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M4-M5 Link

Environmental Impact Statement

August 2017

Appendices L to N



Volume 2F

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M ..... Shadow diagrams and overshadowing

N ..... Technical working paper: Active transport strategy

WestConnex

Appendix L

Technical working paper: Urban design

WestConnex

M4-M5 LINK

SYDNEY, NSW

URBAN DESIGN REPORT

August 2017

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Glossary

Abbreviation	Name
ATN	Active Transport Network
CBD	Central Business District
CPTED	Crime Prevention Through Environmental Design
EIS	Environmental impact statement
EP&A Act	*Environmental Planning and Assessment Act 1979* [NSW]
LGAs	Local Government Areas
Roads and Maritime	NSW Roads and Maritime Services
SEARs	Secretary's Environmental Assessment Requirements
SMC	Sydney Motorway Corporation
UDLP	Urban Design and Landscape Plan
WSUD	Water Sensitive Urban Design

Executive Summary

This report provides the principles by which the project would demonstrate design excellence and integrate with surrounding neighbourhoods, particularly at areas of surface intervention.

NSW Roads and Maritime Services [Roads and Maritime] consider that whilst the functionality of the M4-M5 Link project is fundamental, attention to design quality at the outset would ensure long-term success. This report details the urban design principles that have been developed for the project. These principles are based on analysis of site context, particularly in relation to the Rozelle Rail Yards and Iron Cove. These principles would also guide the development of the urban design concepts for the above ground infrastructure located within the Darley Road motorway operations complex [MOC1] at Leichhardt, and the Campbell Road motorway operations complex [MOC5] at St Peters. The remaining areas of surface intervention at Haberfield and St Peters have been planned under the M4 East and New M5 projects respectively.

The principles will guide the development of urban design concepts and master plans for the sites. Based on the Roads and Maritime guideline 'Beyond the Pavement' and the 'WestConnex Urban Design Framework,' the principles are:

An integrated and collective approach- Create holistic and integrated design solutions generated by collaboration across disciplines, the community, stakeholders and government bodies.

An environmental vision- Create a sustainable and enduring design response which enhances and connects local ecologies, and green spaces.

Cross scale connection of spaces- Prioritise both local and regionally significant connections that respond to broader issues, aims and initiatives of the local neighbourhoods and the city.

A motorway integrated within its context- Understand the existing landscape and respond in a respectful manner that seeks to enhance and contribute to its context.

Place sensitive design- Celebrate and work with the character of each place and destination, responding to their unique histories, materiality, architecture, built fabric, cultural context, landform and topography.

A multidimensional user focus- Consider holistically how a diversity of users' experience space including all ages, abilities and transport modes for a truly inclusive, universally accessible and safe outcome.

Revitalisation, opportunity and economics- Establish opportunities for development that supports and connects existing neighbourhoods, complements and stimulates local economies and provides opportunity for growth across existing and future local industries.

These principles have been applied to concepts for the Rozelle Rail Yards and Iron Cove Link sites as presented in this report. The base scope of the urban design components of the project as committed by Roads and Maritime includes construction of:

— Active transport connections
— Fixed facilities such as ventilation facilities and outlets, water treatment plants, electricity substations and offices and worker parking
— Drainage, including Water Sensitive Urban Design [WSUD]
— Open space and landscaping.

Section 6 contains options as to how the principles and base scope could be embellished to deliver future opportunities for these sites and surrounds. The final design and arrangement of urban design elements would be detailed in a series of Urban Design and Landscape Plans [UDLPs] for the project. These plans would be based on the principles developed and include detailed master plans for the site and would be subject to consultation with the community and stakeholders.

1.0 Introduction

NSW Roads and Maritime Services [Roads and Maritime] is seeking approval to construct and operate the WestConnex M4-M5 Link [the project], which would comprise a new multi-lane road link between the M4 East Motorway at Haberfield and the New M5 Motorway at St Peters. The project would also include an interchange at Lilyfield and Rozelle [the Rozelle interchange] and a tunnel connection between Anzac Bridge and Victoria Road, east of Iron Cove Bridge [Iron Cove Link]. In addition, construction of tunnels, ramps and associated infrastructure to provide connections to the proposed future Western Harbour Tunnel and Beaches Link project would be carried out at the Rozelle interchange.

Together with the other components of the WestConnex program of works and the proposed future Sydney Gateway, the project would facilitate improved connections between western Sydney, Sydney Airport and Port Botany and south and south-western Sydney, as well as better connectivity between the important economic centres along Sydney's Global Economic Corridor and local communities.

Approval is being sought under Part 5.1 of the *Environmental Planning and Assessment Act 1979* [NSW] [EP&A Act] for the project. A request has been made for the NSW Minister for Planning to specifically declare the project to be State significant infrastructure and also critical State significant infrastructure. An environmental impact statement [EIS] is therefore required.

1.1 OVERVIEW OF WESTCONNEX AND RELATED PROJECTS

The M4-M5 Link is part of the WestConnex program of works. Separate planning applications and assessments have been completed for each of the approved WestConnex projects. Roads and Maritime has commissioned Sydney Motorway Corporation [SMC] to deliver WestConnex, on behalf of the NSW Government. However, Roads and Maritime is the proponent for the project.

In addition to linking to other WestConnex projects, the M4-M5 Link would provide connections to the proposed future Western Harbour Tunnel and Beaches Link, the Sydney Gateway [via the St Peters interchange] and the F6 Extension [via the New M5].

The WestConnex program of works, as well as related projects, are shown in Figure 1.1 and described in Table 1.1.

Project	Description	Status
	Westconnex program of works	
M4 Widening	Widening of the existing M4 Motorway from Parramatta to Homebush.	Planning approval under the EP&A Act granted on 21 December 2014. Open to traffic.
M4 East	Extension of the M4 Motorway in tunnels between Homebush and Haberfield via Concord. Includes provision for a future connection to the M4-M5 Link at the Wattle Street interchange.	Planning approval under the EP&A Act granted on 11 February 2016. Under construction.
King Georges Road Interchange Upgrade	Upgrade of the King Georges Road interchange between the M5 West and the M5 East at Beverly Hills, in preparation for the New M5 project.	Planning approval under the EP&A Act granted on 3 March 2015. Open to traffic.
New M5	Duplication of the M5 East from King Georges Road in Beverly Hills with tunnels from Kingsgrove to a new interchange at St Peters. The St Peters interchange allows for connections to the proposed future Sydney Gateway project and an underground connection to the M4-M5 Link. The New M5 tunnels also include provision for a future connection to the proposed future F6 Extension.	Planning approval under the EP&A Act granted on 20 April 2016. Commonwealth approval under the *Environment Protection and Biodiversity Conservation Act 1999* [Commonwealth] granted on 11 July 2016. Under construction.
M4-M5 Link [the project]	Tunnels connecting to the M4 East at Haberfield [via the Wattle Street interchange] and the New M5 at St Peters [via the St Peters interchange], a new interchange at Rozelle and a link to Victoria Road [the Iron Cove Link]. The Rozelle interchange also includes ramps and tunnels for connections to the proposed future Western Harbour Tunnel and Beaches Link project.	The subject of this EIS.
	Related projects	
Sydney Gateway	A high-capacity connection between the St Peters interchange [under construction as part of the New M5 project] and the Sydney Airport and Port Botany precinct.	Planning underway by Roads and Maritime and subject to separate environmental assessment and approval.
Western Harbour Tunnel and Beaches Link	The Western Harbour Tunnel component would connect to the M4-M5 Link at the Rozelle interchange, cross underneath Sydney Harbour between the Birchgrove and Waverton areas, and connect with the Warringah Freeway at North Sydney. The Beaches Link component would comprise a tunnel that would connect to the Warringah Freeway, cross underneath Middle Harbour and connect with the Burnt Bridge Creek Deviation at Balgowlah and Wakehurst Parkway at Seaforth. It would also involve the duplication of the Wakehurst Parkway between Seaforth and Frenchs Forest.	Planning underway by Roads and Maritime and subject to separate environmental assessment and approval.
F6 Extension	A proposed motorway link between the New M5 at Arncliffe and the existing M1 Princes Highway at Loftus, generally along the alignment known as the F6 corridor.	Planning underway by Roads and Maritime and subject to separate environmental assessment and approval.

Table 1.1: WestConnex and related projects

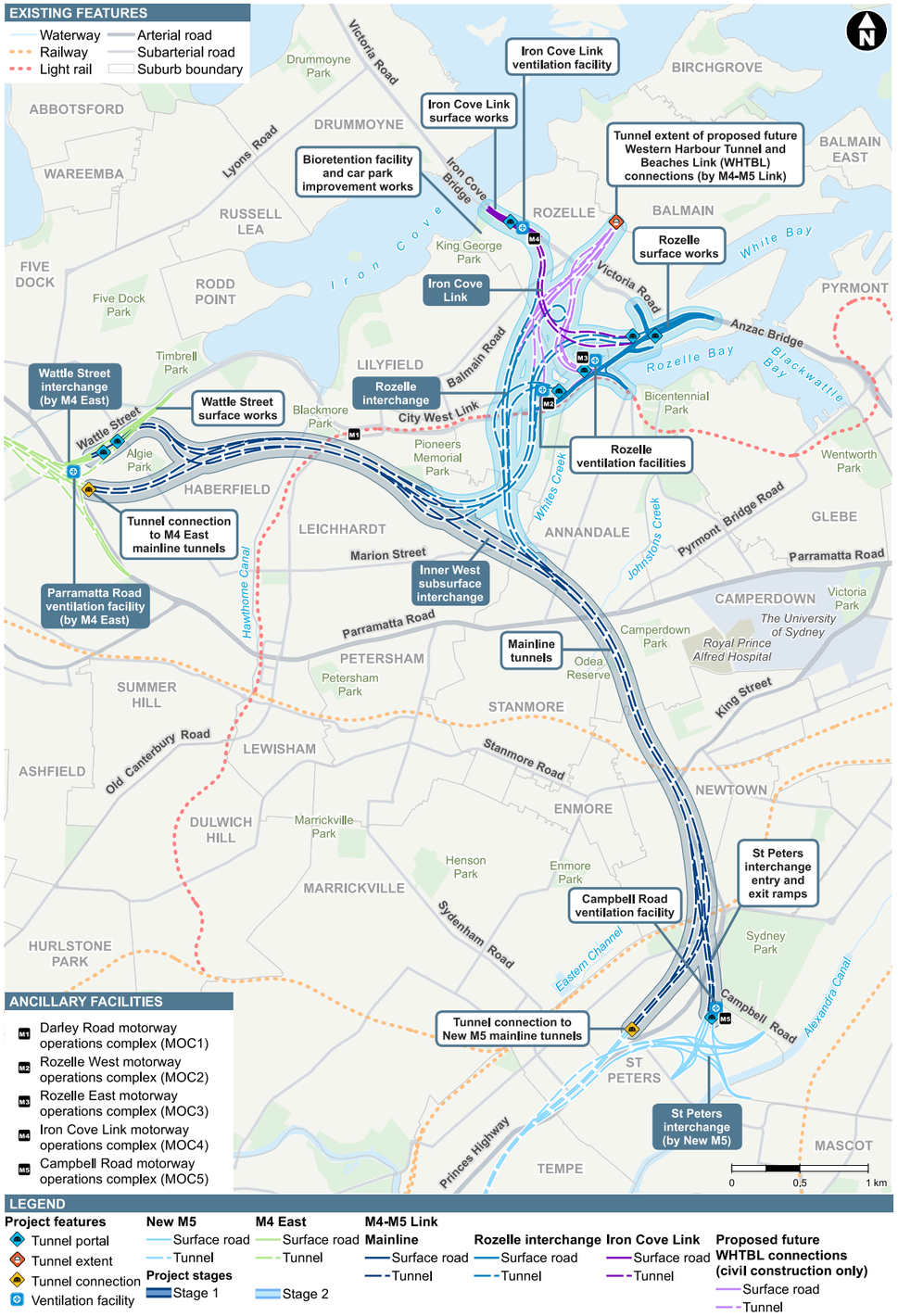


Figure 1.1: Overview of the project

1.2 PURPOSE OF THIS REPORT

This report provides the principles by which the project would demonstrate design excellence during detailed design and integrate with surrounding neighbourhoods, particularly at areas of surface intervention. The report provides concepts for future site uses at Rozelle Rail Yards and Iron Cove Link based on the principles.

Permanent ancillary facilities would also be constructed by the project at Darley Road at Leichhardt and at the Campbell Road Ventilation facility at St Peters. These facilities include:

- Darley Road motorway operations complex [MOC1], comprising a water treatment facility, substation and associated infrastructure
- Campbell Road motorway operations complex [MOC5], comprising a ventilation facility, emergency smoke extraction facility including outlets, substation and associated infrastructure.

This above ground infrastructure would be designed in accordance with the M4-M5 Link UDLP and the principles detailed in this report.

The urban design concepts for Haberfield and the remaining areas of surface intervention at St Peters are detailed in the M4 East and New M5 EISs as updated by the UDLPs developed for both these projects.

Final designs for both the Rozelle Rail Yards and Iron Cove Link sites would be created using the principles that have been developed. A context specific response would be developed that may vary from the concepts outlined in this report based on:

- Feedback from the community
- Feedback from councils
- Development of adjacent developments such as The Bays Precinct
- Designs submitted by the successful contractor to construct the works.

The concepts provided illustrate one way in which the principles could apply to the design of the site. The principles and concepts set a benchmark in terms of the outcome being sought for the sites and outline the commitment to achieving a 'more than the motorway' response.

The project would deliver open space development including active transport [pedestrian and cyclist] connections, landscaping, Water Sensitive Urban Design [WSUD] elements including drainage and heritage interpretation within the Rozelle Rail Yards. The final arrangement and design of these elements would be included in the UDLPs.

Detailed UDLPs would be developed to outline the final designs for the sites accounting for the feedback received. The UDLPs would be based on the principles outlined in this report and further develop the concepts to arrive at a final design for the sites. Section 7 outlines the considerations that would be included in the UDLPs.

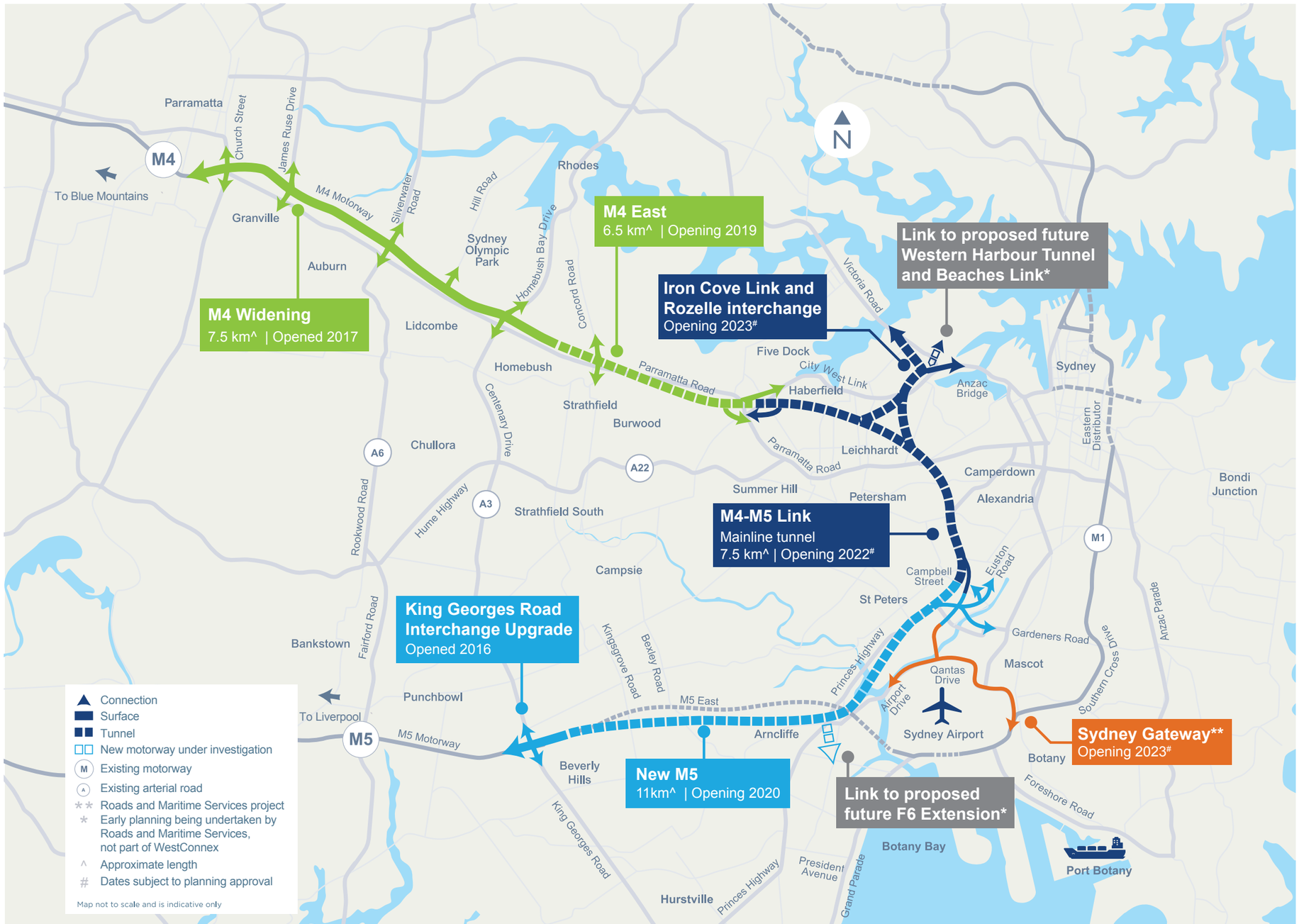


Figure 1.2: Overview of WestConnex and related projects

1.3 SEARS

In preparing this Urban Design Report, the Secretary's Environmental Assessment Requirements [SEARs] issued for the M4-M5 Link have been addressed. The key matters raised by the Secretary for consideration in the Urban Design Report, and where this report addresses the SEARs are outlined in Table 1.2.

	Requirement	Section where addressed in report
Urban Design	**The project design complements the visual amenity, character and quality of the surrounding environment. The project contributes to the accessibility and connectivity of communities.**	
	1. The Proponent must: [a] identify the urban design and landscaping aspects of the project and its components to enhance the appearance of ventilation outlets, interchanges, potential connections to The Bays Precinct and transport linkages, tunnel portals, bridges, noise walls, ancillary buildings, and any additional surface infrastructure, 'cut and cover' arrangements;	Sections 5, 6, 7.
	[b] identify measures aimed at improving 'north-south' connectivity between Balmain/Rozelle and Sydney Harbour;	Sections 5 and 6.
	[c] identify measures aimed at preserving the 'east-west' connectivity between White Bay and the Rozelle Rail Yards;	Sections 6. See also EIS Appendix N [Technical working paper: Active transport strategy].
	[d] consider resulting residual land treatments, and demonstrate how the proposed hard and soft urban design elements of the proposal would be consistent with the existing and desired future character of the area traversed or affected by the proposal;	Sections 5, 6, 7. See also EIS Chapter 12 [Land use and property].
	[e] identify opportunities to utilise surplus or residual land, particularly for the provision of community space [passive and recreational] and utilise key structures [such as ventilation outlets] for multiple uses i.e. integration with other structures;	Sections 5, 6, 7. See also EIS Chapter 12 [Land use and property].
	[f] evaluate the visual impacts and urban design aspects of the proposal and its components [such as the ventilation outlets and interchanges] on surrounding areas, taking into consideration the urban and landscape design of the M4 East and New M5 Motorways and WestConnex Urban Design Corridor Framework;	See EIS Appendix O [Technical working paper: Landscape and visual impact].
	[g] explore the use of Crime Prevention Through Environmental Design [CPTED] principles during the design development process, including natural surveillance, lighting, walkways, signage and landscape;	Section 7.
	[h] identify urban design strategies and opportunities to enhance healthy, cohesive and inclusive communities; and	Sections 5, 6, 7.
	[i] describe urban design and landscape mitigation measures, having regard to the urban design and landscape objectives for the proposal	Sections 5, 6, 7.
Visual Amenity	**The project minimises adverse impacts on the visual amenity of the built and natural environment [including public open space] and capitalises on opportunities to improve visual amenity.**	
	1. The Proponent must provide artist impressions and perspective drawings of the project from a variety of locations along and adjacent to the route to illustrate how the project has responded to the visual impact through urban design and landscaping.	See EIS Appendix O [Technical working paper: Landscape and visual impact].
Socio-economic, Land Use and Property	**The project minimises adverse social and economic impacts and capitalises on opportunities potentially available to affected communities.** **The project minimises impacts to property and business and achieves appropriate integration with adjoining land uses, including maintenance of appropriate access to properties and community facilities, and minimisation of displacement of existing land use activities, dwellings and infrastructure.**	
	1. The Proponent must assess impacts from construction and operation on potentially affected properties, businesses, recreational users and land and water users, including property acquisitions/adjustments, access amenity, relevant statutory rights, and community severance and barrier impacts resulting from the project.	See EIS Appendix P [Technical working paper: Social and economic].
	2. The Proponent must identify opportunities for local centre street revitalisation improvements, pedestrian and cyclist access and connectivity and provision of community and social facilities.	Sections 5, 6, 7. See also EIS Appendix N [Technical working paper: Active transport strategy] and EIS Appendix P [Technical working paper: Social and economic].
	3. The design and siting of project elements should be located in such a way that functional, contiguous areas of residual land are maximised. The design and siting must consider appropriate land use interfaces [i.e. White Bay] and the social and economic impacts of proposed land uses against alternate land uses.	Sections 5, 6, 7. See also EIS Appendix P [Technical working paper: Social and economic].
	4. Where air quality allows, residual land must be designed to positively contribute to additional community uses, public recreation uses and/or affordable or social housing. Passively landscaped areas should not be the default use for residual land.	Sections 5, 6, 7. See also EIS Chapter 12 [Land use and property].
Traffic and Transport	**Network connectivity, safety and efficiency of the transport system in the vicinity of the project are managed to minimise impacts. The safety of transport system customers is maintained. Impacts on network capacity and the level of service are effectively managed. Works are compatible with existing infrastructure and future transport corridors.**	
	[d] wider transport interactions [local and regional roads, cycling, public and freight transport], taking into account the Sydney City Centre Access Strategy and planned future urban release areas such as The Bays Precinct;	See EIS Appendix N [Technical working paper: Active transport strategy]. and EIS Appendix H [Technical working paper: Traffic and transport]
	[f] impacts on cyclists and pedestrian access and safety, including on known routes and future proposals such as along Lilyfield Road;	See EIS Appendix N [Technical working paper: Active transport strategy]. and EIS Appendix H [Technical working paper: Traffic and transport]
	[g] opportunities to integrate cycling and pedestrian elements with surrounding networks and within the project;	See EIS Appendix N [Technical working paper: Active transport strategy]. and EIS Appendix H [Technical working paper: Traffic and transport]

Table 1.2: How SEARs have been addressed in this report

1.4 RELATIONSHIP TO OTHER REPORTS IN THE EIS

The Urban Design Report should be read in conjunction with the following EIS chapters and appendices:

- EIS Chapter 5, Project description: this chapter describes the project, including the project tunnels, interchanges and associated infrastructure, and ancillary facilities. It also describes the design standards required to deliver the project
- EIS Chapter 6, Construction work: this chapter describes the proposed approach to the construction of the project
- EIS Chapter 7, Consultation: this chapter outlines the consultation that has occurred and assisted in developing the urban design concept for the project
- EIS Chapter 12, Land Use and Property: this chapter details the process for identifying potential future uses for land not required for the ongoing use of the project
- EIS Chapter 13, Urban design and visual amenity: this chapter provides an overview of the urban design principles and findings in this report, and the landscape character and visual impacts of the project
- EIS Appendix N, Active transport strategy: this report details the future active transport network [pedestrian and cycle access] to be provided by the project, as well as future links that could be created by others to complete the network
- EIS Appendix O, Landscape and visual impact: this report analyses the landscape character and visual impacts of the project
- EIS Appendix P, Social and economic: this report details the social impacts of the project and how management measures [including urban design principles] will manage these impacts on surrounding communities.

2.0 Urban Design and M4-M5 Link

2.1 URBAN DESIGN

Whilst the functionality of the M4-M5 Link project is paramount, attention to design quality at the outset would ensure long-term success. Through implementation of an overarching urban design vision and careful analysis of context, the project would seamlessly integrate with, and provide peripheral benefits for local and regional communities.

2.2 PROJECT LOCATION

The project would be generally located within the City of Sydney and Inner West local government areas [LGAs]. The project is located about two to seven kilometres south, southwest and west of the Sydney central business district [CBD and would cross the suburbs of Ashfield, Haberfield, Leichhardt, Lilyfield, Rozelle, Annandale, Stanmore, Camperdown, Newtown and St Peters]. The local context of the project is shown in Figure 1.1.

2.3 OVERVIEW OF THE PROJECT

Key components of the project are shown in Figure 1.1 and would include:

- Twin mainline motorway tunnels between the M4 East at Haberfield and the New M5 at St Peters. Each tunnel would be around 7.5 kilometres long and would generally accommodate up to four lanes of traffic in each direction

- Connections of the mainline tunnels to the M4 East project, comprising:
  - A tunnel-to-tunnel connection to the M4 East mainline stub tunnels
  - Entry and exit ramp connections between the mainline tunnels and the Wattle Street interchange at Haberfield [which is currently being constructed as part of the M4 East project]
  - Minor physical integration works with the surface road network at the Wattle Street interchange including road pavement and line marking

- Connections of the mainline tunnels to the New M5 project, comprising:
  - A tunnel-to-tunnel connection to the New M5 mainline stub tunnels north of the Princes Highway, near the intersection of Mary Street and Bakers Lane
  - Entry and exit ramp connections between the mainline tunnels and the St Peters interchange at St Peters [which is currently being constructed as part of the New M5 project]
  - Minor physical integration works with the surface road network at the St Peters interchange including road pavement and line marking

- An underground interchange at Leichhardt and Annandale [the Inner West subsurface interchange] that would link the mainline tunnels with the Rozelle interchange and the Iron Cove Link [see below]

- A new interchange at Lilyfield and Rozelle [the Rozelle interchange] that would connect the M4-M5 Link mainline tunnels with:
  - City West Link
  - Anzac Bridge
  - The Iron Cove Link [see below]
  - The proposed future Western Harbour Tunnel and Beaches Link

- Construction of connections to the proposed future Western Harbour Tunnel and Beaches Link project as part of the Rozelle interchange, including:
  - Tunnels that would allow for underground mainline connections between the M4 East and New M5 motorways and the proposed future Western Harbour Tunnel and Beaches Link [via the M4-M5 Link mainline tunnels]
  - A dive structure and tunnel portals within the Rozelle Rail Yards, north of the City West Link / The Crescent intersection
  - Entry and exit ramps that would extend north underground from the tunnel portals in the Rozelle Rail Yards to join the mainline connections to the proposed future Western Harbour Tunnel and Beaches Link
  - A ventilation outlet and ancillary facilities as part of the Rozelle ventilation facility [see below]

- Twin tunnels that would connect Victoria Road near the eastern abutment of Iron Cove Bridge and Anzac Bridge [the Iron Cove Link]. Underground entry and exit ramps would also provide a tunnel connection between the Iron Cove Link and the New M5 / St Peters interchange [via the M4-M5 Link mainline tunnels]

- The Rozelle surface works, including:
  - Realigning The Crescent at Annandale, including a new bridge over Whites Creek and modifications to the intersection with City West Link
  - A new intersection on City West Link around 300 metres west of the realigned position of The Crescent, which would provide a connection to and from the New M5/St Peters interchange [via the M4-M5 Link mainline tunnels]
  - Widening and improvement works to the channel and bank of Whites Creek between the light rail bridge and Rozelle Bay at Annandale, to manage flooding and drainage for the surface road network
  - Reconstructing the intersection of The Crescent and Victoria Road at Rozelle, including construction of a new bridge at Victoria Road
  - New and upgraded pedestrian and cyclist infrastructure
  - Landscaping, including the provision of new open space within the Rozelle Rail Yards

- The Iron Cove Link surface works, including:
  - Dive structures and tunnel portals between the westbound and eastbound Victoria Road carriageways, to connect Victoria Road east of Iron Cove Bridge with the Iron Cove Link
  - Realignment of the westbound [southern] carriageway of Victoria Road between Springside Street and the eastern abutment of Iron Cove Bridge
  - Modifications to the existing intersections between Victoria Road and Terry, Clubb, Toelle and Callan streets
  - Landscaping and the establishment of pedestrian and cycle infrastructure

- Five motorway operations complexes; one at Leichhardt [MOC1], three at Rozelle [Rozelle West [MOC2], Rozelle East [MOC3] and Iron Cove Link [MOC4]], and one at St Peters [MOC5]. The types of facilities that would be contained within the motorway operations complexes would include substations, water treatment plants, ventilation facilities and outlets, offices, on-site storage and parking for employees

- Tunnel ventilation systems, including ventilation supply and exhaust facilities, axial fans, ventilation outlets and ventilation tunnels

- Three new ventilation facilities, including:
  - The Rozelle ventilation facility at Rozelle
  - The Iron Cove Link ventilation facility at Rozelle
  - The Campbell Road ventilation facility at St Peters

- Fitout [mechanical and electrical] of part of the Parramatta Road ventilation facility at Haberfield [which is currently being constructed as part of M4 East project] for use by the M4-M5 Link project

- Drainage infrastructure to collect surface and groundwater for treatment at dedicated facilities. Water treatment would occur at
  - Two operational water treatment facilities [at Leichhardt and Rozelle]
  - The constructed wetland within the Rozelle Rail Yards
  - A bioretention facility for stormwater runoff within the informal car park at King George Park at Rozelle [adjacent to Manning Street]. A section of the existing informal car park would also be upgraded, including sealing the car park surface and landscaping

- Treated water would flow back to existing watercourses via new, upgraded and existing infrastructure

- Ancillary infrastructure and operational facilities for electronic tolling and traffic control and signage [including electronic signage]

- Emergency access and evacuation facilities, including pedestrian and vehicular cross and long passages and fire and life safety systems

- Utility treatments, including protection and/or adjustment of existing utilities, removal of redundant utilities and installation of new utilities. A Utilities Management Strategy has been prepared for the project that identifies management options for utilities, including relocation or adjustment. Refer to Appendix F [Utilities Management Strategy] of this EIS.

The project does not include:

- Site management works at the Rozelle Rail Yards. These works were separately assessed and determined by Roads and Maritime through a Review of Environmental Factors under Part 5 of the EP&A Act [refer to Chapter 2] Assessment process [of the EIS]

- Ongoing motorway maintenance activities during operation

- Operation of the components of the Rozelle interchange which are the tunnels, ramps and associated infrastructure being constructed to provide connections to the future Western Harbour Tunnel and Beaches Link project.

Temporary construction ancillary facilities and temporary works to facilitate the construction of the project would also be required.

2.4 CONSULTATION

Table 2.1 outlines the consultation to date with key agency stakeholders that has informed and shaped the urban design concept for the project. Feedback from other agencies and the local community has also been considered in developing this concept. Further details regarding consultation are contained in Chapter 7 [Consultation] of the EIS.

2.5 URBAN DESIGN REVIEW PANEL

SMC has established an Urban Design Review Panel to oversee development of urban and landscape design for the project. The role of the Panel is to provide advice regarding the urban design concept and its development. The panel makes recommendations in relation to architecture, urban and landscape design and artistic aspects of the project. These recommendations are used during detailed design and preparation of the UDLPs in the course of design review. Members of the Panel include:

- Peter Poulet [Chair] - NSW Government Architect
- Yvonne von Hartel - Peck von Hartel Architects
- Kim Crestani - Order Architects
- Gareth Collins - Principal Manager, Centre for Urban Design, Roads and Maritime

Stakeholder	Feedback	Impact on M4-M5 Link
UrbanGrowth NSW	As developer for The Bays Precinct project, UrbanGrowth has provided key input on the concept for the Rozelle Rail Yards, including: • Active transport connections to allow seamless connections between the Rozelle Rail Yards and White Bay • A desire to reduce the amount of land used for surface roads within the Rozelle Rail Yards and the future Bays Precinct • A desire for contiguous land parcels that maximise usable remaining project land • A desire for development sites within the Rozelle Rail Yards in line with The Bays Precinct Transformation Strategy • A desire for reduced land take adjacent to the White Bay Power Station.	• Active transport network designed to provide level access to White Bay • Placement of the majority of motorway infrastructure below ground to maximise the amount of open space • Use of landform above motorway infrastructure for recreation. • Efficient motorway design east of Victoria Road to reduce land take surrounding White Bay Power Station.
NSW Heritage Council	The NSW Heritage Council were consulted during design development of the project. Feedback to date has included: • Desire for an urban design led solution • Desire for integration and interpretation of elements that explain former uses of the Rozelle Rail Yards • Desire to minimise impacts on surrounding communities and heritage items.	• Retention of rail gantries, lighting tower and rail tracks from the Rozelle Rail Yards for incorporation in ultimate open space design • Development of an urban design solution for the project that has led to the majority of road infrastructure occurring underground.
City of Sydney and Inner West	A number of workshops have been held with both City of Sydney and Inner West councils regarding the development of the project. Key areas of feedback include: • Desire for an integrated active transport concept • Desire for contiguous remaining project land parcels with active end-uses • Minimisation of impacts on local roads- desire to not increase surface traffic • Integration with surrounding streetscapes and public domain palettes.	• Developed the active transport strategy [Appendix N of the EIS] • Developed concepts for Rozelle Rail Yards and Iron Cove.

Table 2.1: Key stakeholder engagement that has shaped the urban design concept

3.0 Principles and Objectives

3.1 ASSESSMENT METHODOLOGY

The methodology used to develop the urban design concept for the project is outlined in Figure 3.2. The guidelines and policies [Figure 3.1] as well as the contextual site analysis [section 4] were distilled into a set of principles for the urban design component of the project. These principles formed the lens through which strategies and concepts could be developed for the sites. Examples of such concepts are contained in section 5.

The following guidelines and policies were considered in the development of the urban design of M4-M5 Link.

Urban Design Guidelines and Policies



• WestConnex Motorway Urban Design Framework

Australian Standard®

Control of the obtrusive effects of outdoor lighting

• AS4282-1997 Control of the obtrusive effects of outdoor lighting



• Beyond the Pavement: Roads and Maritime urban design policy, procedures and design principles [Roads and Maritime, 2014]



• Bridge Aesthetics: Design guidelines to improve the appearance of bridges in NSW [Roads and Maritime, 2012]



• NSW Sustainable Design Guidelines Version 3.0 [Transport for NSW, 2013]



• Roads and Maritime Landbridge discussion paper

Crime prevention
and the assessment of
development applications

Guidelines under section 79C of the *Environmental Planning and Assessment Act 1979*

• Crime prevention and the assessment of development applications [DUAC, 2001]



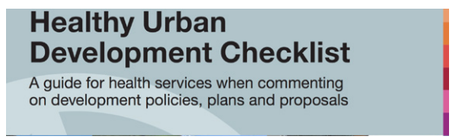
• Crime Prevention through Environmental Design [CPTED] [Queensland Government, 2007]

Disability (Access to Premises — Buildings) Standards 2010

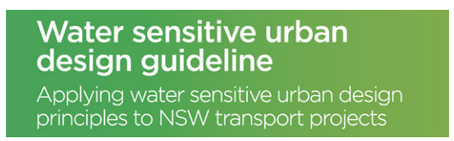
• Disability [Access to Premises – Buildings] Standards 2010



• Technical guideline for Urban Green Cover in NSW



• Healthy Urban Development Checklist [NSW Health, 2009]



• Roads and Maritime/Transport for NSW Water Sensitive Urban Design Guideline

Figure 3.1: Guidelines and policies used

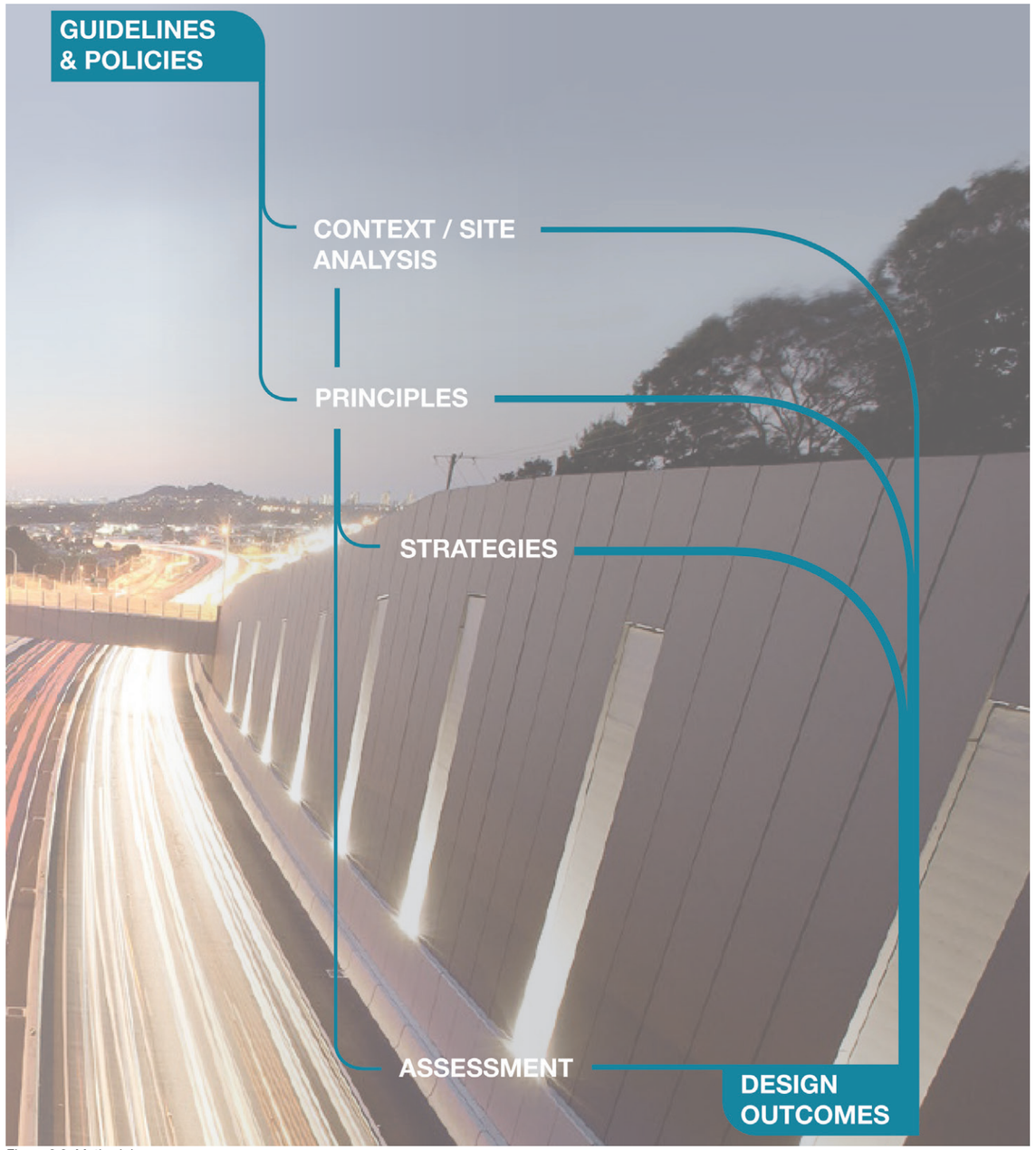
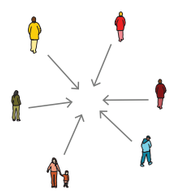
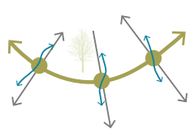
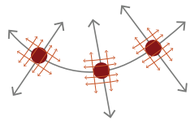
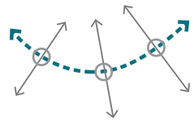
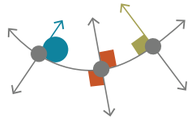


Figure 3.2: Methodology

3.2 URBAN DESIGN OBJECTIVES AND PRINCIPLES

The principles, goals, objectives and opportunities from the key guidelines and policies are reflected in the following principles. The principles provide a platform from which the design concepts have been produced.

	Principle	Considerations
1 	*An integrated and collective approach* Create holistic and integrated design solutions generated by collaboration across disciplines, the community, stakeholders and government bodies.	– Working across disciplines – Holding regular stakeholder workshops to contribute to design options – Prioritising community input [see Chapter 7 [Consultation] of the EIS] – Working with all future plans and government bodies – Considering relevant regulatory frameworks on the site and in surrounding areas
2 	*An environmental vision* Create a sustainable and enduring design response which enhances and connects local ecologies, and green spaces.	– Enhancing waterways and creeks – Using WSUD where possible – Connecting green spaces – Enhancing local ecologies and vegetation – Using durable, sustainable and long lasting materials and timeless design
3 	*Cross scale connection of spaces* Prioritise local and regional significant connections that respond to broader issues, and support aims and initiatives of the local neighbourhoods and the city.	– Enhancing connectivity between streets, facilities, neighbourhoods, green spaces, cycle and pedestrian connections across the site and the city – Integrating and connecting transport modes – Connecting local and regional road, cycle, public transport and pedestrian links
4 	*A motorway integrated within its context* Understand the existing landscape and respond in a respectful manner that seeks to enhance and contribute to its context.	– Responding to the natural patterns – Respecting and working with the local landform – Enhancing the interface between existing open spaces and the motorway – Avoiding sterilisation of land by providing connections across motorway infrastructure – Simple unadorned structures
5 	*Place sensitive design* Celebrate and work with the character of each place and destination, responding to their unique histories, materiality, architecture, built fabric, cultural context, landform and topography.	– Incorporating heritage [see section 7 in regards to requirements for a heritage interpretation strategy] – Respecting and responding to cultural contexts – Complementing the existing built fabric – Consulting with local communities [see Chapter 7 [Consultation] of the EIS] – Increasing the legibility of places, buildings, streets and landmarks
6 	*A multidimensional user focus* Consider holistically how a diversity of users experience space including all ages, abilities and transport modes for a truly inclusive, universally accessible and safe outcome.	– Ensuring Crime Prevention Through Environmental Design [CPTED] driven designs – Safe, legible connections with way finding for all users – Ensuring universal design outcomes – Considering the user experience for all modes including drivers, pedestrians, cyclists and public transport.
7 	*Revitalisation, opportunity and economics* Establish opportunities for development that supports and connects existing neighbourhoods, complements and stimulates local economies and provides opportunity for growth across existing and future local industries.	– Contributing to urban structure and revitalisation – Capitalising on traffic reduction to enhance local streets and increase neighbourhood liveability – Creating opportunities for urban renewal

4.0 Context

Pressure on Sydney's infrastructure is increasing rapidly. Sydney's population is expected to rise from 4.7 million in 2012 to eight million in 2061 [Australian Bureau of Statistics, 2013].

This type of large-scale population growth puts increased pressure on Sydney's infrastructure. A range of transport solutions is required to meet this growth, and the M4-M5 Link is one component of this solution.

4.1 REGIONAL CONTEXT

Due to years of urban sprawl, the fabric of Australian cities like Sydney cover an extensive area with low density development by international measures. At the same time as this growth is occurring, we are witnessing another phenomena, where the population has become focused on the inner city. Dubbed "the great inversion," housing demand has shifted from the periphery to the centre, where infrastructure is easily accessible, commute times are reduced and knowledge jobs are close at hand.

4.2 METROPOLITAN CONTEXT

In many cities the centre lies in the middle of a ring road transport network. In Sydney however, some of our major transport routes, such as the M1 Motorway and Parramatta Road, run adjacent to, or though the centre. This places Sydney on the edge of the ring, increasing pressure on the city's heart. With the expected population growth this pressure is anticipated to increase dramatically. WestConnex will relieve some of the pressure on the inner city providing a new ring road link that reduces the need for traffic to travel though the centre. The M4 Widening, M4 East, King Georges Road Interchange Upgrade, New M5 and M4-M5 Link together complete this ring road as shown in Figure 4.1.

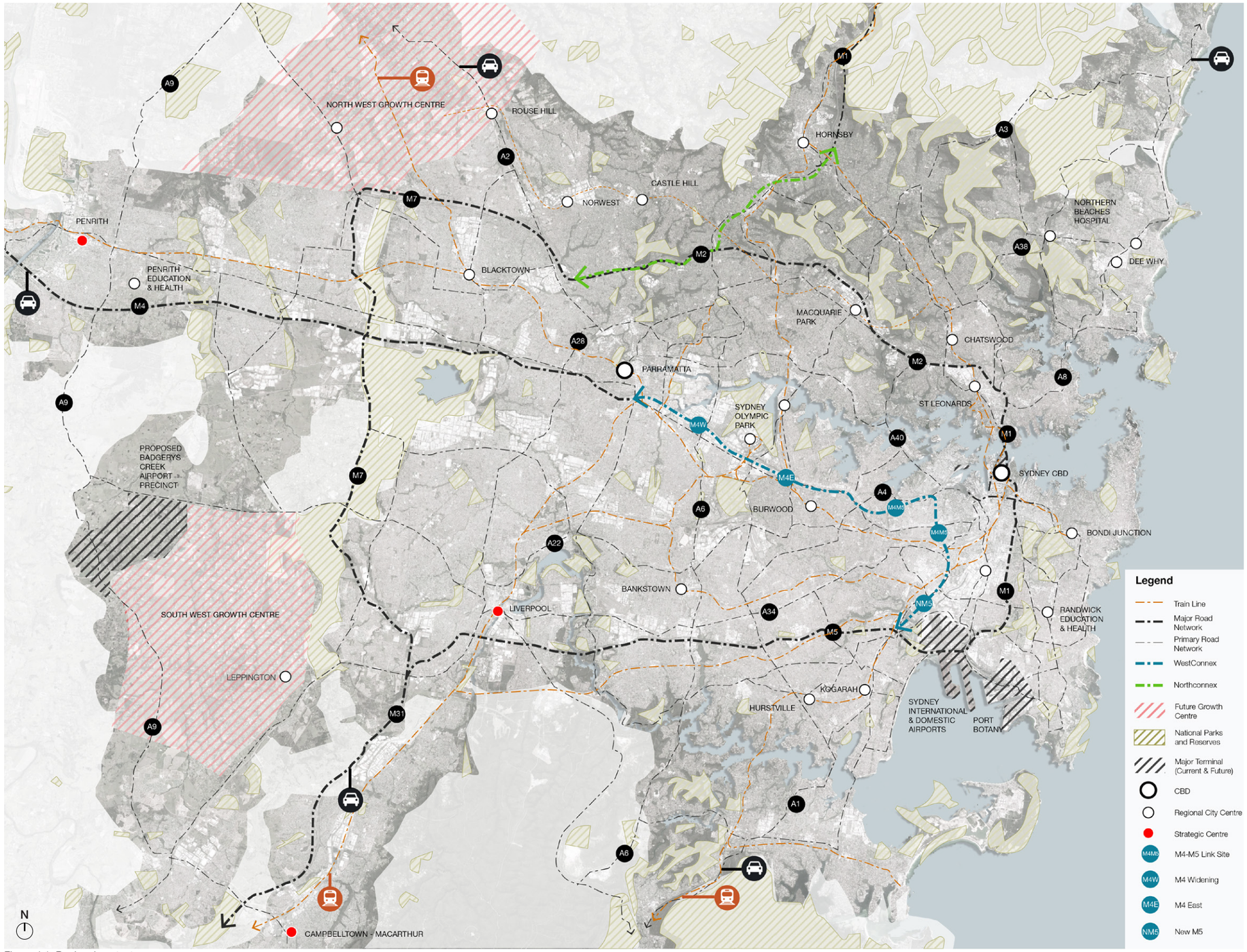


Figure 4.1: Regional context

4.3 LOCAL CONTEXT

The M4-M5 Link would be an underground motorway with entry and exit points that connect to the wider transport network at Haberfield, Rozelle and St Peters. The Rozelle Rail Yards and Iron Cove Link sites are located at and adjacent to disconnected urban environments. These conditions are the result of the historically typical approach to building large individual road systems, which disconnect suburbs and greatly reduce the connectivity and amenity of sustainable modes of transport such as cycling and walking, as shown in Figure 4.2. Rather than increasing or adding to the existing disconnection, the project would provide increased connectivity at these sites.

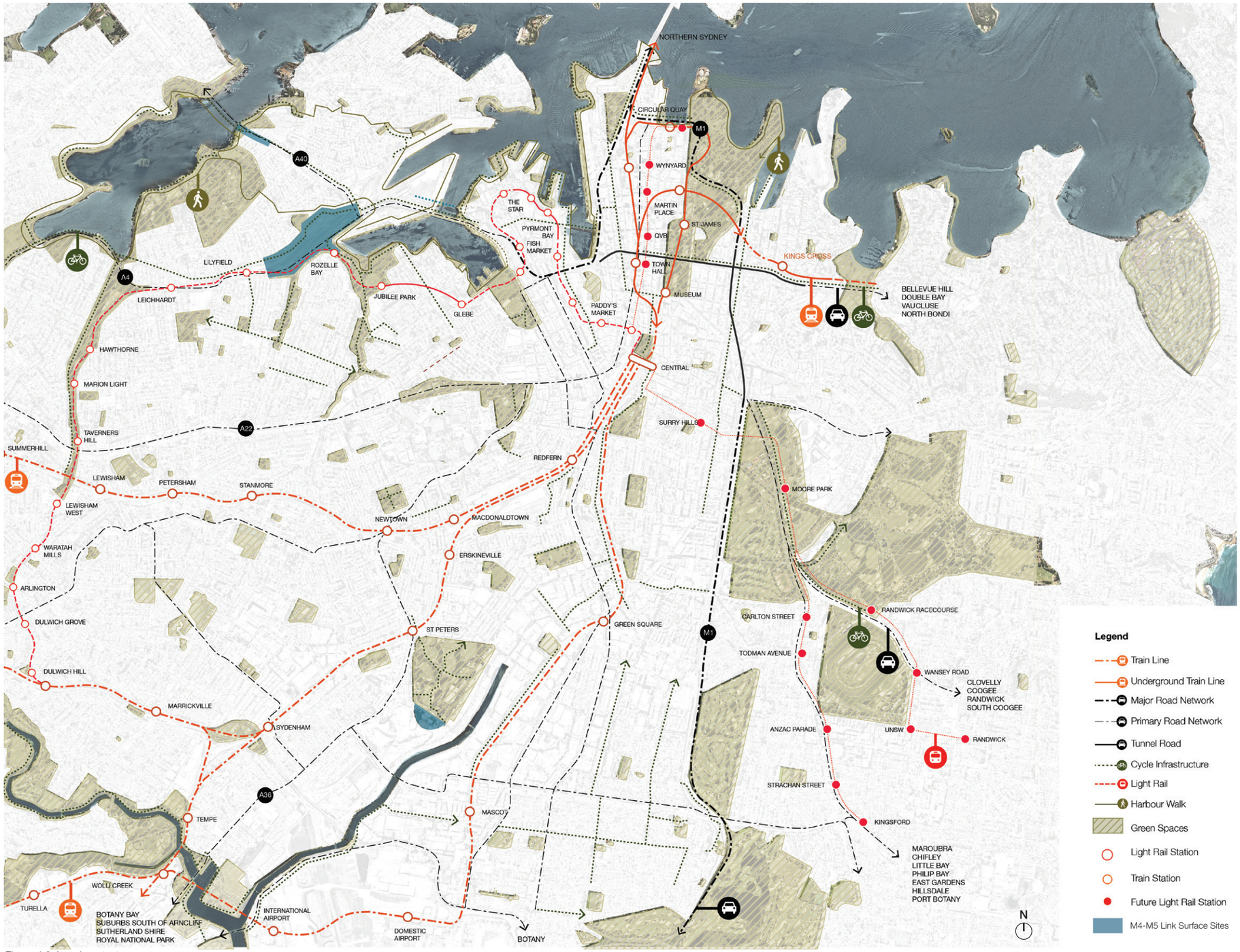


Figure 4.2: Local context

5.0 Urban Design Analysis and Outcomes

5.1 ROZELLE INTERCHANGE

The proposed underground connection linking the M4 and M5 motorways connects to the wider motorway network at Rozelle. The Rozelle interchange would allow for the connection of the proposed future Western Harbour Tunnel and Beaches Link as well as redesign and improve the current Victoria Road intersection with The Crescent and Anzac Bridge.

A tunnel connection from the Rozelle interchange to the eastern abutment of Iron Cove Bridge at Rozelle would also be provided [the Iron Cove Link].

Roads and Maritime is carrying out a suite of site management works on part of the Rozelle Rail Yards site. The works, which include removal of rail and rail-related infrastructure, buildings, vegetation and stockpiles, are needed to manage the existing environmental and safety issues at the site and would also improve access to surface conditions, which would allow for further investigation into the location of utilities and the presence of contamination and waste.

The following section of the report outlines the existing conditions of the Rozelle Rail Yards and provides key findings. It also stipulates the strategic responses implemented in the urban design outcome, which correlate to the principles in section 3.

Example of redundant rail infrastructure to be removed under site management works

ROZELLE INTERCHANGE

5.1.1 EXISTING CONDITIONS

Access and movement

The Rozelle Rail Yards site and surroundings are dominated by the major road connections between Anzac Bridge, City West Link and Victoria Road. Regional, local and neighbourhood traffic are intermingled, creating congestion and an unclear hierarchy of movement. Generous and pleasant neighbourhood movement networks and routes include the foreshore walk and cycle path around Glebe Foreshore, and the local connector of Lilyfield Road and the Rozelle Bay light rail stop. The extended intersection of Lilyfield Road, Victoria Road, City West Link and Anzac Bridge occurs at an elevated level, disconnected from the Rozelle Rail Yards and Rozelle Bay foreshore.

There are existing inaccessible, short tunnels under Victoria Road, connecting the Rozelle Rail Yards with White Bay Power Station and Glebe Island. These local connections, whether vehicular, bicycle or pedestrian, are truncated by Victoria Road and City West Link, separating Rozelle and Balmain from Annandale and Glebe.

Pedestrian and cycling routes and the foreshore walk from Annandale, Glebe and Rozelle Bay are truncated at the intersection of The Crescent, City West Link and Victoria Road.



Traffic along City West Link.



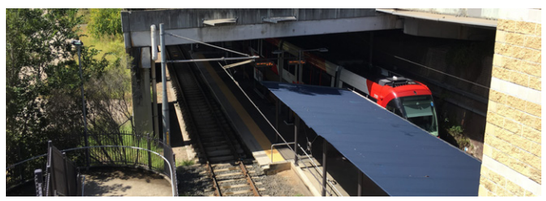
Pedestrian and cycle infrastructure at intersection of Anzac Bridge and Victoria Road.



Poor pedestrian and cycle amenity at The Crescent and City West Link intersection.



Glebe foreshore walk in Jubilee Park.



Lilyfield light rail station under land bridge with poor pedestrian amenity.



Figure 5.1: Access and movement

Culture

The Rozelle Rail Yards has a rich industrial history linked with fabrication, transport [rail and maritime] and power generation. The immediate site still retains artefacts of its rail use, including a series of steel gantries that run perpendicular to the site boundary through the length of the site. The site and surrounding area is dominated by the structures, infrastructure, and traces of its industrial past.

Remnants of this legacy still exist in pockets of light industrial fabric and activities along Lilyfield Road and The Crescent. There are also remnants in a series of robust and significant structures of former and current industrial use, including White Bay Power Station, the Glebe Island silos, Harold Park Tram-shed and the railway viaduct [now used by the light rail route].

The northern foreshore of Rozelle Bay is a vibrant precinct of boat and maritime related activity, some of the last vestiges of the working harbour. Active retail and commercial streets are found well away from the site, the closest being Darling Street to the north and Johnston Street and Glebe Point Road to the south.



The active Callan Park site campus during “Laneway Festival”.



White Bay and Glebe Island working docks.



White Bay Power Station - a future cultural anchor.



Rozelle collectors market on Darling Street.



Popular shops & cafés along Glebe Point Road.

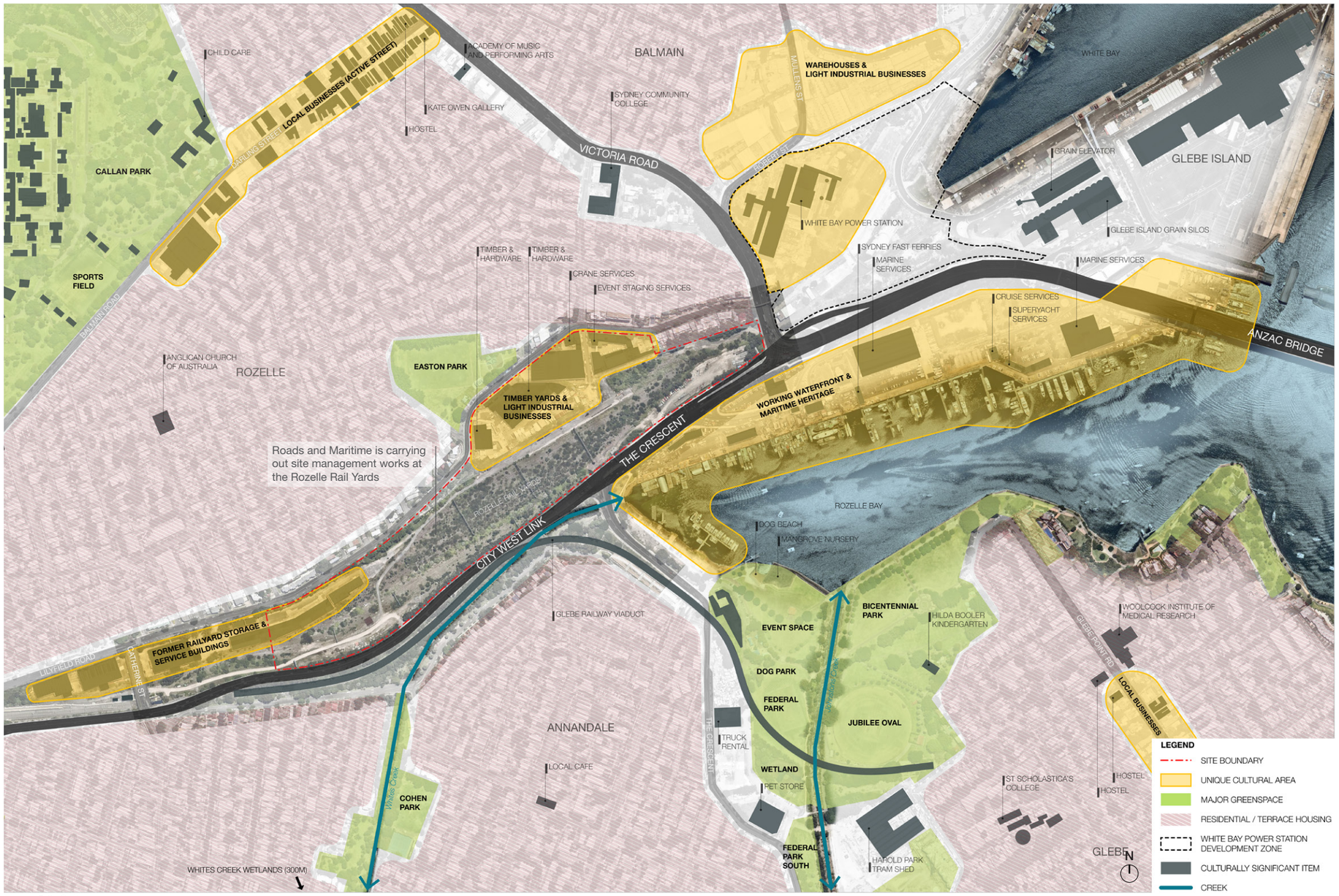


Figure 5.2: Culture

Natural environment

The Rozelle Rail Yards was part of Rozelle Bay and formerly an extended wetland and watercourse in the valley between what are now the suburbs of Rozelle and Annandale, draining to Sydney Harbour at Rozelle Bay. Though filled in to form the Rozelle Rail Yards, there are remnants of green enclaves and watercourses along the edges of the site, still connecting to the bay. The site is surrounded by significant green spaces - Whites Creek and Bicentennial Park to the south and Callan Park and Easton Park to the north. Most of the parks have extensive stands of mature figs and other native tree species, which create both habitat and feeding zones for a variety of local and regional bird and flying fox species. While many of the local watercourses have been covered, several small sections of Whites Creek in Annandale have been restored and remediated. The harbour at Rozelle Bay has poor water quality, but the decline in industrial run-off and growing oyster beds and restored sections of mangrove habitats along the foreshore may help contribute to its remediation. Whites Creek and Johnstons Creeks are systems that discharge stormwater into the harbour. Inner West Council, however, set an example through Whites Creek further upstream by creating habitat wetlands showing the potential to re-establish natural drainage and limit pollutants. This work is being continued by Sydney Water under a program to naturalise a large extent of Whites Creek.



Stormwater drains adjacent to the Rozelle Rail Yards.



Grasslands, native and exotic vegetation reclaim the Rozelle Rail Yards.*



Sydney rock oysters native to the Blackwattle Bay area.



Sydney Water educational talks about local species at the Whites Creek wetland.



Water pollution from stormwater outlets in Rozelle Bay.

*Roads and Maritime is carrying out site management works at the Rozelle Rail Yards



Figure 5.3: Natural environment

Built form and landscape

Resulting from its geological history, the Rozelle Rail Yards is essentially a deep trench separating the residential suburbs of Rozelle and Annandale. Beyond the topographical depression that defines much of the length of the Rozelle Rail Yards, the site is further separated from its surroundings by built fabric, a series of low warehouses and factories on the north side, and City West Link on the south side. Beyond the valley of the Rozelle Rail Yards, the two neighbouring suburbs of Rozelle and Lilyfield to the north rise upwards. These neighbourhoods are characterised by a fine grain fabric of predominantly one and two storey houses in a dense street pattern of small local streets and interlinked back laneways. Towards the east and the harbour, the topography is flat, having been levelled for industrial use. Major physical elements include the industrial and maritime buildings, and the dominant elevated roadway linking Anzac Bridge with City West Link and Victoria Road.

Opportunities exist to improve visual connections across the site as well as views of local landmarks, including White Bay Power Station and Anzac Bridge. Views in Figure 5.4 have been taken from preliminary site analysis. Detailed landscape and view analysis is contained in EIS Appendix O [Technical working paper: Landscape and visual impact].



Corner of The Crescent and City West Link looking east over Rozelle Bay to Sydney CBD.



Green view from the Catherine Street crossing to Sydney CBD.



View from Victoria Road pedestrian bridge to the White Bay Power Station.



Glimpses of green across the Rozelle Rail Yards.



View from Victoria Road to the Harbour Bridge.

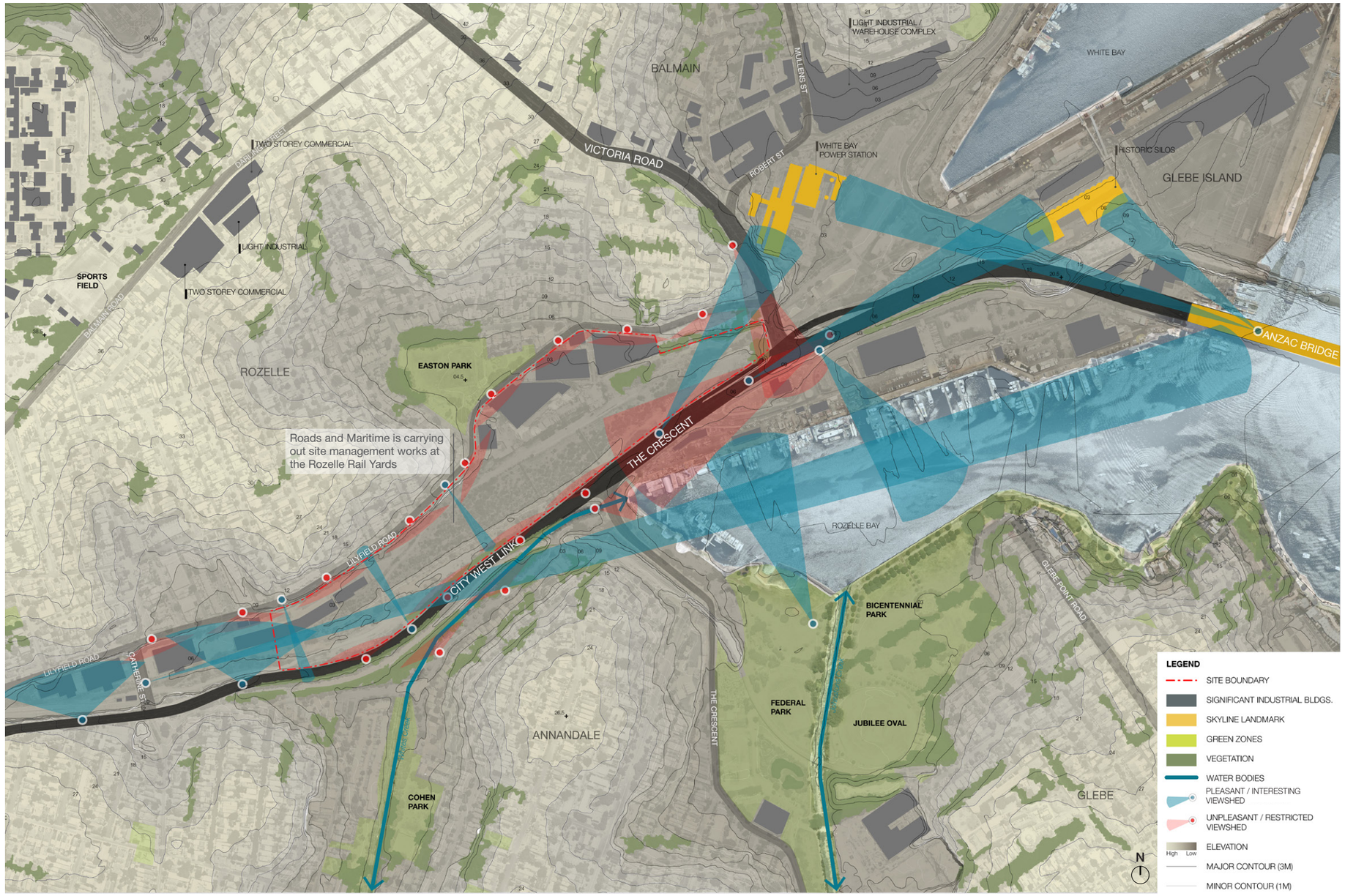


Figure 5.4: Built form and landscape

History and heritage

The Rozelle Rail Yards were part of Rozelle Bay and evolved from a low lying wetland draining to the harbour into an isolated zone of rail switching and holding yards. Changing shorelines, in-filled bays, reclaimed land, suspended piers and docks, elevated platforms and bridges – the site is not continuous solid ground, but rather a man-made structure.

