workforce parking area*
5	Freight and industrial	▪ Compound C1* ▪ Workforce parking area
6	Residential	Nil
7	Warehousing and employment	Nil

Likely impacts

The sites identified for construction compounds are generally cleared areas or areas that would require clearing for the project. A small amount of additional vegetation would potentially need to be removed in some sites. Compound sites are located away from sensitive receivers such as residential areas. For more detail on the site selection criteria for compounds, refer to **Chapter 8 of the EIS/preliminary draft MDP**.

The use of the land for construction compounds and other ancillary facilities would result in temporary landscape character impacts to landscape character zones where ancillary facilities would be located (refer **Table 7**). In addition to changed land use and access arrangements discussed in **section 7.2.1**, impacts would include changes to the spatial and visual character of the area. Compound sites C4 and C5 include existing car parking areas with a total capacity of about 181 parking spaces. Due to staging, not all spaces would be unavailable for the entire construction period. The temporary loss of these spaces would be managed by Sydney Airport Corporation. Other temporary impacts would result from noise generated during construction activities. Potential noise and vibration impacts are discussed in **Chapter 2 of the EIS/preliminary draft MDP**.

Due to the built up nature of the project area and the locations of compounds with easy access from arterial roads, construction compounds C2, C3, C4 and C5 would be highly visible to large numbers of potential viewers along Airport Drive, Qantas Drive, Sir Reginald Ansett Drive and the Alexandra Canal cycleway (including the temporary cycleway as discussed in **section 7.2.1**). They would temporarily alter the character of the landscape in LCZ 1, LCZ 2, LCZ3, LCZ 4 and LCZ 5.

They would also have some impact on the adjoining:

- LCZ 6, due to the visual exposure of compound C3 to viewers in multi-storey buildings in Wolli Creek
- LCZ 7, due to the proximity of compound C1 to employment areas in South Burrows Road
- LCZ 9, due to the proximity of compound C5 to business east of Sir Reginald Ansett Drive.

These impacts may be reduced subject to the final construction staging sequence adopted for the project.

Ancillary facilities are not anticipated to impact on the following areas, due to their location away from sensitive receivers and due to the landform, built form and vegetation of the project area:

- The portions of LCZ 6 located in Tempe and Mascot
- The part of LCZ 7 between Alexandra Canal and O'Riordan Street
- The part of LCZ 9 north of the Botany Rail Line.

Impact mitigation measures

To minimise potential impacts, all ancillary facilities are temporary and would only be used for the construction of the project. The land on which ancillary facilities are located would be rehabilitated to at least their pre-construction condition, as soon as practicable and as set out in the principles outlined in **section 7.2.1**.

7.2.4 Construction-related traffic movements

The project would result in additional vehicle movements in the area during construction to facilitate the movement of:

- Workers: the workforce is expected to peak at around 1,000 workers for a period of about 13 months travelling to, from and within the project area
- Plant and equipment: construction would involve the movement of a range of (refer **Technical Working Paper 2 - Noise and Vibration** for a full list of plant and equipment):
  - Large machinery, such as trucks, cranes, piling rigs, concrete trucks and pumps, excavators, compactors, sprayers and sweepers
  - Smaller plant and equipment such as generators, welding equipment, jack-hammers and personal tools
- Haulage of materials and resources such as fill and waste, concrete, steel, pavement materials, water, petrol and fuel and other deliveries. .

Likely impacts

The above would result in additional vehicle movements during the construction period that would impact on the landscape character zones through increased traffic, noise, emissions and the visual presence of additional vehicles, in particular heavy vehicles and machinery. Preliminary routes for the movement of construction vehicles (particularly heavy vehicles) have been proposed, and are shown in **Figure 107**, together with preliminary access points. More details is provided in **Chapter 8 of the EIS/preliminary draft MDP**. Where practicable, these routes have been selected to enable vehicles to be conveyed directly to the nearest arterial road, avoiding local roads. As all landscape character zones include or border arterial roads, construction-related traffic movements would have a temporary impact on all zones. The most heavily affected landscape character zones would be those with haulage and temporary access roads and points, as well as those with construction compounds. They are LCZ 1, LCZ 2, LCZ 4 and LCZ 5.

Impact mitigation measures

To reduce these impacts construction vehicle movements would be scheduled to occur outside peak periods as far as practicable. In addition, worker shifts would be scheduled to avoid workers arriving and departing during peak periods as far as practicable. Refer to Chapter 8 of the EIS/preliminary draft MDP for more detail.

7.2.5 Landscape character impact assessment

Table 8 provides a summary of landscape character impacts during construction, based on the discussion in sections 7.2.1 to 7.2.4.

Table 8. Landscape character construction impact assessment

LANDSCAPE CHARACTER ZONE		SENSITIVITY	SOURCE AND MAGNITUDE OF IMPACT				OVERALL MAGNITUDE	IMPACT RATING
			Construction footprint	Construction activities	Ancillary facilities	Construction traffic		
1	Terminal precincts	High	H	H	M	H	High	High
2	Greenspace	High	H	M	H	H	High	High
3	Alexandra Canal	High	N	M	L	N	Low	Moderate
4	Runway precinct	Moderate	M	L	H	M	Moderate	Moderate
5	Freight and industrial	Low	H	H	H	H	High	Moderate
6	Residential	High	-	L	-	L	Low	Moderate
7	Warehousing and employment	Low	-	-	-	M	Low	Low
8	Motorway	Low	L	L	-	N	Low	Low
9	Airport support	Low	L	N	-	L	Low	Low

7.3 OPERATIONAL LANDSCAPE CHARACTER IMPACTS

The project would result in the permanent loss of around one hectare of land within Tempe Lands. This area includes land currently occupied by the Tempe Golf Range and Academy and the off-leash dog exercise area.

However, upon completion of the project, up to 10 hectares of residual land would be available for use in this area. This would consist of land temporarily required during construction, including about four hectares currently occupied by recreational facilities within Tempe Lands, and land currently occupied by Tyne Container Services. Potential future uses could include open/space recreation, or other future uses in accordance with the priorities of local and regional strategic planning and Inner West Council.

The assessment of operational landscape character impacts has assumed that land in the Tempe Lands and on both sides of the project alignment would be dedicated to open space uses, including the placement of emplacement mounds - refer section 7.3.1. If further planning were to identify different preferred future land uses for the Tempe Lands, the identified beneficial landscape character impacts in Table 9 may not eventuate, potentially affecting the landscape character impact ratings for the project.

7.3.1 Emplacement mound design options

The landscape character impact assessment considers two emplacement mound design options for the Tempe Lands (also refer to Chapter 6). The options place emplacement mounds in different locations, as follows:

- "Option One": locates one emplacement mound between the Terminal 1 connection and one emplacement mound north of the freight link road
- "Option Two": locates one emplacement mound west of the Terminal 1 connection, in the area of existing open space that also encompasses the dog park, and one emplacement mound between the Terminal 1 connection and the freight link road.

The placement of emplacement mounds leads to different opportunities and potential layouts for the provision of park infrastructure and recreation facilities on the Tempe Lands. They are shown indicatively in Figure 99 and Figure 100 in section 6.6.2.

As a result the emplacement mound options result in slightly different landscape character and visual effects.

7.3.2 Landscape character impact assessment

Table 9 provides a summary of landscape character impacts during operation of the project, based on the methodology outlined in Chapter 3.

Table 9. Landscape character operational impact assessment

* Landscape character zone assessed for emplacement mound design options

Landscape character zone		Sensitivity	Project elements within the zone	Landscape character changes	Magnitude	Landscape character impact summary

LCZ 1*	Terminal precincts	High	▪ Terminal 1 connection and southern project tie-in
			▪ Freight terminal bridge link to Link Road
			▪ Qantas Drive upgrade and extension including removal of large number of mature trees of landscape amenity value (refer to section 4.4.4.)
			▪ Existing buildings adjoining Qantas Drive
			▪ Active transport changes including
			  • Alexandra Canal cycleway relocation
			  • Removal of the cycle link between Alexandra Canal cycleway and Qantas Drive
			  • Removal of the Airport Drive pedestrian crossing at Link Road
			  • Removal of footpath along Qantas Drive
			▪ Terminals 2/3 access including Qantas Drive viaduct and changes to the road system within the Terminals 2/3 precinct
			▪ Removal of existing advertising billboards
			▪ Robey Street intersection upgrade including footpath improvements
			▪ Tree clearing
				▪ The road footprint would approximately double in width, resulting in a large increase in hard surfaces that would be in contrast with the relatively small scale of the current Qantas Drive and Sir Reginald Ansett Drive
				▪ The Terminals 2/3 access viaduct would result in a two-tiered roadway including supporting retaining walls and piers that would result in a notable change from the existing character
				▪ Extensive removal of trees with retention and landscape amenity value along Qantas Drive due to road widening and viaduct construction would change the spatial character and visual containment of this area. With no scope for tree reinstatement, the project would open up the interface to the Botany Rail Line and urban areas beyond, affecting the visual relationship between this zone and landscape character zones 07 and 09. The removal of the treed buffer would alter views from medium-rise buildings in landscape character zone 09 towards the project, making the project more visually prominent than the existing road corridor.
				▪ The visual relationship between the airport, Airport Drive and Alexandra Canal would be altered with the introduction of new bridge structures and the relocation of Airport Drive
				▪ Removal of the Airport Drive pedestrian crossing opposite Link Road would remove the direct active transport link from Tempe Recreation Reserve to Link Road and the Terminal 1 precinct
				▪ The footpath along Qantas Drive would be removed and not reinstated, removing the ability for people to walk along the corridor
				▪ Removal of existing airport buildings adjoining Qantas Drive would alter the built form and therefore the area's spatial qualities as well as the ability to interpret the airport's historic development
				▪ LCZ 1 would also be affected by changes in adjoining character zones, due to changes in the outlook and potential effects on the spatial character. The most notable effects would result from changes to landscape character zones:
				  ▪ LCZ 5, from construction of the freight terminal link including the freight terminal bridge and from emplacement mounds in both emplacement mound design options
				  ▪ LCZ 2, from emplacement mounds in mound design "Option Two".
				▪ Both emplacement mound options would be equally visible from LCZ 1. However:
				  ▪ "Option One" would have a smaller impact on the spatial character of the area as it would replace shipping containers as the dominant three dimensional form in LCZ 3
				  ▪ "Option Two" would introduce additional elevation, having a great effect on the spatial character and three dimensional form of the area.
					High	**High**
						A high magnitude of adverse landscape character impact is derived from extensive changes to the existing built fabric, tree cover, interfaces between land uses and views. There would also be minor changes to active transport arrangements.
						Reinstatement potential for trees is limited due to new road infrastructure, space and airport operational constraints. This would lead to a net loss of tree cover, and permanent changes to views within the zone, as well as towards the zone from surrounding areas.
						Due to the high visual impacts resulting from the number of project elements in this zone, the emplacement mound design adopted would not affect the overall landscape character impact rating.

Landscape character zone	Sensitivity	Project elements within the zone	Landscape character changes	Magnitude	Landscape character impact summary
LCZ 2* Greenspace	High	Mound design "Option One" ▪ Terminal 1 connection including Terminal 1 connection bridge ▪ Freight terminal bridge ▪ Qantas Drive bridge ▪ Qantas Drive upgrade and extension ▪ Terminal link bridge ▪ An approximately 4m tall noise barrier along the Terminal 1 connection, for a length of about 450 metres ▪ Removal of existing advertising billboards ▪ Active transport changes including Alexandra Canal cycleway relocation and removal of the cycle link between Alexandra Canal cycleway and Qantas Drive ▪ Earthworks and retaining walls ▪ Tree clearing ▪ Adjustment to ponds and sluice gates below the Qantas Drive bridge ▪ Landscaping and recreational facilities.	▪ Greenspace in the triangle between Alexandra Canal, Airport Drive and the Botany Rail Line would be replaced with road infrastructure including raised carriageways, bridges and retaining walls to facilitate eight lanes of vehicular traffic ▪ Permanent loss of around one hectare of public open space land within the Tempe Lands including land currently occupied by the Tempe Golf Range and Academy and the off-leash dog exercise area. The latter would be temporarily relocated ▪ Removal of trees with retention and landscape amenity value on the embankments of the Tempe Lands ▪ Removal of indigenous trees with retention and landscape amenity value along Canal Road ▪ The continuity of open landscape between Alexandra Canal and adjoining greenspace would be interrupted by the bridges ▪ Large and extensive earth embankments and retaining walls would be required for the St Peters interchange connection. They would noticeably alter the three dimensional form of this zone and be visible from adjoining zones ▪ The character of greenspace between the Tempe Lands and Alexandra Canal would be notably changed with the introduction of the Terminal 1 connection and Freight terminal bridge including removal of mature vegetation ▪ Reinstatement potential for trees is limited due to new road infrastructure, airport operational constraints including the obstacle limitation surface, existing land fill and new emplacement mounds ▪ There would be a loss of green areas as a result of new road infrastructure on currently undeveloped land adjoining Canal Road ▪ Relocation of the Alexandra Canal cycleway to the western side of the canal would maintain active transport continuity along the canal ▪ The Tempe Golf Range and Academy would be permanently removed ▪ The two parts of the Tempe Lands parklands would be divided by an eight to ten lane wide arterial road lined by a noise barrier that extends for much of the parklands. Pedestrian access would need to be provided through the noise barrier to facilitate access to the pedestrian crossing at the signalised intersection. The lack of grade-separated active transport crossing would likely make it difficult and unpleasant for pedestrians or cyclists to cross the Terminal 1 connection to access eastern parts of the park. This may potentially reduce the attractiveness of the eastern part of the park to local residents and therefore its potential to meet daily local recreation needs ▪ The noise barrier would constitute a visual barrier separating the parklands and limit passive surveillance of the parklands from the roadway ▪ Removal of shipping containers in the adjoining LCZ5 provides potential opportunities to expand existing parkland, subject to consistency with the priorities of local and regional strategic planning and IWC. This would represent a beneficial community outcome ▪ For mound design "Option One", there is potential to provide for either passive or active recreation facilities in the Tempe Lands west of the project that may assist in meeting active recreation needs. There is a benefit to this location as it is contiguous with sporting fields in Tempe Recreation Reserve, allowing for an expansion of existing uses and direct access that would not require a connection across a major arterial road.	High	High Magnitude of impact is a result of the construction of a new motorway through existing greenspace, resulting in changes to land use, land form and tree cover, including the permanent loss of about one hectare of public open space in the Tempe Lands. Reinstatement potential for trees is limited due to new road infrastructure, airport operational constraints, existing land fill and new emplacement mounds. This would lead to a net loss of tree cover. The expansion of public open space within the Tempe Lands would potentially have a beneficial impact, subject to: ▪ Open space being the preferred future land use ▪ Provision for ease of community and active transport access ▪ Provision for passive surveillance from the roadway. Mound design "Option One" offers potential for provision of additional active recreation infrastructure which may be of benefit, subject to community need. This would need to be confirmed in further consultation with stakeholders including IWC.

Landscape character zone		Sensitivity	Project elements within the zone	Landscape character changes	Magnitude	Landscape character impact summary
		High	Mound design "Option Two": As per mound design "Option One" plus: ▪ Emplacement mounds.	As for mound design "Option One", plus: ▪ Mound design "Option Two" would result in additional large elevation above existing open space in the Tempe Lands, creating large new landforms that would alter the spatial character, outlook and views within the LCZ and adjoining areas.	High	High Magnitude of impact is as per mound design "Option Two". Given this has already identified a high impact of the project on this zone, the addition of the emplacement mounds would not further alter the landscape character impact. The benefits of new open space would be reduced relative to mound design "Option One", due to much of the open space potentially usable for active recreation being located in the area east of the Terminal 1 connection, disconnected from existing open space.
LCZ 3	Alexandra Canal	High	▪ Terminal 1 connection bridge ▪ Freight terminal bridge ▪ Qantas Drive bridge ▪ Terminal link bridge ▪ Active transport bridge over Alexandra Canal ▪ Alexandra Canal cycleway relocation ▪ Perforations of the Alexandra Canal wall for seven drainage outlets ▪ Removal of Alexandra Canal walls for concrete channel outlets with an approximate combined width of 15 metres ▪ Tree clearing.	▪ The construction of five new bridges would alter the character of the open air space above Alexandra Canal resulting in changes to: ▪ Views to and from the canal ▪ Views along the canal ▪ The visual relationship between the canal and nearby industrial remnants ▪ Permanent changes to the open landscape setting of the canal. ▪ The construction of the bridges would alter the character of open space along the canal through removal of many mature trees with retention and landscape amenity value, particularly between the Terminal 1 connection bridge and the freight terminal bridge ▪ Public access along Alexandra Canal would shift from the eastern side to the western side, following the closure of Airport Drive and relocation of the cycleway. It is noted that people currently access both sides of the canal for walking, breaching existing fencing to access the Sydney Water maintenance track on the western side ▪ The limited setback and clearance below the eastern abutment of the Terminal 1 connection bridge and the freight terminal bridge affects the potential for public access along both banks as recommended by the CMP - refer **section 4.5.2** ▪ The proximity of the eastern abutment of the Terminal 1 connection bridge to the canal edge infringes on the heritage curtilage of the canal (refer **section 4.5.2**). It also prevents public access along the eastern edge of the canal, therefore removing the potential to provide a direct route from Tempe Recreation Reserve to Link Road to replace the existing Airport Drive signalised crossing ▪ Drainage works would impact on the heritage fabric of Alexandra Canal with concrete channel outlets resulting in a highly visible permanent change to the appearance of the canal wall.	High	High Alexandra Canal is a highly sensitive cultural landscape that would be adversely impacted by the project in a number of ways that contravene several conservation policies set out in the Alexandra Canal CMP. The project has a high impact on the air space above the canal. It also impacts on the open space and high value vegetation alongside the canal, and restricts potential for public access to and along both sides of the canal. Reinstatement potential for trees is limited due to new road infrastructure, and space and airport operational constraints. This would lead to a net loss of tree cover and permanent changes to views and vistas. Active transport provision and connectivity is reduced with the loss of access to the eastern side of the canal and the loss of the pedestrian cycle connection between Tempe Recreation Reserve and Link Road due to removal of the Link Road signalised crossing.
LCZ 4	Runway precinct	Moderate	▪ Eastbound terminal link ▪ Northern Lands access including associated changes to the Northern Lands car park i.e. loss of parking spaces ▪ Qantas Drive bridge ▪ Qantas Drive upgrade and extension including Terminal link bridge tie-in ▪ Removal of existing advertising billboards ▪ Active transport path relocation to the northern side of Alexandra Canal.	▪ New project elements are consistent with the infrastructure and transport character of the zone ▪ With the exception of the Qantas Drive bridge, project elements would be generally low-lying, following the existing landform ▪ Project elements would be located towards the perimeter of the zone where the landscape starts to rise and change as it interfaces with adjoining zones. Changes would be less readily perceived in these areas than they would be if they were located in the centre of the zone where the flat open landscape and sky are the key features. The backdrop of rising land form and built structures in adjoining zones somewhat reduces the prominence of new elements in the landscape so that they would not alter the essential characteristics of the zone ▪ The Qantas Drive bridge and Qantas Drive upgrade and extension would alter the open landscape character in the north-eastern part of the zone. This would affect the continuity of the open industrial landscape between the runway precinct and adjoining landscape character zones by altering spatial qualities, views and vistas ▪ The provision of the Northern Lands access would increase connectivity between the Northern Lands and the Inner West including light industrial areas in St Peters.	Low	Moderate-low The essential qualities of this zone are its openness and the ability to interpret the historical evolution and development of Sydney Airport. While there would be some changes to the spatial qualities and views, the majority of project elements would be located near the zone edges. In these areas the zone's character is influenced by adjoining landscape character zones and their three-dimensional form. This backdrop would somewhat reduce the degree to which the changes in this zone would be perceived. Vehicular connectivity would be enhanced by the Northern Lands access.

Landscape character zone		Sensitivity	Project elements within the zone	Landscape character changes	Magnitude	Landscape character impact summary
LCZ 5*	Freight and industrial	Low	Mound design "Option One": ▪ Terminal 1 connection and southern project tie-in ▪ Northern Lands access including signalised intersection with the Terminal 1 connection, roundabout, freight terminal link road and freight terminal bridge ▪ Eastbound terminal link ▪ Westbound terminal link ▪ Northern Lands access ▪ Qantas Drive bridge ▪ St Peters interchange connection including three bridges over Canal Road, with provision for a future active transport link ▪ Flood mitigation storage area ▪ Drainage infrastructure including culverts and open concrete channels ▪ Earthworks and retaining walls ▪ An approximately 5m tall noise barrier along the Terminal 1 connection ▪ Emplacement mound between the Terminal 1 connection and the freight link road ▪ Landscaping and recreational facilities.	▪ The project would introduce a large amount of built form, including the multiple carriageways, walls, ramps, and bridges, into an area that has limited permanent built structures ▪ The project would result in the loss of about 8.5 hectares of industrial land outside of Sydney Airport land, reducing the overall availability of industrial land in the project area. The economic and employment activities that these lands provide for are required for Greater Sydney's operation. *A Metropolis of Three Cities* (refer section 2.4.4) identifies the need to retain these lands in the Eastern City area ▪ A large portion of this zone would change in land use from freight to road infrastructure, replacing the distinct and dynamic character of shipping container storage to static road infrastructure ▪ Removal of shipping containers provides potential opportunities to expand existing parkland, subject to consistency with the priorities of local and regional strategic planning and IWC. This would represent a beneficial community outcome ▪ Large and extensive earth embankments and retaining walls would be required north of the Botany Rail Line, including for the St Peters interchange connection and westbound terminal link. They would noticeably alter the three dimensional form of this zone and be visible from adjoining zones ▪ Removal of container storage areas would lead to a reduction in truck movements on surrounding local roads to get to this zone. However, the project would introduce traffic movements on the new roads through this zone that would be greater than existing traffic movements ▪ The Cooks River Intermodal Terminal constitutes about a third of the zone and would not be affected by the project ▪ There is potential for new open space to be created in the western part of the zone which would help to offset greenspace losses in LCZ 2, subject to consistency with the priorities of local and regional strategic planning and IWC ▪ The project creates the opportunity for a future active transport link to connect the Cooks River to Sydney Park via the St Peters interchange ▪ The project would introduce extensive open concrete drainage channels to the area, as well as a large flood mitigation basin. These would be hard structures that would be visible from the project and surrounding areas, as well as from the air above, affecting the visitor experience, with little potential for mitigation or softening with landscape and green infrastructure, due to space and contamination constraints. ▪ The project would create opportunities for future improvements to recreation areas and facilities in the Tempe Lands such as new recreation facilities and active transport links ▪ The two parts of the Tempe Lands parklands would be divided by an eight to ten lane wide arterial road lined by a noise barrier that extends for much of the parklands. Pedestrian access would need to be provided through the noise barrier to facilitate access to the pedestrian crossing at the signalised intersection. The lack of grade-separated active transport crossing would likely make it difficult and unpleasant for pedestrians or cyclists to cross the Terminal 1 connection to access eastern parts of the park. This may potentially reduce the attractiveness of the eastern part of the park to local residents and therefore its potential to meet daily local recreation needs ▪ The noise barrier would constitute a visual barrier separating the parklands and limit passive surveillance of the parklands from the roadway ▪ Emplacement mounds for both mounding options would partly replace shipping containers as prominent three dimensional form. Due to similar a height, they would not substantially alter the spatial character in these locations ▪ Emplacement mounds for both options would create new opportunities for views over surrounding areas.	High	Moderate This zone would undergo extensive land use changes, resulting in a wide range of landscape character changes. Beneficial outcomes include provision for a future active transport link to the St Peters interchange and new open space, subject to open space being the preferred future land use based on the priorities of local and regional strategic planning (including the need to retain industrial zoned land in inner urban areas) and IWC.

