

Appendix F

Landscape Character and Visual Impact Assessment



WestConnex enabling works, Airport east precinct

Urban Design, Landscape Character & Visual Impact Assessment

December 2014



studio colin polwarth



**Corkery
Consul**



Transport
Roads & Maritime
Services

Blank back of cover page

WestConnex enabling works, Airport east precinct

Urban Design, Landscape Character & Visual Impact Assessment

December 2014

Prepared for



By



studiocolinpolwarth

28 / 185 Campbell Street
Surry Hills NSW 2010
www.studiocolpol.com.au
e colpol@optusnet.com.au
t (02) 9331 8483
f (02) 9331 8483



Landscape Architecture • Urban Design

Suite 3, 38 Albany Street
St Leonards NSW 2065
t (02) 9906 6636
f (02) 9906 6634
e office@corkeryconsulting.com.au
www.corkeryconsulting.com

Issue	Date	Status	Checked
A	29.01.14	Preliminary Draft for Review	NC/CP
B	17.03.14	Revised Draft for Review	NC/CP
C	30.06.14	Final Draft for Review	NC/CP
D	24.07.14	Final	NC/CP
E	05.12.14	Draft Revised REF	CP/NC

This page is intentionally left blank

Contents

Figures	iii
Tables.....	iv
Executive Summary.....	I
1.0 Introduction.....	7
1.1 Background.....	7
1.2 Scope and Purpose of this Report.....	7
1.3 Future Proposal Development.....	7
1.4 Structure of the Report.....	8
1.5 Definitions	8
2.0 The Proposal + Context.....	9
2.1 The Proposal.....	9
2.2 The Proposal Site and its Regional Context	9
2.2.1 Road network study – WestConnex to Port Botany and airport areas.....	10
2.2.2 Community involvement.....	10
2.3 Local Context.....	11
2.4 Relevant Strategic Policies and Documents	13
2.5 Urban Analysis.....	13
2.5.1 General.....	13
2.5.2 General Holmes Drive / Joyce Drive Analysis	17
2.5.3 Landscape Character Zones	19
3.0 The Urban Design Vision.....	24
3.1 The Vision Statement.....	24
3.2 Roads and Maritime Services Urban Design Objectives.....	24
3.3 Design Generators	26
4.0 The Urban Design Strategy.....	28
5.0 The Urban Design Principles	30
5.1 Introduction	30
5.2 General Holmes Drive / Joyce Drive Upgrade.....	30
5.2.1 Introduction.....	30
5.2.2 Principles	30
5.2.3 Central median screen and lighting	34
5.2.4 Visual screening along the southern edge of Joyce Drive.....	34
5.2.5 Future airport development.....	36
5.2.6 Landform and vegetation	36

5.2.7	Powerlines and utilities.....	37
5.3	The Gateway.....	37
5.3.1	Introduction.....	37
5.3.2	Design Principles and Considerations.....	37
5.3.3	Rail bridge over Wentworth Avenue.....	39
5.3.4	Railway Bridge over Wentworth Avenue - Aesthetics	39
5.3.5	Pump station.....	44
5.3.6	Stormwater culvert bridge at the intersection	44
5.3.7	Stormwater culvert bridge aesthetics	45
5.3.8	Landform and vegetation	45
5.4	Coastal Sydney	46
5.4.1	Introduction.....	46
5.4.2	Landform and vegetation	48
5.4.3	Street lighting	48
5.4.4	Fencing and security.....	48
5.5	Urban Sydney - Mascot Interface	50
5.5.1	Introduction.....	50
5.5.2	Design Principles and Considerations.....	50
5.5.3	Heritage items for protection.....	51
5.5.4	Botany Road	53
5.5.5	Wentworth Avenue.....	54
5.5.6	Shared path.....	54
5.5.7	The public realm and streetscapes	54
5.5.8	Artist's impression of the corner of Wentworth Avenue and Botany Road	55
6.0	Landscape Character + Visual Impact Assessment	57
6.1	Introduction	57
6.2	Landscape Character Impact Assessment.....	58
6.3	Visual Impact Assessment	60
6.4	Visual Impact Conclusion	63
7.0	Conclusion, Mitigation and the Next Steps	65
8.0	Bibliography	66
Appendix 1 – Potential Plant List		
Appendix 2 – Bridge Design Checklist		

Figures

Figure 1 - The proposal site in the context of existing road connections.....	10
Figure 2 - Local context.....	12
Figure 3 - Urban and landscape structure.....	14
Figure 4 - Visual analysis	16
Figure 5 - Photograph of existing signage along Joyce Drive	17
Figure 6 - Existing retail and advertising analysis.....	18
Figure 7 - Landscape Character Zones	20
Figure 8 - Flight paths of birds by Dennis Hlynsky (left) and chronophotography of Étienne-Jules Marey (right).....	26
Figure 9 - Aircraft flight paths (source: Brisbane Investor).....	26
Figure 10 - The smooth lines of Australia's coastal sand dunes (source: queensland-australia.com)	27
Figure 11 - Avenue of street trees along Botany Road (left) and formal planting along Wentworth Avenue (right).....	27
Figure 12 - Strategy components.....	29
Figure 13 – General Holmes Drive / Joyce Drive Upgrade Principles Plan.....	32
Figure 14 - Inset Plan 1 Joyce Drive west.....	33
Figure 15 - Section AA through General Holmes Drive / Joyce Drive	33
Figure 16 - Design sections and principles for a feature median screen along Joyce Drive.....	35
Figure 17 - Typical cross section through Joyce Drive.....	36
Figure 18 - The Gateway Principles Plan.....	38
Figure 19 - General arrangement section and elevation of the rail bridge over Wentworth Avenue	41
Figure 20 - Detail sections of the rail bridge over Wentworth Avenue.....	42
Figure 21 - Detailing to improve the appearance of the rail bridge.....	42
Figure 22 - Artist's impression of the new rail bridge over Wentworth Avenue (subject to consultation and design refinement).....	43
Figure 23 - Coastal Sydney Principles Plan	47
Figure 24 - Section BB through Coastal Sydney precinct.....	49
Figure 25 - Urban Sydney - Mascot Interface Principles Plan	52
Figure 26 - Inset Plan 2 Wentworth Avenue	53
Figure 27 - Typical layout for shared path along Botany Road and Wentworth Avenue.....	55
Figure 28 - Artist's impression of the corner of Wentworth Avenue and Botany Road (subject to consultation and design refinement).....	56
Figure 29 - Key viewpoints.....	60

Tables

Table 1 - Urban design objectives	24
Table 2 - Potential character impact assessment	59
Table 3 - Potential visual impact assessment of views from roads.....	61
Table 4 - Potential visual impact assessment of views from adjoining residences	62

Executive Summary

Purpose

This urban design report has been prepared to form part of the Review of Environmental Factors for the WestConnex enabling works, Airport east precinct proposal.

In order to improve traffic flow and access to the Airport and Port Botany, as well as future connectivity to the proposed WestConnex motorway, Roads and Maritime Services are currently planning to upgrade various sections of roads located in the precinct east of the Airport. As Sydney Airport and Port Botany form two of Australia's most important international transport gateways, it is essential that safe and efficient connectivity is developed to them.

Guiding the future stages of development

This report will assist and guide future design stages of the proposal through appropriate and careful responses to the urban and landscape design issues associated with the Airport's interface with the transport corridor.

The future character of the Airport east precinct will be influenced not only by the proposal but also by any activities and works that may be carried out by several adjoining landowners and stakeholders. The interface between the proposed works and the requirements of adjoining landowners and stakeholders will be resolved in future stages of the project development. The relationship of the project to the advertising and adjacent development that is beyond the project boundary is likely to have a major influence on the overall project outcome.

An integrated corridor strategy is therefore desirable. However, as the proposal will only influence those elements within the project boundary achieving such an integrated outcome will require the major stakeholders and agencies to identify key issues and coordinate the development of an agreed desired character for the corridor.

Character and visual assessment

The context of the proposed upgrade works is described and illustrated to provide a framework in which the current design is assessed in terms of how it responds to the urban setting. A strong vision is presented for the revitalisation of the precinct, combined with road safety improvements. The landscape character and visual impact assessment as well as the urban design concept, have been prepared in parallel with the proposed road works design process to achieve an integrated and imaginative urban design outcome.

References

Preparation of this report has been guided by a number of relevant strategic policies and documents that include, but are not limited to:

- *Beyond the Pavement; urban design policy procedures and design principles*, RMS Centre for Urban Design, 2014
- *WestConnex Urban Design Framework*, RMS Centre for Urban Design, 2013
- *Sydney Airport Master Plan 2033*, Sydney Airport Corporation Limited, 2013
- *Environmental Impact Assessment Practice Note EIA-NO4: Guideline for Landscape Character and Visual Impact Assessment*, RMS Centre for Urban Design, RMS 2013

Urban Design Vision

The urban design vision for the WestConnex enabling works in the Airport east precinct is to create a distinctive and contextually integrated gateway that benefits all users including international and regional travellers, the local community, the broader city-wide community, as well as freight and transport providers. The urban design vision is to sympathetically resolve all aspects of environmental integration of the proposed works into a sculptural and visually engaging urban design outcome.

Objectives

Beyond the Pavement; urban design policy procedures and design principles (RMS Centre for Urban Design, 2014) describes Roads and Maritime Services urban design principles that are applicable to all projects. These principles have been incorporated within project-specific objectives, some of which have been amended to suit the WestConnex enabling works. The objectives include:

- a. Contribute to the urban structure and revitalisation
- b. Fit into the built fabric
- c. Connect movement modes and communities
- d. Respond to the natural pattern and landform
- e. Design the road corridor as an experience in movement
- f. Incorporate heritage and cultural contexts and values
- g. Create a self-explaining road environment
- h. Achieve an integrated and minimal maintenance outcome
- i. Create a site-specific gateway experience at the Airport
- j. Respond to the existing airport infrastructure and aesthetics.

Urban Design Principles

The urban design principles applied to this project respond to and incorporate the analysis, vision and objectives to provide an integrated and context-related response to the proposal site. The principles also employ design generators to assist in developing a contextually related concept. During future development stages of the proposal the design generators can be refined in response to changes that may occur to the proposal objectives and also to simplify the design outcomes. The objectives, strategies and principles provided in this report relate to the works within the proposal site boundary only.

Design considerations

Specific design considerations for each of the components and zones of the project have been developed for the purposes of the REF and would require agreement and further development with stakeholders and agencies in future stages of the project's development. The design strategies for specific areas within the project are covered in the main section of this report.

General Holmes Drive / Joyce Drive Upgrade

The urban design principles for this component of the project propose a streetscape response that incorporates sculptural landforms and endemic vegetation species, together with integrated public art to create a distinctive 'General Holmes Drive / Joyce Drive Upgrade' area.

Principles

The following principles could improve the visual amenity, with the agreement of adjoining property owners and stakeholders:

- Integrate elements of the proposal with features in the existing corridor to create a context related design

- Provide traffic calming and appropriate safety features where road widening occurs
- Maintain view corridors to existing advertising
- Provide robust, contemporary low maintenance landscape design that responds to the natural and built context of the area
- Consider the Airport east-west runway flight path Obstacle Limitation Surface in design proposals
- Consider opportunities to integrate public art to enhance the streetscape
- Consider upgrading utilities to improve the streetscape
- Provide a high quality urban design outcome along General Holmes Drive / Joyce Drive that responds to the sense of arrival and departure at the Sydney international airport.

Design considerations for this area of the project corridor are detailed in Section 5.2 of the report.

The Gateway

The proposed extension of Wentworth Avenue, which will involve development of a new railway underpass and intersection with General Holmes Drive, will create a new ‘Gateway’ to the Airport. West of the Wentworth Avenue rail bridge underpass, the road will ascend to a new intersection at General Holmes Drive. From this ‘Gateway’ intersection, panoramic views could be opened up to extend across the airport runways. The existing General Holmes Drive at-grade rail crossing will be terminated, to significantly improve safety.



Artist’s impression of the rail bridge over the proposed Wentworth Avenue extension (subject to consultation and design refinement)

Principles

The following principles are to apply for works within the proposal site boundary and include but are not limited to:

- Create a memorable experience at the Airport interface area through an integrated road and urban design response
- Create new infrastructure structures that are of high quality and appropriate to the context

- Provide an upgraded landscape through a design solution that integrates indigenous vegetation planting with new gently undulating coastal dune landforms
- Consider the design of utilities to improve the streetscape.

Design considerations for this area of the project corridor are detailed in Section 5.3 of this report.

Coastal Sydney

Restoration of the currently degraded landscape associated with this area will form an integral component of the proposal and result in the creation of a distinctly Coastal Sydney landscape character that will enhance the visual experience of travellers passing through the precinct adjoining the eastern edge of Sydney Airport.

Principles

Principles to be applied to urban design associated with the proposed works within the proposal site boundary and could include:

- Create a high quality landscape design that emphasises the indigenous coastal landscape character of the site context
- Open up views to the airport runways and infrastructure where possible to reinforce the sense of place and arrival that will assist 'wayfinding' and orientation
- Consider the design of utilities and road safety elements, such as fences, to improve the streetscape and landscape quality.

Design considerations for the design of this area of the project corridor are detailed in Section 5.4 of this report.

Urban Sydney – Mascot Interface

The intended outcome for the Urban Sydney – Mascot Interface area is to emphasise and enhance the existing urban character of Mascot and thereby integrate the new works into the urban context. Wentworth Avenue and Botany Road are proposed to be widened to accommodate increased traffic flows. A new shared path would be constructed together with street tree planting and other landscape works where possible. A new pocket park would be created at the south east corner of the Botany Road / Wentworth Avenue intersection together with landscape works on the north east corner. The proposed intersection changes would provide a new public amenity in the area.

Principles

The following principles should be adopted for works inside the project boundary within the Urban Sydney – Mascot Interface area:

- Consider enhancing the streetscape by context related landscape design
- Revitalise the public realm, including creation of a new pocket park, intersections design, median design and the new shared path that form part of the project
- Extend the existing formalised landscape design of local roads
- Provide public transport amenities that include shelters at bus stops, pedestrian crossings and sections of shared path
- Remove the existing rail level crossing to improve the movement of freight trains servicing Port Botany.
- Provide new road furniture, signage and safety barriers
- Consider the design of utilities to improve the streetscape character
- Consult with the local community, agencies and stakeholders in the area in relation to the detailed urban design aspects of the proposal.

Design considerations for this area of the project corridor are detailed in Section 5.5 of this report.



Artist's impression of the corner of Wentworth Avenue and Botany Road (subject to consultation and design refinement)

Visual and Landscape Character Assessment

The Visual and Landscape Character Assessment indicates that the overall visual impact of the proposed upgrade works incorporating the mitigation measures will generally be moderate, with moderate to high impacts in some locations associated with removal of existing large street trees. Results of the visual impact assessment are summarised on the page that follows each of the four main components of the Strategy.

General Holmes Drive / Joyce Drive Upgrade

The proposed upgrade works along Joyce Drive and General Holmes Drive will result in wider sections of road corridor. Short term construction impacts, including removal of roadside trees, will initially result in high visual impacts in some locations. The visual impacts will moderate over time as mitigation strategies, such as the screen planting of shrubs and trees begin to mature. The corridor will be revitalised and road users will experience safer conditions and improved visual amenity around the eastern precinct of the Airport by employing the design principles and strategies outlined in the report.

Urban Sydney – Mascot Interface

The proposed changes to the intersection of Wentworth Avenue and Botany Road will result in road widening in the neighbourhood of Mascot. Under the proposal, the streetscape will be significantly modified by changes to the intersection and construction of a new rail bridge over the proposed extensions of Wentworth Avenue. There will be a high visual impact resulting from significant loss of street trees along both Botany Road and Wentworth Avenue as part of the road widening works as well as development of a new shared path. However, this initial visual impact will be mitigated by the removal of overhead powerlines as part of the works together with extensive tree planting and other landscape works in Dr Darragh Reserve, which will form a visually prominent pocket park that will provide shade and visual contrast with adjoining buildings. The Reserve will be visually and physically connected to the Beckenham Memorial Church. The future status of the church is not determined at this stage of the proposal but will be subject to further consultation with the various stakeholders.

Future detailed urban and landscape design will need to address potential visual impacts and identify design solutions to mitigate the potential impacts and integrate the urban design components with the road works design. Opportunities for

enhanced visual outcomes will be identified in detailed stages of the proposal development, which will involve consultation with Council, the community and stakeholders, to achieve a high quality public domain outcome.

Coastal Sydney

Retention of the remnant wetland area combined with ecological restoration and landscape works in this area between General Holmes Drive and Botany Road north of Mill Road should aim to make a major contribution to the creation of a memorable gateway to the eastern precinct of Sydney Airport.

Mitigation of impacts

Further development of mitigation measures is required during the detailed design stages of the proposal to ensure high quality outcomes. Mitigation of potential visual impacts should be considered throughout the whole design and construction process. Considerations for mitigation measures to improve the design outcome include:

- Engagement of qualified urban and landscape designers for all future stages of the proposal
- Further consultation with the local community, relevant stakeholders and agencies in relation to the urban design components of the proposal to achieve high quality outcomes
- General Holmes Drive / Joyce Drive Upgrade – creation of a high quality airport corridor that enhances safety and the visual experience for all road users
- The Gateway – creation of a new intersection that is commensurate with the Airport's role as a primary 'gateway' to the city of Sydney
- Coastal Sydney – retention of the existing wetland endangered ecological community and creation of new landscape that incorporates landforms reflecting the coastal dune landscape and plant species that occur naturally in the Eastern Suburbs Banksia Scrub vegetation association
- Urban Sydney – Mascot Interface – preparation and implementation of a contextually related design that improves safety and the quality of the public domain in eastern precinct of Sydney Airport.

Future consultation and design development

The urban design strategy presented in this report will form input to further design development of the proposal, including preparation of the REF and the detailed design and documentation of the proposal. Stakeholder and community consultation will take place in all subsequent phases of the proposal development. Improvements to the visual quality of the proposed upgrade works are to be identified and incorporated in future design stages of the proposal.

The overall urban design for the proposal should result in a project of merit that revitalises this local area and improves safety and visual outcomes. It is also expected to improve the movement of freight trains servicing Port Botany and ameliorate traffic congestion at the Airport for users as well as the local community.

1.0 Introduction

1.1 Background

Sydney Airport and Port Botany form two of Australia's most important international gateways. Roads and Maritime Services proposes to upgrade various sections of road located in the precinct east of the Airport in order to improve the movement of freight trains servicing Port Botany, traffic flows and access to the Airport and Port Botany as well as connectivity to the future WestConnex motorway.

1.2 Scope and Purpose of this Report

This report describes and illustrates an urban design strategy for the proposed upgrade works, their context and how the strategy responds to site-specific issues. Potential visual impacts are also identified together with mitigation measures to form part of the Review of Environmental Factors.

The urban design strategy has been prepared in parallel with the road/rail engineering works design by Roads and Maritime Services in order to achieve an appropriate and integrated outcome.

Preparation of this urban design report has involved:

- Site inspections and photographic recording of the proposal site and assessment of the landscape character
- Desktop review of relevant documents relating to the proposal site and surrounding areas as well as the proposed rail underpass and road works concept design
- Establishing urban design principles in line with *Beyond the Pavement*, the Sydney Airport Master Plan and project-specific goals and objectives
- Developing preliminary urban and landscape design concepts in line with proposal design principles
- Involvement in multidisciplinary workshops
- Drafting the report to form an Appendix to the main Review of Environmental Factors for the proposal.

A Visual Assessment of the proposed works has been prepared in accordance with the Environmental Impact Assessment Practice Note EIA-N04 (Roads and Maritime Services, 2013). Recommended visual mitigation measures are included in the assessment together with options to improve the visual quality of the proposal area.¹

1.3 Future Proposal Development

The strategy presented in this urban design report will form input to future design development of the proposal, including preparation of the Review of Environmental Factors and the detailed design and documentation process. Stakeholder and community consultation will take place in all subsequent phases of the project development and this strategy will guide future stages of the design process.

Improvements to the visual qualities of the proposed upgrade works are to be identified and incorporated in future design stages of the proposal. Improvements need to be addressed in accordance with the relevant environmental planning documents and processes. Any recommended design modifications should be incorporated in order to achieve a high quality urban design outcome.

¹ Environmental Impact Assessment Practice Note, RMS Urban Design Centre, EIA Practice Note, RMS 2013

1.4 Structure of the Report

The report has been structured to clearly identify the proposal's opportunities and constraints and to describe and illustrate the urban design strategy.

Chapter 2.0 'The Proposal + Context' describes and illustrates the nature and extent of the proposed works, the regional and local context of the proposal, an analysis of the urban environment and a summary of character zones.

Chapter 3.0 'The Urban Design Vision' describes the urban design vision and objectives for the proposal.

Chapter 4.0 'The Urban Design Strategy' summaries the urban design strategy for the proposal to guide further development of the concept and detailed design process. The strategy responds to the analysis, the proposal vision, objectives and principles.