These large scale landscape changes are also endemic to the surrounding area: Glebe Island, once a rocky isolated outcrop in the harbour, is now a flat expanse of tarmac – vacant, but with the latent potential of many post-industrial sites. The legacy of the site's industrial past is inescapably present in the large scale artefacts, structures, and traces of former operations and institutions.

A number of the items being removed during the site management works, including the rail gantries, lighting tower, and some sections of rail tracks are being preserved [if possible] for interpretation in the final design. The site has a number of heritage conservation areas close to its boundary.

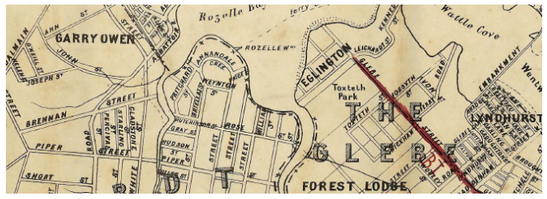
These areas will not be physically impacted by the work, however, visual impacts will be considered by means of the visual impact assessments [refer to Appendix O [Technical working paper: Landscape and visual impact]]. Impacts on listed heritage items at the site have been assessed in Appendix U [Technical working paper: Non-Aboriginal heritage].



Tunnel access from Rozelle Rail Yards to White Bay.



The Rozelle Rail Yards in use, 1965.



1885 Historical Map.



Old Rozelle Town Centre at the tram sheds.



Rail gantries within the Rozelle Rail Yards.

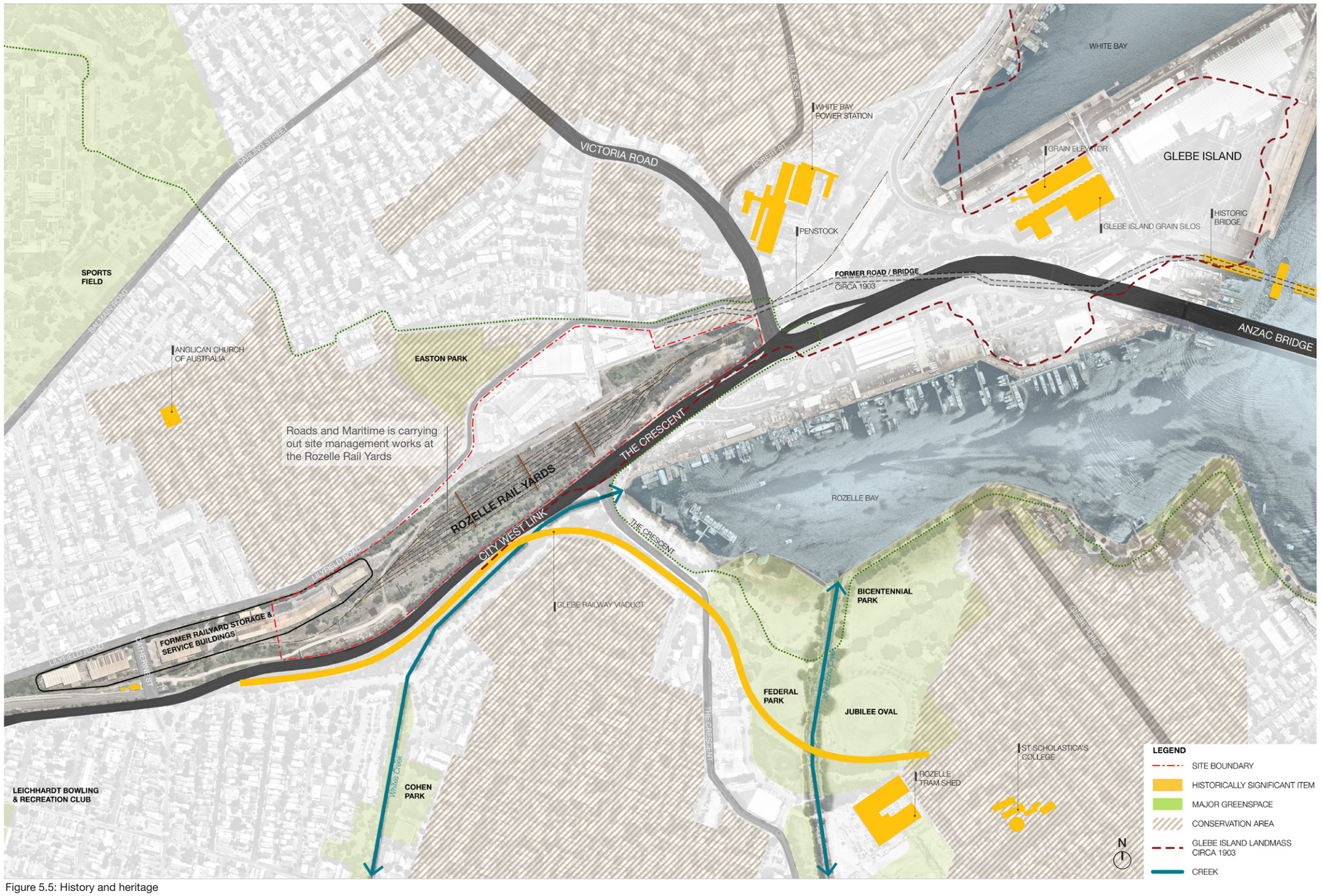


Figure 5.5: History and heritage

5.1.2 KEY FINDINGS

Access and movement

Pedestrian, cycling routes and the foreshore walk from Annandale, Glebe and Rozelle Bay are truncated at the intersection of The Crescent, City West Link, Victoria Road and Anzac Bridge. There is an opportunity to facilitate the connectivity of the site to the surrounding area.

Culture

The remnants of robust and significant structures of former and current industrial use, including White Bay Power Station, the Glebe Island silos, Harold Park Tram Shed and the railway viaduct [now used by the light rail route] should be celebrated in the future use of the Rozelle Rail Yards as features of the landscape design.

Natural environment

The major green spaces in the locality are separated by the Rozelle Rail Yards and City West Link, though there are multiple fragments of green spaces and tree lined streets through Rozelle offering the potential for continuous links.

Built form and landscape

The central portion of the site, while closer to surrounding levels, is separated from its surroundings, both spatially and visually, by City West Link and industrial warehouses along Lilyfield Road. This creates an opportunity to use existing physical conditions to increase connectivity through the site, integrating it with its surrounds.

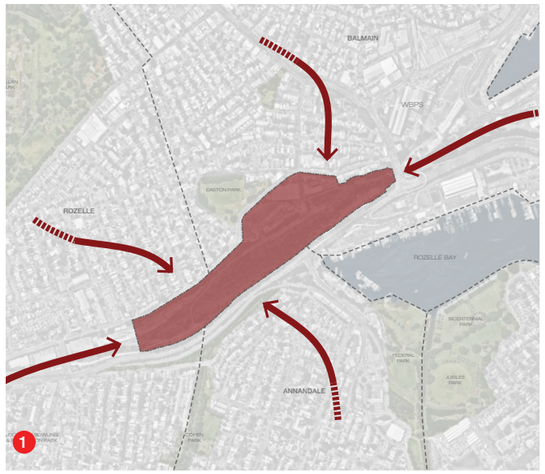
History and heritage

Until recently, the site has been a pivotal location for movement and transport, as expressed in the legacy of the site's industrial landscape and remnant rail infrastructure. This history presents as an opportunity to interpret connection and movement within the future use of the site.

5.1.3 ROZELLE RAIL YARDS STRATEGIES

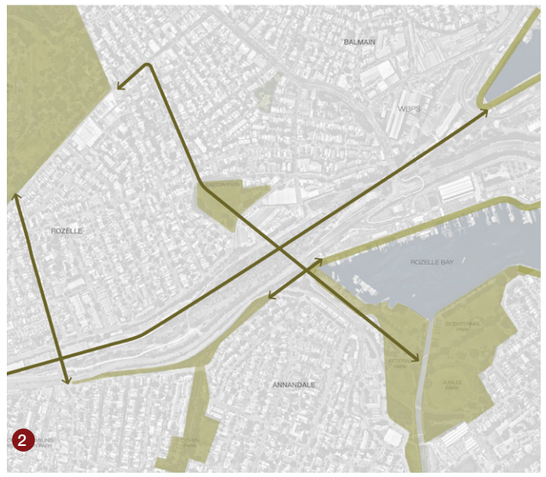
The following diagrams represent the key strategies that have been developed for the Rozelle Rail Yards. The Rozelle Rail Yards concept [Figure 5.6] outlines how the key strategies could be delivered on the site. The concept exemplifies the key strategies through links between Rozelle, White Bay and the light rail, active transport links along the spine of the site, a large volume of new open space and connection of communities adjacent to City West Link.

The project would deliver up to 10 hectares of open space and landscaping, including the land at the Rozelle Rail Yards. While the final urban design form will be refined during detailed design, the concept has been prepared to demonstrate how the principles established for the final end state could be implemented in the development and refinement the project.



Connect and provide for communities

The concept offers a parkland destination that works to stitch together previously separated communities by providing a range of social infrastructure at a central, easily accessible location.



Enhance green links

The concept reactivates closed-off land through new green spaces and links. These links strategically establish a new green “interaction” connecting a series of significant yet fragmented [future and existing] green spaces in and around White Bay, Rozelle Bay, Rozelle, Balmain, Glebe and Annandale.



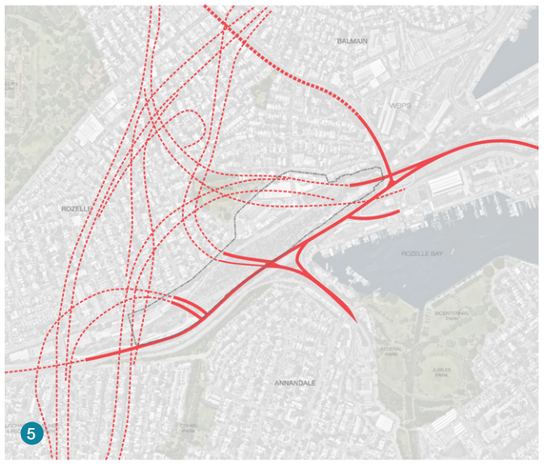
Integrate WSUD

Located in an old creek and swamp bed, the concept strategically uses this to its advantage, employing WSUD to ecologically filter run off before it enters the harbour.



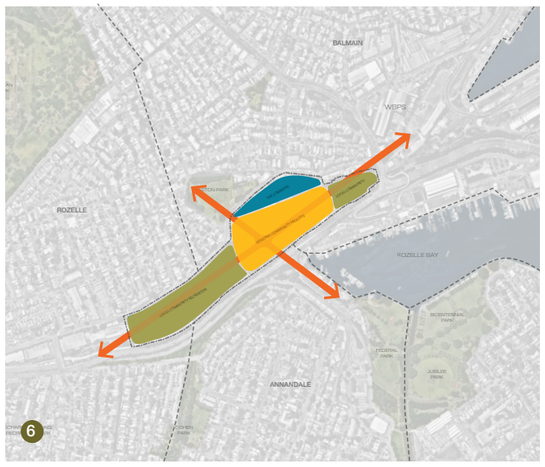
Integrate active transport links

A new active transport spine that works directly with existing and future connections providing a much needed funnel between previously-disconnected communities, the foreshore and the city.



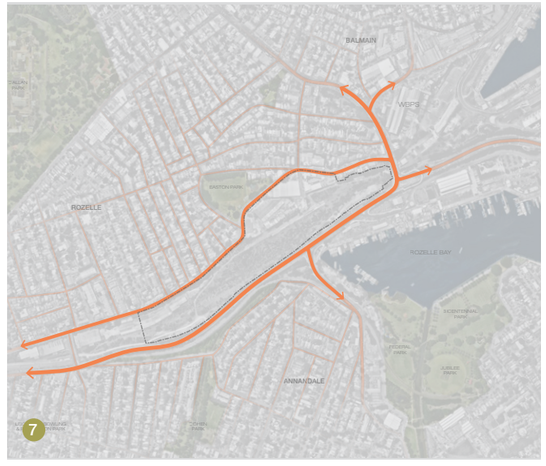
Integrate the motorway

Working with the road design leverages the potential of co-locating road infrastructure to offer more functional space to the community.



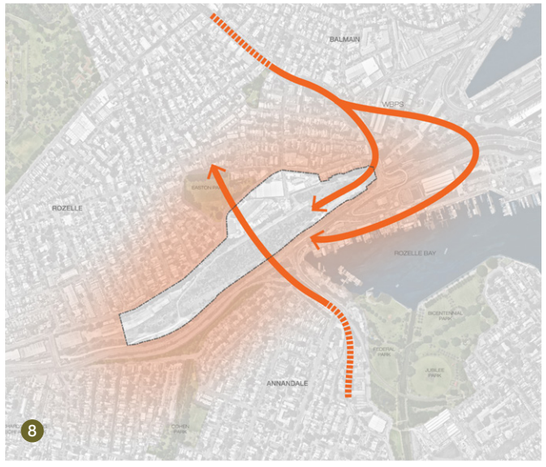
Respond to the local character

Respecting and maintaining the unique heritage, industrial character and topography of the Rozelle Rail Yards through interpretation.



Revitalise streets for equality of mobility

New public spaces and much-needed universally accessible links establish entirely new “public streets” and enhance the surrounding neighbourhood.



Sensitive economic revitalisation

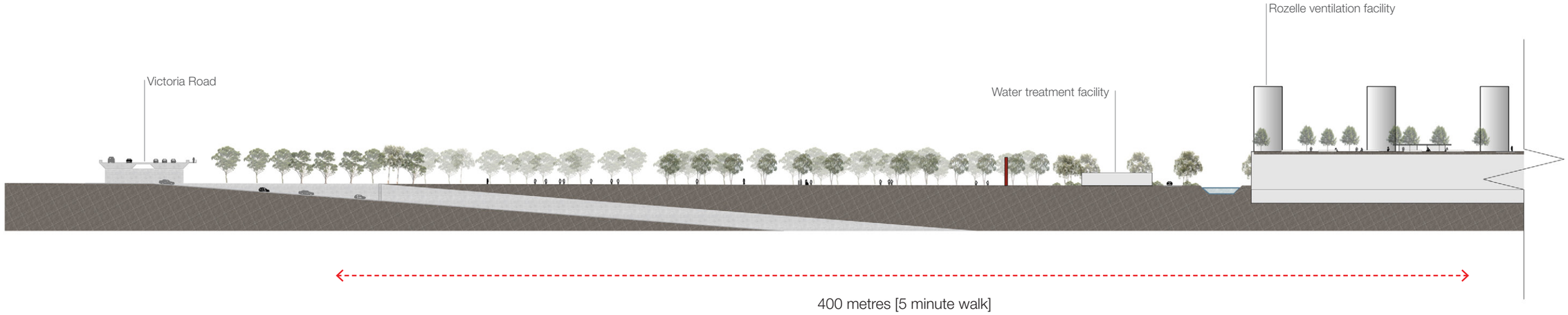
With the intended future growth of the area, the design delivers much needed and quality open space and social infrastructure [through active recreation facilities] for both existing and future communities.

PROGRAM

01	Watercourse	08	Water treatment plant
02	Active transport land bridge	09	Light rail
03	Wetlands and boardwalk	10	Bike ramp
04	Waterside walk	11	Culvert
05	Ventilation facility	12	Access stair and ramp (accessible during construction of the project)
06	Light rail vehicular ramp	13	Whites Creek access bridge
07	Ventilation supply facility, substation and deluge water tanks	14	Sloping lawn



Figure 5.6: Rozelle Rail Yards concept plan



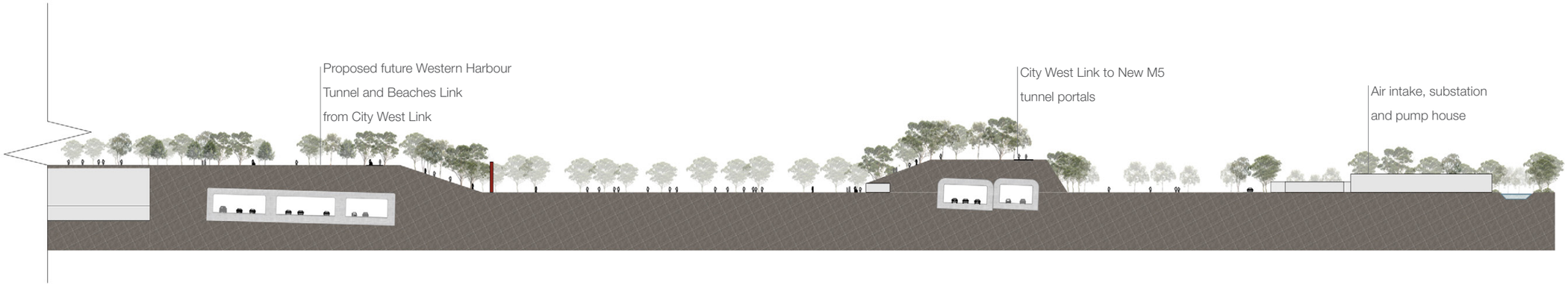


Figure 5.7: Rozelle Rail Yards longitudinal section



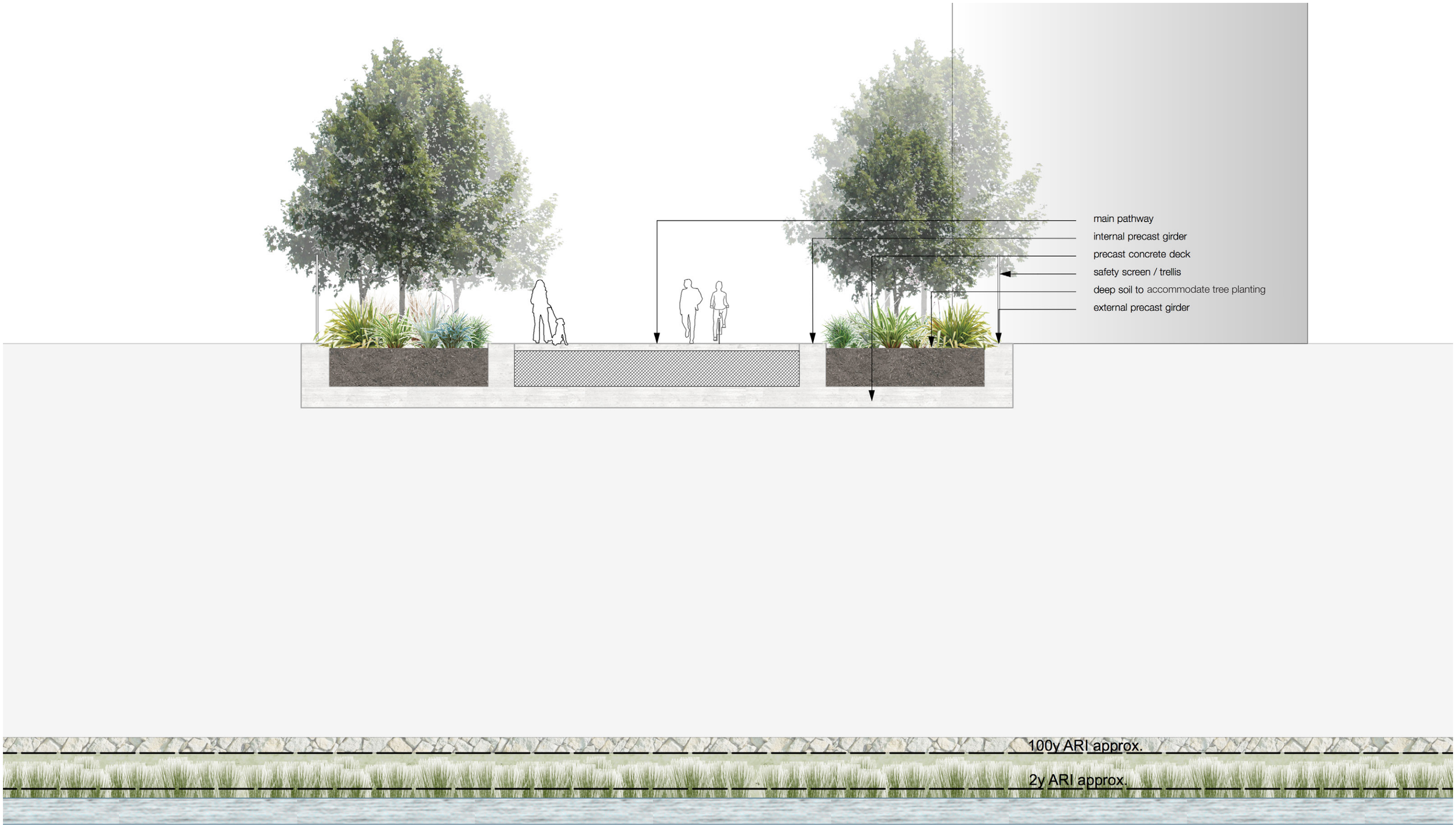


Figure 5.8: Rozelle Rail Yards land bridge section

5.1.4 BUILT FORM

The Rozelle Rail Yards concept integrates motorway infrastructure within a parkland setting. The built form components that would be constructed within the Rozelle Rail Yards are shown in Figure 5.9, and would therefore be present in any refinement of the urban design solution, include:

- Ventilation facility [1]
- Ventilation outlets [2]
- Water treatment plant [3]
- Ventilation supply facility and substation [4]
- New M5 tunnel portals [5]
- Land bridge [6]
- Proposed future Western Harbour Tunnel and Beaches Link tunnel portals [7]
- M4 East / Anzac Bridge tunnel portals [8]

The ventilation outlets would be sited at the confluence of City West Link, The Crescent and proposed future Western Harbour Tunnel and Beaches Link entry and exit ramps. As around 35 metre structures above existing ground level, the three outlets would be significant vertical elements within the landscape. Along with the White Bay Power Station outlets and Anzac Bridge pylons, the M4-M5 Link ventilation outlets have the ability to become markers within the surrounding landscape.

The White Bay Power Station chimneys are composed of brick and metal banding and the Anzac Bridge pylons are simple precast concrete composed in an elegant design. Both structures are reflective of their use and the design language of their time. Such a philosophy would be reflected in the M4-M5 Link ventilation outlets at Rozelle in the material and colour choice. Furthermore, the final design of the open space within the Rozelle Rail Yards would be used to determine a final material palette, and would be detailed in the UDLP.

The ventilation supply facility, water treatment facility and electricity substation would be designed to allow them to become recessive elements within the overall park design. Under the concept, elements such as the water treatment facility and ventilation facilities are co-located within the landscape.

A pedestrian and cycle 'land bridge' would be provided to create a north-south connection between Bicentennial Park, the Rozelle Rail Yards and beyond to Easton Park. It would span City West Link and provide connections either side of The Crescent for pedestrian and cyclist access north-south between Annandale/Glebe and Rozelle. The bridge would feature planting across its span to provide an amenable space for pedestrians and cyclists.

As a largely concrete structure, the detailing of the spans would require consideration to ensure it presents the thinnest profile possible.

The New M5 tunnel portals would be located at the western end of the Rozelle Rail Yards and be partially concealed by vegetation. The portals themselves would be simple structures and largely unadorned to ensure the landscape forms the most dominant feature.

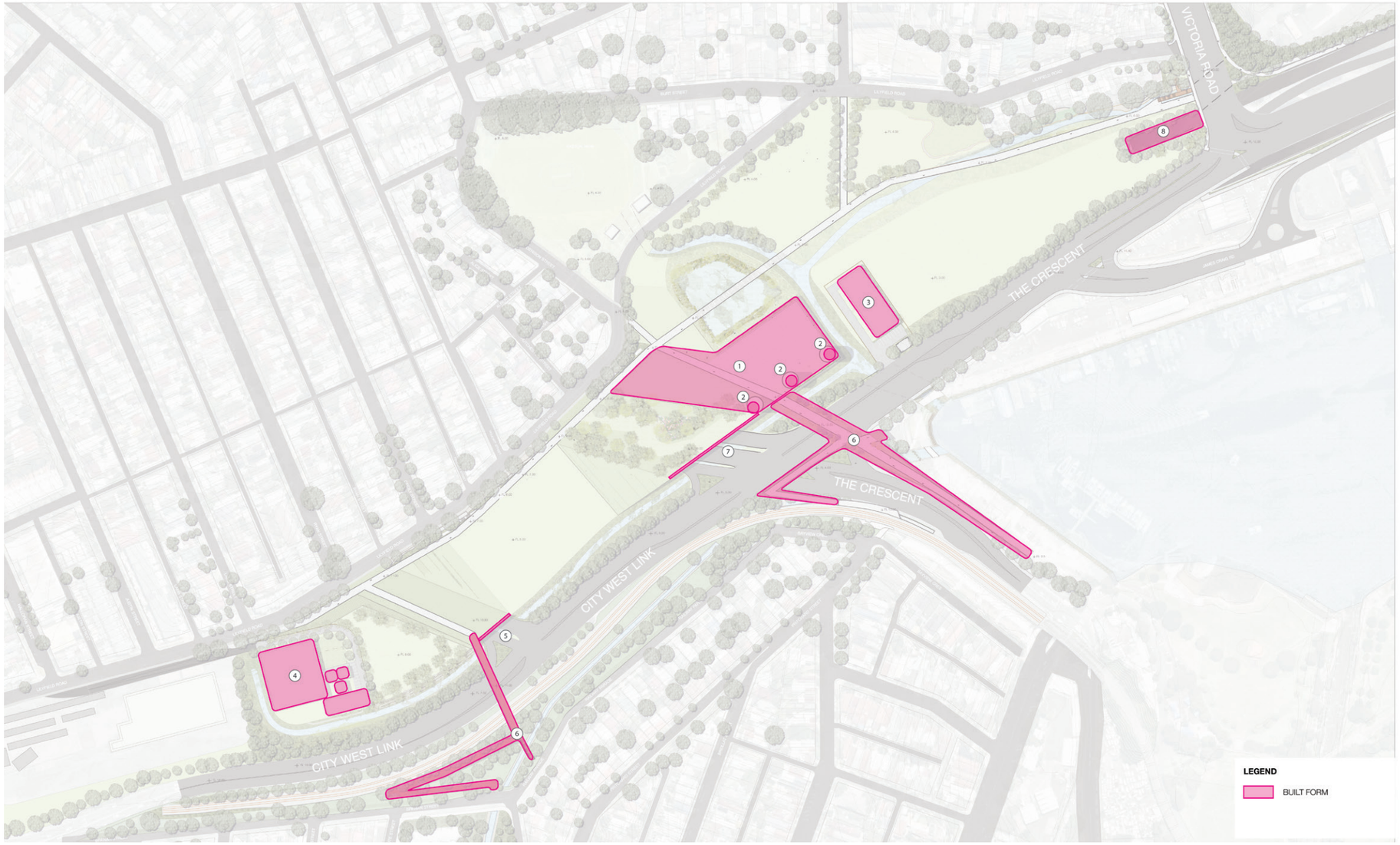


Figure 5.9: Rozelle Rail Yards built form

5.1.5 OPEN SPACE AND CONNECTIVITY

The concept for the Rozelle Rail Yards improves pedestrian and cyclist connectivity. Key routes are created north-south via the land bridge and a pedestrian and cyclist bridge between Whites Creek and Lilyfield Road. These links would greatly improve accessibility between Glebe/Annandale and Rozelle/Lilyfield. They would also provide connectivity between the waters of Rozelle Bay north to the waters of Iron Cove, picking up key green spaces of Bicentennial Park, Rozelle Rail Yards, Easton Park and Callan Park.

East-west connectivity would be provided through the site, connecting to the Lilyfield Road cycleway adjacent the CBD South East Light Rail Rozelle maintenance depot. A path would connect to the existing Anzac Bridge shared path by travelling underneath the Victoria Road/City West Link intersection. This connection would provide future possibilities for connections into The Bays Precinct.

Access along City West Link is provided on the southern side of the road way. This would provide a connection between the upgraded cycleway on the western side of Victoria Road via a signalised crossing and the shores of Rozelle Bay.

The Rozelle Rail Yards concept provides a significant addition of open space to the inner west area. This open space would benefit current and future communities. The Bays Precinct program being led by UrbanGrowth NSW would generate an increase in the worker and resident population around Rozelle Rail Yards and the open space provided would assist in supporting the recreation needs of this future population.

Significant tree planting along the perimeter of the site will continue the canopy of surrounding areas. Within the site large grassed areas would be complemented by tree planting and garden beds to create a series of spaces. These spaces could accommodate a range of future uses according to the needs of the community.

Heritage interpretation would be included within the final urban design of the site. A number of elements that are being removed by the site management works at Rozelle would be reinstated in the final design. These elements include the former rail gantries, lighting tower and some rail tracks [if possible].

Water would be treated through the site within vegetated swales and water treatment ponds that would be designed to integrate with the landscape.

The scope of open space development to be provided by M4-M5 Link includes all pedestrian and cycle connections, hard and soft landscaping, WSUD elements and heritage interpretation.

Details on the connectivity provided by the project is contained in Appendix N [Technical working paper: Active transport strategy].

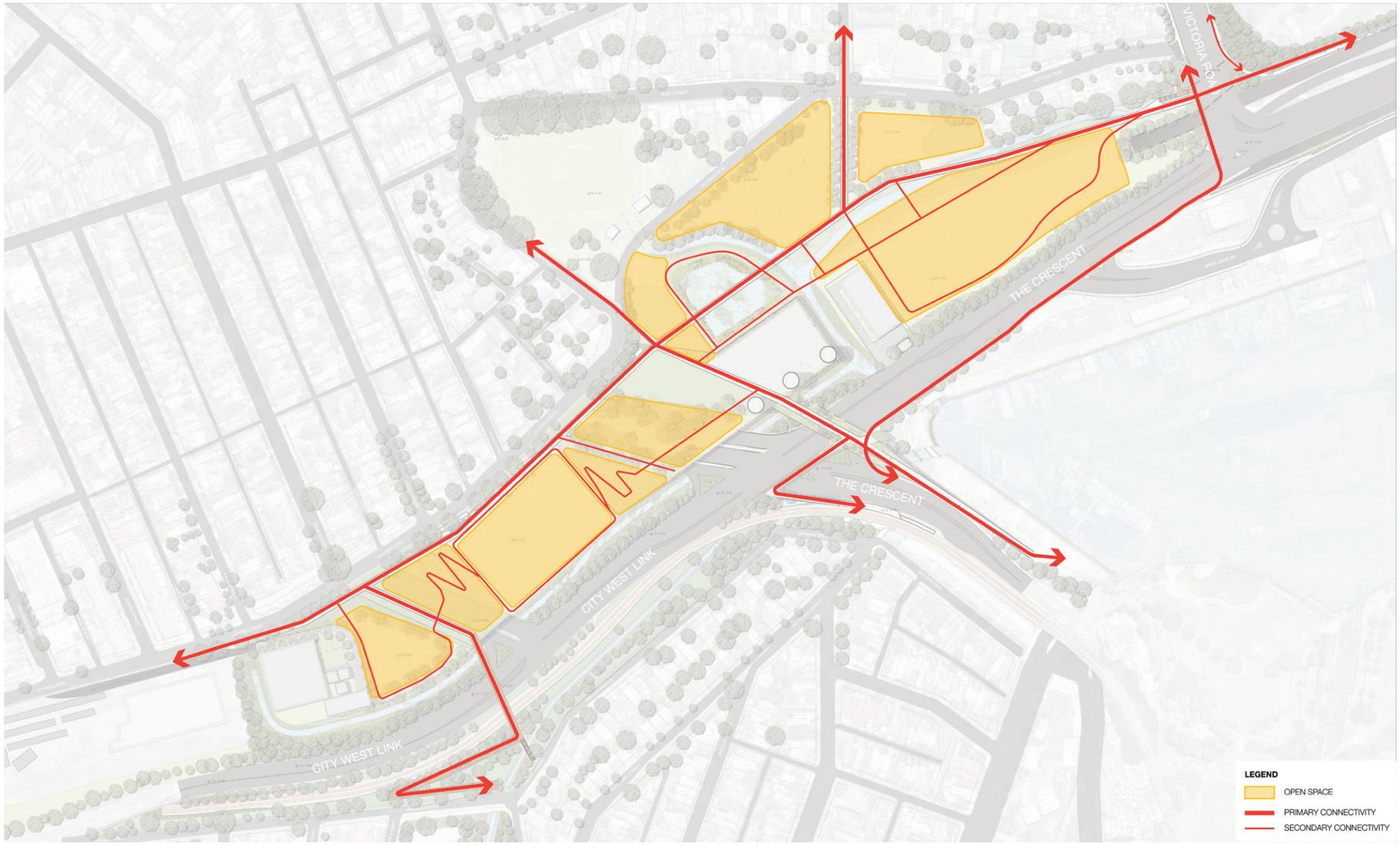
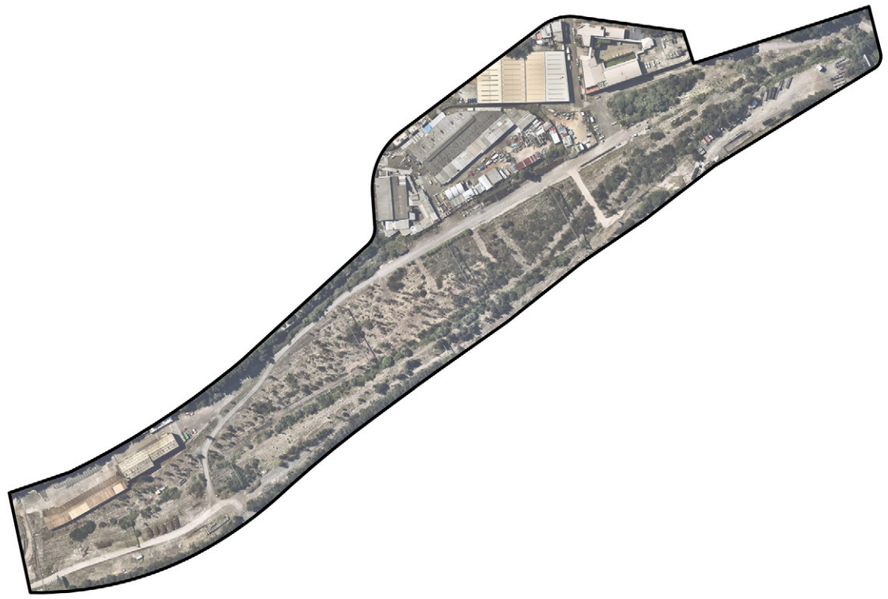


Figure 5.10: Rozelle Rail Yards open space and connectivity

5.1.6 SPATIAL COMPARISON

The proposed Rozelle Rail Yards is a significant addition to Sydney's matrix of publically accessible open space. The size of the site is difficult to appreciate. To comprehend the scale of the site, a comparison with other well-known parks is shown in Figure 5.11 below.



Rozelle Rail Yards - 13 hectares



Bicentennial and Federal Park [Glebe] - 5 hectares

Jubilee Park [Glebe] - 10 hectares



Hyde Park - 16 hectares

Figure 5.11: Public open space comparison



Figure 5.12: Artist's impression of waterside walk heading east

Figure 5.13: Artist's impression of bird's eye view of Rozelle Rail Yards



Figure 5.14: Render at 10 years of project operation from Catherine Street at the entry to Lilyfield light rail stop [Inset: existing view]



Figure 5.15: Render at 10 years of project operation of view looking west along City West Link [Inset: existing view]

New M5 tunnel portals

Figure 5.16: Render at 10 years of project operation of view looking west from City West Link east of The Crescent [Inset: existing view]

Ventilation facilities subject to detailed design as part of the UDLP

Land bridge

Figure 5.17: Render at 10 years of project operation
looking south from Easton Park to the Rozelle Rail Yards
[Insert: existing view]

Ventilation facilities subject to detailed design as part of the UDLP



Figure 5.18: Render at 10 years of project operation of view looking west from The Crescent east of City West Link
[Inset: existing view]

Ventilation facilities subject to detailed design as part of the UDLP





5.2 IRON COVE LINK

The following sections outline existing conditions of the Iron Cove Link site and provides key findings for each criteria. It stipulates the strategic responses implemented in the urban design outcome, which correlate to the principles in section 3. Finally, this section contains a proposed concept plan for the Iron Cove Link site which maximises the opportunities derived from the key findings and combines the strategic responses.

5.2.1 EXISTING CONDITIONS

Access and movement

The Iron Cove Link site and surroundings are dominated by the major regional link of Victoria Road, which connects Iron Cove Bridge to the north-west with City West Link and the Anzac Bridge to the CBD. While a major regional connection, Victoria Road also carries local and neighbourhood traffic from Darling Street to Iron Cove. Access to public transport is available via bus stops that are located along Victoria Road. These movements are intermingled, creating congestion and an unclear hierarchy of movement. Shared footpaths are constricted and immediately adjacent to high volumes of traffic. The footpaths also form local connections between the Bay Run for pedestrians and cyclists. Despite the link to Iron Cove, the surrounding neighbourhoods are impacted by the regional road traffic on Victoria Road, which effectively separates Rozelle and Balmain. As such major points of local amenity, such as Callan Park and Iron Cove Bay, while visible, are not easily accessed from surrounding neighbourhoods.



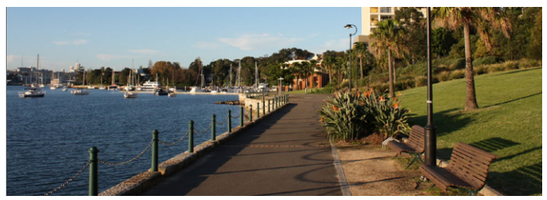
Traffic along Victoria Road.



Dog walker walking down Victoria Road, which links into the parks along the water's edge.



Poor pedestrian and cycle amenity along Victoria Road.



Iron Cove foreshore walk.



Pedestrian and cycle infrastructure along Iron Cove Bridge.

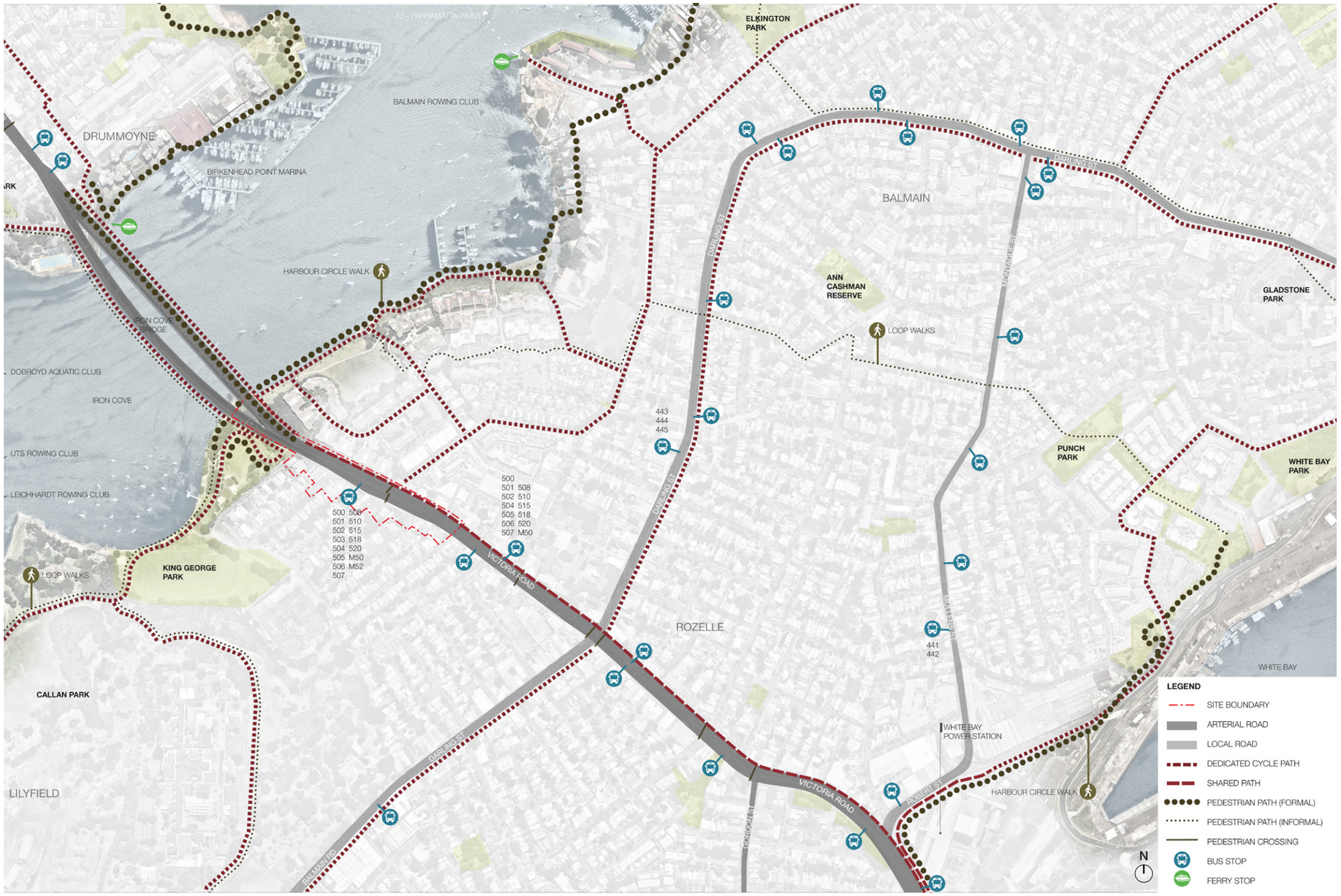


Figure 5.19: Access and movement

Culture

The harbour and its foreshore have been a strong cultural influence on Iron Cove. A history of industrial maritime activity in Iron Cove and the ongoing recreational boating activities produce a maritime landscape that attracts residents and visitors.

The extensive foreshore walk supports a broad range of cultural activities including cycling, dog walking, running events, and sight-seeing.

The main pedestrian connection between Blackwattle Bay and Iron Cove is Victoria Road. The current form of Victoria Road discourages pedestrian activity and cultural pursuits. The Iron Cove Link site stands as a potential location for expanding existing cultural activities such as dog walking, cycling, as well as local residents' daily needs.



Under the bridge, Iron Cove.



Iron Cove rowing clubs.



Open green space and foreshore walks, King George Park.



Rozelle Markets on Darling Street.



The Bay Run.



Figure 5.20: Culture

Natural environment

The combination of open water and ample tree cover along parts of the Iron Cove foreshore creates a riparian edge, attracting and supporting a variety of terrestrial and aquatic species. Stands of mature trees within Callan Park tie into the foreshore walk and harbour ecology. Birds and bats use the dense canopies as nesting and foraging grounds, and the mature fig trees serve as an important food source for the area's flying-fox population.

While the foreshore exists as a major green linkage around Iron Cove, few other green links are present in the area. The lack of northwest-southeast green links poses a challenge for terrestrial animals that might seek to migrate between Iron Cove and Rozelle Bay, and options for pedestrians who wish to traverse the area via a green corridor are limited.

The Iron Cove foreshore exists as a threshold space of vegetation, land, and water, serving to attract and support local wildlife. There is an absence of a wildlife corridor for fauna. As such the changes to Victoria Road serve as an opportunity to create a green link along Victoria Road.



Footpath along Victoria Road.



Open green links, King George Park.



Dense tree canopies along the foreshore.



Oyster beds along the Iron Cove foreshore.



Storm water run-off into Iron Cove.



Figure 5.21: Natural environment

Built form and landscape

The site is situated upon a northwest-southeast slope descending from the juncture of Victoria Road and Darling Street to the Iron Cove foreshore. Southwest of the site the terrain falls steeply into King George Park and Callan Park, while to the northeast the slope is more gradual until it meets the water.

The slope from Darling Street to Iron Cove provides views from the top of Victoria Road across Iron Cove. The amenity of these views are impeded by the high volume of traffic on the road and the poor quality of the public domain.

The built form consists of residential fabric which flanks Victoria Road on either side and some light industrial/commercial uses along the road. Due to these conditions, Victoria Road exists as a barrier between the Rozelle and Balmain neighbourhoods. Along Victoria Road, from Darling Street to the foreshore some of the buildings stand vacant and are deteriorating in their appearance, discouraging pedestrian activity.

Opportunities exist to improve visual connections across the site as well as views towards Iron Cove. Views in Figure 5.22 have been taken from preliminary site analysis. Detailed landscape and view analysis is contained in EIS Appendix O [Technical working paper: Landscape and visual impact].



Iron Cove Bridge viewed from all stretches of the foreshore walk.



View up Victoria Road.



View north east from Iron Cove Bridge.



Urban decay on Victoria Road.



Iron Cove Bridge.

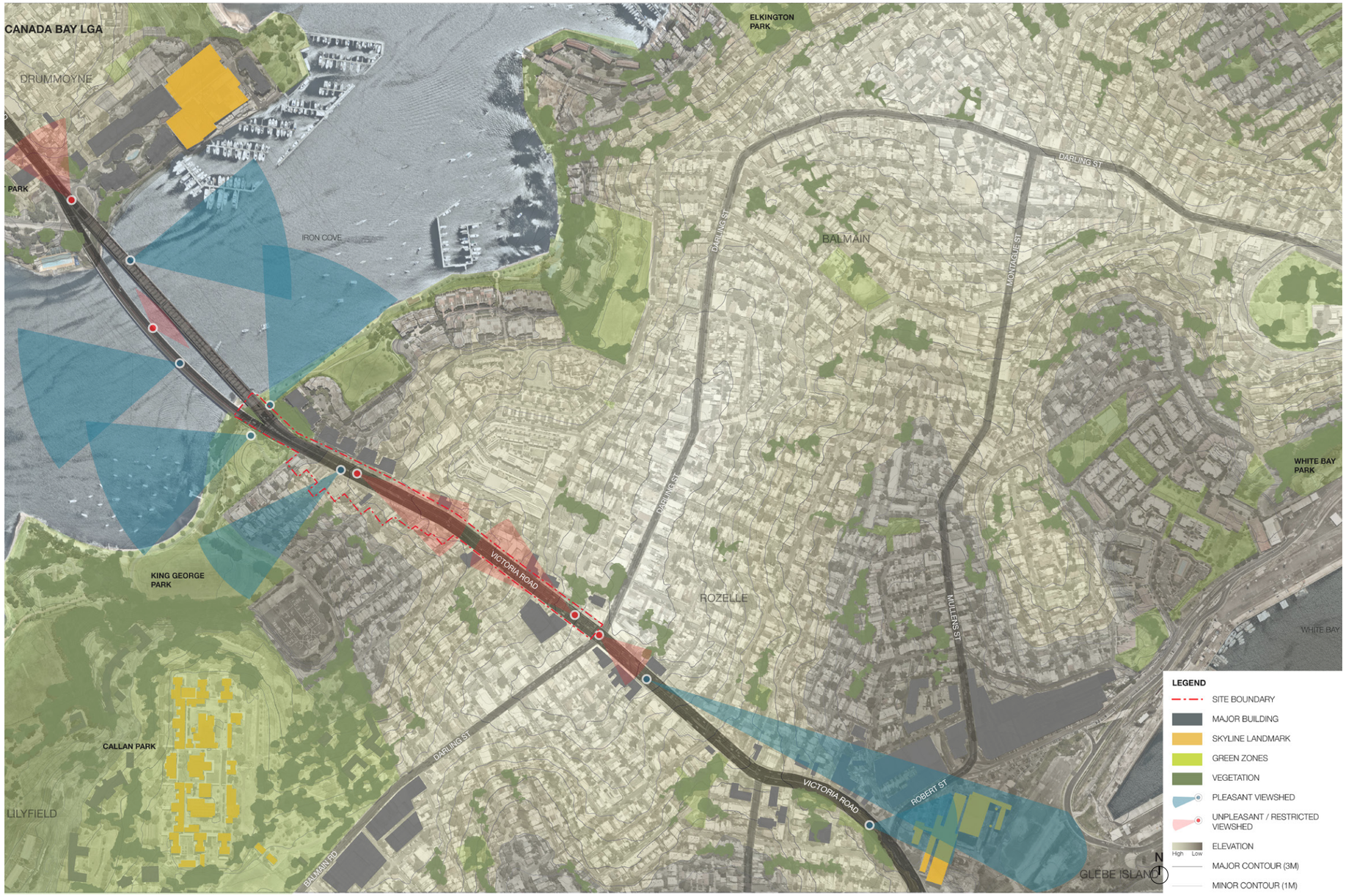


Figure 5.22: Built form and landscape

History and heritage

Victoria Road has historically served as a major connector between Sydney, Balmain, and beyond. The expansion of Victoria Road in 1959 supported growing vehicular traffic to Sydney. This transformed Victoria Road from a high street supporting community activities to a regional road dividing the neighbourhoods of Rozelle and Balmain.

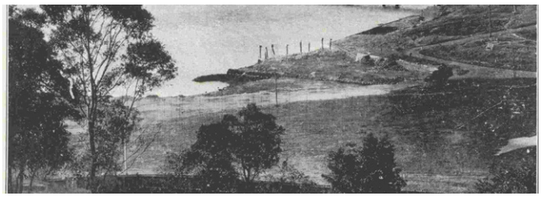
Since then, traffic has increased along Victoria Road, decreasing pedestrian amenity due to the vehicle-focused landscape. The surrounding area contains a conservation zone to the north of Victoria Road and heritage items and green space subject to State heritage listing, to the south. There may be opportunity to draw on the rich heritage of the area and interpret this within the public domain.



Kirkbride Callan Park.



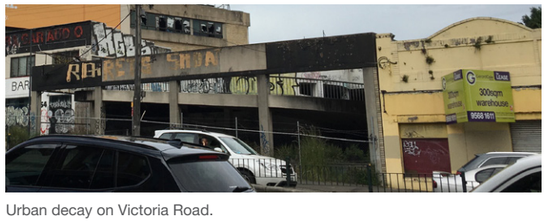
Iron Cove Bridge, 1885.



King George Park and Iron Cove Bridge, 1910.



Plaque commemorating the H.M.S Birkenhead.



Urban decay on Victoria Road.

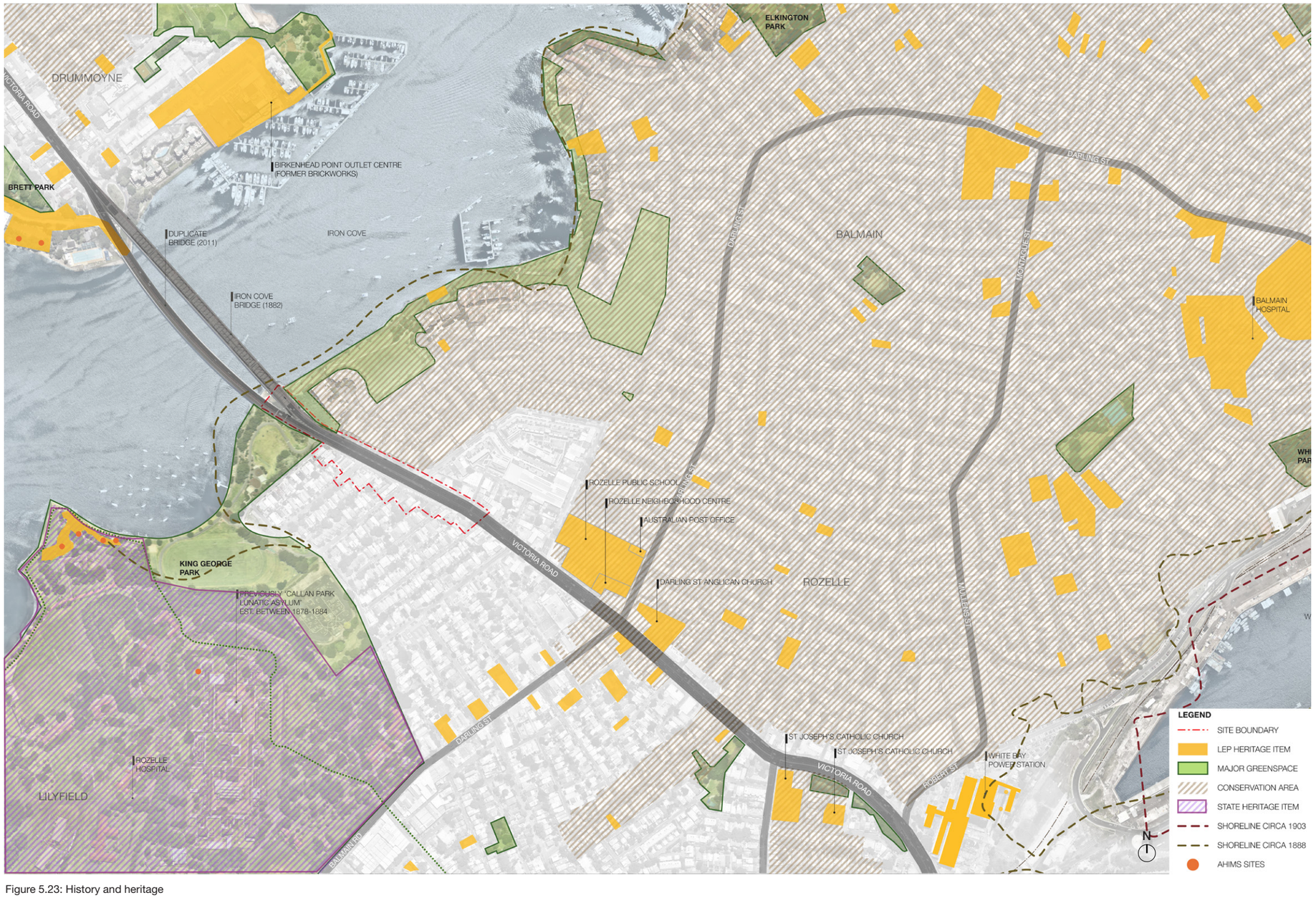


Figure 5.23: History and heritage

5.2.2 KEY FINDINGS

Access and movement

With only one signalled crossing of Victoria Road between Darling Street and Terry Street there is an opportunity to improve the quality of connectivity. While the foreshore supports active pedestrian and cycling activity, movement across and along Victoria Road is disrupted by poor connectivity and amenity.

Culture

The Iron Cove Link site stands as a potential location for enhancing existing cultural pursuits including walking, dog walking, running, cycling, drawing the energy of the Bay Run towards Darling Street.

Natural environment

The Iron Cove foreshore exists as a threshold space of trees, land and water, serving to attract and support local wildlife, while green links within the wider area are restricted to street tree cover and backyard vegetation. The changes to Victoria Road serve as an opportunity to create a green link along Victoria Road, connecting to King George Park and the Iron Cove foreshore.

Built form and landscape

Traffic reductions and streetscape improvements along Victoria Road would provide the opportunity to enhance the built form and landscape. There are opportunities to provide new contiguous, functional areas of public realm along Victoria Road.

History and heritage

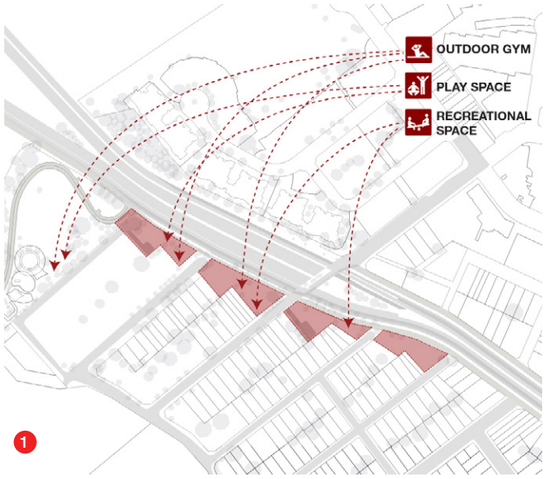
The surrounding area contains a heritage conservation zone to the north of Victoria Road, heritage items and green space subject to State and local heritage status. There may be opportunity to draw on the rich heritage of the area and interpret it within the public domain.

5.2.3 IRON COVE STRATEGIES

The contextual analysis has led to key strategies for the Iron Cove area. These strategies have been applied to a concept plan [Figure 5.24] for the site that demonstrates an option for the future form of this site.

The Iron Cove concept plan would integrate the exit and entry portals with a realigned Victoria Road. Remaining project land present the opportunity to create a series of new open spaces for the community, which connect with King George Park to the west and the local street network.

The concept plan seeks to identify opportunities and provides a template that could be used for the remainder of Victoria Road through to Roberts Street and transform Victoria Road to 'Victoria Street' [see section 6.2 for further details].



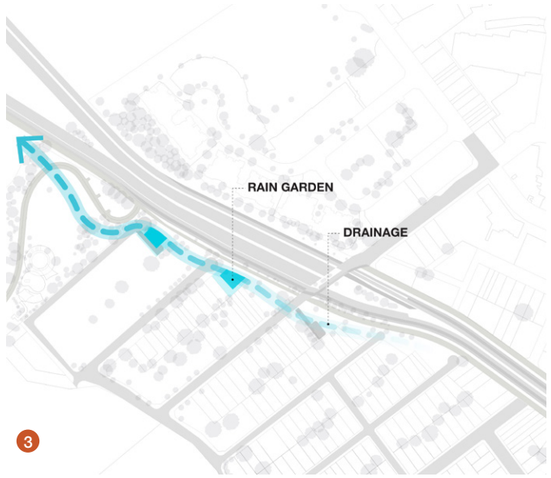
Connect and provide for communities

Bring locals back to Victoria Road through activation of remaining project land and integrate community facilities such as bike hubs, play space and recreational space subject to community consultation.



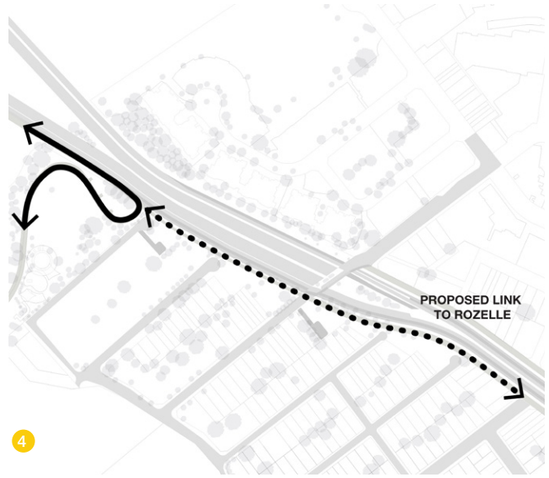
Enhance green links

Connect green spaces and canopy along Victoria Road and the remaining project land with King George Park and Callan Park.



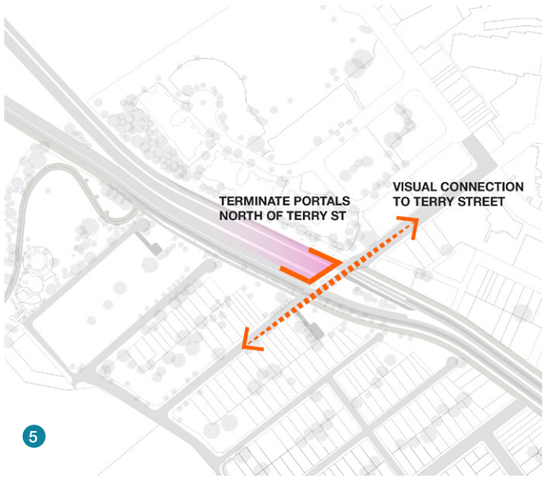
Integrate WSUD

Make use of the topography along Victoria Road and the remaining project land in the harvesting and polishing water run-off.



Integrate active transport links

Integrate Iron Cove Active Transport Network with the southern edge of Victoria Road to link to Rozelle and the wider network.



Integrate the motorway

Terminate the portals north of the Terry Street alignment to have visual connection across Victoria Road.



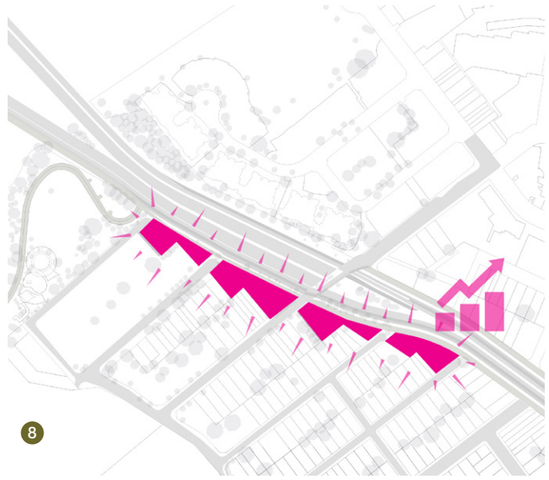
Respond to the local character

Scale any proposed built form to respect the existing fine grain character with materiality that is sympathetic to the quality of the local area.



Revitalise streets for equality of mobility

Better connected streets for pedestrians and cyclists that intersect with Victoria Road.



Sensitive economic revitalisation

Investigate opportunities for sensitive growth along Victoria Road south of Terry Street that use remaining project land.

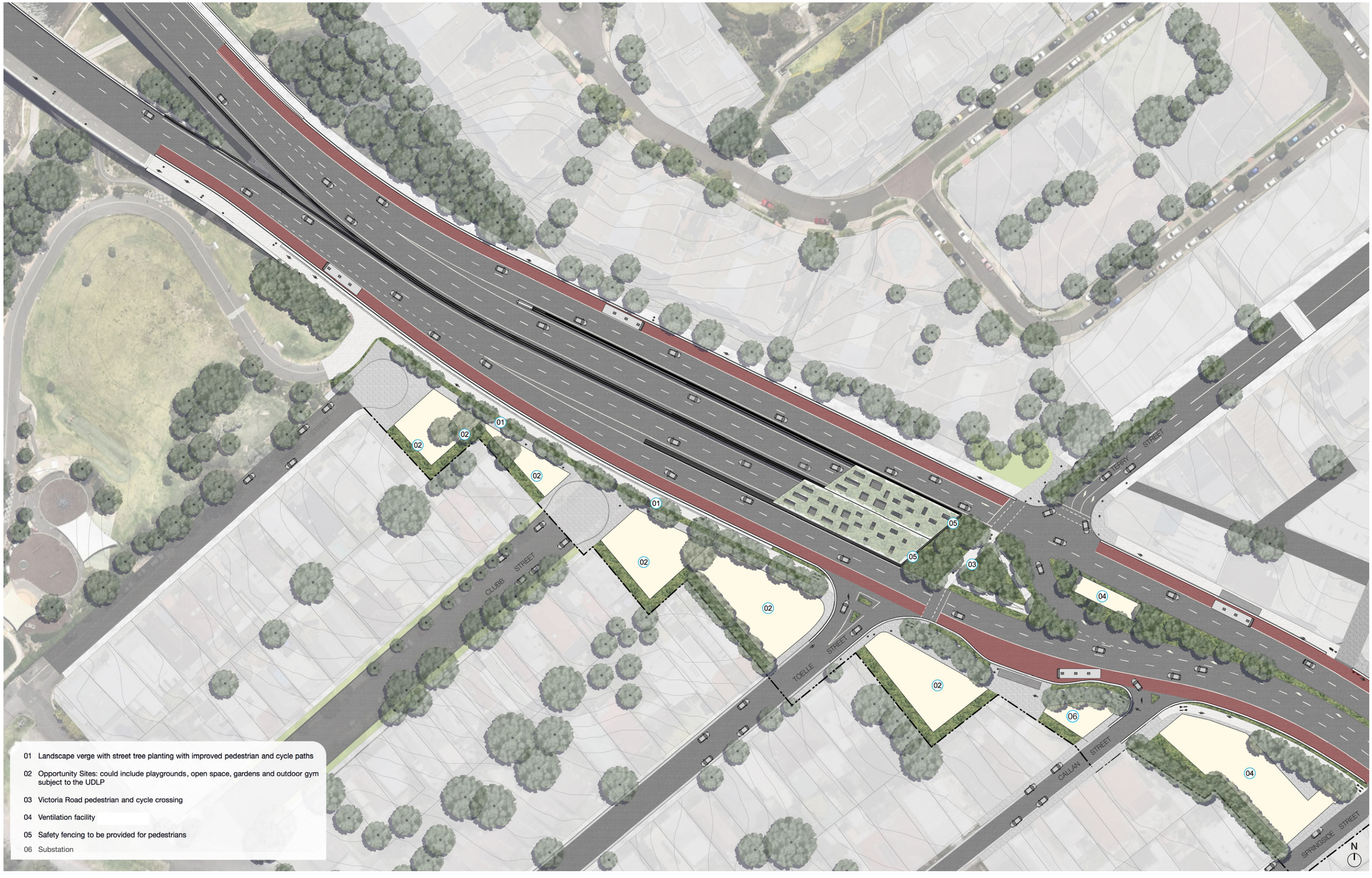


Figure 5.24: Iron Cove concept plan

5.2.4 BUILT FORM

The built form elements of motorway infrastructure at Iron Cove include the tunnel entry and exit portals. These portals would be designed as recessive components within the landscape. The intended composition is for a simple intervention within the road carriageway that is largely not visible from surrounding pedestrian areas. The material choice would reflect the recessive nature of the design. A repetitive shade structure is proposed above both the entry and exit portal lanes to assist in disguising the portals from surrounding pedestrian areas as well as enhance driver comfort in transitioning into and out of the tunnels. This structure would feature landscaping where possible.

A ventilation outlet would be located within the road carriageway. The structure would be around 20 metres above existing ground level and thus form a prominent marker in the landscape. The material composition of the structure would take cues from the surrounding built form and feature a defined base, middle and top. This would reflect the composition of surrounding structures that have a defined base or foundation level, a middle facade and a distinct composition for the top or roof.

The ventilation facility and electricity substation would be designed in a manner that allows them to become recessive elements within the landscape. These structures would feature defined facades to allow them to blend with the surrounding built form.