Landscape character zone	Sensitivity	Project elements within the zone	Landscape character changes	Magnitude	Landscape character impact summary
LCZ 5* Freight and industrial	Low	Mound design "Option Two": As per mound design "Option One" plus: ▪ Additional emplacement mound north of the freight link road.	As for mound design "Option One", plus: ▪ For mound design "Option Two", there would be potential to accommodate active recreation facilities north of the freight link road that would be readily accessed by car, but have limited active transport access. Given the relatively limited available land area (equivalent to about one full size sports field or about eight netball courts in size, with some ancillary space), there is a need to determine the most appropriate and viable recreation use for the eastern parklands through further stakeholder and community consultation.	High	Moderate Magnitude of impact is as per mound design "Option One". Due to the extensive changes to the zone, the impact would remain the same, irrespective of the mound design option adopted. The benefits of potential new open space areas would be reduced relative to mound design "Option One", due to much of the open space usable for active recreation being located in the area east of the Terminal 1 connection, resulting in it being disconnected from existing open space.
LCZ 6* Residential	High	▪ An approximately 4.8 metre tall noise barrier for a length of about 450m metres on the northern side of the Botany Rail Line adjoining Baxter Street, Mascot ▪ A number of project elements would be located in other zones and potentially be visible from this zone ▪ A second noise barrier would be located in LCZ 2 and might be visible from small parts of residential areas in Tempe. This barrier would be approximately five metres tall and extend for about 450 metres along the Terminal 1 connection.	▪ The noise barrier along the southern side of Baxter Road, Mascot would be the major project element located within this zone. It would be visible from Baxter Street and alter the outlook from parts of this street. However, the barrier would be closely aligned with the Botany Rail Line and well set back from residential dwellings and businesses. Existing established street trees on the southern side of Baxter Road would screen the barrier from the major part of the street ▪ The main project elements located in other zones and potentially visible within the Wolli Creek portion of this zone would be: ▪ The Terminal 1 connection, including terminal 1 bridge and noise barrier ▪ Freight terminal bridge and Link Road connection ▪ The emplacement mounds in landscape character zones 2 (for mound design "Option Two") and 5 (for both for mound design options) ▪ The main project elements located in other zones and potentially visible within part of the Tempe portion of this zone are the emplacement mounds and noise barrier along the Terminal 1 connection. Due to intervening landform and vegetation, they would only have a minor effect on this area which would generally be limited to a small part of the area, around Smith Street, Tempe ▪ The Terminal 1 connection, noise barrier, terminal 1 bridge and freight terminal bridge would alter the outlook from Wolli Creek. This would affect views from the Novotel Sydney International Airport Hotel, and for residents in medium and high rise apartment buildings on the southern side of the Cooks River in Wolli Creek. North-facing apartments currently enjoy open panoramic views over the Cooks River, Alexandra Canal and open space in Tempe Recreation Reserve and the Tempe Lands. They would be sensitive to the changes in the view as a result of the project, in particular the replacement of a parkland view with a view of a major arterial road, and the two large bridges over Alexandra Canal. The viewing distance of about 900 metres would somewhat reduce the effect on the view ▪ While emplacement mounds would slightly alter the outlook, both mound design options would replace the existing stacked shipping containers as a three dimensional element in LCZ 5. They would be a landscape element that would not alter the spatial qualities of areas within LCZ 5, due to the generally lower height of emplacement mounds relative to stacked shipping containers ▪ Mound design "Option Two" would result in additional large elevation above existing open space in the Tempe Lands, creating large new landforms that would alter the spatial character, outlook and views from LCZ 6. While they would be visible from both Tempe and Wolli Creek, they would be particularly noticeable from medium rise apartments in Wolli Creek that have open panoramic views over the Tempe Lands. Mounds in this location would somewhat screen views of the noise barrier ▪ Mound design "Option One" would be slightly more visible from areas close to the Princes Highway, but would replace the existing stacked shipping containers as a three dimensional element, with no effect on the spatial qualities of the area.	Low	Moderate The project would only have a very limited direct impact on this zone. The zone would however be impacted by works in the adjoining landscape character zones 2 and 5. The assessment has assumed that residual land within the Tempe Lands would be used for public open space purposes. Changes in outlook result from the placement of emplacement mounds: ▪ In LCZ 2 (for mound design "Option Two") ▪ In LCZ 5 (for both for mound design options). The mound design option adopted would not affect the landscape character impact rating of this zone. Both mound design options would only be visible from more elevated areas close to the Princes Highway and from multi-storey buildings in Wolli Creek. Mound design "Option Two" would be more prominent from Wolli Creek, while the extent of mounding visible from Tempe would be slightly greater for "Option One".

Landscape character zone		Sensitivity	Project elements within the zone	Landscape character changes	Magnitude	Landscape character impact summary
LCZ 7*	Warehousing and employment	Low	▪ The project boundary intersects with the zone, crossing into zone in only a small area along Canal Road ▪ Minor tie-in and adjustment works ▪ Closure and removal of the portion of Swamp Road parallel to the Princes Highway ▪ Changes at the zone interface would be negligible, if present at all.	▪ Project elements within surrounding zones would be visible from this zone, works in adjoining landscape character zones: ▪ LCZ 1, for works along Qantas Drive ▪ LCZ 2, for mound design "Option Two" ▪ LCZ 5, for the Terminal 1 connection, St Peters interchange connection, terminal links, Qantas Drive bridge, the Northern Lands access and emplacement mounds in both design options. ▪ Works in adjoining zones would alter the outlook from LCZ 7, with some effect on how LCZ 7 is perceived. Particular areas that are visually affected these works include South Burrows Road and big box retailers along the Princes Highway such as IKEA and the Salvos Store. In particular the panoramic views from the big box retail precinct would be altered, with effects on the landscape character within the zone ▪ Business in the Mascot portion of LCZ 7 would also experience a change in outlook, as tree removal between Qantas Drive and the Botany Rail Line removes the current visual buffer between LCZ 1 and 7. Due to space constraints, the project offers no scope to reinstate a green buffer between the two zones ▪ Removal of container storage areas such as the Tyne Container site would reduce truck movements through Tempe and along the Princes Highway, resulting in a beneficial community outcome ▪ While emplacement mounds would slightly alter the outlook from some areas along the Princes Highway, both mound design options would replace the existing stacked shipping containers as a three dimensional element. They would be a landscape element that would not alter the spatial qualities of the area, due to their generally lower height than the stacked shipping containers.	Low	Low Direct character impacts are very limited. The character of the zone would be impacted by highly visible works in adjoining zones. This would result in permanent changes to the outlook from the zone and its spatial character, with little potential for reinstatement due to space constraints along Qantas Drive that prevent the re-establishment of trees along the LCZ 1 and 7 interface. The mound design option adopted would not affect the landscape character impact rating of this zone. Mound design "Option One" would be slightly more visible from the Princes Highway, but would replace the existing stacked shipping containers as a three dimensional element, with no effect on the spatial qualities of the area. The reduction in truck movements along the Princes Highway and Swamp Road would be a beneficial outcome.
LCZ 8	Motorway	Low	▪ St Peters interchange connection including three road bridges over Canal Road and associated abutment retaining walls, and with provision for a future active transport link ▪ Tie-in works.	▪ The motorway zone is currently under construction as part of the St Peters interchange ▪ The zone has been planned and designed for the specific purpose of providing a motorway connection between the St Peters interchange and the Sydney Gateway. Construction of the project is therefore consistent with the desired future land use and character.	Negligible	Negligible Changes as a result of the project are consistent with the desired future land use and character of the zone.
LCZ 9	Airport support	Low	▪ An approximately 4.8 metre tall noise barrier for a length of about 450m metres on the northern side of the Botany Rail Line adjoining Baxter Street, Mascot ▪ Tree clearing for noise barrier installation ▪ Tie-in works along Robey Street ▪ Widened footpath in Robey Street ▪ Tie-in works along Joyce Drive.	▪ The noise barrier along the southern side of Baxter Road, Mascot would be a large new element located in this zone. It would be visible from Baxter Street and alter the outlook from parts of this street. However, the barrier would be closely aligned with the Botany Rail Line and well set back from residential dwellings and businesses. Existing established street trees on the southern side of Baxter Road would screen the barrier from the major part of the street ▪ The project would result in a decrease in road footprint in Robey Street and an associated increase in footpath width, including under the Robey Street bridge, leading to enhanced active transport paths ▪ Project elements within surrounding zones would be highly visible from the eastern part of the zone located between Joyce Drive and Ross Smith Avenue, altering the outlook with some effect on how LCZ 9 is perceived ▪ The Terminals 2/3 access viaduct in LCZ 1 would alter the visibility and presentation of businesses located along Sir Reginald Ansett Drive ▪ Businesses in the Mascot portion of LCZ 9 would also experience a change in outlook, as tree removal between Qantas Drive, Joyce Drive and the Botany Rail Line removes the current visual buffer between LCZ 1 and 9. Due to space constraints, the project offers no scope to reinstate a green buffer between the two zones..	Moderate	Moderate to low Magnitude of landscape character impact as a result of works within this zone is low. It would include the noise barrier along the northern side of the Botany Rail Line, as well as beneficial outcomes including the widening of the Robey Street footpath which would improve active transport connectivity. Additional magnitude of impact is derived from works in the adjoining LCZ 1, including tree removal and the Terminals 2/3 access viaduct. They would permanently alter the outlook and alter views to and from businesses, affecting the presentation of business from the road network. Tree removal would also result in permanent changes to the outlook from the zone and its spatial character, with little potential for reinstatement due to space constraints along Qantas Drive that prevent the re-establishment of trees along the LCZ 1 and 9 interface.

7.4 CUMULATIVE IMPACTS

A number of other major projects are currently under construction or planned for construction near to the Sydney Gateway road project. The major developments considered as part of the cumulative impact assessment for the project are summarised in Table 10 and shown in Figure 214.

Table 10. Major development in the project area

Project	Description
Botany Rail Duplication	The project will provide additional rail capacity and improved service reliability on the Port Botany Rail Line.
Boral Concrete St Peters	Boral are proposing to upgrade their existing facility on Burrows Road South.
Qantas Flight Training Centre relocation	Qantas are proposing to relocate their existing training centre. The proposed location is on King Street in Mascot, which is around 150 metres to the east of the existing centre.
Airport West Precinct	Widening Marsh Street, Arncliffe to three lanes westbound. Works are now complete
Airport East Precinct	Upgrades to roads east of Sydney Airport including removal of the General Holmes Drive rail level crossing by constructing a road underpass. Works cover Wentworth Avenue, Botany Road, Mill Pond Road, Joyce Drive and General Holmes Drive.
Airport North Precinct	Upgrade to roads north of Sydney Airport including conversion of the southern sections of Robey Street and O'Riordan Street into one way roads.
WestConnex New M5	The New M5 will provide twin underground tunnels from Kingsgrove to the new St Peters interchange. It also includes the extension and widening of Campbell Street, St Peters, operational sites in Kogarah Golf Course in Marsh Street, Arncliffe and Burrows Road, St Peters, as well as two ventilation facilities and open space near the St Peters interchange.
WestConnex M4-M5 Link	Twin tunnels connecting the New M4 at Haberfield and the New M5 at the St Peters interchange.
Sydney Airport Ground Access Solutions and Hotel Project	Within Sydney Airport land, at the entrance to Terminals 2/3.

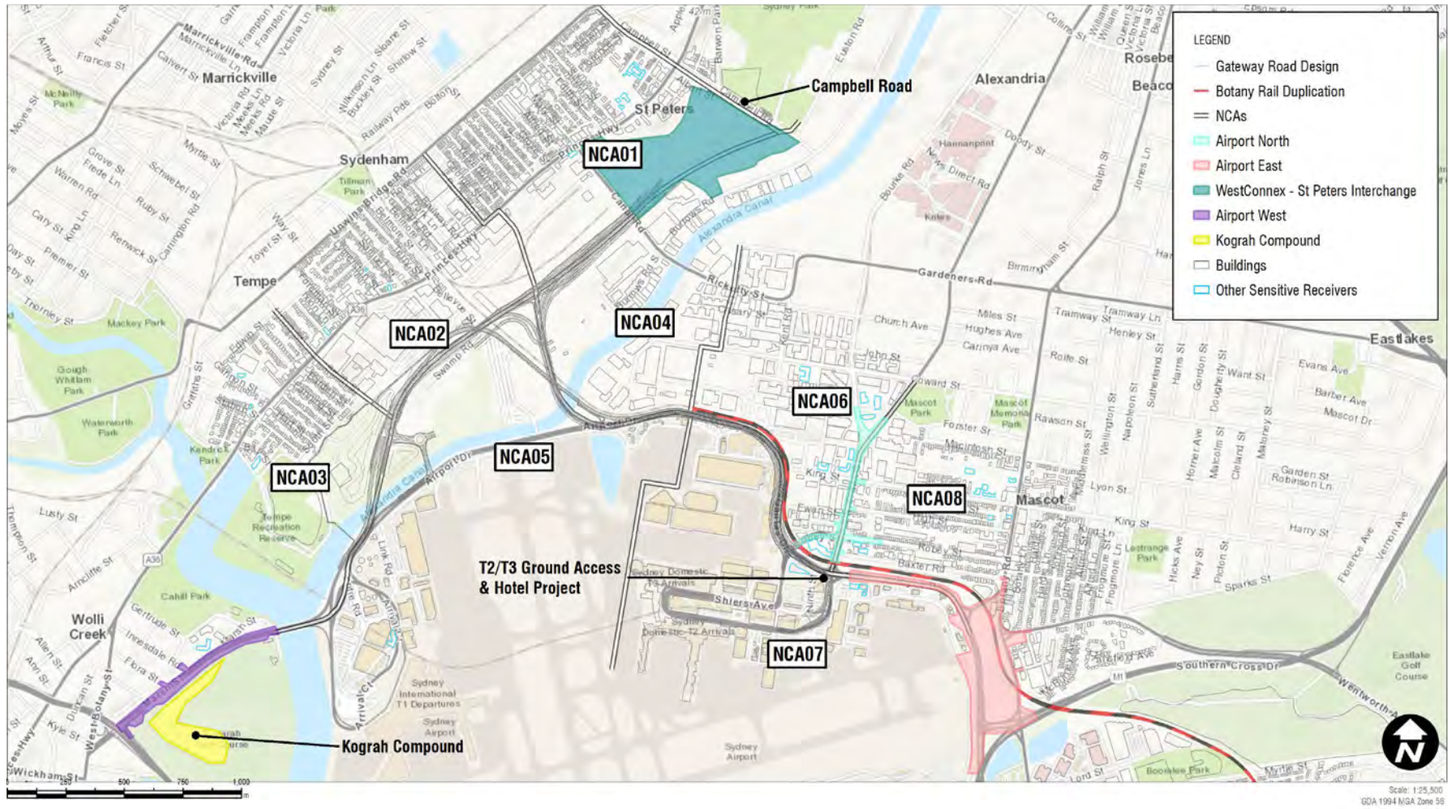

Figure 214. Location of other major developments surrounding the project

Project and Work Phase	2016				2017				2018				2019				2020				2021				2022				2023				2024			
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
Airport East																																				
Airport North																																				
WestConnex New M5																																				
WestConnex M4-M5																																				
Sydney Gateway road project																																				
Botany Rail Duplication																																				
T2/T3 and Hotel Project																																				
Boral Concrete Upgrade																																				
Qantas Centre																																				

Figure 215. Indicative construction schedule for major projects

Cumulative construction impacts may occur if construction on these projects is carried out at the same time as Sydney Gateway road project, including visual, spatial, noise, access and connectivity, and traffic impacts as discussed in section 7.2. There is also potential for consecutive impacts if certain receivers are affected by extended impacts from more than one project occurring after each other. Indicative construction schedules for these projects are provided in Figure 110. This also shows that construction works have been carried out in the project area since at least 2016, and would continue to late 2024 if the Sydney Gateway road and rail projects were approved.

Based on the locations, duration and scale of ongoing works for major developments, the magnitude of cumulative effect on the landscape character zones would be considered:

- High, for LCZ 1, LCZ 2 and LCZ 3
- High to moderate, for LCZ 5
- Moderate, for LCZ 6, LCZ 7 and LCZ 9
- Moderate to low, for LCZ 4
- Low, for LCZ 8.

While the duration of construction impacts may be up to eight years in parts of the project area, it is noted that major developments in the area are part of a suite of access and transport improvement projects that are consistent with NSW state policy, as well as with the strategic planning directions adopted for metropolitan Sydney and the *Eastern City District Plan* (refer section 2.4). It is further noted that, with the exception of the Sydney Gateway road project, major development works are generally confined to existing infrastructure and arterial road corridors that would be less sensitive to temporary impacts than for example residential or open space areas.

As such, major developments in the project area are part of a city-wide vision and transformation strategy that will alter the landscape character of the project area through a range of infrastructure investments and new developments. The cumulative and construction impacts arising from major projects in the area would be felt during the combined extended construction period. However, these impacts would not be able to be avoided if strategic planning and policy visions for the area surrounding the project are to be realised. The impacts would remain temporary while seeking implementation of long-term strategic planning and desired local character outcomes.

7.5 LANDSCAPE CHARACTER IMPACT SUMMARY

7.5.1 Impacts during construction

The project would have a range of landscape character impacts during the construction period. The impacts would be limited to the construction footprint and to the construction period. The major landscape character impacts would include:

- Restricted or changed access and connectivity
- Temporary loss of access to about four hectares of open space in the Tempe Lands, including temporary closure and relocation of the off-leash dog exercise area
- Spatial and visual impacts as a result of temporary structures and construction activities
- Potential impacts of construction activities on the operations and infrastructure of Sydney Airport, the Botany Rail Line and the Airport Line
- Increased traffic and vehicular movements as a result of the project workforce, haulage and delivery movements.

The resulting temporary landscape character impacts would be:

- High for two zones
- Moderate for four zones
- Low for three zones.

A series of measures would be adopted to manage and minimise potential impacts during instruction including:

- A construction staging strategy
- A construction traffic management strategy
- A rehabilitation strategy
- Other environmental management and safeguard measures.

More detail on these measures is provided in EIS/preliminary draft MDP chapters 2, 8 and 19.

7.5.2 Operational impacts

The landscape character impacts of the project are summarised in Table 11 on the following page. As noted in section 7.3, the identified impact ratings are based on the assumption that residual land within the Tempe lands would be used as public open space following completion of the project. Different land uses would likely result in different landscape character impacts and impact ratings. It is noted that the identified impact ratings remain the same, irrespective of the emplacement mound design option adopted. This is further discussed in Emplacement mound design options below.

Based on the assessment above, out of the nine landscape character zones, the impact of the project on the landscape character would be:

- High for three zones
- Moderate for two zones
- Moderate to low for two zones
- Low for one zone
- Negligible for one zone.

The nature of the impact would be:

- Largely adverse for four zones
- A combination of adverse and beneficial for four zones
- Neutral for one zone.

Beneficial impacts are largely derived from:

- The potential for the creation of new open space on residual land, subject to open space being the preferred land use in accordance with the priorities of local and regional strategic planning and IWC
- Reduction of truck movements on surrounding roads
- Vehicular connectivity improvements to the Northern Lands
- Upgrades to existing footpaths
- Provision for future active transport links
- Potential for new viewing opportunities in the Tempe Lands as a result of emplacement mounds.

Adverse impacts are generally the result of:

- Built form and/or land use changes that would alter the existing landscape character including:
  - Introduction of new road infrastructure into brownfield sites
  - Replacement of greenspace with road infrastructure, including the permanent loss of around one hectare of land within Tempe Lands which includes land currently occupied by the Tempe Golf Range and Academy and the off-leash dog exercise area
- Extensive tree removal with limited scope for replacement trees due to space, operational and environmental constraints such as land fill design
- The interruption of the open landscape by new built form and from the exposure of new built form against the open sky where the "big sky" is a defining aspect of the landscape character and integral to heritage values such as at Sydney Airport and along Alexandra Canal
- Other impacts on heritage fabric such as removal of some sections of Alexandra Canal wall and removal of buildings in the airport's north-east sector. The latter are important because their arrangement and form contributes to an understanding of the airport's historic evolution
- Altered or blocked views, vistas or important visual relationships
- Loss of exposure or changes to the presentation for businesses
- New views resulting from tree removal and therefore reduced spatial enclosure, creating views of road infrastructure where they did not exist before
- The extent of hard drainage infrastructure including open concrete channels, flood mitigation storage and pond adjustment works would be potentially highly visible by motorists and plane travellers from above, and alter the existing landscape character
- Changes in active transport connectivity including removal of the pedestrian cycle link between Tempe Recreation Reserve and Link Road and removal of the pedestrian and cycle link between the Alexandra Canal cycleway and Qantas Drive. The upgraded Qantas Drive would not replace the existing footpath
- The loss of about 8.5 hectares of industrial land outside of Sydney Airport land, reducing the overall availability of industrial/employment land in the project area. This is further discussed in Technical Working Paper 11 – Social Impacts and Technical Working Paper 12 – Business Impacts.

Table 11. Operational landscape character impact summary

Landscape character zone		Sensitivity	Magnitude	Impact	Adverse/Beneficial
1*	Terminal precincts	High	High	High	Adverse
2 *	Greenspace	High	High	High	Combination of adverse and beneficial impacts
3	Alexandra Canal	High	High	High	Adverse
4	Runway precinct	Moderate	Low	Moderate-low	Combination of adverse and beneficial impacts
5*	Freight and industrial	Low	High	Moderate	Combination of adverse and beneficial impacts
6*	Residential	High	Low	Moderate	Adverse
7*	Warehousing and employment	Low	Low	Low	Adverse
8	Motorway	Low	Negligible	Negligible	Neutral
9	Airport support	Low	Moderate	Moderate-low	Combination of adverse and beneficial impacts

Emplacement mound design options

The assessment has considered two emplacement mound design options for the Tempe Lands. It has found that, due to the extent of the project's landscape character impacts, the emplacement mound design adopted would have little bearing on the project's landscape character impacts overall.

It is important to note that the potentially greater beneficial impacts would be derived from the project if emplacement mound design "Option One" were adopted. If new active recreation facilities such as playing fields were needed, "Option One" would offer greater integration with existing playing fields and other recreation facilities in Tempe Recreation Reserve.

The location of active recreation facilities for "Option Two" would be north of the freight terminal link. This location is separated from adjoining residential areas by the Terminal 1 connection and the limited active transport connectivity to surrounding areas, suggesting that any recreational facilities would largely rely on vehicular access, as is common for higher order open space areas.

However, the land available in this area offers scope for only one full sized playing field, or around eight netball courts, plus parking. This would be considered to fall short of requirements for a district or regional active open space.

It is therefore recommended that the viability of the design options to meet active and passive recreation needs is further discussed in consultation with key project stakeholders including IWC as part of its planned master plan process for the former Tempe landfill - also refer section 6.6.2. This would ensure that any new open space created as part of the project best meets local, district and sub-regional recreation needs.

It is further noted that the most suitable land use for the area east of the Terminal 1 connection would need to be determined in accordance with the priorities of local and regional strategic planning and IWC. This may identify potential future land uses other than open space.

Chapter 9 includes a range of potential measures for further investigation, to reduce the identified adverse landscape character impacts.

7.5.3 Cumulative impacts

There have been a number of major infrastructure developments in the area surrounding the project, dating back to at least 2016, and with the potential to continue to 2024 should the Sydney Gateway road project be approved.

This represents a long-lasting series of temporary impacts, with multiple projects often occurring at any one time. It is noted however that these impacts are a result of works contributing to the implementation of strategic planning and policy visions and of the desired future local character of the area. With the exception of the Sydney Gateway road project, the works are generally confined to existing infrastructure and arterial road corridors that would be less sensitive to temporary impacts than for example residential or open space areas.

7.5.4 Summary of impacts on Commonwealth land

Potential landscape character impacts to Commonwealth land would occur as a result of proposed works within:

- LCZ 1,
  At the western project tie-in and along Qantas Drive, Joyce Drive and Sir Reginald Ansett Drive
- LCZ 2
  In the triangle of undeveloped land between Alexandra Canal, Airport Drive and the Botany Rail Line, and undeveloped land along Canal Road
- LCZ 4
  Within the Northern Lands
- LCZ 5
  Between the Botany Rail Line and Canal Road.