Chapter 5.0 'The Urban Design Principles' includes principles to assist in the design development of the corridor. The principles govern items that are included in the proposal scope at this stage of the design process.

Chapter 6.0 'Landscape Character and Visual Impact Assessment' identifies the Proposal's potential impact on landscape character, and presents a Visual Assessment of the proposal that is prepared in accordance with Roads and Maritime Services EA Visual Assessment Guidelines.

Chapter 7.0 'Conclusion, Mitigation and the Next Steps' succinctly describes the key strategies and principles to be adopted within the next phase of the proposal.

Appendices are also provided to present additional detailed information.

1.5 Definitions

The following definitions describe the use of certain terms in this report. Definitions have been sourced from relevant Roads and Maritime Services policies in consultation with Roads and Maritime Services staff.

Landscape character is the combined quality of built, natural and cultural aspects that make up an area and provide its unique sense of place.

Landscape design is a subset of urban design and can refer to the shaping of the external spaces and constituent elements (earthworks, vegetation, paths, walls, barriers, drainage etc.), excluding the alignment, built structure, architecture, bridges and tunnels.

Urban design as carried out by Roads and Maritime Services is the process and product of design projects that:

- fit sensitively with the built, natural and community environment
- contribute to the functioning of the community
- contribute to the quality of the public domain for the community and road users.

It is the shaping of the whole project and all its constituent parts.

2.0 The Proposal + Context

2.1 The Proposal

Two of Australia's most important international gateways are formed by Sydney Airport and Port Botany. The roads around the Airport and Port Botany are becoming increasingly congested due to the rising number of movements by passenger and freight vehicles. Roads and Maritime Services is therefore proposing to undertake upgrading works to address this congestion, including:

- Widening Joyce Drive and General Holmes Drive between O'Riordan Street and Mill Pond Road to three lanes in each direction
- Removal of the General Holmes Drive rail level crossing to create a major safety upgrade
- Construction of a new rail bridge to accommodate a road underpass as an extension of Wentworth Avenue that will connect to General Holmes Drive
- Provision of new signalised intersections at Wentworth Avenue / Botany Road, General Holmes Drive / Botany Road and General Holmes Drive / Wentworth Avenue extension
- Improvements to the Mill Pond Road intersections with General Holmes Drive and Botany Road to support future growth and access demand to Sydney Airport
- Provision of sections of shared path along Botany Road and Wentworth Avenue
- New bus provisions.

2.2 The Proposal Site and its Regional Context

The proposal site is located in the south-eastern suburbs of Sydney bordering the northern shore of Botany Bay and includes interfaces with two of Sydney's major transport and freight infrastructure components – Sydney Airport and Port Botany.

The urban interface between Mascot and the Airport is characterised by single story residential properties generally of the 1930-1970's era with avenue style streetscapes. There are some medium density residential buildings and midrise hotel buildings near or within the proposal site. A mixture of industrial, commercial and residential buildings is located near the site and around the Airport, with a combination of high and low traffic volume roads. A number of well established motorway connections, ramps and underpasses are located in the precinct together with a freight rail corridor. The rail corridor visually separates the Mascot residential development from the Airport and transport corridors. The urban fabric, land use and transport connections are complex in layout, resulting from the strategic and close relationship between the Airport and the business centre of Sydney.

The Sydney Airport Master Plan and recent planning approvals encourage an increase in commercial buildings in the interface areas between existing residential development and airport land. Consequently more of this type of development is likely in the future.

Within the Airport precinct the experience of road users is dominated by transport infrastructure and industrial development that includes advertising, retail and commercial enterprises. Road users may also experience views across the Airport from a small section of General Holmes Drive.

General characteristics of the context of the proposal site are identified in Section 2.3, while the landscape character of the proposal site is detailed and illustrated in Section 2.5.3.

2.2.1 Road network study² – WestConnex to Port Botany and airport areas

Roads and Maritime Services plans to upgrade roads in the Sydney Airport east precinct and remove the General Holmes Drive level crossing of the railway line. These works are intended to improve the movement of freight trains servicing Port Botany and to increase road safety, traffic flow and vehicle access to the Airport, Port Botany and connection to the future WestConnex project.

Figure 1 below illustrates the proposal site in the context of existing road connections.

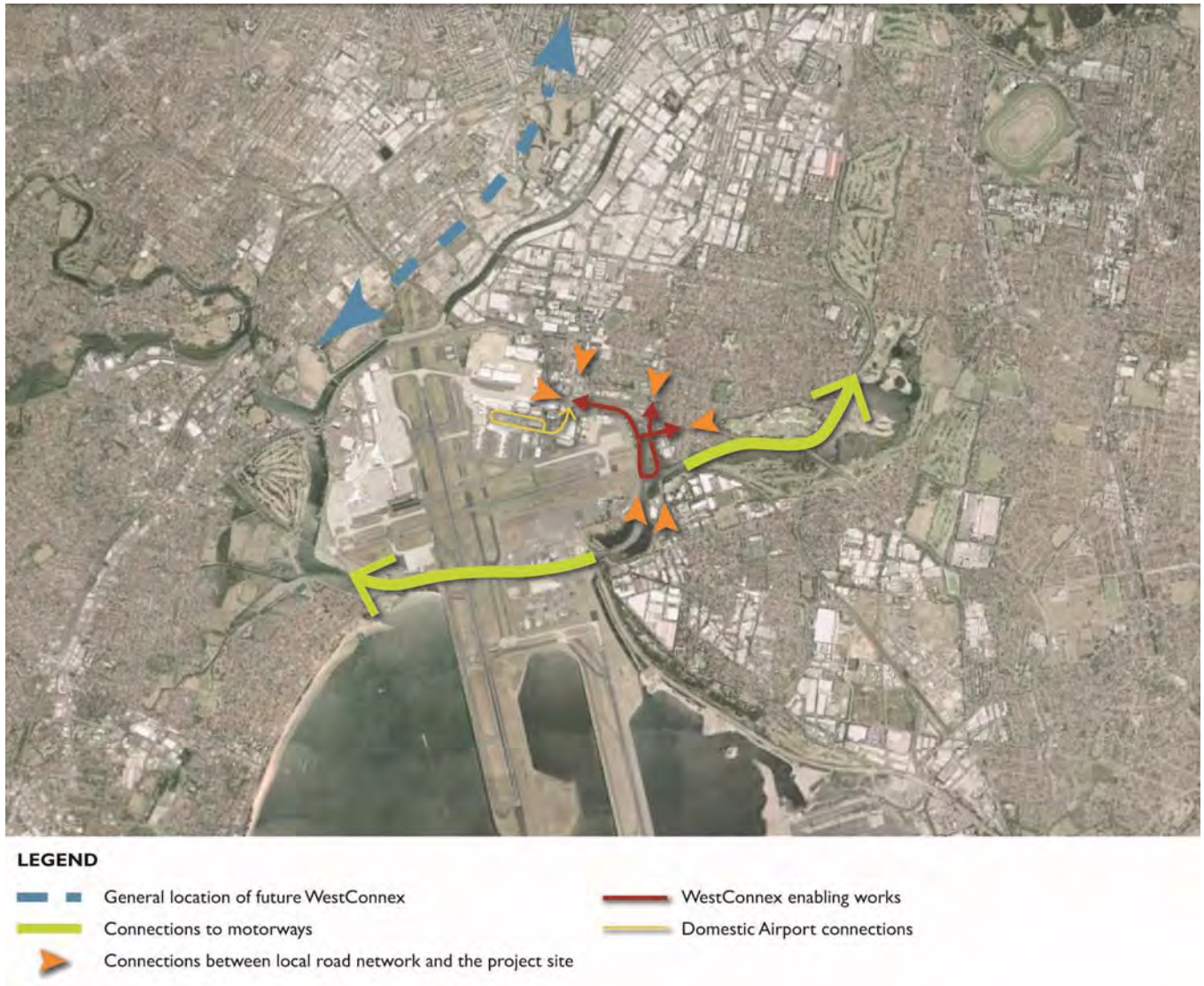


Figure 1 - The proposal site in the context of existing road connections

2.2.2 Community involvement

Community consultation on the strategic concept design of upgrade works within the Airport east precinct was carried out by Roads and Maritime Services in November and December 2013. Feedback received has been taken into account and will be addressed in the Community Issues Report, which will be available at www.rms.nsw.gov.au/roadprojects/AirportEast or on request.

Additional opportunities for community comment will be provided in future stages of the proposal and when the concept design and Review of Environmental Factors are displayed.³

² Please note this is not Traffic Network Analysis; which is covered in other reports / studies. This is an urban fabric and associated road layout study

³ http://www.rms.nsw.gov.au/roadprojects/projects/sydney_region/southern_sydney/westconnex_enabling_works/documents/131114_westconnex_community_update_november_2013.pdf

2.3 Local Context

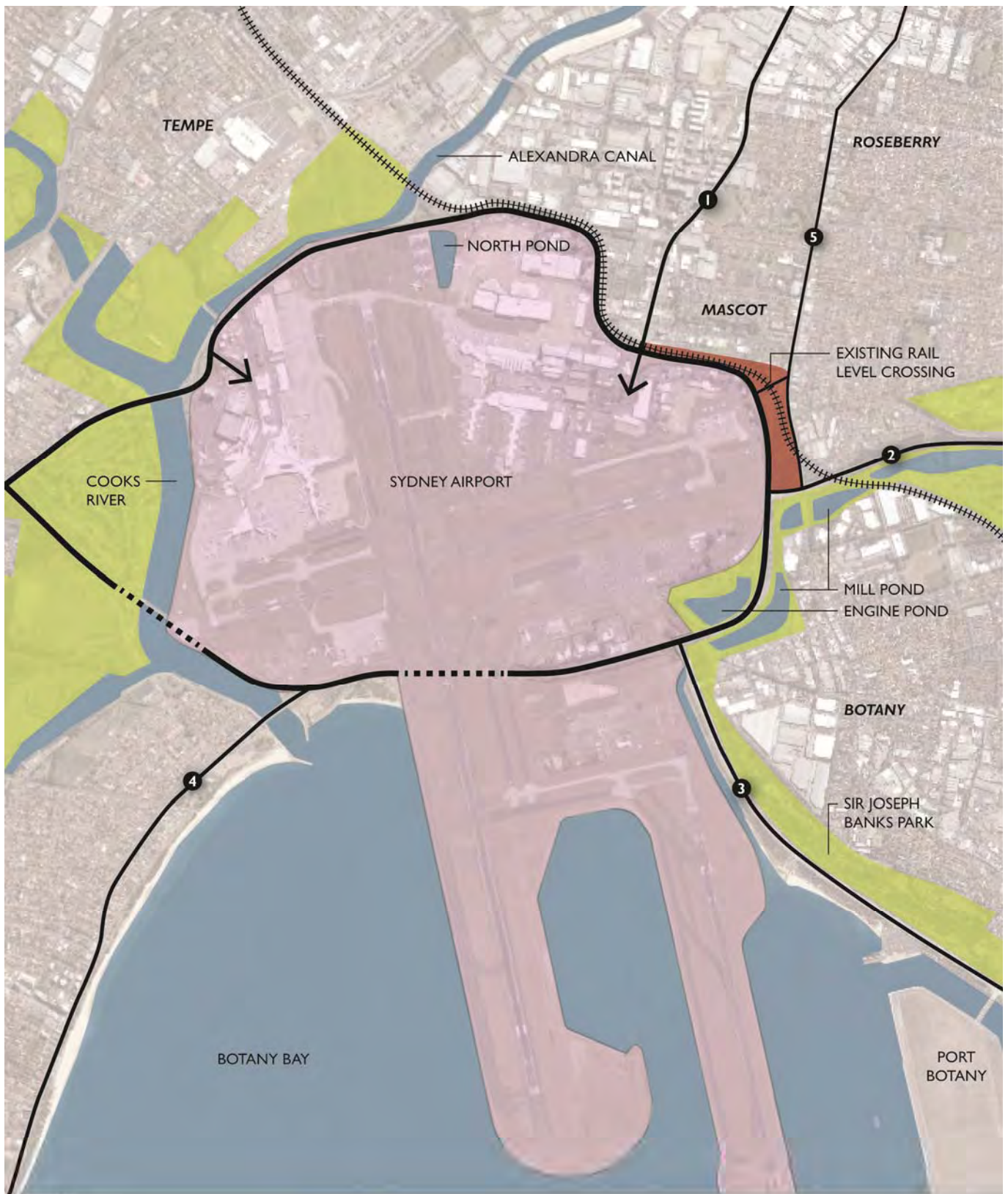
Sydney International Airport dominates the local context of the proposal site as a result of its size and flat nature and the constant movement of vehicles and planes. Additionally, Mascot is a support hub of industry for the Airport. The proposal site is located at the interface between the Airport and the urban area of Mascot. The railway line to Port Botany is elevated on an embankment and separates the Mascot urban area from the Airport, both physically and visually. The proposal can be defined as a high use transport corridor on the eastern side of the Airport.

Open spaces, parklands and golf courses in the vicinity of the proposal site are of significant recreation and scenic value. Sir Joseph Banks Park, which adjoins Foreshore Drive and Botany Bay south of the proposal site, is a 28ha parkland area in which the Sir Joseph Banks Pleasure Gardens are located. Both the Cooks River and Alexandra Canal, which are located west of the Airport, are channelised waterways flowing to Botany Bay and are adjoined by extensive open space and a golf course.

Residential development in the suburbs of Mascot and Botany, which adjoin the proposal site, is characterised by low density housing in the form of post-war detached single-family cottages and houses. Some new infill of medium to high density residential development has taken place, often on former industrial land.

The urban character of these suburbs strongly contrasts with that of Sydney Airport, which is characterised by large scale buildings, infrastructure and extensive flat and visually open areas occupied by runways and aprons.

The local context of the proposal site is illustrated on Figure 2 on following page.



LEGEND

- ① O'Riordan Street
- ② Southern Cross Drive
- ③ Foreshore Road
- ④ General Holmes Drive
- ⑤ Botany Road

- WestConnex Enabling Works project site
- Open space
- Botany Bay / canal / wetland / pond
- Sydney Airport
- Airport loop road

- Freight rail line servicing Port Botany
- Arterial road connection to airport

0 1 km



Figure 2 - Local context

2.4 Relevant Strategic Policies and Documents

A number of relevant strategic policies and documents have been referred to in the preparation of this report, including:

- *Beyond the Pavement; urban design policy procedures and design principles*, RMS, 2014
- *Bridge Aesthetics: Design guidelines to improve the appearance of bridges in NSW*, Centre for Urban Design, RMS, 2012
- *City of Botany Bay Bicycle Plan*, 1996
- *Environmental Impact Assessment Practice Note EIA-NO4: Guideline for Landscape Character and Visual Impact Assessment*, RMS Centre for Urban Design, RMS 2013
- *Landscape Guideline: Landscape design and maintenance guidelines to improve the quality, safety and cost effectiveness of road corridor planting and seeding*, RMS, 2008
- *NSW Bicycle Guidelines*, RMS, 2003
- *NSW Long Term Transport Master Plan*, Transport for NSW, 2012
- *Sydney Airport Car Parking & Commercial Facilities International Terminal Precinct Major Development Plan*, 2005
- *Sydney Airport Master Plan 2033*, Sydney Airport Corporation Limited, 2014
- *Sydney Airport Office Development International Terminal Precinct Major Development Plan*, 2002
- *Sydney Airport Runway Safety Enhancement Runway 25 - Runway End Safety Area Major Development Plan*, 2008
- *WestConnex enabling works – Airport east precinct Biodiversity Assessment*, SMEC Pty Ltd, 2014

A bibliography is provided in Section 8.0.

2.5 Urban Analysis

2.5.1 General

The proposal site is defined by Joyce Drive, General Holmes Drive, Mill Pond Road, Botany Road and Wentworth Avenue. The Port Botany freight railway line divides the site into two portions each with a very different character. The eastern portion is dominated by urban development in the suburb of Mascot while the character of the western portion is defined by Sydney Airport and associated road infrastructure.

The key elements of the proposal site, which are identified in Figure 3, include:

- The eastern interface with the suburb of Mascot, which is characterised by a mixture of residential, commercial and industrial development, predominantly in the form of low density housing with some medium density redevelopment and pockets of industrial development
- The commercial centre of Mascot, which is located along Botany Road adjoining the northern extent of the proposal site
- Significant public open spaces within the suburb of Mascot, including L'Estrange Park and John Curtin Reserve in the vicinity of Botany Road
- The western portion of the proposal site is visually dominated by vehicular movements along the major transport corridors that service Sydney Airport and Port Botany
- The area located south of the existing railway level crossing between the railway line embankment and General Holmes Drive has been highly disturbed and is characterised by flat landform together with low vegetation generally composed of weed species, some remnant native species and an area of wetland. A major concrete-lined drainage channel runs through the area flowing south to the Mill Pond.



LEGEND




- | | |
|---|--|
|  Existing residential building |  Existing road side trees defining corridor |
|  Existing commercial building |  Degraded landscapes |
|  Existing industrial building |  Existing ponds / wetlands / culvert |
|  Existing airport building |  Existing railway corridor |
|  Existing cultural building |  Existing advertising signs |

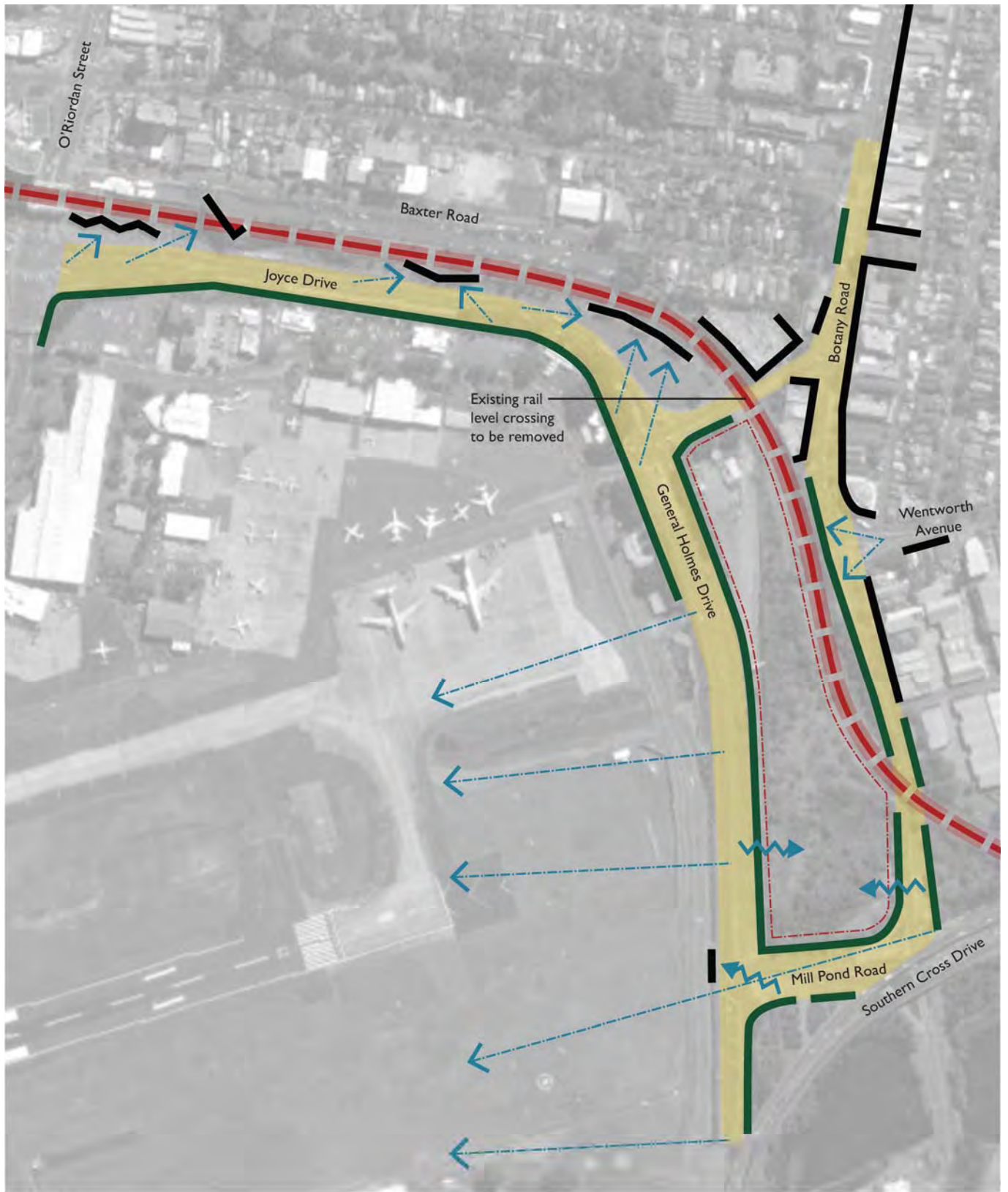


Figure 3 - Urban and landscape structure

The visual experience of motorists and pedestrians moving through the proposal site is defined by a combination of buildings, other structures, landforms and vegetation as illustrated on Figure 4.