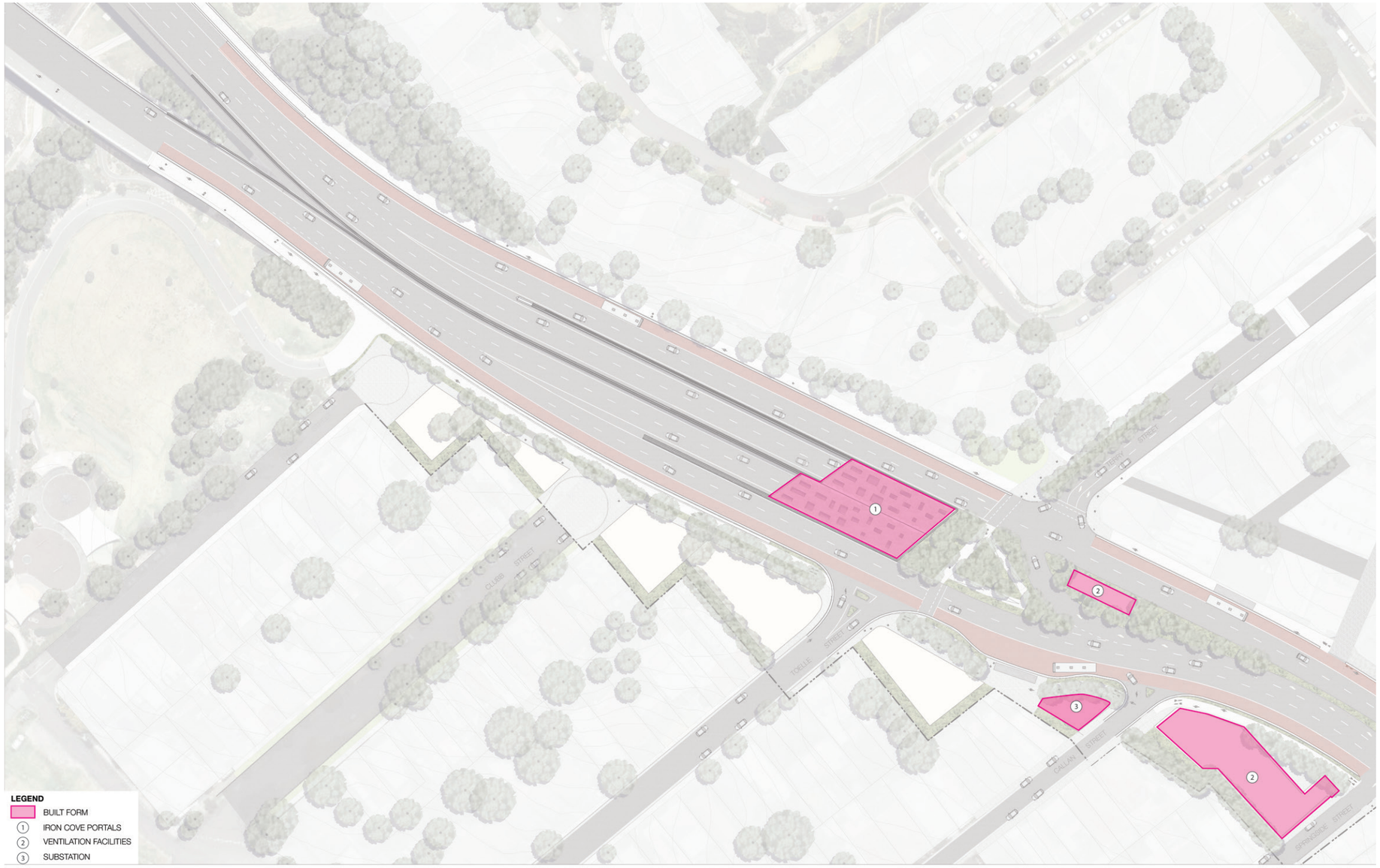


Figure 5.25: Iron Cove built form

5.2.5 STREETSCAPE AND CONNECTIVITY

The widened Victoria Road carriageway has the ability to exacerbate the separation between the communities of Rozelle and Balmain. The design of the portals in this location would lessen this impact by providing improved pedestrian and cyclist accessibility between Toelle and Terry streets. The portals have been located to allow a direct link between these streets that would provide a crossing over the two northbound lanes to a pedestrian refuge above the portals before another signalised crossing over the two southbound lanes of Victoria Road.

A new pedestrian footpath and separated cycleway would be provided between Springside Street connecting to the Bay Run at Byrnes Street on the southern side of Victoria Road. Sufficient space would be provided for a two-way cycleway as well as a separate footpath that meets required standards.

The streetscape on the southern side of Victoria Road would feature street tree plantings and a vegetated verge that separates the vehicle movements of Victoria Road from the pedestrian and cycle paths. The majority of the westbound Victoria Road carriageway would be at a level below the pedestrian and cycle path, providing further improved amenity.

The area above the portals, including the pedestrian and cycle refuge area would be planted with street trees to provide canopy cover. This would act to improve amenity for pedestrians and cyclists and provide further separation of these movements with the right turn vehicle movements into Terry Street.

A bioretention facility would be constructed within to King George Park adjacent to Manning Street within land currently used for informal car parking. The facility would treat water run-off from adjacent areas. In addition to the facility, the project would also formalise car parking in this location.

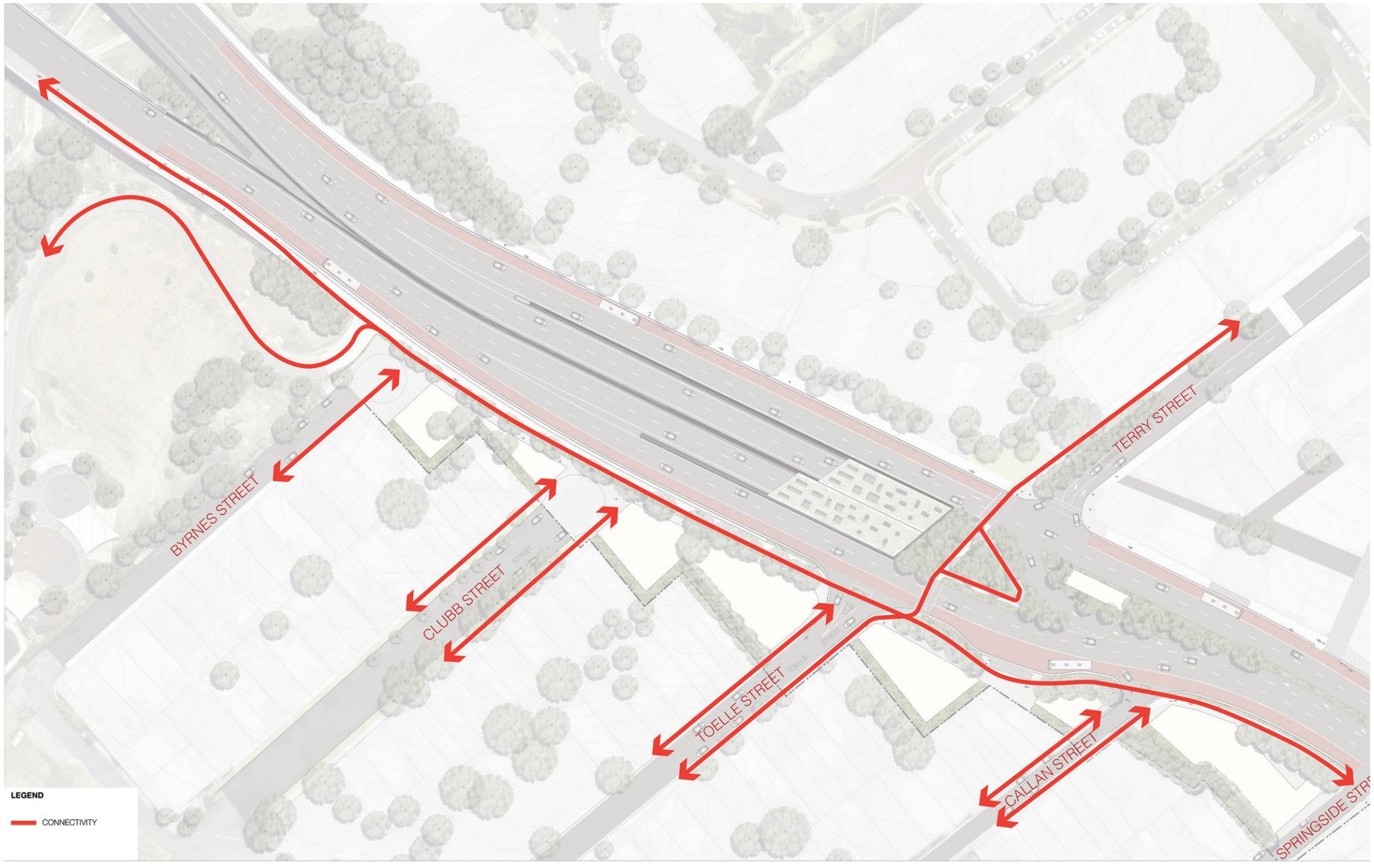


Figure 5.26: Iron Cove streetscape and connectivity

5.2.6 FUTURE USES

The remaining land parcels on the western side of Victoria Road that are not required after completion of the project would provide a buffer between the Victoria Road carriageway and the existing residential houses. There are a number of opportunities for the future use of these spaces that could include:

- Children's play spaces
- Active recreation to complement the Bay Run such as outdoor gyms
- Infill housing development
- Community gardens.

Community input would be central to the ultimate decision on use of their land at Iron Cove. Should uses such as children's play spaces or outdoor gyms be desired, these would be provided by the project. If community gardens or infill development were preferred future uses, this would potentially be delivered by others.

All future uses could be designed in a manner to ensure that the existing amenity of the adjacent residences would be preserved. For example, any infill development would act as a buffer to noise and be designed appropriately for noise insulation of occupants. Play spaces or open spaces could include features such as landscaped mounds or walls for growing of plants that would serve both an open space purpose as well as a noise mitigation measure should it be required. These future uses will be detailed in the UDLP, as outlined in section 7.

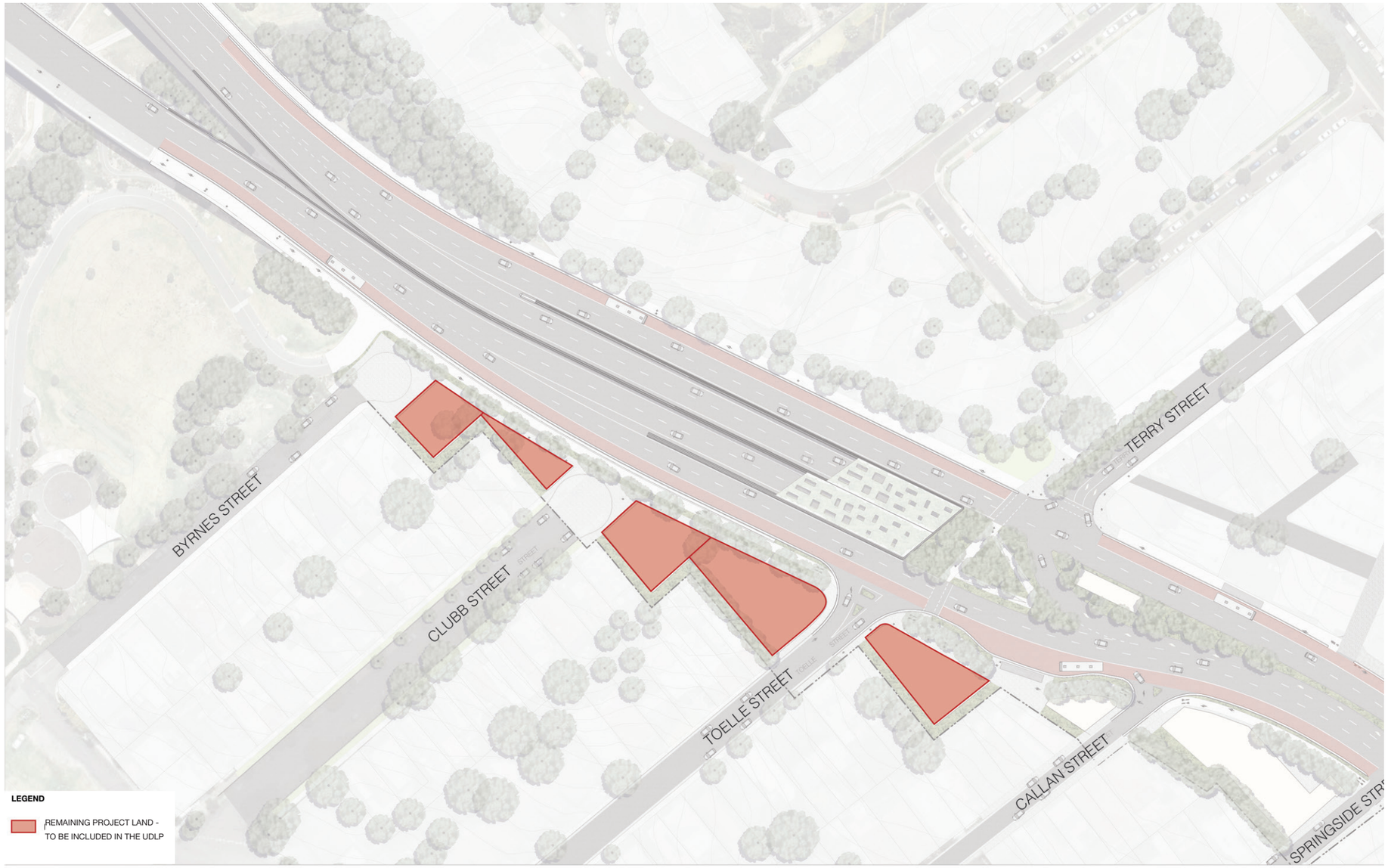


Figure 5.27: Iron Cove future uses

5.3 PROJECT INTERFACES

5.3.1 WATTLE STREET INTERCHANGE

The M4-M5 Link includes an underground connection between the mainline tunnels and the Wattle Street interchange, which is being constructed as part of the M4 East project. At Haberfield, the M4-M5 Link would use land during construction that is currently being used as construction compounds and sites for the M4 East. Once construction of both projects is completed, residual land not required for operational infrastructure or subject to landscaping as part of the M4 East project would be rehabilitated and would be subject to applicable conditions of approval from the M4 East conditions of approval, including a Residual Land Management Plan. This plan is currently being prepared by the M4 East team and would be subject to the consultation requirements and timeframes set out in the conditions of approval for the M4 East project.

A draft UDLP has been prepared as part of the M4 East project that details the landscape design approach at the Wattle Street interchange.

The M4-M5 Link project would not impact on the implementation of these plans, but may impact the timing in which in the plans are carried out.

Figure 5.28 demonstrates the current landscape concept for Haberfield.



Figure 5.28: Haberfield concept plan [draft]

5.3.2 ST PETERS INTERCHANGE

M4-M5 Link works

The M4-M5 Link project would include construction of the Campbell Road motorway operations complex [MOC5] and ventilation facilities within the St Peters interchange, which would be in accordance with urban design principles in this report and subject to detailed design as part of the UDLP for the M4-M5 Link. The facilities would be located above the portals in the north west corner of the site. The ventilation facility has been designed to minimise land-take from the St Peters interchange open space areas.

The ventilation outlets would be around 22 metres above existing ground level and the facility would also include structures to house worker amenities, parking and an electricity substation.

Integration of M4-M5 Link and New M5

The M4-M5 Link ventilation facilities at St Peters have been located to fit within the broader concept for the St Peters interchange being delivered as part of the New M5 project. The New M5 received planning approval in April 2015 that contained a number of conditions of approval relating to the ultimate design of the St Peters interchange. In addition to the open space concept contained in the New M5 EIS, the conditions of consent require the following urban design enhancements:

- Construction of a land bridge to connect Sydney Park to the St Peters interchange open space. Development of an active recreation strategy for land within the St Peters interchange adjacent to Campbell Road
- A review of the pedestrian and cycle network to highlight any additions required to the network within one kilometre of the interchange
- The responsibility for delivering these conditions falls to a number of different parties [see Figure 5.30].

New M5 UDLP

A draft UDLP has been prepared as part of the New M5 project that details the finishes to all local road upgrades as well as the St Peters interchange.

The UDLP includes details of the cycle and pedestrian paths, street tree planting and landscaping along local roads. The work described in the UDLP will be constructed as part of the New M5. The M4-M5 Link project would not impact on the implementation of these plans, but may impact the timing in which in the plans are carried out.

Land bridge

Roads and Maritime, as the proponent for the New M5 project, has responsibility for the design of a land bridge connecting Sydney Park to the St Peters interchange. Delivery of the land bridge would occur upon completion of the M4-M5 Link.

Active recreation strategy

Roads and Maritime have developed an active recreation strategy for the new open space area at the St Peters interchange. The new open space would include:

- A full size multi-purpose field [football, AFL, Rugby]
- Four multi-purpose courts [netball, basketball, hockey].
- Change rooms
- Space for more passive recreation such as outdoor chess
- Walking circuit
- 54 new parking spaces off Albert Street to service the recreation area.

Delivery of the active recreation strategy is currently being determined.

Pedestrian and cycle network

Roads and Maritime identified upgrades to the pedestrian and cycle network in the St Peters area including:

- A new connection from the St Peters interchange to Sydenham
- Improvements to the King Street Gateway pedestrian and cycleway
- A new Cooks River link
- A new connection to the future Alexandria to Moore Park road corridor.

These are shown in Figure 5.29 and Figure 3.30.

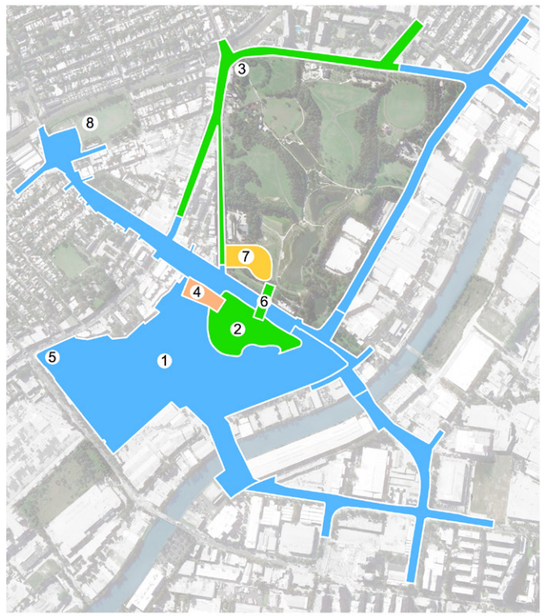
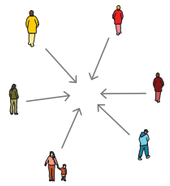
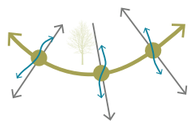
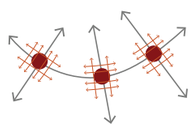
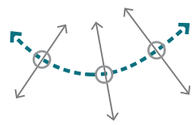
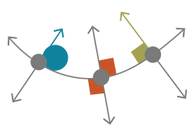


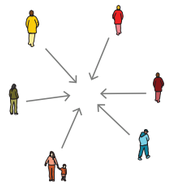
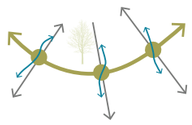
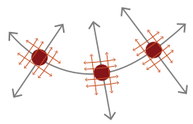
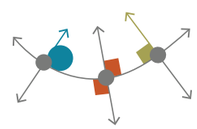
Figure 5.29: St Peters master plan staging [Draft New M5 UDLP, 2017]



Figure 5.30: St Peters master plan [Draft New M5 UDLP, 2017]

5.4 ASSESSMENT OF THE M4-M5 LINK AGAINST THE URBAN DESIGN PRINCIPLES

	Principle	Responses	
		Iron Cove	Rozelle Rail Yards
1 	*An integrated and collective approach* Create holistic and integrated design solutions generated by collaboration across disciplines, the community, stakeholders and government bodies.	Bring locals back to Victoria Road through activation of remaining project land and integrate community facilities such as outdoor gyms, play spaces or recreational spaces.	Offer a parkland destination that stitches together previously disconnected communities by providing a range of social infrastructure at a central, easily accessible location.
2 	*An environmental vision* Create a sustainable and enduring design response which enhances and connects local ecologies and green spaces.	Connect green spaces and canopy along Victoria Road and the remaining project land with King George Park and Callan Park. Also, make use of the topography along Victoria Road and the remaining project land in the harvesting and polishing of water run-off.	Reactivate closed off land though new green spaces and links. This will strategically connect a series of significant, green spaces located in an old creek and swamp bed, and employ WSUD to filter run-off before it enters the harbour.
3 	*Cross scale connection of spaces* Prioritise local and regional significant connections that respond to broader issues, and support aims and initiatives of the local neighbourhoods and the city.	Integrate Iron Cove active transport network along the southern edge of Victoria Road, linking to Rozelle in the east, Drummoyne and the Bay Run in the north and the wider network beyond.	Create a new active transport spine that works directly with existing and future connections providing a much needed funnel between previously disconnected communities, the Bay Run and the CBD.
4 	*A motorway integrated within its context* Understand the existing landscape and respond in a respectful manor that seeks to enhance and or contribute back to its context.	Terminate the tunnel portals to the west of the Terry and Toelle Street alignment, enabling through connection across Victoria Road. Locate the portals below the adjacent opportunity sites to minimise amenity impacts on these sites. Also, locate the ventilation outlet between the Victoria Road carriageways, improving the separation distance from residential and commercial receivers.	Use landform to disguise the motorway and maximise usable open space. Co-locate motorway infrastructure to maximise areas of land that would be available for future open space and community and social facilities. Provide a new connection between the Rozelle Rail Yards and the Rozelle Bay light rail stop.
5 	*Place sensitive design* Celebrate and work with the character of each place and destination, responding to their unique histories, materiality, architecture, built fabric, cultural context, landform and topography.	Scale any proposed built form to respect the existing fine grain character with materials that are sympathetic to the local area. Consult with the community to determine the range of uses that could be delivered in this area.	Respect and maintain the unique heritage, industrial character and topography of the Rozelle Rail Yards, and the port and maritime history of the surrounds.
6 	*A multidimensional user focus* Consider holistically how a diversity of users experience space including all ages, abilities and transport modes for a truly inclusive, universally accessible and safe outcome.	Improve connections of local streets with Victoria Road for pedestrians and cyclists, ensuring universal accessibility. Provide new road infrastructure for motorists as an underground alternative to Victoria Road.	Establish entirely new “public streets” and enhance the surrounding neighbourhood with new public spaces, and much needed universally accessible links. Provide new and upgraded road infrastructure for motorists.
7 	*Revitalisation, opportunity and economics* Establish opportunities for development that supports and connects existing neighbourhoods, complements and stimulates local economies and provides opportunity for growth across existing and future local industries.	Investigate opportunities for sensitive growth along Victoria Road and portions of the remaining project land. This growth could include low-scale infill development. Improve connections along the southern side of Victoria Road, connecting to the Bay Run, as well as residents and businesses further east and west along Victoria Road.	With the intended future growth of the area, deliver much needed and quality open space and social infrastructure that works both for existing and future communities.

	PRINCIPLE	INCLUDES BUT IS NOT LIMITED TO	ADDRESSES THE FOLLOWING INPUTS
1 	*An integrated and collective approach* Create holistic and integrated design solutions generated by collaboration across disciplines, the community, stakeholders and government bodies.	• working across disciplines • holding regular stakeholder workshops and contribution to design options • prioritising comprehensive community input and consultation • working with all future plans and government bodies • considering all relevant regulatory frameworks on the site and in surrounding areas.	Beyond The Pavement Principles: 1, 3 Beyond The Pavement UD Goals: a WestConnex Motorway Objectives: 1, 4 WestConnex Motorway UD Opportunities: n ,p, q, s, u
2 	*An environmental vision* Create a sustainable and enduring design response which enhances and connects local ecologies and green spaces.	• enhancing connectivity between streets, facilities, neighbourhoods, green spaces, cycle and pedestrian connections across the site and the city • integrating and connecting transport modes • connecting local and regional road, cycle, public transport and pedestrian links • reducing the need for car travel.	Beyond The Pavement Principles: 4, 5, 6, 9 Beyond The Pavement UD Goals: a WestConnex Motorway Objectives: 1, 3, 6 WestConnex Motorway UD Opportunities: c, d, e, f, g, h, k, l, s
3 	*Cross scale connection of spaces* Prioritise local and regional significant connections that respond to broader issues, and support aims and initiatives of the local neighbourhoods and the city.	• ensuring CPTED Principles Driven Designs • creating safe, legible connections with way finding for all user types • ensuring universal design outcomes • considering the user experience for all modes including drivers, pedestrians, cyclists and public transport users.	Beyond The Pavement Principles: 3, 7, 8, 2 Beyond The Pavement UD Goals: a, b, c WestConnex Motorway Objectives: 2, 6 WestConnex Motorway UD Opportunities: g, h, i, k, l, n, o, r
5 	*Place sensitive design* Celebrate and work with the character of each place and destination, responding to their unique histories, materiality, architecture, built fabric, cultural context, landform and typography.	• incorporating heritage • respecting and responding to cultural contexts • respecting and working with the local landform • responding to the natural patterns • complement the existing built fabric • Increasing the legibility of places, buildings, streets and landmarks	Beyond The Pavement Principles: 2, 4 ,5, 6, 9 Beyond The Pavement UD Goals: a, b, c WestConnex Motorway Objectives: 2, 3, 6 WestConnex Motorway UD Opportunities: a, b, f, g, m, o, s, t, u
6 	*A multidimensional user focus* Consider holistically how a diversity of users experience space including all ages, abilities and transport modes for a truly inclusive, universally accessible and safe outcome.	• enhancing waterways, creeks and rivers • using, where possible WSUD • connecting fractured green spaces • enhancing local ecologies and vegetation • using durable, sustainable and long lasting materials and timeless design.	Beyond The Pavement Principles: 3, 7, 8, 2 Beyond The Pavement UD Goals: a, b, c WestConnex Motorway Objectives: 2, 5 WestConnex Motorway UD Opportunities: g, i, l, m, o, r
7 	*Revitalisation, opportunity and economics* Establish opportunities for development that supports and connects existing neighbourhoods, complements and stimulates local economies and provides opportunity for growth across existing and future local industries.	• contributing to urban structure and revitalisation • connecting existing and fragmented spaces though property acquisition • capitalising on traffic reduction to enhance local streets and increase neighbourhood liveability • creating opportunities for urban renewal.	Beyond The Pavement Principles: 1, 3, 6 Beyond The Pavement UD Goals: a, c WestConnex Motorway Objectives: 1, 4, 6 WestConnex Motorway UD Opportunities: g, k, n

5.5 GUIDING PRINCIPLES

5.5.1 BUILT FORM DESIGN AND MATERIALS

The built form of all structures for the project would be detailed in the UDLP to be developed in stages [refer to section 7]. The built form components of the project include:

- Ventilation facilities and outlets
- Water treatment plants
- Electricity substations
- Ventilation supply facilities
- Tunnel portals.

The built form structures would be designed to complement the surrounding context. During the detailed design process a material palette would be developed that draws on materials of the surrounding areas. Material palettes for each built form structure would be included in the relevant UDLP which will be made available for public comment.

5.5.2 PORTAL DESIGN

The design of portals would be treated carefully to reduce the impact of these structures within the landscape. A Portal Design Review has been undertaken to examine national and international examples of portal design [see Annexure 1]. The review provides key criteria by which the detailed design of portals for the project would be developed. The UDLP will contain the portal designs in accordance with the following themes:

Threshold

While tunnel portal design is largely the result of strict controls relating to speed and volume of traffic, the articulation of these structures has historical and symbolic value. City boundaries are often marked with gateways, describing a transition from one context to another. Portals for the project have the ability to exemplify this gateway phenomenon.

Contextual conditions

The nature of tunnel design requires engagement with two or more specific contexts at entry and exit points. These two conditions can be radically different to each other by virtue of their surroundings. There are two ways in which to mark these thresholds:

1. A unified expression which treats the tunnel experience at the entry and exit with the same expression, often as an extension of the tunnel.
2. Use the portal design as a response to its local context.

Entry and exit experience

The treatment of portals varies greatly. Historically, the portal acts as a threshold to the city, a marker, which delineates suburban with urban. Whether entering or exiting the tunnel, one is required to depart and arrive from their point of origin. As such, tunnel portals can often be suggestive of embracing the motorist on arrival, and releasing on departure.

This often has symbolic as well as practical reasons. When exiting the tunnel, the abrupt change in light conditions is often mediated by the gradual transition from tunnel to open roadway. Likewise, on entering, colours and form can be used as wayfinding devices for the motorist.

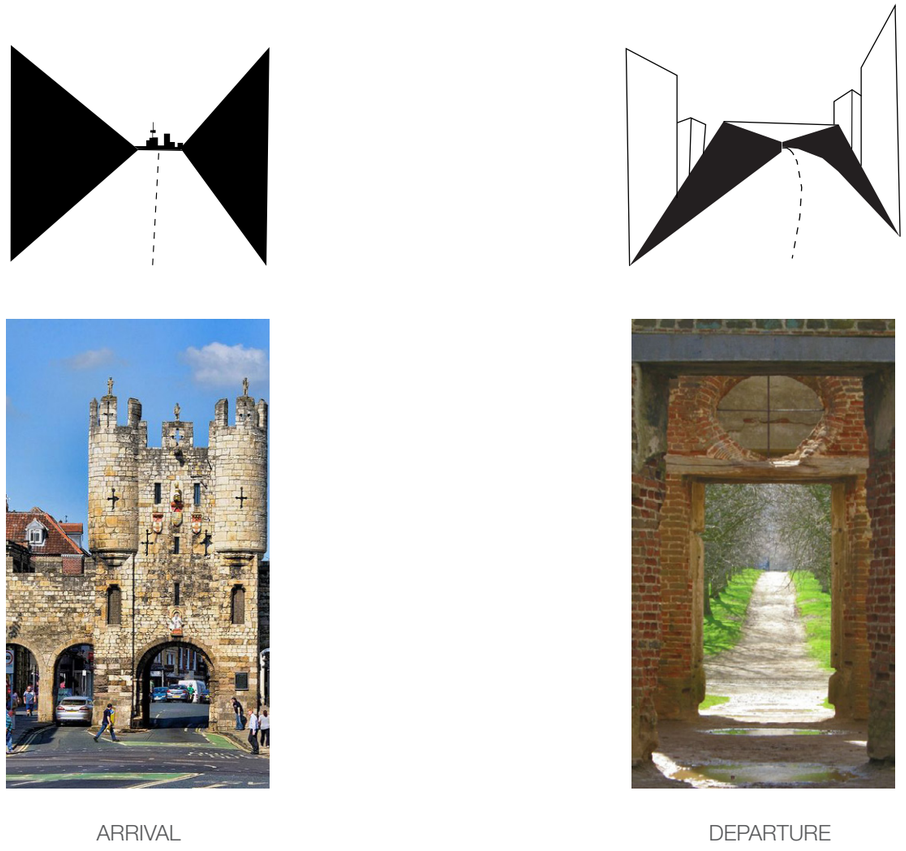


Figure 5.31: Portal design threshold

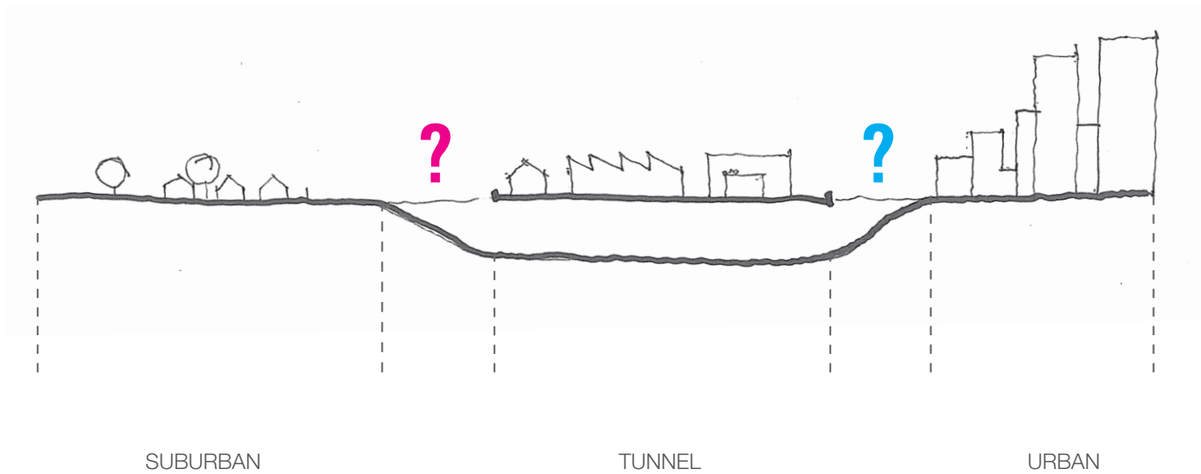


Figure 5.32: Portal design contextual conditions

5.5.3 TUNNEL INTERIORS

Completion of the project would create a tunnel network of approximately 23 kilometres [including the M4 East and New M5 components of WestConnex]. A tunnel of this length requires consideration of the driver experience in relation to safety, alertness and driver comfort. The New M5 and M4 East include a 'tunnel experience' overlay that includes feature lighting and suburb identifiers along the tunnel walls. These features would assist in providing interest for the motorist along the journey and assist in wayfinding.

A concept for in-tunnel experience would be prepared as part of the UDLP for M4-M5 Link that continues the principles developed for both the New M5 and M4 East. The principles by which the M4-M5 Link in-tunnel experience would be developed include:

- Creation of landmark or site specific/ unique experiences
- Use of optimal lighting / adaptable luminance
- Creation of subtle variations to keep drivers alert
- Measures to break-up long continuous underground travel distances
- Shifting gradients and alignments to avoid monotony
- Providing clear speed and distance references
- Legible wayfinding.

The images to the right represent a possible design overlay that would reflect the above principles. In order to assist wayfinding, a lighting wash could be projected on the left hand tunnel lining to indicate a diverge point. In addition to regulatory signage, the lighting would provide an indication to the motorist of a decision making point along the journey. The light would then envelope the tunnel lining at the point of diversion indicating to the motorist that the journey decision has been made.

Such a concept for in-tunnel experience is an example of how the principles could be applied for the project. The UDLP for the main tunnel component would outline the final concept to be used for the project.



Figure 5.33: Portal design: entry and exit experience

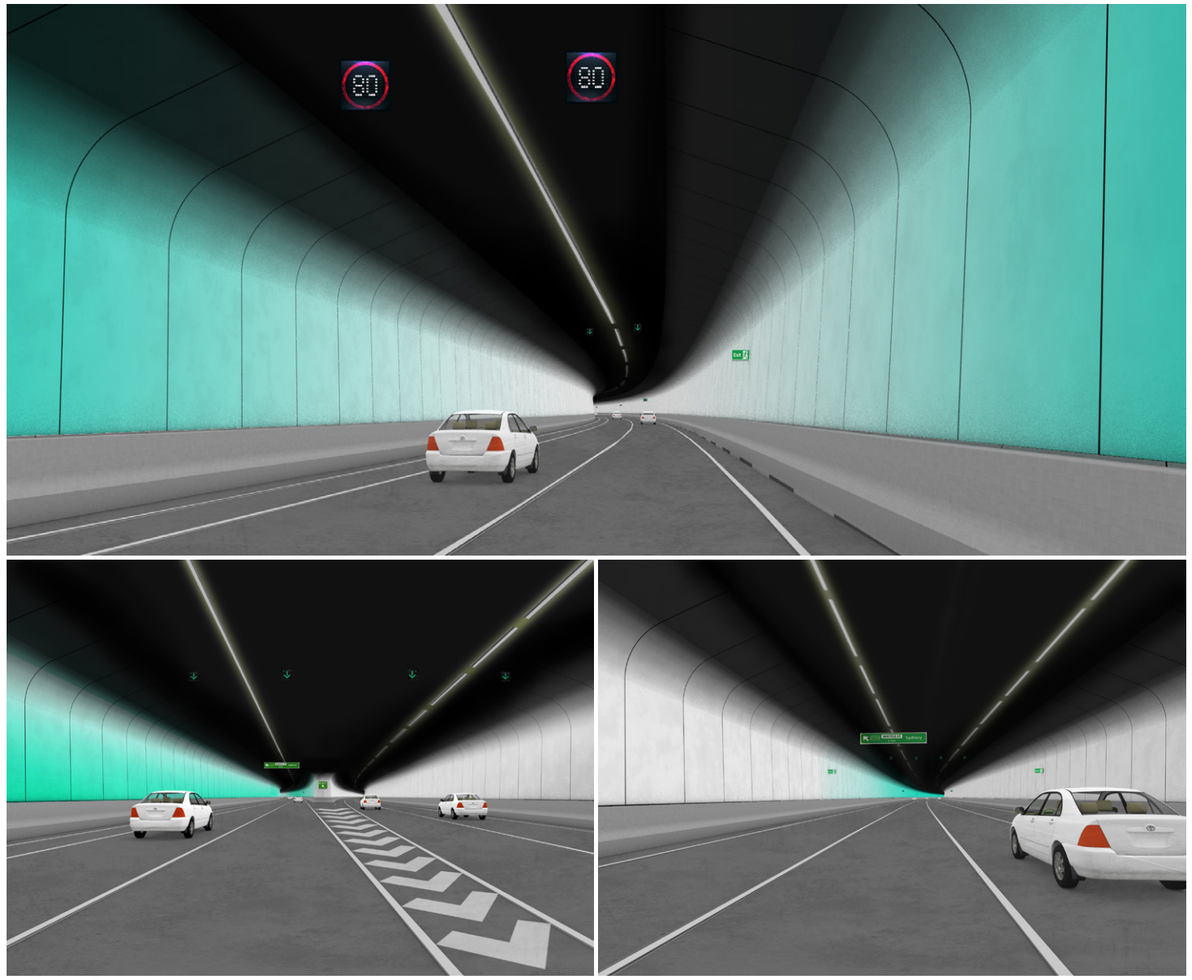


Figure 5.34: Tunnel interiors

5.5.4 VENTILATION FACILITY DESIGN

The ventilation facilities would form a dominant marker of the project within the landscape. A Ventilation Facility Design Review has been undertaken to examine national and international examples of ventilation facility design [see Annexure 2]. The review provides key criteria by which the detailed design of ventilation facilities for the project would be developed.

Across the history of ventilation facility design there appear to be four fundamental approaches by way of expression. In some cases, the [historical] approach appears as a representation of the spirit of the time - perhaps an expression of an attitude towards a new form of transport or technology. In many cases the approach appears rooted in the nearby physical context. More recently there appears to be a tendency towards a more stylistic form of expression, as demonstrated by Figure 5.35.

The UDLP will contain the ventilation facility designs in accordance with the following themes:

- The design strategy employed for the ventilation facility should be intrinsically linked to the community and its immediate context
- By understanding the ventilation facility as a 'signifier' for the wider project, there is an opportunity where appropriate for these structures to celebrate infrastructure, as opposed to disguising it
- Embedding an additional function could provide additional benefit to the surrounding context, and also help mitigate the negative associations with ventilation facilities in general [pollution, visual impact]. This addition can also be of social value to the community
- Distance from residential areas is often the point of strongest contention. By locating the ventilation outlet close to the portals the amount of impact from the community's perspective could be reduced.

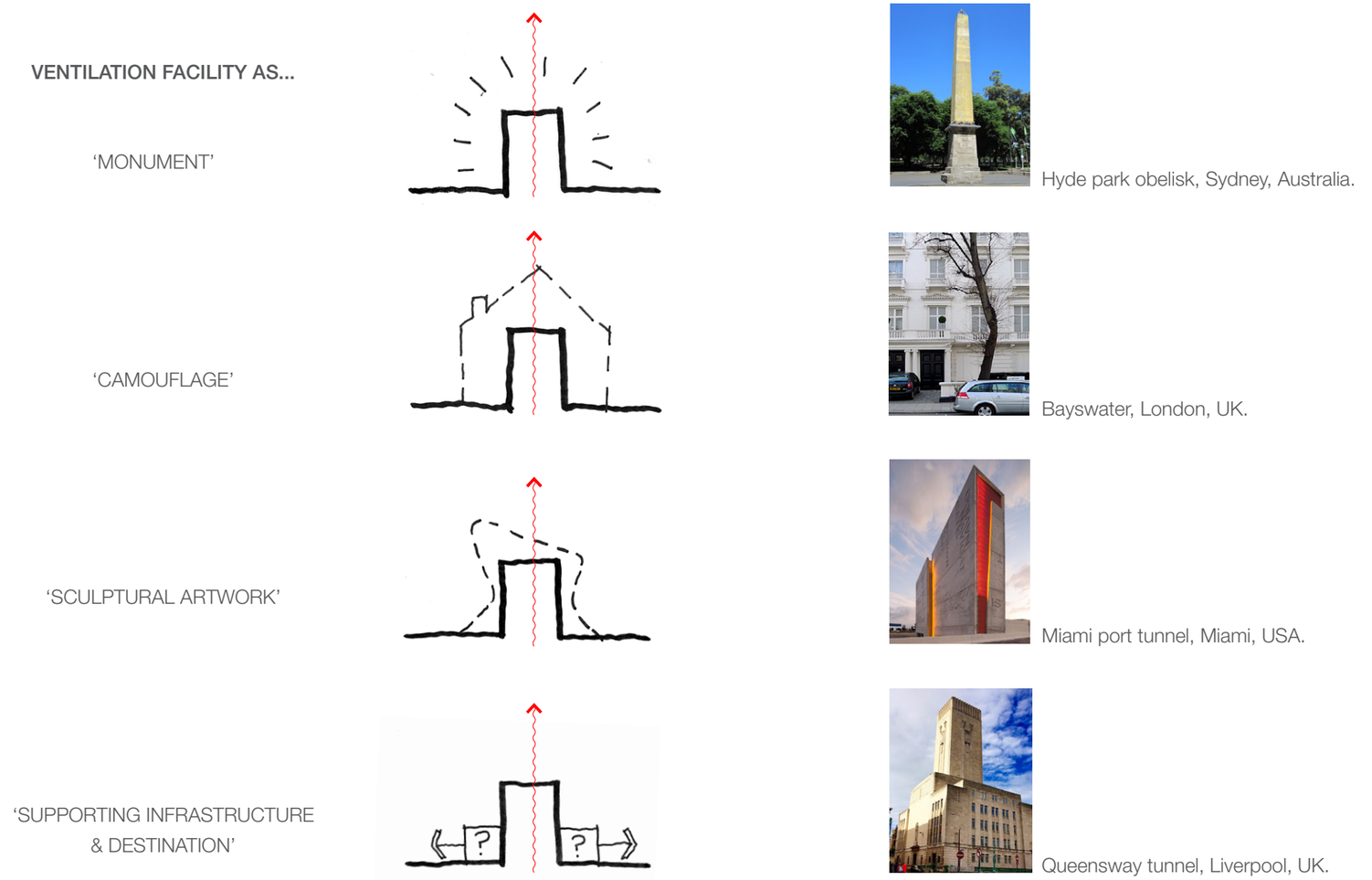


Figure 5.35: Ventilation facility design

5.5.5 LIGHTING

The final designs for Rozelle and Iron Cove would include a detailed lighting concept based around the considerations outlined below, and would be developed in accordance with AS/NZS 1158 *Lighting for roads and public spaces,* AS 2560 *Guide to sports lighting,* AS 4282 *Control of the obtrusive effects of outdoor lighting*, and AS/NZS 60598 - Series *Luminaires.*

Below are the principles that should guide the development of the detailed concepts.

1. Reinforce wayfinding and legibility

- Allow lighting to facilitate orientation and wayfinding to assist in creating a legible night time environment
- Encourage active transport and recreation at night through appropriate applications of lighting to path networks and recreation facilities.

2. Make use of open space to its full potential

- Create and enhance the night time experience of the public domain to increase visitation and use
- Create an enjoyable nightscape and feeling of comfort by improving the aesthetic quality of the environment at night time.

3. Distinctiveness and place

- Develop a strategic framework for targeted specialised lighting applications to express distinctiveness of place and emphasise landmarks
- Ensure lighting is integrated as part of urban design, streets and public art.

4. Promote safety and inclusive design

- Establish appropriate lighting levels, in line with relevant standards and luminaire criteria that promotes a safe public domain
- Create an enjoyable night-scape and feeling of comfort by improving the aesthetic quality of the environment at night time.

5. Promote sustainability

- Achieve a reduction in greenhouse gas emissions by using fittings that are powered by renewable energy sources such as integrated solar
- Establish appropriate lighting levels, standards and luminaire criteria to minimise light spill, energy consumption, and potential adverse environmental effects.







5.5.6 WATER SENSITIVE URBAN DESIGN

WSUD is considered a fundamental inclusion in the design of the project. Whilst achieving a number of environmental benefits, the inclusion of WSUD would also provide amenity benefits and add interest to the open spaces being planned as part of the project.

The final design of WSUD features would be undertaken in tandem with the design of surface sites at UDLP stage. The following section, in referencing to Water by Design [2009] by Healthy Waterways Partnership, outlines the considerations that would be included in this final design in relation to WSUD.

1. Protect and improve water quality

2. Protect and conserve precious drinking water supply

3. Restore lost waterways and ecological communities

4. Provide habitat to improve biodiversity in a highly urban context

5. Use water to reduce the urban heat island effect and improve local micro climates

6. Express water in the landscape to create water literate communities

7. Provide benefits to the community and multiple stakeholders

The strategies to implement the seven key principles for sustainable water management at the Rozelle Rail Yards and Iron Cove could include:

1. Water quality

- Treat intercepted tunnel groundwater to best practice from road infrastructure
- Treat stormwater to best practice from new road infrastructure
- Treat all wash down and emergency water use from road infrastructure to best practice
- Treat the external Rozelle catchment draining to Rozelle Bay
- Use a combination of natural treatment systems including vegetated bioretention facilities and wetlands to treat the above sources of water.

2. Water supplies

- Provide a non potable water source for new development and new and existing parklands
- Harvest all treated groundwater in a storage tank and/or open pond integrated into the landscape suitable for one day's storage supply
- Provide a post storage filtration and disinfection system to polish the water prior to supply
- Develop a non-potable reticulation system to distribute the water to the new development and parklands for irrigation.

3. Restore lost waterways and ecological communities

- Divert all water sources entering the Rozelle Rail Yards into restored creek lines and waterways
- Wherever possible, use natural vegetated systems to transport water rather than pits and pipes
- Recreate lost waterways and creek lines to create the foundations for new ecologies previously lost.

4. Provide habitat

- Provide a wide range of wet and dry natural areas using natural treatment systems
- Provide a diverse range of habitat including native vegetation, running water, shallow and deep water
- Incorporate designed habitat features for birds, frogs, lizards, fish, turtles and other habitat.

5. Reduce urban heat island

- Maximise irrigation of green spaces to reduce local temperatures
- Maximise the areas of open water and marshlands to provide cooling.
- Retain water in the landscape to reduce temperatures
- Maximise use of trees which are irrigated with non potable water to provide for quick growth to establish a tree canopy
- Where possible, use pavement which reduce urban heat island effect and maximise cooling.

6. Express water in landscape

- Maximise interaction with park users and water systems using bridges, informal waterways, crossings, opportunities to get close to water systems
- Use appropriate signage and art to express water in the landscape
- At key locations such as where water enters the natural systems express this water creatively in the landscape
- Provide opportunities for engaging with nature eg bird watching, catching tadpoles, fish etc.

7. Provide benefits to community

- Irrigate local playing fields to improve quality of surface
- Partner with Sydney Water to gain access to their infrastructure and achieve their water management goals
- Partner with UrbanGrowth NSW to integrate into the new developments at the White Bay Power Station, Glebe Island, Rozelle Bay, White Bay and beyond
- Partner with local councils to look at opportunities to integrated water reuse schemes such as the City of Sydney Jubilee Park harvesting scheme.







5.5.7 WAYFINDING, INTERPRETATION AND PUBLIC ART

Wayfinding is an important inclusion in the urban design components of the project. Together, wayfinding, interpretation and public art would be viewed as an integrated whole and developed collectively. Strategies would be developed as part of the UDLPs, based on the final design to be constructed. The following section outlines the principles that wayfinding, interpretation and public art should follow.

Wayfinding

1. Legibility

- Select the appropriate text size required for legibility of signage
- Adhere to international best practice models for placement of signage.

2. Directional hierarchy

- Develop and follow a protocol for ordering messages on wayfinding signage.

3. Signage height

- Develop and follow signage heights to ensure a consistent and legible signage system.

4. Pictogram language

- Use pictograms to supplement the written message ensuring it is understood by all. Where required by code use the correct pictogram and colours [eg Accessibility symbol].

5. Proportions

- Develop a proportional sign system whose forms maximise standard material sheet sizes to minimise waste and reduce cost.

6. Contrast

- Ensure there is adequate contrast between the text and the background colour of the signs in line with relevant standards.

7. Mapping

- Mapping should be incorporated at key decisions points to ensure visitors can orient themselves.

Interpretation and public art

1. Excellence

- The commissioning of artworks [of whatever scale, style or function], which embody imaginative and appropriate concepts, well executed, intelligently and appropriately sited and which would therefore stand up well to national and international comparison.

2. Site specificity

- The commissioning of artworks that reflect and express different aspects of the sites and add to the enjoyment of the particular qualities of the place in which they are sited.

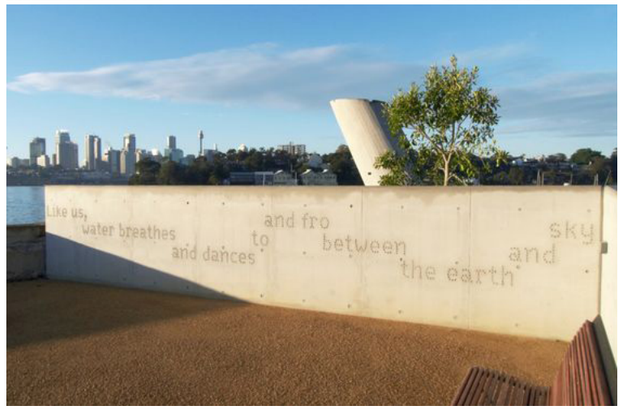
3. Strategically considered

- The commissioning of artworks within the context of other Council objectives and plans and which measurably add value to the place; for example, by increasing its profile, by increasing the ease of the public usage, by creating a new meeting place, or by improving the quality of an old one.

4. Inclusion and diversity

- The commissioning of artworks that reflect fully the range of places, interests and cultures that make up local areas.







5.5.8 CRIME PREVENTION THROUGH ENVIRONMENTAL DESIGN

The strategy for Crime Prevention Through Environmental Design [CPTED] would be in accordance with *Crime Prevention Through Environmental Design* [Queensland Government, 2007] and Safer By Design principles. The key principles to be considered in order to reduce opportunities for crime are outlined below.

1. Surveillance

- The public realm and buildings would be designed and managed to maximise, consistent with other legitimate goals, the potential for passive surveillance.

2. Legibility

- The public domain would be designed, detailed and managed to make them legible for users, especially pedestrians and cyclists, without losing the capacity for variety and interest
- Legibility would be promoted in both the overall structure and form of the public domain and in appropriate detail within them.

3. Territoriality

- Security would be supported by designing and managing spaces and buildings to define clearly legitimate boundaries between private, semi- private, community-group and public space
- Territoriality would be delivered without significant loss of surveillance.

4. Ownership of the outcomes

- A feeling of individual and community ownership of the public realm and associated built environments would be promoted to encourage a level of shared responsibility for their security.

5. Management

- The public realm would be designed and detailed to minimise damage and the need for undue maintenance, without undermining the aesthetic and functional qualities that make the places attractive to the community
- Systems of both regular and reactive maintenance and repair would be implemented to maintain the quality of the place
- A regular auditing system of CPTED issues in the public domain would be implemented.

6. Vulnerability

- The public domain would be designed and managed to reduce or limit risk from assault by providing well-lit, active and places of high visibility, and pedestrian and cyclist systems and routes to important places
- The design and management of places would avoid creating or maintaining hidden spaces close to pedestrian/cyclist travel routes in the public realm, in ways that remain consistent with the purpose of the place
- The design and management of the public domain should provide a variety of routes and other ways to avoid potential or actual problems
- The pursuit of safety should be delivered in ways consistent with the purpose of the place.



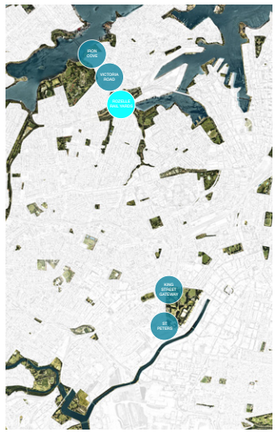




6.0 Future Opportunities

The following provides an outline of future projects that could be undertaken by others to capitalise on the opportunities provided by the project [Figure 5.6 shows the components to be delivered by the M4-M5 Link project]. These projects require coordination across agencies and levels of Government and would be best championed by an agency with a development/planning focus.

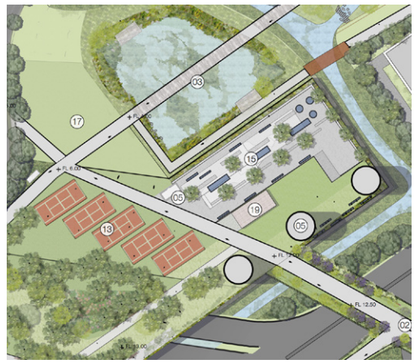
6.1 FUTURE OPPORTUNITIES AT THE ROZELLE RAIL YARDS



Location: Rozelle Rail Yards



Rozelle Rail Yards master plan 01





The Rozelle Rail Yards master plan options provide the opportunities for further open space embellishment to suit the needs of current and future communities. The options demonstrate how the principles could be applied in a final site design.

The final master plan would account for active recreation and consider a number of studies that have been conducted in the Local Government Areas adjacent to the M4-M5 Link project. Overwhelmingly, they identify a shortage of sporting and recreational facilities. Survey outcomes from UrbanGrowth NSW's Active Recreation Needs Study for The Bays Precinct indicates the following:

- The general view is there are insufficient sporting facilities in the CBD and inner west
- Increasing numbers of residents wanting to engage in active recreation will result in people being turned away or an increase in facilities operating at or over capacity
- The need for synthetic fields that can withstand high levels of use
- Quality pedestrian and cycle connections to future active recreation areas.

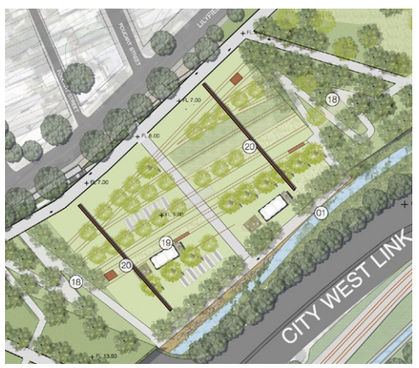
In addition to these findings, the Leichhardt Recreation & Open Space Needs Study identifies a number of open space and recreational and sporting findings for the surrounding area. These include:

- A high value is placed on the provision of quality and accessible parks and open space areas by residents and groups
- A demonstrated overuse of current sports grounds
- An expressed demand for additional sporting fields
- The integration of facilities and spaces suitable for young people in the broader open space network.



Rozelle Rail Yards master plan 02





It is envisaged that the quantum of active recreation within the Rozelle Rail Yards would be further developed by others as projects such as The Bays Precinct are developed. The concept plan provides spaces that could include an array of active recreation opportunities and even community facilities such as gardens or a school. The concept plan would catalyse such future embellishments, providing the space for these uses to be determined according to the needs of future communities.

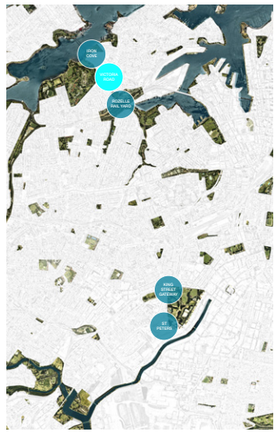


Rozelle Rail Yards master plan 03

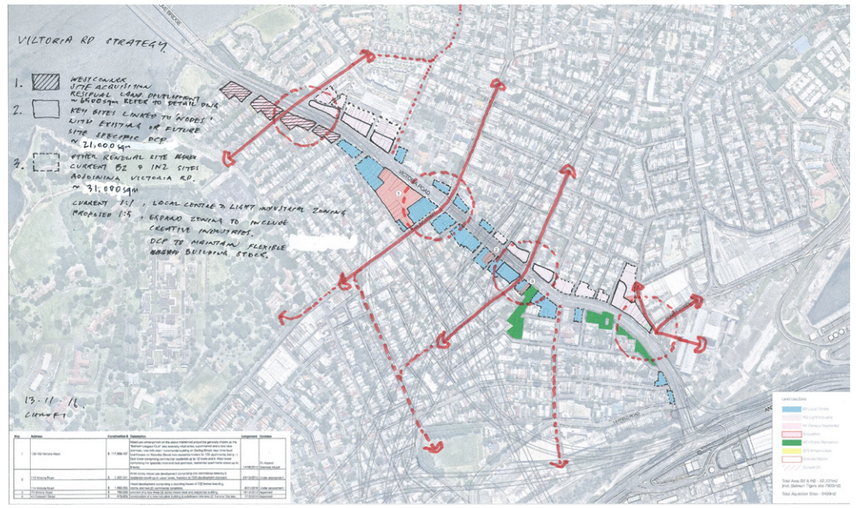




6.2 FUTURE OPPORTUNITIES ON VICTORIA ROAD



Location: Victoria Road, Rozelle NSW



Urban regeneration along Victoria Road has been identified as a future project facilitated by the M4-M5 Link. It is outside the current scope of works, however the forecast reduction in traffic along Victoria Road resulting from the Iron Cove Link presents a number of opportunities.

High level concept work identified a small uplift in floor space ratio, from 1:1 to 1.5:1, combined with an expansion of the current definitions governing uses in IN2 Light Industrial lands, as presenting a number of opportunities. Site specific Development Control Plans could further maximise the potential of redevelopment sites along the corridor on a case by case basis.

A revitalised Victoria Road would become more like a ‘Street’, presenting new opportunities for businesses, locals and visitors, while providing strong local pedestrian and cycle connections between Lilyfield and Rozelle. The streetscape upgrades to be provided by the project could be continued through to Roberts Street as part of this future project.

7.0 Summary

The concepts and principles outlined in this report would be developed into detailed designs under UDLPs for the various components of the project. These UDLPs would relate to one another and the other stages of WestConnex. A series of UDLPs would be developed including:

Mainline tunnel - a detailed design that includes:

- Assessment of final designs for all surface elements against the principles outlined at section 3
- Final design and material composition for built form structures such as water treatment plants and electricity substations
- Final design for in-tunnel overlay
- Final design and material composition for the St Peters ventilation facility and a car parking strategy
- Final landscape plans around permanent operational infrastructure.

Rozelle interchange - a detailed design that includes:

- Final master plan
- Final design and material composition for built form structures, including a specific study regarding the design of ventilation facilities
- Final landscape design
- Final heritage interpretation, in accordance with the recommendations of Appendix U [Technical working paper: Non-Aboriginal heritage] of the EIS
- Wayfinding strategy
- Public art strategy
- Lighting strategy
- WSUD strategy
- CPTED review of design
- Active recreation facilities to be provided by the project to be developed in consultation with Council within the UDLP, under a recreational facilities needs analysis
- Final location of parking to support recreational uses to be determined.

Iron Cove Link - a detailed design that includes:

- Final land use for remaining lands
- Final design and material composition for built form structures, including a specific study regarding the design of ventilation facilities
- Final landscape design
- Final heritage interpretation plan
- CPTED review of design.

8.0 References

The following policies and guidelines have been used to develop the concepts contained within this report. These policies and guidelines would be further followed in the development of UDLPs for the various components of the project.



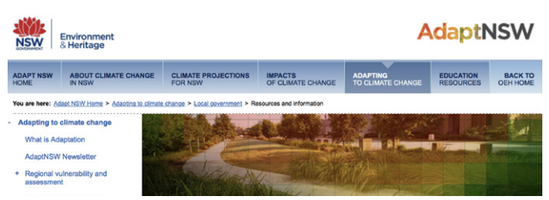
WestConnex Active Transport Network



Beyond The Pavement - Urban Design Procedures and Design Principles



AS 4282-1997 - Control Of The Obtrusive Effects Of Outdoor Lighting



Technical Guidelines for Urban Green Cover in NSW



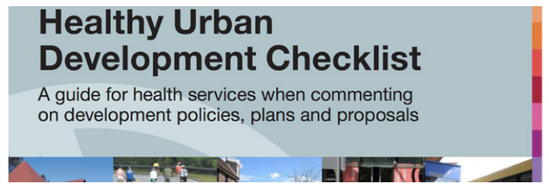
Sydney Green Grid by McGregor Coxall



Westconnex Motorway - Urban Design Framework



NSW Sustainable Design Guidelines Version 3.0 [Transport for NSW, 2013]



Healthy Urban Development Checklist [NSW Health 2009]



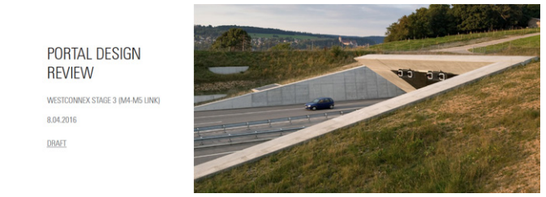
M4-M5 Link, Site Analysis & Related Studies



Bridge Aesthetics



A Plan for Growing Sydney by the Greater Sydney Commission



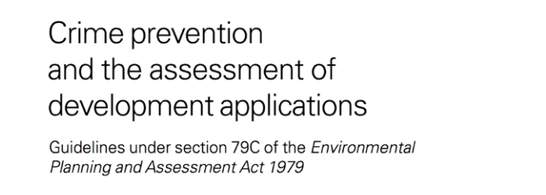
Portal Design Review



Sydney 2030 Report



Ventilation Facility Review



Crime Prevention And The Assessment Of Development Applications [DUAC, 2001]



Crime Prevention Through Environmental Design [CPTED] [Queensland Government, 2007]



Disability [Access To Premises - Buildings] Standards 2010



Water by Design [2009] Concept Design Guidelines for Water Sensitive Urban Design

Annexure 1 - Portal Design Review

PORTAL DESIGN REVIEW

WESTCONNEX STAGE 3 (M4-M5 LINK)

03.05.2016



WestConnex

CHROFI

MCGREGOR COXALL

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- CROSS CITY TUNNEL - SYDNEY
- EASTERN DISTRIBUTOR - SYDNEY
- TUGON BYPASS - BRISBANE
- AIRPORT LINK TUNNEL - BRISBANE
- CLEM 7 TUNNEL - BRISBANE
- WATERVIEW CONNECTION - AUCKLAND, NZ
- VEDEGGIO CASSARATE - SWITZERLAND
- FIGUEROA ST TUNNELS - LOS ANGELES, USA
- OLYMPIC SCULPTURE PARK - SEATTLE, USA
- MIAMI PORT TUNNEL - USA
- SAN PANCRAZIO TUNNEL - ITALY
- TRANSJURANNE MOTORWAY - SWITZERLAND

8. CONCLUSION

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1.0 INTRODUCTION

This review is presented in 2 parts. Part 1 explores the physical parameters and characterisitcs of the entry and exit portals of tunnels already within the Sydney road network. Part 2 is a qualitative review of local and international examples of tunnel portal design

A tunnel by definiton has a beginning and an end. Experientially, the beginning is marked by the point at which the tunnel is entered and the end of the tunnel is marked by an 'exit'. These moments of entry and exit, or portals, were historically expressed as a quite pragmatic termination of the tunnel - a point at which a stark distinction was felt between inside and outside with little consideration of the need for a sense of transition from one state to the other or for the journey.

This review asks:

Can the portal be defined as more than just the termination of the tunnel?

Is there an opportunity in each of the 3 Westconnex Stage 3 sites for the tunnel portals to mark a place with some greater relevance for the nearby community and also for the tunnel users?



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2.1
TUNNEL CONDITIONS: TOPOGRAPHICAL RESPONSE

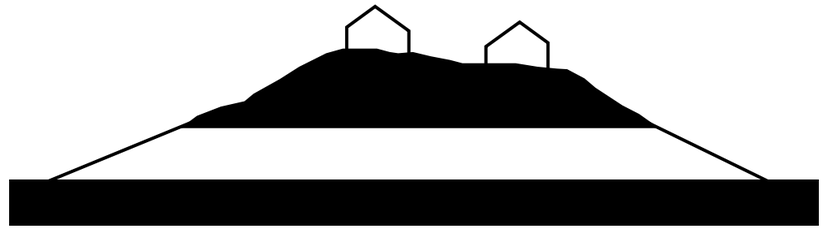
TUNNEL TOPOGRAPHY

Tunnel design typically falls in to two topographically responsive categories: depression under natural ground level or on grade excavation.

These two conditions ultimately dictate the portal design, as well as the vehicle speed and gradient of approach/exit.

This review has been laid out to explore the two primary topographical and contextual conditions in which tunnels occur and the possible opportunities these conditions present for the design of the tunnel entry and exit portal structures.





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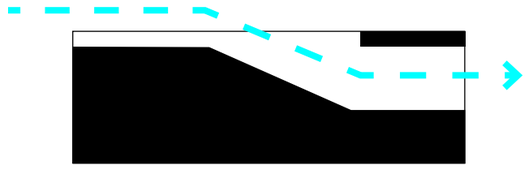
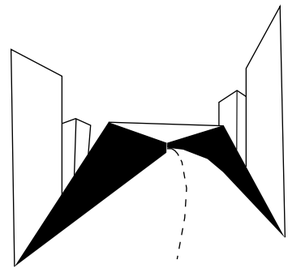
2.2
TUNNEL CONDITIONS: ENTRY & EXIT

Each tunnel portal structure, whether entry or exit, serves a dual purpose.

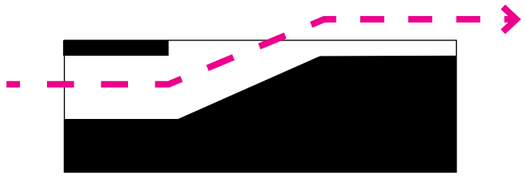
The moment at which entry to the tunnel is made defines the beginning of the tunnel experience but it also marks a point of departure from a specific public domain context.

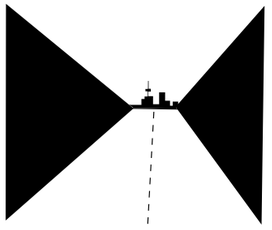
Conversely, the tunnel exit marks an arrival point, often within and at a context rather different from the context left behind at the entry of the tunnel.





' TUNNEL ENTRY '
DEPARTURE





' TUNNEL EXIT'
ARRIVAL

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PORTAL DESIGN REVIEW - PART 1

LOCAL TUNNEL REVIEW



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3.0 INTRODUCTION: METHODOLOGY & FINDINGS

METHODOLOGY

This report catalogues the physical conditions of existing portal entries/exits in Sydney and Australia.

This desktop review is intended to be used as a design reference only, and as such the methods by which data has been obtained is simplistic. Nearmaps maps have been used in order to ascertain ramp lengths, while a combination of RMS tunnel authority data and google street view is used to form an understanding of clearance heights, ramp grades and speeds limits.