Potential impacts would include both impacts during the construction period and during project operation, as discussed in **section 7.2, section 7.5.1** and **section 7.3**.

Impacts during construction

Generally, construction related impacts would occur as a result of proposed construction, including both work sites during project construction and ancillary facilities. Proposed ancillary facilities located on Commonwealth land are summarised in **Table 7** and shown in **Figure 212**.

Any potential impacts from both construction activities and ancillary site operation would be temporary and mitigated through the measures outlined in **section 7.2** and **Chapter 9**.

Operational impacts

Potential landscape character impacts during operation of the project generally relate to changes in the landscape character summarised in **section 7.5.2**.

Impacts to Commonwealth land would include the following:

- Within LCZ 1, LCZ 4 and LCZ 5, the project would result in earthworks modifications including new cut and fill embankments as well as new emplacement mounds that would be elevated above the existing landform and stand out as large unnatural landforms in the generally flat to gently sloping landscape
- Removal of large amounts of mature vegetation in all zones but particularly in LCZ 1 along Qantas Drive, with limited scope for reinstatement due to space and operational constraints as well as land fill design constraints
- Changes to active transport links including removal of the Airport Drive signalised pedestrian crossing at Link Road, and removal of the cycle link between the Alexandra Canal cycleway and Qantas Drive. The upgraded Qantas Drive would not replace the existing footpath
- In the case of LCZ 1, LCZ 4 and LCZ 5, the new road alignment would introduce major new built form into the landscape, including the roads itself as well as bridges, the Terminals 2/3 access viaduct, retaining walls and other supporting infrastructure. They would impact the “big sky” landscape that is identified as a contributing factor to Sydney Airport’s heritage values
- Within LCZ 1, the heritage values of Sydney Airport would be affected through the removal of existing buildings which contribute to an understanding of the historic evolution of the airport
- Within LCZ 2 and LCZ 5, drainage measures including drainage culverts, concrete channels and pond adjustment works would be potentially highly visible and alter the existing landscape character, including its experience by plane travellers from above
- Land use changes in LCZ 2 and LCZ 5, respectively converting open space and freight/container storage areas to arterial road corridors.

This would result in long-term impacts to Commonwealth land during operation of the project. Impacts would be minimised through the implementation of the measures outlined in **Chapter 9**.

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CHAPTER 8

Visual Impact Assessment

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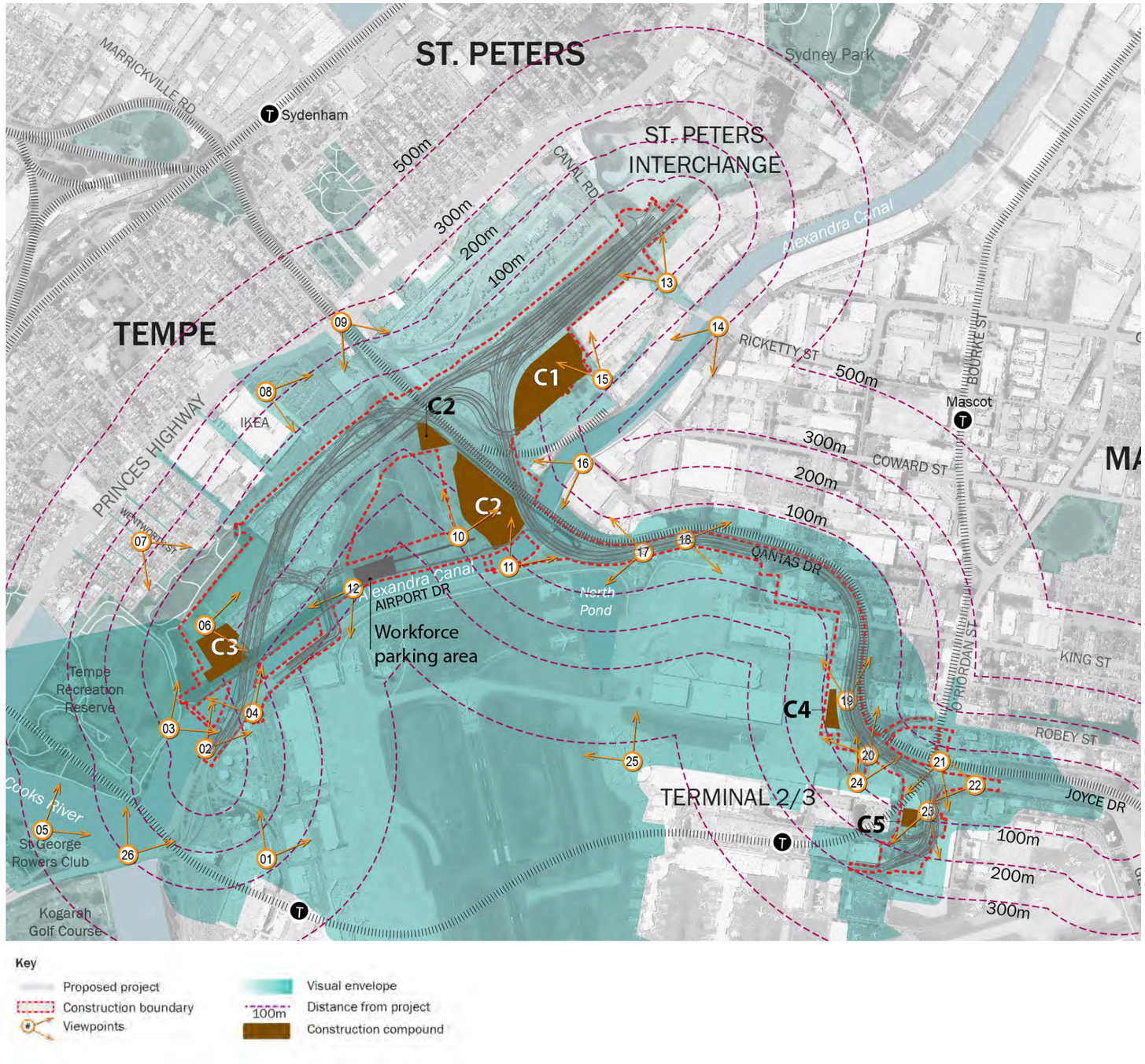

Figure 216. Visual envelope map for the project and locations of viewpoints for visual assessment and locations of proposed ancillary facilities

8.1 CHAPTER OVERVIEW

This chapter identifies the areas from where the project would be visible, also known as the visual envelope of the project. It determines a range of representative viewpoints within that catchment, covering a range of different land uses and viewers as outlined in Chapter 3.

An overview of the viewpoints is provided in section 8.2.

This is followed by an assessment of:

- Visual impacts during project operation (section 8.3)
- Visual impacts during project construction (section 8.4).

Both the assessment of operational and construction impacts include a discussion of cumulative impacts as a result of other major developments in the area - also refer section 7.4.

The chapter concludes with a discussion of visual impacts on Commonwealth land (section 8.5).

8.2 VISUAL ENVELOPE

Figure 215 depicts the project's visual envelope, representing the areas from where the project would be visible.

8.2.1 Viewpoints for assessment

A number of viewpoints within the visual envelope of the project have been selected for the visual impact assessment. The locations and directions of the chosen viewpoints are representative of the range of viewpoints, or groups of viewpoints, both within and beyond the project site, and are shown on Figure 216.

They include generally publicly accessible places such as open space areas, roads, pedestrian and cycleways and popular destinations or places of interest such as the "Rowers on Cooks River" restaurant and function centre, IKEA and the Qantas Heritage Collection in Terminal 3.

Table 12 summarises the viewpoints, the visual setting and their resulting degree of sensitivity to change. This is further elaborated on in section 8.3.

Table 12. Viewpoint summary

[1] G=Negligible, L=Low, ML=Moderate Low, M=Moderate, MH=Moderate High, H=High

View	Location	Sensitivity	
01	P2 car park at Sydney Airport's Terminal 1, looking north-east towards the main runway, Northern Lands and Sydney CBD.	M	Sensitive elements in this view include the vast open landscape setting with open views towards the runway and several major centres, as well as dense planting on the embankments of the Tempe Lands.
02	Alexandra Canal cycleway adjacent Airport Drive and opposite Tempe Recreation Reserve, looking north.	M	Sensitivity is derived from water glimpses and from vegetation lining the road corridor and Alexandra Canal, as well as from the open nature of the sky above the airport.
03	Tempe Recreation Reserve looking north-east along Alexandra Canal and towards the Tempe Lands.	H	Sensitivity is derived from the parkland setting with mature vegetation, including along Alexandra Canal and in the Tempe Lands. Other sensitive elements are the waterway itself and the open sky above it.
04	Link Road at the intersection with Airport Drive, looking north-west	M	Sensitive elements are the open views across Alexandra Canal to the Tempe Lands with its heavily vegetated embankments. Vegetation along the canal is also sensitive to change. Containers stored on the Tyne Container site are a colourful element in the background.
05	Rowers on Cooks River restaurant and function centre, Rockwell Avenue, Wolli Creek, looking north-east. The view also captures similar views from apartments and hotels	H	Sensitive elements are the open water body of the Cooks River and Alexandra Canal, open space in Tempe Recreation Reserve and the Tempe Lands, and mature vegetation in open space areas and along Alexandra Canal.
06	Tempe Lands, looking north-east across the Tempe Golf Range and Academy and the dog park	L	Visually sensitive aspects of this view include the 'big sky' landscape, views towards the Sydney CBD, glimpses of Sydney Airport and parkland vegetation. Shipping containers are colourful visual feature.
07	Wentworth Street, Tempe, looking south-east towards the Tempe Lands	M	Parklands and vegetation in Lori Short Reserve and in the Tempe Lands terminate the view and are sensitive to change.
08	The view is located on the first floor of the IKEA store in Tempe, looking south-east across the open Sydney Airport landscape	M	The "big sky" landscape with open views of Sydney Airport including the Qantas Jet Base, is sensitive. Stands of vegetation provide relief in this densely developed urban setting and are also sensitive.
09	Princes Highway bridge over the Botany Rail Line, Tempe, looking south-east	L	The sensitive elements in this view is the open vista towards across the landscape and Terminals 2/3, one of very few open view corridors from densely built up areas along the Princes Highway. The "big sky" landscape above Sydney Airport is also sensitive. Vegetation along the Botany Rail Line would also be sensitive to change.
10	North Precinct Road, north of Nigel Love bridge looking north-east	L	Much of the view has an unkempt and industrial character. Sensitive elements include established vegetation and the openness of the landscape where the sky is the an important visual element
11	Alexandra Canal cycleway near Mascot (Shea's Creek) underbridge, looking north-east along Alexandra Canal	H	The view has a riverside parkland character that would be sensitive to change. Particular sensitive elements include established vegetation along Alexandra Canal, the open waterway, the expanse of sky above and strips of greenspace along the canal.
12	Access track along the western side of Alexandra Canal and the desalination pipeline, looking south-west	H	Sensitive elements in this view are the large mature trees on both sides of Alexandra Canal, as well as the open sky and vista along the canal towards Wolli Creek.
13	Bus stop on the northern side of Canal Road looking north-west	M	Sensitive elements in this view are the large mature trees on both sides of the road corridor, providing a green frame to the road.
14	Canal Road bridge over Alexandra Canal, looking south-west	H	Visually sensitivity of this view is derived from its importance as one of the key viewpoints of Alexandra Canal. Visually sensitive elements include the waterway itself, the mature trees lining its banks, the vista towards the airport with planes visible at the terminals, and the open sky above the canal
15	Burrows Road South, looking north-west	M	Established mature trees provide amenity within the industrial estate and are visually sensitive.
16	Alexandra Canal cycleway south of Coward Street, looking south-west along the canal	H	The whole waterside setting is sensitive. Specific sensitive elements are the mature trees lining the canal, and the open sky above.
17	Qantas Drive and Airport Drive junction, looking west	M	The major sensitive element in the view is the big open sky and the long vista towards the Tempe Lands and Wolli Creek beyond. The park-like character of the land adjacent to Alexandra Canal provides relief through greenery in the form of grass and mature trees and is a sensitive element, as are Sydney Airport perimeter hedges.
18	Qantas Drive, near the Botany Rail maintenance overbridge, looking east	M	Sensitive features include the mature trees lining the road corridor on the southern side, as well as a park-like strip of grass and low planting in front of advertising structures.
19	Qantas Drive between Robey and Ewan Streets, looking north	M	Established mature tree cover is the major visually sensitive element, complemented by low level planting in the verges, creating a green setting for the roadway.

View	Location	Sensitivity	
20	Seventh Street at the intersection with Qantas Drive, looking west	M	Established mature tree cover, including a large mature fig tree south of Qantas Drive and a dense stand of mature vegetation on the northern side, is highly sensitive. Old multi-storey building stock on airport land in the background is of low visual quality but contributes to the airport's heritage significance.
21	O'Riordan Street at the intersection with Qantas Drive and Joyce Drive, looking south	M	Much of this view is taken up by the large size of the intersection. The most sensitive elements are the mature vegetation and feature planting on the southern side of the intersection, as well as the vista towards the Terminals 2/3 entrance and the large open sky above the airport. Nearby businesses would be sensitive to any changes to its presentation and visibility.
22	Joyce Drive looking west on the approach to the Sir Reginald Ansett Drive intersection.	L	Visually sensitive elements include a dense stand of mature trees west of O'Riordan Street and established palm trees at the entrance to Terminals 2/3. The long-distance vista through the Qantas Jet Base to the Tempe Water Tower is also sensitive.
23	Sir Reginald Ansett Drive looking south	M	The view is framed by a welcome gantry and comprised to a large extent by the existing road pavement. Established mature trees lining the road are sensitive elements, as is the open sky above Sydney Airport. Adjacent businesses would be sensitive about visual exposure.
24	Seventh Street, looking north	M	Established mature tree cover on the northern side of Qantas Drive terminates the view and is the major, visually sensitive element. It also helps to conceal visual clutter from road furniture.
25	Qantas Heritage Collection, Level 1, Terminal 3, looking north-west	M	Visually sensitive elements are trees along Alexandra Canal, greenspace in the Northern Lands and the Tempe Lands, as well as between taxing areas. They constitute only a relatively small portion of a busy view. Shipping containers are colourful but also visually busy, adding to visual clutter. Much of the view is taken up by the sky and the view would be sensitive to elements that disrupt the openness of the sky above the expansive airport landscape.
26	Giovanni Brunetti Bridge looking north-east	H	Sensitivity of view at this location is derived from the open waterway setting with vistas along Alexandra Canal towards the Sydney CBD. Vegetation along the canal, in Tempe Recreation Reserve and on the embankment of the Tempe Lands provides a strong natural frame and would be sensitive to change.

8.3 VISUAL IMPACTS DURING OPERATION

The operational visual impact assessment analyses how well the design responds to what people see from the selected 26 viewpoints by describing the sensitivity of the views and the magnitude of the project, as outlined in Chapter 3.

As per the landscape character impact assessment and discussed in section 7.3, the visual impact assessment has assumed that land in the Tempe Lands and on both sides of the project alignment would be dedicated to open space uses, including the placement of emplacement mounds - refer section 8.3.1. If further planning were to identify different preferred future land uses for the Tempe Lands, some of the identified visual impacts (including beneficial impacts) in section 8.3.28, section 8.4.2 and section 8.5 would differ, potentially affecting the visual impact assessment outcome for the project.

8.3.1 Visual impact assessment structure

For each viewpoint, the assessment discusses:

- The location of the viewpoint, and who the potential viewers would be
- The visual sensitivity of the view to change
- Permanent elements of the project visible in the view
- The magnitude of the visual effect on the view
- The overall rating of the visual impact resulting from the combination of sensitivity and magnitude of visual effect

The ratings for visual sensitivity and magnitude are measured relative to each other within the scope of the project, rather than to an absolute scale covering all potential forms of impact.

Through this process, the visual impact of the project as a whole has been identified - refer section 8.6 for a summary of the visual impact assessment.

Emplacement mound design options

As per the landscape character impact assessment, the visual impact assessment also considers two emplacement mound design options for the Tempe Lands that differ in the placement locations for emplacement mounds, as well as in the potential layouts for open space and recreation facilities in the Tempe Lands - refer section 7.1.1 and Figure 99 and Figure 100.

As a result the emplacement mound options have different landscape visual effects which in turn affect the visual impact rating.

8.3.2 Viewpoint 1

Location and potential viewers

P2 car park at Sydney Airport's Terminal 1, looking north-east towards the main runway, Northern Lands and Sydney CBD. P2 is primarily used for staff car parking. The top level is also a well known and used regularly as a plane spotting location.

Visual sensitivity

The elevated position on top of the car park provides panoramic views in all directions. This viewpoint is frequented by plane spotters whose primary view direction is north-east towards the main runway. The distance between viewers and the project varies from about 300 metres to about 1.3 kilometres, reducing the amount of detail that can be perceived.

Sensitive elements in this view include the vast open landscape setting with open views towards the runway and several major centres, as well as dense planting on the embankments of the Tempe Lands. Detracting elements include at grade and multi-storey car parks and the high degree of visual clutter and complexity around the edges of the runway zone.

The view is considered to be **moderately** sensitive.

Visible project elements

Owing to the high elevation of the viewpoint, about two thirds of the project would be visible including the following key features:

- Terminal 1 connection
- Freight terminal bridge
- Northern Lands access including freight terminal link road and roundabout
- Eastbound terminal link and terminal link bridge
- Qantas Drive bridge
- Qantas Drive upgrade and extension
- St Peters interchange connection
- Tree clearing/vegetation removal
- Landform changes including emplacement mounds
- Noise barrier along the Terminal 1 connection.

Figure 217. Viewpoint 1 - existing view

Magnitude of visual effect

While much of the project would be visible, many changes would be viewed from a distance of 400 metres or more, making them smaller in the view and harder to perceive. Removal of vegetation on the embankments for the Freight terminal bridge, the freight terminal link road and emplacement mounds would be readily visible in the middle ground in the view. This would affect only a small portion of the view, resulting in an overall **low** magnitude of impact on this view.

Visual impact summary

Changes would be readily perceived in only a small portion of the view. The view also has a high level of existing visual clutter. The majority of sensitive view elements would be retained. This results in an overall moderate to **low** visual impact, irrespective of the mounding option adopted.

Visual sensitivity	Magnitude of visual effect	Overall rating of visual impact
Moderate	Low	Moderate to low

Nature of impact

Much of the impact would be neutral. However, there are some adverse impacts such as vegetation clearing, resulting in an overall adverse impact.

Changes over time

As it matures, new landscaping in the Tempe Lands would assist to blend the emplacement mound landforms with the existing landform, somewhat reducing the visual impact over time. This is subject to emplacement mound design permitting new shrub and tree cover.

8.3.3 Viewpoint 2

Location and potential viewers

Alexandra Canal cycleway adjacent Airport Drive and opposite Tempe Recreation Reserve, looking north. People that experience this view include Alexandra Canal cycleway users, airport related traffic such as airport visitors, freight traffic and employees, and general road users including commuters and bus passengers travelling along this arterial route to and from a multitude of destinations.

Visual sensitivity

Sensitivity of view at this location is derived from water glimpses and from vegetation lining the road corridor, including tree cover along Alexandra Canal, as well as boundary hedging to airport lands that provides a visual screen and mitigating green element along the corridor. The open nature of the sky above the airport is another visually sensitive element. Detracting view elements include advertising billboards, roads and heavy traffic, fuel storage tanks and light poles silhouetted against the open sky.

Overall the view is considered to have a **moderate** level of sensitivity.

Visible project elements

- Terminal 1 connection bridge
- Terminal 1 connection
- Freight terminal link road
- Adjustments to the existing Airport Drive/tie-in works
- Alexandra Canal cycleway adjustments
- Road directional signage
- Tree clearing along Alexandra Canal.

Magnitude of visual effect

Removal of signage gantries would make a positive contribution to the view. The project would alter the left portion of the view through mature tree clearing along the banks of Alexandra Canal for the Terminal 1 connection bridge and the freight terminal link road, changing the vista along the canal. The turfed verge in the foreground would also be removed. Construction of the

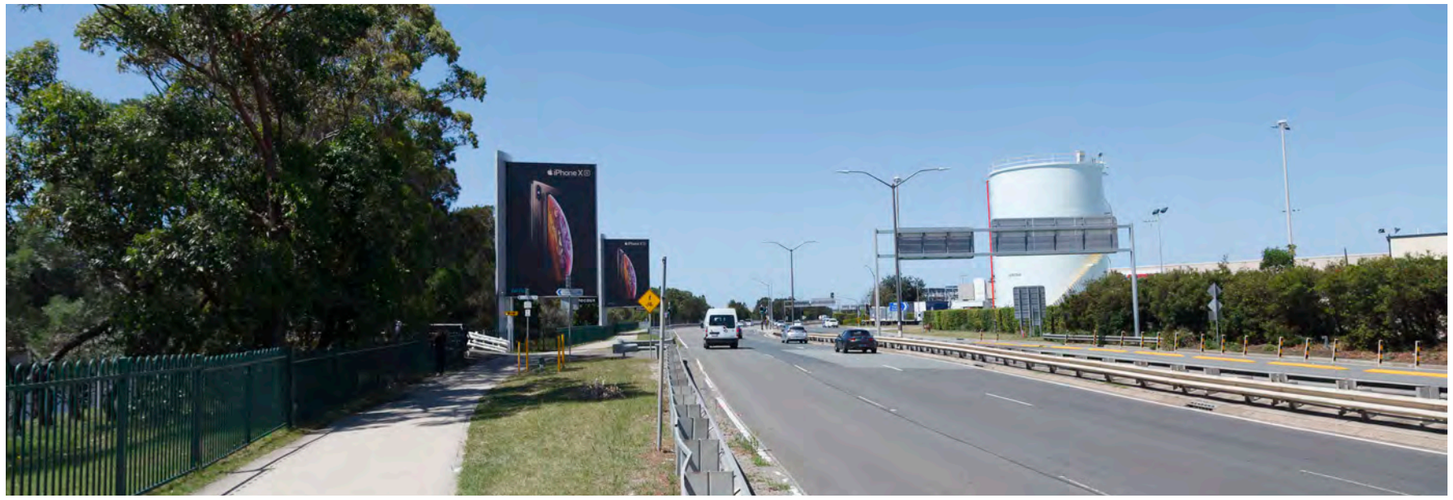

Figure 218. Viewpoint 2 - existing view

elevated Terminal 1 connection bridge would interrupt views along Alexandra Canal and introduce a prominent new built structure. New road directional signage would also be prominent in the foreground. Overall, the magnitude of visual change is **high**.

Visual impact summary

The combination of sensitive elements that comprise a large portion of the view and changes that affect those sensitive elements, results in a **high** visual impact on this view.

Visual sensitivity	Magnitude of visual effect	Overall rating of visual impact
Moderate	High	High-moderate

Nature of impact

Sensitive elements in the view would be altered including the line of trees along Alexandra Canal, the open vista along the canal, and the openness of the sky above, making the impact of the project on this view adverse in nature.

Changes over time

As new landscaping on either side of Airport Drive matures over time, it would somewhat reduce the impacts, reinstating trees and other vegetation in the foreground, and adding a green buffer on the right-hand side of the view to partially screen the fuel storage tanks.

8.3.4 Viewpoint 3

Location and potential viewers

Tempe Recreation Reserve looking north-east along Alexandra Canal and towards the Tempe Lands. Viewers include people engaged in active and passive recreational activities such as family groups, schools and sports clubs, (dog) walking and personal fitness. Other viewers include shared path users such as recreational users and commuters, IWC and Sydney Water maintenance staff.

Visual sensitivity

Sensitivity is derived from the parkland setting with mature vegetation, including along Alexandra Canal and in the Tempe Lands. Other sensitive elements are the waterway and open sky above and along Alexandra Canal

These elements comprise much of the view, making it **highly** sensitive to change.

Visible project elements

- Terminal 1 connection bridge
- Vegetation/tree clearing
- Emplacement mounds in the Tempe Lands.

Magnitude of visual effect

Construction of the Terminal 1 connection bridge would interrupt the open views along Alexandra Canal, introducing a large new built structure. Tree removal along Alexandra Canal for bridge construction would further alter the vista along the canal. These impacts are somewhat mitigated by the distance to the viewer, affecting a smaller portion of the view.