Key components of the visual environment include:

- The section of Joyce Drive east of the O’Riordan Street intersection, which is visually enclosed by large advertising signs along the northern edge and a combination of roadside trees and buildings along the southern edge; road users have limited opportunity to view the Airport from this section of the road corridor due to a hedge of shrubs and advertising signs
- South of the General Holmes Drive railway level crossing the road corridor visual character is defined by trees on both sides for a short section and then opens up to the west to provide long distance views across the airport runways and aprons, while the eastern edge is defined by planted roadside shrubs and weeds
- The area between General Holmes Drive and the railway corridor, which is highly disturbed and degraded by extensive weed growth is visually enclosed by vegetation and the railway embankment
- The western edge of Botany Road south of the General Holmes Drive railway crossing is visually enclosed by trees and the railway embankment, with buildings and street trees located along the eastern edge of Botany Road
- The section of Botany Road north of the General Holmes Drive railway crossing is visually enclosed by commercial and residential buildings on both sides.



LEGEND

- Existing primary view
- Potential view currently blocked
- Road corridor
- View from road corridor blocked by vegetation
- View from road corridor blocked by built form
- Railway embankment / corridor
- Visually enclosed space



Figure 4 - Visual analysis

2.5.2 General Holmes Drive / Joyce Drive Analysis

Airport retail / commercial hubs

The international and domestic terminals at Sydney Airport are significant commercial and retail hubs that serve local and international customers and trade. Advertising associated with these activities extends in to adjoining road corridors as illustrated in Figure 5, which shows an area along Joyce Drive and General Holmes Drive.



Figure 5 - Photograph of existing signage along Joyce Drive

Airport advertising along Joyce Drive and General Holmes Drive

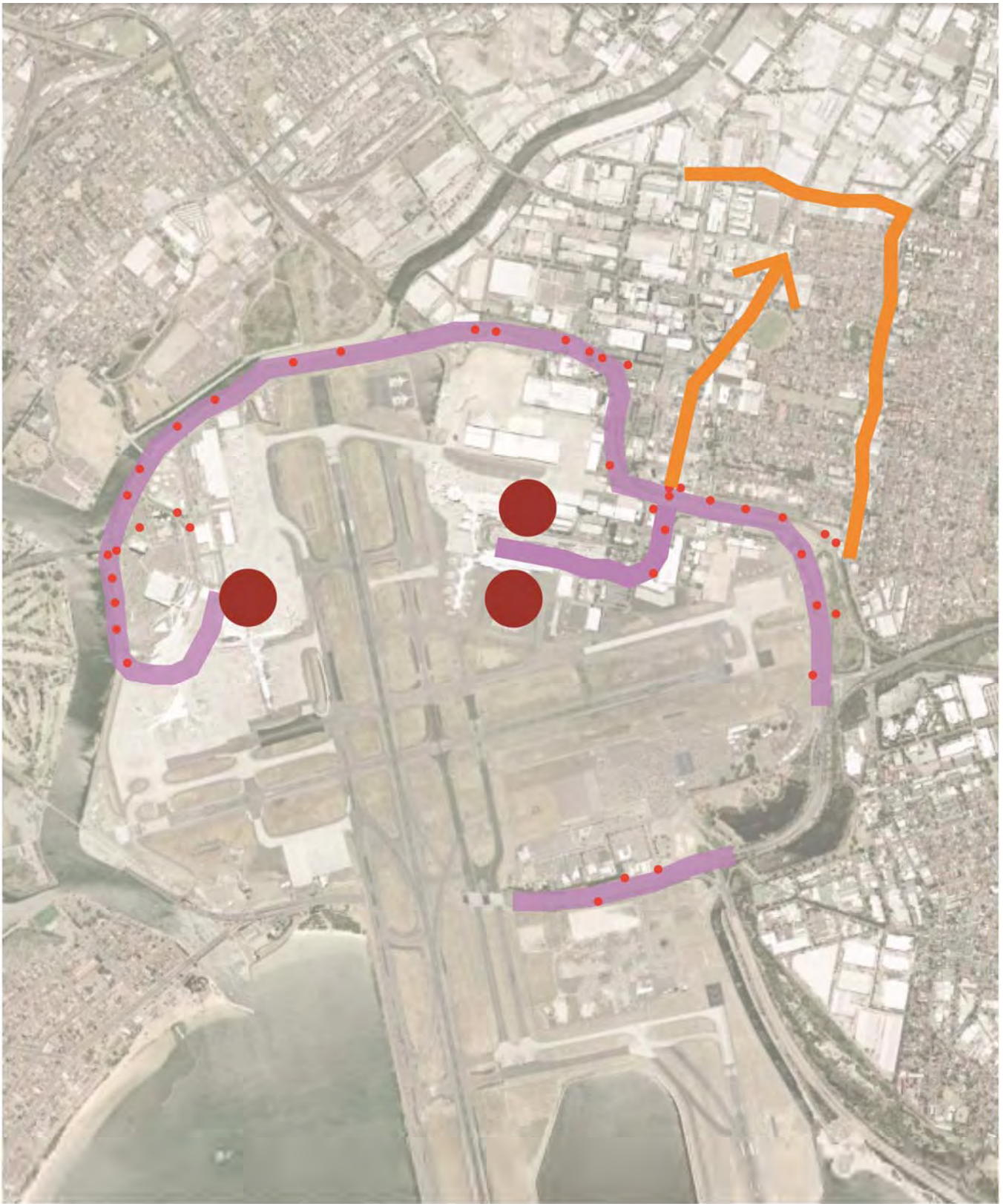
The advertising associated with the retail activities in the Airport terminal buildings is illustrated in Figure 6. The Airport advertising corridor has large, frequently changing physical advertising signage that generates revenue. It also forms a major aspect of the visual experience of motorists travelling along the road corridor.

Branded stores / hotels / commercial areas on Joyce Drive

Branded stores / outlets and hotels are also associated with Joyce Drive, as part of the retail /commercial facilities of the Airport. These commercial / retail areas require easy and legible access together with advertising for their economic viability.

Local strip commercial and retail areas

The retail analysis in Figure 6 also indicates the local retail 'strips' in Mascot and Botany that form part of the retail and commercial connections to the Airport's retail activities. These 'strip shops' are important for local communities, including personnel working at the Airport, as they provide important economic activity in the area. The suburbs of Mascot and Botany have historically provided specialised retail and commercial activities along local roads and streets, renowned for discounting, specialised products and services at low prices that reflects low rentals and direct access to freight distribution areas in and around Port Botany and the Airport. This urban form is comparable to many other cities that have airports close to the city centre.



LEGEND



Retail Node.
Main terminal building
commercial centres



Retail strip.
Retail shopping streets
in Mascot and Botany



Advertising Sign.
Advertising signs along the
ring road at the airport



Advertising Corridor.
Advertising supporting the
retail and commmmercial
offerings at the airport

Figure 6 - Existing retail and advertising analysis

2.5.3 Landscape Character Zones

The assessment of landscape character presented in this report provides a description of the existing context in which potential impacts can be identified and assessed⁴. Six Landscape Character Zones associated with the proposal site were identified that are relatively consistent in terms of their combination of landform, vegetation, buildings and infrastructure.

A Landscape Character Impact Assessment is presented in Section 6.0. The visual sensitivity and magnitude of potential impacts for each of the Landscape Character Zones are identified in Section 6.2.

The Landscape Character Zones presented on Figure 7 include:

- Landscape Character Zone 1 – General Holmes Drive / Joyce Drive streetscape
- Landscape Character Zone 2 – General Holmes Drive corridor
- Landscape Character Zone 3 – Landscape area east of General Homes Drive
- Landscape Character Zone 4 – Coastal Sydney Freshwater Wetlands
- Landscape Character Zone 5 – Urban development of Mascot and Botany
- Landscape Character Zone 6 – Sydney Airport

Each Landscape Character Zone is described and illustrated on the following pages.

⁴ Environmental Impact Assessment Practice Note, RMS Urban Design Centre, EIA Practice Note, RMS 2013



LEGEND

- Zone 1 - Joyce Drive
- Zone 2 - General Holmes Drive corridor
- Zone 3 - Landscape east of General Holmes Drive
- Zone 4 - Coastal Sydney Freshwater Wetlands
- Zone 5 - Urban development of Mascot and Botany
- Zone 6 - Sydney Airport



Figure 7 - Landscape Character Zones

Landscape Character Zone 1 – General Holmes Drive / Joyce Drive streetscape

Key characteristics:

- Visually enclosed road corridor with high traffic flows connecting to the Airport and freight rail line to Port Botany
- Large scale advertising signs with turf slope in foreground
- Exotic and indigenous formal plantings along the road corridor
- Mature trees along the Airport side of Joyce Drive with a variety of commercial buildings and structures partly visible to motorists.



Joyce Drive looking west with advertising on north side and mature trees along south

Landscape Character Zone 2 – General Holmes Drive corridor

Key characteristics:

- Northern portion of the road corridor that is visually enclosed by roadside trees on both sides
- Southern portion of the corridor has views to the west extending across flat landform of the airport runway and aprons, with the movement of aircraft forming an engaging visual element
- Along the eastern edge of the roadway planted shrubs and weeds block views that could potentially extend over the low-lying landscape and wetland area to the railway embankment
- At the intersection of Mill Pond Road and General Holmes Drive a large scale advertising sign and sections of hedge block potential long distance views across the Sydney Airport runways and aprons.



General Holmes Drive with roadside vegetation (L) and advertising along airport boundary at Mill Pond intersection (R)

Landscape Character Zone 3 – Landscape area east of General Holmes Drive

Key characteristics:

- The area between General Holmes Drive and the railway embankment south of the level crossing has been degraded by large scale regrading, construction of a major concrete lined drainage channel and extensive weed growth
- The landform has been highly modified by earthworks and placement of fill material (reclamation) over many decades
- Vegetation is dominated by weed species such as Lantana and Boneseed
- The area is visually enclosed by planted shrubs along the roadsides as well as invasion of weed trees and shrubs
- An area of wetland is located in the southern portion of this zone.



View east to railway embankment (L) and concrete lined drainage channel (R)

Landscape Character Zone 4 – Coastal Sydney Freshwater Wetlands

Key characteristics:

- The wetlands consist of a series of ponds that include areas of open water and surrounded by Bull Rushes
- Stands of indigenous trees and shrubs such as Casuarina and Melaleuca border the wetlands in many locations.



Wetlands with Bull Rushes and surrounding trees and shrubs

Landscape Character Zone 5 – Urban development of Mascot and Botany

Key characteristics:

- Predominantly commercial and industrial built form along Botany Road
- The visual character of the built form is variable in scale and form with larger scale structures, including industrial buildings south of the Wentworth Avenue intersection and adjoining the General Holmes Drive railway level crossing, with smaller post-war detached single-family cottages along Robey Street and Baxter Road
- Street trees commonly form part of the visual character but their health and appearance is variable, due to lopping carried out for overhead powerlines and communications cables
- Between Botany Road and O’Riordan Street the urban development is predominantly residential in character with street trees forming a significant element of the visual character
- Along Baxter Street immediately north of the railway corridor the visual character is variable and includes a large surface car park together with large buildings along the western portion and residential development at the eastern end.



Botany Road north of railway crossing (L) and view from Botany Road along side street (R)

Landscape Character Zone 6 – Sydney Airport

Key characteristics:

- The northern portion of the Airport east precinct is dominated by large scale buildings and structures with extensive paved areas used by aircraft
- The southern portion has a distinct visual character resulting from the flat landform, extensive areas of paved runways and taxiways with grassed aprons allowing long distance views
- Views to the west from the adjoining section of General Holmes Drive extend to the western edge of the Airport
- A key component of the visual character of the Airport is the movement of large aircraft on the ground and in the air as they take off and land.



View to west across airport

3.0 The Urban Design Vision

3.1 The Vision Statement

The urban design vision for the WestConnex enabling works in the Airport east precinct is to create a distinctive and contextually integrated gateway that benefits all users including international and regional travellers, the local community, the broader city-wide community, as well as freight and transport providers. The urban design vision is to sympathetically resolve all aspects of environmental integration of the proposed works into a sculptural and visually engaging urban design outcome.

3.2 Roads and Maritime Services Urban Design Objectives

Beyond the Pavement; urban design policy procedures and design principles (RMS Centre for Urban Design, 2014) describes Roads and Maritime Services urban design principles that are applicable to all projects. These principles have been incorporated within the project-specific objectives and strategies described in Table I below. Some of these have been amended to suit the WestConnex enabling works.

Table I - Urban design objectives

OBJECTIVE ONE	ELEMENTS
Contribute to the urban structure and revitalisation.	Consider the role of transport networks in the structuring of towns, cities and regions.
	Consider both transport and community needs in planning and design of road networks and hierarchies.
	Create streets and boulevards that provide a sense of place.
	Consider the potential opportunities for an increase in traffic volume over time.
OBJECTIVE TWO	ELEMENTS
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 proposal design.
	Avoid adverse visual impacts in the planning and design of roads.
	Consider the potential use of adjoining land.
OBJECTIVE THREE	ELEMENTS
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.
	Consider the intersections as significant nodes in the journey, providing the place with a sense of arrival and departure.
	Consult with community, agencies and stakeholders in the design and construction of the public realm, especially where new parkland spaces and streetscape improvements are required.
OBJECTIVE FOUR	ELEMENTS
Respond to the natural pattern and landform.	Form a road in response to topography and landform.
	Consider slope stabilisation design as part of the proposal.
	Integrate existing patterns and natural systems into the streetscape design.
	Ensure physical continuity of natural systems.
	Employ existing characteristics in the streetscape, landscape design.

OBJECTIVE FIVE	ELEMENTS
Design of the road as an experience in movement.	Enhance the view from the road.
	Provide visual stimuli within the road corridor.
	Create a progressive sequence of visual events.
OBJECTIVE SIX	ELEMENTS
Incorporate heritage and cultural contexts	Integrate historic buildings and precincts into road design thinking.
	Adapt and reuse heritage infrastructure in proposals.
	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.	
OBJECTIVE SEVEN	ELEMENTS
Create self-explaining road environments	Distinguish between the different functions and speeds of roads by differentiating their appearance.
	Improve the legibility of roads.
	Employ intersection design to assist with network legibility.
OBJECTIVE EIGHT	ELEMENTS
Achieve safe, 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. Provide an anti-graffiti strategy.
	Incorporate CPTED safety principles into all aspects of the design, especially in relation to fences, the new bridge, the railway line and the canal.
Create a simple, coordinated and neat composition of road elements along a corridor.	
OBJECTIVE NINE	ELEMENTS
Create a site-specific entry / exit experience at the Airport	Enhance views to the Airport from the road to create a unique airport experience for road users.
	Utilise the intersection functionality (stop / start) and sightlines to enhance legibility.
	Utilise the open space for the benefit of road users and create an landscape consistent with the Airport in the city.
	Create a sense of arrival / departure and excitement in the urban and landscape design in a sculptural and functional manner.
	Consider traffic movement and structure opportunities to minimise adverse effects at day and night.
OBJECTIVE TEN	ELEMENTS
Respond to the existing airport infrastructure and aesthetics.	Engage with Airport management to fully appreciate the opportunities for development and future growth in transport systems (air, road, and rail).
	Appropriately respond to the existing infrastructure, including the advertising, urban development, existing landscape, existing buildings and edge to Mascot and Botany.
	Create an urban and landscape design that responds to the open qualities of the Airport and airport infrastructure.
	Where trees currently screen buildings and infrastructure (such as along Joyce Drive and General Holmes Drive), and where existing trees are removed for construction, provide alternative screening; consider re-plantings trees and shrubs for screening.

3.3 Design Generators

Design generators are employed as catalysts for the urban design and proposal aesthetics in this report. The design generators adopted for the proposal are strongly influenced by the Airport and local neighbourhood to encourage contextually based design responses.

Aeronautics - flowing lines

The Airport dominates the proposal, as a response to the significant role it plays in the city of Sydney and state. Consequently, the design generators adopted for the airport side of the railway line relate to aeronautics and the natural environment.

Generator 1 – Bird flight paths: The flight paths of birds demonstrate smooth, flowing lines while the imagery of bird in flight is evocative.

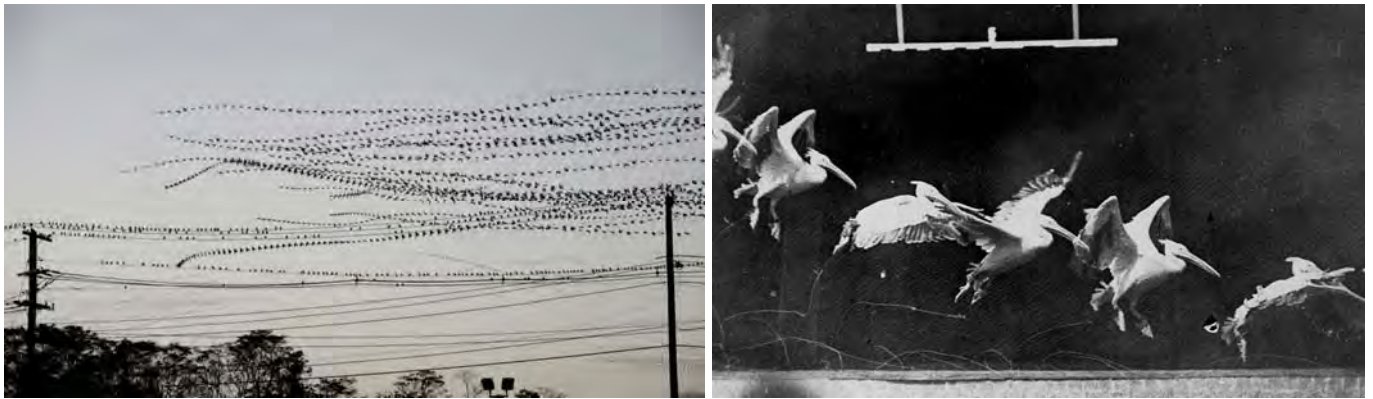


Figure 8 - Flight paths of birds by Dennis Hlynsky (left) and chronophotography of Étienne-Jules Marey (right)

Generator 2 – Aircraft flight paths: The elegant aesthetics of flight paths includes smooth, sinuous, flowing lines, sophisticated curves and elegant forms. The flowing organic lines provide an appropriate approach to assist in developing strategies for the design.



Figure 9 - Aircraft flight paths (source: Brisbane Investor)

Generator 3 – Sand dunes: Sand dunes dominated this site prior to the development of the city and Airport; the flowing lines of this endemic landscape form, which is related to the movement of wind and sand, provide a strong design generator for the proposal’s informal landscape aesthetic.



Figure 10 - The smooth lines of Australia's coastal sand dunes (source: queensland-australia.com)

Neighbourhood - local community and the public realm

The neighbourhood design generators are significantly different to those of the Airport. They are found in the urban areas of Mascot and Botany to the east and north of the railway line that visually separates the Airport from the urban areas.

Generator 4 – Avenues: Avenues of mature trees along local roads characterise the streetscapes of Mascot and can be found along Baxter Road, Botany Street and Wentworth Avenue. This streetscape character of shade tree avenues provides a strong design generator.

Generator 5 – Formal landscape at Wentworth Avenue: Previous upgrades of Wentworth Avenue have included formalised plantings with carefully maintained planter beds. Regarded as a design generator for the neighbourhood’s public realm, the formalised landscape should be extended to integrate the streetscape into the urban context.



Figure 11 - Avenue of street trees along Botany Road (left) and formal planting along Wentworth Avenue (right)

Other design generators

Other design generators that are also appropriate to the context and overall proposal aesthetics should be considered in future detailed design stages of the proposal, including. Stakeholders and the local community should be consulted through the design process that uses the design generators.

4.0 The Urban Design Strategy

This chapter outlines an Urban Design Strategy for the proposal that is to guide further development of the concept and the detailed design process. The strategy responds to the analysis, the proposal vision, objectives, principles and design generators. The aim of the Strategy is to achieve an integrated and context-related response to the landscape character zones identified in the analysis. The various components of the Strategy are described below.

General Holmes Drive / Joyce Drive Upgrade

The strategy for works within the proposal site is to create a distinctive streetscape that integrates sculptural landforms, public art and indigenous vegetation. Design strategies should be employed to mitigate the effects of road widening, buildings and infrastructure along Joyce Drive and improve the streetscape. The revitalized corridor and improved quality of the public domain could include opening views to the airport runways from some sections of General Holmes Drive, new lighting, legibility and safety measures. The outcome would be a new level of enjoyment for motorists arriving and departing the airport as well as improving road safety.

The Gateway

The proposed extension of Wentworth Avenue and development of an intersection with General Holmes Drive will form a new 'gateway' to the Airport. Design of the rail bridge, road underpass retaining walls and other structural elements together with lighting and signage should be integrated to reinforce the gateway function of the new section of Wentworth Avenue. The upgraded intersection of Botany Road and Wentworth Avenue will provide an opportunity for the creation of a visually distinctive gateway through the application of urban and landscape design that is integrated with the road works and signage. Opening views to the airport runway would provide a highly desirable 'placemaking' outcome.