Each of the case studies has been categorised into single entrance, single exit and dual entrance/exit as well as the topographic strategy used.

FINDINGS

This review has identified that there is no singular approach to tunnel portal design with regard to ramp grades/lengths or posted speed limits.

It appears that the existing local topography, urban context and traffic speeds are the determining factors for each portal configuration.

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3.1 INTRODUCTION: SYDNEY TUNNEL NETWORK

PROPOSED WESTCONNEX STAGE 3 TUNNEL & PORTAL ENTRY/EXITS

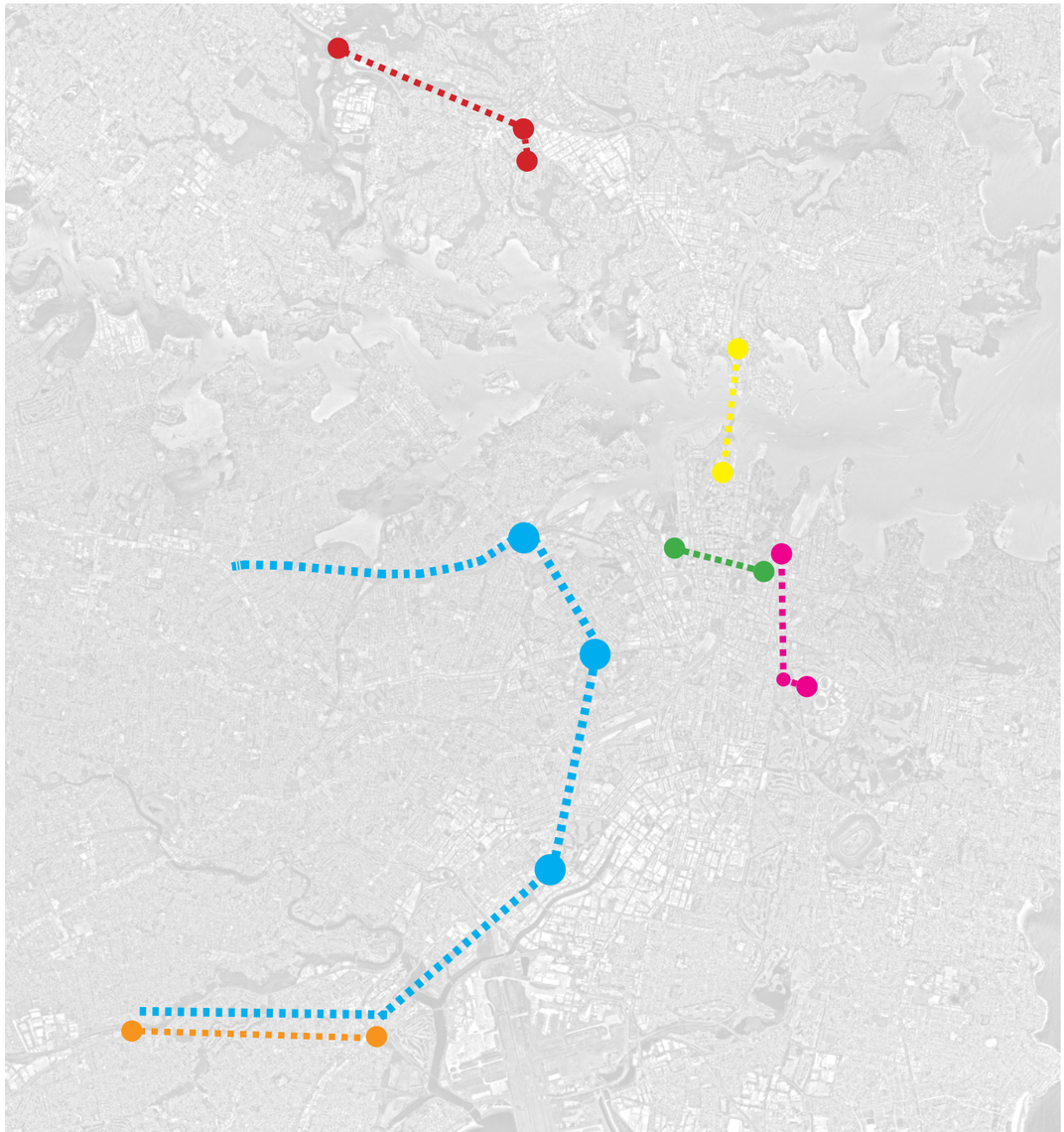
EASTERN DISTRIBUTOR TUNNEL & PORTAL ENTRY/EXITS

CROSS CITY TUNNEL & PORTAL ENTRY/EXITS

M5 EAST TUNNEL & PORTAL ENTRY/EXITS

SYDNEY HARBOUR TUNNEL & PORTAL ENTRY/EXITS

LANE COVE TUNNEL & PORTAL ENTRY/EXITS



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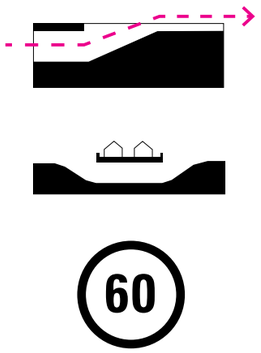
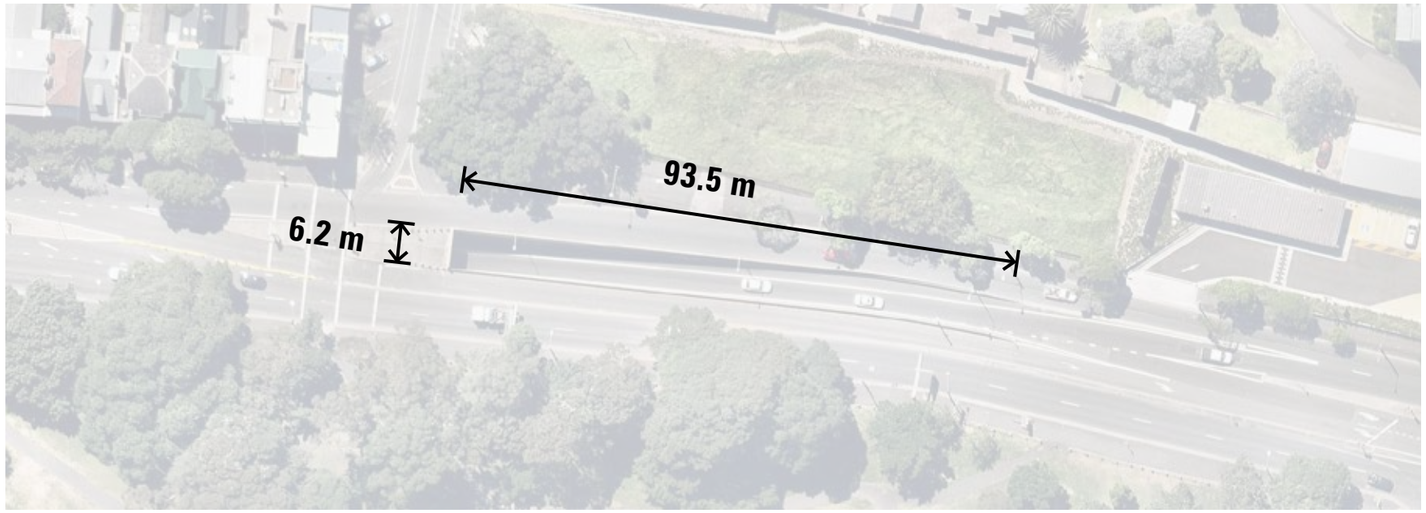
4.0 PRECEDENT: EASTERN DISTRIBUTOR SYDNEY, AUS



Program
Tunnel Exit Portal Ramp
Location
Moore Park Rd, Paddington
Year
2000
Size
93.5m (L) x 6.2m (W)

- TUNNEL EXIT SPEED - 60 Km/H
- LOCAL SPEED LIMIT - 50 Km/H
- CLEARANCE HEIGHT - 4.4 m
- RAMP GRADIENT - MODERATE







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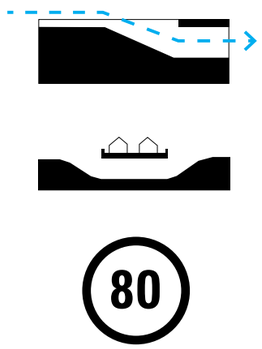
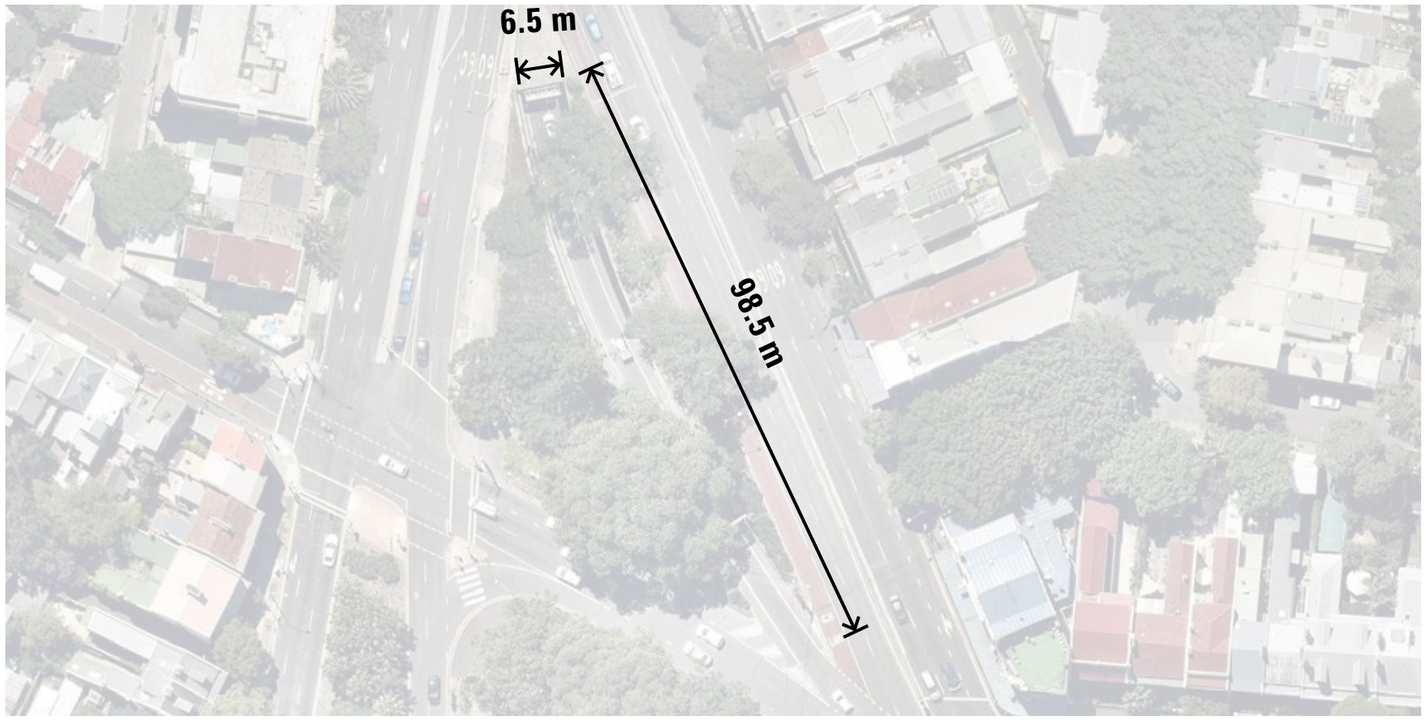
4.0 PRECEDENT: EASTERN DISTRIBUTOR SYDNEY, AUS



Program
Tunnel Entrance Portal Ramp
Location
Flinders St, Darlinghurst
Year
2000
Size
98.5m (L) x 6.2m (W)

- TUNNEL ENTRANCE SPEED - 80 Km/H
- LOCAL SPEED LIMIT - 60 Km/H
- CLEARANCE HEIGHT - 4.4 m
- RAMP GRADIENT - MODERATE





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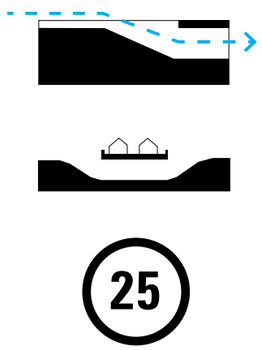
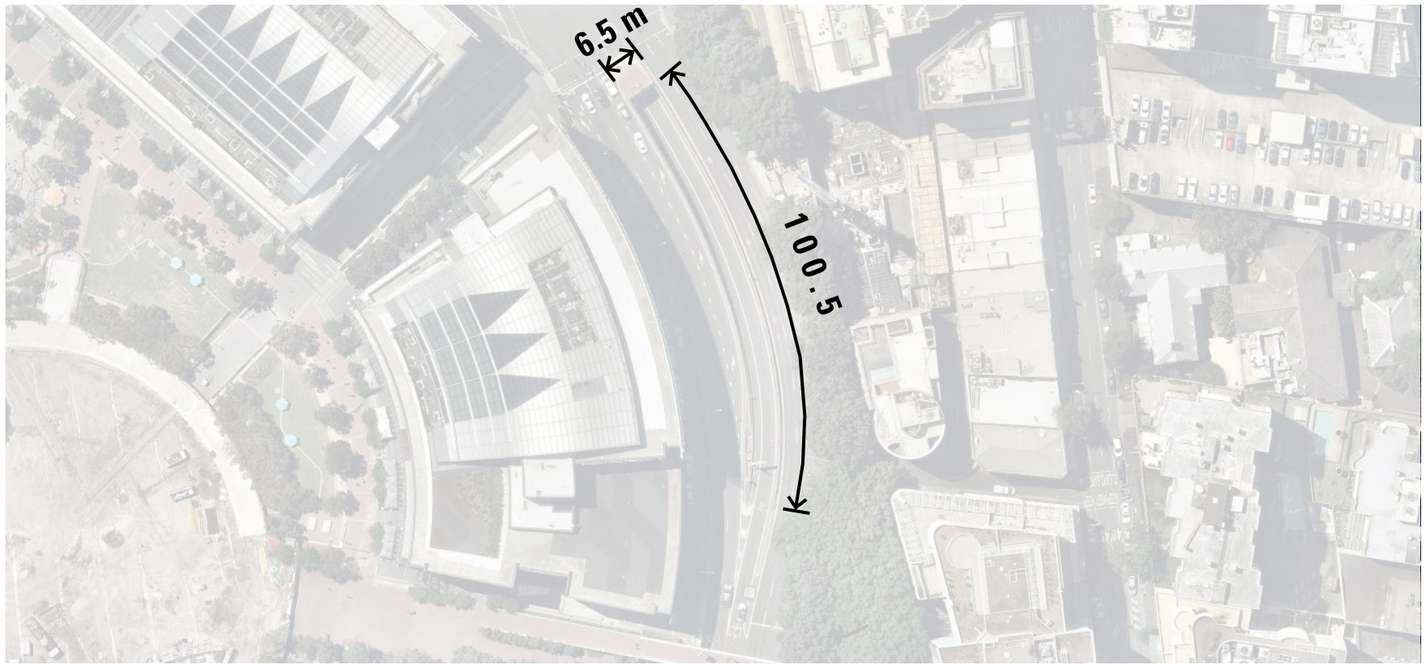
4.0 PRECEDENT: CROSS CITY TUNNEL SYDNEY, AUS



Program
Tunnel Entrance Portal Ramp
Location
Harbour St, Darling Harbour
Year
2000
Size
100.5 m (L) x 6.5m (W)

- TUNNEL ENTRANCE SPEED - 25 Km/H
- LOCAL SPEED LIMIT - 50 Km/H
- CLEARANCE HEIGHT - 4.4 m
- APPROX. GRADIENT - MODERATE







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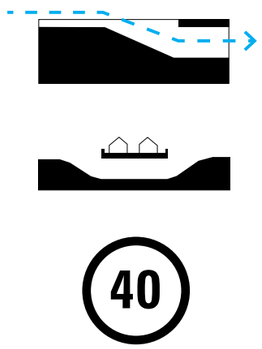
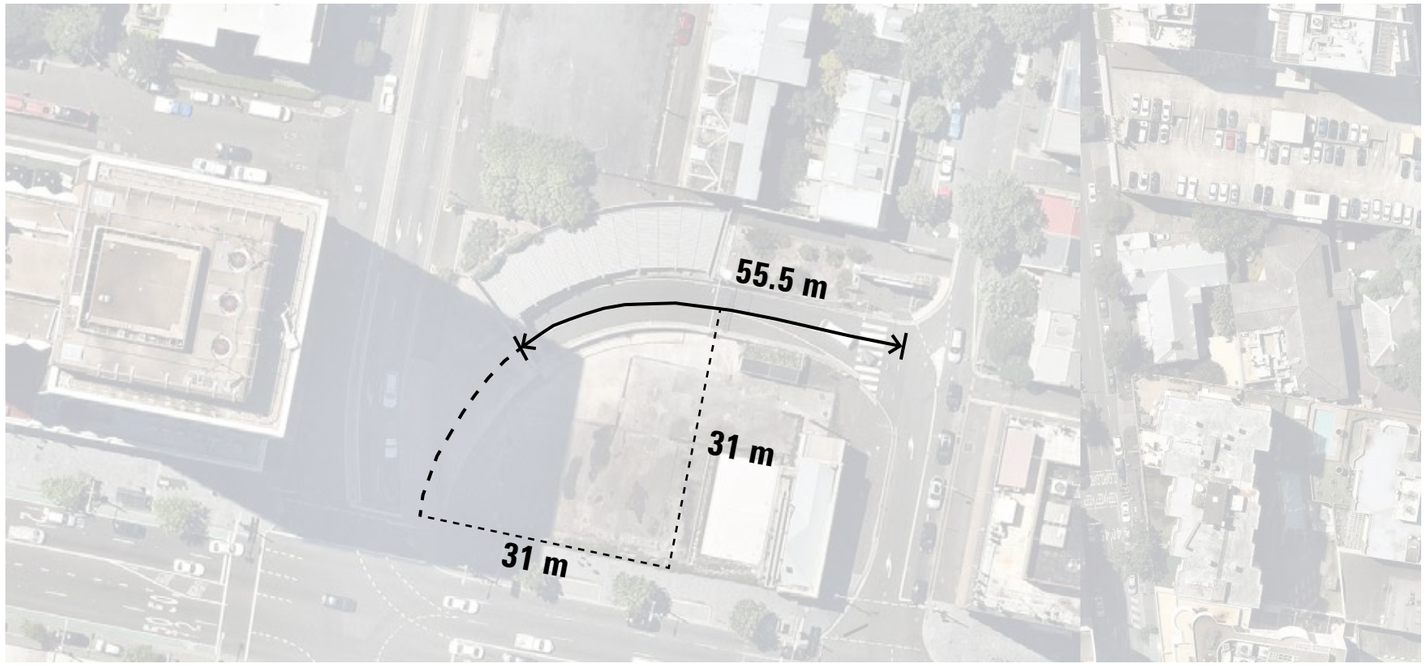
4.0 PRECEDENT: CROSS CITY TUNNEL SYDNEY, AUS



Program
Tunnel Entrance Portal Ramp
Location
Bourke St, Woolloomooloo
Year
2000

- TUNNEL ENTRANCE SPEED - 40 Km/H
- LOCAL SPEED LIMIT - 50 Km/H
- CLEARANCE HEIGHT - 4.4 m
- APPROX. GRADIENT - STEEP





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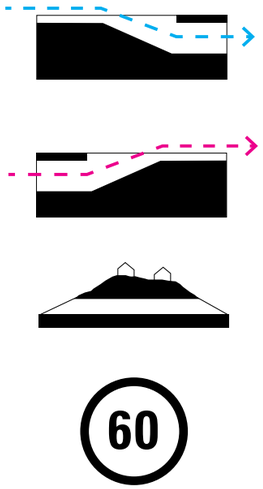
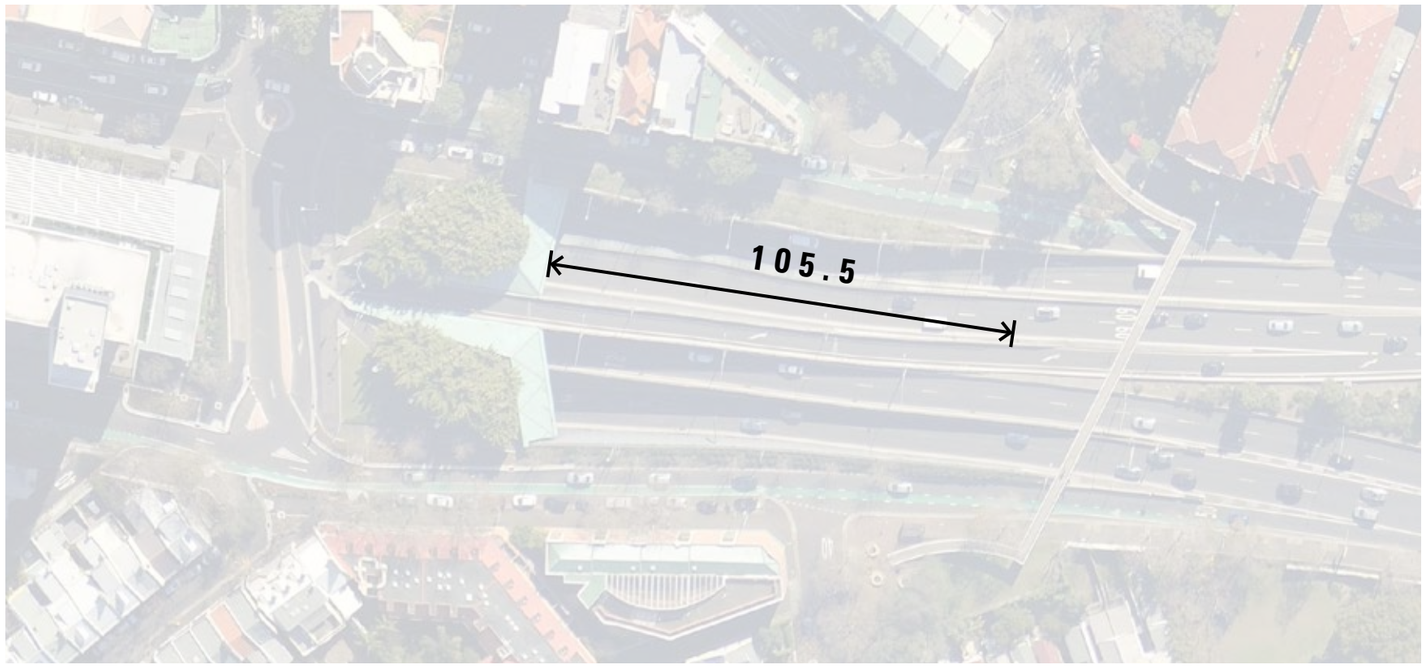
4.0 PRECEDENT: CROSS CITY TUNNEL SYDNEY, AUS



Program
Tunnel Entrance Portal Ramp
Location
William St, Rushcutters Bay
Year
2000
Size
105.5m (L) x 18.5m (W)

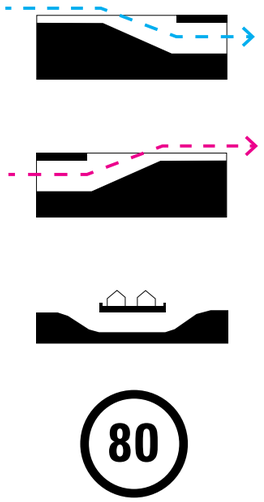
- TUNNEL ENTRANCE SPEED - 60 Km/H
- LOCAL SPEED LIMIT - 60 Km/H
- CLEARANCE HEIGHT - 4.4 m
- APPROX. GRADIENT - GENTLE





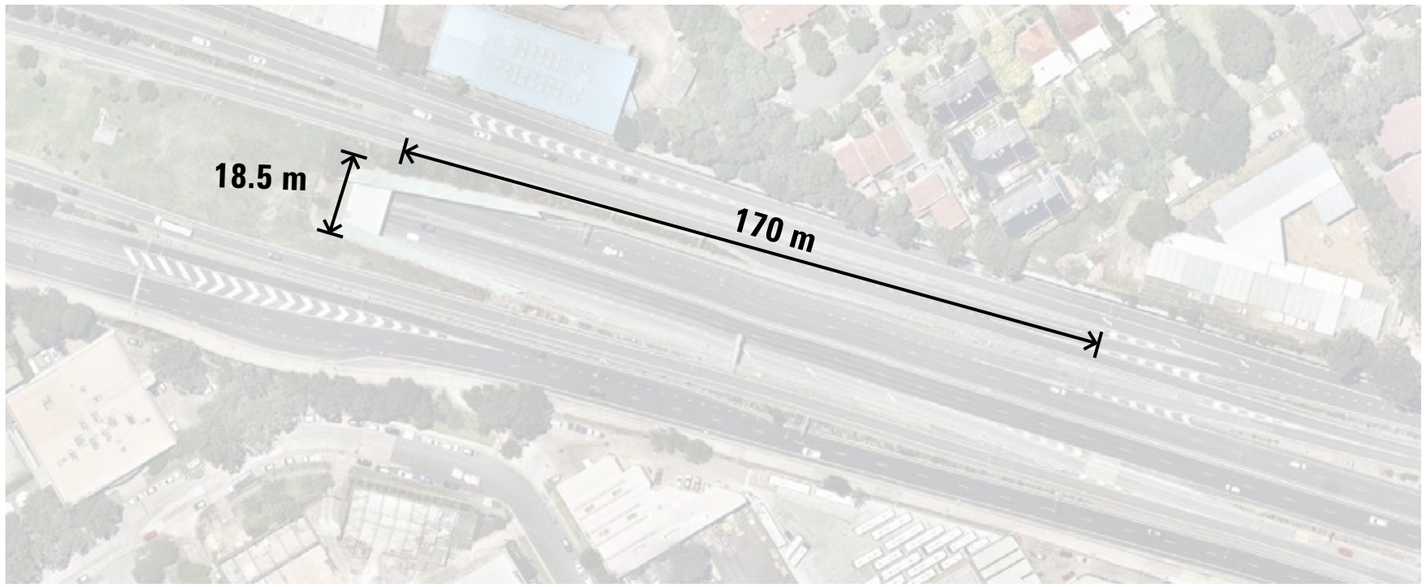
© CHROFI : 2016

4.0 PRECEDENT: LANE COVE TUNNEL SYDNEY, AUS



Program
Tunnel Entrance/Exit Portal & Ramp
Location
M2 Hills Motorway, Lane Cove
Year
2007
Size
170m (L) x 18.5m (W)

- TUNNEL ENTRANCE SPEED - 80 Km/H
- LOCAL SPEED LIMIT - 80 Km/H
- CLEARANCE HEIGHT - 4.4 m
- GRADIENT - GENTLE

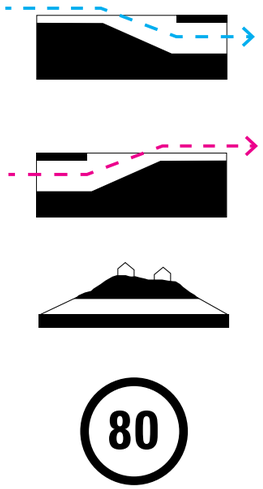






© CHROFI : 2016

4.0 PRECEDENT: LANE COVE TUNNEL SYDNEY, AUS



Program
Tunnel Entry/Exit Portal & Ramp
Location
M2 Hills Motorway, Lane Cove
Year
2007
Size
111m (L) x 21.5m (W)

- TUNNEL ENTRANCE SPEED - 80 Km/H
- LOCAL SPEED LIMIT - 80 Km/H
- CLEARANCE HEIGHT - 5 m
- GRADIENT - GENTLE





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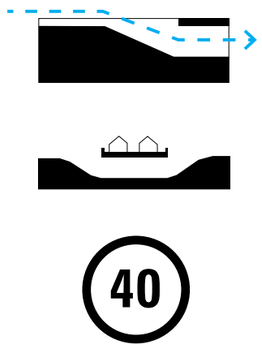
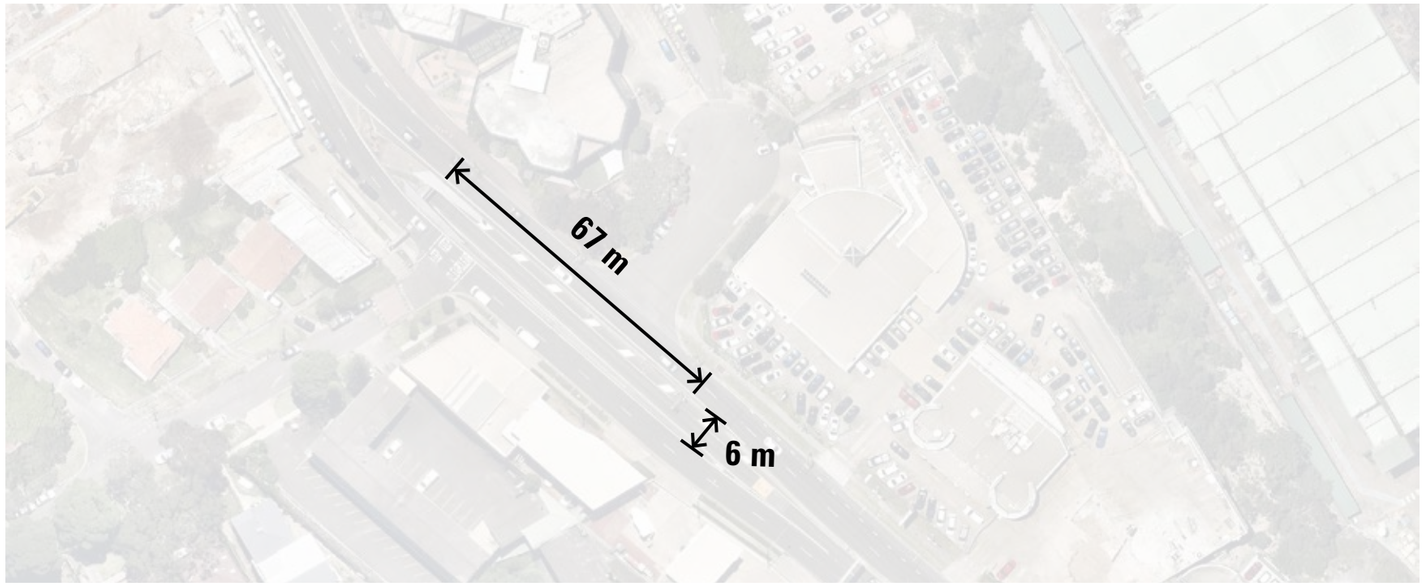
4.0 PRECEDENT: LANE COVE TUNNEL SYDNEY, AUS



Program
Tunnel Entrance Portal & Ramp
Location
Pacific Hwy, St Leonards
Year
2007
Size
67m (L) x 6m (W)

- TUNNEL ENTRANCE SPEED - 40 Km/H
- LOCAL SPEED LIMIT - 60 Km/H
- CLEARANCE HEIGHT - 5 m
- GRADIENT - STEEP SLOPE







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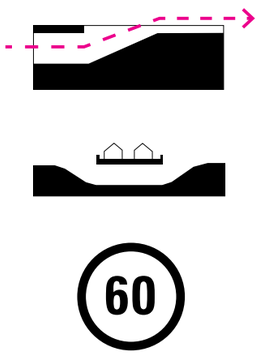
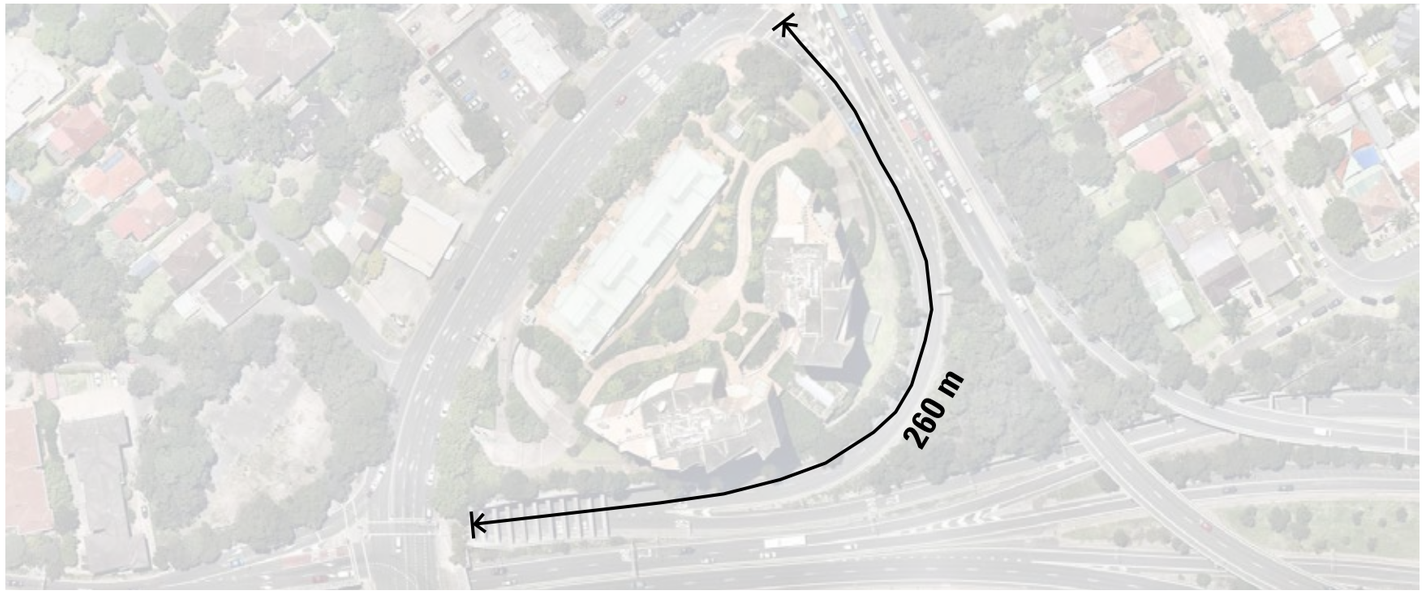
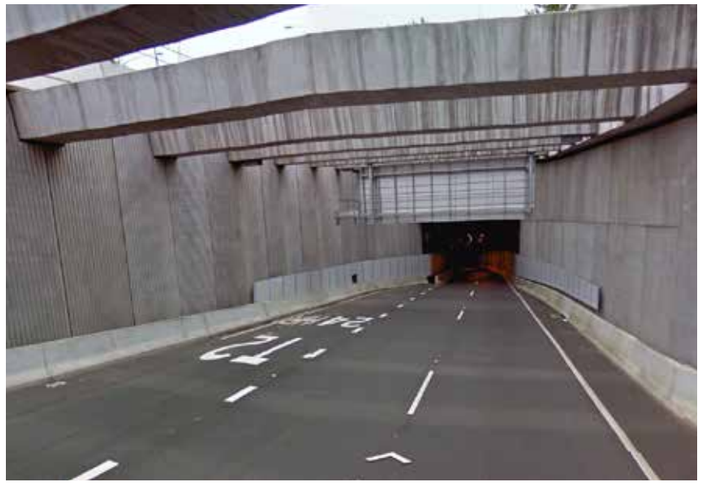
4.0
PRECEDENT:
LANE COVE
TUNNEL
SYDNEY, AUS



Program
Tunnel Entrance Portal & Ramp
Location
Pacific Hwy, St Leonards
Year
2007
Size
260m (L) x 11m (W)

- TUNNEL EXIT SPEED - 60 Km/H
- LOCAL SPEED LIMIT - 60 Km/H
- CLEARANCE HEIGHT - 4.4 m
- GRADIENT - MODERATE





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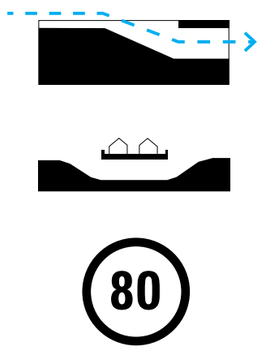
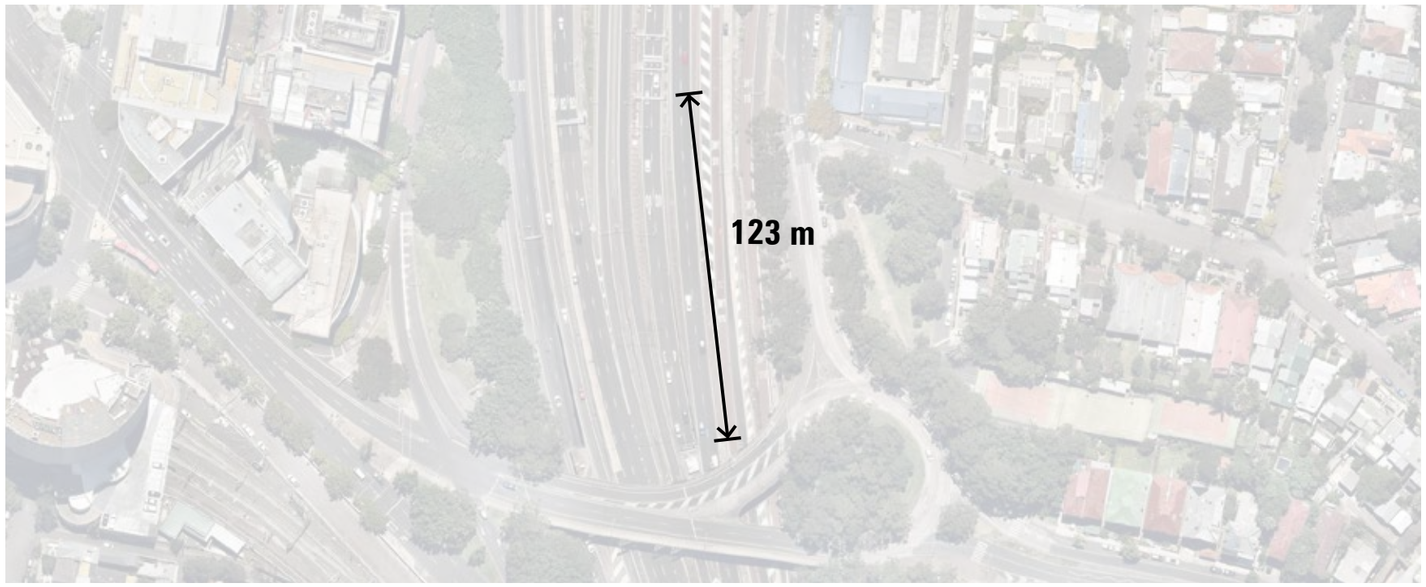
4.0 PRECEDENT: SYDNEY HARBOUR TUNNEL SYDNEY, AUS



Program
Tunnel Entrance Portal & Ramp
Location
Bradfield Hwy, North Sydney
Year
1992
Size
123m (L) x 7.5m (W)

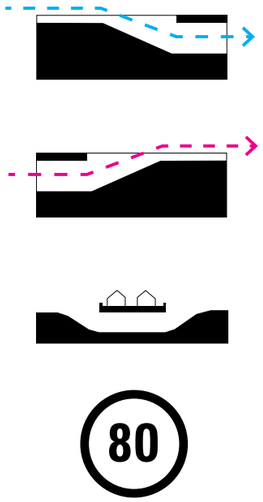
- TUNNEL ENTRANCE SPEED - 80 Km/H
- LOCAL SPEED LIMIT - 80 Km/H
- CLEARANCE HEIGHT - 4.4 m
- GRADIENT - GENTLE





© CHROFI : 2016

4.0 PRECEDENT: SYDNEY HARBOUR TUNNEL SYDNEY, AUS



Program
Tunnel Entrance Portal & Ramp
Location
Bradfield Hwy, North Sydney
Year
1992

- TUNNEL ENTRANCE SPEED - 80 Km/H
- LOCAL SPEED LIMIT - 80 Km/H
- CLEARANCE HEIGHT - 4.4 m
- GRADIENT - GENTLE





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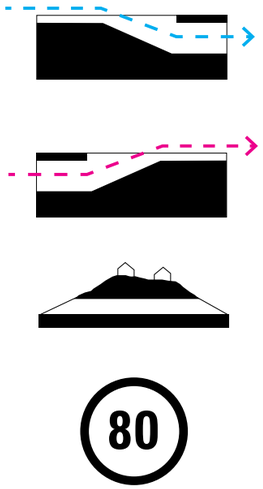
4.0
PRECEDENT:
CLEM 7
TUNNEL
BRISBANE, AUS



Program
Tunnel Entry/Exit Portal & Ramp
Location
M7 - Clem 7, Herston
Year
2010

- TUNNEL ENTRANCE SPEED - 80 Km/H
- LOCAL SPEED LIMIT - 80 Km/H
- CLEARANCE HEIGHT - 4.4 m
- GRADIENT - ON GRADE





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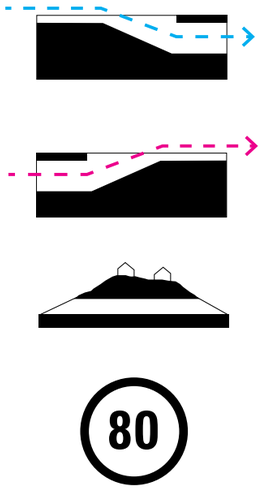
4.0
PRECEDENT:
LEGACY WAY TUNNEL
TUNNEL
BRISBANE, AUS



Program
Tunnel Entry/Exit Portal & Ramp
Location
Legacy Way Tunnel, Taringa
Year
2015

- TUNNEL ENTRANCE SPEED - 80 Km/H
- LOCAL SPEED LIMIT - 80 Km/H
- CLEARANCE HEIGHT - 4.4 m
- GRADIENT - ON GRADE





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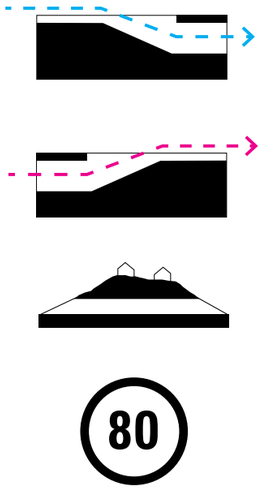
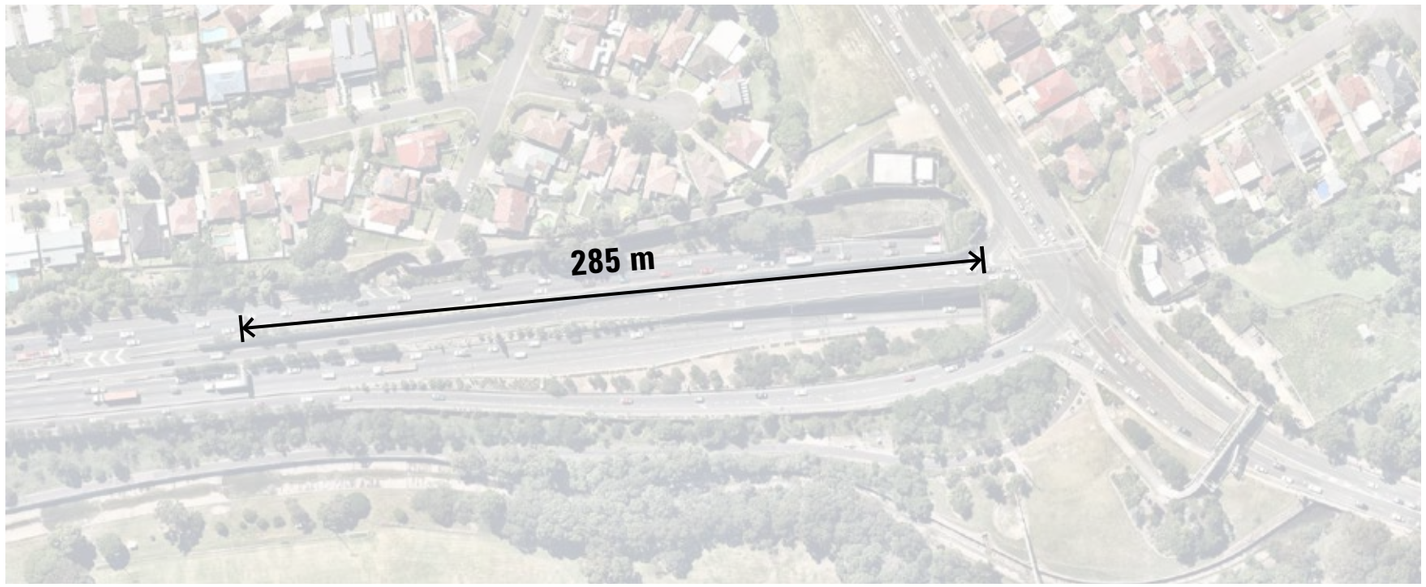
4.0 PRECEDENT: M5 EAST TUNNEL SYDNEY, AUS



Program
Tunnel Entry/Exit Portal & Ramp
Location
M5 East, Wolli Creek
Year
2000
Size
285m (L)

- TUNNEL ENTRY/EXIT SPEED - 80 Km/H
- LOCAL SPEED LIMIT - 80 Km/H
- CLEARANCE HEIGHT - 4.4 m
- GRADIENT - GENTLE



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PORTAL DESIGN REVIEW - PART 2

QUALITATIVE REVIEW



WestConnex

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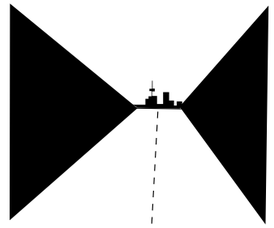
CHROFI

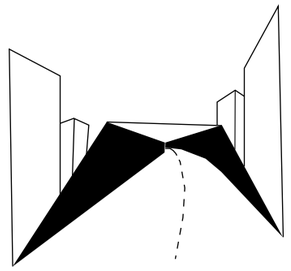
MCGREGOR COXALL

5.1 PORTAL DESIGN: THRESHOLD

While tunnel portal design is largely the result of strict controls relating to speed and volume of traffic, the articulation of these structures has historical and symbolic value. City boundaries are often marked with gateways, describing a transition from one context to another. In this sense the following review is not limited to only tunnel portals, but also various articulations which define this threshold.

The following review attempts to gather a wide variety of strategies which define this threshold condition.







ARRIVAL



DEPARTURE

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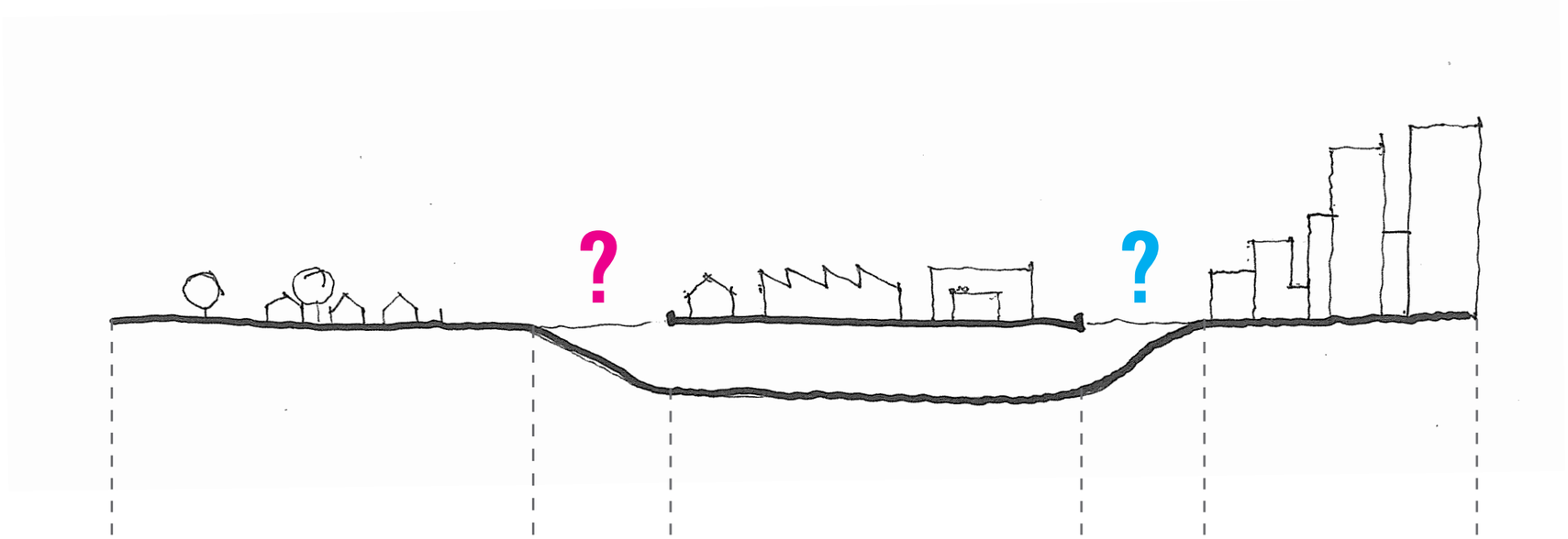
5.2 PORTAL DESIGN: CONTEXTUAL CONDITIONS

The nature of tunnel design requires engagement with two or more specific contexts at entry and exit points. These two conditions can be radically different to each other by virtue of their surroundings.

Two trends emerge in the following case studies which deal with how to mark these thresholds. The first is a unified expression which treats the tunnel experience at the entry and exit with the same expression, often as an extension of the tunnel. An alternative approach is to use the portal design as a response to its local context.



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5.3
PORTAL DESIGN:
ENTRY/EXIT EXPERIENCE & TREATMENT

The treatment of portals varies greatly. Historically, the portal acts as a threshold to the city, a marker which delineates suburban with urban. Whether entering or exiting the tunnel, one is required to depart and arrive from their point of origin. As such, tunnel portals can often be suggestive of embracing the motorist on arrival, and releasing on departure.

This often has symbolic as well as practical reasons. When exiting the tunnel, the abrupt change in light conditions is often mediated by the gradual transition from tunnel to open roadway. Likewise, on entering, colours and form can be used as way-finding devices for the motorist.



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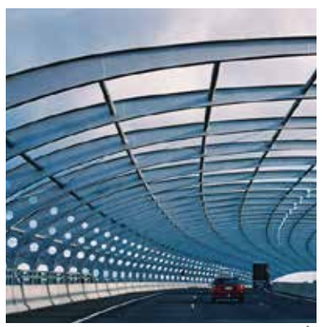
6.0
VISUAL SUMMARY: TUNNEL PORTALS

Adjacent is a local and international summary of portal designs in its various stylistic and historical forms.


1


2


3


4


5


6

1. CITY LINK GATEWAY. MELBOURNE
2. CRAGIEBURN BYPASS. MELBOURNE
3. WATERVIEW CONNECTION. NZ
4. PENINSULA LINK. MELBOURNE
5. TUGON BYPASS. BRISBANE
6. AIRPORT LINK. BRISBANE
7. CLEM 7. BRISBANE
8. LANE COVE TUNNEL. SYDNEY
9. VEDEGGIO CASSARATE. SWITZERLAND
10. FIGUEROA ST TUNNEL. USA
11. SAN PANCRAZIO TUNNEL. ITALY
12 TRANSJURANNE. SWITZERLAND
13. TRANSJURANNE. SWITZERLAND
14. TRANSJURANNE. SWITZERLAND
15. CROSS CITY TUNNEL. SYDNEY
16. MIAMI PORT TUNNEL. USA
17. EASTERN DISTRIBUTOR. SYDNEY
18. EASTLINK, MELBOURNE. 2014


7


8


9

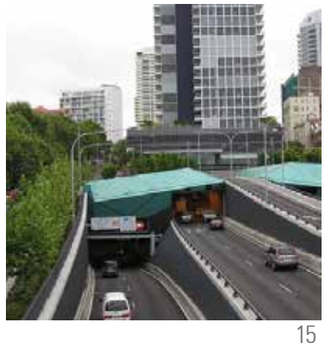

10


11


12


13


14


15


16


17


18

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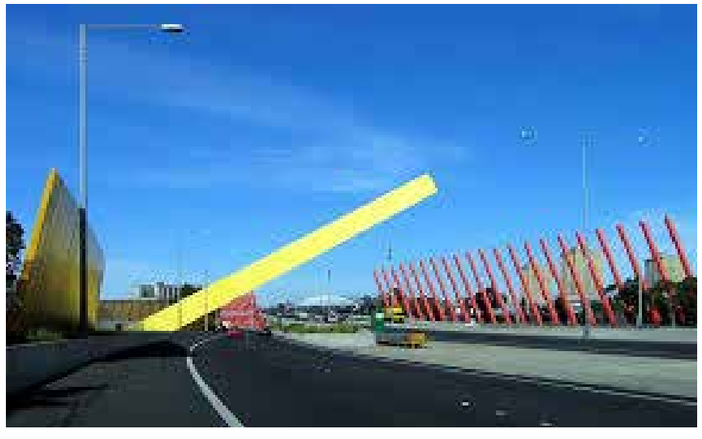
7.0
PRECEDENT:
CITY LINK GATEWAY
MELBOURNE, AUS

Program
Entrance Portals
Architect
DCM
Year
1996

+VE COLLECTIVE ENSEMBLE OF STRUCTURES WHICH UTILISES THE NATURE OF SPEED AND PERSPECTIVE AS AN ELEMENT OF COMPOSITION.

+VE FRAMED PORTAL STRUCTURE EMPHASISES THE EXPERIENCE OF 'EXIT/ARRIVAL'





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7.0
PRECEDENT:
CRAGIEBURN BYPASS
MELBOURNE, AUS

Program
Pedestrian Bridge & Sound Walls
Architect
TZG & TCL
Year
2014

+VE COLLECTIVE ENSEMBLE OF STRUCTURES WHICH UTILISES THE NATURE OF SPEED AND PERSPECTIVE AS AN ELEMENT OF COMPOSITION.

+VE ROBUST MATERIALITY AND SUBTLE ARTICULATION SOFTEN THE STRUCTURE IN THE LANDSCAPE.





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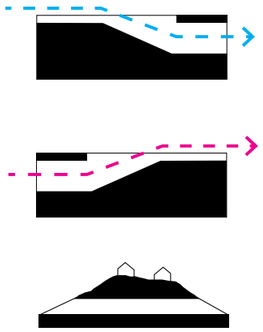
7.0
PRECEDENT:
EAST LINK
MELBOURNE, AUS



Program
Ventilation Facility
Architect
Wood Marsh
Year
2014

+VE INTEGRATED VENTILATION FACILITY WITH TUNNEL PORTAL. MINIMISES IMPACT ON SURROUNDING RESIDENTIAL AREA. REDUCES PERCEPTION OF EXHAUST TOWER.

+VE GRAPHIC OVERLAY PROVIDES RELIEF FROM SCALE OF TOWER.





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7.0
PRECEDENT:
PENINSULA LINK
MELBOURNE, AUS

Program
Sound Wall & Freeway Threshold
Architect
Wood Marsh
Year
2013

+VE SIMPLE BOLD GEOMETRY AND COLOUR IS IMPLEMENTED TO MAKE USE OF LIGHT AND SHADOW AT SPEED.

+VE REFERENCES TO SUBURBAN VERNACULAR ASSISTS IN CREATING A PLACE MARKER FOR THE MOTORWAY.





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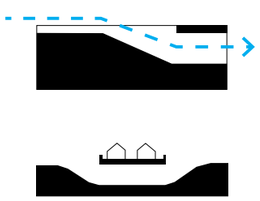
7.0 PRECEDENT: LANE COVE TUNNEL SYDNEY, AUS



Program
Tunnel Pacific Hwy Entrance Portal & Ramp
Architect
KI Studio
Year
2003

+VE SHORT RAMP LENGTH & DISCREET ARTICULATION OF ENTRANCE MINIMISES VISUAL IMPACT.

+VE POSITIONING RAMP IN CENTRAL LANE MINIMISES IMPACT ON PEDESTRIAN MOVEMENT .

- VE DESIGN MISSES OPPORTUNITY TO MARK SENSE OF PLACE WHEN ENTERING TUNNEL.







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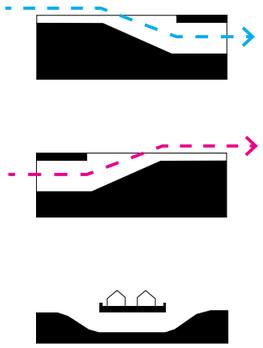
7.0 PRECEDENT: LANE COVE TUNNEL SYDNEY, AUS



Program
Tunnel Entrance/Exit Portal & Ramp
Architect
KI Studio
Year
2003

+VE COLLECTIVE ENSEMBLE OF STRUCTURES WHICH IS IMPLEMENTED ACROSS ALL PORTALS ADDING TO A SENSE OF LEGIBILITY.

-VE DESIGN MISSES OPPORTUNITY TO MARK SENSE OF PLACE WHEN ENTERING TUNNEL.





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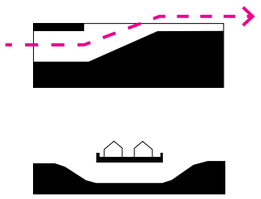
7.0
PRECEDENT:
LANE COVE TUNNEL
SYDNEY, AUS



Program
Tunnel Exit Portal Ramp
Architect
KI Studio
Year
2003

+VE ROBUST MATERIALITY
+VE USE OF BEAM STRUCTURE ABOVE RAMP ENTRY PROVIDES GRADUAL TRANSITION BETWEEN DARK TUNNEL EXPERIENCE AND NATURAL LIGHT OF ROAD NETWORK.

- VE DESIGN MISSES OPPORTUNITY TO MARK SENSE OF PLACE WHEN ENTERING TUNNEL.



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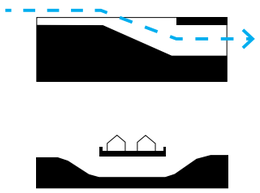
7.0 PRECEDENT: CROSS CITY TUNNEL SYDNEY, AUS



Program
Tunnel Entrance Portal Ramp
Architect
Hassell
Year
2005

+VE DISCREET ARTICULATION OF ENTRANCE MINIMISES VISUAL IMPACT.

+VE POSITIONING RAMP IN CENTRAL LANE MINIMISES IMPACT ON PEDESTRIAN MOVEMENT .

- VE DESIGN MISSES OPPORTUNITY TO MARK SENSE OF PLACE WHEN ENTERING TUNNEL.



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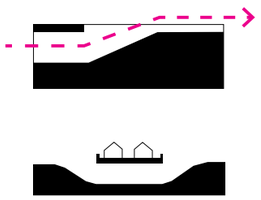
7.0 PRECEDENT: EASTERN DISTRIBUTOR SYDNEY, AUS



Program
Tunnel Exit Portal Ramp
Architect
Conybeare Morrison
Year
2000

+VE DISCREET ARTICULATION OF ENTRANCE MINIMISES VISUAL IMPACT.

+VE POSITIONING RAMP IN CENTRAL LANE MINIMISES IMPACT ON PEDESTRIAN MOVEMENT .

- VE DESIGN MISSES OPPORTUNITY TO MARK SENSE OF PLACE WHEN ENTERING TUNNEL.





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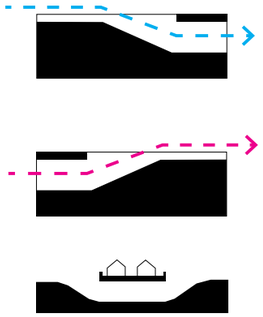
7.0
PRECEDENT:
TUGON BYPASS TUNNEL
BRISBANE, AUS



Program
Tunnel Entrance Portal
Year
2012

+VE EXPRESSIVE FROM ASSISTS IN TRANSITIONING MOTORIST FROM TUNNEL ENVIRONMENT TO OPEN ROAD NETWORK.

+VE STRONG SCULPTURAL FORM ACTS AS MEMORABLE PLACE MAKER FOR WAY-FINDING AND LEGIBILITY.



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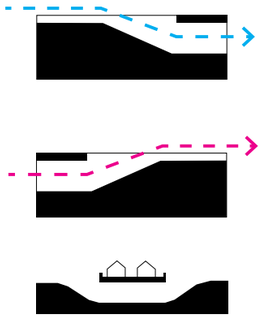
7.0
PRECEDENT:
AIRPORT LINK TUNNEL
BRISBANE, AUS



Program
Tunnel Entrance Portal
Architect
RPS Group
Year
2014

+VE EMBRACING SCULPTURAL GESTURE UTILIZES ROADS GEOMETRY TO GENERATE FORM.
+VE INTEGRATION OF LANDSCAPE AND OPEN AREA ADDS BENEFIT TO SURROUNDING COMMUNITY.

- VE TRANSITION OF SCALE FROM MOTORWAY INFRASTRUCTURE TO SURROUNDING RESIDENTIAL LACKING MEDIATION



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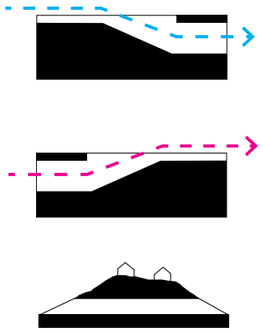
7.0
PRECEDENT:
WATERVIEW CONNECTION
AUCKLAND, NEW ZEALAND



Program
Tunnel Entrance Portal & Vent Facility
Architect
Warren Mahoney
Year
Under Construction

+VE INTEGRATED VENTILATION FACILITY WITH TUNNEL PORTAL. MINIMISES IMPACT ON SURROUNDING RESIDENTIAL AREAS. REDUCES PERCEPTION OF EXHAUST TOWER.

+VE EXIT & ENTRY TUNNELS EACH HAVE DISTINCTIVE VISUAL RELIEF & ARTICULATION.

+VE GOOD OPPORTUNITY FOR PLANTING BETWEEN TRAFFIC, PROVIDING FURTHER RELIEF.



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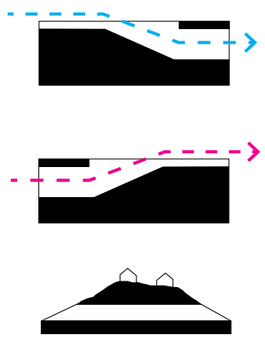
7.0
PRECEDENT:
CLEM 7 TUNNEL
BRISBANE, AUS



Program
Tunnel Entrance Portal
RPS Group
Year
2012

+VE DISTINCTIVE CANOPY FORM CREATES MEMORABLE PLACE MARKER FOR MOTORIST.
+VE CANOPY SHADING DEVICE HELPS TRANSITION LIGHT CONDITION FOR MOTORIST APPROACHING WESTERN SUN.



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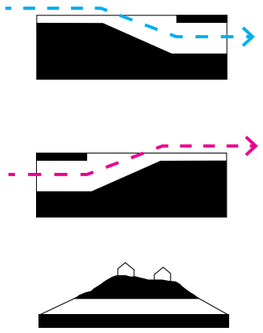
7.0
PRECEDENT:
VEDEGGIO CASSARATE TUNNEL
LUGANO, SWITZERLAND



Program
Tunnel Entrance Portal
Architect
Cino Zucchi
Year
2012

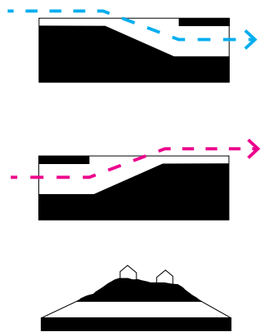
+VE SCULPTURAL FORM SUGGESTIVE OF EMBRACING MOTORIST ON JOURNEY FROM ONE CONTEXT TO ANOTHER.

+VE SUBTLE ARTICULATION HELPS SOFTEN THE STRUCTURE IN THE LANDSCAPE.



© CHROFI : 2016

7.0
PRECEDENT:
FIGUEROA STREET TUNNELS
LA, USA



Program
Tunnel Entrance Portal
Architect
Unkown
Year
1931

+VE FINELY DETAILED ART DECO MOTIF INTEGRATES WELL WITH SURROUNDING INFRASTRUCTURE.

+VE PORTAL DESIGN TREATED AS BRIDGING ELEMENT, MINIMISING IMPACT ON THE LANDSCAPE AND POTENTIALLY CONNECTING EITHER SIDE OF THE MOTORWAY.





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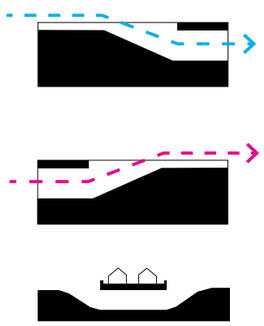
7.0
PRECEDENT:
OLYMPIC SCULPTURE PARK
SEATTLE, USA



Program
Tunnel Entrance Portal & Sculpture Park
Architect
Weiss/Manfredi Architects
Year
2007

+VE PORTAL DESIGN IS INTEGRATED INTO LARGER URBAN DESIGN ROLE OF BRIDGING DISCONNECTED PARTS OF THE CITY FOR THE PEDESTRIAN.

+VE CONTINUOUS CONNECTION TO THE WATERFRONT IS PROVIDED BY MAKING USE OF A LARGE-SCALE URBAN DEVELOPMENT AS AN OPPORTUNITY TO CONNECT CITIES.