Depending on the emplacement mound option chosen, the magnitude of visual effect would vary:

- "Option One" would not add to the magnitude of visual effect, as the mounds would not be visible in this view
- "Option Two" would have a marginally greater visual effect as emplacement mounds placed on top of the Tempe Lands may be partially visible above existing tree cover, from parts of the park. However, this would only affect a very small part of the view and not significantly increase the magnitude of visual effect.

Therefore magnitude of visual effect is **moderate**, irrespective of the mound design option chosen.

Visual sensitivity	Magnitude of visual effect	Overall rating of visual impact
High	Moderate	High-moderate

Visual impact summary

The visual impact on this view would vary depending on the mounding design chosen. It is a combination of the highly sensitive nature of this view and the magnitude of new, visually exposed elements.

Nature of impact

Changes would intrude on the existing parkland setting and are therefore considered adverse.

Figure 219. Viewpoint 3 - existing view (top) and artist impression of the view showing the project (bottom)

Changes over time

The view offers little potential to screen the project through landscaping or other measures. As a result, no changes to visual impacts are expected over time.

8.3.5 Viewpoint 4

Location and potential viewers

Link Road at the intersection with Airport Drive, looking north-west. People who experience this view include motorists such as airport employees and delivery drivers accessing freight and other airport services around T1. They also include pedestrians accessing the terminal and employment areas via the pedestrian crossing and footbridge from Tempe Recreation Reserve.

Visual sensitivity

Sensitive elements are the open views across Alexandra Canal to the Tempe Lands with its heavily vegetated embankments. Vegetation along the canal is also sensitive to change. Containers stored on the Tyne Container site are a colourful and ever-changing element in the background. Detracting elements include heavy traffic on Airport Drive in the foreground and floodlighting associated with the Tempe Golf Range and Academy.

The sensitivity of the view is **moderate**.

Visible project elements

- Terminal 1 connection bridge
- Terminal 1 connection
- Adjustments to Airport Drive including removal of pedestrian crossing
- Tree clearing
- Noise barrier along the Terminal 1 connection
- Variable message sign
- Emplacement mounds in the Tempe Lands.

Magnitude of visual effect

The view would be impacted by the Terminal 1 connection bridge over Alexandra Canal as a major new element that would dominate the view, and would require removal of mature vegetation. Emplacement mounds, especially for design "Option Two", would result in new landforms that would be partially visible against the sky.

The magnitude of visual effect is **high**.

Figure 220. Viewpoint 4 - existing view (top) and artist impression of the view showing the project (bottom)

Visual impact summary

A large portion of this is comprised of sensitive elements. The majority of these would be removed or altered by the project, resulting in a high visual impact. Because the magnitude of visual effect of the Terminal 1 connection bridge is **high**, the visual impact would not substantially change irrespective of the mounding design option adopted.

Visual sensitivity	Magnitude of visual effect	Overall rating of visual impact
Moderate	High	High-moderate

Nature of impact

The impact on this view would be adverse due to the effect of changes on sensitive view elements such as trees and views.

Changes over time

There is little opportunity to screen major new project elements through landscaping or other measures. As a result, little change to the identified visual impact is expected over time.

8.3.6 Viewpoint 5

Figure 221. Viewpoint 5 - existing view

Location and potential viewers

This view is from the "Rowers on Cooks River" restaurant and function centre, Rockwell Avenue, Wolli Creek, looking north-east. Viewers include restaurant patrons, recreational users of Cahill Park, the Cooks River foreshore and Kogarah Golf Club east of Marsh Street, cyclists on local and regional cycle links. Viewers would also include waterway recreational users including kayakers and recreational boats coming to and from moorings near the Princes Highway Cooks River bridge.

It is noted that the Novotel Sydney International Airport Hotel in Wolli Creek, and residents in north-facing Wolli Creek apartment towers would have a very similar view angle. Due to their elevation, they currently enjoy open panoramic views over the Cooks River, Alexandra Canal and open space in the Tempe Recreation Area and Tempe Lands.

Visual sensitivity

Sensitive elements are the open water body of the Cooks River and Alexandra Canal, open space in Tempe Recreation Reserve and the Tempe Lands, and mature vegetation in open space areas and along Alexandra Canal.

The view is considered to be **highly** sensitive.

Visible project elements

- Southern tie-in
- Emplacement mounds in the Tempe Lands

Viewers in from medium and high rise buildings would also see:

- Terminal 1 connection
- Noise barrier along the Terminal 1 connection
- Terminal 1 connection bridge
- Freight terminal bridge.

Magnitude of visual effect

While at foreshore level, the majority of the project is concealed from view by intervening built structures, landform and vegetation in Tempe Recreation Reserve, viewers in medium and high rise buildings would have open views of the Terminal 1 connection bridge, noise barrier, terminal 1 link and the freight link bridge. For these viewers, the project would affect a central portion of their outlook, removing open space and replacing it with road infrastructure. New bridges would also affect the vista along Alexandra Canal. Tie-in works, if visible at all, would be difficult to discern and not generally affect the view.

Another visible project element, from both the ground and surrounding buildings, would be the emplacement mounds in the Tempe Lands. Depending on the emplacement mound option chosen, the magnitude of visual effect would vary:

- "Option One" would not add to the magnitude of visual effect, as mounds would not be visible from the ground. For more elevated viewers, the noise barrier would be prominent, somewhat shielding the mounds and replacing shipping containers as major hard infrastructure in the view
- "Option Two" would be more visible from the foreshore as emplacement mounds placed on top of the Tempe Lands would be visible as new landforms that add elevation at the top of the existing embankment, behind the Robyn Webster Sports Centre. However, this change would only affect a very small portion of the view, limiting the magnitude of visual effect on the view. Because mounds would be visible from elevated viewers in both options, the slightly closer proximity of "Option Two" mounds would not make the mounds significantly more prominent in the view, and therefore not add to the magnitude of visual effect.

For both mounding options, the magnitude of visual change is **low**, affecting only a small portion of the view.

Visual impact summary

The visual impact on this view is a combination of the highly sensitive nature of this view and the magnitude of new, visually exposed elements. While the latter would vary slightly for viewers on the foreshore and in elevated apartments and hotels, overall the project would be located at some distance and alter only a small portion of the view, resulting in a **moderate** visual impact irrespective of the mound design option adopted.

Visual sensitivity	Magnitude of visual effect	Overall rating of visual impact
High	Low	Moderate

Nature of impact

Changes would affect views from the foreshore, apartments and hotels and alter the parkland setting and skyline through road and bridge infrastructure and emplacement mounds. They are therefore considered adverse.

Changes over time

The view offers little potential to screen the bridges through landscaping or other measures. The Terminal 1 connection and noise barrier may be partially screened once new vegetation

matures, subject to emplacement mound design permitting new shrub and tree cover.

8.3.7 Viewpoint 6

Location and potential viewers

Tempe Lands, looking north-east across the Tempe Golf Range and Academy and the dog park. Viewers include recreational users such as golf players, people walking their dogs and plane spotters. The dog park is also used by professional dog walkers and by Council staff. The car park is used for overflow car parking for Tempe Recreation Reserve. With the exception of golf, similar viewers would see this view following project completion.

Visual sensitivity

Visually sensitive aspects of this view include the 'big sky' landscape, views towards the Sydney CBD, glimpses of Sydney Airport and parkland vegetation. Shipping containers are a colourful and ever-changing feature. The large expanse of paving, safety fences around the golf driving range, flood lights and generally low quality built structures and furniture act as visual detractors.

The sensitivity of this view is low.

Visible project elements

- Terminal 1 connection including signalised intersection with the freight terminal link road
- Noise barrier along the Terminal 1 connection
- Variable message sign
- Road directional signs
- Reinstatement of open space areas
- Emplacement mounds
- Vegetation clearing.

Magnitude of visual effect

A major visual effect in this view would be the noise barrier along the Terminal 1 connection. It would be about five metres tall and about 450 metres long, prominently located in the centre of this view. It would block off the long-distance views towards the Sydney CBD. Other changes to the view would result from emplacement mounds and removal of vegetation. The Terminal 1 connection would replace parts of the container terminal and the golf driving range with a new roadway. Visible roadside elements above the noise barrier would include a variable message sign and road directional signage gantries, as well as traffic signals at the freight link road intersection.

Figure 222. Viewpoint 6 - existing view (top) and artist impression of the view showing the project (bottom)

Beneficial changes would include reinstatement of parklands over disturbed or paved areas and potentially the creation of new open space areas. They would also include the removal of low quality built structures including visually prominent fencing, floodlights and shipping containers, reducing the extent of visual clutter.

Depending on the emplacement mound option chosen, the magnitude of visual effect would vary. Both mounding design options would result in new landforms that would replace the shipping containers as visually prominent vertical elements extending into the skyline. While mounds in "Option Two" would close off existing glimpses to the east, this would affect only a minor portion of the view. Mounds in "Option One" would affect a slightly larger portion of the view.

It is noted that both mounding options would have potential to provide new and enhanced viewing opportunities over surrounding areas including Sydney Airport, due to the additional elevation they would provide.

In summary, the major visual effect would result from the noise barrier and mounding options would not significantly alter the magnitude of visual effect on this viewpoint.

The magnitude of visual change is **high**.

Visual impact summary

The combination of low sensitive and high magnitude of visual effect results in an overall **moderate** visual impact.

Visual sensitivity	Magnitude of visual effect	Overall rating of visual impact
Low	High	Moderate

Nature of impact

While there would be some beneficial changes to this view, the noise barrier is considered a visually adverse element, resulting in a neutral impact overall.

Changes over time

Maturing landscaping in the Tempe Lands would over time somewhat reduce the adverse visual impacts, increasing the prominence of open space elements and reducing the visual prominence of the road infrastructure. While the scale of emplacement mounds would not alter over time, landscaping of the Tempe Lands may assist in blending in the new landform with the existing landform. Both would be subject to the park and landfill being designed to allow for the installation of larger shrubs and trees.

8.3.8 Viewpoint 7

Location and potential viewers

Wentworth Street, Tempe, looking south-east towards Lori Short Reserve and the Tempe Lands. People who would experience this view include residents of Wentworth Street, people accessing Lori Short Reserve or the Tempe Lands for recreation, recreational and commuter cyclists connecting to the Short Street cycle link.

It is noted that a similar view would also be experienced by people in Station Street, Hart Street, Fanning Street, Barden Street and Smith Street.

Figure 223. Viewpoint 7 - existing view

Visual sensitivity

Parklands and vegetation in Lori Short Reserve and in the Tempe Lands terminate the view and are sensitive to change, but comprise less than half of the view.

The sensitivity of this view is **moderate**.

Visible project elements

- Emplacement mounds
- Noise barrier along the Terminal 1 connection.

Magnitude of visual effect

The main item visible in this view, would be a small portion of emplacement mounds if mounding design “Option Two” were adopted where mounds would be in closer proximity to the viewer than those in “Option One”. The magnitude of visual effect of the mounds would be negligible as the project is generally concealed from view by intervening landform and vegetation in the Tempe Lands.

It is noted that emplacement mounds would likely be visible from the more elevated parts of residential streets, closer towards the Princes Highway, as well as residential streets to the north. From the Princes Highway, emplacement mounds would be visible as large new landforms atop the Tempe Lands. In some areas they would replace shipping containers, while in other areas they would add new elevation.

The noise barrier would be visible from Smith Street, where it would terminate the currently open view. It would unlikely be visible from other residential streets in this area, due to distance and vegetation in the Tempe Wetlands.

Overall, given the large viewing distance and the presence of vegetation screening much of the project, the magnitude of visual effect would be **low**.

Visual impact summary

The visual impact of the project on this view would be **moderate to low**.

Visual sensitivity	Magnitude of visual effect	Overall rating of visual impact
Moderate	Low	Moderate-low

Nature of impact

The visual impact on this view is mildly adverse, due the effect of noise barriers on a limited number of similar views.

Changes over time

While the scale of emplacement mounds would not alter over time, landscaping of the Tempe Lands may assist in blending in the new landform with the existing landform to realise a more "natural" fit. It is noted that this would be subject to the park and the landfill being designed to allow for the planting of larger shrubs and trees.

8.3.9 Viewpoint 8

Location and potential viewers

The view is located on the first floor of the IKEA store in Tempe, looking south-east across the open Sydney Airport landscape. Viewers would include shoppers and staff, as well as people visiting the IKEA food hall or indoor child play facility.

Visual sensitivity

The "big sky" landscape with open views of Sydney Airport including the Qantas Jet Base, is sensitive. Bands and stands of vegetation provide relief in this densely developed urban setting and are also sensitive. However, these are only a small component of what is a very busy view.

The sensitivity of this view is considered to be **moderate**.

Visible project elements

- Terminal 1 connection
- Eastbound terminal link
- Westbound terminal link
- Northern Lands access
- Qantas Drive bridge
- Terminal link bridge
- St Peters interchange connection including fill and retaining walls

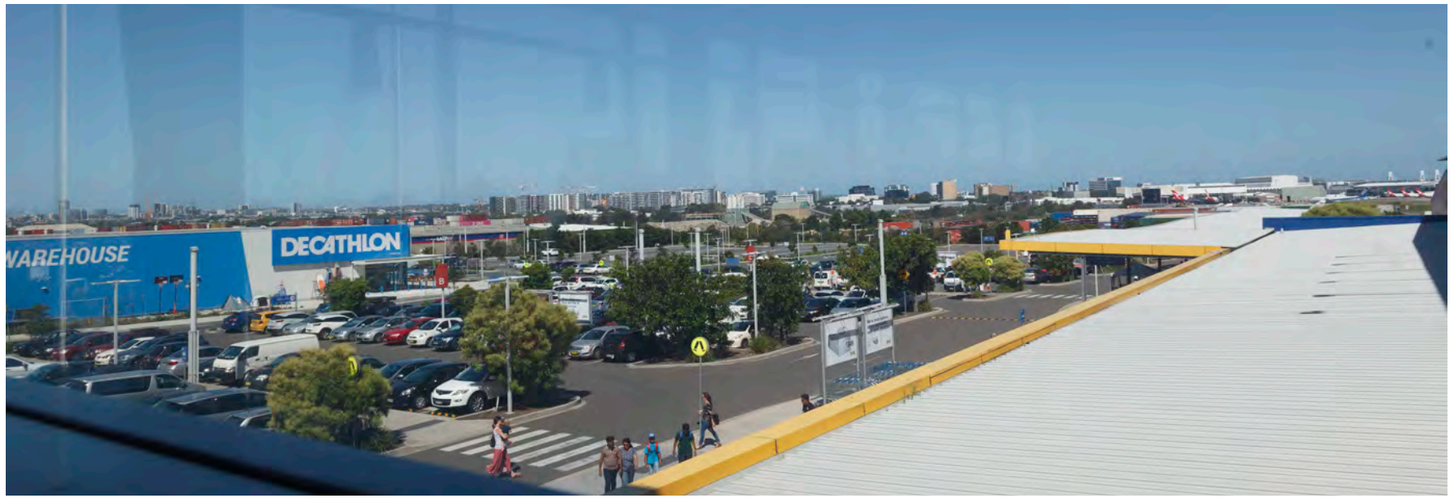

Figure 224. Viewpoint 8 - existing view

- Qantas Drive upgrade and extension
- Earthworks.

Magnitude of visual effect

While many of the project's key features would be visible in this view, they would constitute only a small portion of the view, due to the large viewing distance, the busy background against which many of the project's elements would be set and the intervening built form for elements located in closer proximity.

The magnitude of visual effect is **low**.

Visual impact summary

The combination of the small portion of the view where changes would be readily perceived with the high level of existing visual clutter and the retention of the majority of sensitive view elements results in an overall moderate to **low** visual impact.

Visual sensitivity	Magnitude of visual effect	Overall rating of visual impact
Moderate	Low	**Moderate-low**

Nature of impact

The nature of the impact is considered mildly adverse as it adds to an already cluttered view.

Changes over time

Due to airport operational constraints including the obstacle limitation surface there is limited potential for landscaping to provide a visual buffer to the project. The visual impact is therefore not expected to decrease over time.

8.3.10 Viewpoint 9

Location and potential viewers

Princes Highway bridge over the Botany Rail Line, Tempe, looking south-east. Viewers would include motorists on the Princes Highway who would only see a quick glimpse as they travel past, as well as pedestrians and cyclists. Freight train drivers on the Botany Rail Line below would experience a similar view.

Visual sensitivity

The sensitive elements in this view is the open vista across the landscape and Terminals 2/3, one of very few open view corridors from densely built up areas along the Princes Highway. The “big sky” landscape of Sydney Airport is also sensitive, but constitutes only a small portion of the view. Vegetation along the Botany Rail Line would also be sensitive to change, despite heavy weed infestation. The utilitarian character of the railway corridor is a visual detractor.

The sensitivity of this view is **low**.

Visible project elements

- Terminal 1 connection including bridge over the Botany Rail Line
- St Peters interchange connection
- Eastbound terminal link
- Northern Lands access
- Qantas Drive bridge.

Magnitude of visual effect

A number of new project elements would intrude into and affect this view. The most prominent of these is the Terminal 1 connection bridge over the Botany Rail Line, with the Terminal link bridge and the Qantas Drive bridge visible in the background.

The viewing distance reduces the perceived scale of these project elements, making the magnitude of visual effect **moderate**.

Figure 225. Viewpoint 9 - existing view

Visual impact summary

The importance of the view as a rare view corridor would not be affected by the project as the project elements would be viewed against a busy backdrop of other built structures, therefore not affecting the visually sensitive open sky. Combined with the moderate magnitude of project elements, this results in an overall **moderate** visual impact.

Visual sensitivity	Magnitude of visual effect	Overall rating of visual impact
Low	Moderate	Moderate-low

Nature of impact

The nature of the impact is considered mildly adverse as the project adds to an already cluttered outlook.

Changes over time

Due to airport operational constraints including the obstacle limitation surface there is limited potential for landscaping to provide a visual buffer to the project. The visual impact is therefore not expected to decrease over time.

8.3.11 Viewpoint 10

Location and potential viewers

North Precinct Road just north of the Nigel Love bridge, looking north. The view is primarily seen by airport staff.

Visual sensitivity

Much of the view has an unkempt and industrial character. Sensitive elements include established vegetation and the openness of the landscape where the sky is an important visual element (also refer **section 4.5.2**). Fencing, areas of bare earth interspersed with weeds are visual detractors.

The sensitivity of this view is low.

Visible project elements

- Terminal 1 connection including the bridge over the Botany Rail Line
- Eastbound terminal link
- Westbound terminal link
- Qantas Drive bridge
- Northern Lands access
- Retaining walls
- Roadside furniture including lighting, road directional signage and Integrated Speed and Lane Use Sign (ISLUS) gantries.

Magnitude of visual effect

A number of structures would impact this view that are visually prominent due to their large scale. They are the Terminal 1 connection including the rail overbridge, the Qantas Drive bridge and the eastbound terminal link. They would replace visually sensitive vegetation with road infrastructure. The visually sensitive skyline would be affected by roadside furniture which would introduce an element of visual clutter into the skyline. The bulk of the structures themselves would largely be set against a backdrop of other built form that reduces their prominence in the flat open landscape.

The magnitude of visual effect is **high**.

Figure 226. Viewpoint 10 - existing view (top) and artist impression of the view showing the project (bottom)

Visual impact summary

The combination of the large portion affected by changes and the introduction of visual clutter against the skyline results in a high visual effect. This combines with the low sensitivity of the view to result in an overall **moderate** visual impact.

Visual sensitivity	Magnitude of visual effect	Overall rating of visual impact
Low	High	**Moderate**

Nature of impact

The replacement of vegetation with road infrastructure and increase visual clutter against the skyline create an adverse visual impact.

Changes over time

Due to airport operational constraints including the obstacle limitation surface there is limited potential for landscaping to provide a visual buffer to the project. The visual impact is therefore not expected to decrease over time.

8.3.12 Viewpoint 11

Location and potential viewers

Alexandra Canal cycleway near Mascot (Shea's Creek) underbridge, looking north-east along Alexandra Canal. Current viewers include users of the Alexandra Canal cycleway, maintenance staff accessing the sluice gates and land along the Botany Rail Line. A very similar view is also experienced by Sydney Airport staff accessing the Northern Lands Car Park via the Nigel Love bridge. The view would also be similar from the relocated cycleway on the northern side of Alexandra Canal.

Visual sensitivity

The view has a riverside parkland character that would be sensitive to change. Particular sensitive elements include established vegetation along Alexandra Canal, the open waterway, the expanse of sky above and strips of greenspace along the canal.

The sensitivity of this view is **high**.

Visible project elements

- Qantas Drive bridge
- Eastbound terminal link
- Terminal link bridge
- Qantas Drive upgrade and extension
- Active transport link bridge over Alexandra Canal
- St Peters interchange connection
- Vegetation removal
- Roadside furniture including lighting.

Magnitude of visual effect

A number of large prominent new structures would impact this view and fundamentally change the outlook. The major items are the Qantas Drive bridge, Terminal link bridge and eastbound terminal link. They would affect visually sensitive vegetation and the open airspace over Alexandra Canal (also refer **section 4.5.2**)

The magnitude of visual effect is **high**.

Figure 227. Viewpoint 11 - existing view (top) and artist impression of the view showing the project (bottom)

Visual impact summary

The combination of extensive changes to the view with elements with a high magnitude of visual effect, affecting sensitive view elements, results in a **high** visual impact.

Visual sensitivity	Magnitude of visual effect	Overall rating of visual impact
High	High	High

Nature of impact

Due to its effect on sensitive view elements and heritage values, the impact of the project on this view is considered adverse.

Changes over time

Due to airport operational constraints including the obstacle limitation surface there is limited potential for landscaping to provide a visual buffer. The visual impact is therefore not expected to decrease over time.

8.3.13 Viewpoint 12

Location and potential viewers

Access track along the desalination pipeline on the western side of Alexandra Canal, looking south-west. Current viewers include maintenance staff and people walking their dogs. Potential future viewers would also include users of the relocated Alexandra Canal cycleway.

Visual sensitivity

The waterway setting of this view is sensitive to change. Specific sensitive elements in this view are the large mature trees on both sides of Alexandra Canal, as well as the open sky and vista along the canal towards Wolli Creek.

The sensitivity of this view is **high**.

Visible project elements

- Freight terminal bridge
- Terminal 1 connection bridge
- Active transport link relocation
- Tree removal.

Magnitude of visual effect

The new Freight terminal bridge and Terminal 1 connection bridge including associated abutment and pylons would be large new elements in the view and close off the vista along the canal. Large numbers of mature trees would be removed for the freight link road. The magnitude of relocated active transport link is comparatively low.

The magnitude of visual effect is **high**.

Visual impact summary

The combination of the large portion of the view altered by new project elements that would affect sensitive view elements results in an **overall** high visual impact.

Visual sensitivity	Magnitude of visual effect	Overall rating of visual impact
High	High	High

Figure 228. Viewpoint 12 - existing view (top) and artist impression of the view showing the project (bottom)

Nature of impact

Due to the effect on sensitive view elements and heritage values, the impact of the project on this view is considered adverse.

Changes over time

There are little opportunities in this location to install landscaping to provide a visual buffer to the project. The visual impact is therefore not expected to decrease over time.

8.3.14 Viewpoint 13

Location and potential viewers

Bus stop on the northern side of Canal Road, opposite the entrance to the Goodman St Peters Business Park, looking north-west. Canal Road is a busy arterial road linking the Mascot/Botany area and Terminals 2/3 to Sydney's inner west. Viewers include motorists and pedestrians along Canal Road, public transport users waiting at the bus stop, as well as workers and drivers accessing employment areas such as the Goodman St Peters Business Park and the Cooks River Intermodal Terminal.

Visual sensitivity

Sensitive elements in this view are the large mature trees on both sides of the road corridor. They provide an attractive green frame and reduce the visual prominence of otherwise detracting elements such as the road itself, heavy traffic and power lines.

The sensitivity of this view is **moderate**.