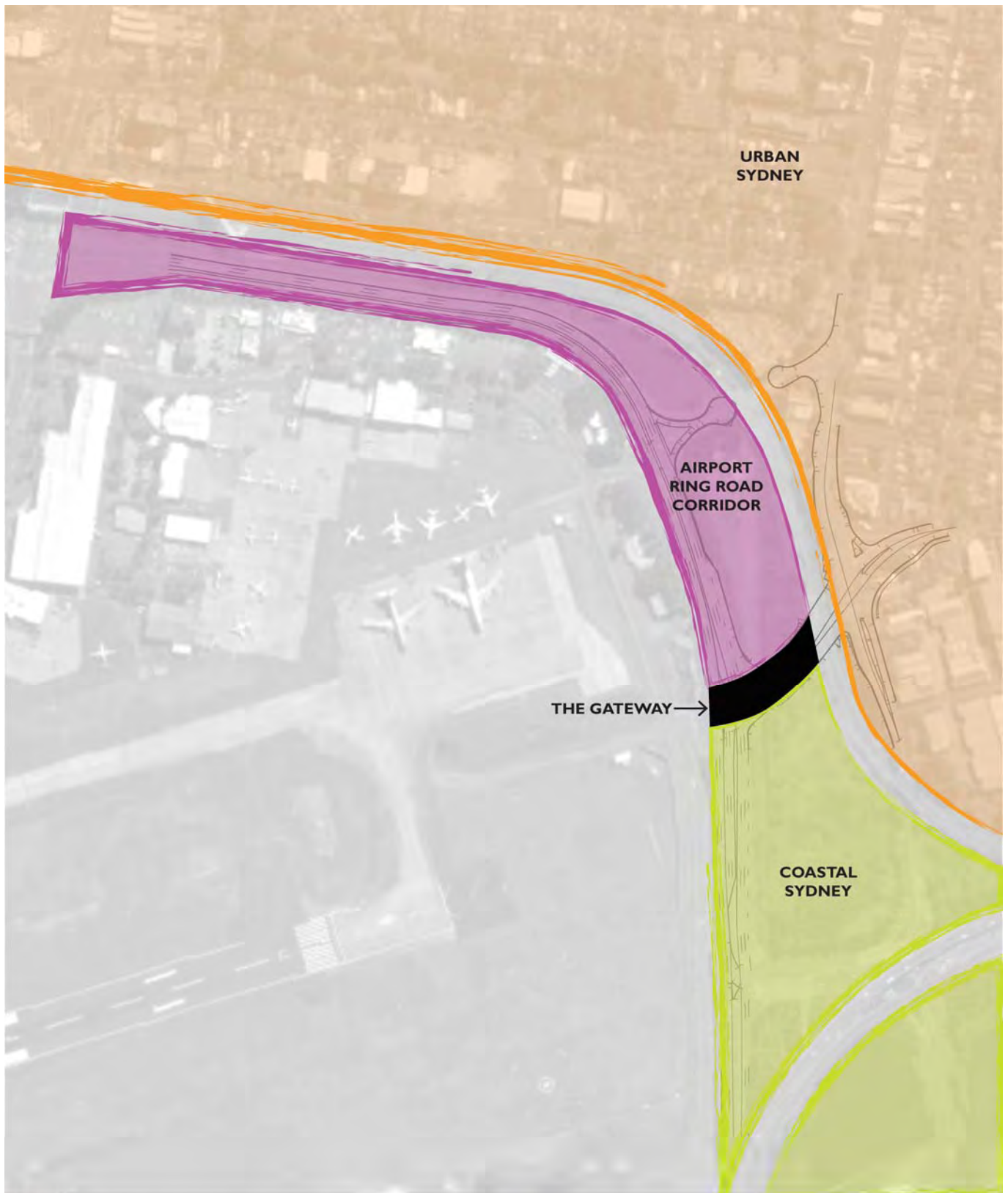
Coastal Sydney

Restoration of the existing degraded landscape area south of 'The Gateway' will form an integral component of the proposal. It will result in the creation of a distinctly Coastal Sydney landscape character that will enhance the visual experience of travellers arriving and departing Sydney Airport. The sand dunes that formed a key component of the original landscape character in the area will be reflected in the new landforms that will contrast with the existing flat landform of the Airport. This increase in landform variation will create visual interest and help to integrate the road works and structures in to the landscape setting. Opening views to the airport runways and across the wetlands would make a major contribution to 'placemaking' and the visual experience of motorists.

Urban Sydney – Mascot Interface

Upgrading the intersection of Botany Road and Wentworth Avenue will create opportunities to implement improvement works to improve the urban character of the area. The interface between the railway corridor and urban areas of Mascot and Botany will be modified along sections of Botany Road and Wentworth Avenue within the proposal site. A shared path network will be created to improve safety and connectivity for cyclists and pedestrians, providing sustainable connections between urban areas adjoining the Airport. A new pocket park will mitigate the effects of removing street trees along both Wentworth and Botany Roads, and provide new public open space for the local community. Design of the new pocket park and adjoining streetscape needs to be undertaken in consultation with the community, Council and other stakeholders.

These four components of the strategy are illustrated in Figure 12 and discussed on the following pages.



LEGEND

- 

General Holmes Dr./ Joyce Dr. Corridor.
Strong urban theme, character defined by existing formal structure (including advertising) within the corridor
- 

The Gateway.
Gateway emphasised by juxtaposition of Airport, Coastal and Urban landscapes
- 

Coastal Sydney.
Character defined by the image of coastal Sydney, native coastal scrub landscape recreated
- 

Urban Sydney.
Street character defined by pedestrian/cycle paths, street trees and landscape

Figure 12 - Strategy components

5.0 The Urban Design Principles

5.1 Introduction

This section of the report presents principles that are recommended for consideration to assist in the design development of the proposal. The principles apply to items that are included in the proposal scope at this stage of the design process. Recommendations are presented for further design development of specific items that were not resolved at the time of preparing this report. While more detailed information is provided in this section of the report, it is regarded as 'preliminary conceptual urban design' only. The design concepts presented are not intended to be prescriptive but rather to form a starting point for the design development process.

Conceptual urban design illustrated in the report will be subject to refinement and modification through a process that will involve consultation with stakeholders, the local community, Council and other agencies.

5.2 General Holmes Drive / Joyce Drive Upgrade

5.2.1 Introduction

The General Holmes Drive / Joyce Drive Upgrade area of the project is one Sydney's most important transport arterials. It is also a major route for tourists and residents. The proposal presents a rare opportunity to upgrade all aspects of the corridor, not only traffic-related matters but also major improvements to the urban and landscape quality of the area. This approach is consistent with the principles of the Roads and Maritime Services' *Beyond the Pavement*.

5.2.2 Principles

General Holmes Drive / Joyce Drive Upgrade

The urban design principles for this component of the proposal articulate a streetscape response that incorporates sculptural landforms and endemic vegetation species, together with integrated public art that will create a distinctive 'General Holmes Drive / Joyce Drive Upgrade' area.

Principles

Adoption of the following principles, with the agreement of adjoining property owners and stakeholders, could significantly improve the visual amenity of the area:

- Integrate elements of the proposal with existing features in the corridor to create a context related design
- Provide traffic calming and appropriate safety features where road widening occurs
- Maintain views to advertising in the corridor
- Provide robust, contemporary low maintenance landscape design that responds to the natural and built context of the corridor
- Consider the Airport east-west runway flight path Obstacle Limitation Surface in design proposals
- Consider opportunities to integrate public art to enhance the streetscape quality
- Consider upgrading utilities to improve the streetscape
- Achieve a high quality urban design outcome along General Holmes Drive that responds to the sense of arrival and departure at Sydney International Airport.

Design considerations

Design considerations would be developed in consultation with stakeholders and may include a number of design elements to improve the visual amenity of the area, which could include but not limited to:

- Improving the landscape design to open views to the airport runways and advertising areas⁵
- Providing visual screening to improve the quality of the public domain that is consistent with the importance of the proposal location, which may include built elements and landscape. Consideration should be given to providing screening between adjacent buildings, service areas, access roads and the project corridor
- Relocation or screening of utilities to improve the visual amenity and streetscape quality of the corridor
- Planting trees for shade and shrub for screening to improve the visual and functional amenity of parking areas adjoining widened road, while retaining existing trees where possible
- Appropriate responses to the existing built form that includes food outlets, hotel, vehicle facilities and parking, showrooms, water storage tanks and other airport infrastructure to ensure a high quality design outcome.

⁵ Beyond the corridor strategies

The RMS project does not include an advertising strategy. Careful consideration of the current and future advertising opportunities at the Airport could improve the visual amenity of the area in accordance with SEPP64 and road safety requirements. Future advertising opportunities should be undertaken in consultation with agencies and stakeholders.

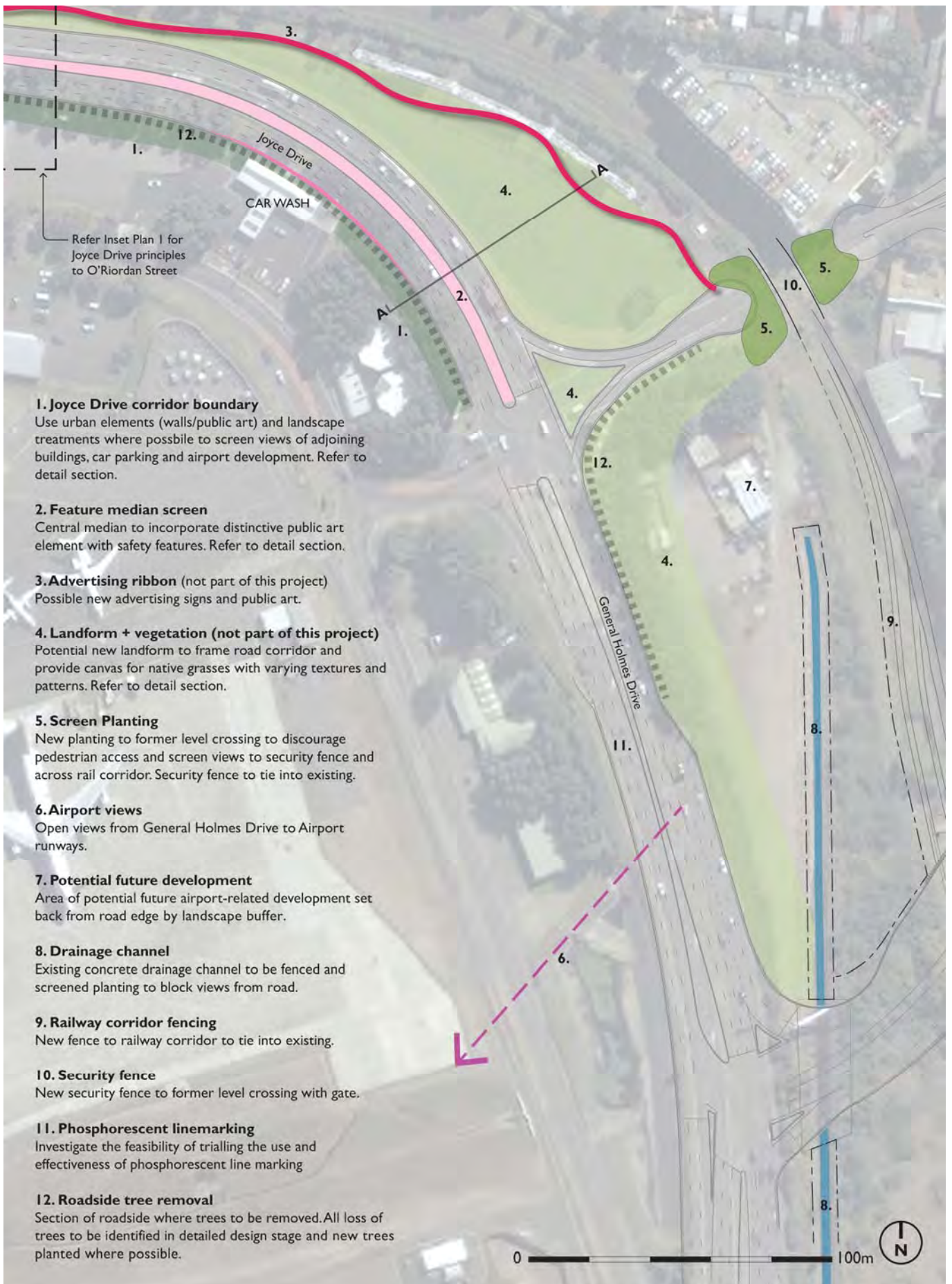


Figure 13 – General Holmes Drive / Joyce Drive Upgrade Principles Plan

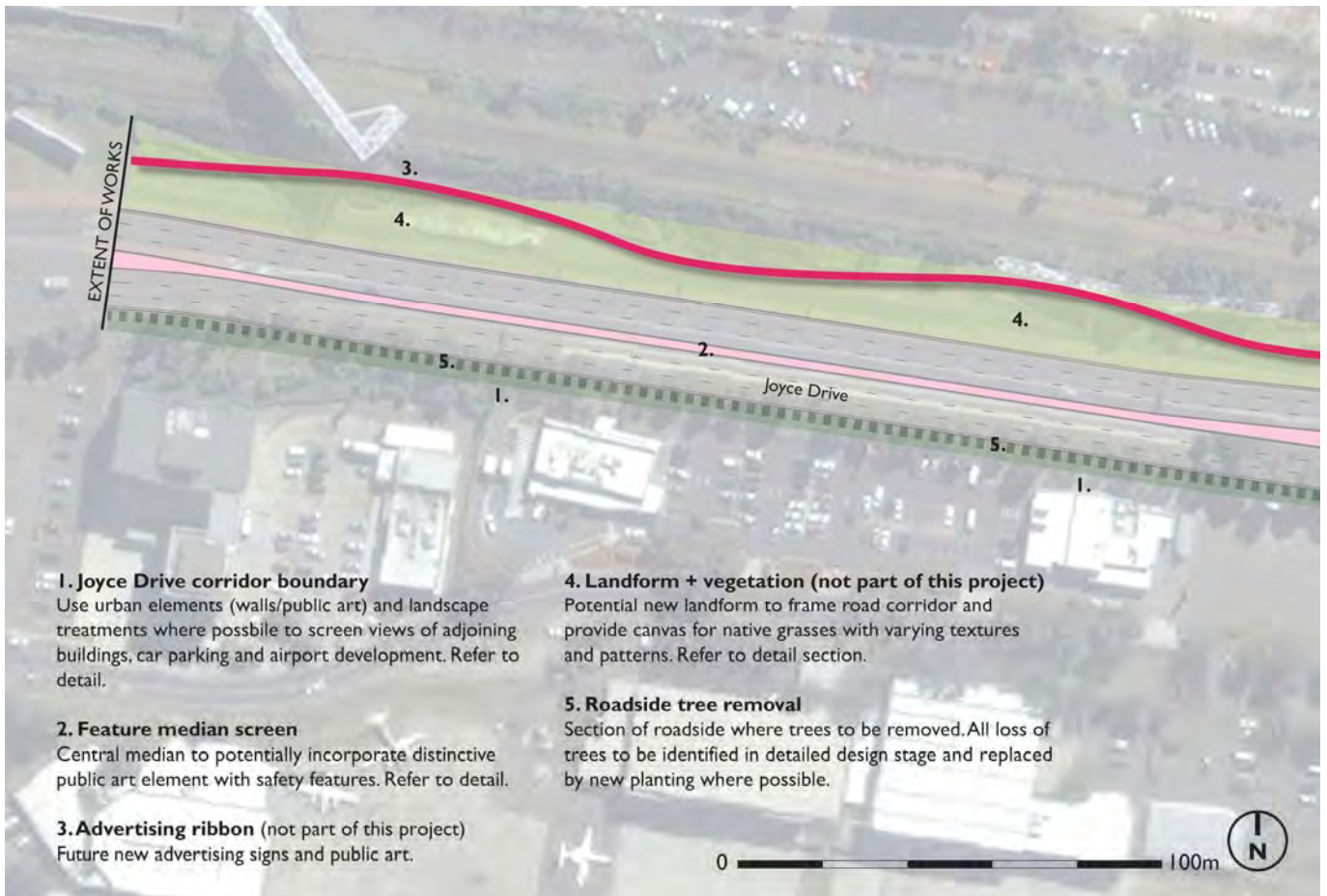


Figure 14 - Inset Plan I Joyce Drive west

1. Consider planting trees where possible along southern boundary of road corridor
2. Consider a traffic calming solution in central median
3. Potential new landform and planting with native grasses and groundcover to edge of the corridor
4. Excavated material used in potential new landform
5. Existing Eucalypt trees define visual extent of northern edge of road corridor



Figure 15 - Section AA through General Holmes Drive / Joyce Drive

5.2.3 Central median screen and lighting

Overview

The proposal presents opportunities to address the median design with special treatment for traffic calming purposes that considers both day and night conditions. The concept design of the median of General Holmes Drive as illustrated in Figure 16 and Figure 17 sections is a suggestion only and other design options should be considered in the detailed design process to follow. Design considerations include:

- Safety features for 70km/h zone in Joyce Drive
- A sculptural median screen to assist with visually separating traffic travelling in opposite directions in the narrow curving corridor
- Low maintenance, robust and dynamic feature, subject to Roads and Maritime Services safety reviews
- Assists in reducing night-time glare of on-coming traffic, especially on the curve in the road
- Maintains key sight lines and vistas within the corridor
- Feature lighting of the median screen integrated with new street lighting
- Tapers at the ends of the median screen are required to improve sight lines
- The length of the visual screen could be determined at later stages of design development
- New feature streetlights could be proposed for Joyce Drive, the streetlights may require extended outreach arms for the widened road, consideration could be given to creating feature street lighting that provides a distinctive identity for the road corridor as part of the 'gateway'.

5.2.4 Visual screening along the southern edge of Joyce Drive

Road widening proposed on the southern edge of Joyce Drive would result in a loss of trees and creation of views to the rear of buildings currently screened by trees and hedges. Design considerations for this area of the proposal include:

- Retain as many trees as possible along Joyce Drive for visual screening and visual amenity
- Plant frangible trees, shrubs and grasses within the safety zone along the southern edge of Joyce Drive to visually screen buildings and car parking and to form a green edge to the corridor
- Plant trees outside the safety zone (a 4.0m setback is required for 70km/h) to replace trees removed
- Provide visual screening or streetscape enhancements where road widening exposes views of existing structures and car parking.