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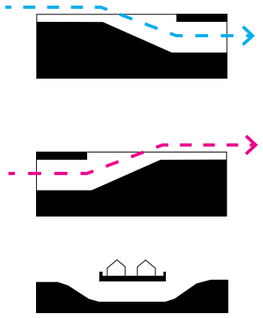
7.0
PRECEDENT:
MIAMI PORT TUNNEL

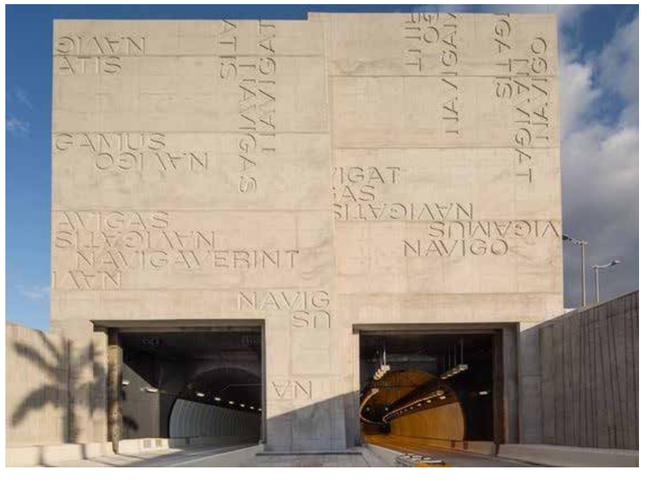


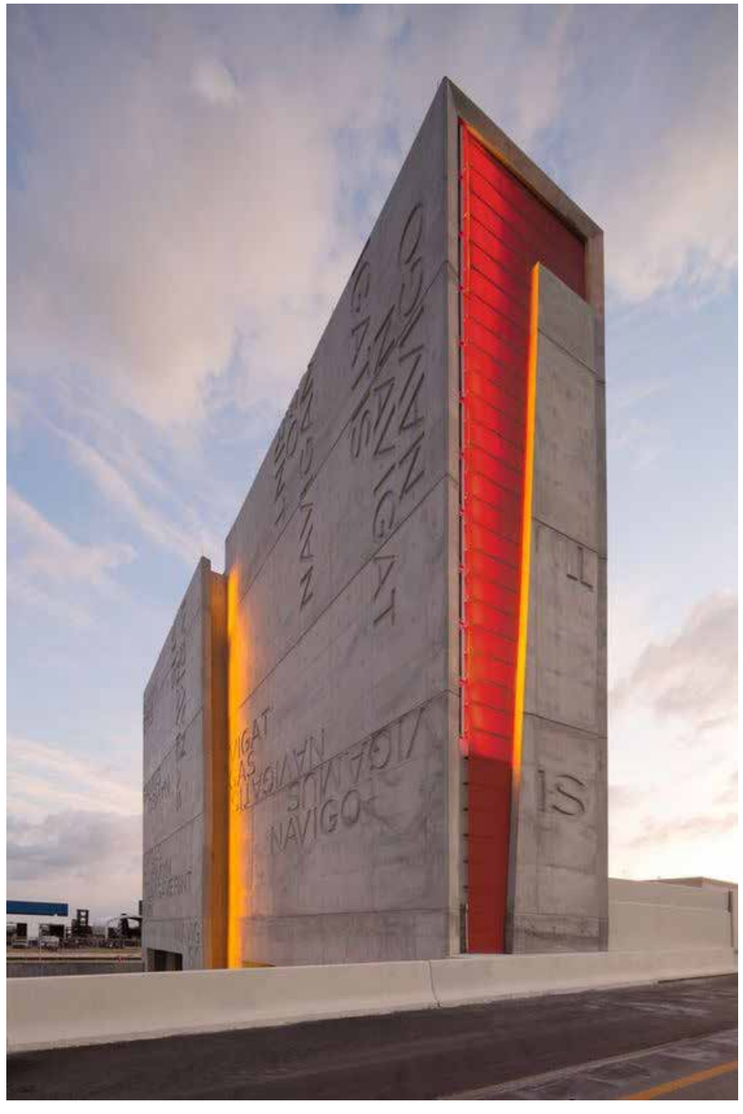
Program
Tunnel Entrance, Vent Shaft & Flood Gate
Architect
ArquitectonicaGEO
Year
2014

+VE CLEAN INTEGRATED FORM ACTS AS BOTH PORTAL ENTRANCE TO TUNNEL. & VENTILATION FACILITY.
+VE ROBUST MATERIALITY.
+VE ADDITION OF TEXT OVERLAY PROVIDES CULTURAL LAYER.









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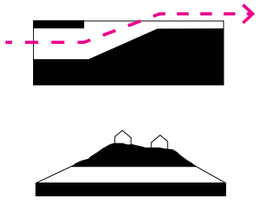
7.0
PRECEDENT:
SAN PANCRAZIO TUNNEL
ITALY



Program
Tunnel Entrance Portal
Architect
DISSING+WEITLING architecture
Year
Under Construction/Concept

+VE EXPRESSIVE FORM CELEBRATES THE ENGINEERING AND FUNCTIONALITY OF INFRASTRUCTURE

+VE ROBUST MATERIALITY SUGGESTS PERMANENCE.

+VE FORM OF THE TUNNEL USES SPEED AND MOVEMENT AS AN ELEMENT IN THE COMPOSITION, ALLOWING THE SCULPTURAL FORM TO BE READ DIFFERENTLY AT DIFFERENT SPEEDS AND VANTAGE POINTS.





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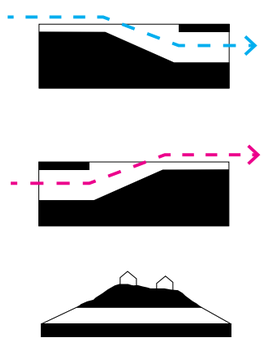
7.0
PRECEDENT:
TRANSJURANNE MOTORWAY
SECTION 4
LUGANO, SWITZERLAND

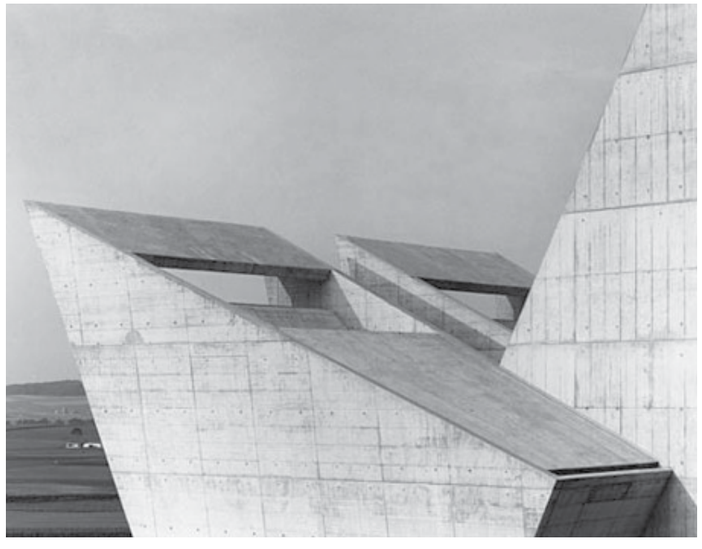


Program
Tunnel Entrance Portal & Ventilation Facility
Architect
Flora Ruchat
Year
1998

+VE EXPRESSIVE FORM CELEBRATES THE ENGINEERING AND FUNCTIONALITY OF INFRASTRUCTURE
+VE ROBUST MATERIALITY SUGGESTS PERMANENCE.
+VE VENT FACILITY LOCATED IN CLOSE PROXIMITY TO PORTAL, MNIMISING IMPACT ON SURROUNDING LANDSCAPE SETTING.
+VE CONSISTENT FORMAL LANGUAGE OF SIMPLE VOLUMES IS REPEATED, PROVIDING A DISTINCTIVE MARKER IN THE MOTORISTS MEMORY.







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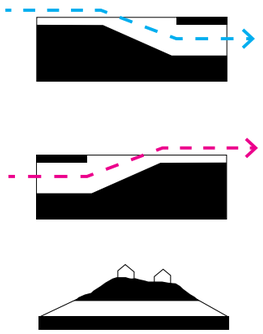
7.0
PRECEDENT:
TRANSJURANNE MOTORWAY
SECTION 4
LUGANO, SWITZERLAND



Program
Tunnel Entrance Portal & Ventilation Facility
Architect
Flora Ruchat
Year
1998

+VE EXPRESSIVE FORM CELEBRATES THE ENGINEERING AND FUNCTIONALITY OF INFRASTRUCTURE
+VE ROBUST MATERIALITY SUGGESTS PERMANENCE.
+VE VENT FACILITY LOCATED IN CLOSE PROXIMITY TO PORTAL, MINIMISING IMPACT ON SURROUNDING LANDSCAPE SETTING.
+VE CONSISTENT FORMAL LANGUAGE OF SIMPLE VOLUMES IS REPEATED, PROVIDING A DISTINCTIVE MARKER IN THE MOTORISTS' MEMORY.







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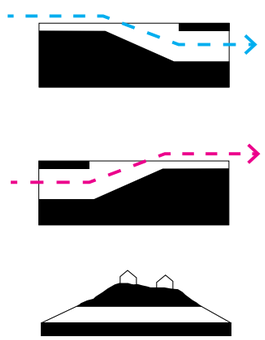
7.0 PRECEDENT: TRANSJURANNE MOTORWAY SECTION 3 LUGANO, SWITZERLAND



Program
Tunnel Entrance Portal & Ventilation Facility
Architect
Flora Ruchat
Year
1998

+VE EXPRESSIVE FORM CELEBRATES THE ENGINEERING AND FUNCTIONALITY OF INFRASTRUCTURE
+VE ROBUST MATERIALITY SUGGESTS PERMANENCE.
+VE VENT FACILITY LOCATED IN CLOSE PROXIMITY TO PORTAL, MNIMISING IMPACT ON SURROUNDING LANDSCAPE SETTING.
+VE CONSISTENT FORMAL LANGUAGE OF SIMPLE VOLUMES IS REPEATED, PROVIDING A DISTINCTIVE MARKER IN THE MOTORISTS' MEMORY.







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8.0
CONCLUSION

The Tunnel Portal design will play a key role in defining motorists experience of WestConnex Stage 3. While the structure is largely experienced by the motorist, the portals can also contribute to the nearby public domain.

Portal design evolves out of two conditions: topographical context in which the tunnel emerges; and the degree to which the threshold is celebrated or downplayed.

The design of portals are often seen as an opportunity to create a landmark, though they also have the ability to respond to their specific context and be simple and legible to the motorist.

The strategies to articulate the portals are often based upon the user experiencing them. In the case of the motorist, speed and perspective are equally important elements in the composition as materiality and colour. The structures are transient, often only in view for a matter of seconds. Conversely, the surrounding community experiences the portal at a much slower, pedestrian scale. This duality of experience must be carefully considered to ensure an integrated outcome is achieved.

On a larger scale, these portals typically apply a consistent architectural language at both the entry and exit points for the motorist. While this can provide a unified experience across the city, it can ignore the contextual surroundings in which it sits. By marking these points with distinctive, context driven design, the portals can begin to become way-finding markers and integrate more seamlessly with the local road and pedestrian networks.



ROZELLE



VIEW TOWARDS CITY FROM ROZELLE



CAMPERDOWN



SANDSTONE WALL, PARRAMATTA RD



ST. PETERS



SYDNEY PARK BRICK STACKS

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Annexure 2 - Ventilation Facility Design Review

VENTILATION FACILITY REVIEW

WESTCONNEX STAGE 3 (M4-M5 LINK)

03.05.2016



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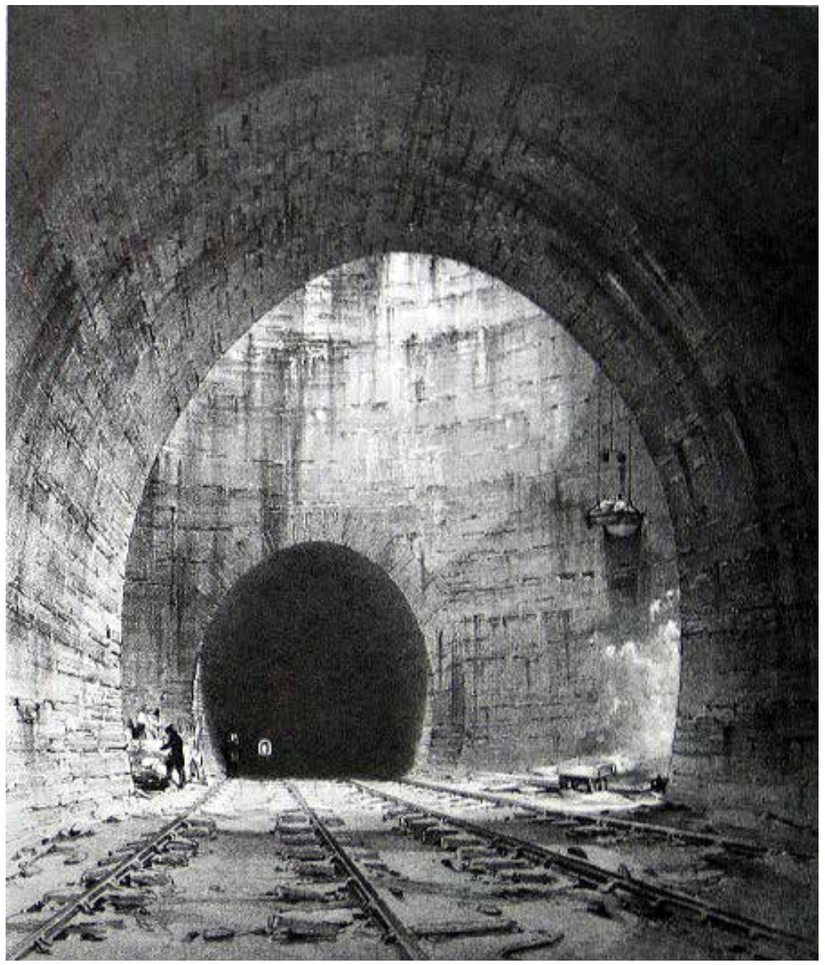
MCGREGOR COXALL

CONTENTS



KILSBY TUNNEL, UK (FRONT COVER SHOWS ABOVE GROUND VENT)

1. INTRODUCTION

2. VENTILATION FACILITY PRINCIPLES

3. VISUAL SUMMARY
- TUNNEL VENTILATION FACILITIES
- SIMILAR INFRASTRUCTURE

4. KEY STRATEGIC APPROACHES

5. PRECEDENT CASE STUDIES:
- CROSS CITY TUNNEL - SYDNEY
- TRANSGRID VENTILATION SHAFT - SYDNEY
- M5 EAST TUNNEL - SYDNEY
- EASTLINK TUNNEL - MELBOURNE
- CITY LINK TUNNEL - MELBOURNE
- LEGACY WAY TUNNEL - BRISBANE
- AIRPORT LINK TUNNEL - BRISBANE
- CLEM 7 TUNNEL - BRISBANE
- QUEENSWAY TUNNEL - LIVERPOOL, UK.
- JUBILEE LINE - LONDON, UK
- MIAMI PORT TUNNEL - MIAMI, USA
- CHEMINEE MORRETTI - PARIS,FRANCE
- PATERNOSTER VENTS - LONDON, UK
- TRANSJURANNE MOTORWAY -SWITZERLAND
- SIGNAL BOX -SWITZERLAND

6. CONCLUSION

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1.
INTRODUCTION

This review has been laid out to reflect briefly on the history of ventilation facilities and to investigate the opportunities these structures can bring to WestConnex Stage 3.

This review is the result of a desktop study which has uncovered a demonstrative cross section of ventilation facility design from an historical and geographical point of view.

Ventilation facilities play a vital role in civic infrastructure projects. With the majority of the infrastructure being underground they are often highly contested pieces of public architecture.

As such, the architectural strategies employed to implement these structures are often tied up in a wider civic role. In some cases they are signifiers of progress, monumental and unashamedly proud of their industrial function. Conversely, the contested nature of the structures and their association with pollution often require camouflage and concealment.

This review raises two key questions:

How can the ventilation facilities respond to their context in a meaningful way?

How can WestConnex use the ventilation facilities to provide visual amenity to the skyline and greater social value at ground level?



HOLLAND TUNNEL, USA.

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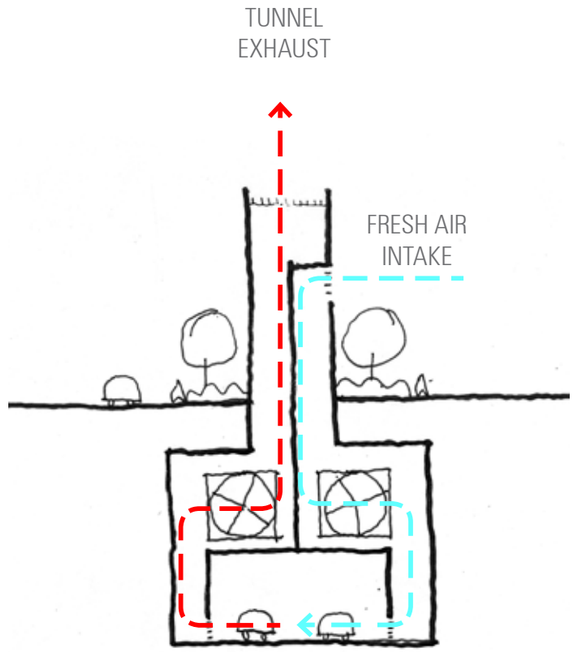
2.
VENTILATION FACILITY PRINCIPLES & CURRENT VENTILATION PHILOSOPHY

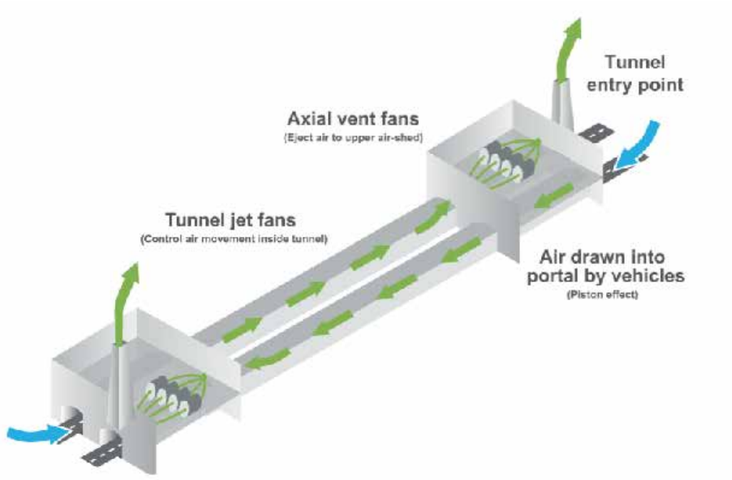
PRINCIPLES & TRENDS

The design of Tunnel ventilation facilities is generally governed by a number of technical and functional principles. The shape, size, location and height of the facility ensures the tunnel has minimal impact on local and regional air quality.

- Typical tunnel design requires both intake of fresh air, and removal of exhaust air.
- The current ventilation philosophy is to employ the 'piston effect', by dragging fresh air via the entry portal and exhausting tunnel air at or very close to the exit portal. This reduces the need to bring in fresh air through the stack, potentially unlocking ground level activation around the shaft.



FRESH AIR AND EXHAUST PRINCIPLES



WESTCONNEX TUNNEL VENTILATION DIAGRAM

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3.1
VISUAL SUMMARY: TUNNEL VENTILATION FACILITIES

Adjacent is a local and international summary of tunnel ventilation facility design in its various stylistic and historical forms.


1


2


3


4


5


6

CHRONOLOGICAL OVERVIEW:

1. KILSBY TUNNEL. UK. 1838
2. HYDE PARK OBELISK. SYDNEY. 1857
3. BAYSWATER, UK. 1863
4. QUEENSWAY TUNNEL, UK. 1925
5. HOLLAND TUNNEL, USA. 1927
6. BROOKLYN TUNNEL, USA. 1950
7. GIBSON SQUARE, UK. 1965
8. BLACKWALL, UK. 1967
9. KINGSWAY TUNNEL, UK. 1971
10. JUBILEE LINE TUNNEL, UK. 1990
11. JUBILEE LINE TUNNEL, UK. 1990
12 CHEMINÉE MORETTI, FRANCE. 1991
13. M5 EAST, SYDNEY. 2001
14. CROSS CITY TUNNEL, SYDNEY. 2005
15. TRANSGRID, SYDNEY. 2006
16. MIAMI PORT TUNNEL, USA. 2014
17. CLEM 7 TUNNEL, BRISBANE. 2014
18. EASTLINK, MELBOURNE. 2014


7


8


9


10


11


12


13


14


15


16


17


18

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3.2 VISUAL SUMMARY: SIMILAR INFRASTRUCTURE

Ventilation facility design shares many similarities with other infrastructure typologies such as substations, signal boxes and residential ventilation outlets. These typologies demonstrate that infrastructure can be celebrated with sculptural form and finely crafted detail, regardless of its use or context.

Colour, materiality and composition can play a key role in the integration of these elements into their context.

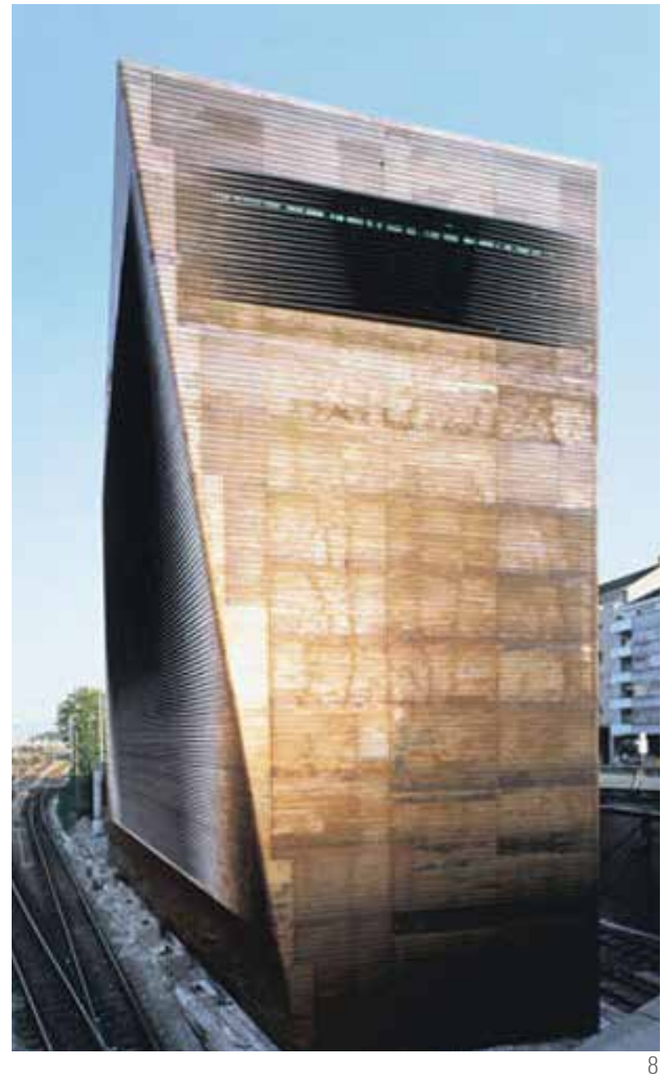
SELECTED OVERVIEW:

1. TORRES DE SATÉLITE, MEXICO CITY. 1958
- PUBLIC SCULPTURE
2. TOWER OF WINDS. TOKYO. 1986
-WATER TANK/ART INSTALLATION
3. INCINERATION LINE, DENMARK. 2014
- WASTE TO ENERGY PLANT
4. STAZIONE OLIMPICA, LONDRA. 2012
-ELECTRICAL SUBSTATION
5. PETROL SUBSTATION, ANTWERP, 2010
-ELECTRICAL SUBSTATION
6. SWITCHING BOX, ZURICH. 1999
7. UNITÉ D'HABITATION, MARSEILLE. 1952
-RESIDENTIAL VENTILATION
8. SIGNAL BOX, SWITZERLAND. 1994


1


2


3


8


4


5


6


7

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4.
KEY STRATEGIC APPROACHES

Across the history of ventilation facility design there appear to be 4 fundamental approaches by way of expression.

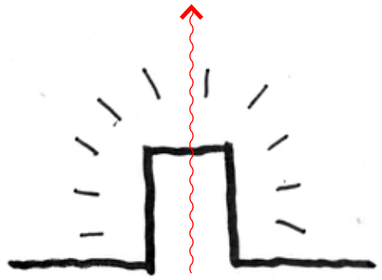
In some cases, the (historical) approach appears as a representaton of the zeitgeist or spirit of the time - perhaps an expression of an attitude towards a new form of transport or technology.

In many cases the approach appears rooted in the nearby physical context.

More recently there appears to be a tendency towards a more stylistic form of expression.

VENTILATION FACILITY AS...

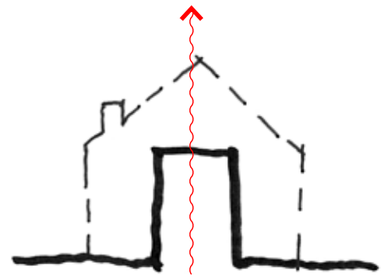
' MONUMENT '





HYDE PARK OBELISK. SYDNEY.

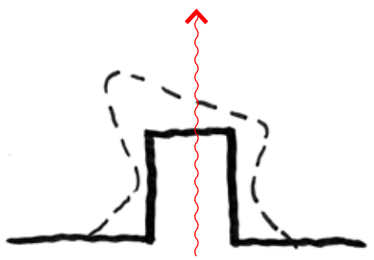
' CAMOUFLAGE '





BAYSWATER, UK.

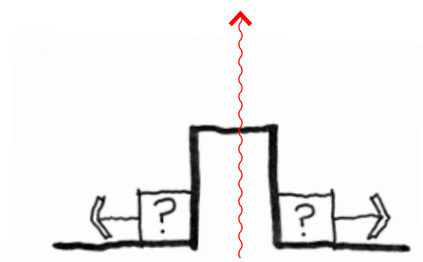
' SCULPTURAL ARTWORK '





MIAMI PORT TUNNEL, USA.

'SUPPORTING INFRASTRUCTURE & DESTINATION '





QUEENSWAY TUNNEL, UK.

WestConnex

CHROFI

MCGREGOR COXALL

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5.
PRECEDENT CASE STUDIES:

The following case studies have been identified as representative of the broad cross section of local and international approaches to ventilation facility design.

















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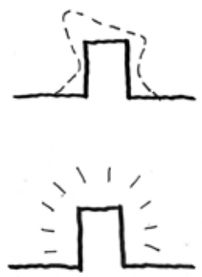
5.
PRECEDENT:
CROSS CITY TUNNEL
SYDNEY, AUS



Program
Vent Facility
Architect
HASSELL
Year
2005
Size
16m (L) x 13m (W) x 62m (H)

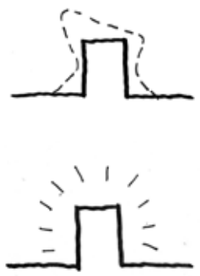
+VE TALL SLENDER PROPORTIONS SIT COMFORTABLY WITH URBAN TOWER CONTEXT.
+VE LIGHT GREY MATERIALITY AND HORIZONTAL ARTICULATION REFLECTS MANY COMMERCIAL FACADES IN ITS SURROUNDING AND AS SUCH APPEARS TO BE AN EXTENSION OF THE CITY.



VIEW OF CROSS CITY TUNNEL VENTILATION FACILITY

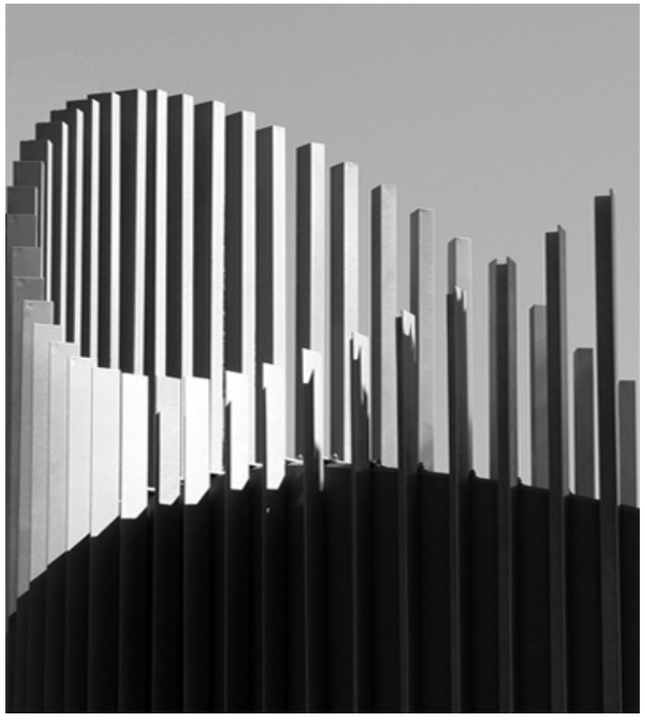
© CHROFI : 2016

5.
PRECEDENT:
TRANSGRID
VENTILATION FACILITY
SYDNEY, AUS



Program
Vent Facility
Architect
CHROFI
Year
2006
Size
5m (L) x 5m (W) x 6m (H)

+VE FORM AND ARTICULATION CELEBRATE THE NATURAL FORM OF THE FACILITY.
+VE INTERPLAY BETWEEN THE INNER STRUCTURE AND CLADDING IS ACCENTUATED, SOFTENING THE PROFILE OF THE FORM AGAINST THE SKY.

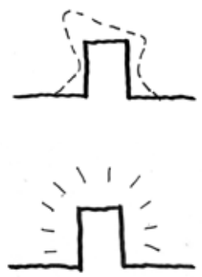




VIEW OF VENTILATION FACILITY AT HENDERSON RD

© CHROFI : 2016

5.
PRECEDENT:
M5 EAST
SYDNEY, AUS



Program
Ventilation Facility
Architect
DEM
Year
2001
Size
16m (L) x 13m (W) x 31m (H)

+VE STRONG FORM CLEARLY ARTICULATES ITS FUNCTION AS A VENTILATION FACILITY.
+VE MATERIALITY DRAWS ON SUBURBAN SANDSTONE CHARACTER AND VERTICAL HEIGHT IS BROKEN DOWN INTO HORIZONTAL EXPRESSIONS.

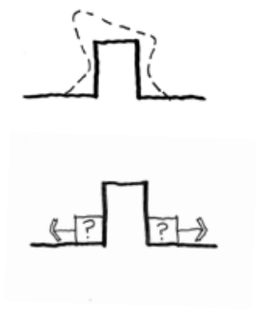
- VE HEIGHT AND PROPORTION OF FACILITY TOO LARGE FOR SUBURBAN CONTEXT.
- VE MISSED OPPORTUNITY TO ACTIVATE WITH ADDITIONAL PROGRAMME GIVEN OPEN SPACE IN PROXIMITY.



VIEW OF VENTILATION FACILITY FOR M5 EAST TUNNEL FROM TURRELLA RESERVE, EARLWOOD. NSW

© CHROFI : 2016

5.
PRECEDENT:
EAST LINK
MELBOURNE, AUS



Program
Ventilation Facility
Architect
Wood Marsh
Year
2014
Size
16m (L) x 13m (W) x 31m (H)

+VE INTEGRATED VENTILATION FACILITY WITH TUNNEL PORTAL. MINIMISES IMPACT ON SURROUNDING RESIDENTIAL. REDUCES PERCEPTION OF EXHAUST TOWER.

+VE GRAPHIC OVERLAY PROVIDES RELIEF FROM SCALE OF TOWER.



GRAPHIC OVERLAY ON VENTILATION FACILITY



VIEW OF VENTILATION FACILITY AND PORTAL ENTRY OF EASTLINK TUNNEL

© CHROFI : 2016

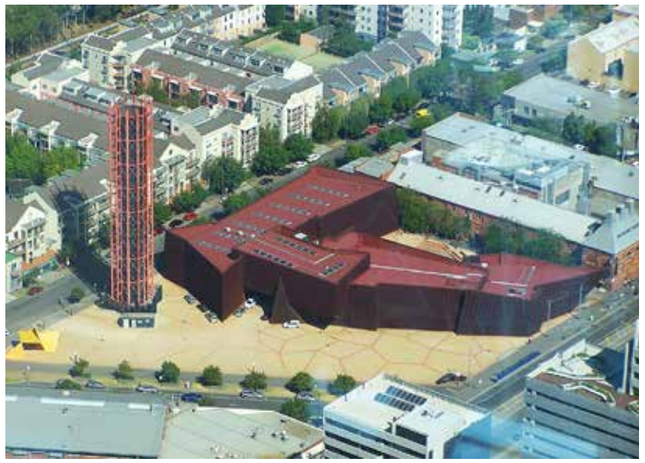
5.
PRECEDENT:
CITY LINK
MELBOURNE, AUS



Program
Ventilation Facility
Architect
Unkown
Year
1999
Size
7m (L) x 10m (W) x 31m (H)

+VE SCALE AND PROPORTION SITS COMFORTABLY AS 'SCULPTURAL' ELEMENT'.

- VE MISSED OPPORTUNITY TO ACTIVATE WITH ADDITIONAL PROGRAMME GIVEN OPEN SPACE IN PROXIMITY.

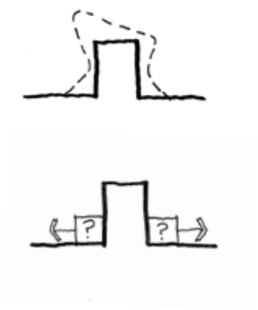




VIEW OF VENTILATION FACILITY FROM ACCA FORECOURT

© CHROFI : 2016

5.
PRECEDENT:
LEGACY WAY TUNNEL
BRISBANE, AUS

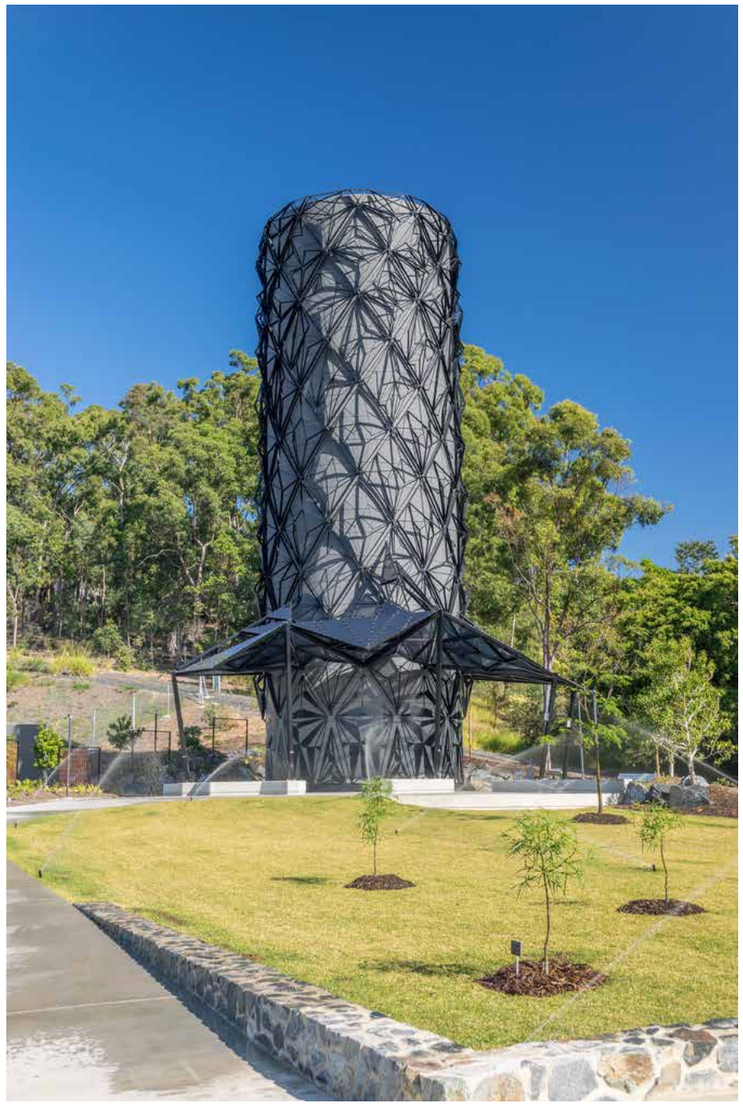


Program
Ventilation Facility and Shading Structure
Architect
RPS Group
Year
2014
Size
5m (L) x 5m (W) x 10m (H)

+VE 3 DIMENSIONAL PATTERN ADDS VISUAL INTEREST AND SHADOW PLAY WITHIN PARK SETTING.
+VE ADDITION OF SHADING CANOPY PROVIDES GOOD AMENITY TO PARK.
+VE SCALE AND PROPORTION SITS COMFORTABLY AS 'SCULPTURAL' ELEMENT.



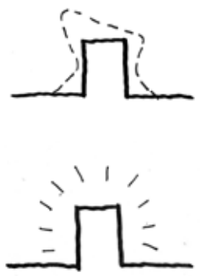




VIEW OF VENTILATION FACILITY & SHADING FROM BRISBANE BOTANIC GARDENS

© CHROFI : 2016

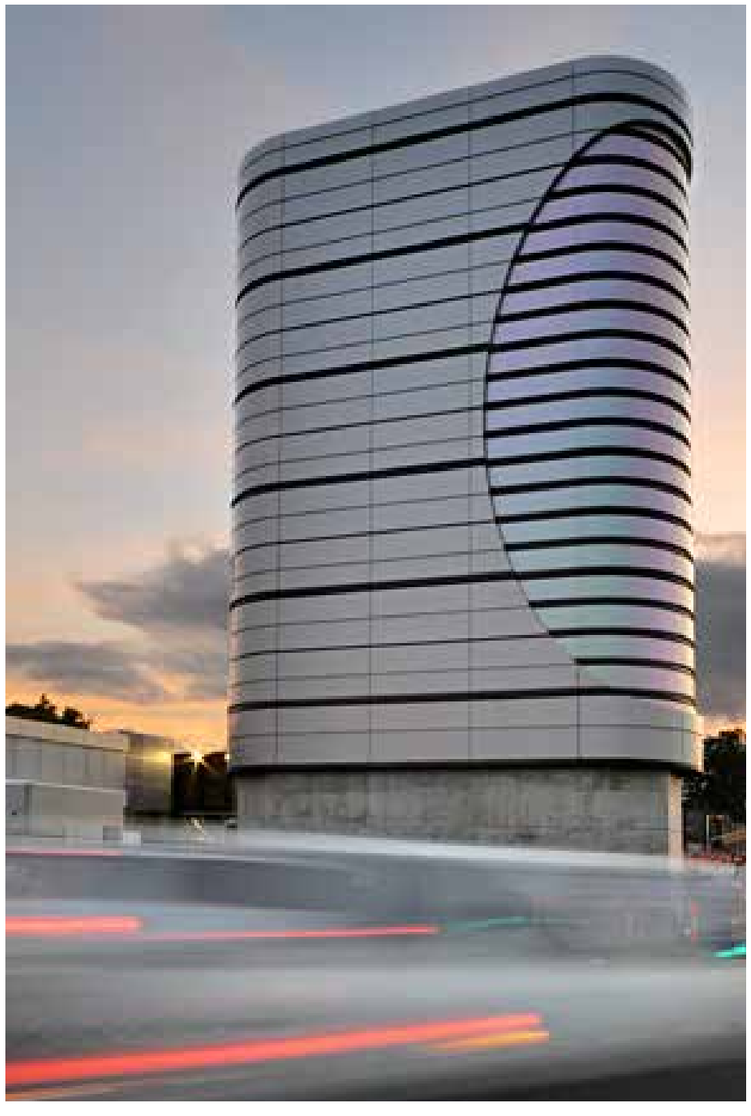
5.
PRECEDENT:
AIRPORT LINK
BRISBANE, AUS



Program
Ventilation Facility and Fan Exhaust
Architect
RPS Group
Year
2014
Size
16m (L) x 6m (W) x 23m (H)

+VE	TALL SLENDER PROPORTIONS REDUCE VISUAL IMPACT.
- VE	MATERIALITY SITS UNCOMFORTABLY WITHIN PRIMARILY RESIDENTIAL CONTEXT.
- VE	MISSED OPPORTUNITY TO ACTIVATE WITH ADDITIONAL PROGRAMME GIVEN OPEN SPACE IN PROXIMITY.





VIEW OF VENTILATION FACILITY FROM BRISBANE AIRPORT LINK ROAD

© CHROFI : 2016

5.
PRECEDENT:
CLEM 7
BRISBANE, AUS



Program
Ventilation Facility and Fan Exhaust
Architect
John Ilett
Year
2014
Size
45m (L) x 20m (W) x 23m (H)

+VE	PATTERN AND COLOUR ARE REPEATED ACROSS MULTIPLE VENTILATION STRUCTURES AND PORTAL ENTRIES, PRESENTING A UNIFIED FAMILY OF INFRASTRUCTURE.
- VE	HEIGHT AND PROPORTION OF FACILITY TOO LARGE FOR SUBURBAN CONTEXT.
- VE	COLOUR AND PATTERNING HAVE LITTLE CONTEXTUAL RELATIONSHIP WHICH EMPHASISES THE SIZE OF THE STRUCTURE.
- VE	FUNCTIONALITY IS NOT TRANSPARENT, CAMOUFLAGING PURPOSE AT THIS SCALE SEEMS INAPPROPRIATE.



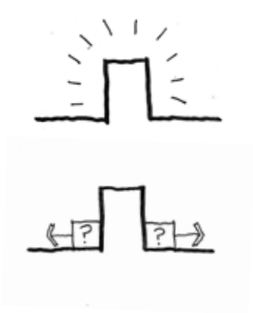
VIEW OF VENTILATION FACILITY FROM CLEM 7 PORTAL



VIEW OF VENTILATION FACILITY AT CLEM 7

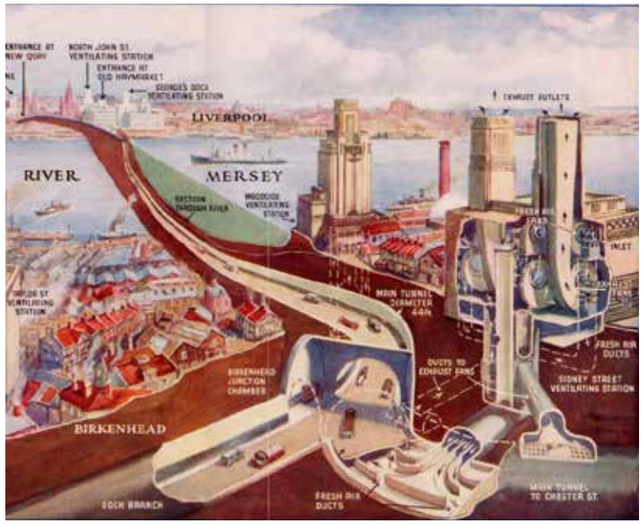
© CHROFI : 2016

5.
PRECEDENT:
QUEENSWAY VENTILATION TOWER LIVERPOOL, UK



Program
Tunnel Ventilation Facility & offices
Architect
Herbert J Rowse
Year
1925
Size
10m (L) x 10m (W) x 40m (H)

+VE COMBINATION OF VENTILATION FACILITY AND ASSOCIATED OFFICES REDUCE THE VISUAL IMPACT.
+VE PRESENTS AN ACTIVE FRONTAGE TO THE STREET.
+VE MATERIALITY SITS WELL IN CONTEXT.



CUTAWAY DIAGRAM ILLUSTRATING VENTILATION PROCESS



VIEW OF VENTILATION FACILITY AND OFFICES AT QUEENSWAY TUNNEL

© CHROFI : 2016

5.
PRECEDENT:
JUBILEE LINE
LONDON, CANADA
WATER, UK

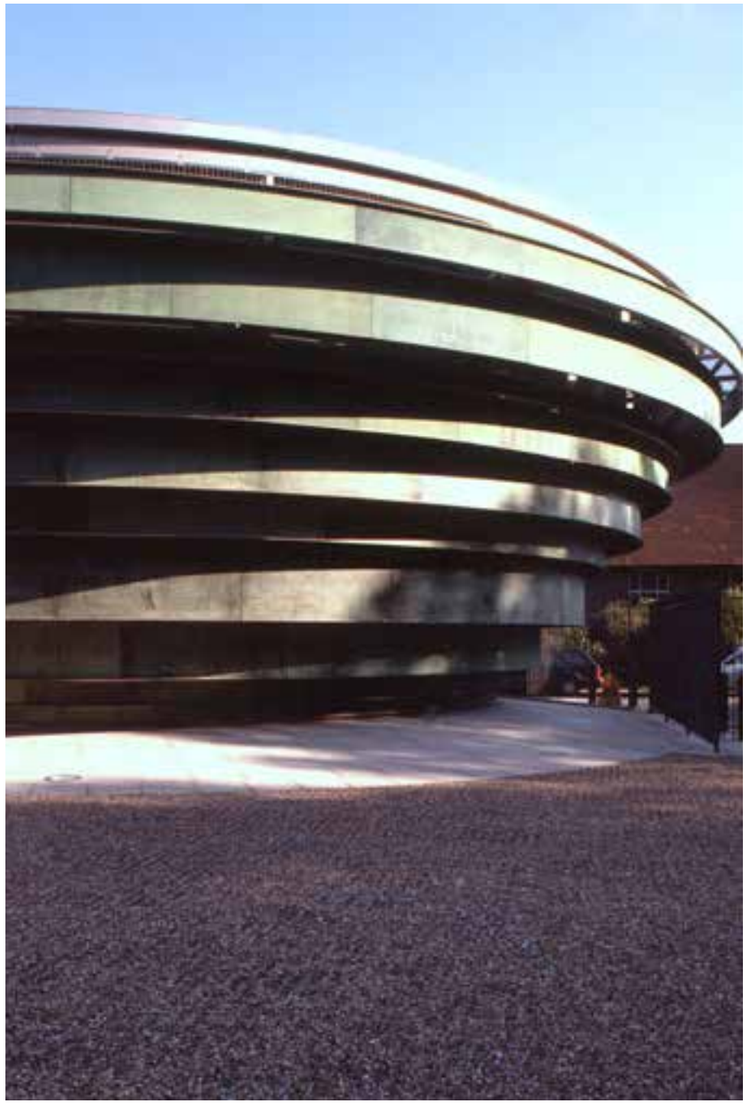


Program
Train Tunnel Ventilation Facility & Escape Exit
Architect
Ian Ritchie
Year
1990
Size
16m (L) x 6m (W) x 4m (H)

+VE SCULPTURAL RIBBON FORM SUGGESTS AIR MOVEMENT OF VENTILATION FUNCTION.
+VE CELEBRATES FUNCTION AND INFRASTRUCTURE.
+VE COPPER MATERIALITY SITS WELL IN CONTEXT.
+VE SCALE AND PROPORTION SITS COMFORTABLY AS 'SCULPTURAL' ELEMENT.

- VE OPPORTUNITY MISSED TO INCORPORATE ADDITIONAL PUBLIC AMENITY GIVEN PROMINENT LOCATION.

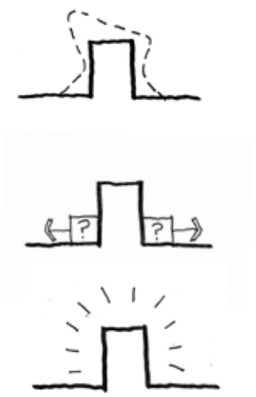




VIEW OF VENTILATION FACILITY AT CANADA WATER STATION, LONDON

© CHROFI : 2016

5.
PRECEDENT:
MIAMI PORT TUNNEL

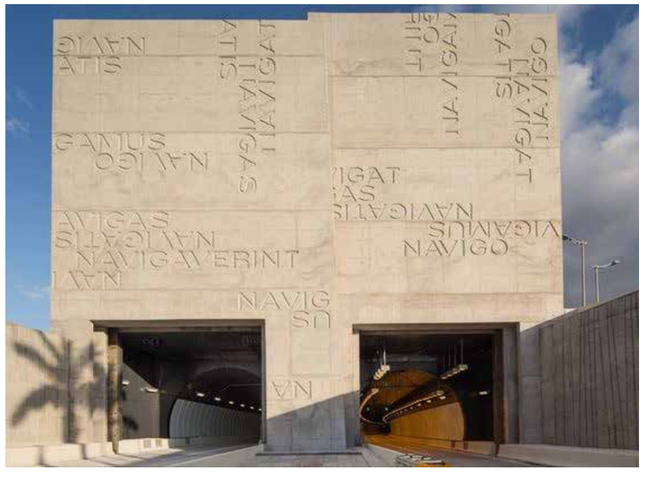


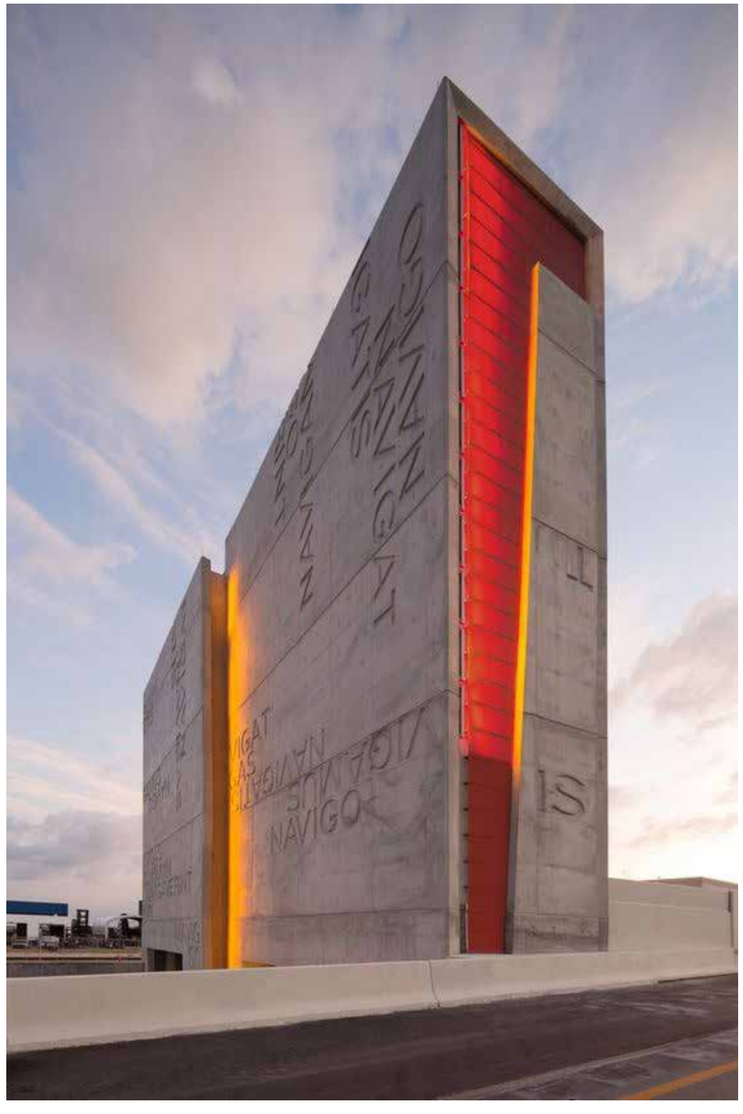
Program
Tunnel Entrance, Vent Facility & Flood Gate
Architect
ArquitectonicaGEO
Year
2014
Size
29m (L) x 6m (W) x 19m (H)

+VE CLEAN INTEGRATED FORM ACTS AS BOTH PORTAL ENTRANCE TO TUNNEL. & VENTILATION FACILITY.
+VE ROBUST MATERIALITY.
+VE ADDITION OF TEXT OVERLAY PROVIDES CULTURAL LAYER.









VIEW OF VENTILATION FACILITY & FLOOD GATES AT MIAMI PORT TUNNEL

© CHROFI : 2016

5.
PRECEDENT:
CHEMINÉE MORETTI
PARIS, FRANCE



Program
Ventilation Facility
Architect
Raymond Moretti.
Year
1990
Size
7m (L) x 7m (W) x 32m (H)

+VE BOLD COLOUR SELECTION CELEBRATES FUNCTION AND INFRASTRUCTURE.
+VE SCALE AND PROPORTION SITS COMFORTABLY AS 'SCULPTURAL' ELEMENT.

- VE OPPORTUNITY MISSED TO INCORPORATE ADDITIONAL PUBLIC AMENITY GIVEN PROMINENT LOCATION.







VIEW OF VENTILATION FACILITY AT LA DÉFENSE, PARIS

© CHROFI : 2016

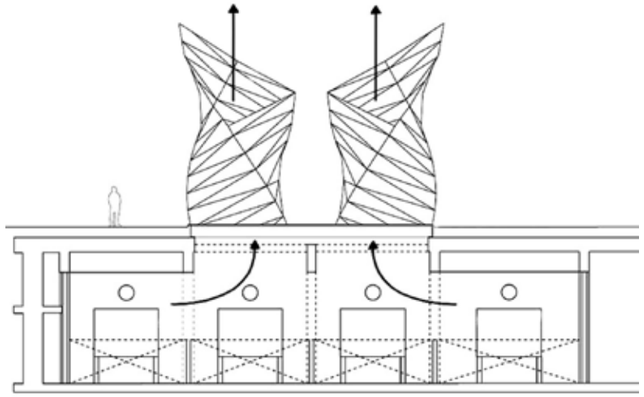
5.
PRECEDENT:
PATERNOSTER VENTS
LONDON, UK



Program
Substation Ventilation Facility
Architect
Thomas Heatherwick
Year
1990
Size
3m (L) x 3m (W) x 5m (H)

+VE SCULPTURAL FORM ADDS VISUAL AMENITY TO PUBLIC SQUARE.
+VE SCALE AND PROPORTION SITS COMFORTABLY AS 'SCULPTURAL' ELEMENT.

- VE OPPORTUNITY MISSED TO INCORPORATE ADDITIONAL PUBLIC AMENITY GIVEN PROMINENT LOCATION.



SECTION DIAGRAM ILLUSTRATING SUBSTATION VENTILATION

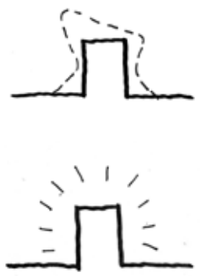




VIEW OF VENTILATION FACILITY FROM PATERNOSTER SQUARE, LONDON

© CHROFI : 2016

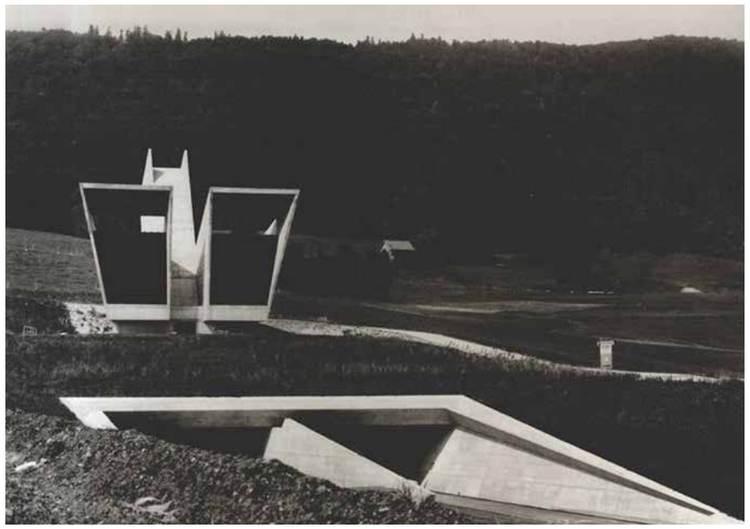
5.
PRECEDENT:
TRANSJURANNE MOTORWAY
SECTION 4 & 5
SWITZERLAND

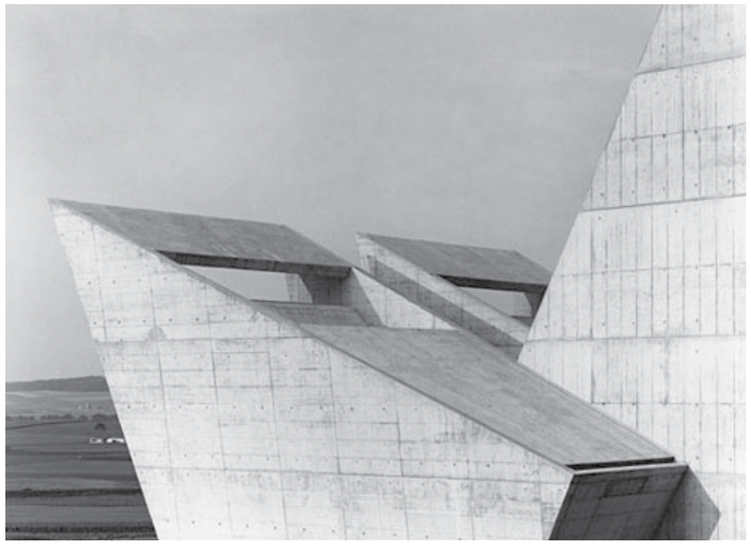


Program
Tunnel Entrance Portal & Ventilation Facility
Year
1998
Size
21m (L) x 26m (W) 24m ()H

+VE EXPRESSIVE FORM CELEBRATES THE ENGINEERING AND FUNCTIONALITY OF INFRASTRUCTURE
+VE ROBUST MATERIALITY SUGGESTS PERMANANCE.
+VE VENT FACILITY LOCATED IN CLOSE PROXIMITY TO PORTAL, MNIMISING IMPACT ON SURROUNDING LANDSCAPE SETTING.
+VE CONSISTENT FORMAL LANGUAGE OF SIMPLE VOLUMES IS REPEATED, PROVIDING A DISTINCTIVE MARKER IN THE MOTORISTS MEMORY.

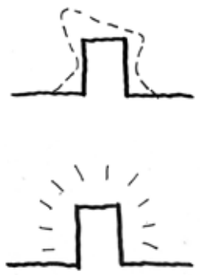






© CHROFI : 2016

5.
PRECEDENT: SIGNAL BOX, SWITZERLAND



Program
Control Box
Architect
Herzog & de Meuron
Year
2014
Size
16m (L) x 10m (W) x 19m (H)

+VE SCULPTURAL FORM WITH INTEGRATED VENTILATION STRATEGY.
+VE ROBUST MATERIALITY SOFTENED WITH REFLECTIONS THROUGHOUT DAY.





EXTERNAL CLADDING DETAIL - COPPER STRIPS



VIEW OF SIGNAL BOX FROM GUTERBAHNHOFSTATION, BASEL

© CHROFI : 2016

6. CONCLUSION

The outcome of this review are a suite of strategies which distills best practice in ventilation facility design. These strategies can be applied to specific sites, with the hope of achieving a mutually beneficial outcome for WestConnex and the community.

Each of the 3 sites provide the opportunity for a contextual urban response. Rather than a repetitive stamped design philosophy, each ventilation facility can act as a place marker for both the commuters and community.

In reviewing the above case studies and identifying key strategies for ventilation facility design, the following key principles have been identified:

- The design strategy employed for the ventilation facility should be intrinsically linked to the community and its immediate context.
- By understanding the ventilation facility as a 'signifier' for the wider project, there is an opportunity where appropriate for these structures to celebrate infrastructure, as opposed to disguising it.
- Embedding an additional function could provide additional benifit to the surrounding context, and also help mitigate the negative associations with ventilation facilities in general (pollution, visual impact etc). This addition can also be of social value to the community.
- Distance from residential areas is often the point of strongest contention. By locating the vent stack close to the portals the amount of impact from the communities perspective could be reduced.