Visible project elements

- Canal Road overbridges (St Peters interchange connection)
- Tree removal
- Roadside furniture including directional signage and ISLUS gantries
- Earthworks.

Magnitude of visual effect

Magnitude of impact is a result of the three new Canal Road overbridges including associated abutments and earthworks and removal of a large amount of mature trees. The bridges would interrupt the vista north along Canal Road. The combined width of the bridges would also result in heavy shadowing effects on the road and footpath below.

The magnitude of visual effect is **high**.

Visual impact summary

The combination of large new project elements taking up much of the view, and the removal of visually sensitive vegetation results in an overall **high to moderate** visual impact.

Figure 229. Viewpoint 13 - existing view (top) and artist impression of the view showing the project (bottom)

Visual sensitivity	Magnitude of visual effect	Overall rating of visual impact
Moderate	High	High-moderate

Nature of impact

The replacement of the treed outlook and vista along the road with a view of road overbridges is considered to constitute an adverse impact.

Changes over time

As it matures, new landscaping along the project would somewhat reduce the visual prominence of the bridge approach. However, due to the limited potential to screen overbridges, their visual effect, including shadowing effects and the loss of the vista, would not substantially change over time, resulting in only a minor reduction of the overall visual impact over time.

8.3.15 Viewpoint 14

Location and potential viewers

Canal Road bridge over Alexandra Canal, looking south-west towards the T1 cargo terminals. Canal Road is a busy arterial road linking the Mascot/Botany area and Terminals 2/3 to Sydney's inner west. Viewers include motorists and pedestrians along Canal Road. The view is sensitive as it is identified by the Alexandra Canal CMP as one of the key views of the canal.

Visual sensitivity

Visually sensitivity of this view is derived from its importance as one of the key viewpoints of Alexandra Canal. Visually sensitive elements include the waterway itself, the mature trees lining its banks, the vista towards the airport with planes visible at the terminals, and the open sky above the canal.

The sensitivity of this view is **high**.

Visible project elements

- Terminal link bridge
- Qantas Drive bridge.

Magnitude of visual effect

Much of the project would be obscured by existing vegetation. Some sensitive vegetation in the background of the view would be impacted but this would be hard to discern. The majority of sensitive vegetation along the canal would not be affected.

Magnitude of impact is derived from the Qantas Drive bridge and eastbound terminal link that would be large new structures terminating the view along the canal. They would alter the outlook along the canal and partially block views of the airport. The large viewing distance reduces the perceived scale and detail of new elements, reducing the overall magnitude of visual effect to result in a **low** magnitude.

Visual impact summary

While the view is highly sensitive, only a small portion of the view would be altered by the project. Seen over a large distance and against the backdrop of T1 and the freight terminal, the project would be small in the view and it would be difficult to perceive a lot of detail. The resulting visual impact on this view is **moderate**.

Figure 230. Viewpoint 14 - existing view (top) and artist impression of the view showing the project (bottom)

Visual sensitivity	Magnitude of visual effect	Overall rating of visual impact
High	Low	Moderate

Nature of impact

The intrusion of new road infrastructure into the sensitive airspace above Alexandra Canal is considered an adverse impact, despite the relatively large viewing distance.

Changes over time

There are little opportunities in this location to install landscaping to provide a visual buffer to the project. The visual impact is therefore not expected to decrease over time.

8.3.16 Viewpoint 15

Location and potential viewers

Burrows Road South, looking north-west. The view is located in South Burrows Road Industrial Estate. The majority of viewers would be people working in the estate, as well as delivery drivers.

Visual sensitivity

Established mature trees provide amenity within the industrial estate and are visually sensitive.

The sensitivity of this view is **moderate**.

Visible project elements

- St Peters interchange connection
- Retaining walls
- Earthworks.

Figure 231. Viewpoint 15 - existing view

Magnitude of visual effect

Visibility of the project would be limited as much of the project would be screened by existing buildings and vegetation. Sensitive view elements would not be affected by the project.

The magnitude of visual effect is **negligible**.

Visual impact summary

The negligible degree of project magnitude in this view results in a **negligible** visual impact.

Visual sensitivity	Magnitude of visual effect	Overall rating of visual impact
Moderate	Negligible	Negligible

Nature of impact

The impact on this view is negligible or neutral.

8.3.17 Viewpoint 16

Location and potential viewers

Alexandra Canal cycleway near the stormwater channel south of Coward Street, looking south-west. Viewers include cyclists travelling along the Alexandra Canal cycleway. A large number of people also use this path for walking, for lunchtime walks and other purposes.

Visual sensitivity

The major part of the view is comprised of the canal and mature trees lining its banks. The waterway setting is sensitive to change. Specific sensitive elements are the mature trees lining the canal, and the open sky above.

The sensitivity of this view is **high**.

Visible project elements

- Terminal link bridge
- Qantas Drive bridge
- Qantas Drive upgrade and extension
- Eastbound terminal link.

Magnitude of visual effect

Much of the project would be obscured by existing vegetation. Sensitive vegetation in the view would not be impacted by the project. Project elements such as the Qantas Drive bridge and eastbound terminal link would be clearly visible in the centre of the view, due their elevation high above the existing ground level. They would affect the visually sensitive open sky above the canal (also refer **section 4.5.2**) and terminate the view with a new focal point.

The magnitude of visual effect is **moderate**.

Figure 232. Viewpoint 16 - existing view

Visual impact summary

The combination of prominent new structures in the most sensitive part of the view leads to a **moderate** visual impact.

Visual sensitivity	Magnitude of visual effect	Overall rating of visual impact
High	Low	Moderate

Nature of impact

New project elements interfere with the open sky above the canal that is considered heritage significant. The impact of the project on the view is therefore adverse.

Changes over time

There are little opportunities in either this location or closer to the project (due to airport operational constraints) to install landscaping to provide a visual buffer to the project. The visual impact is therefore not expected to decrease over time.

8.3.18 Viewpoint 17

Location and potential viewers

Qantas Drive and Airport Drive junction, looking west. Viewers are motorists along Qantas Drive and Airport Drive, including commuters, workers and people accessing Terminal 1, using both private and public transport.

Visual sensitivity

The major sensitive element in the view is the big open sky and the long vista towards the Tempe Lands and Wolli Creek beyond. The road corridor itself is characterised by large areas of pavement framed by visually generally low quality structures, as well as advertising structures. The park-like character of the land adjacent to Alexandra Canal provides relief through greenery in the form of grass and mature trees and is a sensitive element, as are Sydney Airport perimeter hedges.

The sensitivity of this view is **moderate**.

Visible project elements

- Qantas Drive upgrade and extension
- Qantas Drive bridge
- Terminal link bridge
- Removal of advertising billboards
- Road signage gantries
- Tree removal.

Magnitude of visual effect

Magnitude is a result of the change in vertical road alignment that would close off the long-distance vista to Wolli Creek. The upgrade of Qantas Drive would lead to an increase in road width from four lanes to seven lanes, almost doubling the road width. The full extent of this would be difficult to perceive due the concrete median barrier partially concealing the east-bound lanes.

The eastbound terminal link would result in the loss of undeveloped private greenspace and associated tree removal. This in turn would expose views of the Qantas Drive bridge and the Terminal link bridge as large new structures in the background of the view.

The magnitude of visual effect is **moderate**.

Visual impact summary

A large portion of the view would be affected, with visually sensitive views and vegetation replaced by road infrastructure. As project elements are of a mostly horizontal nature, the visual impact would reduce somewhat to **moderate to low**.

Visual sensitivity	Magnitude of visual effect	Overall rating of visual impact
Low	Moderate	Moderate-low

Nature of impact

Because sensitive views and vegetation would be replaced with a view over road infrastructure, the impact of the project on this view adverse in nature.

Figure 233. Viewpoint 17 - existing view (top) and photomontage of the project (bottom)

Changes over time

Opportunities for landscaping are limited, though there may be some potential for landscaping between the Qantas Drive bridge approach and the eastbound terminal link which may over time reduce the extent of project elements exposed to view. As this area is located in the background of the view, any reduction of the overall visual impact would only be minor.

8.3.19 Viewpoint 18

Location and potential viewers

Qantas Drive, near the Botany Rail maintenance overbridge, looking east. Viewers are motorists along Qantas Drive and Airport Drive, including commuters, workers and people accessing Terminals 2/3, using both private and public transport.

Visual sensitivity

The view along the road corridor shows large advertising signs behind a park-like strip with turf and low level planting. Together they conceal the Botany Rail Line. Advertising sign structures are busy and detracting but planted areas on both sides would be sensitive to change. The major sensitive feature is the mature tree that is a central element of the view, as well as other trees lining the road corridor in the background.

The sensitivity of this view is **moderate**.

Visible project elements

- Qantas Drive upgrade and extension
- Tree removal
- Removal of advertising billboards
- Variable message sign
- Road directional signage and ISLUS gantries.

Magnitude of visual effect

Widening and upgrading of Qantas Drive would impact this view through mature tree removal, removal of the park-like strip of turf and low planting, removal of advertising structures, and an increase in road width. The green edge on the north would be replaced by views of the upgraded Botany Rail Line as a second major infrastructure element.

The magnitude of visual effect is **high**.

Figure 234. Viewpoint 18 - existing view

Visual impact summary

The combination of the large portion of the view where changes would be readily perceived, the removal of visually sensitive vegetation and the large scale of the project infrastructure would result in a **high to moderate** visual impact.

Visual sensitivity	Magnitude of visual effect	Overall rating of visual impact
Moderate	High	High-moderate

Nature of impact

The replacement of visually sensitive mature trees with road infrastructure results in an adverse impact on this view.

Changes over time

Due to space constraints the project doesn't offer opportunities to install landscaping to visually mitigate the larger infrastructure or reinstate vegetation along the edge of the road corridor. The visual impact is not expected to decrease over time.

8.3.20 Viewpoint 19

Location and potential viewers

Qantas Drive between Robey and Ewan Streets, looking north. Viewers are motorists along Qantas Drive and Airport Drive, including commuters, workers and people accessing Terminal 1, using both private and public transport.

Visual sensitivity

Established mature tree cover is a major visual element in the view and highly sensitive to change. It is complemented by low level planting in the verges, creating a pleasant green setting for the drive. Security fencing, the roadway itself and multi-storey buildings on the western side somewhat detract but are generally well screened by vegetation.

The sensitivity of this view is **moderate**.

Visible project elements

- Qantas Drive upgrade and extension
- Terminals 2/3 access viaduct
- Building removal
- Tree removal
- Rail retaining wall
- Road directional signage.

Magnitude of visual effect

The Terminals 2/3 access viaduct and its abutment walls would be prominent large structures in the view, creating a covered effect and overshadowing. Magnitude of impact also results from a near doubling of the road width, the removal of existing buildings and of the majority of mature trees. A further impact would be an around four metre tall retaining wall at the Botany Rail Line interface that would replace the densely planted verge.

The magnitude of visual effect is **high**.

Visual impact summary

The large magnitude of project elements, combined with the removal of sensitive vegetation and changes that alter the majority of the view, results in a **high to moderate** visual impact on this view.

Visual sensitivity	Magnitude of visual effect	Overall rating of visual impact
Moderate	High	High-moderate

Figure 235. Viewpoint 19 - existing view (top) and artist impression of the view showing the project (bottom)

Nature of impact

The replacement of visually sensitive mature trees with road infrastructure results in an adverse impact on this view.

Changes over time

Due to space constraints the project doesn't offer opportunities to reinstate vegetation along the edge of the road corridor and visually buffer adjoining land uses. Landscaping under the viaduct, if permitted, may somewhat ameliorate the visual impact over time, by reducing the prominence of the viaduct abutment walls and reducing the width of road that can be seen. However, given the extensive scale of visual changes, the reduction of the overall visual impacts would be negligible.

8.3.21 Viewpoint 20

Location and potential viewers

Seventh Street at the intersection with Qantas Drive, looking west along Qantas Drive. Viewers are motorists leaving Terminals 2/3 to access Qantas Drive or Robey Street. They would include a large number of visitors just arrived, as well as employees and people travelling on public transport, either from or via Sydney Airport on the way to other destinations.

Motorists travelling west along Qantas Drive would experience a very similar view. They would include commuters, workers and people accessing Terminal 1, using both private and public transport. Viewers would also include active transport users, that is pedestrians and cyclists leaving the Terminals 2/3 precinct or crossing Seventh Street.

Visual sensitivity

Established mature tree cover, including a large mature fig tree south of Qantas Drive and a dense stand of mature vegetation on the northern side, is the major, visually sensitive element in the view. Old multi-storey building stock on airport land in the background is a visual detractor, as is the roadway itself. However, the buildings contribute to an understanding of the historic street layout and evolution of Sydney Airport and are therefore considered to contribute to the airport's heritage significance (also refer section 4.5.2).

The sensitivity of this view is **moderate**.

Visible project elements

- Qantas Drive upgrade and extension
- Terminals 2/3 access viaduct
- Building removal
- Tree removal
- Removal of advertising billboards
- Rail retaining wall.

Figure 236. Viewpoint 20 - existing view

Magnitude of visual effect

The Terminals 2/3 access viaduct would be a prominent large structure above the existing road, creating a covered effect, blocking views and reducing natural light access. Magnitude of impact also results from a near doubling of the road width, the removal of existing mature trees, car parking and buildings, including removal of the visually prominent, large mature fig tree marking the intersection with Seventh Street. A further impact would be an around four metre tall retaining wall at the Botany Rail Line interface that would replace the dense grove of mature vegetation.

The magnitude of visual effect is **high**.

Visual impact summary

The majority of this would change as trees are removed and replaced with large infrastructure, in particular the viaduct. Combined with the high sensitivity derived from established tree cover, the visual impact of the project on this view would be **high to moderate**.

Visual sensitivity	Magnitude of visual effect	Overall rating of visual impact
Moderate	High	High-moderate

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Nature of impact

The removal of mature vegetation and loss of views and the open road corridor result in an adverse impact on this view. The loss of buildings that contribute to an understanding of the airport's evolution and heritage significance is a further adverse impacts, despite their poor visual contribution to this view.

Changes over time

Due to space constraints the project offers only limited opportunities to reinstate greenery along the edge of the road corridor and visually buffer adjoining land uses. The current project boundary is insufficient to allow for tree cover to be reinstated to mitigate the loss of mature trees. Landscaping under the viaduct, if permitted due to safety requirements, may somewhat reduce the visual impact over time, by providing visual relief and reducing the visible width of road. However, given the extensive scale of visual changes, the reduction of the overall visual impacts would be negligible.

8.3.22 Viewpoint 21

Location and potential viewers

O'Riordan Street at the intersection with Qantas Drive and Joyce Drive, looking south towards Sir Reginald Ansett Drive. Viewers would be motorists travelling south along O'Riordan Street to access Terminals 2/3, Qantas Drive or Joyce Drive. They would include travellers departing from the airport, people picking them up or dropping them off, as well as workers and people on public transport. Viewers would also include pedestrians along the path network.

Visual sensitivity

Much of this view is taken up by the large size of the intersection. The most sensitive elements are the mature vegetation and feature planting on the southern side of the intersection, as well as the vista towards the Terminals 2/3 entrance and the large open sky above the airport. Businesses in the area would be sensitive to any changes to its presentation and visibility from the surrounding road network.

The sensitivity of this view is **moderate**.

Visible project elements

- Qantas Drive upgrade and extension
- Terminals 2/3 access viaduct
- Minor tree removal
- New traffic signals at the Ross Smith Avenue intersection.

Magnitude of visual effect

Sensitive vegetation would not be impacted by the project. Magnitude of impact is derived from the Terminals 2/3 access viaduct that would be a prominent large new structure above the existing road level, creating a visual barrier to the Terminals 2/3 entrance and associated welcome signage, as well as to businesses. It would also block views of the open airspace above Sydney Airport where planes can currently be seen taking off and landing. Finally, the viaduct would cause shadowing impacts on adjacent areas and businesses, as well as immediately below the structure.

The magnitude of visual effect is **high**.

Figure 237. Viewpoint 21 - existing view (top) and artist impression of the view showing the project (bottom)

It is noted that

- Drivers on the new viaduct would enjoy more expansive views
- A similar magnitude if visual effect would be experienced by viewers in adjacent buildings and businesses.

Visual impact summary

The viaduct would introduce a large new structure that would fundamentally alter this view, blocking views to the Terminals 2/3 entrance and of the open sky above the airport and Sir Reginald Ansett Drive. It would also affect the presentation of the car dealership and other businesses to the road network. Combined with the moderate sensitivity of the view, these changes would result in a **high to moderate** visual impact.

Visual sensitivity	Magnitude of visual effect	Overall rating of visual impact
Moderate	High	High-moderate

Nature of impact

The nature of the visual changes are considered adverse, due their effect on sensitive visual elements including the open sky and the business presentation to the road network.

Changes over time

Due to the location of this view in the centre of a major intersection, there are no opportunities for landscaping or visual screening to mitigate the scale or effect of the viaduct. The visual impact on this review would not diminish over time.

8.3.23 Viewpoint 22

Location and potential viewers

Joyce Drive looking west on the approach to the Sir Reginald Ansett Drive/O'Riordan Street intersection. Viewers are motorists along Joyce Drive that are accessing Terminals 2/3 or Terminal 1 from Sydney's eastern suburbs, or orbiting the airport on the arterial road network for commuting or other purposes. A large portion of viewers would be people departing from Sydney Airport, as well as workers. They would also include people travelling on public transport.

Visual sensitivity

Much of this view is taken up by the large size of the intersection. Visually sensitive elements include a dense stand of mature trees west of O'Riordan Street and established palm trees at the entrance to Terminals 2/3. The wide roadway is a visually detracting element. The long-distance vista through the Qantas Jet Base to the Tempe Water Tower is also sensitive.

The sensitivity of this view is **low**.

Visible project elements

- Qantas Drive upgrade and extension
- Terminals 2/3 access viaduct
- Tree removal.

Figure 238. Viewpoint 22 - existing view

Magnitude of visual effect

Sensitive vegetation would not be impacted by the project. Magnitude of impact is derived from the Terminals 2/3 access viaduct that would be a prominent large new structure above the existing road. It would also block long-distance views to Tempe and alter the open landscape character above the road corridor, where planes can currently be seen taking off and landing. The viaduct would block views of nearby businesses, altering visual exposure and presentation. Finally, the viaduct would cause shadowing impacts on adjacent areas and immediately below the structure.

The magnitude of visual effect is **high**.

It is noted that drivers on the new viaduct would enjoy more expansive views.

Visual impact summary

The viaduct would introduce a large new structure that would fundamentally alter this view, blocking views to Tempe and of the open sky above the airport precinct. It would also affect the presentation of businesses such as the car dealership to the road network. Combined with the moderate sensitivity of the view, these changes would result in a **moderate** visual impact.

Visual sensitivity	Magnitude of visual effect	Overall rating of visual impact
Low	High	Moderate

Nature of impact

The nature of the visual changes are considered adverse, due their effect on sensitive visual elements including the open sky and the presentation of businesses to the road network.

Changes over time

Due to the location of this view in the centre of a major intersection, there are no opportunities for landscaping or visual screening to mitigate the scale or effect of the viaduct. The visual impact on this review would not diminish over time.

8.3.24 Viewpoint 23

Location and potential viewers

Sir Reginald Ansett Drive, looking south. Viewers would be motorists accessing Terminals 2/3, employment areas and businesses. They would include travellers departing from the airport, people picking them up or dropping them off, as well as workers and people on public transport. Viewers would also include pedestrians along the path network.

Visual sensitivity

The view is framed by a welcome gantry and comprised to a large extent by the existing road pavement. Established mature trees lining the road are sensitive elements. The open sky above Sydney Airport is also sensitive. A multitude of street lighting poles and other roadside furniture, as well as the width of the road itself , are visual detractors. Adjacent businesses would be sensitive about visual exposure.

Overall, the sensitivity of this view is **moderate**.

Visible project elements

- Terminals 2/3 access viaduct including widening of Sir Reginald Ansett Drive, piers, abutments and retaining walls
- New link road to Ninth Street
- Shiers Street intersection amendments
- Tree removal.

Magnitude of visual effect

The Terminals 2/3 access viaduct would consist of several viaducts and ramps that would be large new elements in this view. Sensitive vegetation on both sides of the view would be removed. The overhead structures above the existing road would result in a more enclosed environment and affect views of the open airspace above Sydney Airport and towards the terminals. The viaduct would also affect visibility of business and cause shadowing impacts on adjacent areas and immediately below the structure including to public footpaths.

It is noted that drivers on the new viaduct would enjoy more expansive views.

Figure 239. Viewpoint 23 - existing view (top) and artist impression of the view showing the project (bottom)

The magnitude of visual effect is **high**.

Visual impact summary

The scale of the new project elements combined with the sensitivity of this view at the entrance to Terminals 2/3 combine to result in a **high to moderate** visual impact.

Visual sensitivity	Magnitude of visual effect	Overall rating of visual impact
Moderate	High	**High-moderate**

Nature of impact

The nature of the visual changes are considered adverse, due their effect on sensitive visual elements including the open sky and the presentation of nearby businesses to the road network.

Changes over time

Due to the location of this view, there are no opportunities for landscaping or visual screening to mitigate the scale or effect of the viaduct structures. The visual impact on this review would not diminish over time.

8.3.25 Viewpoint 24

Location and potential viewers

Seventh Street, looking north towards Qantas Drive and Robey Street. Viewers are motorists leaving Terminals 2/3 to access Qantas Drive or Robey Street. They would include a large number of visitors just arrived, as well as workers and people travelling on public transport, either from Sydney Airport or using one of the routes that stop at Terminals 2/3 on their way to other destinations.

Viewers would also include active transport users, that is pedestrians and cyclists leaving the Terminals 2/3 precinct along Seventh Street.

Visual sensitivity

Established mature tree cover on the northern side of Qantas Drive terminates the view and is the major, visually sensitive element. It also helps to conceal visual clutter from road furniture including light poles and signage. The wide roadway itself is a visual detractor.

The sensitivity of this view is **moderate**.

Visible project elements

- Qantas Drive upgrade and extension
- Terminals 2/3 access viaduct
- Tree removal
- Rail retaining wall.

Magnitude of visual effect

The Terminals 2/3 access viaduct would be a large new structure above the existing road, fundamentally altering this view. Magnitude of impact also results from a near doubling of the road width of Qantas Drive which would result in the removal of the dense grove of mature vegetation on the north-western side of the intersection.

Magnitude of effect is also derived from an around four metre tall retaining wall at the Botany Rail Line interface replacing mature vegetation in the view on both sides of Robey Street. The removal of trees would open up views to urban areas beyond the rail line, replacing the green outlook terminating the view with an urban outlook of medium rise buildings.

The magnitude of visual effect is **high**.

Figure 240. Viewpoint 24 - existing view (top) and artist impression of the view showing the project (bottom)

Visual impact summary

The majority of this view would change as trees are removed and replaced with large infrastructure, in particular the viaduct, but also the rail retaining wall. Combined with the high sensitivity derived from established tree cover, the visual impact of the project on this view would be **high to moderate**.

Visual sensitivity	Magnitude of visual effect	Overall rating of visual impact
Moderate	High	High-moderate

Nature of impact

The removal of mature vegetation and replacement of the treed vista with an urban outlook result in an adverse impact.

Changes over time

Due to space constraints the project offers only limited opportunities to reinstate greenery along the edge of the road corridor. The current project boundary is insufficient to allow for tree cover to be reinstated to mitigate the loss of mature trees and reinstate visual containment of the view by trees to screen the rail line and urban development beyond. The visual impact on this review would not diminish over time.

8.3.26 Viewpoint 25

Location and potential viewers

Qantas Heritage Collection, Level 1, Terminal 3, looking north-west. A similar view would be experienced by people waiting at a number of Qantas gates on the ground floor of the terminal building. Viewers include travellers and their companions, people visiting the collection for personal interest, and airport staff working at Terminal 3.