1. Median screen

Refer to Section 5.2 for design description and detail
Median screen to be sculptural and dynamic respond to traffic flow and movement
Median to be traffic calming and to improve safety

2. Safety enhancements

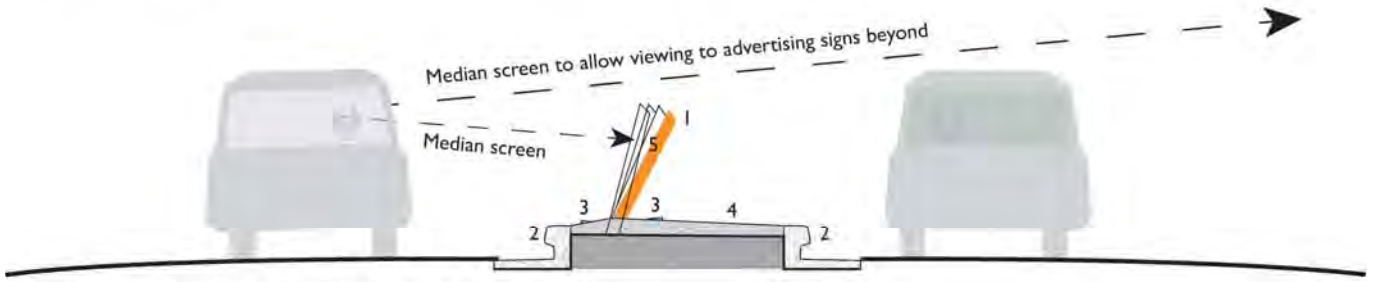
Provide safety enhancement for median, such as Elholtz Kerb

3. Illuminate

Illuminate median screen

4. Median

Median surface to be treated, include fall



DESIGN SECTION THROUGH THE MEDIAN SCREEN

5. Sculptural

Tilt and incline each panel to create a sculptural form

6. Articulate

Articulate through repetitive element and progressively incline each panel



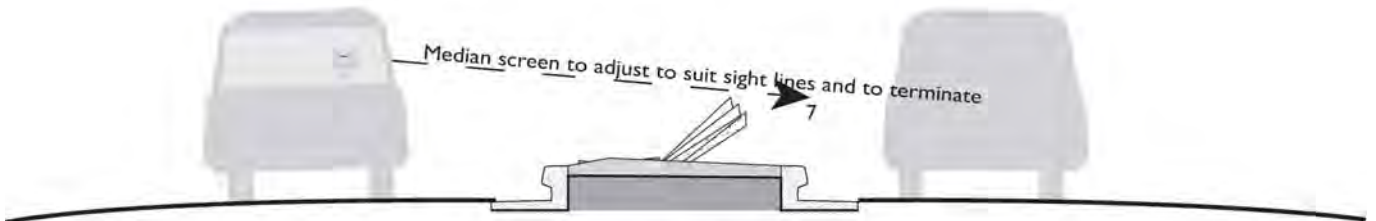
DESIGN ELEVATION OF THE MEDIAN SCREEN

7. Sight lines

Ensure sight lines at median screen termination especially at the intersection of Joyce Drive and Wentworth Avenue Extension

8. Termination

Provide a termination detail for the median screen, consider reducing height and length of panels with increased tilt



DESIGN SECTION SHOWING TERMINATION FOR SIGHT LINES

Figure 16 - Design sections and principles for a feature median screen along Joyce Drive

1. **General** – Improve the appearance of Joyce Drive adjoining the Airport; refer to Section 5.2 for detailed information
2. **Landscape design** – utilise indigenous vegetation in landscape to enhance the corridor, to reflect Sydney’s natural coastal landscape character
3. **Feature Median Screen and Safety** – create a sculptural safety screen in the median of Joyce Drive for traffic calming and safety, with illumination
4. **Visual screening** – retain as many existing trees as possible; screen buildings along Joyce Drive utilising landscape planting and a lightweight screen wall at the carwash
5. **Feature streetlights** – provide new feature streetlights
6. **Underground utilities** – protect existing utilities underground; relocate existing overhead lines underground to improve the visual quality of the corridor; new drainage system along southern verge for road drainage to be located underground

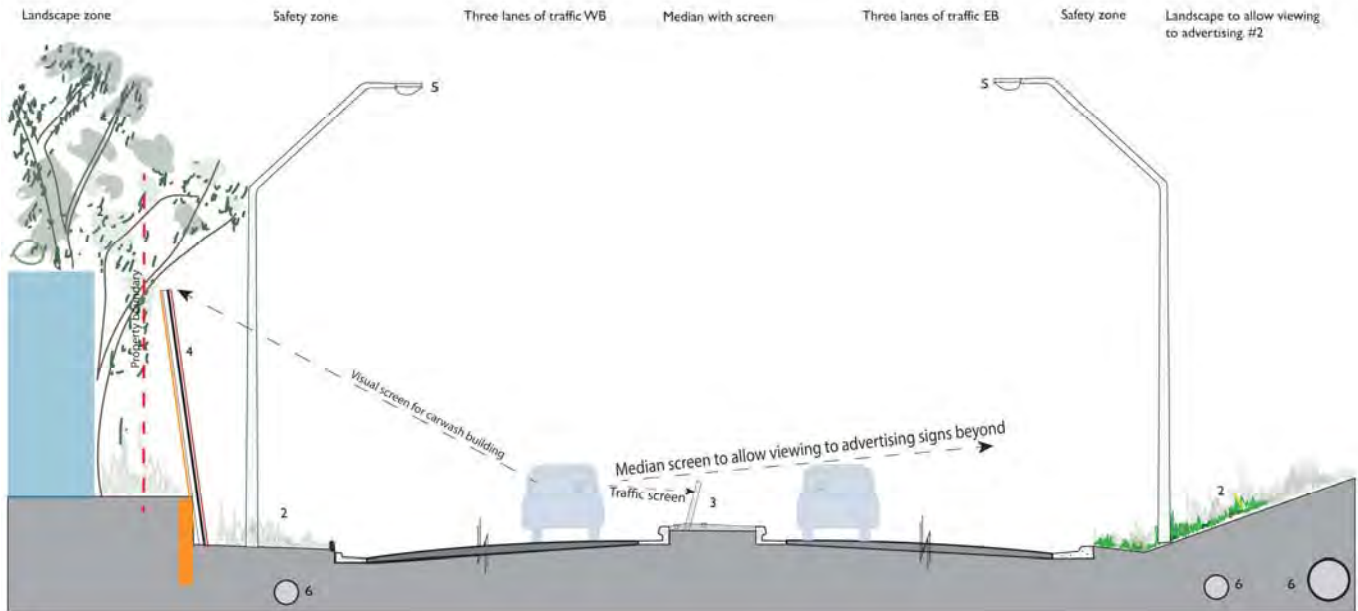


Figure 17 - Typical cross section through Joyce Drive

5.2.5 Future airport development

Future airport development should be anticipated on the south east corner of Joyce Drive and General Holmes Drive. Refer to Figure 13 for the location of these future buildings. While the future development is undetermined at this stage, the following design considerations are recommended for this area:

- Future landscape treatment should anticipate future development as much as possible
- If the existing trees on this corner are removed, then the foundry building east of the railway line will be visually exposed and may require visual screening by planting
- Future airport development may straddle the existing stormwater channel
- Future buildings should be set back from the road to allow a landscape buffer zone that can accommodate earth mounding and establishment of coastal vegetation
- Future buildings should preferably be visually screened from views from the road and high quality architectural design applied if buildings are visible.

5.2.6 Landform and vegetation

The landform alongside Joyce Drive could frame the road corridor and provide a series of sloping planes for planting native grasses and groundcovers of varying patterns, textures and colours. Landform and vegetation should adhere to the following design considerations:

- Landform and vegetation should not obstruct views of new or existing advertising signs and should provide screening for utilities and adjoining development where appropriate
- The existing trees and shrubs along the southern edge of Joyce Drive are important components of the visual character of the corridor and currently screen buildings (Water Tanks, Carwash, McDonalds and Ibis Budget Sydney Airport) and related parking areas; consequently as many trees as possible along the southern side of Joyce Drive should be retained

- Provide dense visual screen planting for the buildings along the southern edge of Joyce Drive; detailed planting design should carefully consider proposed services, road safety clearance requirements, sight lines and property boundaries
- Shrub planting should provide an undercover layer to screen views of buildings from the road to about 3m high along the full length of Joyce Drive
- Species selection should consist primarily of those in the Eastern Suburbs Banksia Scrub vegetation community
- Any future landscape works along the northern edge of Joyce Drive involving landform and planting works should frame the corridor by providing a sloping surface for planting native grasses and groundcovers without obstructing views to existing or proposed advertising signs (not part of this proposal)

5.2.7 Powerlines and utilities

The existing streetlamps would be removed and overhead powerlines relocated underground. The underground gas and electrical utilities in the corridor will limit road widening along the north side of Joyce Drive and will require special consideration during construction.

5.3 The Gateway

5.3.1 Introduction

'The Gateway' presents a new opportunity to enhance the visual character and sense of arrival at the Airport. The Gateway will incorporate the intersection of Wentworth Avenue Extension and General Holmes Drive together with the new rail bridge over Wentworth Avenue, other structures and associated landscape and urban design elements.

The Wentworth Avenue extension will descend to an underpass below the existing railway, which will be supported by a new feature rail bridge.

5.3.2 Design Principles and Considerations

Principles:

- Create a memorable experience at the airport interface area through an integrated road and urban design response
- Create new infrastructure structures that are of high quality and appropriate to the context
- Provide an upgraded landscape design with indigenous planting and gently undulating coastal dune landforms.
- Consider the design of utilities to improve the streetscape.

These principles are illustrated in Figure 18.

Design considerations

Design considerations should be developed in consultation with stakeholders and may include a number of elements to improve the visual amenity of the area that could include, but not be limited to:

- Improve the appearance of the railway corridor and road interface areas of the local neighbourhood of Mascot with new tree planting and landscape works
- Carefully design and locate safety fencing
- Locate the ground water pumping facility discretely and integrate into landscape
- Carefully relocate advertising signs where necessary to ensure they enhance the overall visual amenity⁶

⁶ Relocation of advertising signs should be completed in consultation with agencies and stakeholders and done in accordance with SEPP 64 requirements and RMS road safety requirements. Relocated signs should improve the visual amenity along General Holmes Drive / Joyce Drive in an integrated design response.

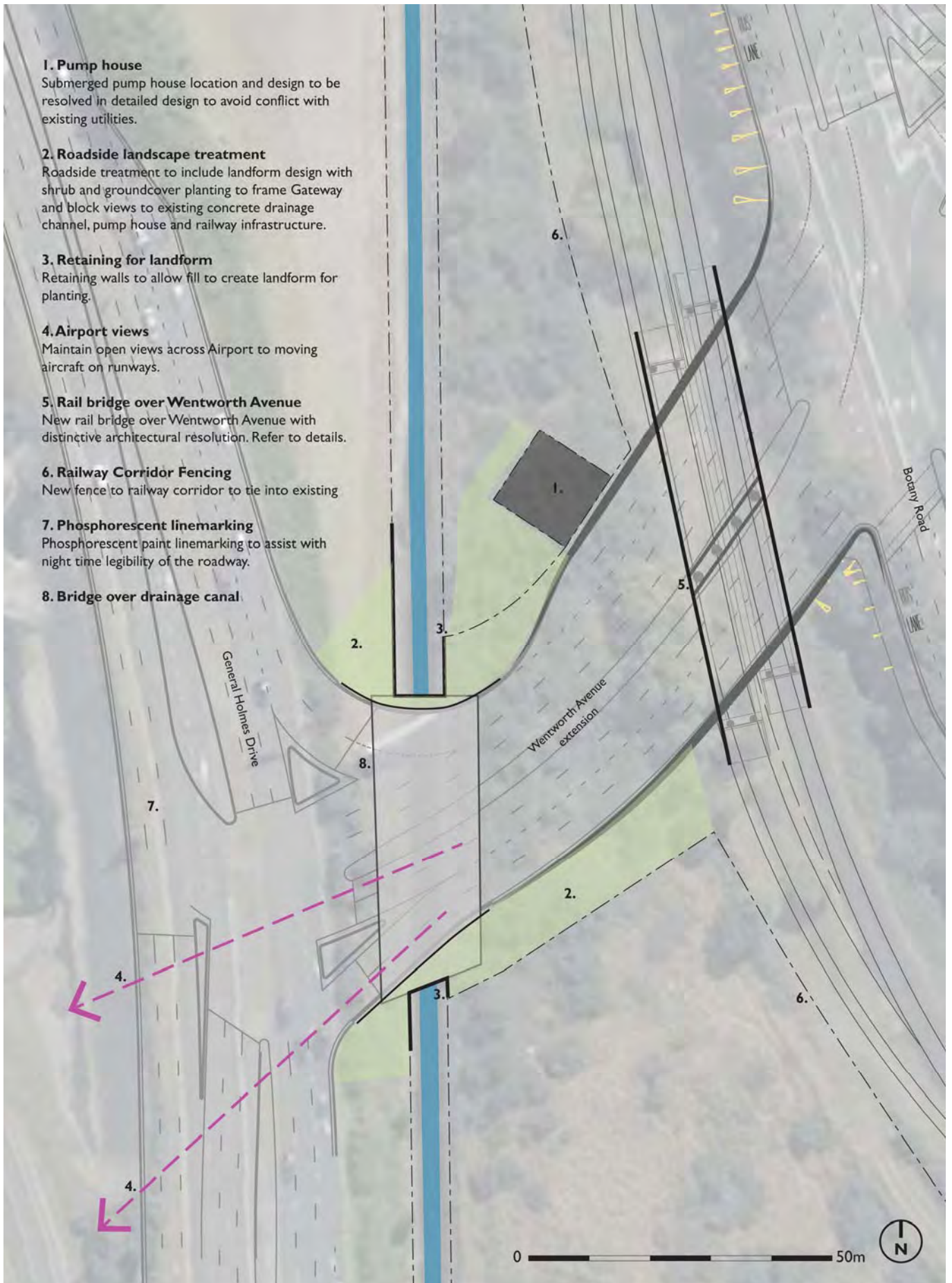


Figure 18 - The Gateway Principles Plan

5.3.3 Rail bridge over Wentworth Avenue

Introduction

The new rail bridge over the Wentworth Avenue extension will provide improved safety by allowing the level rail crossing at General Holmes Drive to be closed. The new rail bridge will be a complex structure due to multiple constraints presented by the site.⁷ It is proposed to be a large double span structure incorporating the 'neck' of the Wentworth Avenue / Botany Road intersection.

Visual qualities

The bridge should incorporate the principles for good design set in out in Roads and Maritime Services Bridge Aesthetics 2012 to achieve an elegant structure in the landscape forming a distinctive feature of the airport infrastructure. The Bridge Design Checklist presented in Appendix 2 should be referred to in future stages of the bridge design development.

Refer to Figure 22 for an artist's representation of the bridge. The design of the bridge is likely to undergo modifications to improve its appearance in later stages of detailed design development.

5.3.4 Railway Bridge over Wentworth Avenue - Aesthetics

Design considerations⁸

Recommended design considerations for the new railway bridge over Wentworth Avenue include but are not limited to:

Context

- Consider the visual relationship between the bridge and surrounding built environment and landscape
- Ensure the bridge appearance is consistent with (or higher quality) than the family of rail bridges visible at other locations in the vicinity of Sydney Airport
- The new bridge structure should form a feature for the proposal

Aesthetics

- Ensure a high quality bridge aesthetic; carefully design the form, proportions and scale to achieve an elegant and refined structure. This will require careful consideration because the bridge spans are not symmetrical, the bridge is on a strong skew and the bridge parapets are very high in relation to the bridge elevation and the adjoining landform
- Employ design generators to create a feature structure at the Airport Gateway
- Provide a vandal resistance strategy for the bridge; consider graffiti, detail undercroft spaces and spaces which do not receive natural light and water

Structure

- Express the structural technology and forces in developing the bridge design

Materiality

- Ensure the materials and finishes are durable and visually attractive; employ textures and colour in the bridge materials that are consistent with the proposal and enhance the bridge appearance

Composition

- Consider the aesthetic relationship of the bridge elements to each other and to the adjoining urban landscape setting

Lighting

- Ensure the lighting of the bridge is consistent with safety, functional and aesthetic requirements
- Limited use of feature lighting should be considered

⁷ The railway bridge constraints include the Obstacle Limitation Surface, grade and drainage constraints, construction and staging constraints and railway and road safety requirements. The identification of the constraints is dealt with in engineering reports.

⁸ The Design Considerations were adapted from RMS Bridge Aesthetic Guidelines.

Cost balance

- Balance cost and aesthetic requirements commensurate with the Airport Gateway precinct as a significant destination that travellers pass through

Consultation

- Consult with the local community, agencies and stakeholders regarding the bridge design and appearance

Proportions

- Resolve the slenderness ratio of span to height, which is a complex relationship for this bridge

Siting

- Design the bridge to be seen in its slightly 'depressed' vertical location under the existing railway line and with Wentworth Road (extension) below natural ground level

Pier design

- Ensure that the structural pier is suitable for purpose – rail bridges generally require blade wall structures, but consider other feature structures if appropriate
- Blade wall architecture should match the abutment wall architecture
- Provide a median safety barrier
- Refer to Figure 19 and Figure 22 for the pier design principles

Parapet

- Ensure the deck overhang considerations are resolved to minimize staining and to resolve shadow casting
- The railway bridge parapet profile requires careful and creative detailing to enhance its appearance together with consideration of articulations to reduce apparent depth
- Consider a special profile for the bridge parapet to articulate the beam to create shadows and to reduce the apparent depth
- The bridge parapet should terminate in an appealing composition that considers safety and fencing
- Refer to Figure 21 for details of the parapet

Soffit

- The bridge soffit and space between the soffit require careful detailing to ensure a high quality outcome
- Recess conduits for lighting and stormwater if they are required
- Consider safety lighting under the bridge

Abutment walls

- Lightweight abutment walls should be considered to screen structures and abutment spaces, and assist with expediting construction
- Abutment walls should have smooth flowing horizontal and vertical alignments, provide smooth flowing tops and bases to walls and terminate in a gradual taper
- Provide abutment wall safety barriers
- Incline the abutment walls to create an open appearance for the bridge and underpass
- Tilt the lightweight panels to create a dynamic composition
- Consider top of wall termination to create a safety barrier
- Refer to Figure 20 for detail sections through the abutment walls

Safety

- The bridge requires special safety considerations due to its location under the airport Obstacle Limitation Surface and in a railway corridor
- Ensure the bridge abutment area does not create vandal spaces by screening and securing all voids
- Ensure that Work Health & Safety requirements for bearing maintenance is integrated into the design

- Design the bridge to incorporate rail safety fences in a discrete and appealing manner
- Rail maintenance walkway between the bridges is required, ensure the detailing enhances the bridge appearance
- Refer to Figure 20 for details of the rail safety fence interface with the abutment walls

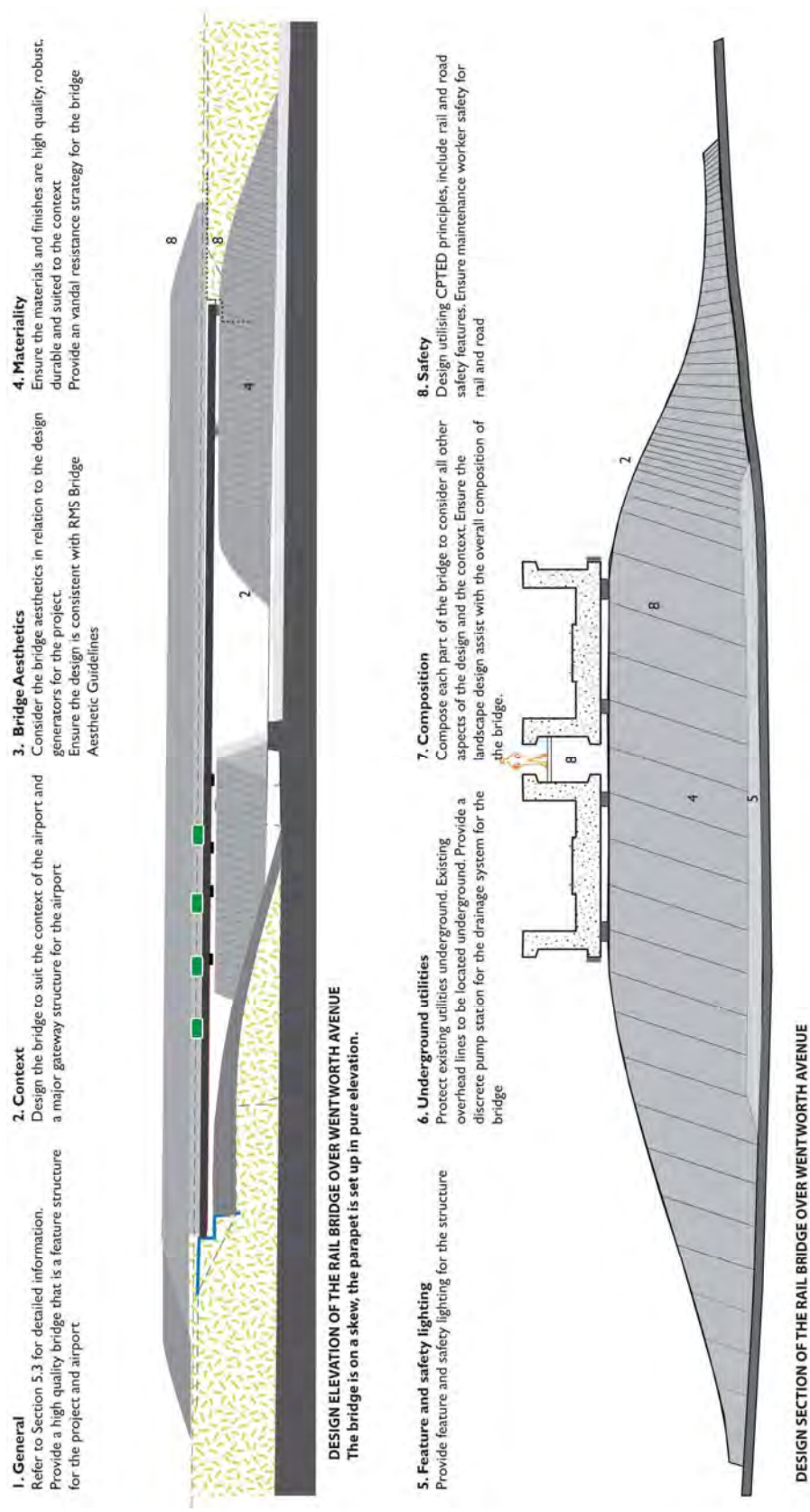
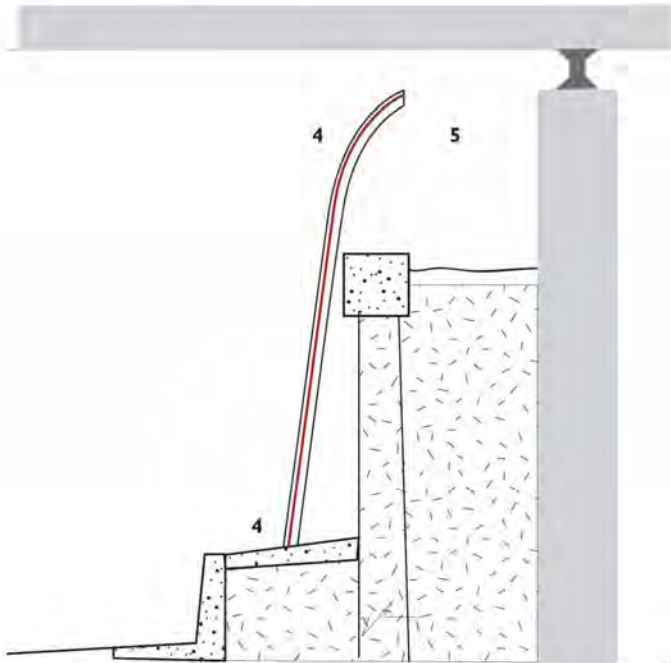