ROZELLE



VIEW TOWARDS CITY FROM ROZELLE



CAMPERDOWN



SANDSTONE WALL, PARRAMATTA RD



ST. PETERS



SYDNEY PARK BRICK STACKS

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CHROFI

MCGREGOR COXALL

Appendix M

Shadow diagrams and overshadowing

WestConnex

WESTCONNEX – M4-M5 LINK

Shadow diagrams and overshadowing

Roads and Maritime Services
WestConnex – M4-M5 Link
Shadow diagrams and overshadowing

Prepared for
Roads and Maritime Services

Prepared by
AECOM Australia Pty Ltd
Level 21, 420 George Street, Sydney NSW 2000, PO Box Q410, QVB Post Office NSW 1230, Australia
T +61 2 8934 0000 F +61 2 8934 0001 www.aecom.com
ABN 20 093 846 925

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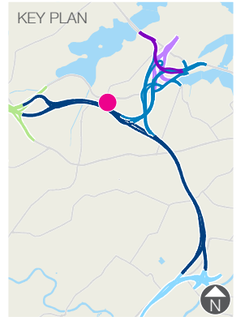
AUGUST 2017



LEGEND

- Building/ structure shadow
- Project buildings and structures

KEY PLAN



SCALE 0 10 20 30 40 50m

N

TITLE

M4-M5 Link - Shadow diagrams and overshadowing

9.00 am analysis (21st June)
Darley Road motorway operations complex (MOC1)
Leichhardt

DRAWING	REVISION	DATE
001	B	11/08/2017

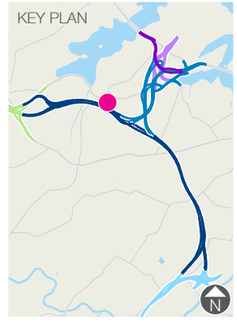
Sydney Motorway Corporation | WestConnex | AECOM



LEGEND

- Building/ structure shadow
- Project buildings and structures

KEY PLAN



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TITLE
M4-M5 Link - Shadow diagrams and overshadowing

10.00 am analysis (21st June)
Darley Road motorway operations complex (MOC1)
Leichhardt

DRAWING	REVISION	DATE
002	B	11/08/2017

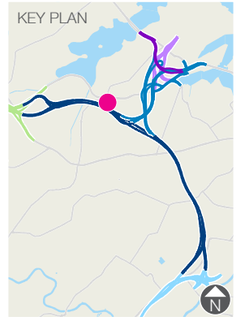
Sydney Motorway Corporation | WestConnex | AECOM



LEGEND

- Building/ structure shadow
- Project buildings and structures

KEY PLAN



SCALE 0 10 20 30 40 50m

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TITLE

M4-M5 Link - Shadow diagrams and overshadowing

11.00 am analysis (21st June)
Darley Road motorway operations complex (MOC1)
Leichhardt

DRAWING	REVISION	DATE
003	B	11/08/2017

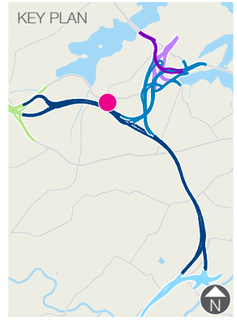
Sydney Motorway Corporation | WestConnex | AECOM



LEGEND

- Building/ structure shadow
- Project buildings and structures

KEY PLAN



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TITLE
M4-M5 Link - Shadow diagrams and overshadowing

12.00 pm analysis (21st June)
Darley Road motorway operations complex (MOC1)
Leichhardt

DRAWING	REVISION	DATE
004	B	11/08/2017

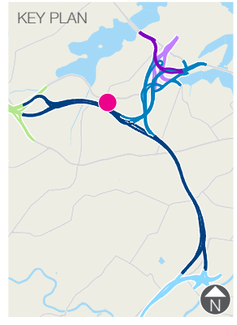
Sydney Motorway Corporation | WestConnex | AECOM



LEGEND

- Building/ structure shadow
- Project buildings and structures

KEY PLAN



SCALE 0 10 20 30 40 50m

N

TITLE

M4-M5 Link - Shadow diagrams and overshadowing

1.00 pm analysis (21st June)
Darley Road motorway operations complex (MOC1)
Leichhardt

DRAWING	REVISION	DATE
005	B	11/08/2017

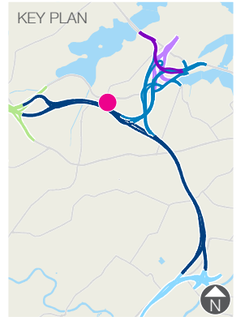
Sydney Motorway Corporation | WestConnex | AECOM



LEGEND

- Building/ structure shadow
- Project buildings and structures

KEY PLAN



SCALE 0 10 20 30 40 50m

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TITLE
M4-M5 Link - Shadow diagrams and overshadowing

2.00 pm analysis (21st June)
Darley Road motorway operations complex (MOC1)
Leichhardt

DRAWING	REVISION	DATE
006	B	11/08/2017

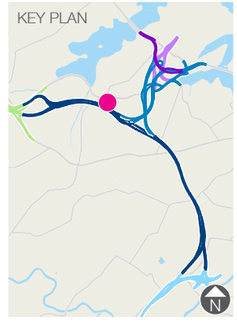
Sydney Motorway Corporation | WestConnex | AECOM



LEGEND

- Building/ structure shadow
- Project buildings and structures

KEY PLAN



SCALE 0 10 20 30 40 50m

N

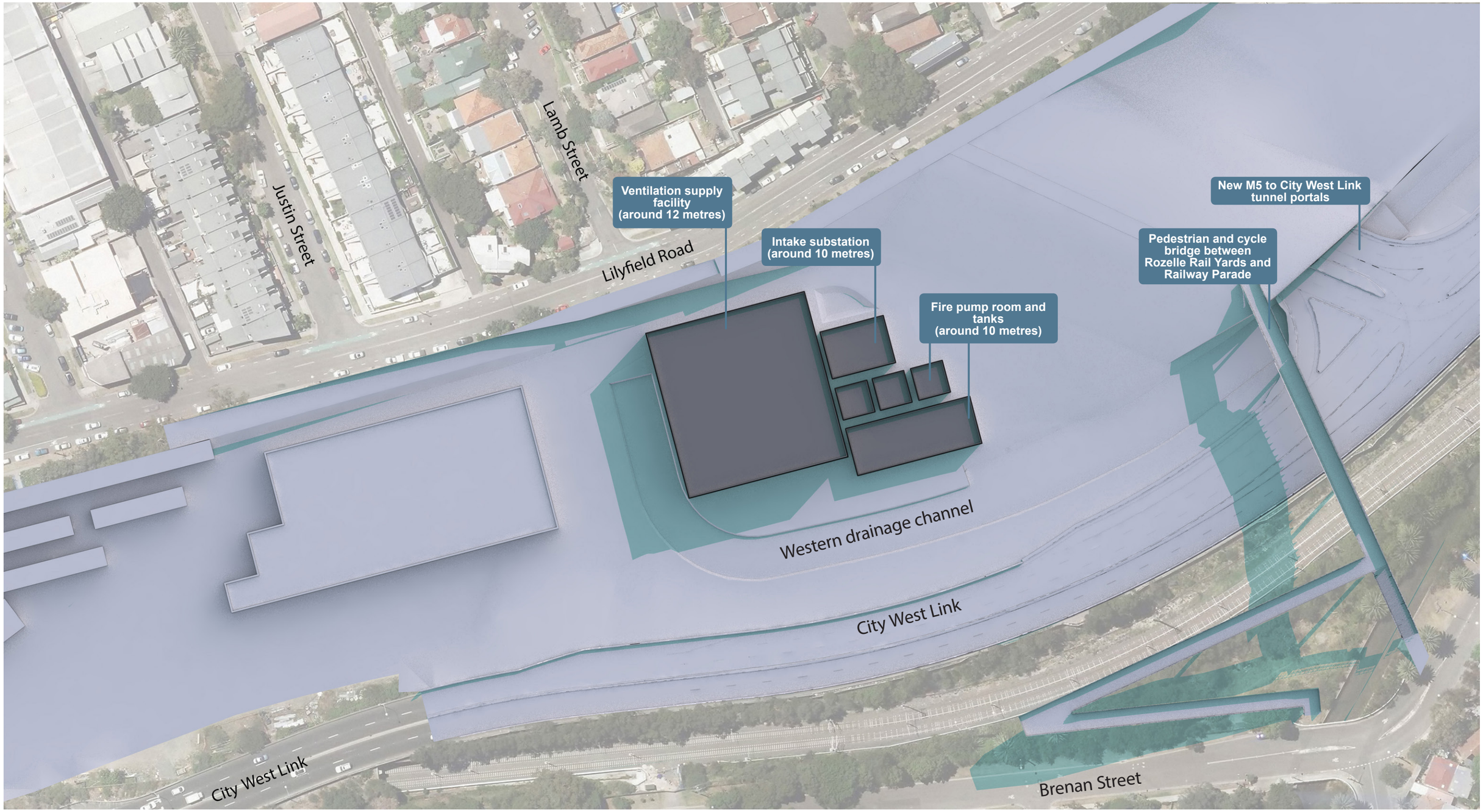
TITLE

M4-M5 Link - Shadow diagrams and overshadowing

3.00 pm analysis (21st June)
Darley Road motorway operations complex (MOC1)
Leichhardt

DRAWING	REVISION	DATE
007	B	11/08/2017

Sydney Motorway Corporation | WestConnex | AECOM



LEGEND

- Building/ structure shadow
- Project buildings and structures

KEY PLAN

SCALE 0 10 20 30 40 50m

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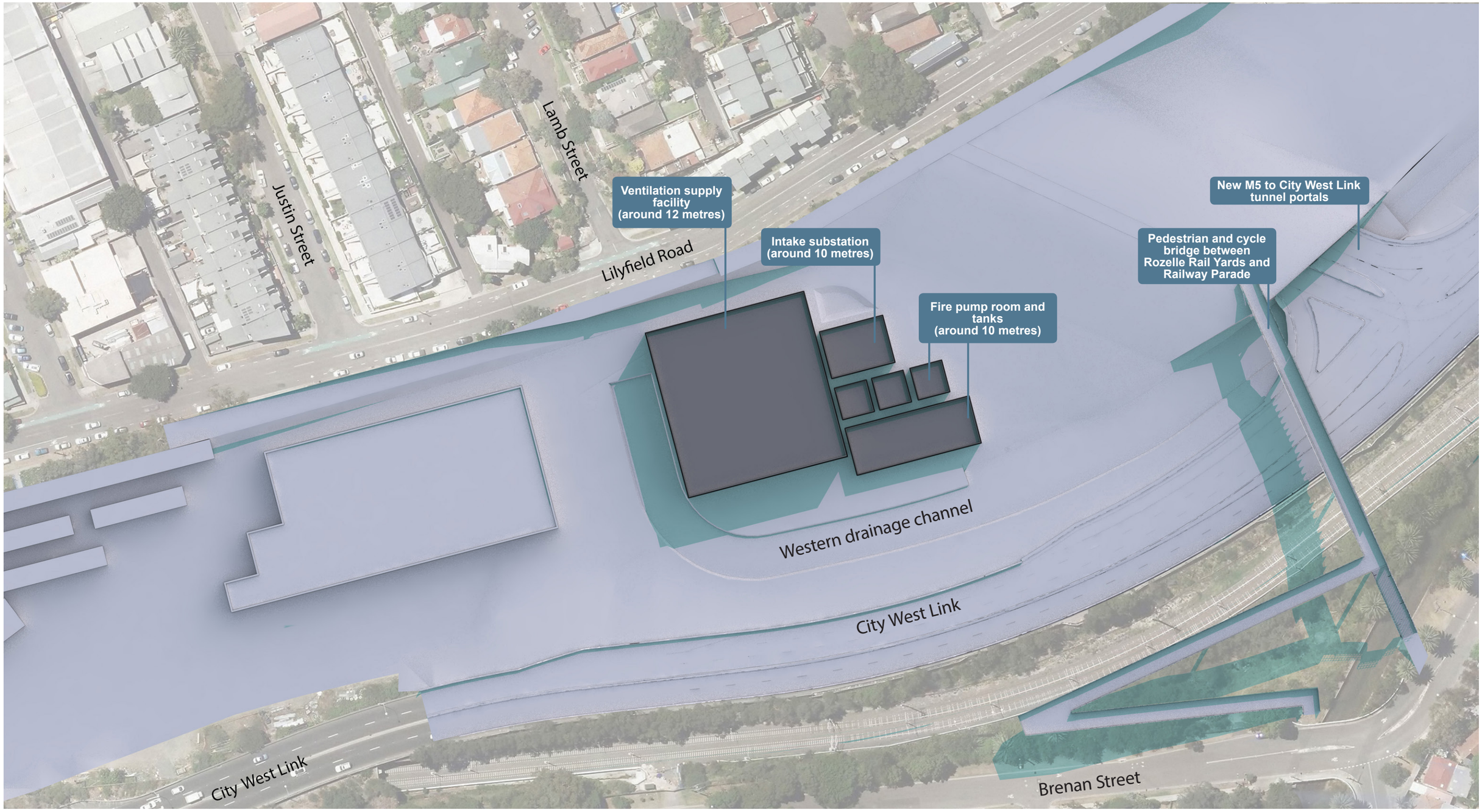
TITLE
M4-M5 Link - Shadow diagrams and overshadowing
9.00 am analysis (21st June)
Rozelle West motorway operations complex (MOC2)
Rozelle

DRAWING	REVISION	DATE
008	B	11/08/2017

Sydney Motorway Corporation | WestConnex | AECOM



LEGEND

- Building/ structure shadow
- Project buildings and structures

KEY PLAN

SCALE 0 10 20 30 40 50m

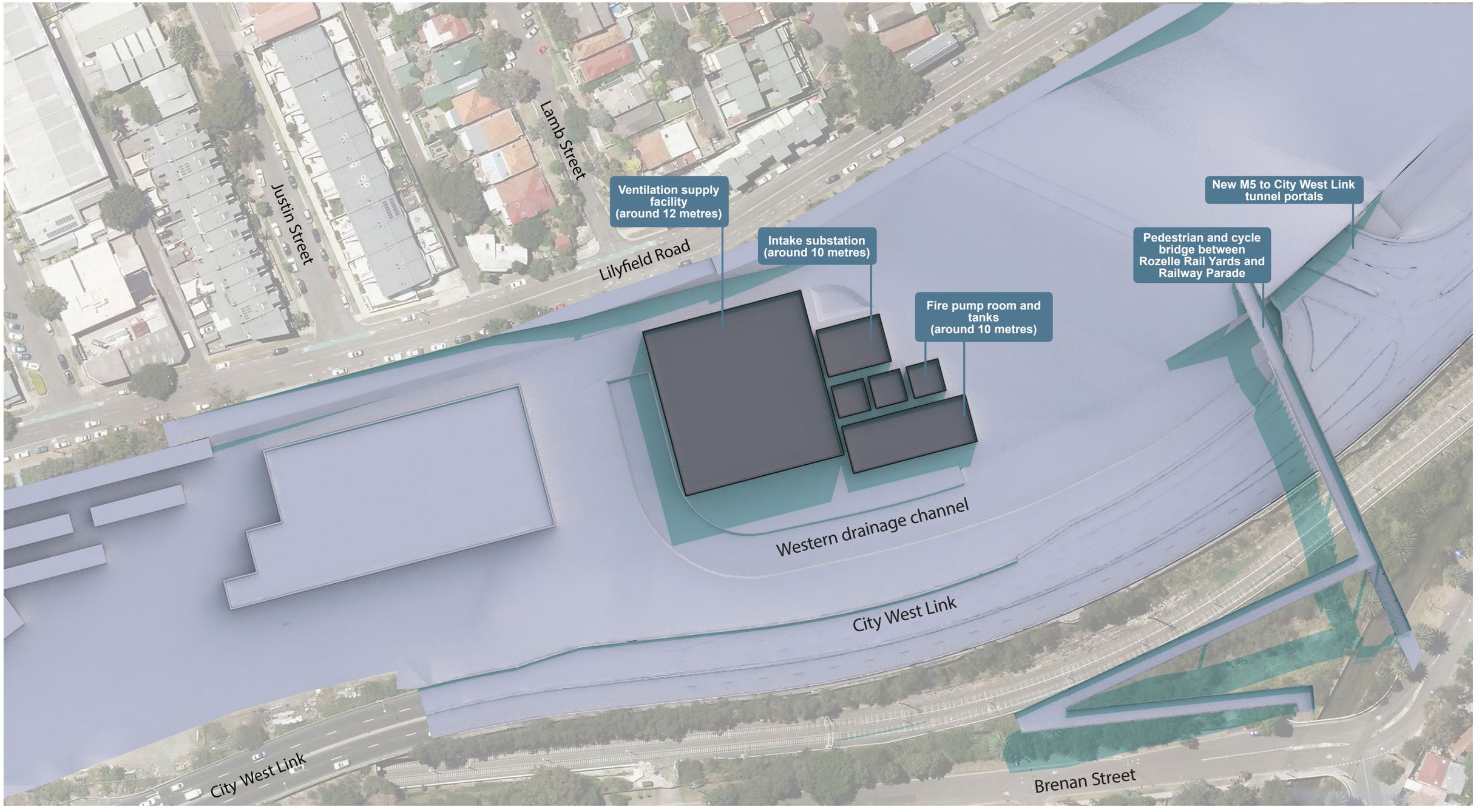
N

TITLE
M4-M5 Link - Shadow diagrams and overshadowing

10.00 am analysis (21st June)
Rozelle West motorway operations complex (MOC2)
Rozelle

DRAWING	REVISION	DATE
009	B	11/08/2017

Sydney Motorway Corporation | WestConnex | AECOM



LEGEND

- Building/ structure shadow
- Project buildings and structures

KEY PLAN

SCALE 0 10 20 30 40 50m

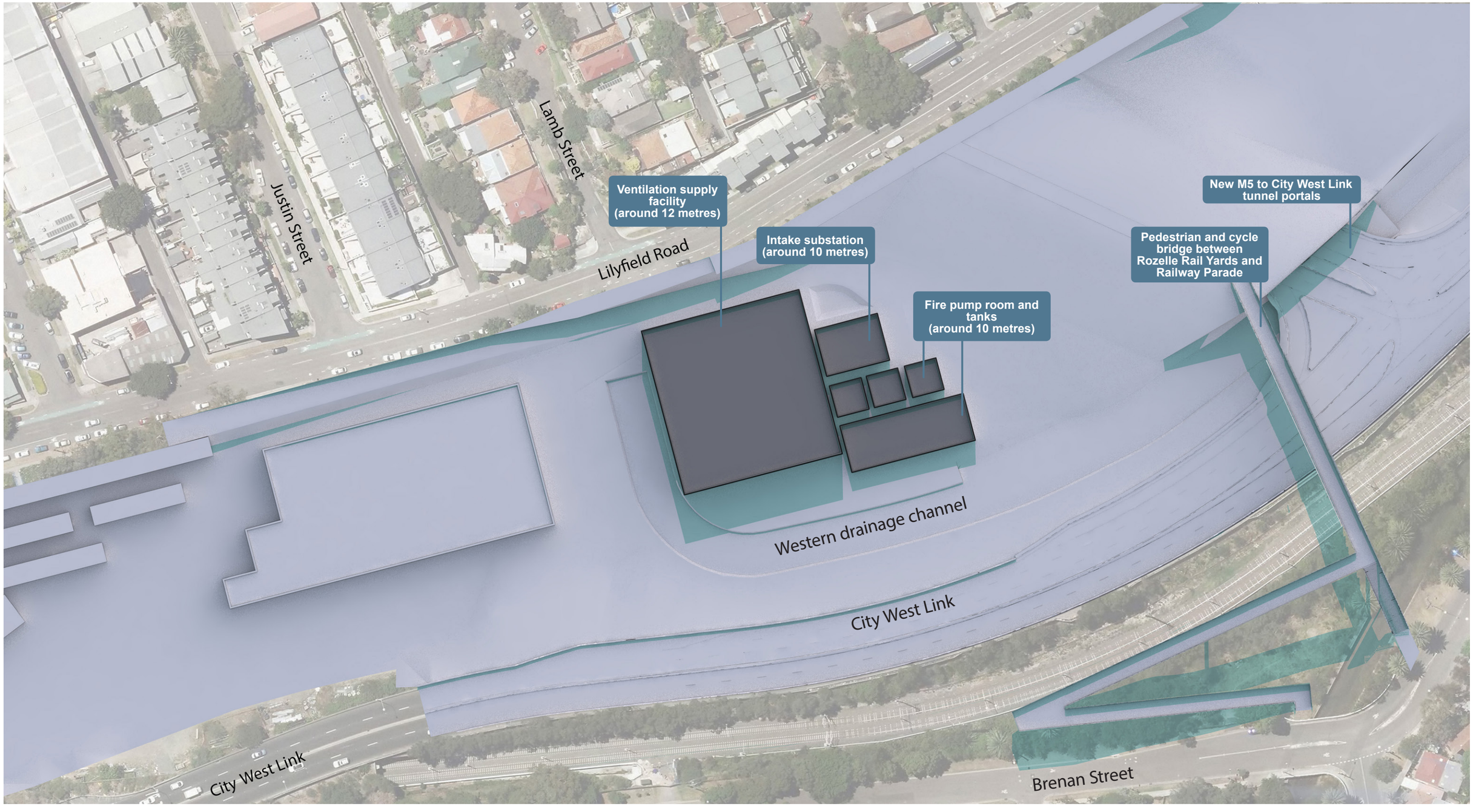
N

TITLE
M4-M5 Link - Shadow diagrams and overshadowing

11.00 am analysis (21st June)
Rozelle West motorway operations complex (MOC2)
Rozelle

DRAWING	REVISION	DATE
010	B	11/08/2017

Sydney Motorway Corporation | WestConnex | AECOM



LEGEND

- Building/ structure shadow
- Project buildings and structures

KEY PLAN

SCALE 0 10 20 30 40 50m

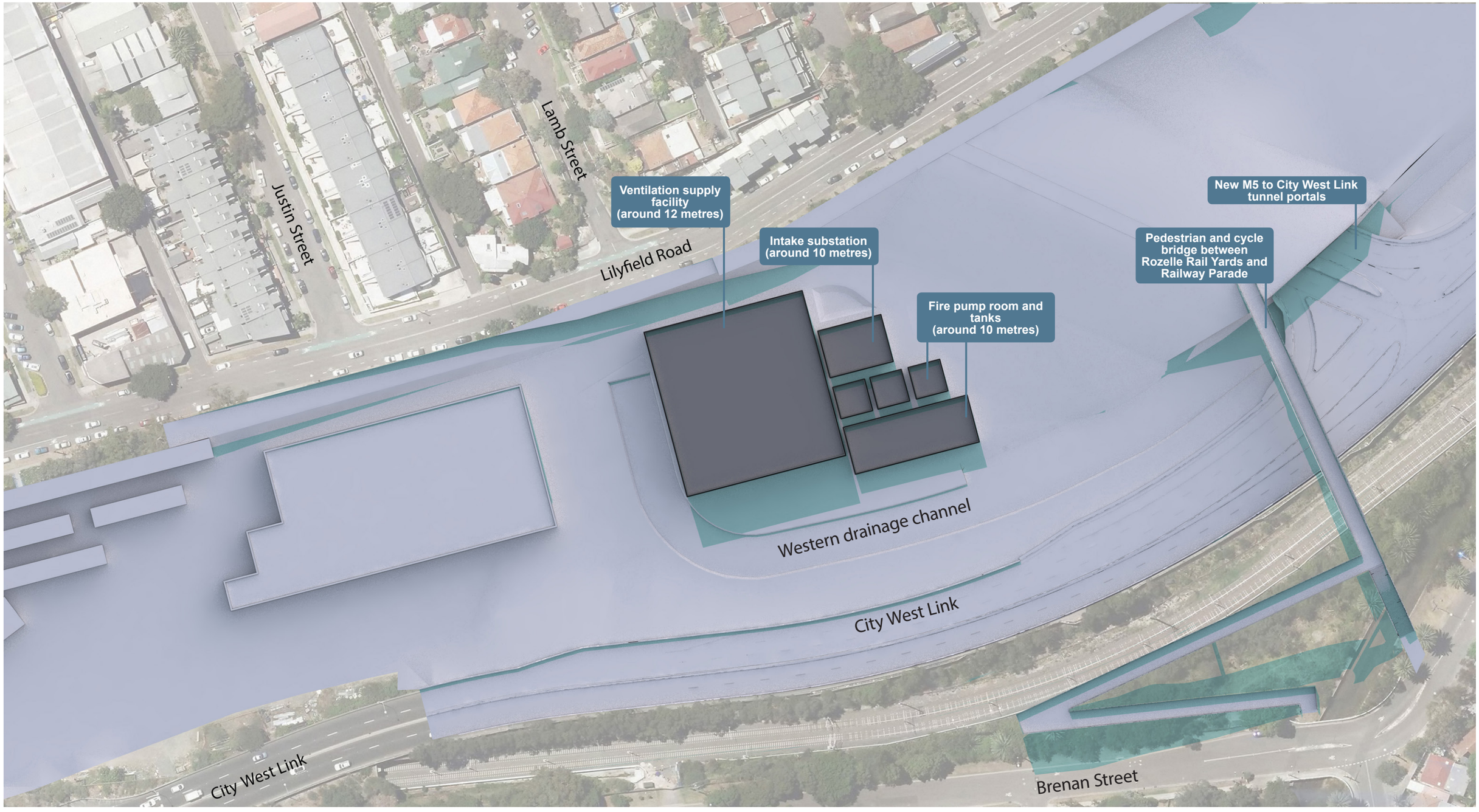
N

TITLE
M4-M5 Link - Shadow diagrams and overshadowing

12.00 pm analysis (21st June)
Rozelle West motorway operations complex (MOC2)
Rozelle

DRAWING	REVISION	DATE
011	B	11/08/2017

Sydney Motorway Corporation | WestConnex | AECOM



LEGEND

- Building/ structure shadow
- Project buildings and structures

KEY PLAN

SCALE 0 10 20 30 40 50m

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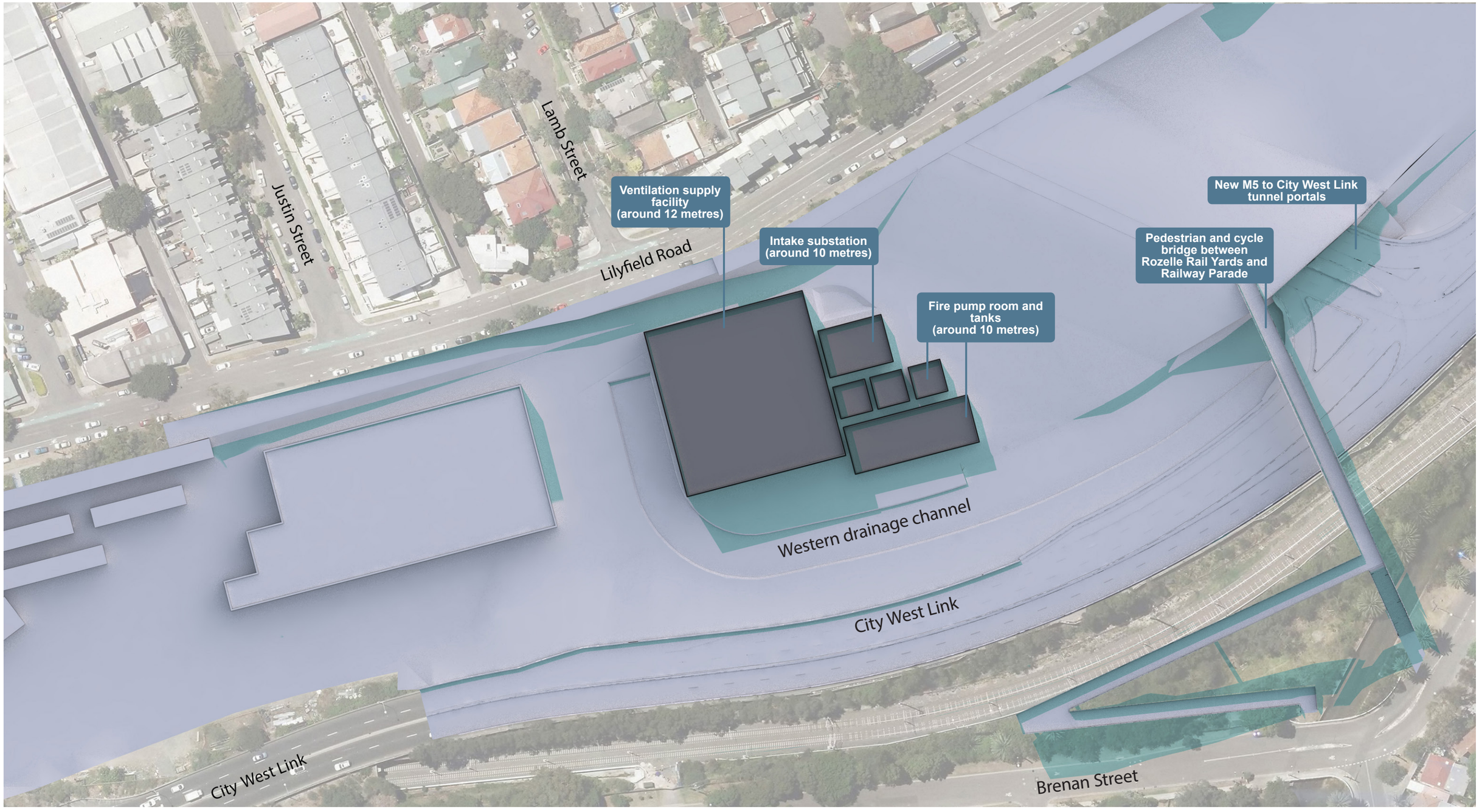
TITLE
M4-M5 Link - Shadow diagrams and overshadowing

1.00 pm analysis (21st June)
Rozelle West motorway operations complex (MOC2)
Rozelle

DRAWING	REVISION	DATE
012	B	11/08/2017

Sydney Motorway Corporation | WestConnex | AECOM



LEGEND

- Building/ structure shadow
- Project buildings and structures

KEY PLAN

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TITLE
M4-M5 Link - Shadow diagrams and overshadowing

2.00 pm analysis (21st June)
Rozelle West motorway operations complex (MOC2)
Rozelle

DRAWING	REVISION	DATE
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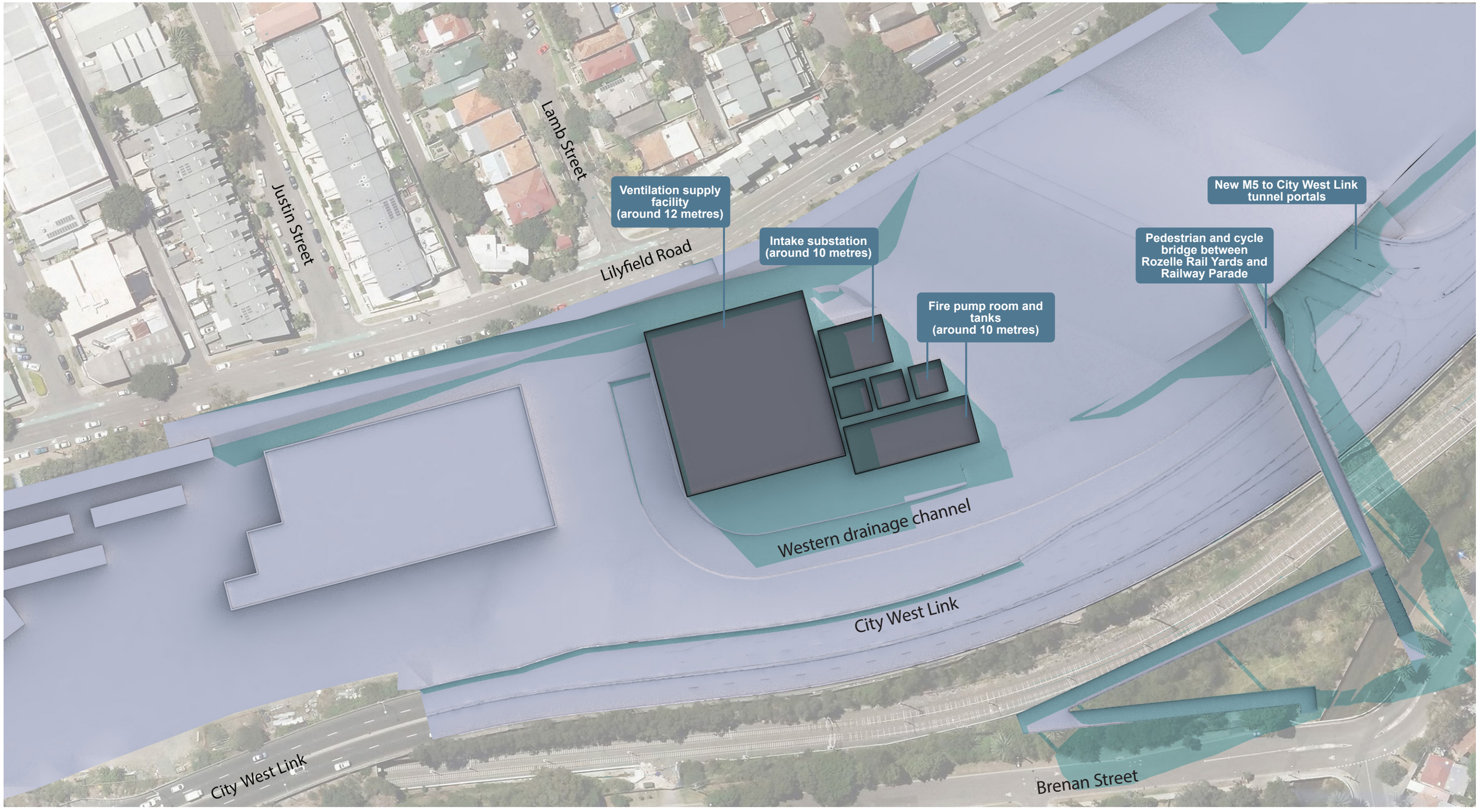

LEGEND

- Building/ structure shadow
- Project buildings and structures

KEY PLAN

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TITLE
M4-M5 Link - Shadow diagrams and overshadowing

3.00 pm analysis (21st June)
Rozelle West motorway operations complex (MOC2)
Rozelle

DRAWING	REVISION	DATE
014	B	11/08/2017

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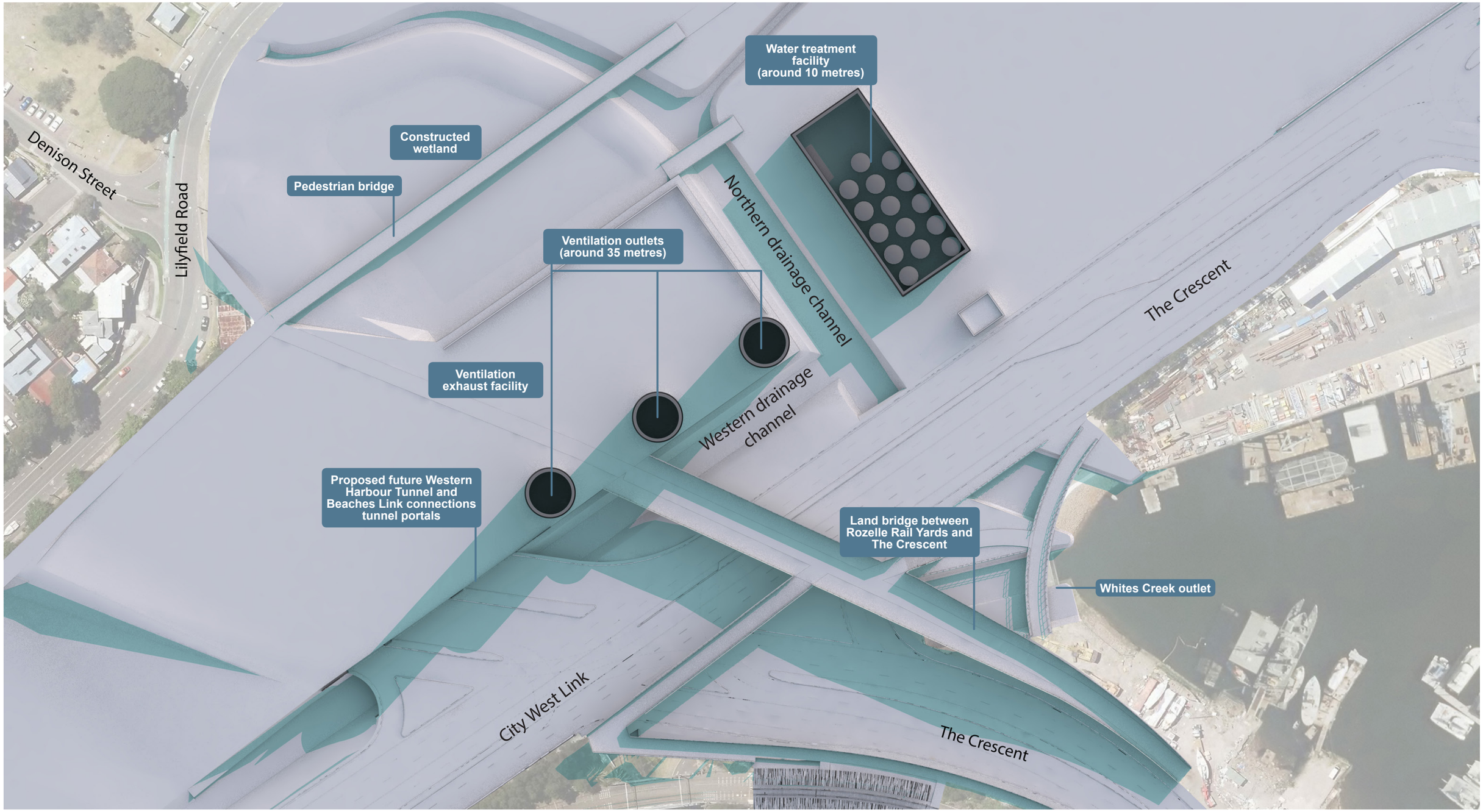

LEGEND

- Building/ structure shadow
- Project buildings and structures

KEY PLAN

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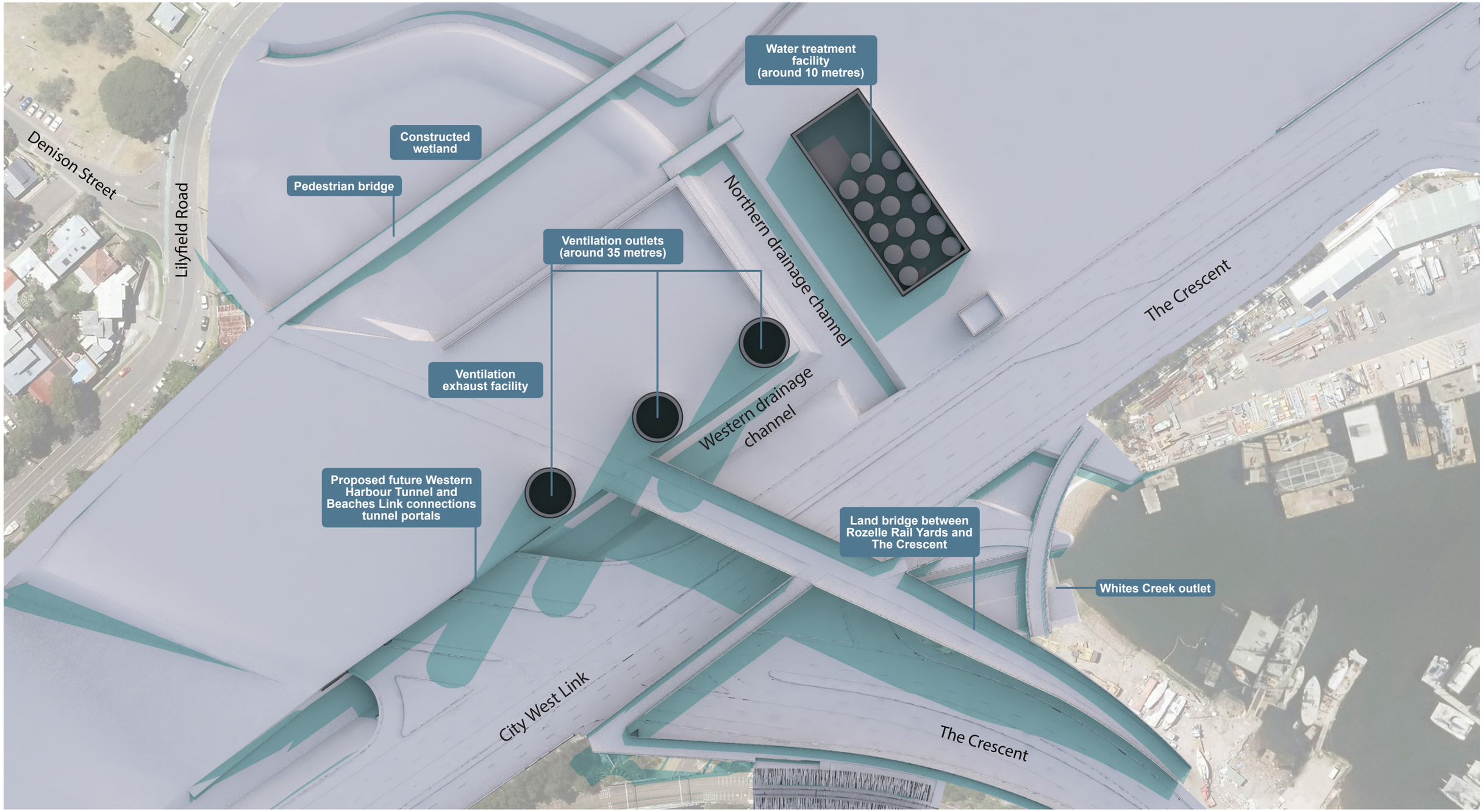
TITLE
M4-M5 Link - Shadow diagrams and overshadowing

9.00 am analysis (21st June)
Rozelle East motorway operations complex (MOC3)
Rozelle

DRAWING	REVISION	DATE
015	B	11/08/2017

Sydney Motorway Corporation | WestConnex | AECOM



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- Building/ structure shadow
- Project buildings and structures

KEY PLAN

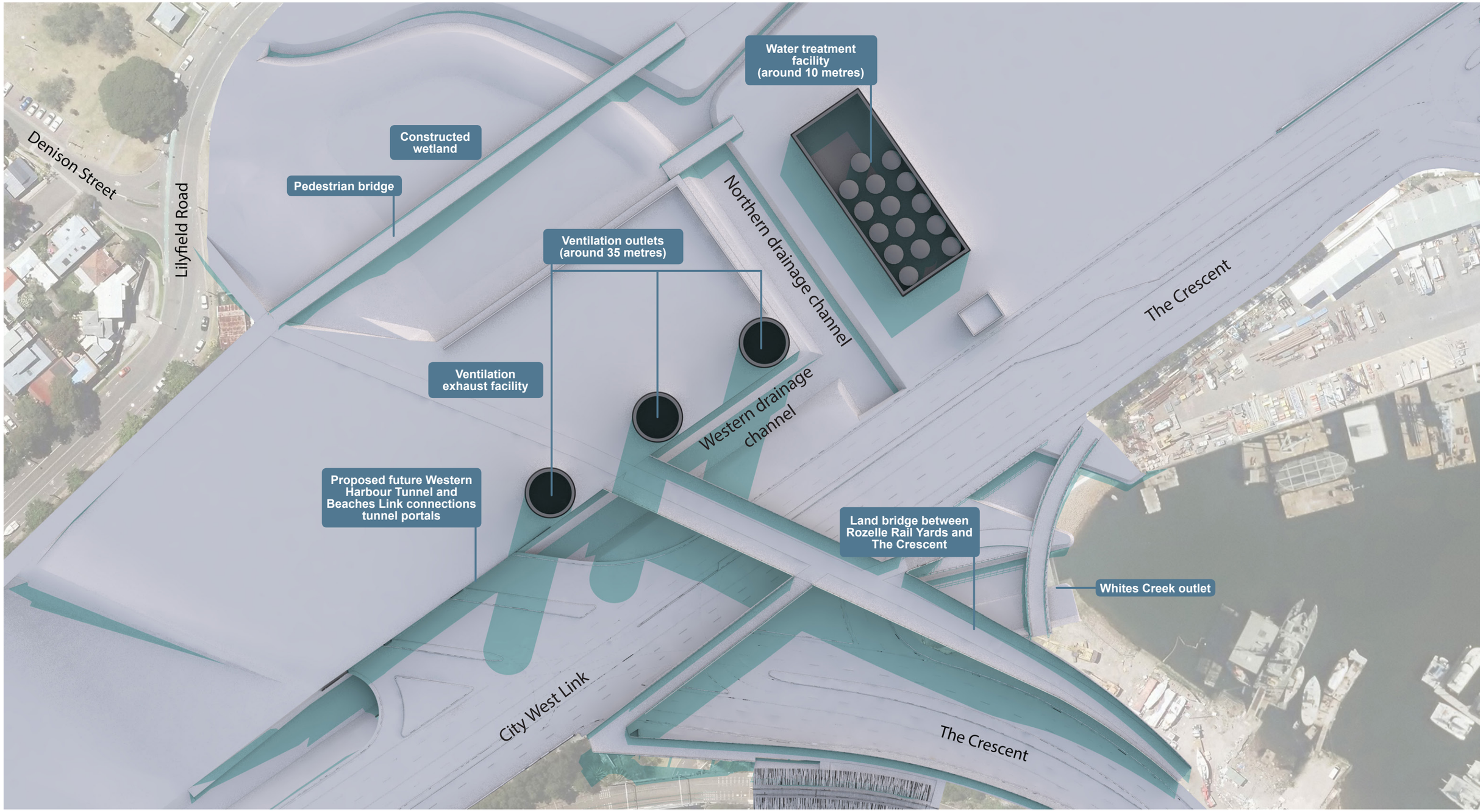
SCALE 0 10 20 30 40 50m

TITLE
M4-M5 Link - Shadow diagrams and overshadowing

10.00 am analysis (21st June)
Rozelle East motorway operations complex (MOC3)
Rozelle

DRAWING	REVISION	DATE
016	B	11/08/2017

Sydney Motorway Corporation | WestConnex | AECOM



LEGEND

- Building/ structure shadow
- Project buildings and structures

KEY PLAN

SCALE 0 10 20 30 40 50m

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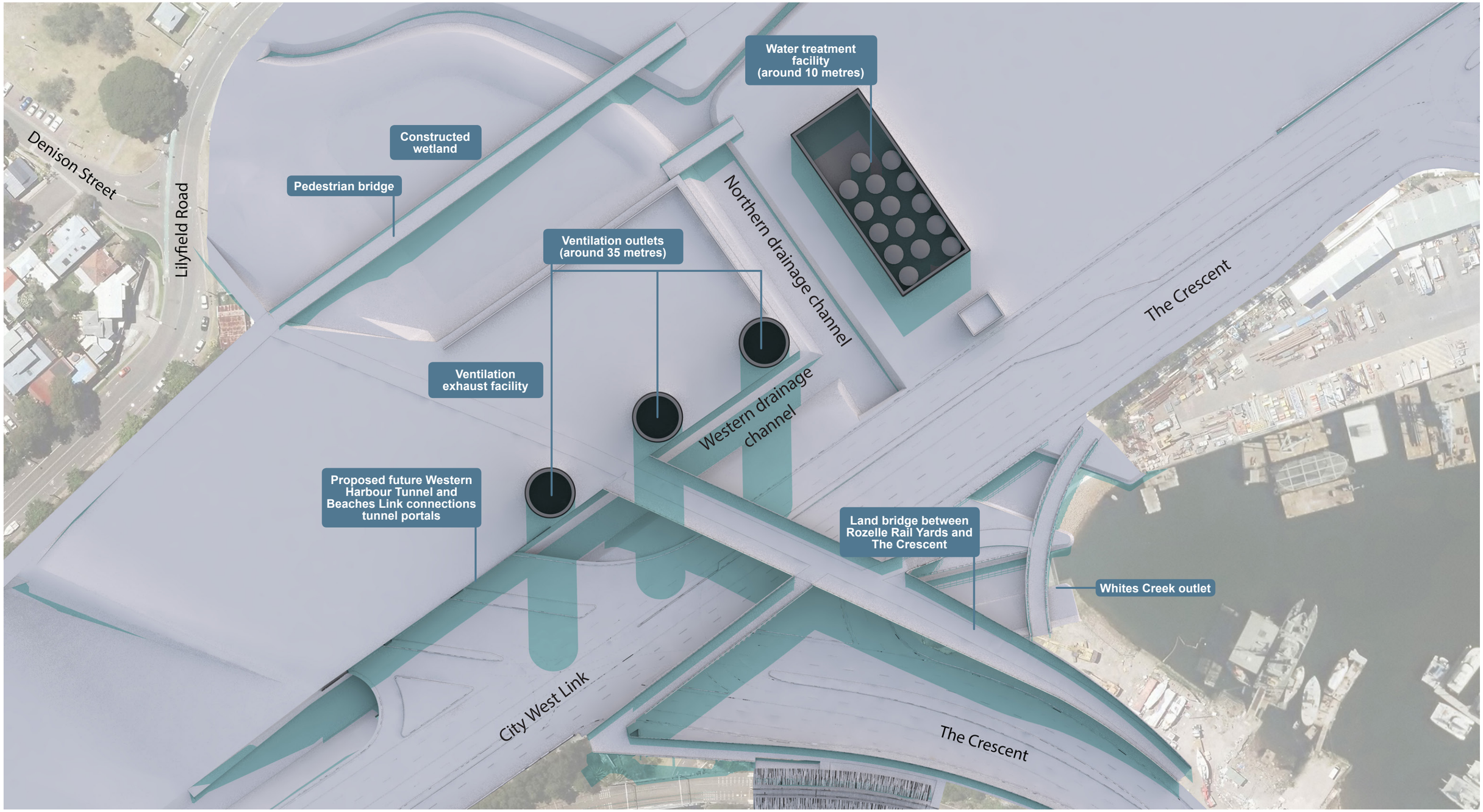
TITLE
M4-M5 Link - Shadow diagrams and overshadowing

11.00 am analysis (21st June)
Rozelle East motorway operations complex (MOC3)
Rozelle

DRAWING	REVISION	DATE
017	B	11/08/2017

Sydney Motorway Corporation | WestConnex | AECOM



LEGEND

- Building/ structure shadow
- Project buildings and structures

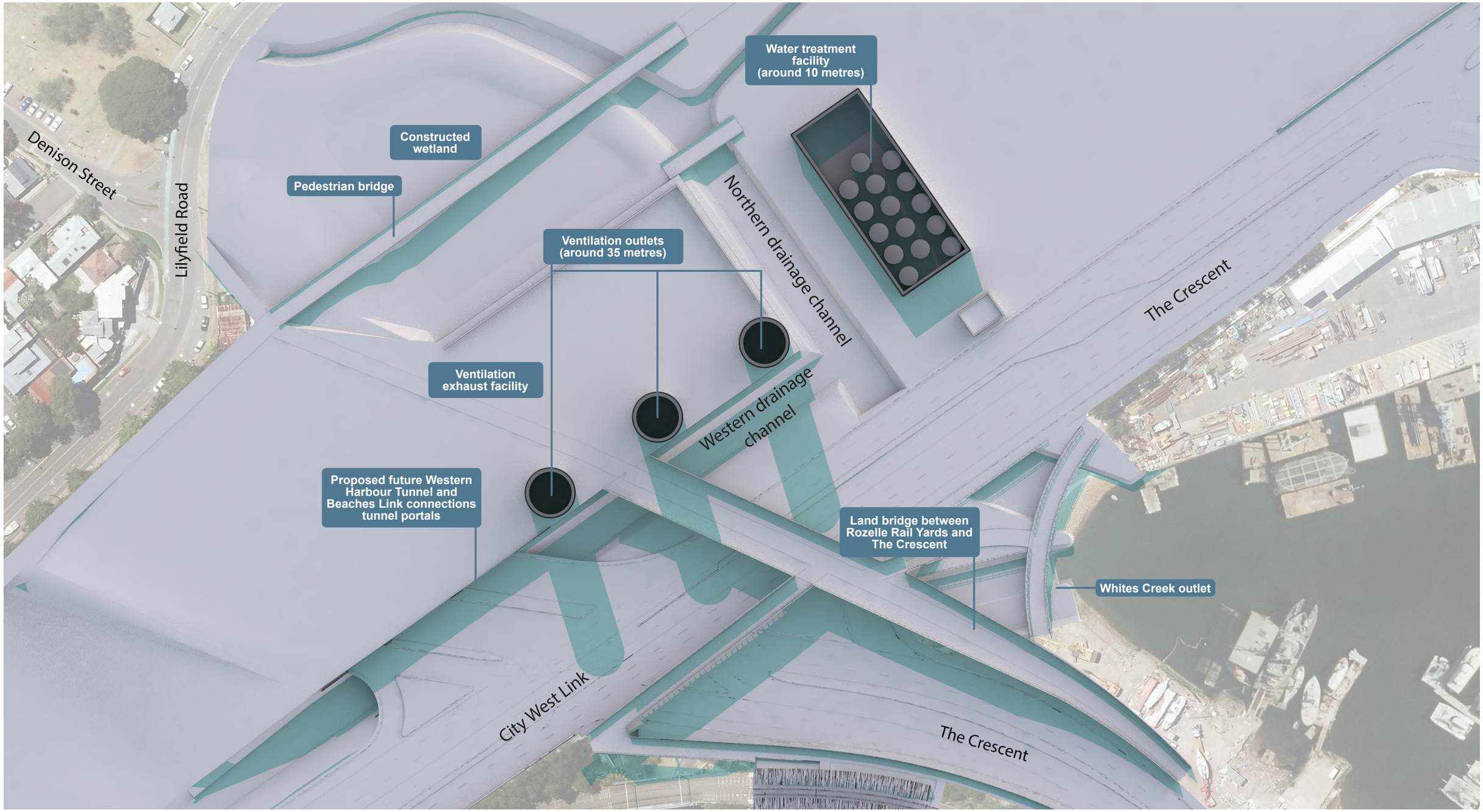
KEY PLAN

SCALE 0 10 20 30 40 50m

TITLE
M4-M5 Link - Shadow diagrams and overshadowing
12.00 pm analysis (21st June)
Rozelle East motorway operations complex (MOC3)
Rozelle

DRAWING	REVISION	DATE
018	B	11/08/2017

Sydney Motorway Corporation | WestConnex | AECOM



LEGEND

- Building/ structure shadow
- Project buildings and structures

KEY PLAN

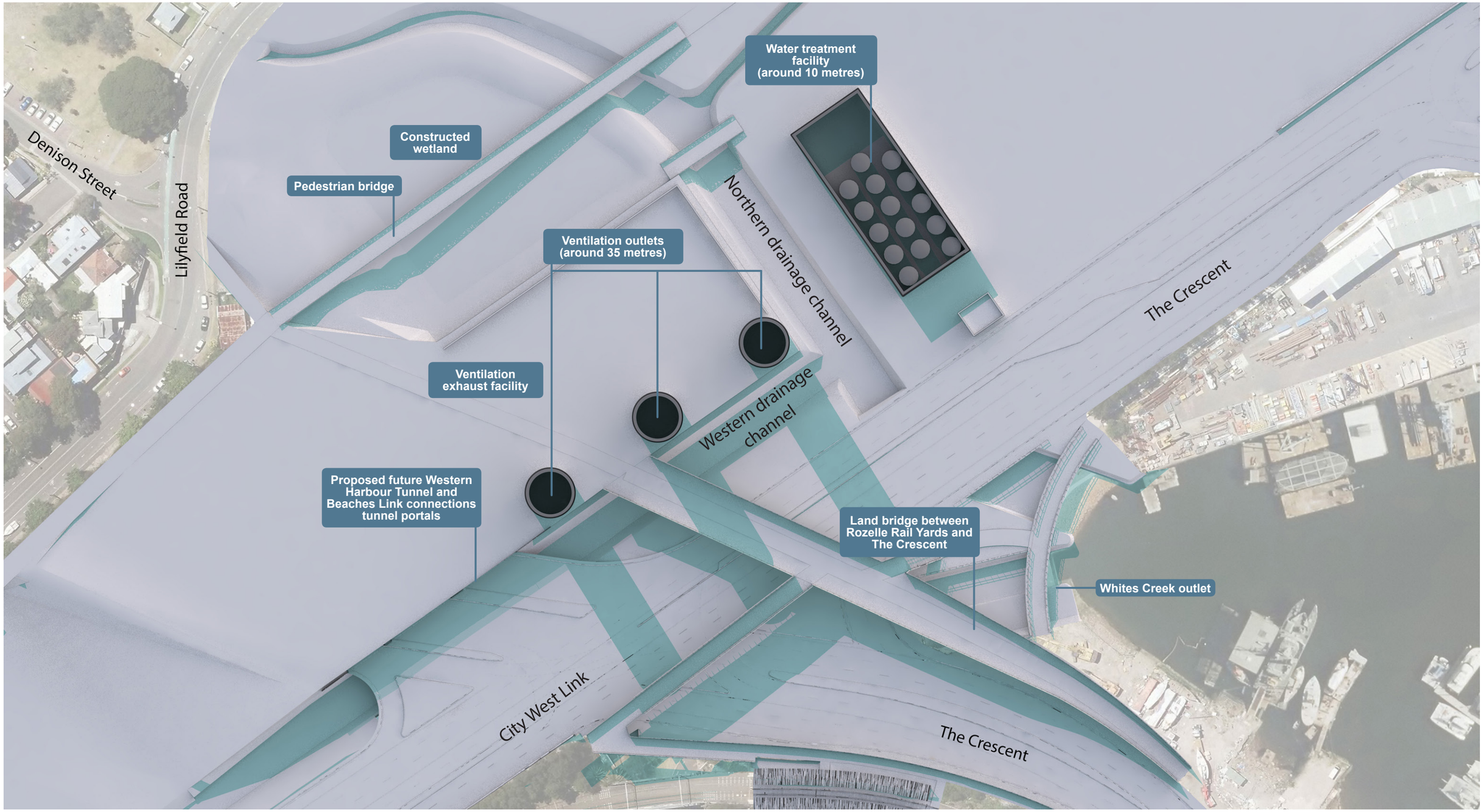
SCALE 0 10 20 30 40 50m

TITLE
M4-M5 Link - Shadow diagrams and overshadowing

1.00 pm analysis (21st June)
Rozelle East motorway operations complex (MOC3)
Rozelle

DRAWING	REVISION	DATE
019	B	11/08/2017

Sydney Motorway Corporation | WestConnex | AECOM



LEGEND

- Building/ structure shadow
- Project buildings and structures

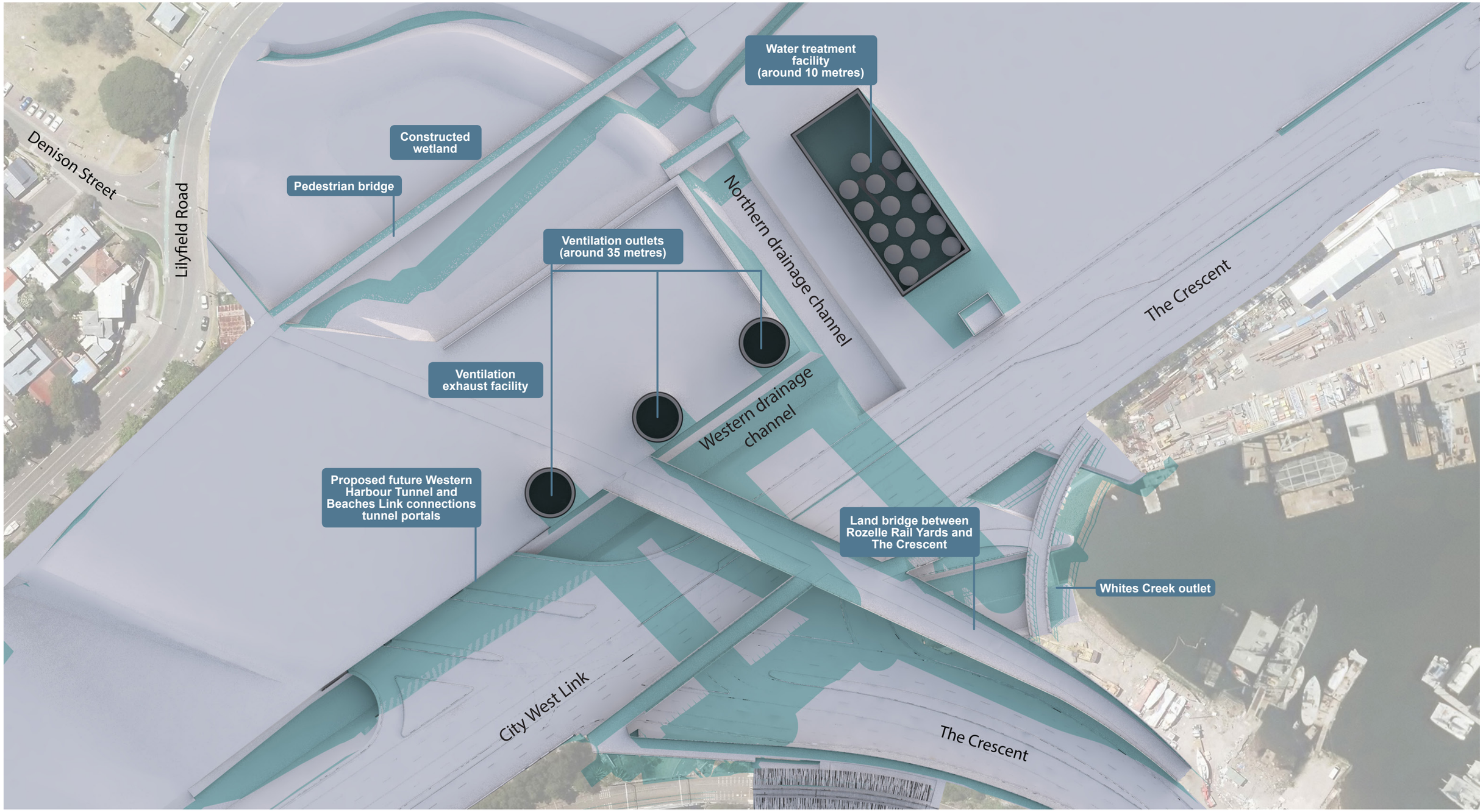
KEY PLAN

SCALE 0 10 20 30 40 50m

TITLE
M4-M5 Link - Shadow diagrams and overshadowing
2.00 pm analysis (21st June)
Rozelle East motorway operations complex (MOC3)
Rozelle

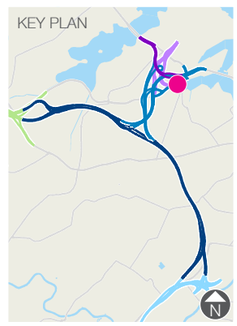
DRAWING	REVISION	DATE
020	B	11/08/2017

Sydney Motorway Corporation | WestConnex | AECOM



LEGEND

- Building/ structure shadow
- Project buildings and structures



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TITLE
M4-M5 Link - Shadow diagrams and overshadowing

3.00 pm analysis (21st June)
Rozelle East motorway operations complex (MOC3)
Rozelle

DRAWING	REVISION	DATE
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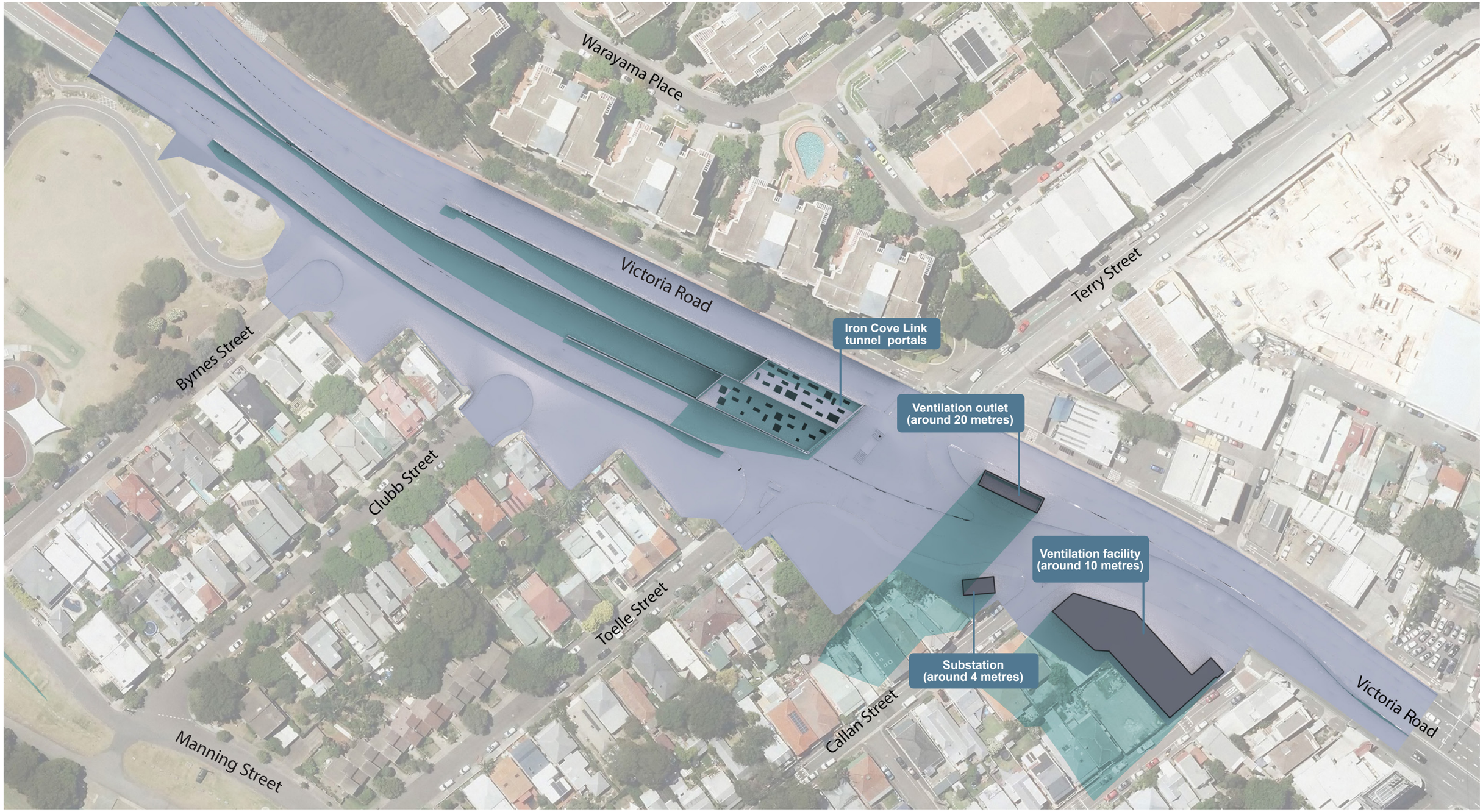

LEGEND

- Building/ structure shadow
- Project buildings and structures

KEY PLAN

SCALE 0 10 20 30 40 50m

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TITLE
M4-M5 Link - Shadow diagrams and overshadowing
9.00 am analysis (21st June)
Iron Cove Link motorway operations complex (MOC4)
Rozelle

DRAWING	REVISION	DATE
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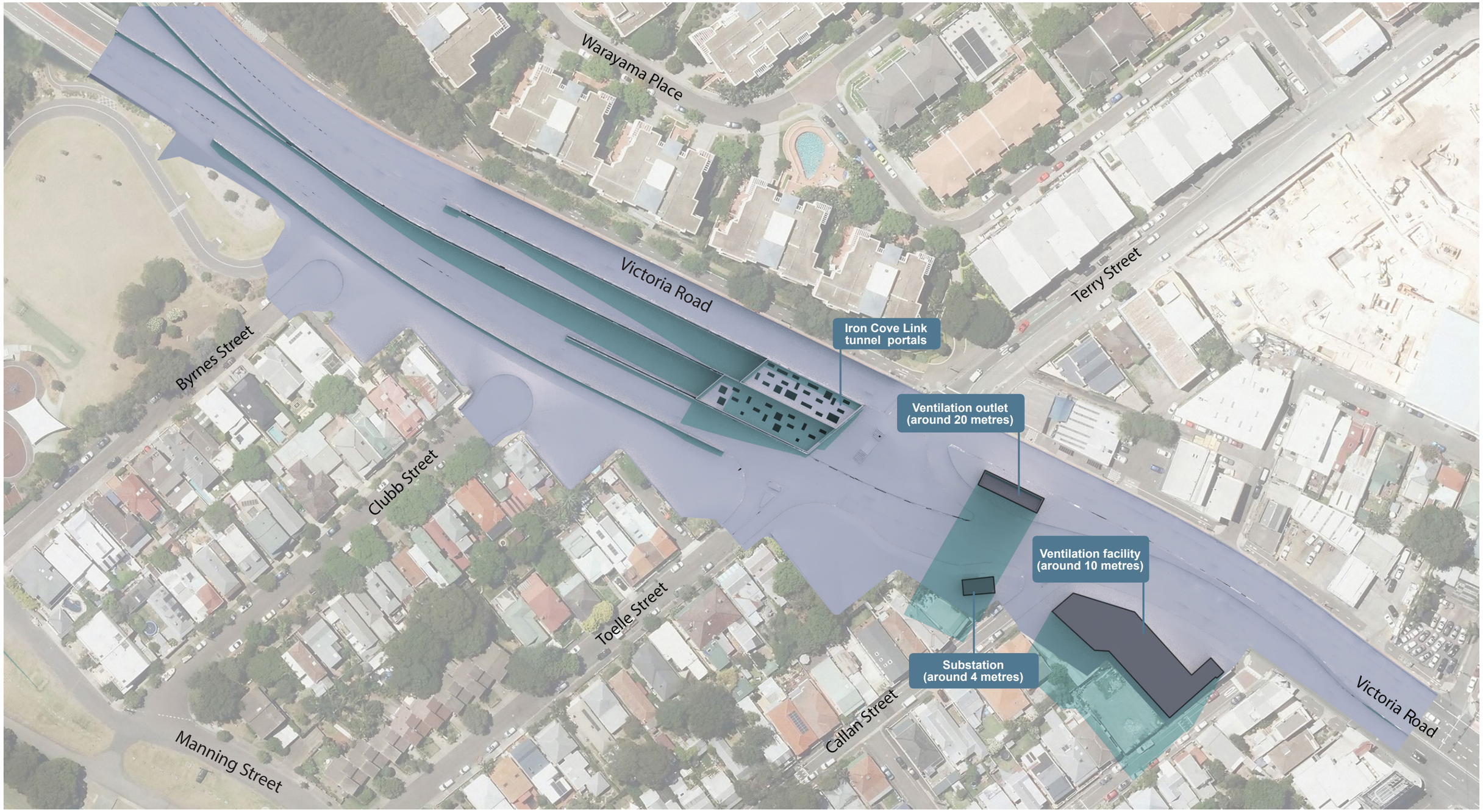
Sydney Motorway Corporation | WestConnex | AECOM



LEGEND

- Building/ structure shadow
- Project buildings and structures

KEY PLAN

SCALE 0 10 20 30 40 50m

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TITLE
M4-M5 Link - Shadow diagrams and overshadowing

10.00 am analysis (21st June)
Iron Cove Link motorway operations complex (MOC4)
Rozelle

DRAWING	REVISION	DATE
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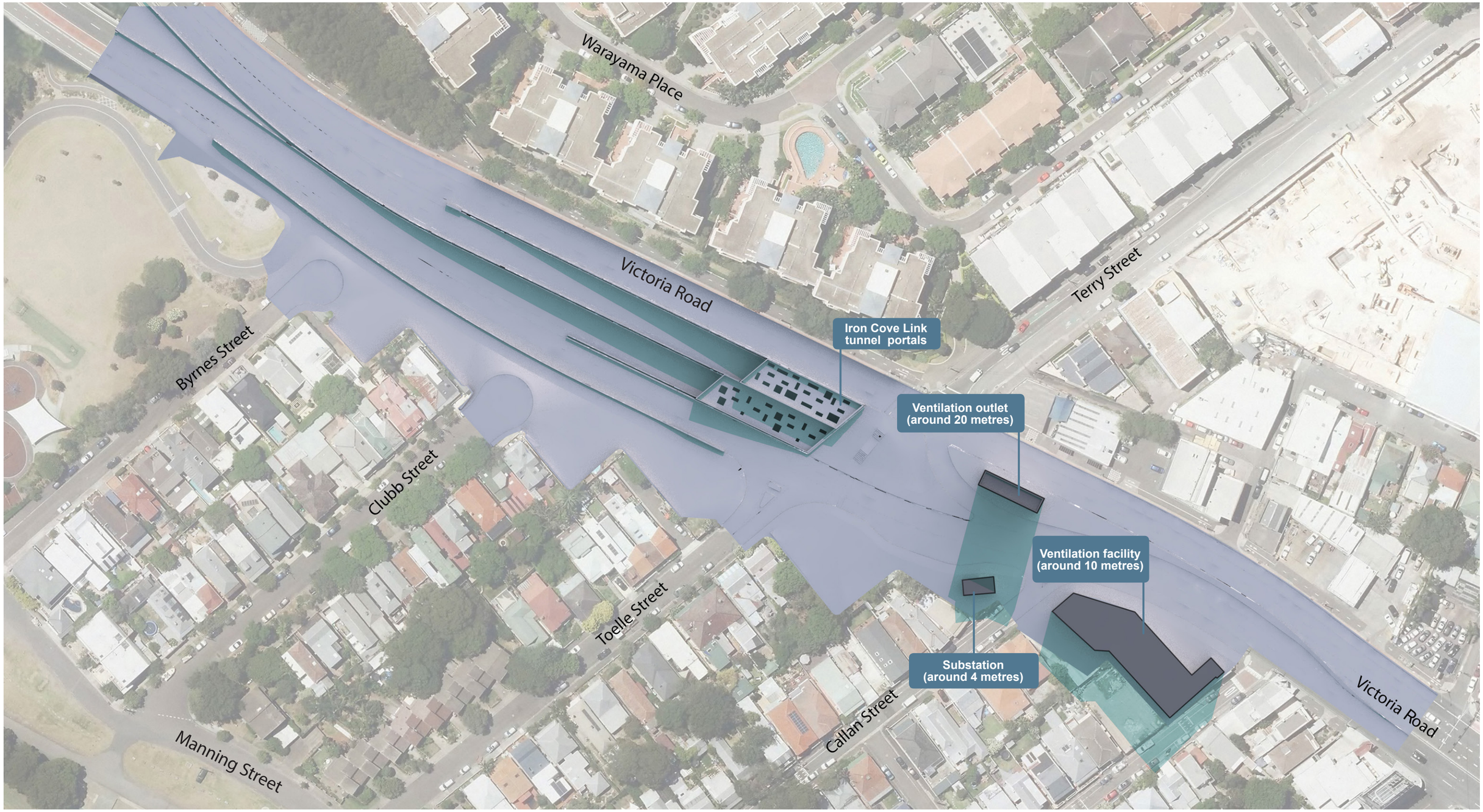
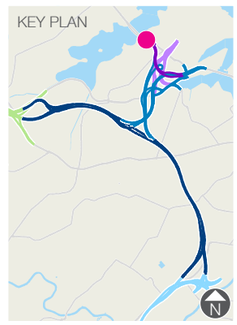