Visual sensitivity

The view looks across the main runway towards the Northern Lands and the Tempe Lands. Amongst a busy backdrop, visually sensitive elements are trees along Alexandra Canal, greenspace in the Northern Lands and the Tempe Lands, as well as between taxing areas. They constitute only a relatively small portion of the view. Shipping containers stored on the Tyne Container site and the Cooks River Intermodal Terminal are colourful but also visually busy, adding to visual clutter. Much of the view is taken up by the sky and the view would be sensitive to elements that disrupt the openness of the sky above the expansive airport landscape.

The sensitivity of this view is **moderate**.

Visible project elements

- Qantas Drive upgrade and extension
- Qantas Drive bridge
- Terminal link bridge
- Terminal 1 connection
- Noise barrier along the Terminal 1 connection
- Freight terminal bridge

Figure 241. Viewpoint 25 - existing view

- Tree removal
- Earthworks including emplacement mounds in the Tempe Lands.

Magnitude of visual effect

The openness of the sky would not be affected by the project but there would be changes to the view as a result of the Terminal 1 connection, Freight terminal bridge, emplacement mounds, Qantas Drive bridge and Qantas Drive upgrade and extension, affecting sensitive view elements. The magnitude of visual impact is reduced by the viewing distance which is further than 500 metres, greatly reducing the amount of detail and change that can be perceived. Emplacement mounds would be lower elevation than the shipping containers and not have affect the openness of the sky above.

The magnitude of visual effect is **low**.

Visual impact summary

The view is moderately sensitive but only a small portion of it would be affected by changes that, for the most part, would be difficult to discern due the large viewing distance, resulting in an overall **moderate to low** visual impact.

Visual sensitivity	Magnitude of visual effect	Overall rating of visual impact
Moderate	Low	Moderate-low

Nature of impact

The project would result in a combination of adverse and beneficial impacts. Visual clutter would be reduced by removal of the shipping containers and replacement with landscape elements in the shape of emplacement mounds. However, the project would introduce a number of new elements that would add to the busy nature of the view. It would also remove visually sensitive vegetation. Overall, the impact of the project on the view is considered neutral.

Changes over time

Due to space and operational constraints the project offers only limited opportunities for landscaping to provide a visual buffer or screen the project from view.

The scale of emplacement mounds would not alter over time but landscaping of the Tempe Lands may assist in blending in the new landform with the existing landform. However, due to the viewing distance, this change would be difficult to perceive.

Overall, changes to visual impacts over time would be negligible.

8.3.27 Viewpoint 26

Location and potential viewers

Giovanni Brunetti Bridge looking north-east along Alexandra Canal. People who see this view include motorists including airport visitors, airport employees accessing the airport and nearby employment areas, general road users including commuters and bus passengers travelling this arterial route to and from a multitude of destinations. Viewers also include pedestrians and cyclists on the bridge, including recreational users and commuters connecting to the Alexandra Canal cycleway from other regional and local cycle links.

Visual sensitivity

Sensitivity of view at this location is derived from the open waterway setting with vistas along Alexandra Canal towards the Sydney CBD. Vegetation along the canal, in Tempe Recreation Reserve and on the embankment of the Tempe Lands provides a strong natural frame and would be sensitive to change.

The sensitivity of the view is **high**.

Visible project elements

- Terminal 1 connection bridge
- Terminal 1 connection
- Terminal link bridge
- Qantas Drive bridge
- Tree removal
- Emplacement mounds
- Variable message sign
- Noise barrier along the Terminal 1 connection.

Magnitude of visual effect

The project would alter the view through the Terminal 1 connection and the Terminal 1 connection bridge. Both would be large new elements in the view and result in vegetation clearing along Alexandra Canal and on the Tempe Lands embankments. They would also interrupt the open vista along Alexandra Canal. The freight terminal bridge would be concealed behind the Terminal 1 connection bridge. Emplacement mounds would result in new landforms altering the skyline, particularly if mounding "Option Two" were adopted.

Figure 242. Viewpoint 26 - existing view

The Terminal link bridge and Qantas Drive bridge are a long way in the distance and would be minor, hard to discern elements in the view. They would have a negligible effect on this view.

Depending on the emplacement mound option chosen, the magnitude of visual effect would vary:

- "Option One" mounds would be further in the background and therefore somewhat smaller in the view. However, they would be more spread out increase the magnitude of visual effect by partially blocking views towards the Sydney CBD
- "Option Two" mounds at the southern end of the Tempe Lands would be closer to the viewer and therefore appear larger, adding notable elevation at the top of the existing mound.

In summary, there are trade-offs for both mound design options. Overall, the magnitude of visual change is considered **moderate** irrespective of the mounding design option adopted.

Visual impact summary

The visual impact on this view is derived from the moderate magnitude of visual effect that results mostly from the Terminal 1 connection bridge and the emplacement mounds, and the associated changes to sensitive vegetation, views and the skyline. The visual impact on this view is **high to moderate**.

Visual sensitivity	Magnitude of visual effect	Overall rating of visual impact
High	Moderate	**High-moderate**

Nature of impact

Changes would alter the existing parkland and canal setting and are therefore considered adverse.

Changes over time

The project offers little potential for visual screening from this view, such as through landscaping or other measures. While the scale of emplacement mounds would not alter over time, landscaping of the Tempe Lands may assist in blending in the new landform with the existing landform. This is subject to emplacement mound design permitting new shrub and tree cover.

Overall, changes to visual impacts over time would be negligible.

8.3.28 Visual impact summary

Table 13 summarises the visual impact of project operation on each view. It includes a description of visible project elements, the magnitude of visual effect, and the resulting visual impact rating.

Table 13. Summary of visual impact assessment during operation

[1] G=Negligible, L=Low, ML=Moderate Low, M=Moderate, MH=Moderate High, H=High
[2] A=Adverse, N=Neutral, B=Beneficial

* View assessed for emplacement mound design options

Viewpoint	Visual sensitivity	Element(s) of project visible	Nature of impact [2]	Magnitude of visual effect [1]	Summary	Resultant rating of visual impact [1]	Reduced impact over time (Y/N)
01*	M	▪ Terminal 1 connection ▪ Freight terminal bridge ▪ Northern Lands access including freight terminal link road and roundabout ▪ Eastbound terminal link and terminal link bridge ▪ Terminal 1 connection noise barrier ▪ Qantas Drive bridge ▪ Qantas Drive upgrade and extension ▪ St Peters interchange connection ▪ Tree clearing/vegetation removal ▪ Landform changes including emplacement mounds.	A	L	Emplacement mounds and removal of vegetation on the embankments of the Tempe Lands and the Terminal 1 connection would be prominent in the view, but would affect only a small portion of the view, irrespective of the mounding option adopted.	ML	N
02	M	▪ Terminal 1 connection bridge ▪ Terminal 1 connection ▪ Freight terminal link road ▪ Adjustments to the existing Airport Drive/tie-in works ▪ Alexandra Canal cycleway adjustments ▪ Road directional signage ▪ Tree clearing along Alexandra Canal.	A	H	Removal of signage gantries would make a positive contribution to the view. However, magnitude of impact at this view is large due to extensive changes including vegetation clearing and construction of the large Terminal 1 connection bridge.	HM	Y

Viewpoint	Visual sensitivity	Element(s) of project visible	Nature of impact [2]	Magnitude of visual effect [1]	Summary	Resultant rating of visual impact [1]	Reduced impact over time (Y/N)
03*	H	▪ Terminal 1 connection bridge ▪ Vegetation/tree clearing.	A	M	Mound design “Option One” The Terminal 1 connection bridge would be a prominent new structure. Views along Alexandra Canal would be interrupted. Tree removal also impacts on the vista. The magnitude of impact is somewhat mitigated by the distance to the viewer.	HM	N
		▪ Terminal 1 connection bridge ▪ Vegetation/tree clearing ▪ Emplacement mounds in the Tempe Lands.	A	M	Mound design “Option Two” The Terminal 1 connection bridge would be the prominent new element. Views along Alexandra Canal would be interrupted. Tree removal also impacts on the vista. A small portion of emplacement mounds may be visible but would only affect a minor portion of the view. The magnitude of impact is somewhat mitigated by the distance to the viewer.	HM	N
04*	M	▪ Terminal 1 connection bridge ▪ Terminal 1 connection ▪ Noise barrier along the Terminal 1 connection ▪ Adjustments to Airport Drive including removal of pedestrian crossing ▪ Tree clearing ▪ Variable message sign ▪ Emplacement mounds in the Tempe Lands.	A	H	The view would be impacted by removal of mature vegetation and the large Terminal 1 connection bridge over Alexandra Canal as a major new element in the view. Because the magnitude of visual effect of the Terminal 1 connection bridge is very high, the visual impact would not noticeably change irrespective of the mounding design option adopted.	HM	N

Viewpoint	Visual sensitivity	Element(s) of project visible	Nature of impact [2]	Magnitude of visual effect [1]	Summary	Resultant rating of visual impact [1]	Reduced impact over time (Y/N)
05*	H	▪ Southern tie-in ▪ Emplacement mounds in the Tempe Lands. Viewers in from medium and high rise buildings would also see: ▪ Terminal 1 connection ▪ Terminal 1 connection bridge ▪ Noise barrier along the Terminal 1 connection ▪ Freight terminal bridge.	A	L	Mound design “Option One” The project would replace open space and vegetation with roads, noise barriers and bridges, visible from elevated areas. Emplacement mounds would replace shipping containers with a landscape element but would be set behind the noise barrier.	M	N
		▪ Southern tie-in ▪ Emplacement mounds in the Tempe Lands. Viewers in from medium and high rise buildings would also see: ▪ Terminal 1 connection ▪ Terminal 1 connection bridge ▪ Freight terminal bridge.	A	L	Mound design “Option Two” Visual impact would be derived from roads, bridges and emplacement mounds. The closer proximity of mounds in “Option Two” would not greatly increase their magnitude in the view relative to “Option One”, due to the generally large viewing distance.	M	N
06*	L	▪ Terminal 1 connection including signalised intersection with the freight terminal link road ▪ Noise barrier along the Terminal 1 connection ▪ Variable message sign ▪ Road directional signs ▪ Landscape and open space improvements ▪ Emplacement mounds ▪ Vegetation clearing.	N	H	The extent of transformation of this view leads to a high visual impact, irrespective of the mounding design option adopted. Changes include both adverse and beneficial elements. The latter include parkland improvements. They would be outweighed by new road infrastructure in the view, in particular the noise barrier. It would be central to the view and block views of the CBD, resulting in an overall adverse impact. While existing views would change, mounds would potentially provide for new viewing opportunities.	M	N

Viewpoint	Visual sensitivity	Element(s) of project visible	Nature of impact [2]	Magnitude of visual effect [1]	Summary	Resultant rating of visual impact [1]	Reduced impact over time (Y/N)
07*	M	▪ Noise barrier along the Terminal 1 connection ▪ Emplacement mounds.	A	L	Changes to the view would be small and limited to partial views of the emplacement mounds, irrespective of the mounding design option adopted. While mounds would add height in some areas, they would replace shipping containers with a landscape element in other areas. Noise barriers would affect some views, making the overall impact mildly adverse.	ML	N
08	M	▪ Terminal 1 connection ▪ Eastbound terminal link ▪ Westbound terminal link ▪ Northern Lands access ▪ Qantas Drive bridge ▪ Terminal link bridge ▪ St Peters interchange connection including fill and retaining walls ▪ Qantas Drive upgrade and extension ▪ Earthworks.	A	L	While many of the project's key features would be visible in this view, they would constitute only a small portion of the view, due to the viewing distance, the busy background against which many of the project's elements would be set, and the intervening built form for elements located in closer proximity. Sensitive view elements would not be noticeably affected.	ML	N
09	L	▪ Terminal 1 connection including bridge over the Botany Rail Line ▪ St Peters interchange connection ▪ Eastbound terminal link ▪ Northern Lands access ▪ Qantas Drive bridge.	A	M	Despite large new structures, the importance of the view as a rare view corridor would not be affected by the project. Project elements would be viewed against a busy backdrop of other built structures, and not affect the visually sensitive open sky.	ML	N
10	L	▪ Terminal 1 connection including the bridge over the Botany Rail Line ▪ Eastbound terminal link ▪ Westbound terminal link ▪ Qantas Drive bridge ▪ Northern Lands access ▪ Retaining walls ▪ Roadside furniture including lighting, road directional signage and ISLUS gantries.	A	H	The view is impacted by large structures, affecting a large portion of the view. They are the Terminal 1 connection including the rail overbridge, the Qantas Drive bridge, and the eastbound terminal link. They would also introduce visual clutter against the skyline.	M	N
11	H	▪ Qantas Drive bridge ▪ Eastbound terminal link ▪ Terminal link bridge ▪ Qantas Drive upgrade and extension ▪ Active transport link bridge over Alexandra Canal ▪ St Peters interchange connection ▪ Vegetation removal ▪ Roadside furniture including lighting.	A	H	A number of large prominent new structures would impact this view. The major items are the Qantas Drive bridge, Terminal link bridge and the eastbound terminal link. They would alter sensitive view elements and result in a high visual impact.	H	N
12	H	▪ Freight terminal bridge ▪ Terminal 1 connection bridge ▪ Active transport link relocation ▪ Tree removal.	A	H	Magnitude of impact is a result of the freight terminal bridge and Terminal 1 connection bridge, their pylons and abutments. Removal of a large number of mature trees in the view and the closure of vistas along the canal also contribute to the visual impact on this view.	H	N
13	M	▪ Canal Road overbridges (St Peters interchange connection) ▪ Tree removal ▪ Roadside furniture including directional signage and ISLUS gantries ▪ Earthworks.	A	H	Magnitude of impact is a result of the new overbridges including associated earthworks and extensive tree removal.	HM	Y
14	H	▪ Terminal link bridge ▪ Qantas Drive bridge.	A	L	While the view is highly sensitive, only a small portion of the view would be altered. Seen over a large distance and against the backdrop of T1 and the freight terminal, the project would be small in the view and it would be difficult to perceive a lot of detail.	M	N
15	M	▪ St Peters interchange connection ▪ Retaining walls ▪ Earthworks.	N	G	Visibility of the project would be limited. Sensitive view elements would not be affected.	G	N
16	H	▪ Terminal link bridge ▪ Qantas Drive bridge ▪ Qantas Drive upgrade and extension ▪ Eastbound terminal link.	A	L	The Qantas Drive bridge and eastbound terminal link would be visible due their elevation and prominently located in the most sensitive part of the view, terminating the vista.	M	N

Viewpoint	Visual sensitivity	Element(s) of project visible	Nature of impact [2]	Magnitude of visual effect [1]	Summary	Resultant rating of visual impact [1]	Reduced impact over time (Y/N)
17	L	▪ Qantas Drive upgrade and extension ▪ Qantas Drive bridge ▪ Terminal link bridge ▪ Removal of advertising billboards ▪ Road signage gantries ▪ Tree removal.	A	M	Magnitude is a result of the change in vertical road alignment that would alter the long-distance vista. The eastbound terminal link would result in tree removal which in turn would expose views of the Qantas Drive bridge and the terminal link bridge as large new structures in the background. The distance to these bridges and the largely horizontal nature project elements in the centre of the view somewhat reduce the overall impact.	ML	N
18	M	▪ Qantas Drive upgrade and extension ▪ Tree removal ▪ Removal of advertising billboards ▪ Variable message sign ▪ Road directional signage and ISLUS gantries.	A	H	Widening and upgrading of Qantas Drive would impact this view through mature tree removal, removal of the park-like strip of turf and low planting, and an increase in road width, affecting a large portion of the view and leading to a high visual impact.	HM	N
19	M	▪ Qantas Drive upgrade and extension ▪ Terminals 2/3 access viaduct ▪ Building removal ▪ Tree removal ▪ Rail retaining wall ▪ Road directional signage.	A	H	Magnitude of impact is derived from the prominent new Terminals 2/3 access viaduct, as well as road widening and associated building and mature tree removal, as well as new walls at the Botany Rail Line interface. New verges would be insufficient in width to attain a similar scale or density of vegetation relative to the mature trees removed.	HM	N
20	M	▪ Qantas Drive upgrade and extension ▪ Terminals 2/3 access viaduct ▪ Building removal ▪ Tree removal ▪ Removal of advertising billboards ▪ Rail retaining wall.	A	H	The Terminals 2/3 access would be a prominent large new structure above the existing road level, creating a covered effect and reducing natural light access. Magnitude of impact is further increased by road widening, close to doubling the width of road pavement in the view and resulting in the removal of mature trees, existing car parking and buildings. A further impact would be large new walls at the Botany Rail Line interface replacing the dense grove of mature vegetation.	HM	N
21	M	▪ Qantas Drive upgrade and extension ▪ Terminals 2/3 access viaduct ▪ Minor tree removal ▪ New traffic signals at the Ross Smith Avenue intersection.	A	H	The viaduct would introduce a large new structure that would fundamentally alter this view, blocking views to the Terminals 2/3 entrance and of the open sky above the airport and Sir Reginald Ansett Drive. It would also affect the presentation of the businesses to the road network.	HM	N
22	L	▪ Qantas Drive upgrade and extension ▪ Terminals 2/3 access viaduct ▪ Tree removal.	A	H	The viaduct would introduce a large new structure that would fundamentally alter this view, blocking views to Tempe and of the open sky above the airport precinct. It would also affect the presentation of the businesses to the road network.	M	N
23	M	▪ Terminals 2/3 access viaduct including widening of Sir Reginald Ansett Drive, piers, abutments and retaining walls ▪ New link road to Ninth Street ▪ Shiers Street intersection amendments ▪ Tree removal.	A	H	Sensitive vegetation on both sides of the view would be partly removed. The Terminals 2/3 access viaduct would introduce a large new overhead structures, creating a more enclosed environment and affecting views of the open airspace and towards the terminals. It is noted that drivers on the new viaduct above would enjoy more expansive views.	HM	N

Viewpoint	Visual sensitivity	Element(s) of project visible	Nature of impact [2]	Magnitude of visual effect [1]	Summary	Resultant rating of visual impact [1]	Reduced impact over time (Y/N)
24	M	▪ Qantas Drive upgrade and extension ▪ Terminals 2/3 access viaduct ▪ Tree removal ▪ Rail retaining wall.	A	H	The majority of this view would fundamentally change as trees are removed and replaced with large infrastructure, including the viaduct and the rail retaining wall.	HM	N
25	M	▪ Qantas Drive upgrade and extension ▪ Qantas Drive bridge ▪ Terminal link bridge ▪ Terminal 1 connection ▪ Freight terminal bridge ▪ Tree removal ▪ Earthworks including emplacement mounds in the Tempe Lands.	N	L	The view is moderately sensitive but only a small portion of it would be affected by changes that, for the most part, would be difficult to discern due the large viewing distance. Changes are a mix of beneficial and adverse.	ML	N
26*	H	▪ Terminal 1 connection bridge ▪ Terminal link bridge ▪ Qantas Drive bridge ▪ Tree removal ▪ Emplacement mounds ▪ Variable message sign.	A	M	The visual impact on this view is derived from the visual effect that results mostly from the Terminal 1 connection bridge and the emplacement mounds, as well as the associated changes to sensitive vegetation, views and the skyline. The magnitude of visual effect does not substantially differ between the two mound design options.	HM	N

The visual impacts of the project on the selected viewpoints are summarised in **Table 15** on the following page.

Comparative visual impacts for emplacement mound options

Table 14 provides a comparative visual assessment. It illustrates that, while emplacement mounds would be visible from seven viewpoints, the visual impacts of the project would be the same overall, irrespective of the design adopted for emplacement mounds.

Table 14. Visual impact comparative assessment for emplacement mound options

	Mound design "Option One"	Mound design "Option Two"	Difference
Visual impact rating			
High	2	2	-
High to moderate	11	11	-
Moderate	6	6	-
Moderate to low	6	6	-
Negligible	1	1	-
Nature of visual impact			
Adverse	23	23	-
Neutral	3	3	-
Reduction of visual impact over time			
Yes	2	2	-
No	23	23	-
Not applicable	1	1	-

Adverse impacts are generally the large scale of the project which would result in changes to much of the view, including changes to the visually sensitive elements of the view such as parklands, mature vegetation, views, vistas and the "big sky" landscape of Alexandra Canal and Sydney Airport.

Neutral impacts result from either negligible visual impacts, or where there is a balance between adverse and beneficial impacts.

Chapter 9 outlines a range of potential measures for further investigation, to reduce the identified adverse visual impacts.

Table 15. Summary of visual impacts during operation

[1] G=Negligible, L=Low, ML=Moderate Low, M=Moderate, MH=Moderate High, H=High
[2] A=Adverse, N=Neutral, B=Beneficial
* View assessed for emplacement mound design options

View	Location	Sensitivity	Magnitude	Nature of impact	Visual impact rating	Reduction over time
01*	P2 car park at Sydney Airport's Terminal 1	M	L	A	ML	N
02	Alexandra Canal cycleway opposite Tempe Recreation Reserve	M	H	A	HM	Y
03*	Tempe Recreation Reserve,	H	M	A	HM	N
04*	Link Road at the intersection with Airport Drive	M	H	A	HM	N
05*	*Rowers on Cooks River* restaurant and function centre, Wolli Creek hotels and apartments	H	L	A	M	N
06*	Tempe Lands car park	L	H	N	M	N
07*	Wentworth Street, Tempe/Tempe residential streets	M	L	A	ML	N
08	IKEA store	M	L	A	ML	N
09	Princes Highway bridge over the Botany Rail Line	L	M	A	ML	N
10	North Precinct Road.	L	H	A	M	N
11	Alexandra Canal cycleway near Shea's Creek underbridge	H	H	A	H	N
12	Access track along the western side of Alexandra Canal	H	H	A	H	N
13	Bus stop on the northern side of Canal Road	M	H	A	HM	Y
14	Canal Road bridge over Alexandra Canal	H	L	A	M	N
15	Burrows Road South	M	G	N	G	-
16	Alexandra Canal cycleway south of Coward Street.	H	L	A	M	N
17	Qantas and Airport Drive junction	L	M	A	ML	N
18	Qantas Drive, near the Botany Rail maintenance overbridge	M	H	A	HM	N
19	Qantas Drive between Robey and Ewan Streets	M	H	A	HM	N
20	Seventh Street at the intersection with Qantas Drive	M	H	A	HM	N
21	O'Riordan Street at the intersection with Qantas Drive	M	H	A	HM	N
22	Joyce Drive near the Sir Reginald Ansett Drive	L	H	A	M	N
23	Sir Reginald Ansett Drive	M	H	A	HM	N
24	Seventh Street	M	H	A	HM	N
25	Qantas Heritage Collection, Level 1, Terminal 3	M	L	N	ML	N
26*	Giovanni Brunetti Bridge	H	M	A	HM	N

8.3.29 Cumulative impact summary

Due to the range of major developments planned in the area (refer **section 7.4**). Based on their locations as shown in **Figure 109**, the major projects that would be visible from viewpoints assessed as part of this visual assessment are:

- Botany Rail Duplication
- Boral Concrete St Peters upgrade
- Qantas Flight Training Centre relocation
- Airport North Precinct
- Airport East Precinct
- WestConnex St Peters interchange
- Sydney Airport Ground Access Solutions and Hotel Project.

Completion of these projects would result in cumulative visual impacts during their operation. **Table 16** summarises the viewpoints from where other major developments would be visible, and their respective magnitude of visual effect.