Figure 19 - General arrangement section and elevation of the rail bridge over Wentworth Avenue

4 Abutment wall details - options

Incline lightweight abutment wall to create open appearance
 Consider base termination with safety barrier etc.
 Consider extending wall to create 1200mm high safety barrier and coping
 Consider termination curve or other feature to top of wall

5 Screen abutment space and make secure

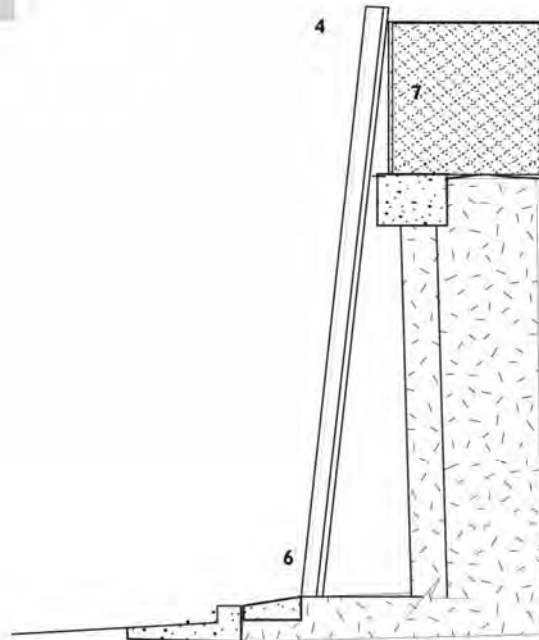


DESIGN OPTION CROSS SECTION THROUGH ABUTMENT WALL

6 Abutment wall detailing - option 2

Incline lightweight abutment wall to create open appearance
 Consider base termination with safety barrier etc.
 Consider profile of the top of the wall, consider a flowing smooth profile and alignment

7 Consider feature termination to abutment wall
 Integrate with fence



DESIGN OPTION CROSS SECTION THROUGH ABUTMENT WALL WITH SAFETY BALUSTER + FENCE

Figure 20 - Detail sections of the rail bridge over Wentworth Avenue

1. Signage

Consider size of lane designation sign and adjust profile to accommodate sign in a consistent composition

2. Detail parapet profile

Consider articulating the bridge parapet profile to reduce the apparent depth of the structure

3. Elegant detailing

Adjust profile of parapet to make elegant
 Fall top of parapet to drain away from facade
 Consider articulating profile to suit project
 Consider angle on the lower flange to accommodate for road sign

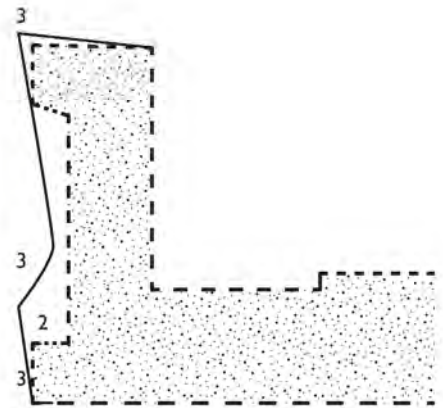
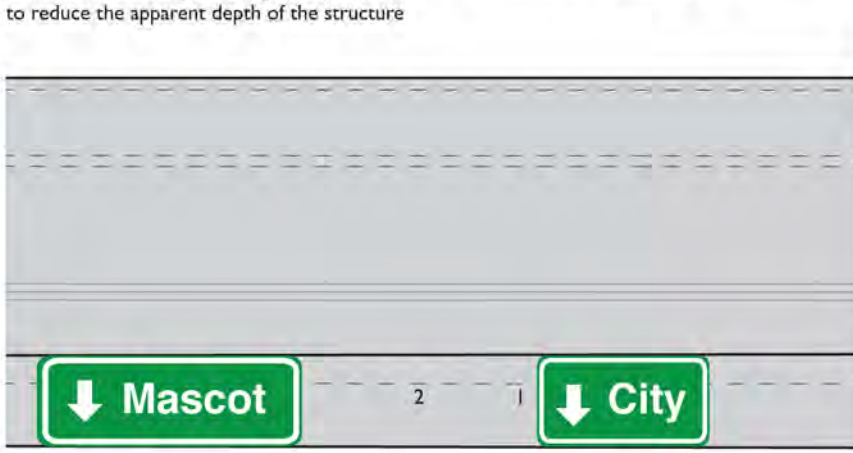


Figure 21 - Detailing to improve the appearance of the rail bridge

An artistic representation of the rail bridge

The illustration of the proposed rail bridge over Wentworth Avenue presented below shows the application of principles rather than a resolved design. Utilising design generators with aerodynamic lines and lightweight cladding for the abutment walls, the composition is integrated into the adjoining landform and urban environment. The preferred design approach is to strive for simplicity.

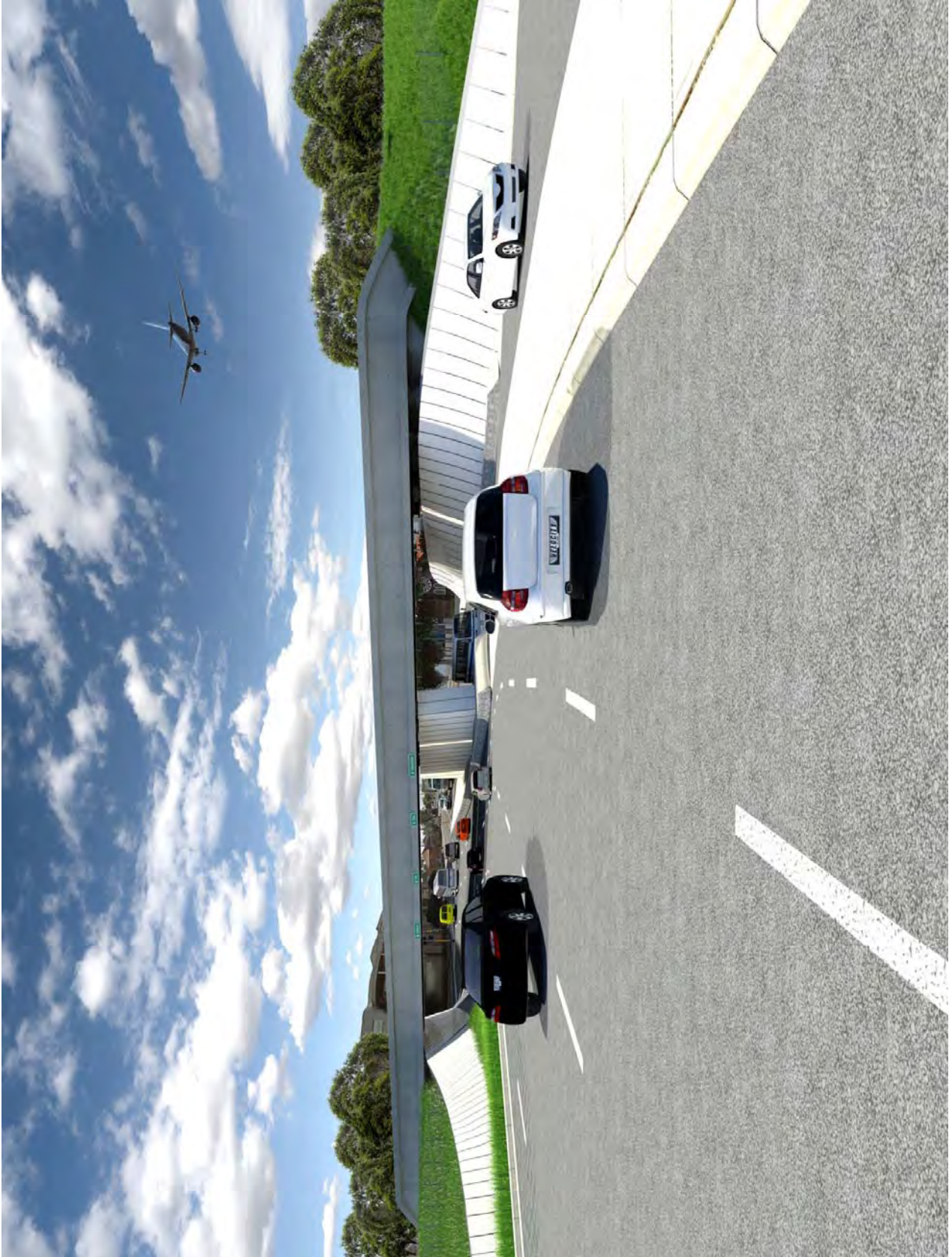


Figure 22 - Artist's impression of the new rail bridge over Wentworth Avenue (subject to consultation and design refinement)

5.3.5 Pump station

A pump station is required for the drainage of the new Wentworth Avenue extension under the rail bridge where the road will be below natural ground level. This section of the road between Botany Road and General Holmes Drive will be excavated to achieve grade separation between the road and the rail bridge, which will make the lowest point in the road close to sea level. Hydrology analysis shows that water pumping will be required to ensure the road does not flood. A pump station is therefore required to accommodate the pumps and piping systems for the road underpass.

Location

The preferred urban design outcome is for the pump station to be located on the northern side of Wentworth Avenue extension, which would allow landform mounding on the southern side of the road as a key element in the landscape design strategy. However, detailed design may determine that due to utility constraints the pump station needs to be located on the southern side of the Wentworth Avenue extension. The final location and design is to be resolved in the detailed design process.

Size

The pump station size will be determined during subsequent stages of the proposal, but is expected to be approximately 11m long x 11m wide x 5m deep. The pumps and sumps will be located at the lowest level of the station.

Design considerations

The urban design considerations for the pump station⁹ are:

- The pump station should be discrete and located below ground level, with the top being open to the sky
- The retaining walls for the pump station are to be extended to approximately 1m high parapet walls
- Work Health & Safety equipment is required for access to the pumps
- Security fencing and a lockable gate will be required to secure the facility or preferably a grated cover installed for security
- Underground piping will connect the pumps to ground water treatment areas or to flood systems
- Earth mounding and screen planting are required around the facility to integrate it into the surrounding landscape
- An unformed gravel maintenance access track to the facility is required.

5.3.6 Stormwater culvert bridge at the intersection

The stormwater culvert bridge is to be located under the Wentworth Road extension at the intersection of General Holmes Drive to span the existing main stormwater channel from Botany (in a north-east to south-west direction). The new bridge is also associated with a structure that will span over an existing gas main. The bridge is located within the airport Obstacle Limitation Surface.

Visual qualities

It is unlikely that the bridge will be seen from General Holmes Drive or from Wentworth Avenue, although the wing walls may be partly visible. Consequently the bridge should be discreet and functional in design.

Culvert headwalls in the form of Type F Barriers are likely to be the only elements visible from the road. Consideration could be given to making the headwalls 'gateway features' at the intersection and to screen the stormwater channel from view. Consideration should also be given to advertising signs at this location. As this is an important gateway intersection at the Airport the headwalls, landscape and possible advertising should be designed to be complementary and integrated with the traffic lights and road signs.

⁹ Referred to as a Pump House in other RMS documents, however to clarify it is assumed that there is no house in the form of walls and a roof. This is an 'open-to-the-air' submerged structure.

5.3.7 Stormwater culvert bridge aesthetics

The stormwater culvert bridge should be a discrete structure in the landscape.

- Provide a simple plank type or Super T girder to facilitate construction
- Ensure the materials and finishes are durable
- Accommodate landscape space between road shoulder and headwall to allow for planting
- Provide well designed safety fence and headwalls for the stormwater channel
- Provide a vandal resistance strategy for the bridge

5.3.8 Landform and vegetation

Landform and vegetation should be focused on framing the Airport Gateway for motorists while screening views to the existing drainage channel, proposed new pump station and railway embankments. Potential views from the road along the existing concrete-lined drainage channel running through the proposal site should be screened by urban and landscape design at the new intersection of Wentworth Avenue and General Holmes Drive. Species selection should result in a strong landscape character that reflects the Sydney coastal environment.

5.4 Coastal Sydney

5.4.1 Introduction

Restoration of the existing degraded landscape in the area south of the Wentworth Avenue extension will form an integral component of the proposal, resulting in creation of a distinctly Coastal Sydney landscape character that will enhance the visual experience of road users arriving and departing from Sydney Airport.

The key strategy of this precinct will be to enhance views to the airport runway from Botany Road across the existing wetland area, as well as to open views to the wetland areas from General Holmes Drive. Landform mounding is proposed to emphasise the low-lying wetland landscape and to screen vehicle movement along Mill Pond Road.

Consultation with Sydney Airport and other stakeholders is required regarding the relocation of advertising signs, removal of vegetation alongside General Holmes Drive and the proposal to enhance views from this area to the airport runways.

Principles

- Create a high quality landscape design that emphasises the indigenous coastal landscape character
- Open up views to the airport runways and infrastructure to reinforce the sense of place and assist 'wayfinding'.
- Consider the design of utilities and safety elements such as fences to improve the streetscape and landscape quality.

The principles are illustrated in Figure 23

Design considerations

Design considerations to be developed during future stages of the project include:

- Create new landforms using excavated material generated by the proposal to reflect the original coastal landscape character for the area
- Establish indigenous vegetation communities that relate to the Sydney coastal landscape
- Consider enhancing the existing fresh water wetlands at the south east corner of this area of the project
- Consider a future water quality control and wetland area to assist with the treatment runoff water from the roadway
- Installation of carefully located and designed safety fencing
- Carefully relocated advertising signs to ensure the advertising enhances the overall visual amenity

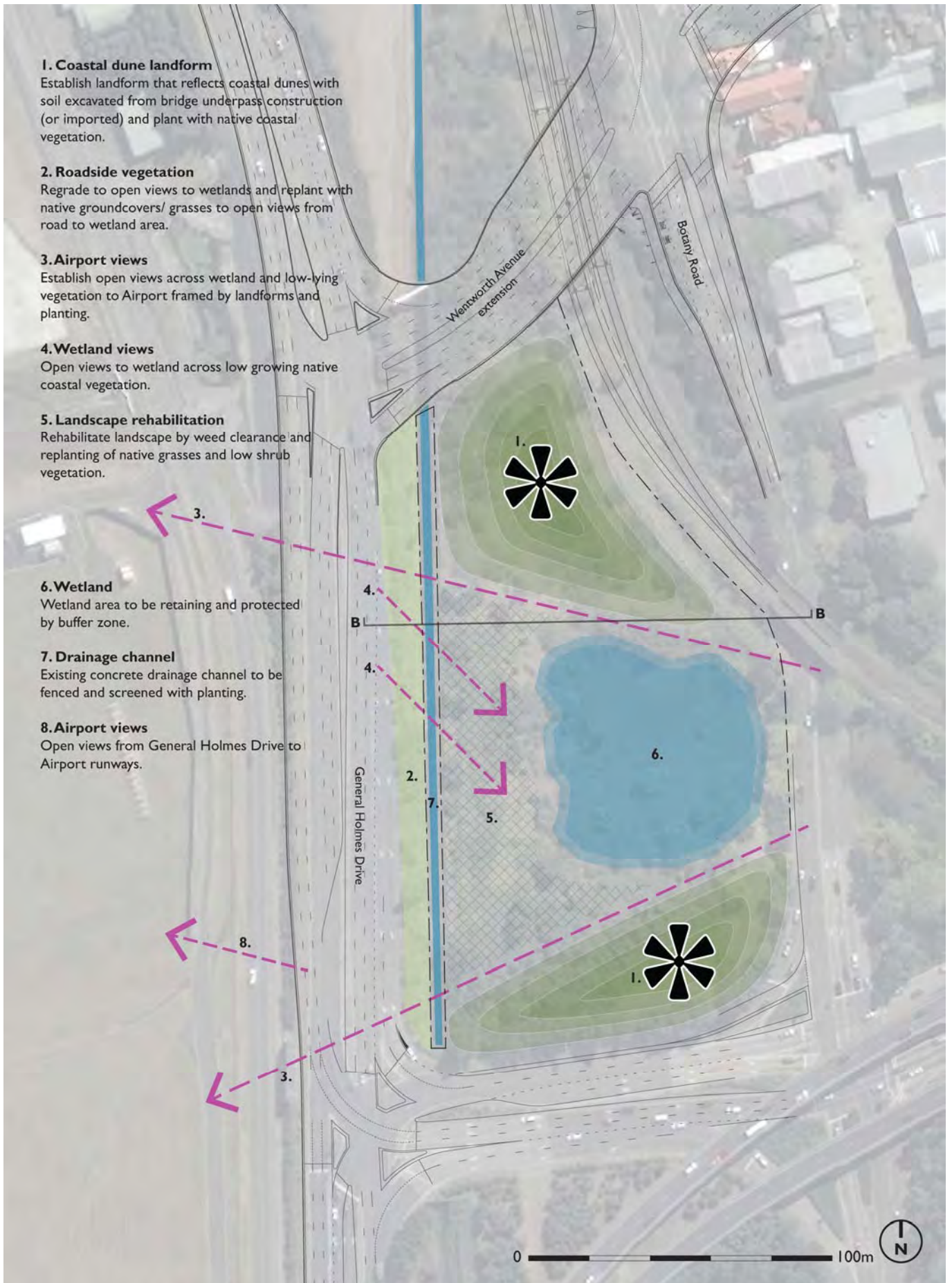


Figure 23 - Coastal Sydney Principles Plan

5.4.2 Landform and vegetation

The sand dunes that formed a key component of the original landscape in the area will be reflected in the new landforms to be constructed with soil excavated for the railway underpass. The new landforms will contrast with the existing flat landform of the Airport. This increase in landform variation will create visual interest and help to integrate the road works and structures into the landscape.

The wetland and associated remnants of Eastern Suburb Banksia Scrub vegetation community are key components of the coastal landscape of Sydney. The proposal works should result in a strong landscape character that reflects the Sydney coastal environment, replacing the existing degraded landscape that is heavily impacted by weeds.

The small area of wetland located west of the Botany Road railway underpass, which is dominated by Bull Rushes, is required to be retained undisturbed and a program of weed removal carried out.

5.4.3 Street lighting

General Holmes Drive in the Coastal Sydney precinct is largely located under the airport Obstacle Limitation Surface, and no street lighting will be permitted in this section of the proposal. Mill Pond Road lighting will remain unchanged or with minor modification. Street lighting is also to be removed at the eastern end of Joyce Drive due to interface constraints with major utilities.

High visibility line marking will be placed where street lighting is removed.

5.4.4 Fencing and security

Fencing is required to prevent public access to the existing stormwater channel. It should be discrete and located to maintain with views across the landscape, especially into the wetland area.

- Public art in the form of interpretive screens should be explored as alternatives to standard fencing
- Fences are to be provided with lockable gates for security.

1. General Holmes Drive
2. Existing concrete drainage channel
3. Wetland area to be retained and protected
4. Coastal dune landform
5. Railway embankment
6. Railway corridor
7. Existing railway bridge over Botany Road
8. Botany Road



Figure 24 - Section BB through Coastal Sydney precinct

5.5 Urban Sydney - Mascot Interface

5.5.1 Introduction

Urban Sydney - Mascot Interface component of the proposal site incorporates the residential and commercial area north and east of the railway corridor that includes Wentworth Avenue and Botany Road. The proposed changes to the intersection of Wentworth Avenue and Botany Road would significantly change the streetscape and urban context. The interface between the proposal site and Mascot urban development is a sensitive component of the proposal due to the location of medium and low density residential buildings adjoining the intersection. The proposal should aim to integrate the new works into the existing urban context in a consistent and visually attractive manner for the benefit of the local community.