LEGEND

- Building/ structure shadow
- Project buildings and structures



SCALE 0 10 20 30 40 50m

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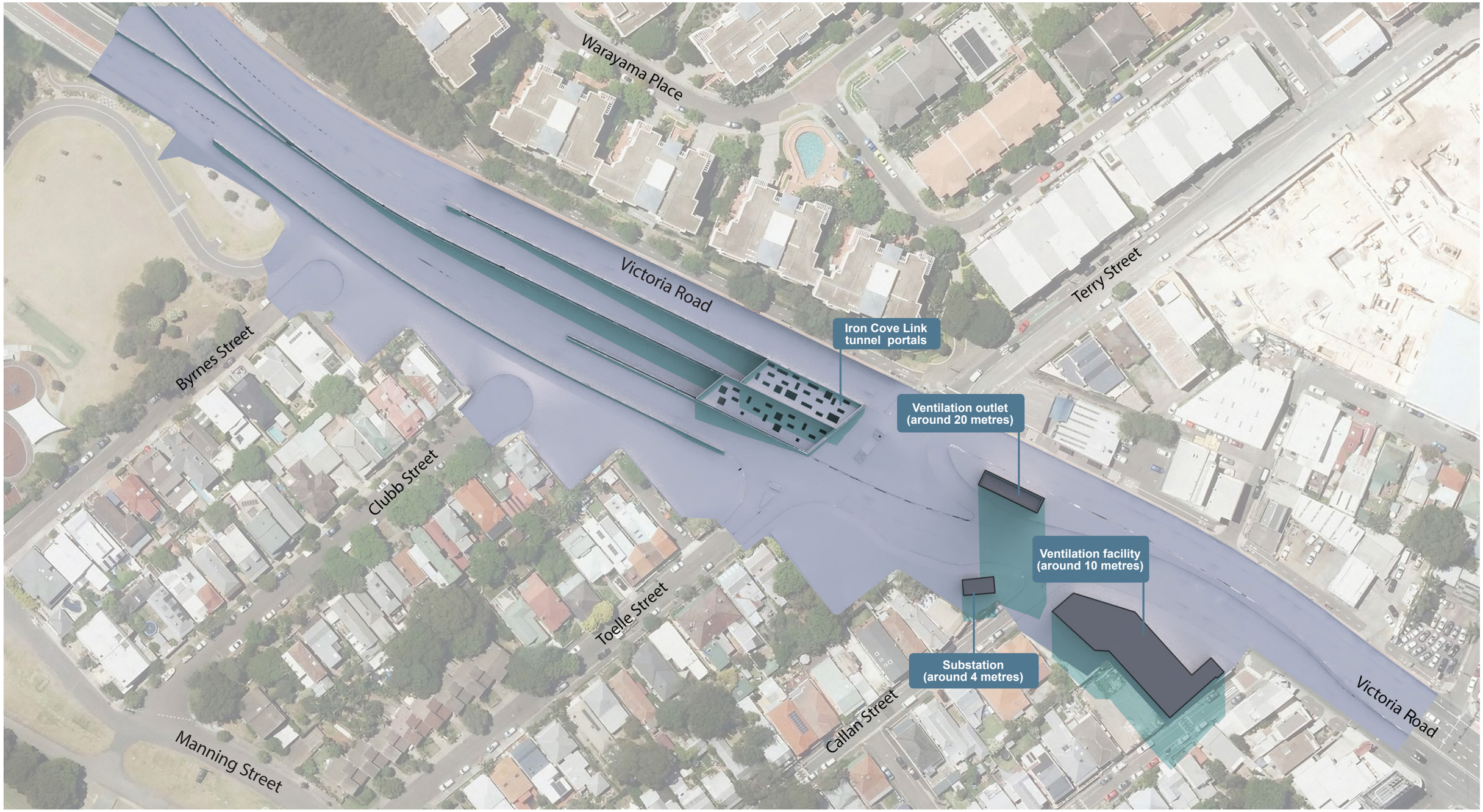
TITLE
M4-M5 Link - Shadow diagrams and overshadowing

11.00 am analysis (21st June)
Iron Cove Link motorway operations complex (MOC4)
Rozelle

DRAWING	REVISION	DATE
024	B	11/08/2017

Sydney Motorway Corporation | WestConnex | AECOM



LEGEND

- Building/ structure shadow
- Project buildings and structures

KEY PLAN

SCALE 0 10 20 30 40 50m

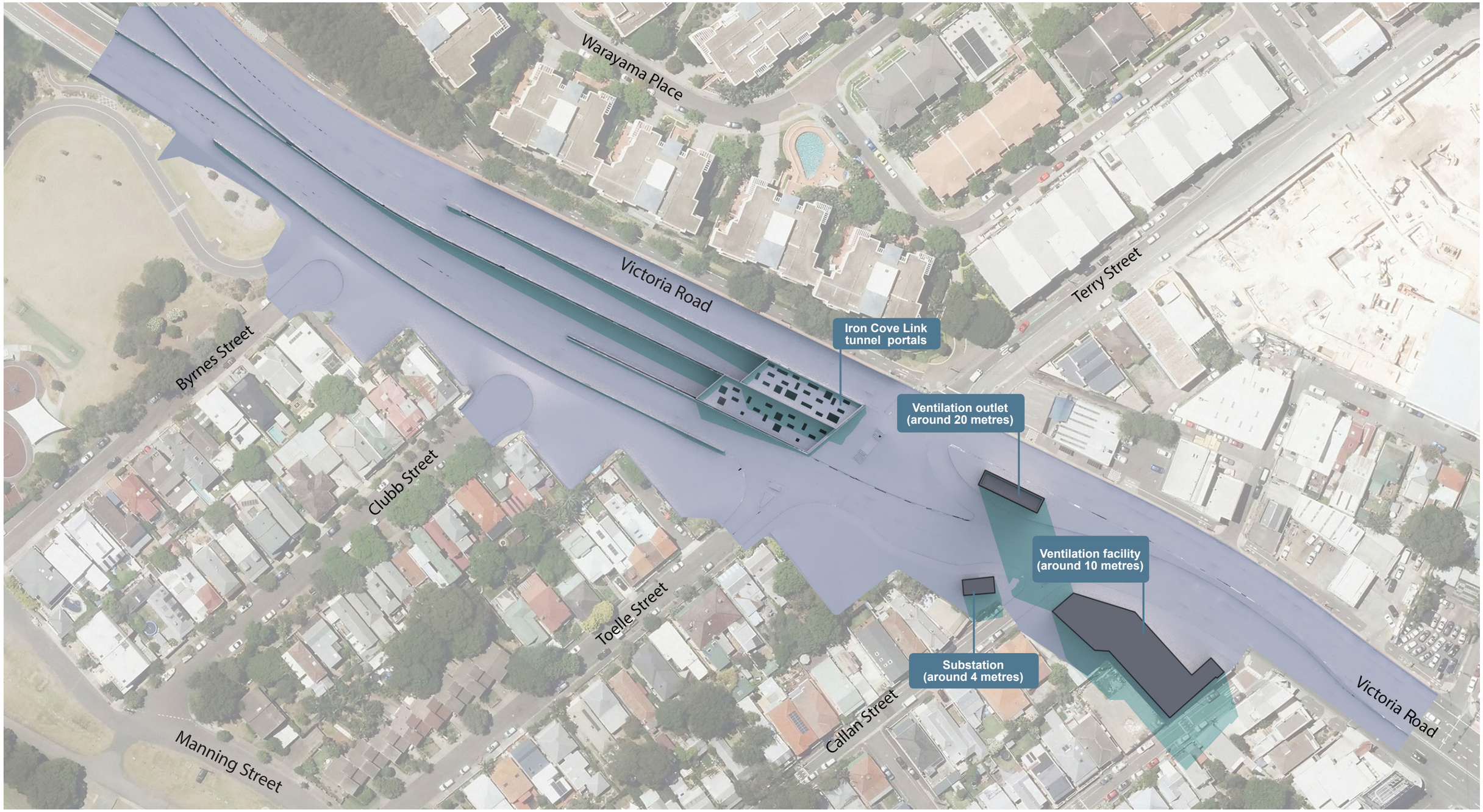
N

TITLE
M4-M5 Link - Shadow diagrams and overshadowing

12.00 pm analysis (21st June)
Iron Cove Link motorway operations complex (MOC4)
Rozelle

DRAWING	REVISION	DATE
025	B	11/08/2017

Sydney Motorway Corporation | WestConnex | AECOM



LEGEND

- Building/ structure shadow
- Project buildings and structures

KEY PLAN

SCALE 0 10 20 30 40 50m

N

TITLE
M4-M5 Link - Shadow diagrams and overshadowing
1.00 pm analysis (21st June)
Iron Cove Link motorway operations complex (MOC4)
Rozelle

DRAWING	REVISION	DATE
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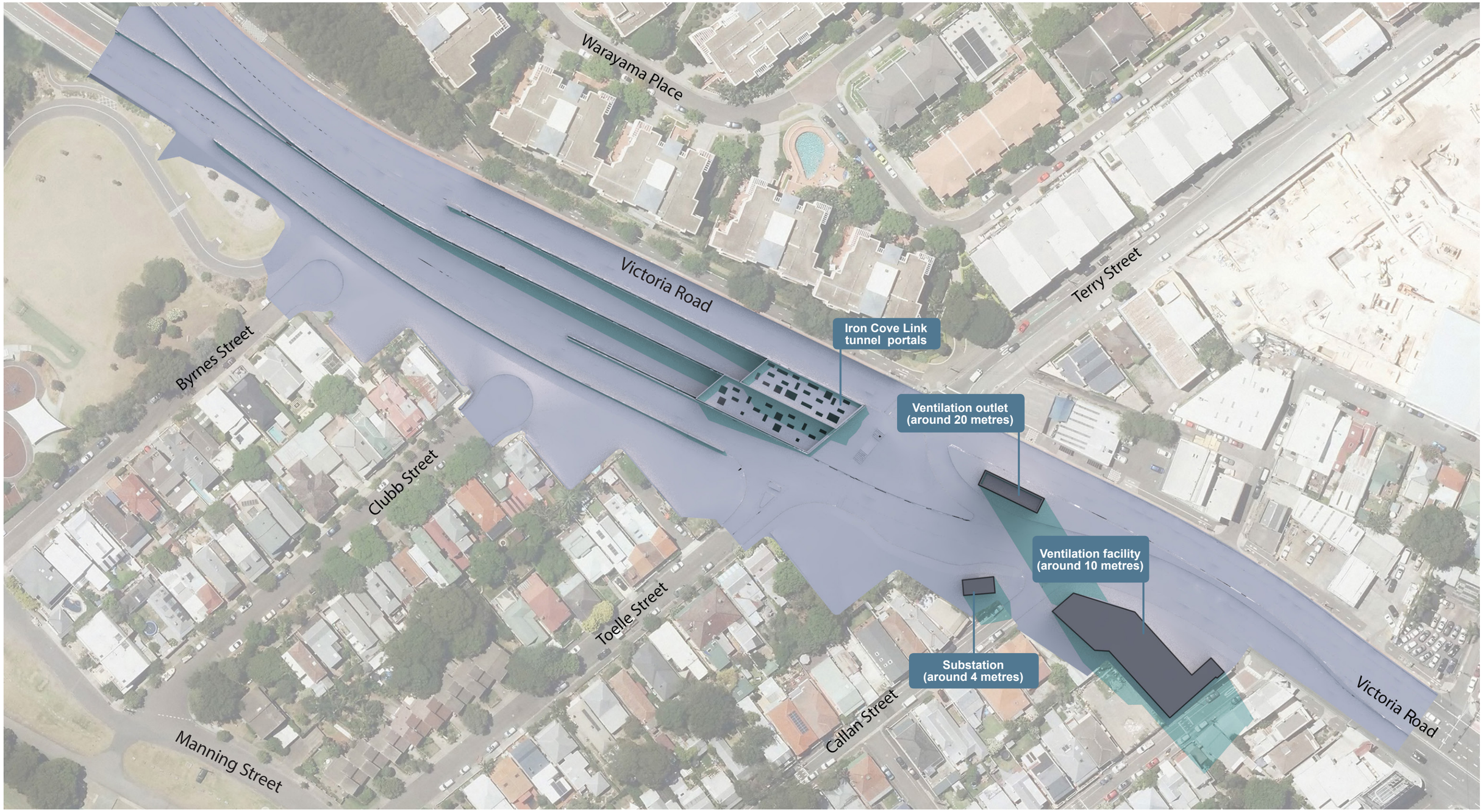

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- Project buildings and structures

KEY PLAN

SCALE 0 10 20 30 40 50m

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TITLE
M4-M5 Link - Shadow diagrams and overshadowing
2.00 pm analysis (21st June)
Iron Cove Link motorway operations complex (MOC4)
Rozelle

DRAWING	REVISION	DATE
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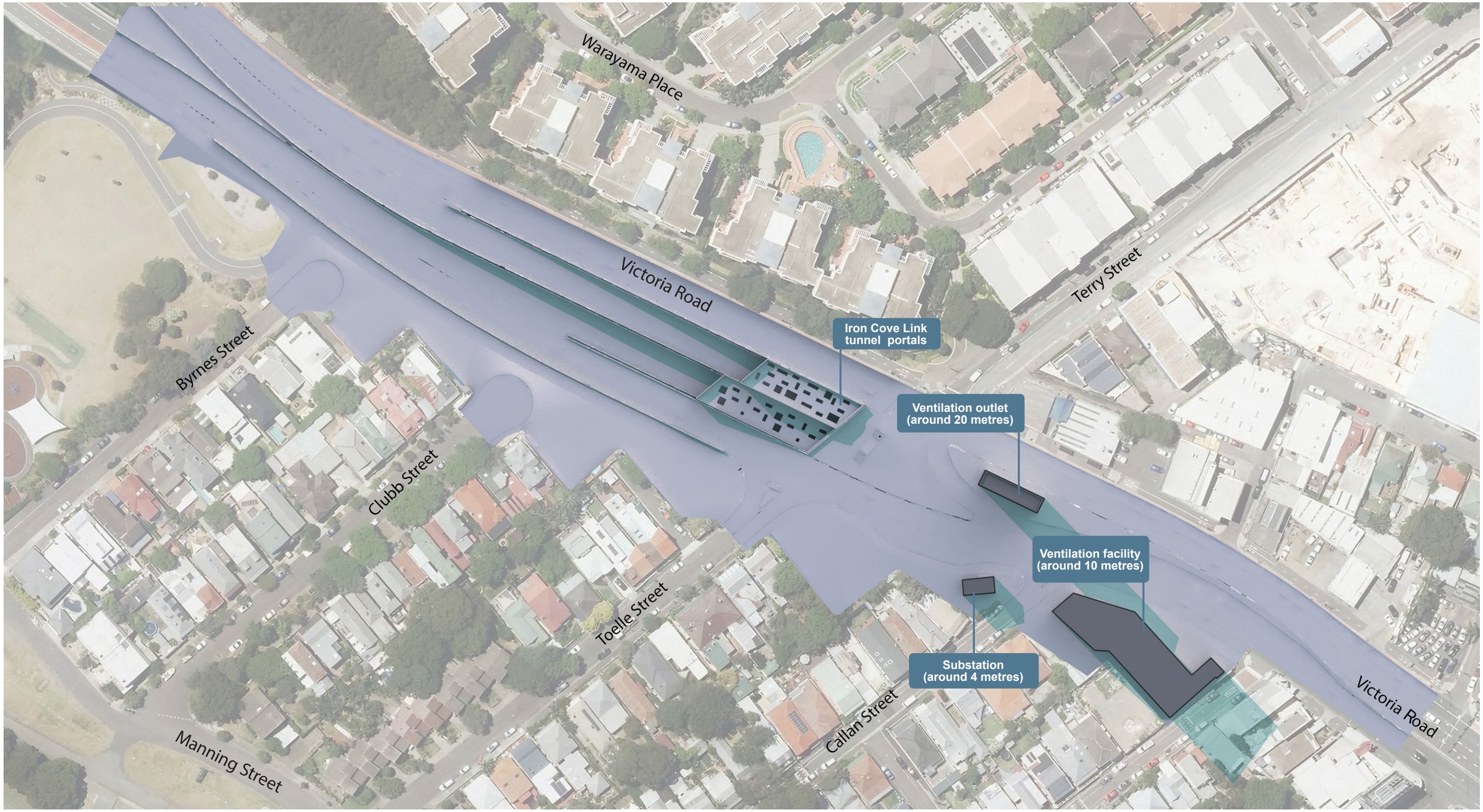

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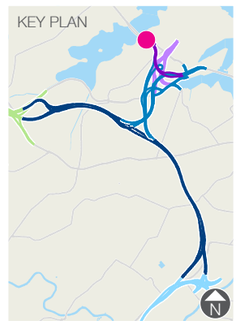
- Project buildings and structures



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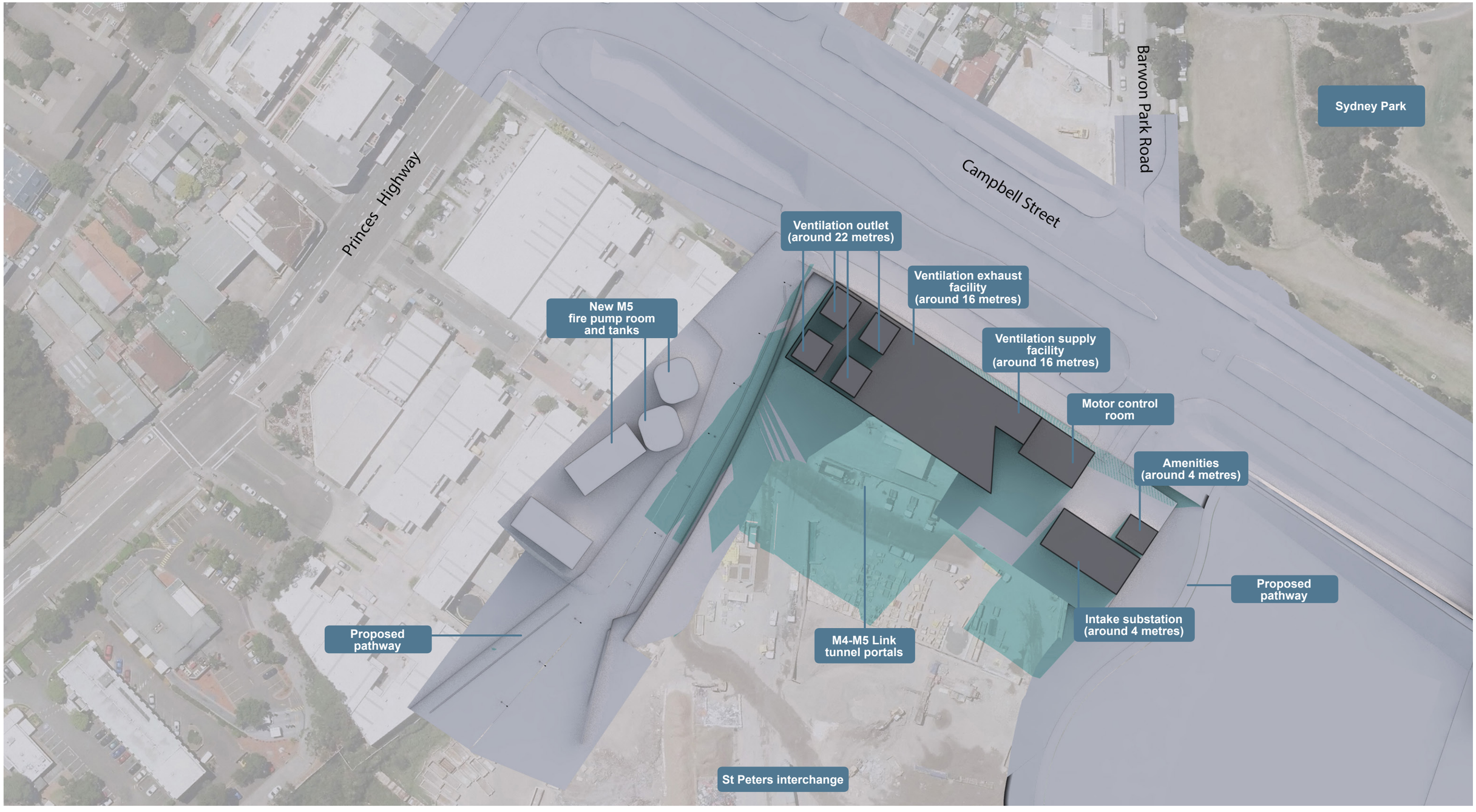
TITLE
M4-M5 Link - Shadow diagrams and overshadowing
3.00 pm analysis (21st June)
Iron Cove Link motorway operations complex (MOC4)
Rozelle

DRAWING	REVISION	DATE
028	B	11/08/2017

Sydney Motorway Corporation | WestConnex | AECOM



LEGEND

- Building/ structure shadow
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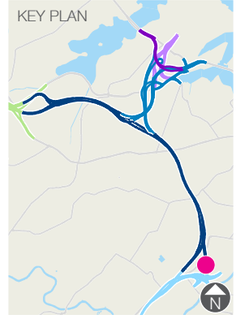


SCALE 0 10 20 30 40 50m

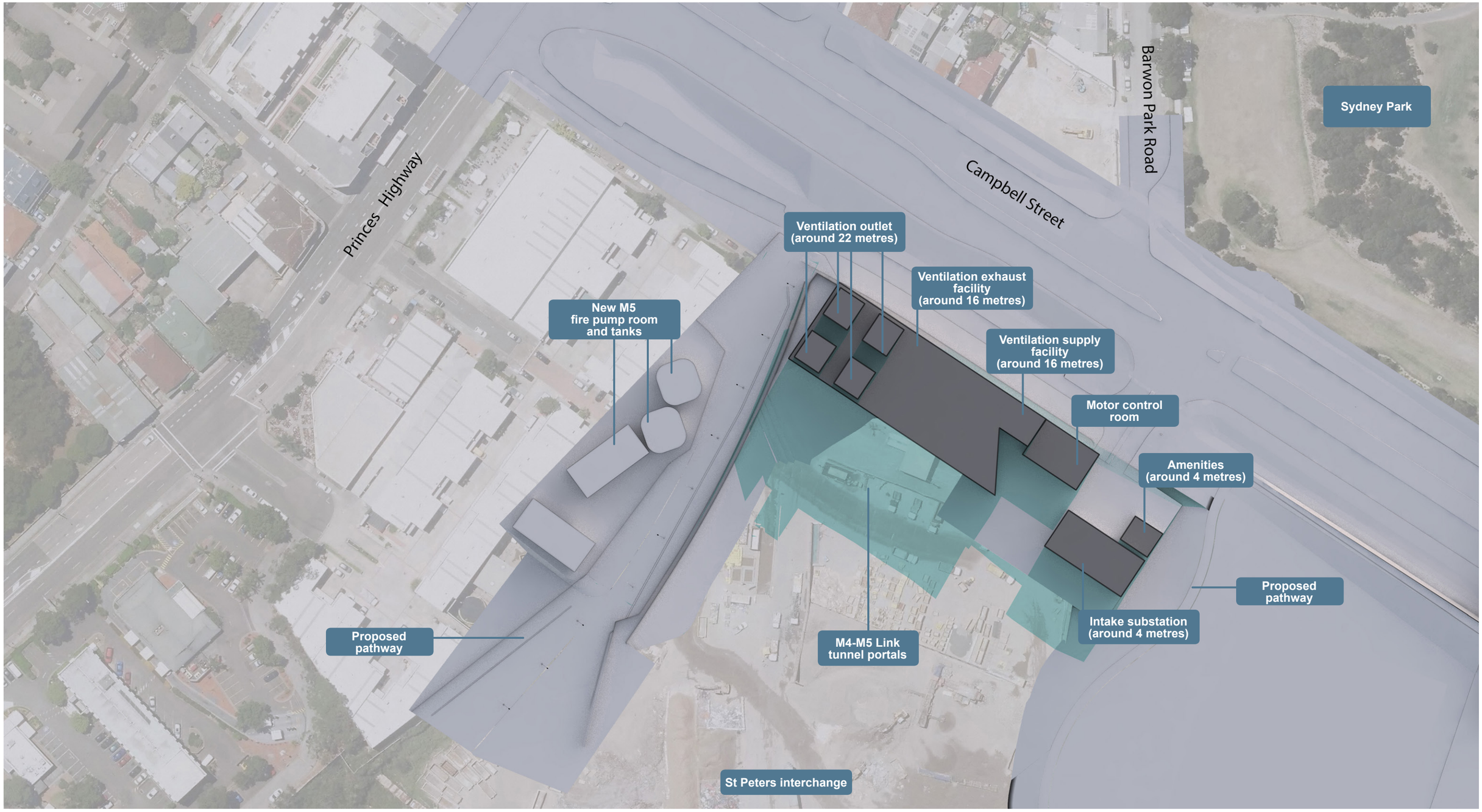
N

TITLE
M4-M5 Link - Shadow diagrams and overshadowing

9.00 am analysis (21st June)
Campbell Road motorway operations complex (MOC5)
St Peters

DRAWING	REVISION	DATE
029	B	11/08/2017

Sydney Motorway Corporation | WestConnex | AECOM



LEGEND

- Building/ structure shadow
- Project buildings and structures

KEY PLAN

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TITLE
M4-M5 Link - Shadow diagrams and overshadowing

10.00 am analysis (21st June)
Campbell Road motorway operations complex (MOC5)
St Peters

DRAWING	REVISION	DATE
030	B	11/08/2017

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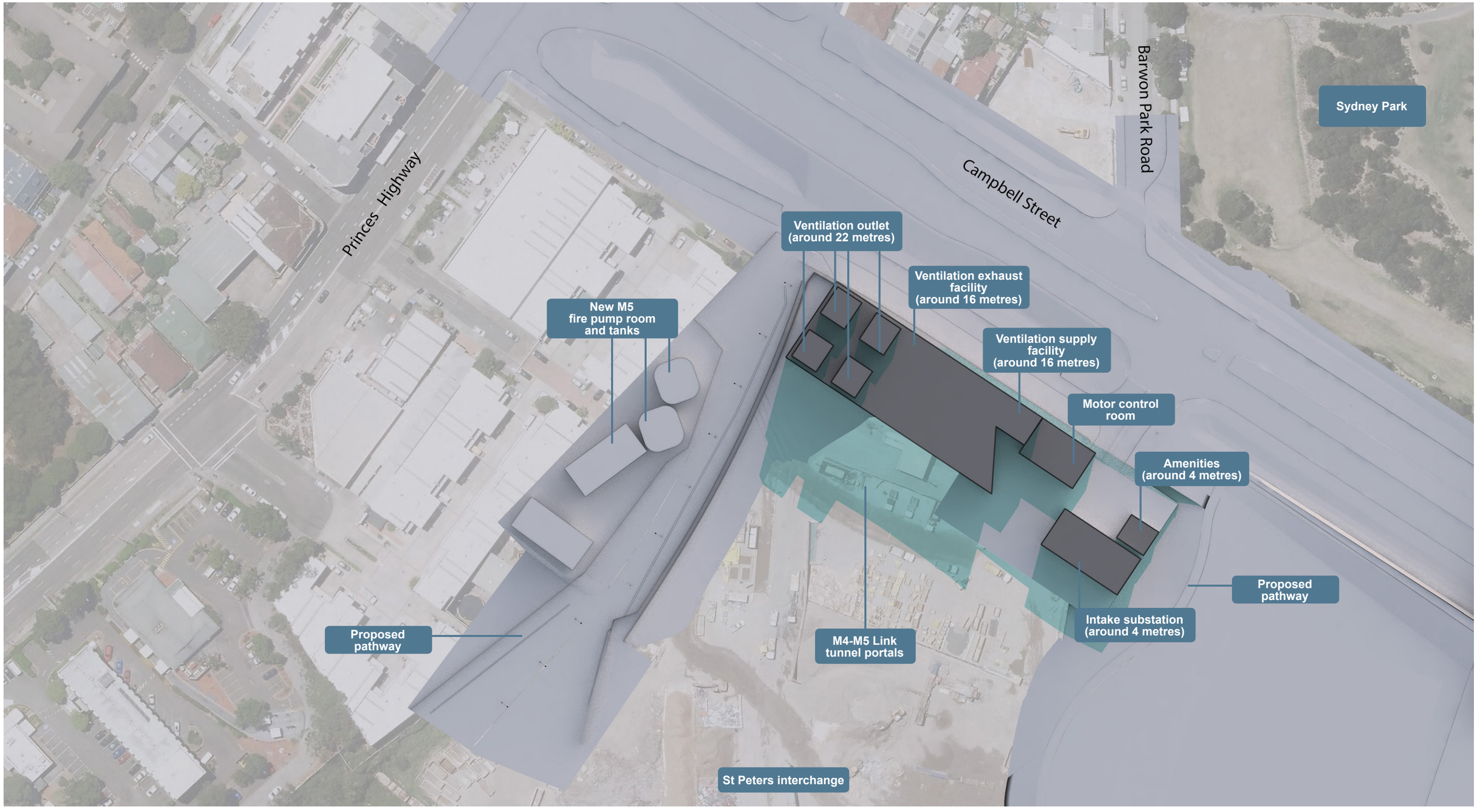

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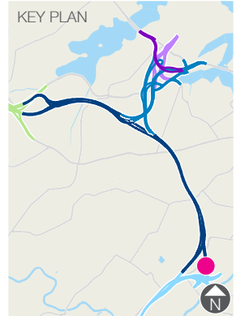

SCALE 0 10 20 30 40 50m

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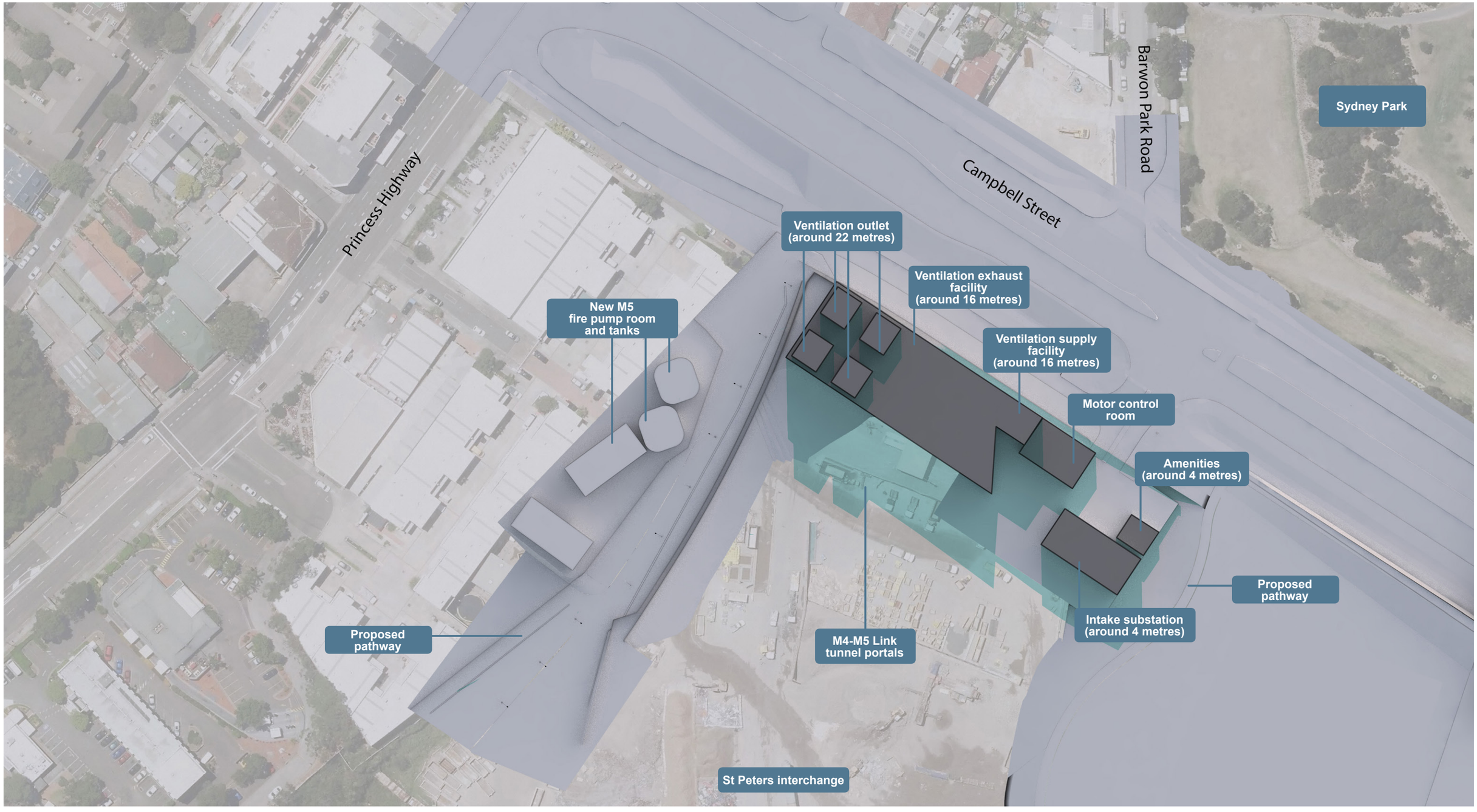
TITLE
M4-M5 Link - Shadow diagrams and overshadowing

11.00 am analysis (21st June)
Campbell Road motorway operations complex (MOC5)
St Peters

DRAWING	REVISION	DATE
031	B	11/08/2017

Sydney Motorway Corporation | WestConnex | AECOM



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- Building/ structure shadow
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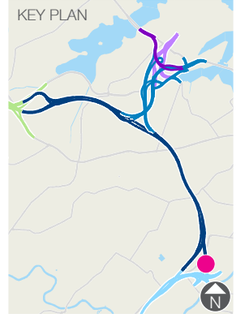

SCALE 0 10 20 30 40 50m

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TITLE
M4-M5 Link - Shadow diagrams and overshadowing

12.00 pm analysis (21st June)
Campbell Road motorway operations complex (MOC5)
St Peters

DRAWING	REVISION	DATE
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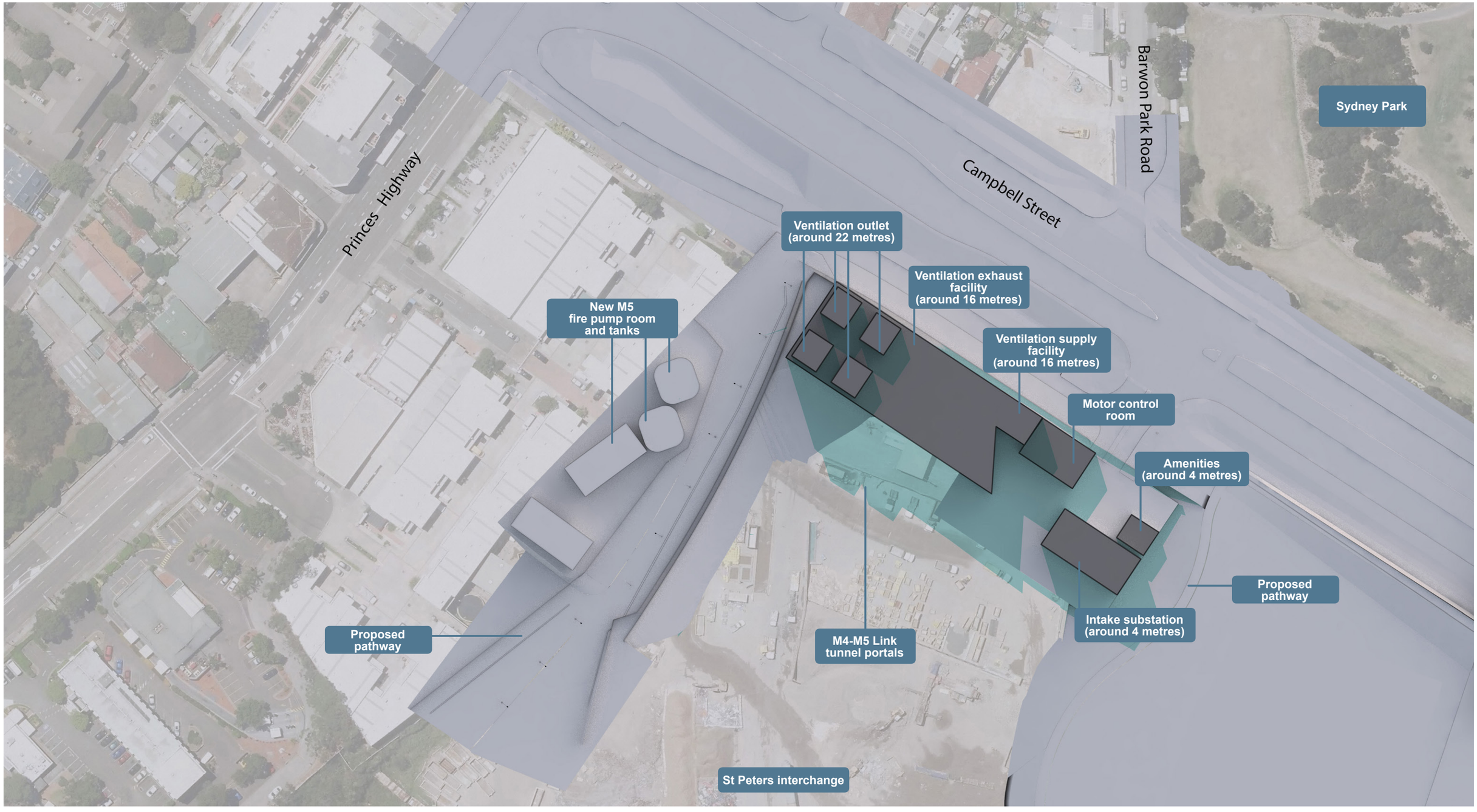

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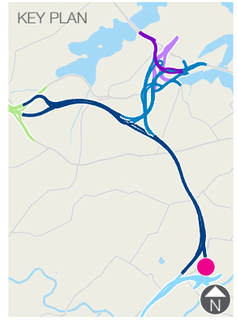

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M4-M5 Link - Shadow diagrams and overshadowing

1.00 pm analysis (21st June)
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St Peters

DRAWING	REVISION	DATE
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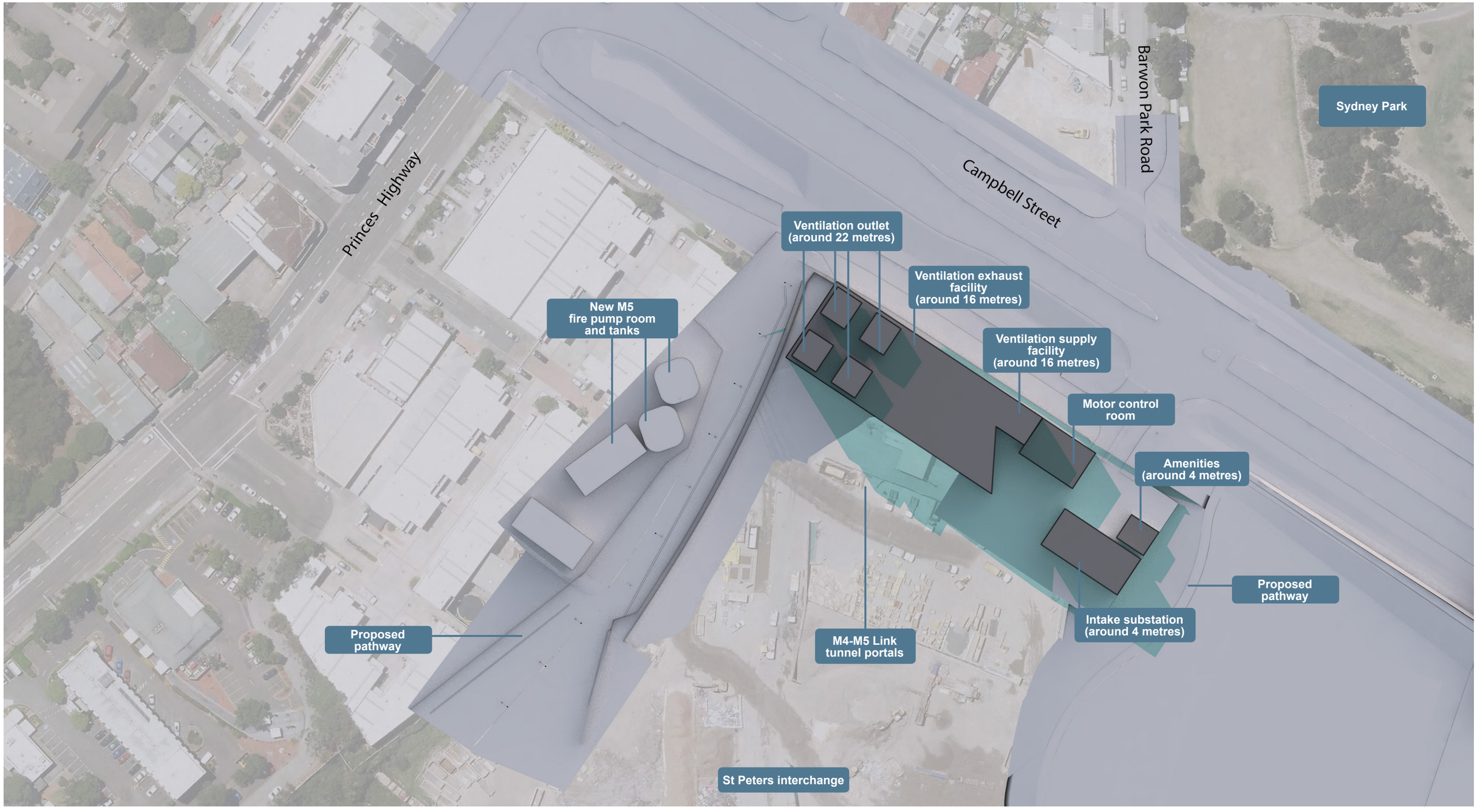

LEGEND

- Building/ structure shadow
- Project buildings and structures

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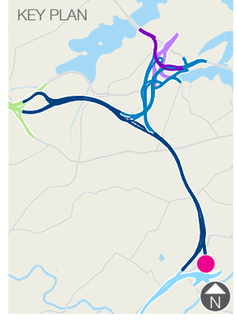

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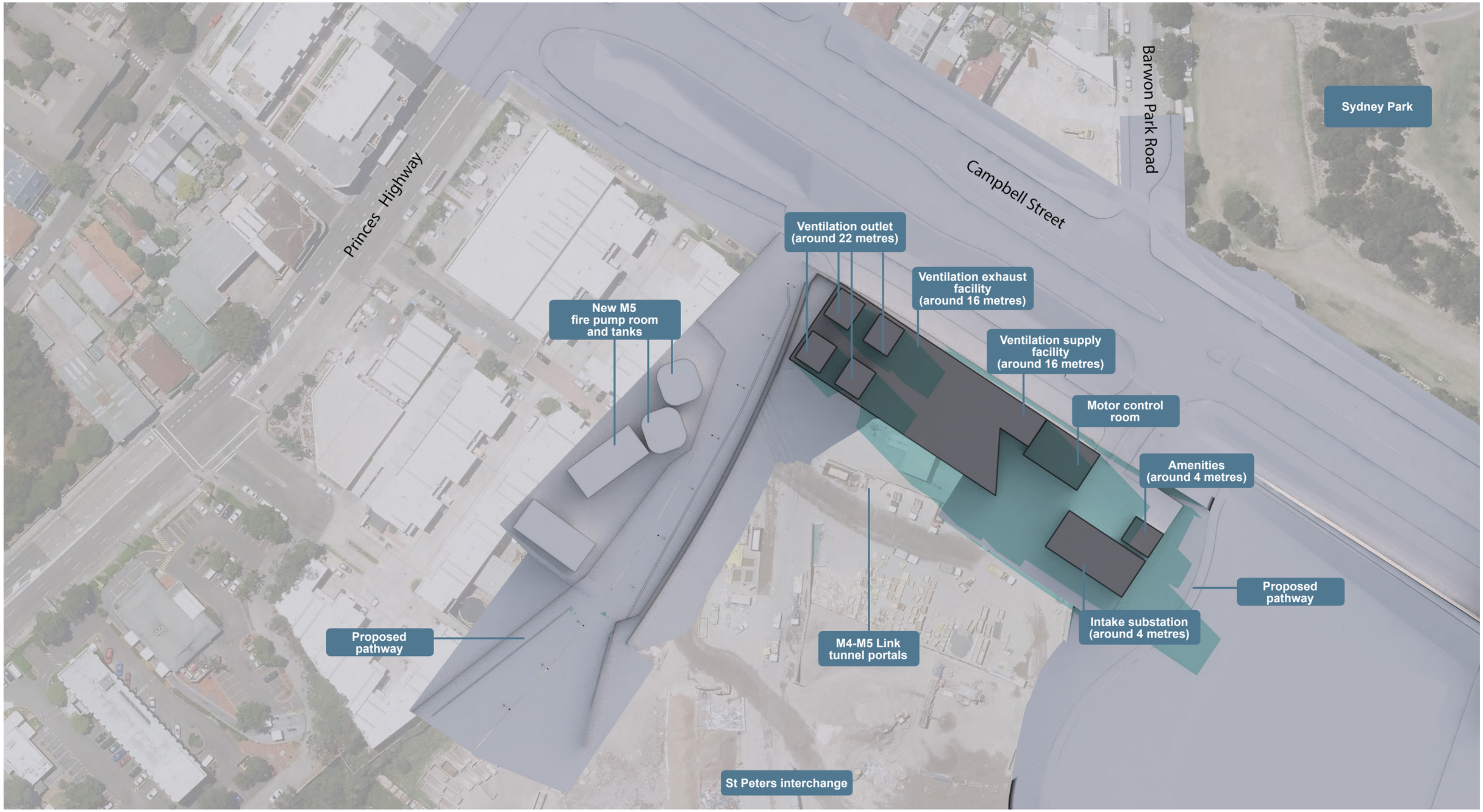
N

TITLE
M4-M5 Link - Shadow diagrams and overshadowing

2.00 pm analysis (21st June)
Campbell Road motorway operations complex (MOC5)
St Peters

DRAWING	REVISION	DATE
034	B	11/08/2017

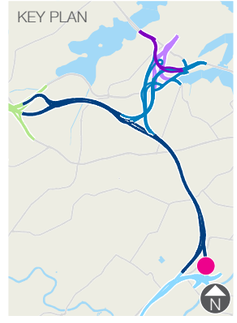
Sydney Motorway Corporation | WestConnex | AECOM



LEGEND

- Building/ structure shadow
- Project buildings and structures

KEY PLAN



SCALE 0 10 20 30 40 50m

N

TITLE
M4-M5 Link - Shadow diagrams and overshadowing

3.00 pm analysis (21st June)
Campbell Road motorway operations complex (MOC5)
St Peters

DRAWING	REVISION	DATE
035	B	11/08/2017

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Appendix N

Technical working paper: Active transport strategy

WestConnex

M4-M5 LINK

SYDNEY, NSW

ACTIVE TRANSPORT STRATEGY

August 2017

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Glossary

Abbreviation	Name
ATN	Active Transport Network
CBD	Central business district
CSELR	CBD and South East Light Rail
EIS	Environmental impact statement
EP&A Act	*Environmental Planning and Assessment Act 1979* [NSW]
Green Grid	Initiative of the NSW Government [2016] as part of 'A Plan for Growing Sydney'
LGA	Local government authority
Roads and Maritime	NSW Roads and Maritime Services
SEARs	Secretary's Environmental Assessment Requirements
SMC	Sydney Motorway Corporation
UDLP	Urban Design and Landscape Plan
WSUD	Water Sensitive Urban Design

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1.0 Introduction

NSW Roads and Maritime Services [Roads and Maritime] is seeking approval to construct and operate the WestConnex M4-M5 Link [the project], which would comprise a new multi-lane road link between the M4 East Motorway at Haberfield and the New M5 Motorway at St Peters. The project would also include an interchange at Lilyfield and Rozelle [the Rozelle interchange] and a tunnel connection between Anzac Bridge and Victoria Road, east of Iron Cove Bridge [Iron Cove Link]. In addition, construction of tunnels, ramps and associated infrastructure to provide connections to the proposed future Western Harbour Tunnel and Beaches Link project would be carried out at the Rozelle interchange.

Together with the other components of the WestConnex program of works and the proposed future Sydney Gateway, the project would facilitate improved connections between western Sydney, Sydney Airport and Port Botany and south and south-western Sydney, as well as better connectivity between the important economic centres along Sydney's Global Economic Corridor and local communities.

Approval is being sought under Part 5.1 of the *Environmental Planning and Assessment Act 1979* [NSW] [EP&A Act] for the project. A request has been made for the NSW Minister for Planning to specifically declare the project to be State significant infrastructure and also critical State significant infrastructure. An environmental impact statement [EIS] is therefore required.

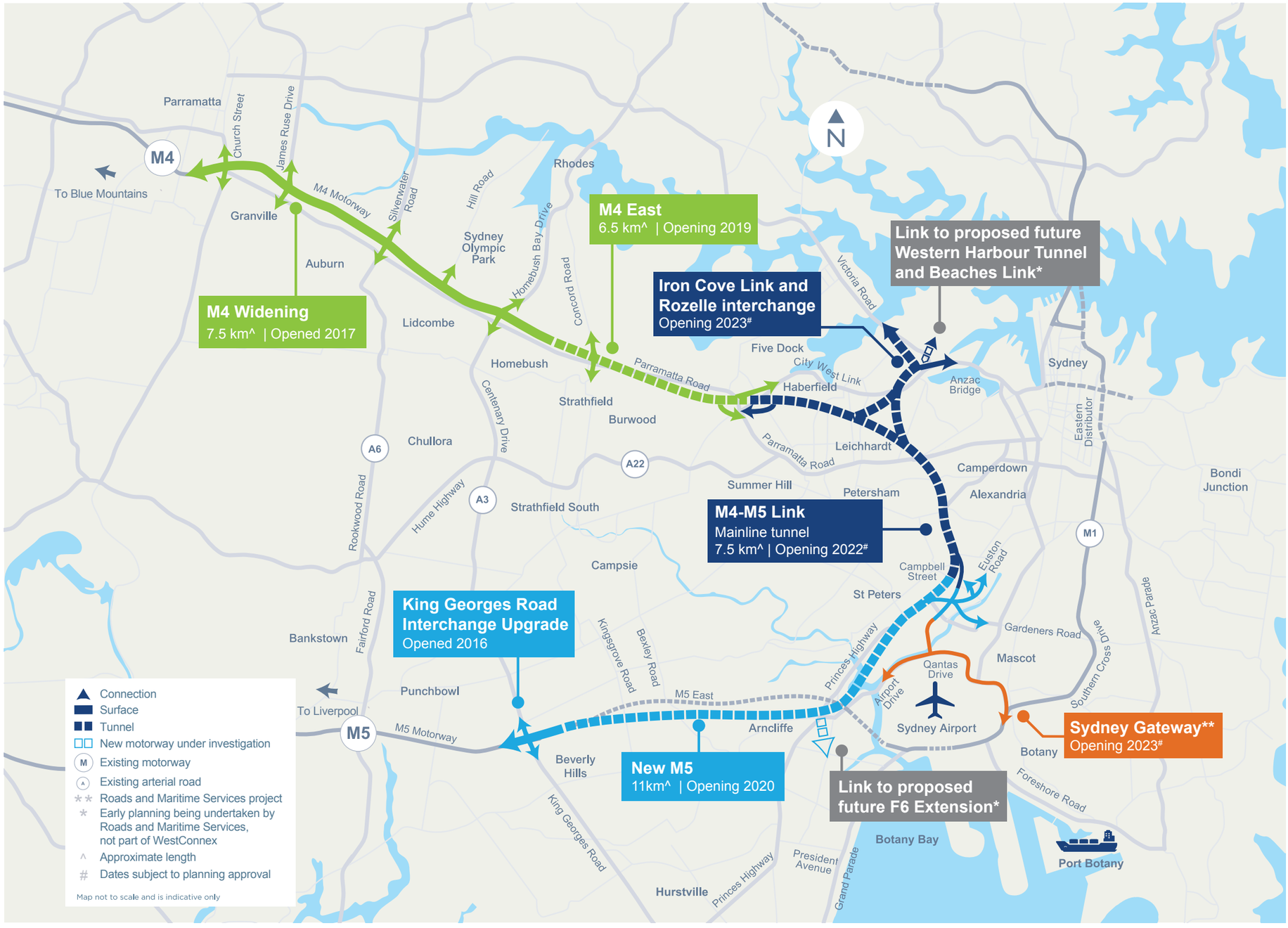


Figure 1.1 Overview of WestConnex and related projects

1.1 OVERVIEW OF WESTCONNEX AND RELATED PROJECTS

The M4-M5 Link is part of the WestConnex program of works. Separate planning applications and assessments have been completed for each of the approved WestConnex projects. Roads and Maritime has commissioned Sydney Motorway Corporation [SMC] to deliver WestConnex, on behalf of the NSW Government. However, Roads and Maritime is the proponent for the project.

In addition to linking to other WestConnex projects, the M4-M5 Link would provide connections to the proposed future Western Harbour Tunnel and Beaches Link, the Sydney Gateway [via the St Peters interchange] and the F6 Extension [via the New M5].

The WestConnex program of works, as well as related projects, are shown in Figure 1.1 and described in Table 1.1.

Project	Description	Status
	Westconnex program of works	
M4 Widening	Widening of the existing M4 Motorway from Parramatta to Homebush.	Planning approval under the EP&A Act granted on 21 December 2014. Open to traffic.
M4 East	Extension of the M4 Motorway in tunnels between Homebush and Haberfield via Concord. Includes provision for a future connection to the M4-M5 Link at the Wattle Street interchange.	Planning approval under the EP&A Act granted on 11 February 2016. Under construction.
King Georges Road Interchange Upgrade	Upgrade of the King Georges Road interchange between the M5 West and the M5 East at Beverly Hills, in preparation for the New M5 project.	Planning approval under the EP&A Act granted on 3 March 2015. Open to traffic.
New M5	Duplication of the M5 East from King Georges Road in Beverly Hills with tunnels from Kingsgrove to a new interchange at St Peters. The St Peters interchange allows for connections to the proposed future Sydney Gateway project and an underground connection to the M4-M5 Link. The New M5 tunnels also include provision for a future connection to the proposed future F6 Extension.	Planning approval under the EP&A Act granted on 20 April 2016. Commonwealth approval under the *Environment Protection and Biodiversity Conservation Act 1999* [Commonwealth] granted on 11 July 2016. Under construction.
M4-M5 Link [the project]	TTunnels connecting to the M4 East at Haberfield [via the Wattle Street interchange] and the New M5 at St Peters [via the St Peters interchange], a new interchange at Rozelle and a link to Victoria Road [the Iron Cove Link]. The Rozelle interchange also includes ramps and tunnels for connections to the proposed future Western Harbour Tunnel and Beaches Link project.	The subject of this EIS.
	Related Projects	
Sydney Gateway	A high-capacity connection between the St Peters interchange [under construction as part of the New M5 project] and the Sydney Airport and Port Botany precinct.	Planning underway by Roads and Maritime and subject to separate environmental assessment and approval.
Western Harbour Tunnel and Beaches Link	The Western Harbour Tunnel component would connect to the M4-M5 Link at the Rozelle interchange, cross underneath Sydney Harbour between the Birchgrove and Waverton areas, and connect with the Warringah Freeway at North Sydney. The Beaches Link component would comprise a tunnel that would connect to the Warringah Freeway, cross underneath Middle Harbour and connect with the Burnt Bridge Creek Deviation at Balgowlah and Wakehurst Parkway at Seaforth. It would also involve the duplication of the Wakehurst Parkway between Seaforth and Frenchs Forest.	Planning underway by Roads and Maritime and subject to separate environmental assessment and approval.
F6 Extension	A proposed motorway link between the New M5 at Arncliffe and the existing M1 Princes Highway at Loftus, generally along the alignment known as the F6 corridor.	Planning underway by Roads and Maritime and subject to separate environmental assessment and approval.

Table 1.1 WestConnex and related projects

1.2 PROJECT LOCATION

The project would be generally located within the City of Sydney and Inner West local government areas [LGAs]. The project is located about two to seven kilometres south, southwest and west of the Sydney central business district [CBD] and would cross the suburbs of Ashfield, Haberfield, Leichhardt, Lilyfield, Rozelle, Annandale, Stanmore, Camperdown, Newtown and St Peters. The location of the interchanges for the project are shown in Figure 1.2.



Figure 1.2 Location of project interchanges

1.3 OVERVIEW OF THE PROJECT

Key components of the project are shown in Figure 1.3 and would include:

- Twin mainline motorway tunnels between the M4 East at Haberfield and the New M5 at St Peters. Each tunnel would be around 7.5 kilometres long and would generally accommodate up to four lanes of traffic in each direction
- Connections of the mainline tunnels to the M4 East project, comprising:
  - A tunnel-to-tunnel connection to the M4 East mainline stub tunnels
  - Entry and exit ramp connections between the mainline tunnels and the Wattle Street interchange at Haberfield [which is currently being constructed as part of the M4 East project]
  - Minor physical integration works with the surface road network at the Wattle Street interchange including road pavement and line marking
- Connections of the mainline tunnels to the New M5 project, comprising:
  - A tunnel-to-tunnel connection to the New M5 mainline stub tunnels north of the Princes Highway, near the intersection of Mary Street and Bakers Lane
  - Entry and exit ramp connections between the mainline tunnels and the St Peters interchange at St Peters [which is currently being constructed as part of the New M5 project]
  - Minor physical integration works with the surface road network at the St Peters interchange including road pavement and line marking
- An underground interchange at Leichhardt and Annandale [the Inner West subsurface interchange] that would link the mainline tunnels with the Rozelle interchange and the Iron Cove Link [see below]
- A new interchange at Lilyfield and Rozelle [the Rozelle interchange] that would connect the M4-M5 Link mainline tunnels with:
  - City West Link
  - Anzac Bridge
  - The Iron Cove Link [see below]
  - The proposed future Western Harbour Tunnel and Beaches Link
- Construction of connections to the proposed future Western Harbour Tunnel and Beaches Link project as part of the Rozelle interchange, including:
  - Tunnels that would allow for underground mainline connections between the M4 East and New M5 motorways and the proposed future Western Harbour Tunnel and Beaches Link [via the M4-M5 Link mainline tunnels]
  - A dive structure and tunnel portals within the Rozelle Rail Yards, north of the City West Link / The Crescent intersection
  - Entry and exit ramps that would extend north underground from the tunnel portals in the Rozelle Rail Yards to join the mainline connections to the proposed future Western Harbour Tunnel and Beaches Link
  - A ventilation outlet and ancillary facilities as part of the Rozelle ventilation facility [see below]
- Twin tunnels that would connect Victoria Road near the eastern abutment of Iron Cove Bridge and Anzac Bridge [the Iron Cove Link]. Underground entry and exit ramps would also provide a tunnel connection between the Iron Cove Link and the New M5 / St Peters interchange [via the M4-M5 Link mainline tunnels]
- The Rozelle surface works, including:
  - Realigning The Crescent at Annandale, including a new bridge over Whites Creek and modifications to the intersection with City West Link
  - A new intersection on City West Link around 300 metres west of the realigned position of The Crescent, which would provide a connection to and from the New M5/St Peters interchange [via the M4-M5 Link mainline tunnels]
  - Widening and improvement works to the channel and bank of Whites Creek between the light rail bridge and Rozelle Bay at Annandale, to manage flooding and drainage for the surface road network
  - Reconstructing the intersection of The Crescent and Victoria Road at Rozelle, including construction of a new bridge at Victoria Road
  - New and upgraded pedestrian and cyclist infrastructure
  - Landscaping, including the provision of new open space within the Rozelle Rail Yards

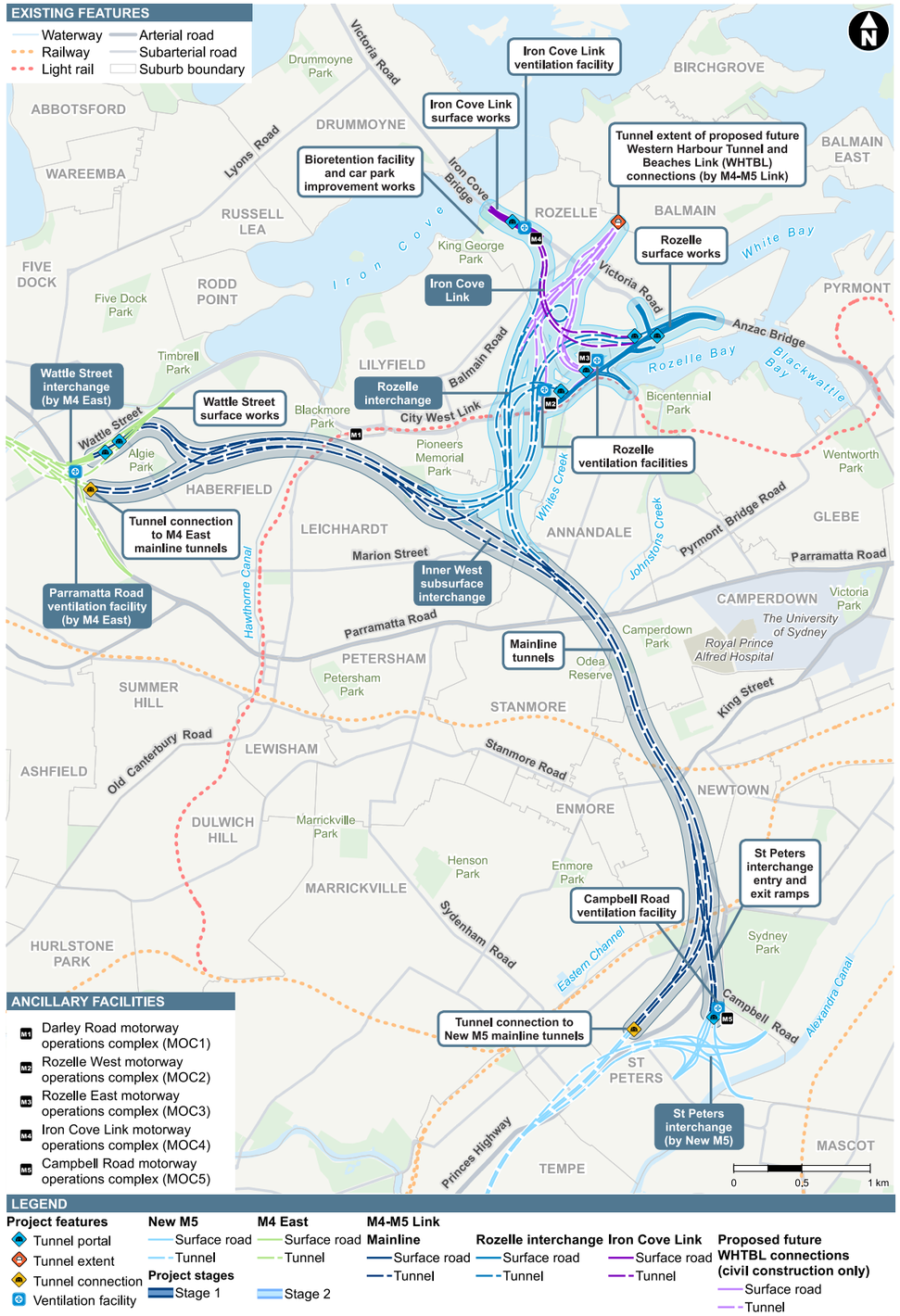


Figure 1.3 Overview of the project

- The Iron Cove Link surface works, including:
  - Dive structures and tunnel portals between the westbound and eastbound Victoria Road carriageways, to connect Victoria Road east of Iron Cove Bridge with the Iron Cove Link
  - Realignment of the westbound [southern] carriageway of Victoria Road between Springside Street and the eastern abutment of Iron Cove Bridge
  - Modifications to the existing intersections between Victoria Road and Terry, Clubb, Toelle and Callan streets
  - Landscaping and the establishment of pedestrian and cycle infrastructure
- Five motorway operations complexes; one at Leichhardt [MOC1], three at Rozelle [Rozelle West [MOC2], Rozelle East [MOC3] and Iron Cove Link [MOC4]], and one at St Peters [MOC5]. The types of facilities that would be contained within the motorway operations complexes would include substations, water treatment plants, ventilation facilities and outlets, offices, on-site storage and parking for employees
- Tunnel ventilation systems, including ventilation supply and exhaust facilities, axial fans, ventilation outlets and ventilation tunnels
- Three new ventilation facilities, including:
  - The Rozelle ventilation facility at Rozelle
  - The Iron Cove Link ventilation facility at Rozelle
  - The Campbell Road ventilation facility at St Peters
- Fitout [mechanical and electrical] of part of the Parramatta Road ventilation facility at Haberfield [which is currently being constructed as part of M4 East project] for use by the M4-M5 Link project
- Drainage infrastructure to collect surface and groundwater for treatment at dedicated facilities. Water treatment would occur at
  - Two operational water treatment facilities [at Leichhardt and Rozelle]
  - The constructed wetland within the Rozelle Rail Yards
  - A bioretention facility for stormwater runoff within the informal car park at King George Park at Rozelle [adjacent to Manning Street]. A section of the existing informal car park would also be upgraded, including sealing the car park surface and landscaping
- Treated water would flow back to existing watercourses via new, upgraded and existing infrastructure
- Ancillary infrastructure and operational facilities for electronic tolling and traffic control and signage [including electronic signage]
- Emergency access and evacuation facilities, including pedestrian and vehicular cross and long passages and fire and life safety systems
- Utility treatments, including protection and/or adjustment of existing utilities, removal of redundant utilities and installation of new utilities. A Utilities Management Strategy has been prepared for the project that identifies management options for utilities, including relocation or adjustment. Refer to **Appendix F** [Utilities Management Strategy] of this EIS.

The project does not include:

- Site management works at the Rozelle Rail Yards. These works were separately assessed and determined by Roads and Maritime through a Review of Environmental Factors under Part 5 of the EP&A Act [refer to **Chapter 2** [Assessment process] of the EIS]
- Ongoing motorway maintenance activities during operation
- Operation of the components of the Rozelle interchange which are the tunnels, ramps and associated infrastructure being constructed to provide connections to the future Western Harbour Tunnel and Beaches Link project.

Temporary construction ancillary facilities and temporary works to facilitate the construction of the project would also be required.