Table 16. Other major projects visible from selected viewpoints

[1] G=Negligible, L=Low, ML=Moderate Low, M=Moderate, MH=Moderate High, H=High

View	Other major projects potentially visible	Magnitude of visual effect
01	▪ Nil	-
02	▪ Nil	-
03	▪ Nil	-
04	▪ Nil	-
05	▪ Nil	-
06	▪ Nil	-
07	▪ Nil	-
08	▪ Botany Rail duplication ▪ Boral Concrete St Peters upgrade	▪ G ▪ G
09	▪ Botany Rail duplication ▪ Boral Concrete St Peters upgrade	▪ G ▪ G
10	▪ Botany Rail duplication ▪ Boral Concrete St Peters upgrade	▪ G ▪ G

View	Other major projects potentially visible	Magnitude of visual effect
11	▪ Botany Rail duplication ▪ Boral Concrete St Peters upgrade	▪ G ▪ L
12	▪ Nil	-
13	▪ WestConnex St Peters interchange	▪ L
14	▪ Botany Rail duplication ▪ Boral Concrete St Peters upgrade	▪ G ▪ G
15	▪ Nil	-
16	▪ Botany Rail duplication ▪ Boral Concrete St Peters upgrade	▪ G ▪ L
17	▪ Botany Rail duplication	▪ L
18	▪ Botany Rail duplication	▪ M
19	▪ Botany Rail duplication ▪ Qantas Flight Training Centre relocation	▪ H ▪ H
20	▪ Botany Rail duplication ▪ Qantas Flight Training Centre ▪ Airport North Precinct	▪ H ▪ M ▪ G
21	▪ Airport North Precinct ▪ Airport East Precinct ▪ Sydney Airport Ground Access Solutions and Hotel Project	▪ G ▪ G ▪ L
22	▪ Botany Rail duplication ▪ Airport North Precinct ▪ Airport East Precinct ▪ Sydney Airport Ground Access Solutions and Hotel Project	▪ L ▪ G ▪ L ▪ G
23	▪ Sydney Airport Ground Access Solutions and Hotel Project	▪ L
24	▪ Botany Rail duplication ▪ Airport North Precinct	▪ H ▪ G
25	▪ Botany Rail duplication	▪ G
26	▪ Nil	-

As can be seen from the table, the magnitude of visual effect from other major projects is in the negligible to low range. This is generally due to the small portion of the view that other major projects would be visible in.

The exception is the Botany Rail duplication and the Qantas Flight Training Centre relocation. The visual effects of the Qantas Flight Training Centre Relocation are considered in the visual impact assessment above, as Centre relocation is integrally connected with the Sydney Gateway road project, in order to facilitate the upgrade and widening of Qantas Drive.

The Botany Rail duplication would result in removal of extensive stands of vegetation between King Street, Mascot and O'Riordan Street, Mascot. This vegetation currently makes a positive contribution to the visual and spatial character of the area. This is illustrated in viewpoints 19, 20, 22 and 24. Rail duplication would also require the construction of a retaining wall for a portion of the boundary between the rail corridor and Qantas Drive. The retaining wall would be visible from the same four viewpoints.

The combination of tree removal, retaining wall construction and space constraints that permit the re-establishment of trees along the road-rail interface would lead cumulative visual impacts that would be permanent, and higher than the visual impacts resulting from the Sydney Gateway road project.

8.4 VISUAL IMPACTS DURING CONSTRUCTION

The project, if approved, would result in temporary visual impacts on views in the area as a result of construction activities. Impacts would be a result of general construction activities, the movement and operation of plant and machinery as well as the erection of temporary structures including fencing, hoarding, working platforms and construction compounds.

Construction activities will vary throughout the anticipated 3.5 year construction periods. As the nature and intensity of construction activities changes, visual impacts would also vary.

The assessment in **Table 17** provides:

- The location of the viewpoint, and who the potential viewers would be during the construction period
- The visual sensitivity of the view to change
- The range of construction activities likely to be visible and have a visual effect on the view
- The magnitude of the visual effect on the view
- The overall rating of the visual impact resulting from the combination of sensitivity and magnitude of visual effect.

It should be noted that the visual effects that would be expected on each of the selected viewpoints are based on typical construction practices over the duration of the construction period. Visual effects may vary depending on final construction methods and staging adopted for the project. The ratings are therefore not absolute and the resulting visual impacts would not be experienced consistently for the duration of construction period. The actual visual impacts would be expected to vary during the construction period and there would be times when the visual impacts experienced are lower than those identified.

Table 17. Assessment of visual impacts during construction

[1] G=Negligible, L=Low, ML=Moderate Low, M=Moderate, MH=Moderate High, H=High
[2] A=Adverse, N=Neutral, B=Beneficial

Viewpoint	Visual sensitivity	Project elements for which construction activities would be visible	Construction facilities visible in addition to works for project elements	Notes	Magnitude of visual effect [1]	Resultant rating of visual impact [1]
01	M	▪ Terminal 1 connection ▪ Freight terminal bridge ▪ Northern Lands access including freight terminal link road and roundabout ▪ Eastbound terminal link and terminal link bridge ▪ Terminal 1 connection noise barrier ▪ Qantas Drive bridge upgrade and extension ▪ St Peters interchange connection ▪ Tree clearing/vegetation removal ▪ Landform changes including emplacement mounds	▪ Primary and secondary haulage routes ▪ Construction compound C2 ▪ Workforce parking area ▪ Crane pads ▪ Fencing, hoarding and access gates ▪ Traffic diversions and traffic management measures ▪ Night work in prescribed airspace between 11pm and 6am (also refer section 7.2.2).	The view would remain open during construction. A wide range of construction activities and facilities would be visible throughout this view. The effect on the view is reduced due to the large viewing distance and existing high level of visual clutter. It is not anticipated that many people would experience light spill impacts on the view, due to the timing of the work and the distance to sensitive viewers.	L	ML
02	M	▪ Terminal 1 connection bridge ▪ Terminal 1 connection ▪ Freight terminal link road ▪ Adjustments to the existing Airport Drive/tie-in works ▪ Alexandra Canal cycleway adjustments ▪ Road directional signage ▪ Tree clearing along Alexandra Canal	▪ Primary haulage routes ▪ Workforce parking area ▪ Crane pads ▪ Fencing, hoarding and access gates ▪ Night work in prescribed airspace between 11pm and 6am (also refer section 7.2.2).	The view would remain open during construction, as traffic movement along Airport Drive and the Alexandra canal cycleway would need to be maintained. A wide range of construction activities and facilities would be visible and would take up most of the view. It is not anticipated that many people would experience light spill impacts on the view, due to the timing of the work and the distance to sensitive viewers.	H	HM
03	H	▪ Terminal 1 connection bridge ▪ Vegetation/tree clearing ▪ Emplacement mounds ▪ Night work in prescribed airspace between 11pm and 6am (also refer section 7.2.2).	▪ Primary and secondary haulage routes ▪ Crane pads	The view would remain open during construction. Construction would be limited to relatively few project elements, taking up a relatively small portion of the view. The magnitude of visual effect is increased due to the secondary haulage road through Tempe Recreation Reserve. It is not anticipated that many people would experience light spill impacts on the view, due to the timing of the work when parks would not typically be widely used.	M	HM
04	M	▪ Terminal 1 connection bridge ▪ Terminal 1 connection ▪ Noise barrier along the Terminal 1 connection ▪ Adjustments to Airport Drive including removal of pedestrian crossing ▪ Tree clearing ▪ Variable message sign ▪ Emplacement mounds in the Tempe Lands.	▪ Primary and secondary haulage routes ▪ Crane pads ▪ Fencing, hoarding and access gates ▪ Traffic diversions and traffic management measures	The view would remain open during construction as access to the freight terminal would need to be maintained. A wide range of construction activities and facilities would be visible and would take up most of the view.	H	HM

Viewpoint	Visual sensitivity	Project elements for which construction activities would be visible	Construction facilities visible in addition to works for project elements	Notes	Magnitude of visual effect [1]	Resultant rating of visual impact [1]
05	H	▪ Southern tie-in ▪ Emplacement mounds in the Tempe Lands. ▪ Viewers in from medium and high rise buildings would also see: ▪ Terminal 1 connection ▪ Terminal 1 connection bridge ▪ Noise barrier along the Terminal 1 connection ▪ Freight terminal bridge.	▪ Primary and secondary haulage routes ▪ Crane pads ▪ Fencing, hoarding and access gates ▪ Traffic diversions and traffic management measures ▪ Night work in prescribed airspace between 11pm and 6am (also refer section 7.2.2).	The view would remain open during construction. The majority of construction activities and facilities would be hard to discern due to the viewing distance and angle, especially from the foreshore. The main affected viewers would be people in multi-storey buildings with more expansive views. Light spill impacts from night works, would be minor, due to the viewing distance and timing of the works.	G	G
06	L	▪ Terminal 1 connection including signalised intersection with the freight terminal link road ▪ Noise barrier along the Terminal 1 connection ▪ Variable message sign ▪ Road directional signs ▪ Landscape and open space improvements ▪ Emplacement mounds ▪ Vegetation clearing.	▪ Primary haulage routes ▪ Construction compound C2 ▪ Fencing, hoarding and access gates	There would be no visual impacts on the public during construction as this view would be located within the construction footprint and would not be able to be accessed.	G	G
07	M	▪ Noise barrier along the Terminal 1 connection ▪ Emplacement mounds.	▪ Primary haulage route	The view would remain open during construction. Construction activities would generally be concealed from view. It is possible that glimpses of vehicle movements along the internal haulage route may be able to be obtained from some parts of the series of Tempe residential streets represented by this view.	G	G
08	M	▪ Terminal 1 connection ▪ Eastbound terminal link ▪ Westbound terminal link ▪ Northern Lands access ▪ Qantas Drive bridge ▪ Terminal link bridge ▪ St Peters interchange connection including fill and retaining walls ▪ Qantas Drive upgrade and extension ▪ Earthworks.	▪ Primary haulage route ▪ Construction compound C2 ▪ Crane pads ▪ Working platform ▪ Fencing, hoarding and access gates ▪ Night work in prescribed airspace between 11pm and 6am (also refer section 7.2.2).	The view would remain open during construction. A wide range of construction activities and facilities would be visible. The effect on the view is reduced due to the large viewing distance and existing high level of visual clutter. It is not anticipated that many people would experience light spill impacts on the view, due to the timing of the work outside of business hours.	L	ML
09	L	▪ Terminal 1 connection including bridge over the Botany Rail Line ▪ St Peters interchange connection ▪ Eastbound terminal link ▪ Northern Lands access ▪ Qantas Drive bridge.	▪ Primary haulage route ▪ Construction compound C2 ▪ Fencing, hoarding and access gates ▪ Night work in prescribed airspace between 11pm and 6am (also refer section 7.2.2).	The view would remain open during construction. A wide range of construction activities and facilities would be visible. The effect on the view is reduced due to the large viewing distance and existing detractors. It is not anticipated that many people would experience light spill impacts on the view, due to the timing of the work and the distance to sensitive viewers.	M	ML

Viewpoint	Visual sensitivity	Project elements for which construction activities would be visible	Construction facilities visible in addition to works for project elements	Notes	Magnitude of visual effect [1]	Resultant rating of visual impact [1]
10	L	▪ Terminal 1 connection including the bridge over the Botany Rail Line ▪ Eastbound terminal link ▪ Westbound terminal link ▪ Qantas Drive bridge ▪ Northern Lands access ▪ Retaining walls ▪ Roadside furniture including lighting, road directional signage and ISLUS gantries.	▪ Construction compound C2 ▪ Primary haulage route ▪ Crane pads ▪ Working platform ▪ Fencing, hoarding and access gates ▪ Traffic diversions and traffic management measures ▪ Night work in prescribed airspace between 11pm and 6am (also refer section 7.2.2).	The view would remain exposed during construction including to Sydney Airport employees. A very similar view would also be experienced by traffic along Airport Drive before relocation is completed. A wide range of construction activities and facilities would be visible. It is not anticipated that many people would experience light spill impacts on the view, due to the timing of the work and the distance to sensitive viewers.	H	M
11	H	▪ Qantas Drive bridge ▪ Eastbound terminal link ▪ Terminal link bridge ▪ Qantas Drive upgrade and extension ▪ Active transport link bridge over Alexandra Canal ▪ St Peters interchange connection ▪ Vegetation removal ▪ Roadside furniture including lighting.	▪ Construction compound C2 ▪ Crane pads ▪ Working platform ▪ Fencing, hoarding and access gates ▪ Temporary active transport routes ▪ Night work in prescribed airspace between 11pm and 6am (also refer section 7.2.2).	The view would remain exposed during parts of the construction period. Construction activities and facilities would be visible and take up much of the view. It is not anticipated that many people would experience light spill impacts on the view, due to the timing of the work and the distance to sensitive viewers.	H	H
12	H	▪ Freight terminal bridge ▪ Terminal 1 connection bridge ▪ Active transport link relocation ▪ Tree removal.	▪ Secondary haulage route ▪ Crane pads ▪ Fencing, hoarding and access gates ▪ Night work in prescribed airspace between 11pm and 6am (also refer section 7.2.2).	There would be no visual impacts on the public during construction as this view would be located within the construction footprint and would not be able to be accessed.	G	G
13	M	▪ Canal Road overbridges (St Peters interchange connection) ▪ Tree removal ▪ Roadside furniture including directional signage and ISLUS gantries ▪ Earthworks.	▪ Primary haulage route ▪ Crane pads ▪ Fencing, hoarding and access gates ▪ Traffic management measures	The view would remain open during construction as traffic movement along Canal Road would need to be maintained. Construction activities and facilities would be visible and take up much of the view. The view would also be affected by increased vehicular movements including for haulage.	H	HM
14	H	▪ Terminal link bridge ▪ Qantas Drive bridge.	▪ N/A	The view would remain open during construction. Construction activities would be hard to discern due to the viewing distance. Visual effect would primarily result from light spill during night work, required to avoid intrusion of construction activities into prescribed airspace (also refer section 7.2.2).	L	M
15	M	▪ St Peters interchange connection ▪ Retaining walls ▪ Earthworks.	▪ Primary haulage route ▪ Compound C1 ▪ Fencing, hoarding and access gates	The view would remain open during construction. Visibility of the project and construction works would be limited. The magnitude of visual effect would increase as a result of the haulage route along this view, resulting in increased movements of large vehicles.	L	ML

Viewpoint	Visual sensitivity	Project elements for which construction activities would be visible	Construction facilities visible in addition to works for project elements	Notes	Magnitude of visual effect [1]	Resultant rating of visual impact [1]
16	H	▪ Terminal link bridge ▪ Qantas Drive bridge ▪ Qantas Drive upgrade and extension ▪ Eastbound terminal link.	▪ Night work in prescribed airspace between 11pm and 6am (also refer section 7.2.2).	The view would remain open during construction. Construction activities would be hard to discern due to intervening vegetation. It is not anticipated that many people would experience light spill impacts on the view, due to the timing of the work and the distance to sensitive viewers.	L	M
17	L	▪ Qantas Drive upgrade and extension ▪ Qantas Drive bridge ▪ Terminal link bridge ▪ Removal of advertising billboards ▪ Road signage gantries ▪ Tree removal.	▪ Primary haulage route ▪ Crane pads ▪ Work platform ▪ Traffic diversions and traffic management measures ▪ Fencing, hoarding and access gates ▪ Night work in prescribed airspace between 11pm and 6am (also refer section 7.2.2)	The view would remain open during construction, as traffic movement along Qantas Drive would need to be maintained. Light spill impacts would be limited to motorists during night work hours. A range of construction activities and facilities would be visible and would take up much of the view. Additional visual effect would derive from light spill during night work, required to avoid intrusion of construction activities into prescribed airspace (also refer section 7.2.2).	M	M
18	M	▪ Qantas Drive upgrade and extension ▪ Tree removal ▪ Removal of advertising billboards ▪ Variable message sign ▪ Road directional signage and ISLUS gantries.	▪ Primary haulage route ▪ Building removal in Sydney Airport ▪ Traffic diversions and traffic management measures ▪ Fencing, hoarding and access gates	The view would remain open during construction, as traffic movement along Qantas Drive would need to be maintained. A range of construction activities would be visible and would take up much of the view.	H	HM
19	M	▪ Qantas Drive upgrade and extension ▪ Terminals 2/3 access viaduct ▪ Building removal ▪ Tree removal ▪ Rail retaining wall ▪ Road directional signage.	▪ Primary haulage route ▪ Building removal in Sydney Airport ▪ Traffic diversions and traffic management measures ▪ Construction compound C4 ▪ Fencing, hoarding and access gates	The view would remain open during construction, as traffic movement along Qantas Drive would need to be maintained. A range of construction activities and facilities would be visible and would take up the majority of the view.	H	HM
20	M	▪ Qantas Drive upgrade and extension ▪ Terminals 2/3 access viaduct ▪ Building removal ▪ Tree removal ▪ Removal of advertising billboards ▪ Rail retaining wall.	▪ Primary haulage route ▪ Building removal in Sydney Airport ▪ Traffic diversions and traffic management measures ▪ Construction compound C4 ▪ Fencing, hoarding and access gates ▪ Night work in prescribed airspace between 11pm and 6am (also refer section 7.2.2)	The view would remain open during construction, as traffic movement along Qantas Drive would need to be maintained. A range of construction activities and facilities would be visible and would take up the majority of the view. Light spill impacts would be limited to motorists during night work hours.	H	HM
21	M	▪ Qantas Drive upgrade and extension ▪ Terminals 2/3 access viaduct ▪ Minor tree removal ▪ New traffic signals at the Ross Smith Avenue intersection.	▪ Primary haulage route ▪ Traffic diversions and traffic management measures ▪ Construction compound C5 ▪ Fencing, hoarding and access gates ▪ Night work in prescribed airspace between 11pm and 6am (also refer section 7.2.2).	The view would remain open during construction, as traffic movement along Qantas Drive, Joyce Drive and Sir Reginald Ansett Drive would need to be maintained. A range of construction activities and facilities would be visible and would take up a notable portion of the view. Additional visual effect would derive from light spill during night work.	H	HM

Viewpoint	Visual sensitivity	Project elements for which construction activities would be visible	Construction facilities visible in addition to works for project elements	Notes	Magnitude of visual effect [1]	Resultant rating of visual impact [1]
22	L	▪ Qantas Drive upgrade and extension ▪ Terminals 2/3 access viaduct ▪ Tree removal.	▪ Primary haulage route ▪ Traffic diversions and traffic management measures ▪ Fencing, hoarding and access gates ▪ Night work in prescribed airspace between 11pm and 6am (also refer **section 7.2.2**)	The view would remain open during construction, as traffic movement along Joyce Drive would need to be maintained. A range of construction activities would be visible and would take up a large portion of the view. Additional visual effect would derive from light spill during night work.	H	M
23	M	▪ Terminals 2/3 access viaduct including widening of Sir Reginald Ansett Drive, piers, abutments and retaining walls ▪ New link road to Ninth Street ▪ Shiers Street intersection amendments ▪ Tree removal.	▪ Traffic diversions and traffic management measures ▪ Construction compound C5 ▪ Fencing, hoarding and access gates	The view would remain open during construction, as traffic movement along Sir Reginald Ansett Drive would need to be maintained. A range of construction activities and facilities would be visible and would take up the majority of the view.	H	HM
24	M	▪ Qantas Drive upgrade and extension ▪ Terminals 2/3 access viaduct ▪ Tree removal ▪ Rail retaining wall.	▪ Primary haulage route ▪ Traffic diversions and traffic management measures ▪ Fencing, hoarding and access gates ▪ Night work in prescribed airspace between 11pm and 6am (also refer **section 7.2.2**)	The view would remain open during construction, as traffic movement along Qantas Drive would need to be maintained. A range of construction activities would be visible and would take up a large portion of the view. Additional visual effect would derive from light spill during night work.	H	HM
25	M	▪ Qantas Drive upgrade and extension ▪ Qantas Drive bridge ▪ Terminal link bridge ▪ Terminal 1 connection ▪ Freight terminal bridge ▪ Tree removal ▪ Earthworks including emplacement mounds in the Tempe Lands.	▪ Primary and secondary haulage routes ▪ Construction compound C2 ▪ Workforce parking area ▪ Crane pads ▪ Fencing, hoarding and access gates ▪ Traffic diversions and traffic management measures ▪ Night work in prescribed airspace between 11pm and 6am (also refer **section 7.2.2**).	The view would remain open during construction. A wide range of construction activities and facilities would be visible throughout this view. The effect on the view is reduced due to the large viewing distance and existing high level of visual clutter. It is not anticipated that many people would experience light spill impacts on the view, due to the timing of the work outside of airport operating hours.	L	ML
26	H	▪ Terminal 1 connection bridge ▪ Terminal 1 connection ▪ Terminal link bridge ▪ Qantas Drive bridge ▪ Tree removal ▪ Emplacement mounds ▪ Variable message sign.	▪ Primary and secondary haulage routes ▪ Construction compound C3 ▪ Crane pads ▪ Fencing, hoarding and access gates ▪ Traffic diversions and traffic management measures ▪ Night work in prescribed airspace between 11pm and 6am (also refer **section 7.2.2**).	The view would remain open during construction. A wide range of construction activities and facilities would be visible throughout this view. The effect on the view is reduced due to the viewing distance, which will reduce the portion of the view affected. Intervening vegetation would restrict visibility of the construction compound and haulage routes to have a minor effect. It is not anticipated that many people would experience light spill impacts on the view, due to the timing of the work and the distance to sensitive viewers.	L	M

8.4.1 Summary of impacts

The assessment found that, during the construction phase, the project's visual impacts on the 26 viewpoints would be:

- High for one viewpoint
- High to moderate for ten viewpoints
- Moderate for six viewpoints
- Moderate to low for five viewpoints
- Negligible for four viewpoints including:
  - Two viewpoints from where construction activities would not be readily discernible
  - Two viewpoints that would not be accessible to the public during the construction period, and therefore not result in any visual impacts to the public.

8.4.2 Cumulative visual impacts

Due to the range of major developments planned in the area (refer **section 7.4**), there would be a number of cumulative visual impacts resulting from construction activities occurring either simultaneously or consecutively. The major projects that would be visible from viewpoints assessed as part of this visual assessment are discussed in **section 8.3.9**.

Additional visual impacts from major developments

Based on the indicative construction schedule in **Figure 215**, and the locations of other major developments (refer **Figure 214**), cumulative visual impacts would occur at a number of viewpoints, as identified in **Table 16** in **section 8.3.9**.

The magnitude of visual effect from other major developments and the resulting additional visual impact on the affected viewpoints is shown in **Table 18**. The combined construction period constitutes the length of time during which visual impacts would be experienced, including any periods of overlap in construction activities. This is captured in the 'Duration of impacts column'.

Table 18. Additional visual impacts from construction of major projects

[1] G=Negligible, L=Low, ML=Moderate Low, M=Moderate, MH=Moderate High, H=High

View	Sensitivity	Magnitude	Additional visual impact rating	Duration of impacts
08	M	G	G	60 months
09	L	L	L	60 months
10	L	L	L	60 months
11	H	L	M	60 months
13	M	L	ML	72 months
14	H	G	G	60 months
16	H	G	G	60 months
17	L	L	L	49 months
18	M	M	M	49 months
19	M	H	HM	54 months
20	M	H	HM	54 months
21	M	G	G	55 months
22	L	L	L	55 months
23	M	G	G	55 months
24	M	M	M	49 months
25	M	G	G	49 months

The table shows that the combined construction schedules would result in lengthy periods during which visual impacts would be experienced.

It is noted that the construction period for the Botany Rail Line would be 49 months, representing a significant length of time during which visual impacts would be experienced. The proposed scheduling of the work to occur in parallel with the Sydney Gateway road project's construction period minimises the overall length of time during which construction impacts would be experienced on views in the area.

Cumulative visual impacts

Table 18 above shows that other major developments would add to the visual impacts from construction activities for the project. Major projects would affect different parts of the viewpoints to those that would be affected by construction for the Sydney Gateway road project.

As a result, the cumulative visual impacts during construction would be higher than those identified for the Sydney Gateway road project. The combined visual impacts are summarised in **Table 19**. It should be noted that the combined visual impacts would represent a maximum potential visual impact on each viewpoint that would:

- Likely vary throughout the construction phases of the major projects
- Potentially be less than shown, depending on the construction staging and processes adopted.

Table 19. Cumulative visual impacts during construction

[1] G=Negligible, L=Low, ML=Moderate Low, M=Moderate, MH=Moderate High, H=High

View	Project visual impact rating	Additional visual impact from major projects	Cumulative visual impact rating
01	ML	-	ML
02	HM	-	HM
03	HM	-	HM
04	HM	-	HM
05	G	-	G
06	G	-	G
07	G	-	G
08	ML	G	ML
09	ML	L	M
10	M	L	HM
11	H	M	H
12	G	-	G
13	HM	ML	H
14	M	G	M
15	ML	-	ML
16	M	G	M
17	ML	ML	M

View	Project visual impact rating	Additional visual impact from major projects	Cumulative visual impact rating
18	HM	M	H
19	HM	HM	H
20	HM	HM	H
21	HM	G	HM
22	M	L	HM
23	HM	G	HM
24	HM	M	H
25	ML	G	ML
26	M	-	M

Cumulative impact summary

During construction there would be some cumulative effects between the project and other major developments. Cumulative visual impacts would result both from:

- Concurrent construction activities
- Consecutive construction.