5.5.2 Design Principles and Considerations

Principles

The following principles should be considered for the Urban Sydney – Mascot Interface area within the proposal site:

- Consider enhancing the streetscape with context related landscape design
- Revitalise the public realm including a new pocket park, intersections design, median design and a new shared path that forms part of the project
- Extend the existing formalised landscape design associated with local roads
- Provide public transport amenities such as shelters at bus stops, pedestrian crossings and shared path amenities
- Remove the existing rail level crossing to improve the movement of freight trains servicing Port Botany
- Provide new road furniture, signage and safety barriers
- Consider the design of utilities to be located underground where possible to improve the streetscape
- Consult with the local community, agencies and stakeholders in the area in relation to the detailed design aspects of the proposal

Design considerations

Design considerations for the works within the project boundary could include but are not limited to the following:

- Create a revitalised public domain for the neighbourhood
- Create new high quality pocket park at the south east corner of the modified intersection of Botany Road and Wentworth Avenue by expanding the existing open space (Dr Darragh Reserve) by revealing the northern façade of the existing heritage church, Beckenham Memorial Church
- Create shaded areas at Dr Darragh Reserve together with parkland facilities and night time lighting in consultation with the community, agencies and stakeholders. The proposal includes an area of shade trees and an open area in front of the church, but is subject to further design development
- Create an attractive pedestrian zone with ground cover and shade tree planting
- Extend the formalised plantings of Wentworth Avenue to the new intersection
- Improve safety for pedestrians and cyclists with a new shared path to be constructed along sections of Botany Road and Wentworth Avenue
- Provide a safe pedestrian crossing at Wentworth Avenue together with landscape works to create a visually attractive urban public space on the north and south sides of the intersection
- Provide pedestrian connections across Botany Road to a relocated bus stop
- Provide a new pedestrian and cyclist crossing to provide shared path connection across Botany Road
- Ensure a high quality design for the new rail bridge over Wentworth Avenue
- Remove overhead power and telecommunication lines and placing them underground where possible and feasible within the project boundary

- The design of the shared path on the north eastern side of the intersection should take into account the level changes and main entrance to the medium density residential block and other houses
- Install new street lighting as part of the works to form an attractive urban element
- Provide a new bus stop shelter along Botany Road
- Carry out new street tree planting where possible to replace trees that need to be removed to allow construction of the new kerbs and shared path. Take account of limitations on the type of trees that may be planted along sections of road with design speed of 60km/h and 70km/h, which include frangible trees and shrubs in the verge space

The design considerations are illustrated in Figure 25 and Figure 26.

5.5.3 Heritage items for protection

The existing Beckenham Uniting Church on Botany Road has local heritage listing. It is a mid-20th Century Gothic Revival style burnt brick basilica format church with trefoil stained glass windows. The crucifix form shape is currently obscured by the church hall to the west. However, removed of the hall to allow road widening, will open up views of the northern façade of the church and create a pocket park area adjoining the Wentworth Avenue and Botany Road intersection. The following issues are recommended for consideration in future stages of the proposal:

Design considerations

- Consult with church administrators to confirm its future use
- Undertake noise modelling to ensure that the church is suitable for purpose once the road widening has occurred
- Design landscape works adjoining the church to assist to mitigate the effects of traffic on the building

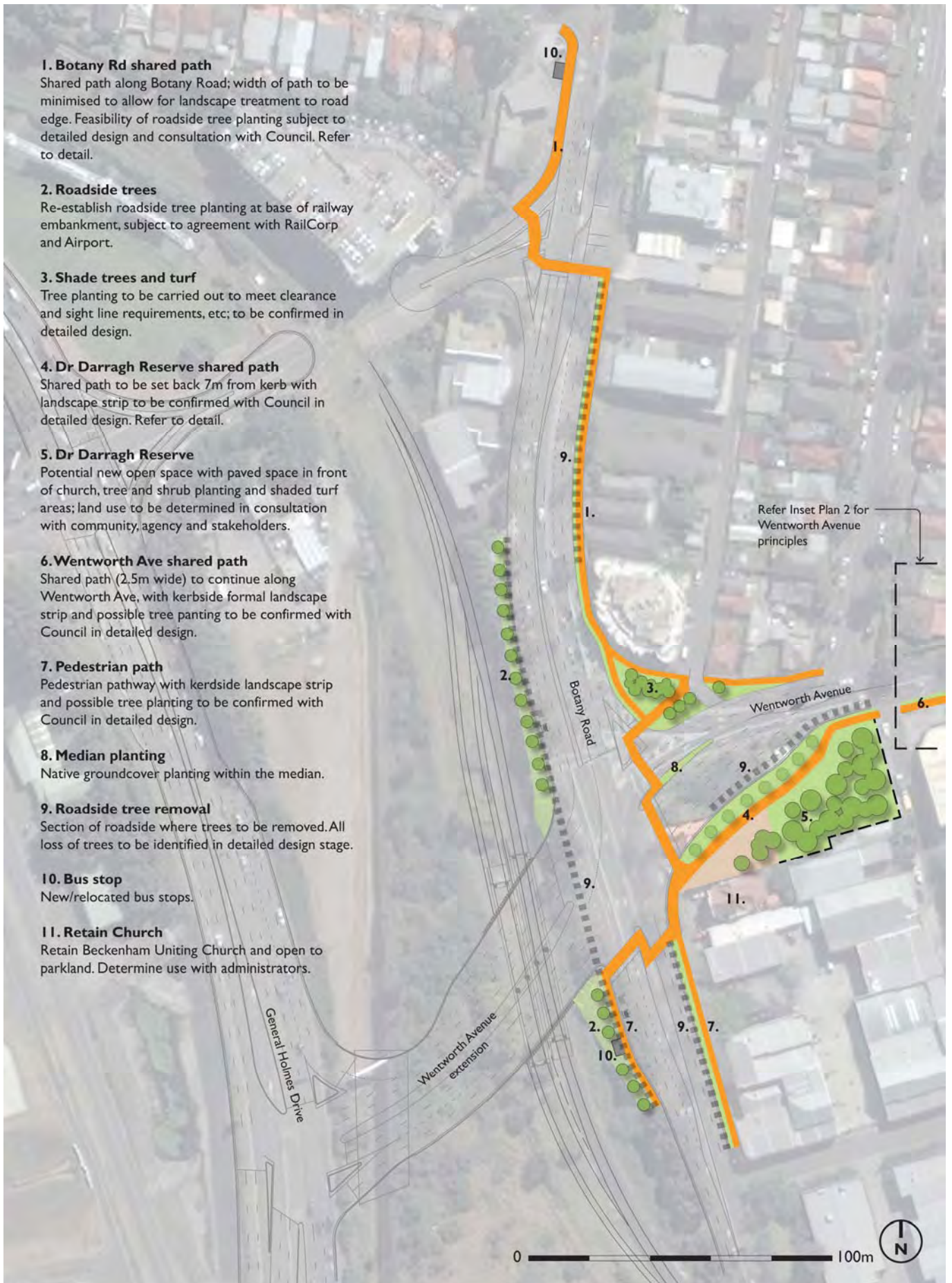


Figure 25 - Urban Sydney - Mascot Interface Principles Plan



Figure 26 - Inset Plan 2 Wentworth Avenue

5.5.4 Botany Road

The following issues are recommended for consideration in future stages of the proposal:

Design considerations

- Botany Road within the proposal site will be widened and form a new intersection with the section of Wentworth Avenue, which will be extended under the railway line to the Airport
- Consultation with the community and Council is required to develop the shared path along the eastern side of Botany Road, which will involve the removal of powerlines, trees and street furniture to accommodate the shared path
- Additional public open space around the intersection will become available as a result of road widening. Design of this space as a pocket park by reconfiguring and expanding the Dr Darragh Reserve, will require consultation.
- The bus stop is to be relocated and a new pedestrian crossing provided for safe access across Botany Road.

5.5.5 Wentworth Avenue

The following considerations are recommended for future design development stages of the proposal:

- Wentworth Avenue east of the proposed new intersection with Botany Road will be widened along the southern edge and will accommodate a 2.5m wide shared path and a landscape strip of varying width (approx. 1m wide)
- Kerbs and drainage will be realigned
- The landscape strip is to consist of formal low-growing hedges to match with the existing landscape character of Wentworth Avenue
- Trees and powerlines will be removed, options for new tree plantings are to be explored subject to clearance requirements and in consultation with Council and adjoining residents
- Other utilities may be provided or relocated that are currently located in the footpath where feasible and practical
- Refer to Figure 27 for a typical detail of the shared path.

5.5.6 Shared path

The shared path will provide a partial connection to the existing bike network along Wentworth Avenue. To provide an adequate shared path width will require existing trees be removed. However, subject to consultation with the community and Council, another cycle path route could be considered outside the proposal site, which would allow existing trees to be retained. Design considerations recommended for this area include:

- Options for new tree plantings are to be considered in safe and appropriate locations, subject to clearance requirements, sight lines and other constraints during the detailed design process
- Consult with Council regarding the type of shrubs and frangible trees to be planted along Wentworth Ave and Botany Rd.
- The shared path is to be 2.5m wide and illuminated
- The urban design preference is for streetlights to be located in the verge space, but this will require frangible poles as the verge is within the 60km/h and 70km/h safety zones
- Refer to Figure 27 for a typical detail of the shared path and Figure 25 and Figure 26 for the location of the path in this precinct.

5.5.7 The public realm and streetscapes

Formal plantings along Wentworth Avenue and the tree lined streetscapes are considered to be desirable outcomes for the proposal. The public domain design should address the following considerations:

- Street lighting and parkland lighting is to include light spill shields and lamps are to be protected with vandal resistant polycarbonate diffusers more than 4m from pavement surface
- Streetlights are to have white light for facial recognition
- Streetlights are to be set back from the shared path by at least 1m where space allows
- Powerlines and communication facilities within the proposal site are to be relocated underground
- Detailed design considerations include relocation of poles providing power to houses, while cabinets and other power infrastructure is to be carefully located so as not to impede the shared path, driveways or paths to houses
- Tree planting along Botany Road and Wentworth Avenue should be maximised, tree species to be confirmed in future stages of design development in consultation with Council
- Protect neighbourhood walls, fences, gates and boundary elements during construction and make good
- Driveway crossings are to be made good and demarcated on the shared path or with line markings or signage.

Refer to Figure 27 for details of a typical shared path.

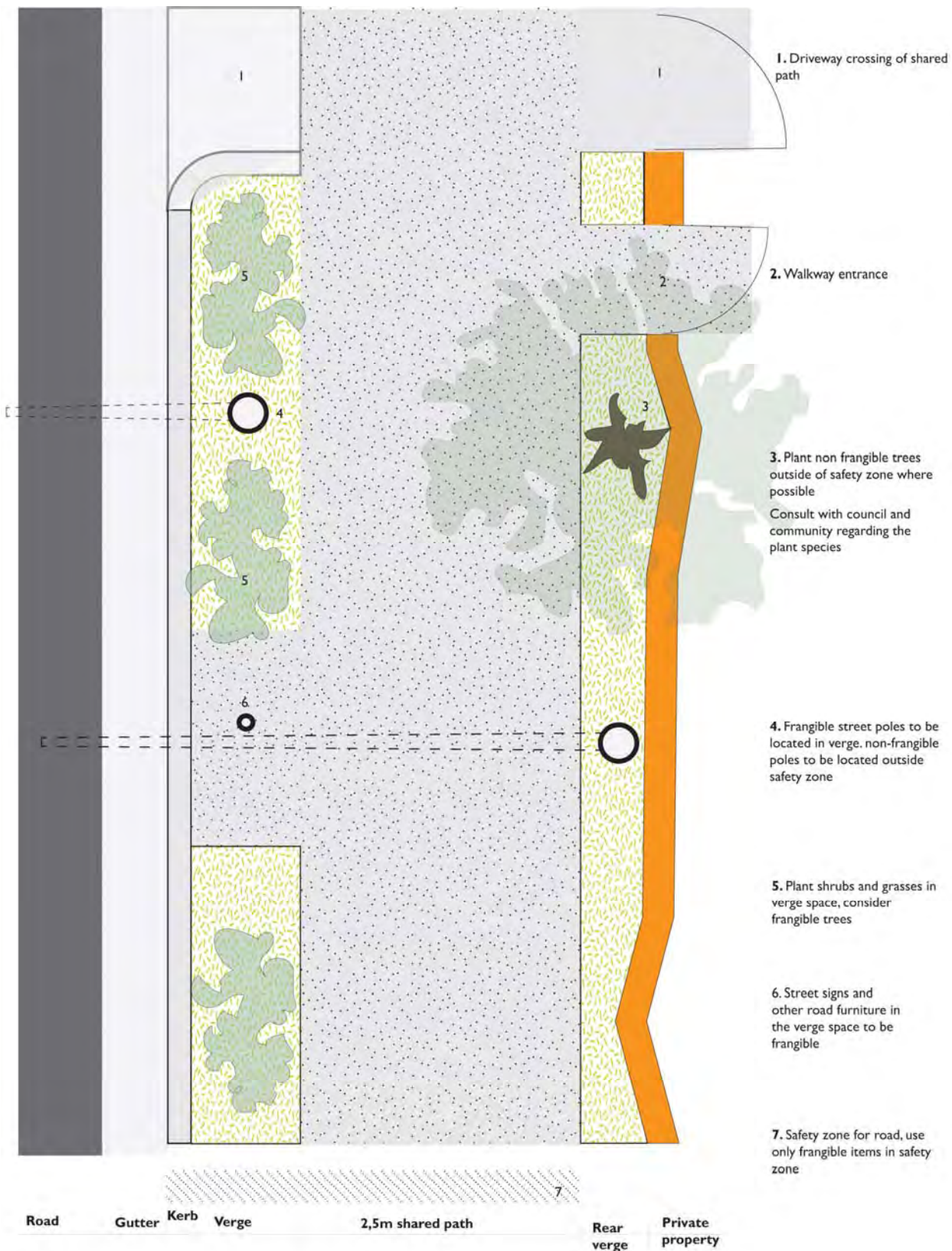


Figure 27 - Typical layout for shared path along Botany Road and Wentworth Avenue

5.5.8 Artist's impression of the corner of Wentworth Avenue and Botany Road

The artist's impression of the corner of Wentworth Avenue and Botany Road presented in Figure 28 shows the realigned Dr Darragh Reserve and the Beckenham Uniting Church facing onto the parkland and intersection at landscape maturity.



Figure 28 - Artist's impression of the corner of Wentworth Avenue and Botany Road (subject to consultation and design refinement)

6.0 Landscape Character + Visual Impact Assessment

6.1 Introduction

The eastern precinct of Sydney Airport forms a major gateway for motorists arriving and departing from the domestic and international terminals. The landscape character of the precinct reflects the combination of flat landform, low vegetation, large advertising signage, extensive road infrastructure and the rail corridor with long distance views to the west across the airport runways to aircraft landing and taking off.

Roads and Maritime Services proposes to implement upgrade works that will improve the movement of freight trains servicing Port Botany as well as the traffic function of the precinct. Key components of the upgrade include:

- Construction of a new rail overbridge to accommodate a new underpass as an extension of Wentworth Avenue connected to General Holmes Drive
- Removal of the General Holmes Drive rail level crossing
- Modification of the existing signalised intersections at Wentworth Avenue / Botany Road, General Holmes Drive / Botany Road
- Provision of a new intersection at General Holmes Drive / Wentworth Avenue extension
- Widening Joyce Drive and General Holmes Drive between O'Riordan Street and Mill Pond Road to three lanes in each direction
- Improving the Mill Pond Road intersections with General Holmes Drive and Botany Road to support future growth and access to Sydney Airport
- Provision of sections of shared path
- New provisions for bus operations.

Implementation of the upgrade works will create substantial changes to the existing landscape character of the precinct and at the same time provide opportunities for significant improvements through urban and landscape design.

The potential visual impact of the proposed works have been assessed to inform the urban design process to ensure it is coordinated and integrated with the road works design process. The Landscape Character and Visual Impact Assessment has been carried out in accordance with Roads and Maritime Services Environmental Impact Assessment Practice Note EIA-N04 *Guideline for Landscape Character and Visual Impact Assessment*.

6.2 Landscape Character Impact Assessment

A Landscape Character Impact Assessment has been carried out as part of the visual impact assessment process. Analysis of the proposal site (refer Section 2.5.3) identified six Landscape Character Zones, which are areas that are relatively consistent in terms of the combination of landform, vegetation, buildings and infrastructure.

Potential impacts that may result from the proposed upgrade works are assessed by combining the sensitivity of the existing landscape to the proposed changes and the magnitude (scale character distance etc.) of the proposed works¹⁰. The visual sensitivity and magnitude of potential impact in each of the Landscape Character Zones are identified in Section 6.2 of the report.

The character zones identified in Section 2.5.3 include:

1. General Holmes Drive / Joyce Drive streetscape
2. General Holmes Drive corridor
3. Landscape east of General Homes Drive
4. Coastal Sydney Freshwater Wetlands
5. Urban development of Mascot and Botany
6. Sydney Airport

Key aspects of the visual character of the proposal include:

- The section of Joyce Drive east of the O’Riordan Street intersection is visually enclosed by large advertising signs along the northern edge and a combination of roadside trees and commercial buildings along the southern edge
- South of the General Holmes Drive railway level crossing the road is visually defined by trees on both sides for a short section and then opens up to the west with long distance views across the airport runways and aprons while the eastern edge is defined by roadside shrubs and weeds
- The area of degraded landscape between General Holmes Drive and the railway line is visually enclosed by vegetation and the railway embankment along the eastern side
- The section of Botany Road south of the General Holmes Drive railway crossing is visually enclosed by planted roadside trees and vegetated railway embankment along the western edge and along the eastern side by buildings and street trees
- The section of Botany Road north of the General Holmes Drive railway crossing is visually enclosed by commercial and residential buildings on both sides together with street trees.

The various levels of visual impact are predicted through the combination of sensitivity and magnitude in accordance with the following matrix prepared by Roads and Maritime Services.

		MAGNITUDE			
		High	Moderate	Low	Negligible
SENSITIVITY	High	High	Mod / High	Moderate	Negligible
	Moderate	Mod / High	Moderate	Mod / Low	Negligible
	Low	Moderate	Mod / Low	Low Impact	Negligible
	Negligible	Negligible	Negligible	Negligible	Negligible

Sensitivity in relation to landscape character refers to the qualities of the area and how sensitive the existing landscape character of the setting is to the proposed change. Sensitivity is dealt with in each section of the analysis.

Magnitude refers to the nature of the proposal, the scale and the magnitude of the proposed works in relation to the landscape setting. Please refer to Section 5 for the Magnitude and Visual Impact Assessment.

¹⁰ Prepared in accordance with RMS EA Visual Assessment Guidelines

Results of the assessment of potential impact on landscape character are presented in the following table.

Table 2 - Potential character impact assessment

Landscape Character Zone	Sensitivity	Magnitude	Impact
1. General Holmes Drive / Joyce Drive streetscape	<u>Low</u> Visually dominant large advertising signs, commercial development and large number of vehicles moving along the road corridor Road.	<u>High</u> Proposed widening will remove existing road side trees and increase the paved area of roadway.	Moderate
2. General Holmes Drive corridor	<u>Moderate</u> Due to the generally undeveloped character of the precinct and views across the Airport.	<u>Low</u> Proposed widening will not involve removal of existing street trees but will include new landscape works.	Moderate / Low
3. Landscape area east of General Homes Drive	<u>Low</u> Degraded landscape condition and general lack of public access to the area.	<u>High</u> Proposed road works that involve construction of a new section of Wentworth Avenue including railway bridge and underpass.	Moderate
4. Coastal Sydney Freshwater Wetlands	<u>High</u> Due to natural landscape character.	<u>Negligible</u> No works are proposed in this Landscape Character Zone.	Negligible / Improvement
5. Urban development of Mascot - Botany	<u>Moderate</u> Existing dominance of traffic and buildings but moderate for adjoining residents.	<u>High</u> Proposed large scale intersection at Wentworth Avenue and Botany Road together with new rail bridge and underpass as extension of Wentworth Avenue. The loss of trees is regarded as resulting in high visual impacts for Botany Road and Wentworth Avenue	Moderate / High
6. Sydney Airport	<u>Low</u> Due to dominance of built form and traffic.	<u>Negligible</u> No works are proposed in this Landscape Character Zone.	Negligible

6.3 Visual Impact Assessment

A Visual Impact Assessment of the proposed upgrade works was carried out to determine the predicted level of visual impact on key viewpoints. The level of impact of the proposed works involved the combination of the **sensitivity** of the key viewpoints and the magnitude of proposed works from viewed from each viewpoint, in accordance with the Roads and Maritime Services matrix presented in Section 6.2.

The key viewpoints from which the works could potentially be visible are identified on Figure 29 and summarised in the following table.



Figure 29 - Key viewpoints

Table 3 - Potential visual impact assessment of views from roads

VIEWS FROM ROADS				
Key Viewpoints	Sensitivity	Magnitude	Visual Impact	Comment
1. Wentworth Avenue travelling west	Moderate	Moderate	Moderate	<ul style="list-style-type: none"> road widening for new intersection tree removal overhead powerlines placed underground new landscape open spaces on south east & north east of intersection to include tree planting and plaza adjoining the church
2. Wentworth Avenue at Botany Road intersection	Moderate	High	Mod/High	<ul style="list-style-type: none"> new rail bridge and underpass constructed existing trees and railway embankment removed intersection expanded new parkland space can moderate the impacts
3. Botany Road travelling south	Moderate	Moderate	Moderate	<ul style="list-style-type: none"> road widening and shared path construction trees to be removed for construction of shared path
4. Botany Road adjoining wetland	Moderate	Low	Mod/Low	<ul style="list-style-type: none"> view across wetland area to be opened up by weed removal and low planting regrading of landform & landscape works
5. Mill Pond Road at General Holmes Drive intersection	Moderate	Low	Mod/Low	<ul style="list-style-type: none"> intersection layout to be modified view to Airport could be opened up if advertising sign relocated
6. General Holmes Drive travelling south	Moderate	Moderate	Moderate	<ul style="list-style-type: none"> road widening views to Airport maintained view to wetland in landscape area opened up
7. Wentworth Avenue extension / General Holmes Drive intersection (looking west)	Moderate	Moderate	Moderate	<ul style="list-style-type: none"> view to Airport from new intersection
8. Wentworth Avenue extension / General Holmes Drive intersection (looking east)	Moderate	High	Mod/High	<ul style="list-style-type: none"> new intersection and road extension with rail bridge and underpass existing vegetation and railway embankment removed major reshaping of landform
9. Joyce Drive travelling west	Moderate	High	Mod/High	<ul style="list-style-type: none"> road widening views to Airport maintained view to new landscape treatment along eastern / southern side of road new visual screening of buildings is required
10. General Holmes Drive at intersection	Moderate	Moderate	Moderate	<ul style="list-style-type: none"> road widening to remove trees and existing path new median to be installed

Table 4 - Potential visual impact assessment of views from adjoining residences

VIEWES FROM ADJOINING RESIDENCES				
Key Viewpoints	Sensitivity	Magnitude	Visual Impact	Comment
11. Residences adjoining Wentworth Avenue at Botany Road intersection	High	High	High	<ul style="list-style-type: none"> • new rail bridge and underpass constructed • existing trees and railway embankment removed • intersection expanded • new parkland space can moderate the impacts
12. Residences adjoining northern side of Wentworth Avenue approx. 100m west of Wentworth Avenue / Botany Road intersection	High	Negligible	Negligible	<ul style="list-style-type: none"> • minor tree removal on opposite side of Wentworth Avenue • works screened by street trees and boundary walls along northern side of road
13. Residences adjoining northern side of Wentworth Avenue approx. 200m west of Wentworth Avenue / Botany Road intersection	High	Low	Moderate	<ul style="list-style-type: none"> • tree removal along southern side of Wentworth Avenue • works mostly screened by street trees and boundary walls along northern side of road
14. Residences adjoining northern side of Wentworth Avenue approx. 300m west of Wentworth Avenue / Botany Road intersection	High	Low	Moderate	<ul style="list-style-type: none"> • tree removal along southern side of Wentworth Avenue • works mostly screened by street trees and boundary walls along northern side of road
15. Residences adjoining southern side of Wentworth Avenue approx. 250m west of Wentworth Avenue / Botany Road intersection	High	High	High	<ul style="list-style-type: none"> • removal of street trees along residential frontage to southern side of Wentworth Avenue
16. Residences adjoining southern side of Wentworth Avenue approx. 300m west of Wentworth Avenue / Botany Road intersection	High	Moderate	Mod/High	<ul style="list-style-type: none"> • removal of street trees along residential frontage to southern side of Wentworth Avenue

6.4 Visual Impact Conclusion

Overall impacts

The Visual Impact Assessment indicates that the overall visual impact of the proposal will be moderate after mitigation strategies of the upgrade including a mature landscape. High visual impacts will be experienced by residents adjoining the north eastern corner of the Wentworth Avenue / Botany Road intersection. Moderate to high visual impacts will be experienced by residents along Wentworth Avenue and by motorists travelling along Wentworth Avenue and Joyce Drive as a result of road safety zones that preclude large trees along the road edge.

Joyce Drive and General Holmes Drive

The upgrade and road widening associated with Joyce Drive and General Holmes Drive will result in a wider road corridor. Short term construction impacts will produce moderate to moderate/high visual impacts. The visual impacts will be reduced over time as mitigation strategies, such as screen planting, new tree planting and other landscape works begin to mature. The corridor will be revitalised and road users will experience safer conditions and improved visual amenity along sections of Joyce Drive and General Holmes Drive within the proposal site.

Urban Sydney - Mascot Interface (Mascot, Wentworth Avenue and Botany Road)

The new intersection of Wentworth Avenue and Botany Road will result in road widening in the neighbourhood of Mascot. The streetscape will be substantially modified by the proposed changes to the intersection and new rail bridge over the extension of Wentworth Avenue. There will be a loss of street trees along both Botany Road and Wentworth Avenue as a result of road widening and construction of the new shared path. New shade trees will be planted through redevelopment of Dr Darragh Reserve that will be visually connected to the Beckenham Memorial Church. The status of the church is currently not decided but will be subject to further consultation with stakeholders together with the use and design of the associated pocket park area.

The increased area of road surface at this intersection will be offset to some extent by undergrounding powerlines and implementing urban design works. However, the visual impact on viewpoints associated with the Wentworth Avenue extension and construction a new railway bridge and underpass will be moderate to high. These works will create a new section of road and expansion of the Botany Road / Wentworth Avenue intersection. Excavation for construction of the Wentworth Avenue extension to pass below a new railway bridge will fundamentally change the visual experience of motorists and pedestrians moving through the area as well as any adjoining residents who have views of the intersection.

Removal of existing street trees along sections of Botany Road and Wentworth Avenue to allow road widening and construction of shared paths will create a moderate to moderate/high visual impact for motorists and pedestrians.

Visual benefits of the proposal

It should be noted that a number of positive visual impacts will result from the proposal that include:

- Creation of a new pocket park on the south east corner of the Botany Road / Wentworth Avenue intersection that will include tree planting and creation of a plaza adjoining the church together with landscape treatment on the north east corner of the intersection
- Relocation of overhead powerlines to below ground where feasible and practical
- Landscape works in the area south of the extension of Wentworth Avenue would include removal weeds to open up views across the existing wetland area, creation of new landforms, establishing indigenous shrub and grass vegetation, tree planting at the closed railway level crossing

- Landscape works adjoining General Holmes Drive north of the Wentworth Avenue extension
- Tree planting and other landscape works adjoining the closed railway level crossing adjoining the multi storey car parking structure.

Further design development

Detailed urban and landscape design will need to address potential visual impacts to integrate design solutions with the road works design. Opportunities to achieve positive visual outcomes should be maximised through the detailed urban and landscape design process to create a high quality public domain. This should include urban design input to the design of the rail bridge together with other structural elements, pedestrian pavements and fencing.

Retention of the wetland area combined with ecological restoration and landscape works should aim to make a major contribution to the creation of a memorable gateway to Sydney Airport.

Mitigation of short term construction impacts

Short term visual impacts of the proposal will vary from moderate to high. These visual impacts will be mitigated over time as a result of implementing the recommended design strategies incorporated in this urban design report and the establishment and maturing of the landscape planting.

The overall urban design component the proposal will result in a project of merit, it will revitalise this local area, provide an improved safety and visual outcomes and ameliorate traffic congestion at the Airport and for the local community.

7.0 Conclusion, Mitigation and the Next Steps

This report describes and illustrates an urban design strategy for the upgrade proposal, its context and how the strategy responds to site-specific issues. The report also identifies potential visual impacts together with mitigation measures as part of the Review of Environmental Factors process. The overall objective is to achieve a high quality urban design outcome for all aspects of the proposal. The visual impact assessment concludes that the proposal would generally have a moderate level of visual impact that will be reduced over time as a result of mitigation strategies to be incorporated in the design development process.

Mitigation of potential impacts

Further design development is required in future stages of the proposal to ensure high quality outcomes. Mitigation of potential impacts should be considered throughout the process of detailed design and construction. The design process should include:

- Engagement of qualified urban and landscape designers for all future stages of the proposal
- Further consultation with the local community, relevant stakeholders and agencies in relation to the proposal's urban design components
- General Holmes Drive / Joyce Drive Upgrade – creation of a high quality airport corridor that enhances safety and interest for all road users
- The Gateway – creation of a new intersection that enhances with the role of Sydney Airport in relation to the city
- Coastal Sydney – retention of the existing wetland endangered ecological community and new creation of new landforms that reflect the coastal dune landscape, with species selection focused on the Eastern Suburbs Banksia Scrub vegetation association
- Urban Sydney – Mascot Interface – preparation and implementation of a contextually related design that improves safety and the quality of the public domain.

The objectives, principles, strategy and design considerations presented in this urban design report will form input to future design development of the proposal, including preparation of the Review of Environmental Factors and the detailed design and documentation process. It is noted that stakeholder and community consultation is to take place in all subsequent phases of proposal design development. Improvements to the visual qualities of the proposed upgrade works are to be identified and incorporated in future design stages of the proposal.

8.0 Bibliography

- Botany Council. 1996. *Botany Bicycle Plan*. Botany Council, Sydney, Australia.
- Department of Planning, Heritage Branch. 2009. *Assessing significance for historical archaeological sites and relics*. Department of Planning, Heritage Branch, Sydney, Australia.
- Environment Protection Authority (EPA). 2012. *NSW State of the Environment 2012*. EPA, Sydney, Australia.
- Mascot City Council. Undated. *Mascot Town Centre Precinct TMAP*. Mascot City Council, Sydney, Australia.
- NSW Department of Urban Affairs and Planning (DoUAP). 2001. *SEPP 64 Advertising and signage explanatory information*. NSW DoUAP, Sydney, Australia.
- Randwick City Council. January 2008. *Randwick City Council, Bicycle Route Network Map*. Randwick City Council, Sydney, Australia.
- Roads and Maritime Services, Transport NSW. 2014. *Beyond the Pavement, Urban Design Policy, Procedures and Design Principles*. Roads and Maritime Services Centre for Urban Design, Sydney, Australia.
- Roads and Maritime Services, Transport NSW. 2014. *Bridge Aesthetics: Design guidelines to improve the appearance of bridges in NSW*. Roads and Maritime Services Centre for Urban Design, Sydney, Australia.
- Roads and Maritime Services, Transport NSW. 2013. *Environmental Impact Assessment Practice Note: Guideline for Landscape Character and Visual Impact Assessment*. Roads and Maritime Services Centre for Urban Design, Sydney, Australia.
- Roads and Maritime Services, Transport NSW. 2008. *Landscape Guideline: Landscape design and maintenance guidelines to improve the quality, safety and cost effectiveness of road corridor planting and seeding*. Roads and Maritime Services Centre for Urban Design, Sydney, Australia.
- Roads and Traffic Authority NSW. 2003, Version 1.2 July 2005. *NSW Bicycle Guidelines*. Roads and Traffic Authority NSW, Sydney, Australia.
- Roads and Maritime Services, Transport NSW. May 2014. *WestConnex enabling works – Airport east precinct Biodiversity Assessment*. SMEC Pty Ltd, for Roads and Maritime Services, Sydney, Australia.
- Sydney Airport Corporation Limited. 2014. *Sydney Airport Master Plan 2033*. Sydney Airport Corporation Limited, Sydney, Australia.
- Sydney Airport Corporation Limited. 2008. *Runway Safety Enhancement Runway 25 – Runway End Safety Area Major Development Plan*. Sydney Airport Corporation Limited, Sydney, Australia.
- Sydney Airport Corporation Limited. 2005. *Car Parking & Commercial Facilities International Terminal Precinct Major Development Plan*. Sydney Airport Corporation Limited, Sydney, Australia.
- Sydney Airport Corporation Limited. 2002. *Office Development International Terminal Precinct Major Development Plan*. Sydney Airport Corporation Limited, Sydney, Australia.
- Transport for NSW. 2012. *Draft Freight and Ports Strategy, State of New South Wales*. Transport for NSW, Sydney, Australia
- Transport for NSW. 2012. *NSW Long Term Transport Master Plan*. Transport for NSW, Sydney, Australia.
- Transport for NSW. 2012. *NSW Sustainable design guideline for rail*. Transport for NSW, Sydney, Australia.
- Transport for NSW. December 2013. *Sydney's Cycling Future, Cycling for everyday transport*. Transport for NSW, Sydney, Australia.
- Transport for NSW. 2013. *Transport Environment and Sustainability Policy Framework*. Transport for NSW, Sydney, Australia.
- WestConnex Delivery Authority. October 2013. *Draft WestConnex motorway urban design framework, WestConnex City Shaping Infrastructure*. Roads and Maritime Services Centre for Urban Design, Sydney, Australia.

Appendix I – Potential Plant List

BOTANIC NAME	COMMON NAME	PLANT COMMUNITY		PROJECT USE		
		Eastern Suburbs Banksia Scrub	Sydney Freshwater Wetland	Street Tree	Dune Landform	Park
Trees						
<i>Banksia serrata</i>	Old Man Banksia	●				
<i>Euclayptus haemastoma</i>	Scribbly Gum					
<i>Glochidion ferdinandi</i>	Cheese Tree					
<i>Lophostemon confertus</i>	Brush Box					
<i>Platanus x acerifolius</i>	Plane Tree					
Small Trees + Tall Shrubs						
<i>Banksia aemula</i>	Wallum Banksia	●				
<i>Banksia ericifolia</i>	Heath-leaved Banksia	●				
<i>Leptospermum laevigatum</i>	Coastal Tea Tree	●				
<i>Leptospermum trinervium</i>	Paperbark Tea Tree	●				
<i>Leptospermum juniperinum</i>	Prickly Tea Tree		●			
<i>Melaleuca nodosa</i>	Prickly-leaved Paperbark	●	●			
<i>Monotoca elliptica</i>	Tree Broom Heath	●				
Small Shrubs						
<i>Astroloma pinifolium</i>		●				
<i>Baeckaea imbricata</i>		●				
<i>Banksia robur</i>	Swamp Banksia		●			
<i>Bauera rubioides</i>	River Rose	●				
<i>Billardiera scandens</i>		●				
<i>Boronia parvifolia</i>		●				
<i>Bossiaea heterophylla</i>		●				
<i>Bossiaea scolopendria</i>		●				
<i>Brachyloma daphnoides</i>		●				
<i>Caustis pentandra</i>		●				
<i>Conospermum taxifolium</i>		●				
<i>Darwinia fascicularis</i>		●				
<i>Darwinia leptantha</i>		●				
<i>Dillwynia retorta</i>		●				
<i>Epacris longiflora</i>	Fuchsia Heath	●				
<i>Epacris microphylla</i>		●				
<i>Epacris obtusifolia</i>		●				
<i>Eriostemon australasius</i>	Wax Flower	●				
<i>Hakea teretifolia</i>	Needlebush	●	●			
<i>Kunzea ambigua</i>		●				
<i>Lambertia formosa</i>	Mountain Devil	●				
<i>Leucopogon ericoides</i>		●				
<i>Monotoca elliptica</i>		●				
<i>Monotoca scoparia</i>		●				
<i>Persoonia lanceolata</i>		●				
<i>Philothea salsolifolia</i>		●				
<i>Pimelea linifolia</i>	Slender Riceflower	●				
<i>Ricinocarpos pinifolius</i>	Wedding Bush	●				

BOTANIC NAME	COMMON NAME	PLANT COMMUNITY		PROJECT USE		
		Eastern Suburbs Banksia Scrub	Sydney Freshwater Wetland	Street Tree	Dune Landform	Park
<i>Styphelia viridis</i>		●				
<i>Woolisia pungens</i>		●				
<i>Xanthorrhoea resinifera</i>	Grass-tree	●	●			
Grasses + Groundcovers						
<i>Actinotus helianthii</i>	Flannel Flower	●				
<i>Actinotus minor</i>	Lesser Flannel Flower	●				
<i>Cyathochaeta diandra</i>		●				
<i>Dianella revoluta</i>	Blueberry Flax-lily	●				
<i>Dichelachne crinita</i>	Longhair Plume Grass	●				
<i>Eragrostis brownii</i>		●				
<i>Haemodorum planifolium</i>		●				
<i>Hardenbergia violacea</i>	False Sarsaparilla	●				
<i>Hibbertia fasciculata</i>		●				
<i>Hypolaena fastigiata</i>		●				
<i>Lepidosperma laterale</i>		●				
<i>Lepyrodia scariosa</i>		●				
<i>Lomandra longifolia</i>	Spiny-headed Mat-rush	●	●			
<i>Restio fastigiata</i>		●				

Appendix 2 – Bridge Design Checklist

Bridge Design Elements Checklist (please refer attached sketch)

General

Refer to Roads and Maritime Services Bridge Aesthetic guidelines to improve the appearance of bridges. Specifically consider the following:

- Provide a structural minimum for the parapets to reduce the appearance of the span to depth ratio. To minimise the apparent parapet depth the following could be considered:
 - Articulate the parapet to reduce the apparent depth
 - Incorporate a parapet treatment that reduces the apparent depth
 - Incorporate maintenance walkways and lighting to the parapet
 - Incorporate advertising signage to provide interest, consistent with other railway bridges at the Airport
- Design parapets with a rectangular format representing the maximum span requirements
- Express the differentiation of spans on either side of the central median pier
- The piers could be vertical and to minimum proportions (width, height ratio)
- Abutment treatments should have flowing lines in horizontal and vertical alignment
- Utilise flowing and organic forms which respond to the Airport, and design generators.

Checklist

The following checklist is provided to assist with the development of the bridge design:

- Have all joints been carefully located?
- Have spacing of elements (handrail elements and abutment joints should be regularly spaced for example) been made regular and integrated?

Parapets:

- Is the parapet design suitable for the function and context?
- Is the parapet suitable for signage and advertising, and resolve both east and west parapet appearances, design accordingly?
- Are the girders (or spanning superstructure) suitable for the spans and the construction type?
- Consider hogs, and edge detailing carefully.

Pier, headstocks and soffit:

- Has the girder cross section been considered for elegance?
- Have the abutment and pier headstocks been integrated in the design or screened?
- Is the pier blade wall or pier structure aesthetically treated to minimize visual impacts?
- Are there multiple piers or a single integrated pier, design accordingly?
- Is the pier cross section elegant and consistent with the rest of the bridge?
- Are the pile caps integrated, recessed or screened?
- Has the bridge soffit design been considered?

Abutments:

- Have the abutments been designed to be integrated with the pier and bridge design?
- Are the abutment walls complementary to the overall bridge compositions?
- Are the abutment walls designed to assist with construction sequencing, consider lightweight, durable cladding.

Safety barriers and fences:

- Bridge barriers require resolution and terminations, have they been resolved?
- The bridge will require safety fences, screens and gates, have they been located to be integrated with the design?

Signage, lighting and drainage:

- Traffic directional signage is likely to be required on northbound and southbound spans, ensure the signs are designed to be integrated with the bridge design in a pleasing manner
- Future advertising signs by others may be included on the bridge parapet or other locations, the structures should be designed to accommodate advertising signs and access to the signs including digital signage and feature lighting
- Feature lighting, safety and functional lighting should be considered in the overall design of the bridge
- Drainage – the bridge has special drainage requirements, these should be carefully resolved and integrated with the design to make a pleasing, functional and maintainable design.

Landscaping:

- Carefully consider the landscape design to assist in improving the bridge appearance
- Ensure that landscape in and around the bridge can be easily maintained and does not obstruct maintenance of the bridge.

Bridge design considerations

During the development of the design of the proposed rail bridge over Wentworth Avenue the following items could be considered in the design development:

- The bridge may have an approximate 3m high concrete spanning parapet (rail safety and span), which may require aesthetic consideration
- Two railway lines over the bridge (one for temporary switchback until the railway line is duplicated) are proposed, this may result in a wide and deep structure
- There is limited rail duplication space due to the existing railway bridge over Botany Road and the curve in the western part of the railway alignment; the bridge is not curved; this should be considered during the design development stage
- Multiple staged operations due to utility locations, the Obstacle Limitation Surface as well as Airport and Work Health & Safety requirements should be considered
- Skew median piers with safety barriers are likely to occur, this could require visual consideration
- A skew road alignment that is depressed below natural ground level may result in the bridge appearing depressed in the landscape, this should be considered in the design resolution
- Pumping facilities required for the depressed road drainage should be considered in the design
- The depressed Wentworth Road extension (neck of intersection and road under the railway line) should be carefully considered in the design of the bridge and abutment walls
- Nine traffic lanes under the bridge and a safety barrier median will result in a wide structure, this should be considered in the design development stage
- Retaining structures (piles and headstocks) in both cut and fill may require dressing to improve the visual amenity
- Avoidance of the Obstacle Limitation Surface overhead (limiting construction) should be considered in the design development stage
- Avoidance of underground gas and other utilities, including construction limitations due to the Obstacle Limitation Surface may have design resolution implications
- Railway track maintenance route (on the side or between the railway lines), which may effect the design
- Construction limitations in reclaimed soil area (over swamp), including deep bedrock should be considered in the design resolution
- West facing road, with sunlight glare should be considered in the design of the bridge

- Safety fencing to prevent unauthorized access to the railway line, road and open space could be included to improve the overall appearance of the bridge
- Lighting requirements associated with the intersection and bridge could be considered
- Safety considerations including maintenance access to the bearings, abutment undercroft space may have impacts on the design resolution
- Vandal and vagrant deterrence for the bridge should be considered.