The primary contributor to cumulative visual impacts would be the Botany Rail duplication which would occur immediately adjacent to, and in parallel with, the Sydney Gateway road project. While this would increase the magnitude of visual effect on some viewpoints during construction, it would minimise the period of time during which visual impacts would be experienced.

8.5 VISUAL IMPACTS ON COMMONWEALTH LAND

The majority of potential visual impacts to Commonwealth land would occur as a result of proposed works along Airport Drive, Qantas Drive, Sir Reginald Ansett Drive and as a result of the eastbound terminal link and the St Peters interchange connection.

Potential visual impacts during operation of the project generally relate to changes to existing views as identified in the viewpoint assessment. As much of the project is located on Commonwealth land, the majority of viewpoints at least partially capture Commonwealth land. The exception to this are the three viewpoints 3, 6 and 7 - refer **Table 20**.

The assessment shows that the project would result in long-term impacts to Commonwealth land during operation of the project. As discussed in **section 8.6.3**, visual impacts would be the same irrespective of the mound design option adopted for the project. Visual impacts would be minimised through the implementation of the mitigation measures outlined in **Chapter 9**. **Chapter 9** also provides a discussion of residual impacts following implementation of the mitigation measures.

Potential construction related impacts are generally temporary and are discussed in **section 8.4**. They would be managed through a construction management plan.

Table 20. Visual impacts on Commonwealth Land

View	Description	View of Commonwealth Land (Y/N)	Visual impact
01*	P2 car park at Terminal 1	Y	ML
02	Alexandra Canal cycleway opposite Tempe Recreation Reserve.	Y	HM
03*	Tempe Recreation Reserve	N	-
04*	Link Road at the intersection with Airport Drive	Y	HM
05*	Rowers on Cooks River	Y	M
06*	Tempe Lands car park	N	-
07*	Wentworth Street, Tempe	N	-
08	IKEA store	Y	ML
09	Princes Highway bridge over the Botany Rail Line	Y	ML
10	North Precinct Road .	Y	M
11	Alexandra Canal cycleway near Shea's Creek underbridge	Y	H
12	Access track along the western side of Alexandra Canal	Y	H
13	Bus stop on the northern side of Canal Road	Y	HM
14	Canal Road bridge over Alexandra Canal	Y	M
15	Burrows Road South	Y	G
16	Alexandra Canal cycleway south of Coward Street	Y	HM
17	Qantas and Airport Drive junction	Y	M
18	Qantas Drive, near the Botany Rail maintenance overbridge	Y	HM
19	Qantas Drive between Robey and Ewan Streets	Y	HM
20	Seventh Street at the intersection with Qantas Drive	Y	HM
21	O'Riordan Street at the intersection with Qantas Drive and Joyce Drive	Y	HM
22	Joyce Drive at Sir Reginald Ansett Drive	Y	M
23	Sir Reginald Ansett Drive	Y	HM
24	Seventh Street, looking north	Y	HM
25	Qantas Heritage Collection, Level 1, Terminal 3	Y	ML
26*	Giovanni Brunetti Bridge	Y	HM

[1] G=Negligible, L=Low, ML=Moderate Low, M=Moderate, MH=Moderate High, H=High
[2] A=Adverse, N=Neutral, B=Beneficial

* View assessed for emplacement mound design options

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CHAPTER 9

Mitigation Measures

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9.1 CHAPTER OVERVIEW

This chapter outlines the proposed safeguards and mitigation measures to be adopted to reduce the identified landscape character and visual impacts, should the project be approved and proceed to detailed design. As outlined in Chapter 3, the aim of the measures is to identify opportunities to further reduce the identified landscape character and visual impacts in future design stages in order to maximise integration of the project with the natural and built context of the surrounding area.

9.2 PURPOSE OF THE MITIGATION STRATEGY

The aim of the mitigation strategy is to realise the engineering and performance objectives of the project while producing a design outcome that produces good urban design outcomes and has a high place making and visual qualities.

Major constraints to realising this outcome include:

- Space constraints within the operational boundary
- Airport operational constraints including the obstacle limitation surface and the need to reduce the risk of bird strike
- Environmental constraints including contaminated fill in the Tempe Lands, new emplacement mounds and saline soils.

A range of mitigation measures are recommended for incorporation into the project. These measures provide an opportunity to review these constraints and to develop a solution that builds on the urban design objectives and urban design concept to maximises the protection of the existing built, natural and visual values of the project area.

Mitigation measures may be considered under two categories:

- Primary mitigation measures are embedded in the design of the proposed works through an iterative process between the engineering and urban design teams. This form of mitigation is generally the most effective. The outcome of this process is the urban design concept described in Chapter 6
- Secondary mitigation measures are designed to specifically address the remaining adverse impacts resulting from the project. They are presented in the following section.

9.3 MITIGATION MEASURES

As part of the detailed design process, an Urban Design and Landscape Plan (UDLP) would be prepared for the project. The UDLP would consider the recommendations presented in this report. It would be prepared in consultation with relevant Council's, stakeholders, landowners and the community.

9.3.1 Mitigation to be incorporated in detailed design

Complementing the urban design for the project described in Chapter 6, the following outlines additional, secondary, measures to be considered during the detailed design phase. They have been developed in accordance with the urban design objectives and principles in Chapter 5 and are aimed at further reducing the identified landscape character and visual impacts from Chapter 7 and Chapter 8 respectively.

The following recommendations are provided for consideration during detailed design:

- Avoid, minimise and manage any potential visual impacts as they arise during detailed design and during construction or operation of the motorway
- Investigate opportunities for further design refinements of major engineering structures including canal bridges and the Terminals 2/3 access viaduct to achieve a high standard of architectural design
- Develop a tree replacement strategy to offset tree removal and realise a net gain of tree cover including investigation of:
  - The potential to retain additional existing vegetation, in particular trees
  - Opportunities for the installation of additional tree cover as part of the project, within and adjoining the construction footprint
  - Opportunities for replanting in other areas outside the project footprint, including as part of Sydney Airport Corporation's offset program and consistent with Sydney Airport Corporation's Wildlife Management Program
  - Opportunities to create high quality streetscapes
- Ensure any mounding has a batter slope no steeper than 4H:1V where feasible to maximise the potential for tree planting for shade and amenity
- Design spill mounds and any contamination capping required to make provision for the installation of tree cover in select locations, subject to meeting aviation safety requirements, in order to:
  - Provide a visual buffer to road infrastructure, particularly from sensitive areas such as open space
  - Provide tree cover in open space areas to ensure user amenity through thermal comfort and provide spatial definition and interest
  - Assist in meeting the desired outcome of a net gain in tree cover as a result of the project
- Investigate opportunities for further active transport connections in consultation with Councils, stakeholders and the community including:
  - A dedicated and efficient east-west link between Terminal 1 and Terminals 2/3
  - An east-west link between the Alexandra Canal cycleway and the St Peters interchange connection and Swamp Road, Tempe
  - Between the Alexandra Canal cycleway and Terminals 2/3
  - Between residential areas in Tempe and new open space east of the Terminal 1 connection
- Investigate opportunities for screening vegetation along the interface between Qantas Drive and Sydney Airport including for replacement trees to offset tree removal along Qantas Drive
- Carefully consider the detailed design of the noise barrier in the Tempe Lands in order to:
  - Provide active transport connectivity across the Terminal 1 connection and between the western and eastern portions of open space
  - Maximise passive surveillance of open space from the roadway. This is important as the roadway is the only potential source of casual surveillance of this open space area
  - Prevent potential turbulence issues to ensure the noise barrier does not result in any adverse effects on airport operations, including aviation safety
- Investigate opportunities to incorporate WSUD in further consultation with hydraulic engineers.

9.3.2 Mitigation during construction

The following mitigation measures are recommended for implementation during construction:

- Contain construction activities within the construction works zone boundary and occupy the minimum area practicable for limit impacts on adjoining areas, including the extent of native vegetation clearing
- Consider the provision of barriers to screen views from visually sensitive nearby areas such as residential and recreational areas
- Construction programming should progressively rehabilitate disturbed areas, to minimise the duration and extent of temporary visual and landscape character impacts and to minimise soils exposure and the potential for erosion and dust generation
- Existing trees to be retained within construction areas are to be identified, protected and maintained in accordance with Australian Standard AS4970 *Trees on Development Sites* (AS4970), or as otherwise directed by a qualified ecologist or arborist. Also refer to the *Sydney Gateway Road Project – Tree Assessment Technical Note* prepared by G2SJV for additional mitigation measures in relation to existing tree cover
- The design of temporary lighting must avoid unnecessary light spill on adjacent residents or sensitive receivers and be designed in accordance with AS1158
- Once construction is complete, or progressively throughout the works where possible, return sites to at least there pre-construction state
- Keep pollution and dust emissions to a minimum and monitor throughout the project construction period
- Divert or re-route footpaths and shared paths that would be affected by construction activities
- Provide a temporary off-leash dog exercise area as close as possible to the existing off-leash dog exercise area. The exact location would be confirmed in consultation with IWC.

9.4 RESIDUAL IMPACTS

The residual impacts are those landscape character and visual impacts which remain after the proposed mitigation measures have been implemented.

This has been assessed both during the construction period and during the design year. The design year is typically taken to be ten to 15 years after the project has been opened to normal operation. By this time the landscape works are deemed to have reached a level of maturity that allows them to perform according to original design objectives and intent.

Irrespective of the mitigation measures and the degree to which they are implemented, the proposed upgrade would result in substantial changes to the landscape and visual character of the area surrounding the project.

While some of the changes would appear less severe over time as proposed vegetation establishes and matures, the project would result in the following long-term irreversible residual impacts:

- Alterations to the topography and three dimensional form
- Loss of built form within Sydney Airport including the ability to interpret some of the airport's historical development phases from remaining built form
- Loss of views and vistas in particular along Alexandra Canal and between Alexandra Canal and adjoining areas
- Land use changes such as conversion of container storage areas and undeveloped land to an arterial road corridor
- Enlarged scale of road infrastructure including large increases in width of existing roads and the introduction of tiered roadways such as the Terminals 2/3 access viaduct
- A potential increase in light levels in parts of the project area, with the potential for spill.

Based on the above, the identified landscape character and visual impacts would not substantially reduce over time. That is they would remain In the moderate to high range for more than half of the identified landscape character zones and assessed viewpoints.

While the impacts themselves would not reduce over time, it is likely that the perception of the severity of the impacts may reduce, as people gradually adjust to the changes in their visual environment.

CHAPTER 10

Conclusion

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Project overview

Sydney Airport and Port Botany are two of Australia's most important infrastructure assets, providing essential domestic and international connectivity for people and goods. Together they form a strategic centre, which is set to grow significantly over the next 20 years.

Sydney Gateway would expand and improve the road network to Sydney Airport and Port Botany, to provide reliable access for employees, residents, visitors and businesses and to support future growth. The project comprises new direct high capacity road connections linking the Sydney motorway network at St Peters interchange with Sydney Airport's terminals and beyond.

The project area

The project site and surrounding areas are comprised of intensely developed inner suburban areas that include residential, commercial, employment and open space uses, in addition to the port activities at Sydney Airport and Port Botany, and their associated land uses and infrastructure such as freight and container terminals, the Botany Rail Line and the arterial road network.

The area is rich in history and has seen continuous historic evolution dating from before European settlement. As a result, the urban landscape retains many traces of its historic change and development, including a large number of listed heritage items. Most notable amongst these are Sydney Airport itself and Alexandra Canal. Individually and combined, Sydney Airport and Alexandra Canal are unique urban landscapes and distinct from surrounding urban areas. The major point of difference is the relative absence of built form in a flat and low-lying landscape, creating a "big sky" landscape with expansive views and vistas.

Project elements

The Sydney Gateway road project involves constructing and operating new and upgraded sections of road connecting the airport terminals with each other and the Motorway network. This includes new bridges over Alexandra Canal, a new Terminals 2/3 access viaduct, a re-aligned Alexandra Canal cycleway and associated road infrastructure including earthworks, retaining walls and road furniture such as lighting and signage. The major new elements in the urban landscape setting as a result of the project would be the:

- Terminal 1 connection – connecting Terminal 1 and the Sydney motorway network via the St Peters interchange, including a new bridge over Alexandra Canal
- Qantas Drive upgrade and extension – widening and upgrading of Qantas Drive and a new section of road connecting the Sydney motorway network and Terminals 2/3 via a high-level bridge over Alexandra Canal
- St Peters interchange connection – a grade-separated section of road connecting Qantas Drive and the Terminal 1 connection with the St Peters interchange
- Terminal links – two sections of road linking Terminal 1 and Terminals 2/3, including a bridge over Alexandra Canal
- Terminals 2/3 access – an elevated road connection to Terminals 2/3 from the upgraded Qantas Drive
- Active transport facilities – realigning the existing shared path and maintaining continuity of connection along Alexandra Canal
- Emplacement mounds in the Tempe Lands, for which two design options ("Option One" and "Option Two") were assessed.

Landscape character impacts during operation

The project elements would affect the existing character of the project site and surrounding areas, with landscape character impacts varying from negligible to high. Five out of nine landscape character zones would experience a high or moderate impact.

While impact ratings tend to be high, it is important to note that not all landscape character impacts are considered adverse. Four landscape character zones experience a combination of adverse and beneficial impacts and one zone experiences a neutral impact.

Beneficial impacts are largely derived from:

- The potential for the creation of new open space on residual land, subject to open space being the preferred land use in accordance with the priorities of local and regional strategic planning and IWC
- Reduction of truck movements on surrounding roads
- Vehicular connectivity improvements to the Northern Lands
- Potential for new viewing opportunities in the Tempe Lands as a result of emplacement mounds
- Upgrades to existing footpaths
- Provision for future active transport links.

Adverse impacts are generally the result of:

- Built form and land use changes
- New road infrastructure through existing open space and undeveloped land including the permanent loss of around one hectare of public open space within the Tempe Lands including land currently occupied by the Tempe Golf Range and Academy and the off-leash dog exercise area
- The interruption of the open landscape and skyline both of which are integral to the heritage values of Sydney Airport and Alexandra Canal
- Other impacts on heritage fabric such as removal of some sections of Alexandra Canal wall and removal of buildings that contribute to an understanding of the airport's historic evolution
- Changes to views, vistas and visual relationships
- Extensive tree removal with limited scope for replacement trees, leading to a net loss in tree cover
- Changes to visual exposure for local businesses
- New views of road infrastructure where they do not currently exist
- Changes to active transport connectivity.

Landscape character impacts during construction

The project would have a range of landscape character impacts during the construction period. The impacts would be limited to the construction footprint and to the construction period. The major landscape character impacts would include:

- Restricted or changed access and connectivity
- Loss of access to about four hectares of open space in the Tempe Lands during the approximately 3.5 year construction period, including temporary closure and relocation of the off-leash dog exercise area
- Spatial and visual impacts as a result of temporary structures and construction activities
- Potential impacts of construction activities on the operations and infrastructure of Sydney Airport, the Botany Rail Line and the Airport Line

- Increased traffic and vehicular movements as a result of the project workforce, haulage and delivery movements.

The resulting temporary landscape character impacts would be high or moderate for six of the nine landscape character zones.

A series of measures would be adopted to manage and minimise potential impacts during instruction including

- A construction staging strategy
- A construction traffic management strategy
- A rehabilitation strategy
- Other environmental management and safeguard measures.

Cumulative landscape character impacts

The area has been subject to a series of infrastructure developments since at least 2016. Construction would continue to 2024 should the Sydney Gateway road project be approved. This represents a long-lasting series of temporary impacts, with multiple projects often occurring at any one time. They would result in high or moderate landscape character impacts on six of the nine landscape character zones.

It is noted that these impacts are a result of works contributing to the implementation of strategic planning and policy visions for the area such as the *Eastern City District Plan*. With the exception of the Sydney Gateway road project, the works are generally confined to existing infrastructure and arterial road corridors that would be less sensitive to temporary impacts than for example residential or open space areas.

The cumulative and construction impacts arising from major projects in the area would be felt during the combined extended construction period. However, these impacts would not be able to be avoided if strategic planning and policy visions for the area surrounding the project are to be realised. The impacts would remain temporary while seeking implementation of long-term strategic planning and desired local character outcomes.

Visual impacts during operation

The project once in operation would also alter existing views in the area. The assessment has found that thirteen of the 26 views assessed would experience a high or high to moderate visual impact as a result of the project, irrespective of the emplacement mound design option adopted. A further six views would experience a moderate visual impact. Visual impacts on the remaining six viewpoints would be moderate to low and negligible for one viewpoint.

The high impact ratings are generally a result of the large scale of the project. It would lead to changes to much of the view, including changes to the visually sensitive elements such as mature vegetation, open space, views and vistas, and the open sky and landscape. The range of factors contributing to beneficial and adverse outcomes are generally the same as those summarised for the landscape character impacts above.

While the vast majority of views would experience adverse impacts, there are a four views that experience a combination of beneficial and adverse visual effects, leading to an overall neutral impact. Beneficial impacts are largely derived from improvements to open space and reduction in visual clutter as a result of the replacement of shipping containers with landscaped emplacement mounds.

Urban and landscape design concept

The urban and landscape design concept for the project has considered the project's likely landscape character and visual impacts. It has refined the engineering design and integrated urban and landscape design measures to minimise potential impacts of the current project design as much as possible.

There are a number of major constraints that have had a limiting effect on the project urban and landscape design. They include:

- Space constraints within the operational boundary
- Airport operational constraints including the obstacle limitation surface and the need to reduce the risk of bird strike
- Environmental constraints including saline soils, contaminated fill in the Tempe Lands, new emplacement mounds and other contaminated soils.

There is an opportunity to review these constraints as part of impact mitigation and further detailed design work, to ensure the project makes a positive contribution to active, healthy and cohesive built form and community outcomes.

Visual impacts during construction

The project would have a range of visual impacts during the construction phase, as a result of construction activities for project elements as well as temporary construction facilities, activities and traffic. The assessment found that, during the construction phase, 11 viewpoints would experience a high or moderate to high visual impact, with a further 6 viewpoints experiencing a moderate impact. However, visual impacts during construction would not be constant but vary at different stages throughout the construction period.

Depending on construction staging and processes, potential visual impacts may be able to be reduced. The need to minimise and mitigate potential visual impacts during the construction phase of the project would be considered in the development of a construction management plan for the project.

Cumulative visual impacts from major projects

A number of major projects are planned in the project area. If approved, they would result in both extended and additional visual impacts that would have the potential to be higher at certain times during the construction phases of the projects than the project's operational impacts.

The primary contributor to cumulative visual impacts during both operation and construction would be the Botany Rail duplication. Construction of the rail duplication would occur immediately adjacent to, and in parallel with, the Sydney Gateway road project. While this would increase the magnitude of visual effect on some viewpoints during construction, it would minimise the period of time during which construction visual impacts would be experienced.

Mitigation of operational impacts

Based on assessment findings, a series of landscape character and visual impact mitigation measures are identified. They build on the project urban design objectives and principles that in turn were developed in response to the analysis of the project area and relevant policy and guideline documents. Recommended impact mitigation measures include:

- Investigate opportunities for further design refinements of major structures to achieve a high standard of architectural design

- Develop a tree replacement strategy to realise a net gain of tree cover
- Detailed design of spill mounds to allow for the installation of trees for shade, amenity (thermal comfort), spatial definition, visual buffers to arterial roads and visual interest
- Investigate opportunities to maintain existing active transport connectivity and further enhance active transport connections to deliver network improvements consistent with NSW policy
- Determine the most appropriate uses for residual land in accordance with the priorities of local and regional strategic planning and IWC
- Consult with Sydney Airport regarding the interface between Qantas Drive and Sydney Airport for the opportunity to provide screening vegetation including replacement trees to offset tree removal along Qantas Drive.

Implementation of the mitigation strategy in the detailed design phase would assist with the integration of the project with the surrounding context, taking into account likely future growth and changes.

Residual impacts

Due to the nature and scale of the project, some landscape character and visual impacts would not be avoided or ameliorated through mitigation measures, resulting in the following long-term residual impacts:

- Alterations to the topography and three dimensional form
- Loss of built form within Sydney Airport including the ability to interpret some of the airport's historical development phases from remaining built form
- Loss of views and vistas in particular along Alexandra Canal and between Alexandra Canal and adjoining areas
- Land use changes such as conversion of container storage areas and undeveloped land to an arterial road corridor
- Enlarged scale of road infrastructure including large increases in width of existing roads and the introduction of tiered roadways such as the Terminals 2/3 access viaduct
- A potential increase in light levels in parts of the project area, with the potential for spill.

While landscape and mitigation measures may assist the integration of the project with surrounding areas and people may adjust to the landscape character and visual changes, the impacts themselves are not likely to significantly reduce over time. The visual assessment found that due to the scale of the project infrastructure, only two viewpoints offer potential for a noticeable reduction of visual impacts over time. This applies equally to both adverse and beneficial impacts such as improvements to open space and recreation facilities.

Urban design and place making strategy

The urban and landscape design concept is built on a place making strategy that recognises the significant role of the project area as the gateway to and from Sydney, as well as Australia. The project, and the urban landscape in which it is set, are experienced from both the air and from the ground, by large number of passengers, visitors, local residents, employees and commuters.

The interaction of the water bodies, open spaces, bands of vegetation and the suburbs through which they course in defined ribbons, is a key shaper of the arrival experience from the air. It provides the first, or last, impression of Australia for both visitors and returning residents.

The urban design and place making strategy for the project builds on the opportunity offered by the project to both strengthen and shape this experience through interventions at the ground level that can be appreciated both when travelling in the air and moving along on the ground.

The urban design and place making strategy is built around the notion of a 'dispersed gateway': many elements contribute to a multi-faceted and evolving experience that extends from the motorway network along arterial roads, through open spaces and the public domain into the airport's terminals, and vice versa.

The place making strategy integrates the notion of 'connecting to country' as a quintessential Australian experience, much like major airports around the world integrate their nation's essential qualities into the arrival experience. The place making strategy incorporates an art strategy encompassing both permanent and temporary works and expresses and interprets the area's rich history and evolution, building on Sydney Airport's centenary project SYD100 and the associated SYDStories. They provide a platform for local expression, interpretation and capacity building and enhance the project's urban landscape setting.

<u>New open space</u>

While residual land uses are yet to be confirmed based on the priorities of local and regional strategic planning and IWC, the expansion of parklands within the Tempe Lands are considered integral to the urban design and place making strategy. Open space in the Tempe Lands, while subject to a future master planning process conducted by IWC, has the potential to be of striking visual character and to make a contribution towards the experience of the project from both the ground and the air. It also has the potential to provide for exciting new vantage points over the project area and beyond towards Botany Bay. Open space in the Tempe Lands would provide a parkland setting for the Terminal 1 connection that would frame the road corridor, reducing the perception of the scale of the infrastructure through a generous and attractive landscape setting on the way to and from Terminal 1.

The parklands also offer important potential to provide new active or passive recreation opportunities that could assist in meeting local and sub-regional open space and recreation needs. This would require further design work in consultation with key stakeholders including IWC and Bayside Council and the community, to ensure the best outcome is realised.

Conclusion

Together with the refinement of the engineering concept design based on the urban design objectives, principles and mitigation measures, implementation of the urban design and place making strategy would help achieve a project character that befits the notion of a "Gateway". It would maximise the fit of the project while providing for safe and efficient travel and growth at the ports. Implementation of the urban design and place making strategy and future provision of new parklands would contribute to and enrich the sense of place for locals, visitors and passing travellers.

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RMS.19.1443
ISBN 978-1-922338-10-5