1.4 PURPOSE OF THIS REPORT

This report outlines the investigation of a regional active transport network [ATN] and the role of the M4-M5 Link in this network. The report recommends a number of new strategic links and the delivery mechanisms for them, including identifications of the sections of these links that would be delivered by the project. The structure of this report is:

- Section 2: Principles and objectives
- Section 3: Existing active transport network
- Section 4: Proposed initiatives and future links
- Section 5: Summary of future links
- Section 6: Future consultation
- Section 7: Summary.

Active transport is non-motorised forms of transport that include physical activity, for example walking or cycling. It also includes public transport for longer distance trips, which combine walking or cycling as part of the trip. An ATN provides infrastructure to enable convenient, pleasant and safe walking and cycling trips.

Active transport enhances connectivity, particularly at a local level. Suitable active transport links encourage active lifestyles and reduce car dependency, resulting in health benefits for the community.

The quality of active transport links encourages their use. Links that have reasonable grades, are separated from vehicular traffic and provide amenity will be more frequently used. Path widths would be designed to be as generous as possible, and where possible include landscape buffers on either side.

Cycle and pedestrian paths form part of the WestConnex program of works to improve connectivity and safety and contribute to the ATN. The New M5 includes a number of active transport measures, with around 14 kilometres of new and improved pedestrian and cycle paths. New M5 also includes a new cycling and pedestrian bridge over Alexandra Canal linking Mascot town centre with St Peters and Sydney Park and a new cycling and pedestrian bridge over Campbell Road connecting Sydney Park with future open space at St Peters Interchange.

The M4 East will include permanent re-routing of part of the existing eastbound cycleway on the northern side of the M4 from west of Homebush Bay Drive to near Pomeroy Street, and a new westbound cycleway on-ramp connection from Queen Street at North Strathfield to the existing M4 Motorway. Active transport at Haberfield has been addressed as part of the M4 East project.

1.5 SECRETARY'S ENVIRONMENTAL ASSESSMENT REQUIREMENTS

In preparing this Active Transport Strategy, the Secretary's Environmental Assessment Requirements [SEARs] issued for the M4-M5 Link have been addressed. The key matters raised by the Secretary for consideration in the Active Transport Strategy and where this report addresses the SEARs are outlined in Table 1.2.

	Requirement	Section where addressed in report
Environmental Impact Statement	The project is described in sufficient detail to enable clear understanding that the project has been developed through an iterative process of impact identification and assessment and project refinement to avoid, minimise or offset impacts so that the project, on balance, has the least adverse environmental, social and economic impact, including its cumulative impacts. 1.The EIS must include, but not necessarily be limited to, the following:	
	b] a description of the project and all components and activities [including ancillary components and activities] required to construct and operate it, including:	
	– design of the tunnels, interchanges [inclusive of tunnel portals and entry and exit ramps], and connections to Stage 1 and Stage 2 of WestConnex and other proposals [such as the Western Harbour Tunnel] and road user, pedestrian and cyclist facilities, and lighting;	Section 7
	– surface road upgrade works, including road widening, intersection treatment and grade separation works, property access, parking, pedestrian and cyclist facilities [including appropriate locations for overbridges] and public transport facilities;	Section 7
Traffic and Transport	Network connectivity, safety and efficiency of the transport system in the vicinity of the project are managed to minimise impacts. The safety of transport system customers is maintained. Impacts on network capacity and the level of service are effectively managed. Works are compatible with existing infrastructure and future transport corridors. 1. The Proponent must assess construction transport and traffic [vehicle, pedestrian and cyclists] impacts, including, but not necessarily limited to:	
	e] access constraints and impacts on public transport, pedestrians and cyclists;	EIS Appendix H [Technical working paper: Traffic and transport]
	f] the need to close, divert or otherwise reconfigure elements of the road, cycle and pedestrian network associated with construction of the project. Where the closure, diversion or reconfiguration are temporary, provide an estimate of the duration of the altered access arrangements;	EIS Appendix H [Technical working paper: Traffic and transport]
	2. The Proponent must model and/or assess the operational transport impacts of the project including, but not necessarily limited to	
	a] forecast travel demand and traffic volumes [expressed in terms of total numbers and heavy and light vehicle numbers] for the project and the surrounding road, cycle and public transport network, including potential shifts of traffic movements on alternate routes outside the proposal area [such as toll avoidance] and impact of permanent street closures directly attributable to the SSI;	EIS Appendix H [Technical working paper: Traffic and transport]
	d] wider transport interactions [local and regional roads, cycling, public and freight transport], taking into account the Sydney City Centre Access Strategy, planned future urban release areas such as The Bays Precinct and planned future port activities and uses;	Section 4 and EIS Appendix H [Technical working paper: Traffic and transport]
	g] impacts on cyclists and pedestrian access and safety, including on known routes and future proposals such as along Lilyfield Road;	Section 4 and 5
	h] opportunities to integrate cycling and pedestrian elements with surrounding networks and within the project;	Section 3 and 4
Urban Design	The project design complements the visual amenity, character and quality of the surrounding environment. The project contributes to the accessibility and connectivity of communities. Works are compatible with existing infrastructure and future transport corridors.	
	b] identify measures aimed at improving 'north-south' connectivity between Balmain/Rozelle and Sydney Harbour;	Section 4.1.1
	c] identify measures aimed at preserving the 'east-west' connectivity between White Bay and the Rozelle Rail Yards;	Section 4.1
	h] identify urban design strategies and opportunities to enhance healthy, cohesive and inclusive communities; and	Sections 3 and 4 and EIS Appendix L [Technical working paper: Urban design]
Socio Economic, Land Use and Property	The project minimises adverse social and economic impacts and capitalises on opportunities potentially available to affected communities. The project minimises impacts to property and business and achieves appropriate integration with adjoining land uses, including maintenance of appropriate access to properties and community facilities, and minimisation of displacement of existing land use activities, dwellings and infrastructure.	
	3.The Proponent must identify opportunities for local centre street revitalisation improvements, pedestrian and cyclist access and connectivity and provision of community and social facilities.	Section 4 and EIS Appendix P [Technical working paper: Social and economic]

Table 1.2 How SEARs have been addressed in this report

1.6 RELATIONSHIP TO OTHER REPORTS IN THE EIS

This report should be read in conjunction with the following EIS chapters and appendices:

- EIS Chapter 5, Project description: this chapter describes the project, including the project tunnels, interchanges and associated infrastructure, and ancillary facilities. It also describes the design standards required to deliver the project
- EIS Chapter 6, Construction work: this chapter describes the proposed approach to the construction of the project
- EIS Chapter 7, Consultation: this chapter outlines the consultation that has occurred and assisted in developing the active transport strategy for the project
- EIS Chapter 12, Land use and property: this chapter details the process for identifying potential future uses for land not required for the ongoing use of the project
- EIS Chapter 8 and Appendix H, Traffic and transport: this chapter and report detail the interim arrangements for the active transport network during construction
- EIS Appendix L, Urban design: this report outlines the urban design principles by which the project would demonstrate design excellence and integrate with surrounding neighbourhoods, as well as future opportunities for others
- EIS Appendix O, Landscape and visual impact: this report analyses the landscape character and visual impacts of the project
- EIS Appendix P, Social and economic: this report details the social impacts of the project and how management measures [including urban design principles] will manage these impacts on surrounding communities.

2.0 Principles and Objectives

2.1 STRATEGY OBJECTIVES AND METHODOLOGY

The inner west has seen significant growth over the last 10 years in trips undertaken by active transport. This growth has occurred due to a combination of the provision of infrastructure, changing inner Sydney demographics, and in-fill development in the region. However a significant barrier to increased active transport is the lack of adequate infrastructure.

The M4-M5 Link Active Transport Strategy has been developed with the following objectives:

- Develop an agreed strategy for an ATN for the M4-M5 Link with relevant stakeholders [including Roads and Maritime, Inner West Council and City of Sydney Council and Transport for NSW]
- Provide a strategy that forms the basis of works to be completed by the project and by others through future projects and developments
- Provide connectivity between existing and proposed routes for local communities
- Allowing travel choice for a range of local trips
- Reduce congestion on local roads by providing infrastructure that encourages modal shift for pedestrian and cycle trips [commuter and non-commuter] as well as access to public transport nodes
- Provide regional connections to major destinations [including the CBD, Sydney Airport, The University of Sydney, University of Technology Sydney, The Bays Precinct and town centres and transport hubs]
- Provide a connected open space network which is a valued part of Sydney's 'Green Grid' [that includes the Bay Run, Callan Park, Sydney Park, Cooks River foreshore, GreenWay and Bicentennial Park]
- Reduce travel time for local trips by pedestrians and cyclists.

The method to undertake this strategy is outlined in Figure 2.1.

The strategy has been developed through analysis of:

- The current active transport routes
- The currently planned/proposed active transport routes
- The policies and guidelines outlined in section 2.3

Stakeholder workshops have further assisted development of the strategy. These workshops were attended by:

- Transport for NSW
- Roads and Maritime
- Inner West Council
- City of Sydney Council
- NSW Department of Planning and Environment
- Bicycle user groups.



Figure 2.1 Methodology

2.2 CONSULTATION

In developing the active transport strategy for the project a significant amount stakeholder consultation has been undertaken. Table 2.1 below outlines the consultation to date with key stakeholders that has informed and shaped the active transport strategy for the project. Further details regarding consultation are contained in Chapter 7 [Consultation] of the EIS, including community consultation and feedback on active transport needs. The Inner West Bicycle Coalition response to the M4-M5 Link can be found under Annexure 3.

Stakeholder	Feedback
City of Sydney Council, Inner West Council, Transport for NSW, Roads and Maritime, NSW Department of Planning and Environment [workshops]	– Ensure the active transport strategy has a clear purpose – Concentrate on areas that would provide the biggest advantages to the network the 'pinch points' – Develop strategies that are connected to the wider network and upcoming and planned projects
Inner West Bicycle Coalition Bike East Bicycle NSW	– Routes proposed that would add to the network within the M4-M5 Link corridor – Additional routes were provided for consideration
Urban Growth	– Input into the concept for the Rozelle Rail Yards, including active transport connections between the Rozelle Rail Yards and White Bay – Desire for development sites within the Rozelle Rail Yards in line with The Bays Precinct Transformation Strategy

Table 2.1 Key stakeholder consultation

2.3 STRATEGIES AND DOCUMENTS INFORMING THE ACTIVE TRANSPORT STRATEGY

The following documents were used to inform and develop the M4-M5 Link Active Transport Strategy:

- Sydney's Cycling Future, December 2013
- Inner Sydney Regional Bicycle Network, April 2010
- Leichhardt Council Bike Plan, October 2015
- Marrickville Council Bike Plan, August 2007
- City of Sydney Cycle Strategy and Action Plan, February 2007
- City of Sydney Living Green Network, May 2011
- NSW Bicycle Guidelines, July 2005
- NSW Long Term Transport Master Plan, December 2012
- Transformation Plan, The Bays Precinct Sydney, October 2015
- Parramatta Road Corridor Urban Transformation Strategy, November 2016
- Draft North Annandale Neighbourhood Movement Plan, 2016.

Currently the City of Sydney is the only council in the area with a developed pedestrian network plan. Inner West Council [and its former Councils] is currently investigating and further developing a pedestrian network plan. The former Ashfield Council did not have an ATN plan.

3.0 Existing Active Transport Network

3.1 OVERVIEW

The existing ATN within the M4-M5 Link project corridor has undergone significant upgrades in the past 10 to 15 years. The majority of additional active transport infrastructure has been developed with the aim of providing active transport links to the CBD, primarily as a means of providing access to places of work. While this has generated a significant addition to the network, there are further opportunities to provide connections for leisure and to support newly developing areas such as The Bays Precinct.

The existing ATN is comprised of regional and local routes. The majority of regional routes are segregated pedestrian and cycle paths, with the local routes primarily being either shared paths or pedestrian paths supported by on-road cycle paths. Figure 3.1 demonstrates the existing and proposed [within existing strategies] active transport links around the M4-M5 Link corridor.

As Figure 3.1 demonstrates, the existing network is fragmented. This is due to the following factors:

- The majority of cycle infrastructure has been retrofitted around and on the existing road network
- The majority of cycle infrastructure has been planned by a number of agencies and authorities, across suburb and authority boundaries [eg LGAs]
- Funding shortfalls to deliver the infrastructure necessary [eg pedestrian and cycle bridges across busy roads].

Figure 3.1 demonstrates that while there are significant local active transport routes throughout the M4-M5 Link corridor, there are also significant gaps in regional routes. In particular, there is a deficiency in regional north-south routes around the Rozelle Rail Yards site and east-west routes around the Haberfield site. Furthermore, some of the existing regional routes, while designated on the plan, lack the amenity required to form a usable connection. For example, Parramatta Road is a regional route, but does not provide requisite amenity or infrastructure to form a usable regional active transport connection. Successful active transport connections provide clear separation between each of vehicle, cycle and pedestrian movements.

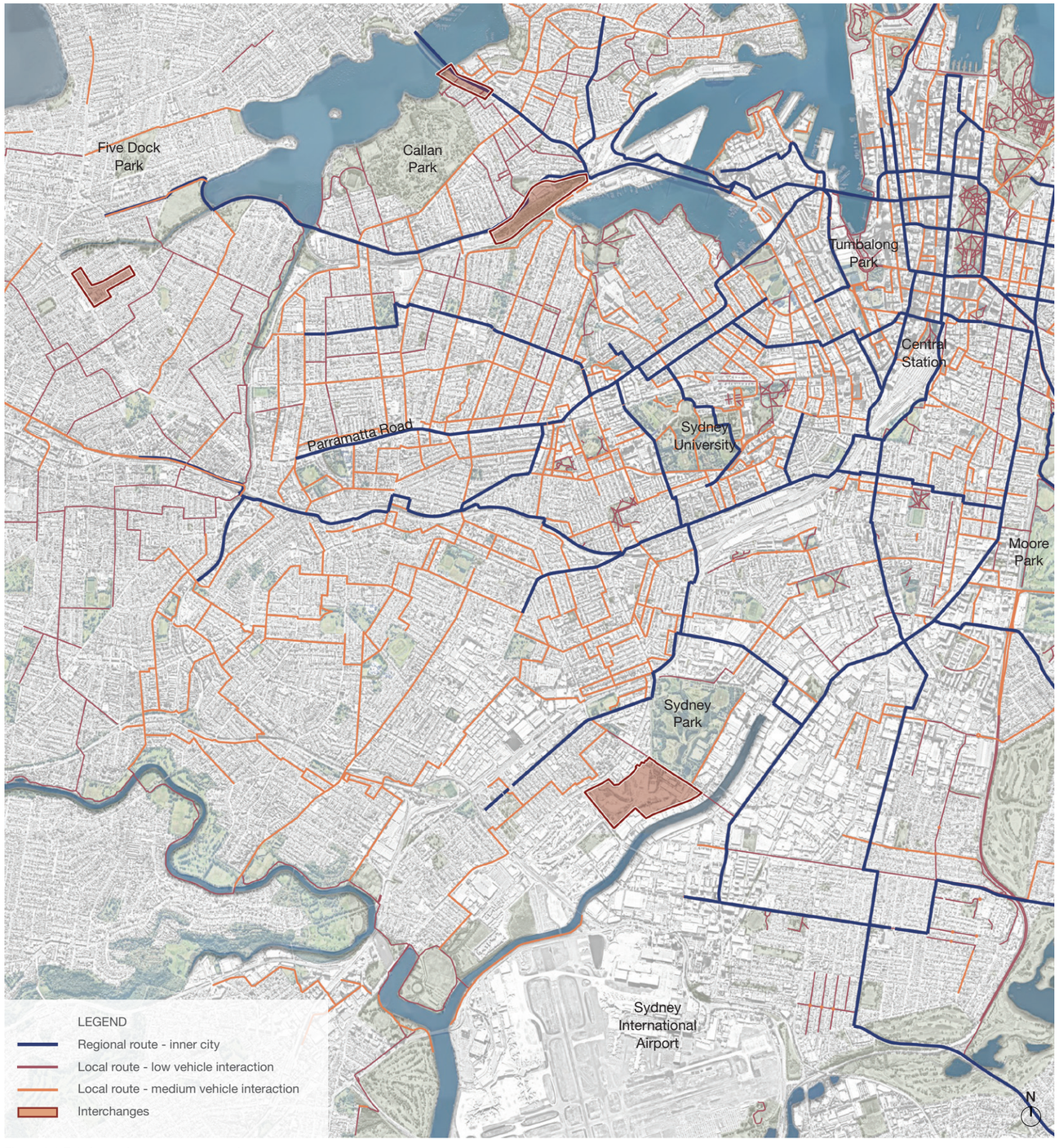


Figure 3.1 Existing active transport network

3.2 REGIONAL CONTEXT

3.2.1 REGIONAL TRIP GENERATORS

An analysis of the key trip generators was undertaken within the corridor to understand the origins and destinations, particularly local trips. A large proportion of trips are local, for example, in the City of Sydney it is assumed that key trip generators included the following groups:

- Employment zones [eg CBD, industrial zones, Green Square, Mascot, Sydney Airport, Australian Technology Park]
- Major education institutions [eg The University of Sydney, University of Technology Sydney]
- Train and light rail stations [eg Sydenham Station, Newtown Station, St Peters Station, Rozelle and Lilyfield light rail stops]
- Major redevelopment zones [eg Green Square, Mascot, The Bays Precinct, CBD and South East Light Rail]
- Major public open space [eg Callan Park, Sydney Park, Sydney Harbour Foreshore, Bicentennial Park]
- Existing major route destinations [eg Cooks River, Bay Run, Bourke Street cycle way]
- Major town centres [eg Newtown, Annandale, Rozelle].

A summary of the trip generators is shown in Figure 3.2. For further analysis of the regional connectivity see to Annexure 1.

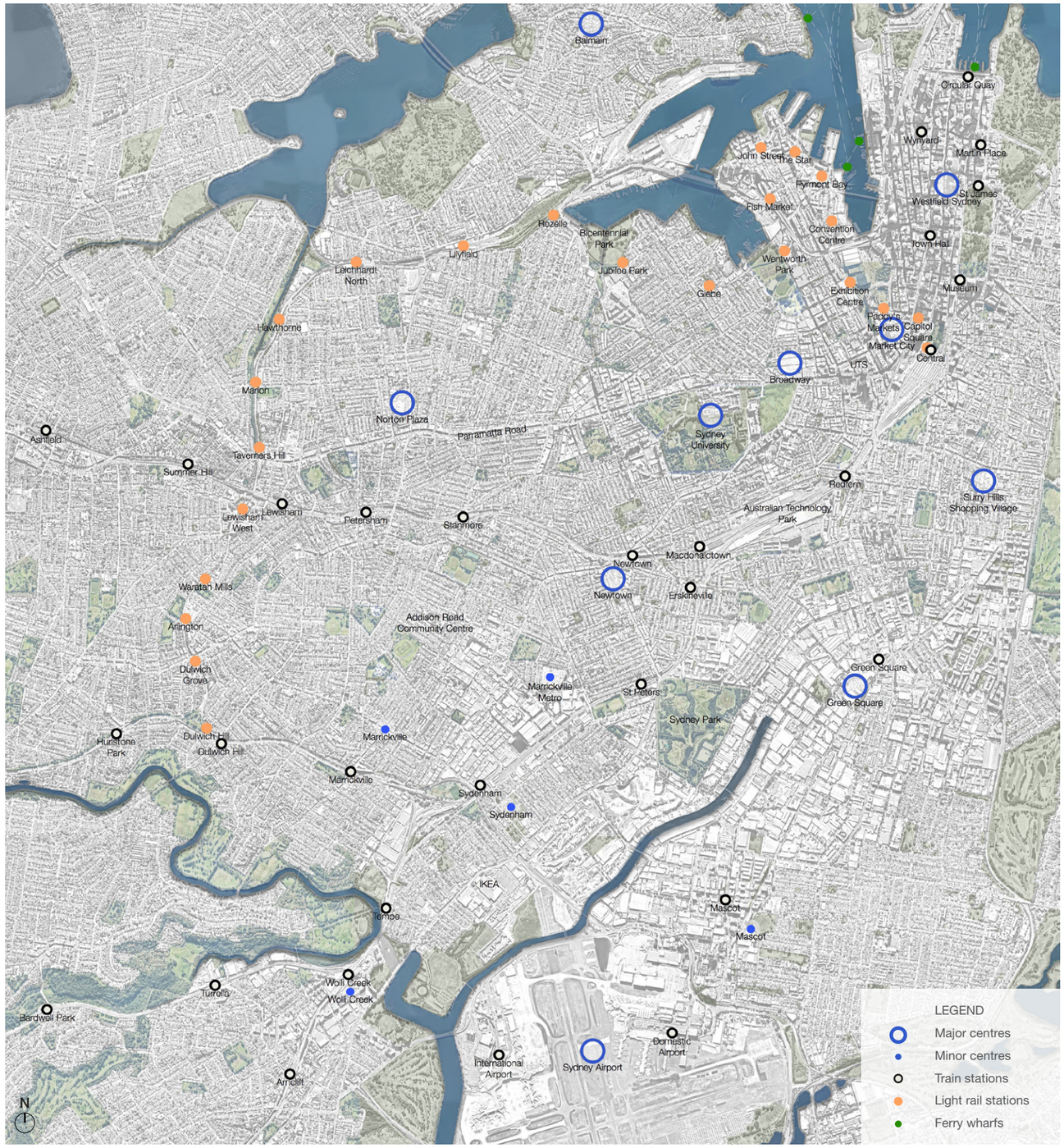


Figure 3.2 Trip generators

A summary of the trip generators and the connectivity for these key drivers is shown in Figure 3.3. This shows the main trip generators and the desired connectivity between those trip generators. A number of the desired connections are already key regional active transport routes. These key routes are trip generators of themselves as they form destinations, particularly for leisurely pursuits.

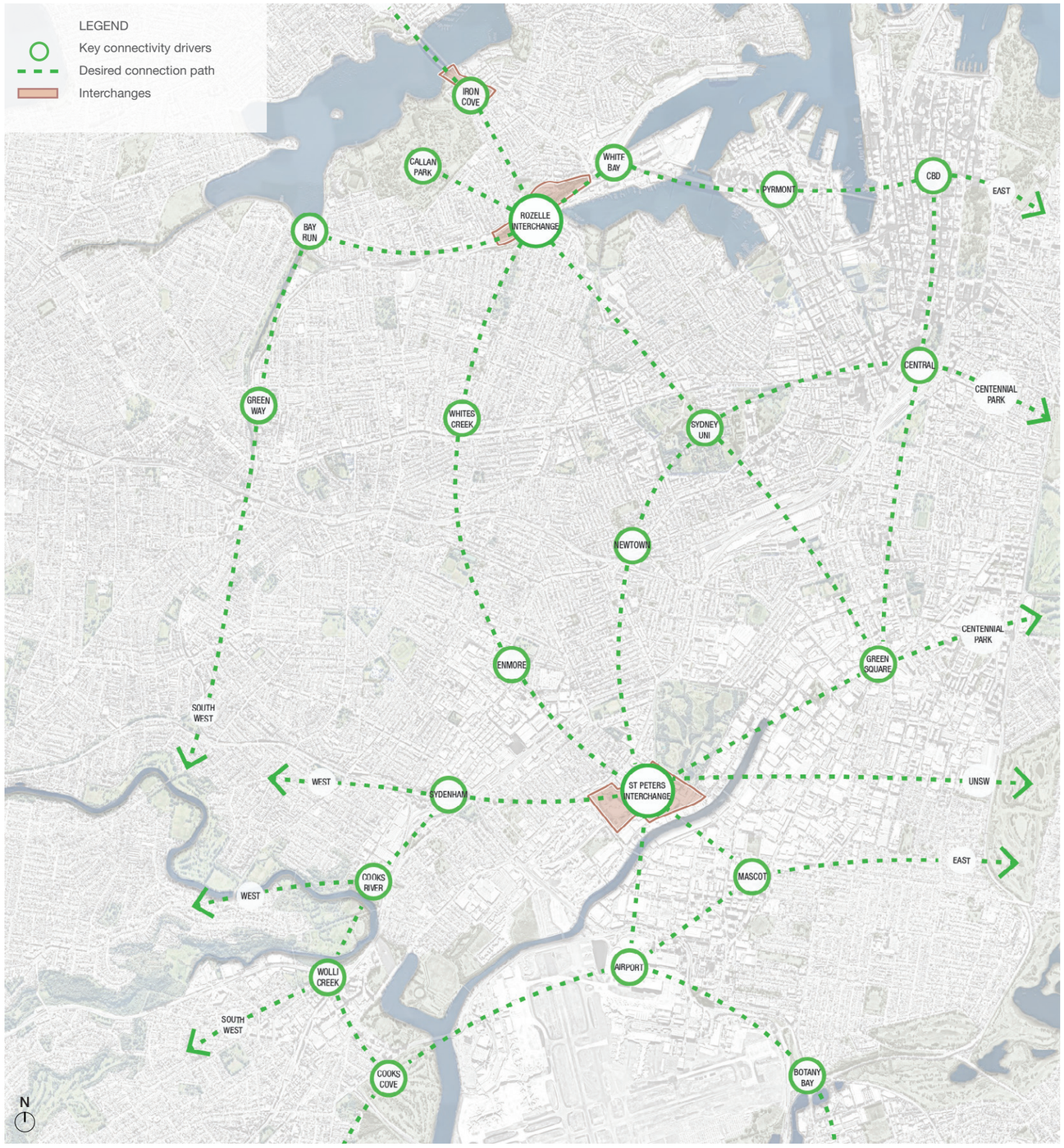


Figure 3.3 Key connectivity drivers

3.3 LOCAL CONTEXT

3.3.1 ROZELLE

The areas of influence for the Rozelle interchange in relation to active transport include the suburbs of Rozelle, Annandale, Lilyfield, Glebe, Balmain and Forest Lodge. These areas contain predominantly residential land uses, including large areas of single dwellings and small scale multi-residential buildings. There are some industrial areas along the waterfront of Rozelle Bay, which are currently designated for redevelopment as part of The Bays Precinct Urban Transformation project [UrbanGrowth NSW, 2016].

The areas of public open space include Callan Park, the Bay Run, Bicentennial Park, Easton Park and the Glebe Foreshores and Whites Valley Creek parklands.

The area has a strong character and identity with active town centres on commercial and retail streets such as Darling Street, Booth Street and Johnston Street.

The area also includes significant active transport links including the Bay Run, Glebe Foreshores, Anzac Bridge cycleway and the northern part of the GreenWay [the active transport connection between Cooks River and Iron Cove].

At present there is poor connectivity between these regional links. In particular, the Rozelle Rail Yards act as a significant barrier between the communities of Annandale, Rozelle and Lilyfield.

A key issue in the area is limited off street parking generating a heavy reliance on on-street parking, particularly for residents. In addition, many streets are lined with large established trees. These two factors are significant in the ability to introduce new active transport infrastructure as road lanes or shoulders are required for on-street parking, preventing their repurposing for new pedestrian or cycleways. The desire to maintain mature street trees can further act as a barrier to development of active transport infrastructure as they are often located in areas where it would be most feasible to develop this infrastructure.

Figure 3.4 illustrates the current existing and proposed active transport routes around the Rozelle interchange.

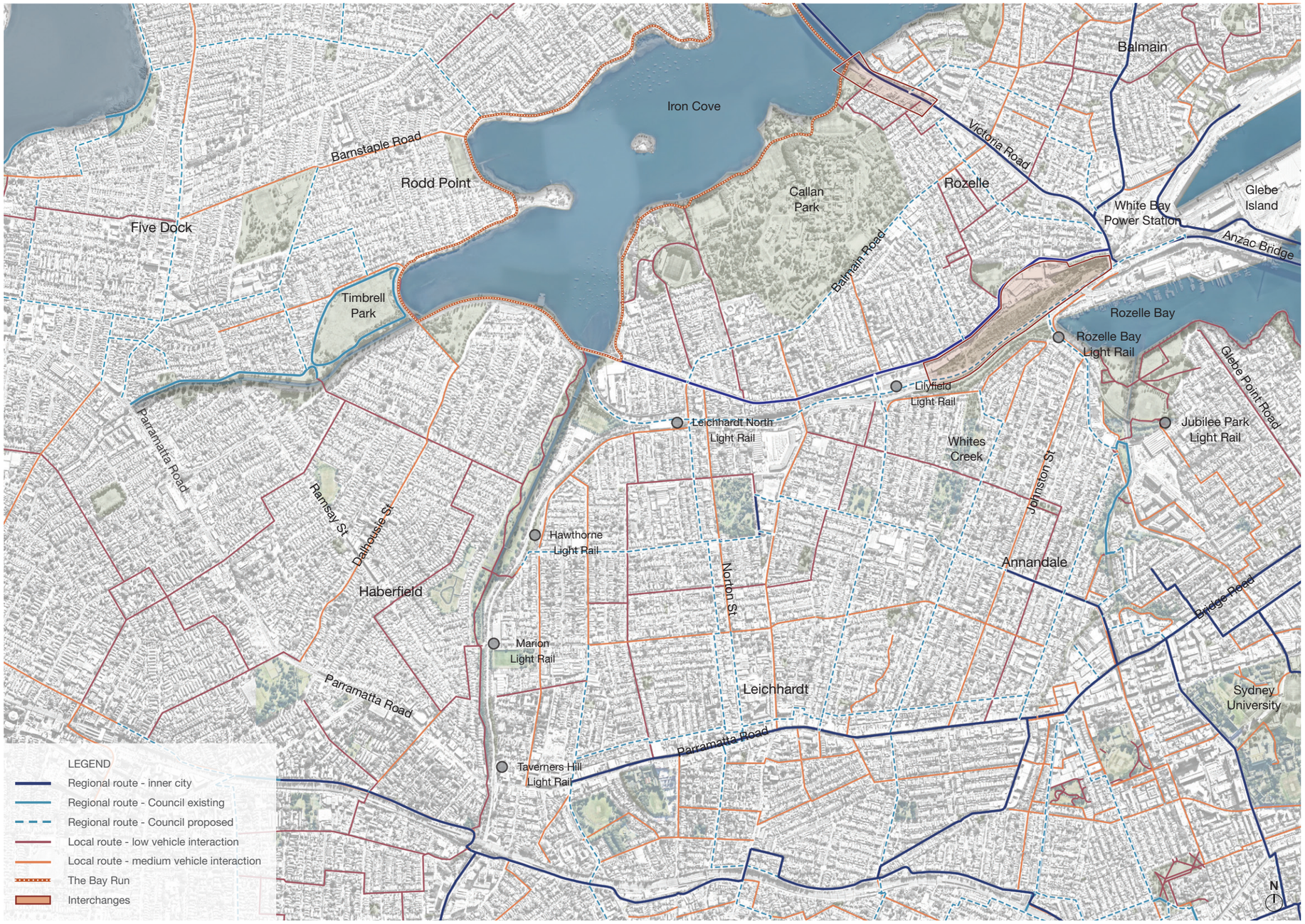


Figure 3.4 Existing network plan - Rozelle

3.3.2 IRON COVE

The Iron Cove Link site is located on Victoria Road near the eastern abutment of the Iron Cove Bridge. The site is surrounded by the predominately residential suburbs of Rozelle, Balmain and Drummoyne to the north. There are a mix of commercial and light industrial land uses along Victoria Road in Rozelle and Balmain and north of Iron Cove in Drummoyne. In its present state, Victoria Road is a highly trafficked arterial road that separates Rozelle and Balmain.

The waters of Iron Cove are a major recreational drawcard for the area and are popular for kayaking and rowing. Iron Cove is bordered by the Bay Run, a seven-kilometre shared pedestrian and cycle path that is a popular regional walk for a range of users.

Victoria Road is lined on both the eastern and western sides with a shared pedestrian and cycle path. This path does not adequately serve the needs of pedestrians and cyclists, suffering from inadequate width, uneven surface and a lack of amenity due to its proximity to traffic on Victoria Road. The existing and proposed ATN surrounding the Iron Cove site is illustrated in Figure 3.5.



Figure 3.5 Existing and proposed network plan - Iron Cove

3.3.3 PROJECT INTERFACES

3.3.3.1 HABERFIELD

The M4-M5 Link includes an underground connection between the mainline tunnels and the Wattle Street interchange, which is being constructed as part of the M4 East project. The draft M4 East Urban Design Landscape Plan [UDLP] outlines the active transport links to be provided in Haberfield by the M4 East project.

3.3.3.2 ST PETERS

The M4-M5 Link includes an underground connection between the mainline tunnels and the St Peters interchange. The St Peters interchange is being constructed as part of the New M5 project. The New M5 EIS and UDLP outline the active transport links to be developed as part of the New M5 project. In addition, a condition of approval was placed on the New M5 EIS to prepare a Pedestrian and Bicycle Network Review [see Figure 3.6] to identify additional pedestrian and cycling infrastructure that could be developed in a one-kilometre radius of St Peters interchange. The review is now complete and the outcomes are contained in section 4.1.3.2 of this report.

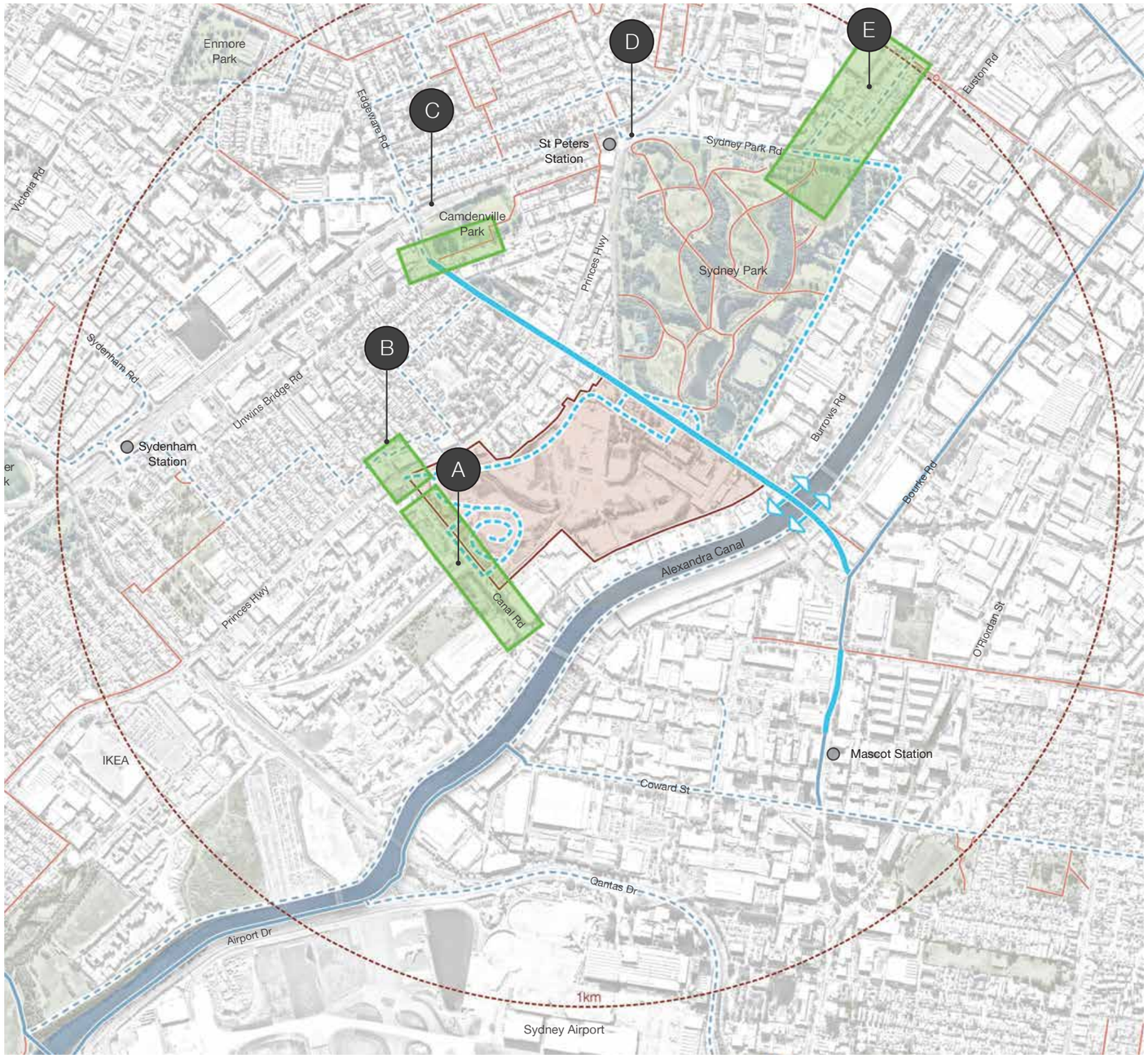


Figure 3.6 St Peters Pedestrian and Bicycle Network Review plan

4.0 Proposed Initiatives and Future Links

4.1 ACTIVE TRANSPORT LINKS TO BE DELIVERED BY THE M4-M5 LINK

This section contains the outcomes of the active transport analysis for the M4-M5 Link. This analysis has taken a corridor-wide approach in making recommendations regarding the additional active transport infrastructure required. Utilising existing plans, policies and outcomes of stakeholder consultation, the strategy includes links to be delivered by the M4-M5 Link project and links to be developed over time by others.

The active transport links to be developed by M4-M5 Link are concentrated in areas of surface intervention for the project. The links have been chosen based on providing key connections that without the M4-M5 Link, would be unachievable or pose significant barriers for others [such as local councils] to achieve. Investment in bridges over large roads and large-scale road realignment are difficult for local government authorities to achieve in creating active transport links, hence the links to be delivered by M4-M5 Link concentrate on providing these outcomes.

4.1.1 ROZELLE INTERCHANGE

Rozelle Rail Yards link

This proposed link is shown in Figure 4.1 and is a key regional connector route which would:

- Provide an east-west connection linking the Bay Run and GreenWay in the west to Anzac Bridge and CBD in the east
- Be an off-road link into and through the Rail Yards
- Provide connectivity and links to an existing network of off-road ATN routes
- Provide a flat, at-grade path, promoting the use of the connection
- Provide potential future linkages to The Bays Precinct, particularly White Bay
- Link to the Lilyfield Road cycleway [currently being planned by Inner West Council].

The Rozelle Rail Yards are located in a sandstone cutting and is typically four to eight metres below the adjacent street levels. The key route requirements for the Rozelle Rail Yards link are to:

- Provide access to sections of the Rozelle Rail Yards, which are currently not accessible to the public
- Provide access both under and over current road crossings
- Provide access to and through the future Bays Precinct developments.

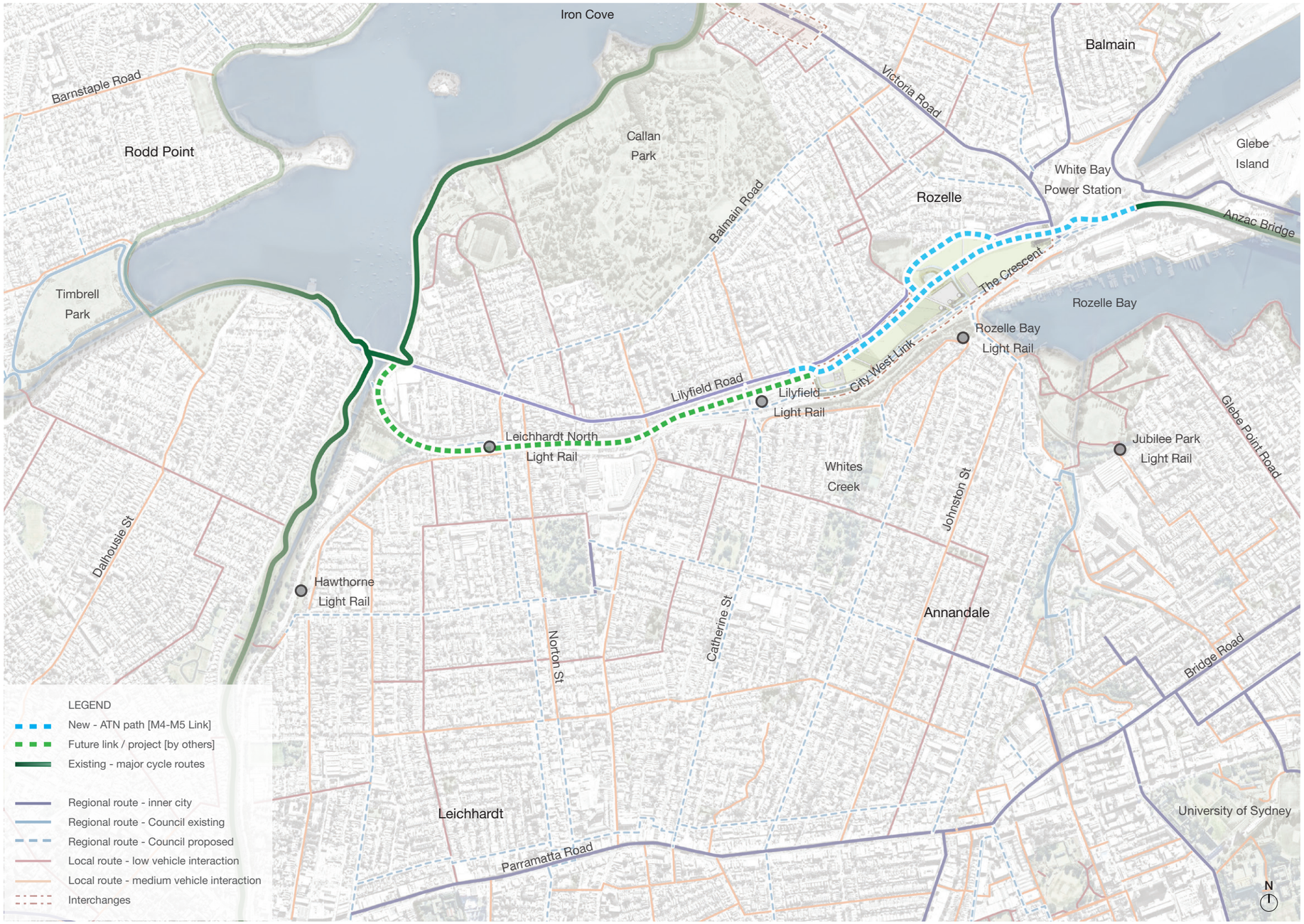


Figure 4.1 Rozelle Rail Yards link

Whites Creek link

This proposed link is shown in Figure 4.2 and is a key regional connector route, which would:

- Link Callan Park to the Rozelle Rail Yards and Parramatta Road
- Link Annandale to Lilyfield
- Be a predominantly off-road ATN link along Whites Creek to Easton Park
- Provide connectivity and links to an existing and proposed network of off-road ATN routes
- Provide a relatively flat at-grade ATN along the Whites Creek section of the route and provide the flattest route north to Callan Park and the Bay Run
- Mostly be completed via the bridge crossing over City West Link to and through the Rozelle Rail Yards
- Link significant open space to new development areas within The Bays Precinct.

The route consists predominantly of parklands including Easton Park, Whites Creek Valley Parklands and the proposed open space within Rozelle Rail Yards [see EIS Appendix L [Technical working paper: Urban design]]. The key route requirements are to:

- Address connectivity from Whites Creek to the Rozelle Rail Yards, crossing the Light Rail and City West Link
- Provide as flat a route as possible from the Rozelle Rail Yards to Callan Park
- Ensure suitable connectivity along Whites Creek ensuring minimal conflict between park users and cyclists
- Transform the Whites Creek easement and laneway into a safe and accessible active transport link.

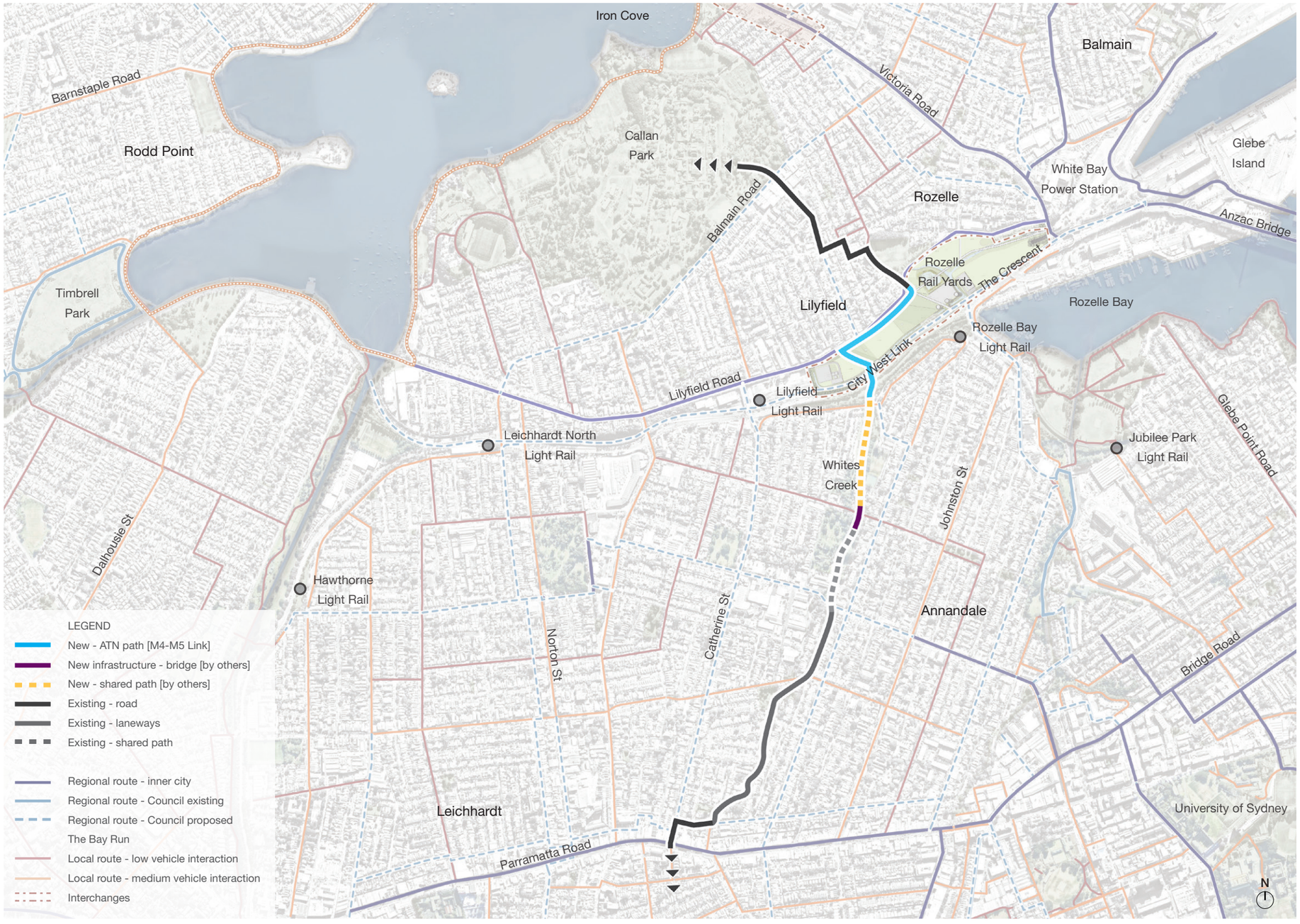


Figure 4.2 Whites Creek link

Rozelle land bridge

The Rozelle land bridge is shown in Figure 4.3 and is a key connector, which would:

- Link Bicentennial Park and Glebe Foreshore to the proposed open space of Rozelle Rail Yards and Easton Park
- Provide north-south connectivity between Glebe and Annandale with Rozelle and Balmain
- Provide a connection from the inner west to The Bays Precinct via the Rozelle Rail Yards
- Remove the need for an at-grade crossing at City West Link
- Provide a shared path over the bridge with a generous width to prevent conflict between pedestrian and cycle traffic
- Connect to the Rozelle Bay Light Rail stop
- Provide appropriate grades on the bridge structure including ramps for cyclist and people with a disability and stairs for pedestrians.

The route connects major green spaces and would provide a link between The Bays Precinct and the inner west. The key route requirements are to:

- Address north-south connectivity between Glebe [and Glebe Foreshore Walk] and Annandale with Rozelle, Balmain and The Bays Precinct
- Remove the conflict between pedestrians and cyclists with traffic on City West Link
- Provide appropriate grades in ramp structures to meet user requirements
- Be a simple and elegant structure to ensure visual impacts of the bridge do not overwhelm the location
- Connect to Rozelle Bay light rail stop.

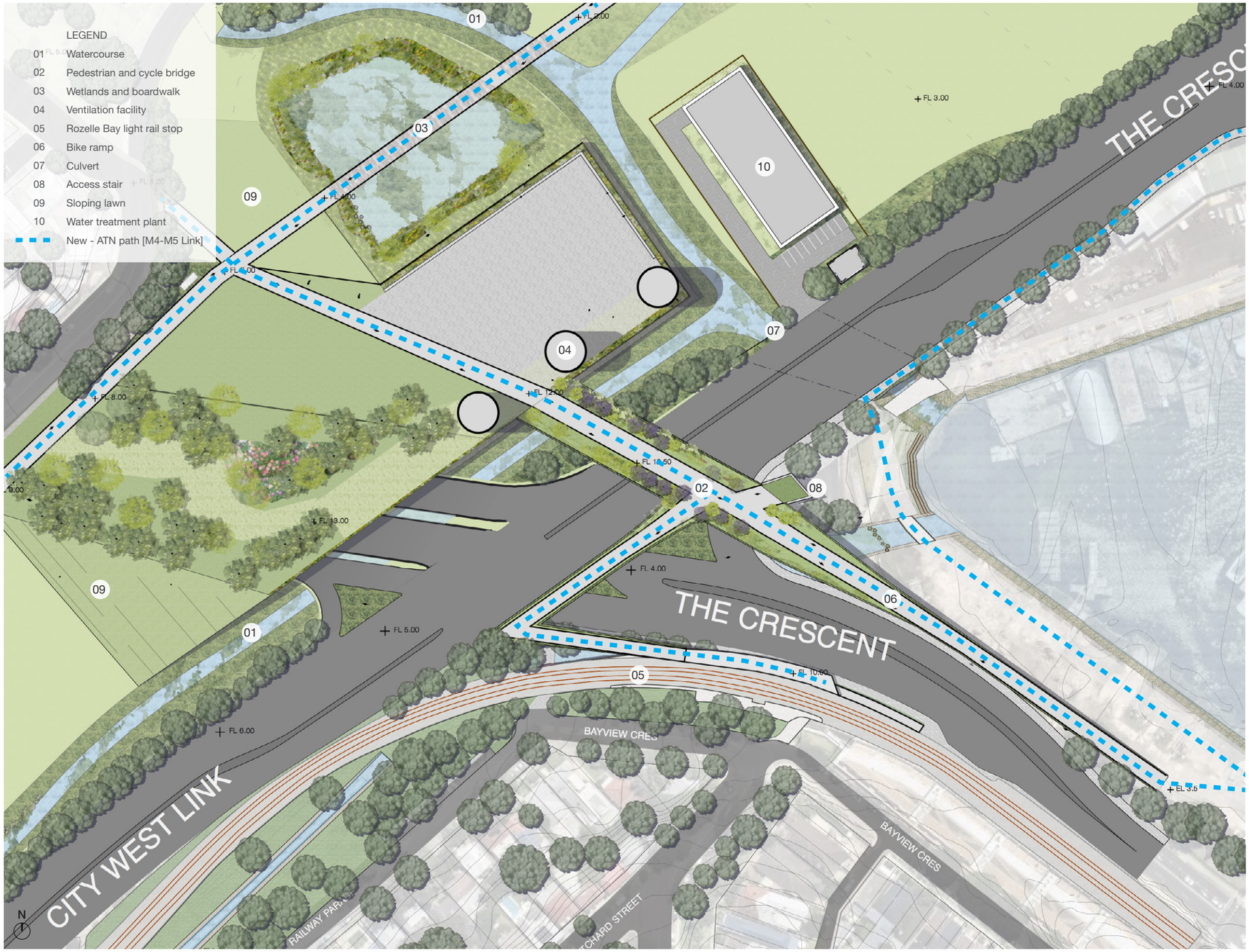


Figure 4.3 Rozelle land bridge

Victoria Road to City West Link connection

The Victoria Road connection is shown in Figure 4.4 and would take advantage of changes to the Victoria Road, The Crescent, Anzac Bridge intersection to provide a connector that would:

- Link Balmain and Rozelle with Glebe and Annandale
- Provide a connection between the elevated areas of Balmain and Rozelle with the lower levels of Rozelle Bay
- Provide an alternate route choice to the Rozelle Rail Yards
- Connect Victoria Road cycleway to the Anzac Bridge shared pedestrian/cycle path
- Provide an upgraded shared pedestrian and cycle way along the southern side of City West Link.

The route connects the residential areas of Balmain and Rozelle with open space at Glebe and the residential areas of Annandale. The key route requirements are to:

- Provide additional route choice in north-south connections between Balmain/Rozelle and Annandale/Glebe
- Provide an at-grade crossing of City West Link at the intersection with Victoria Road
- Connect to the foreshore walk around Glebe Foreshore via City West Link
- Connect to the Anzac Bridge shared path via the eastern side of Victoria Road and to The Bays Precinct.

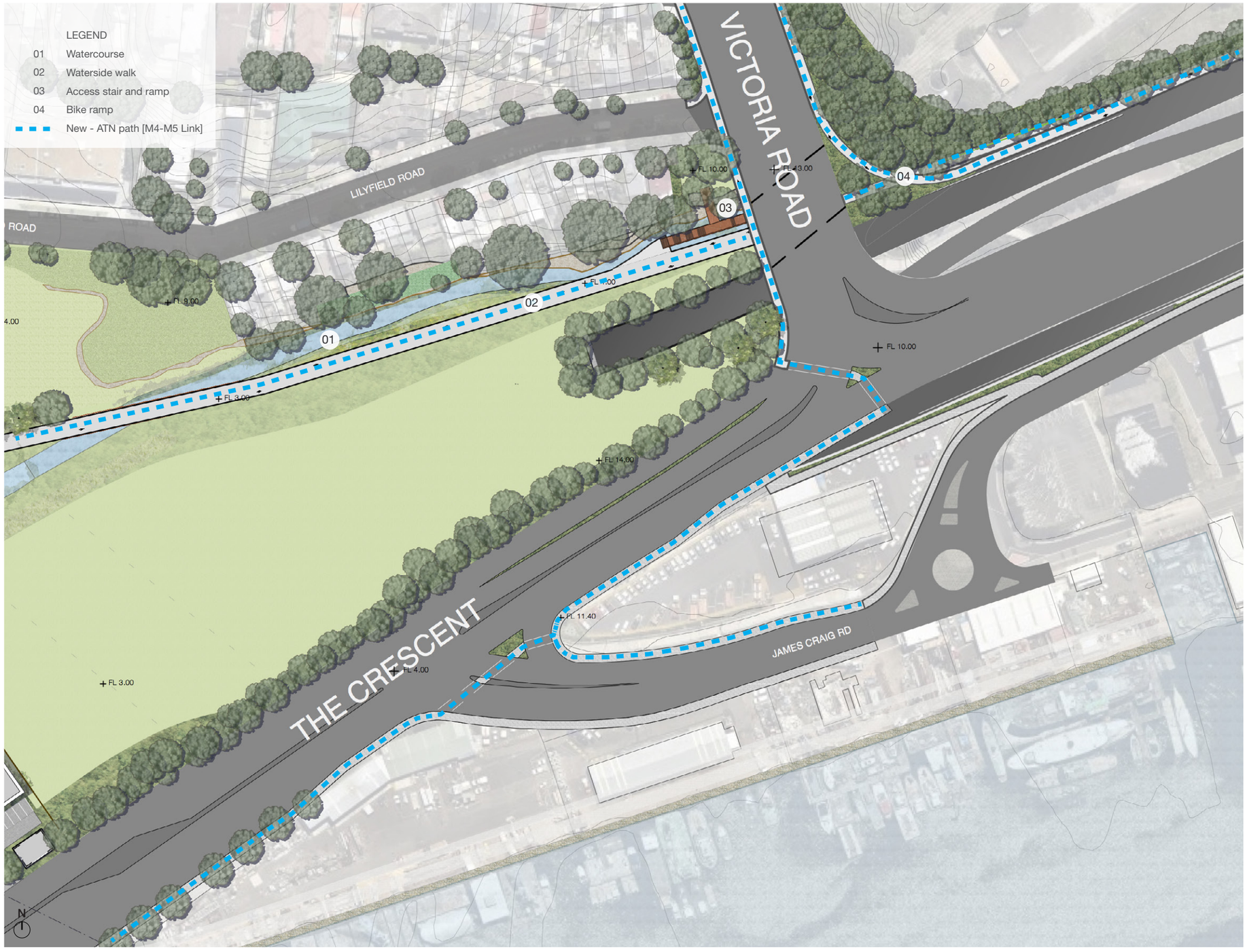


Figure 4.4 Victoria Road to City West Link connection

4.1.2 IRON COVE ATN LINK

The active transport link at Iron Cove is shown in Figure 4.5 and is a key connector that would:

- Connect northern suburbs of Drummoyne [and Russell Lea and Five Dock via the Bay Run] to The Bays Precinct and the CBD
- Connect the existing retail centres on Darling Street and Victoria Road as well as local schools and other community services
- Provide a direct route, notwithstanding significant gradient changes, from Iron Cove Bridge towards Darling Street
- Capitalise on the amenity uplifts potentially assisted by forecast traffic volume reductions on Victoria Road
- Connect to ATN routes on local roads
- Link significant open space from the Bay Run, Callan Park and the future open space at Rozelle Rail Yards and foreshore along The Bays Precinct.

The key route requirements are to:

- Provide a separated cycleway and footpath on the southern side of Victoria Road along the extent of M4-M5 Link works
- Provide a template for the treatment of cycleways and footpaths along the remainder of Victoria Road.



Figure 4.5 Victoria Road Iron Cove ATN link

4.1.3 PROJECT INTERFACES

The M4-M5 Link interfaces with the M4 East and New M5 at Haberfield and St Peters respectively. The scope of active transport links Haberfield will be delivered by the M4 East project and the scope for active transport link at St Peters will be delivered by the New M5 project. These links will be delivered in accordance with the conditions of approval for both the M4 East and New M5 projects. The following section is provided for information only.

4.1.3.1 HABERFIELD

Active transport links within the Haberfield area would be provided by the M4 East project.

The Parramatta Road Urban Transformation Strategy includes a key east-west route as part of the Urban Amenity Improvement Program. This route would link Concord in the west to Five Dock in the east by the Gipps, Queen, Patterson road corridor. These works are currently being pursued by Greater Sydney Commission, the agency charged with delivery of the Urban Amenity Improvement Program.

4.1.3.2 ST PETERS

The New M5 includes a number of new and upgraded active transport links as a component of that project. The area around St Peters interchange will include new separated cycleways, shared paths and pedestrian paths. As shown in Figure 4.6, the following active transport links would be provided as part of the New M5 project:

	Element	Description	Length
A	Campbell Road cycle path	Separated cycle path along Campbell Road between Bourke Street and Unwins Bridge Road	1300m
B	Alexandra Canal Bridge	New bridge providing connectivity between Mascot and St Peters and Sydney Park	100m
C	Bourke Road separated cycle path	Shared cycleway along Bourke Road between Campbell Road and Church Ave	650m
D	Campbell Road land bridge	Improved connectivity into Sydney Park over Campbell Road	20-50m
E	SPI shared path	Behind properties 178-310 to Princes Highway	750m
F	SPI shared path	Along Canal Road linking to future Sydney Gateway ATN	500m
G	Euston Road shared path [subject to further discussion with the City of Sydney]	Shared path along Euston Road between Campbell Road and Sydney Park Road	700m
H	Sydney Park Road shared path	Shared path along Sydney Park Road between Mitchell Road and Euston Road	250m
I	New signalised intersection	Providing improved connectivity at Euston Road and Campbell Road	N/A
J	New signalised intersection replacing two-lane roundabout	Providing improved connectivity at Euston Road and Sydney Park Road	N/A

Table 4.1 St Peters ATN upgrades

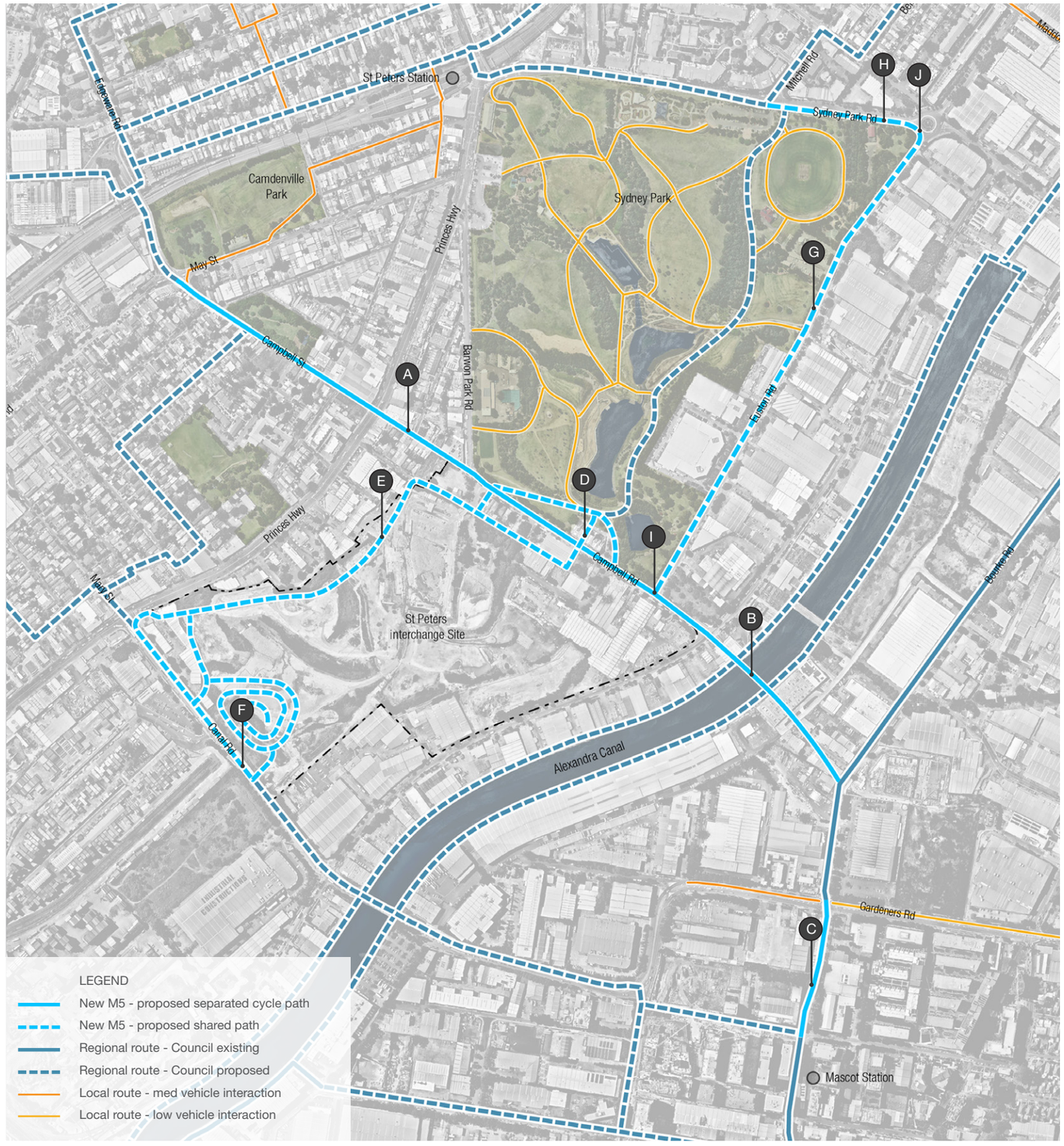


Figure 4.6 St Peters ATN upgrades

New M5 has prepared a pedestrian and bicycle network review in accordance with the project's conditions of approval.

The Proponent must undertake a Pedestrian and Cycleway Network Revíew. The Review must be prepared and approved by the Secretary within six months from the date of this approval [or as otherwise agreed by the Secretary] to identify pedestrian and cycle facilities that are to be provided by the Proponent as part of the St Peters interchange. The Review must be prepared by a suitably qualified and experienced person[s] that has been approved by the Secretary. The Review must be undertaken in consultation with the relevant councils and Bicycle NSW and address the matters raised during consultation. The Review must identify [and consider], but not be limited to:

A. Current and future land use and associated pedestrian and cycle demand and needs;
B. Pedestrian and cycle impacts associated with the project;
C. The King Street Gateway Project, including potential Princes Highway traffic calming initiatives;
D. Alexandria Canal initiatives;
E. Regional and local pedestrian and cycling strategies;
F. Pedestrian and cycle safety, accessibility and connectivity, including to the public realm;
G. Intersection and signal phasing opportunities to reduce waiting and crossing times for pedestrians and cyclists;
H. Provision of upgraded cycle and pedestrian facilities within 1,000 metres of the boundary of the SPI, apart from the areas addressed in conditions B62[c] and B64; and
I. Concept designs for pedestrian and cycleway infrastructure and implementation timeframes.

The review outlined five key areas of further investigation for the pedestrian and cycle network around St Peters interchange outlined in Table 4.2

The results of these further investigations will be included in a Pedestrian and Bicycle Implementation Strategy to be developed as a further condition of approval to New M5. A copy of the New M5 Pedestrian and Bicycle Network Review is included at Annexure 2.

	Option	Description	Next Steps
A	Sydenham Connection	Connecting St Peters interchange to the residents of Sydenham across Princes Highway	Develop concept as part of the New M5 project
B	Airport Link	Connectivity to future Sydney Gateway	Develop concept as part of Sydney Gateway and Canal Road investigated as part of the New M5 project
C	Sydenham and Cooks River Link	Connecting end of Campbell Street, across railway and south-west towards Cooks River	Develop concept as part of the New M5 project
D	King Street Gateway	King Street Gateway and Newtown Link	Roads and Maritime to develop concept
E	Alexandria to Moore Park Potential Connector	Connecting Sydney Park Road to the beginning of the Alexandria to Moore Park upgrade	Develop concept as part of the New M5 project

Table 4.2 Projects for further investigation

5.0 Summary of Future Links

Rozelle Rail Yards link

The Rozelle Rail Yards link would be provided by the project and link with the Lilyfield Road cycleway currently being planned by Inner West Council in the western reaches of the Rozelle Rail Yards site. There remains a future potential project that will continue this link west through the light rail reservation. Realisation of this link will require further work by Inner West Council, Transport for NSW and Roads and Maritime.

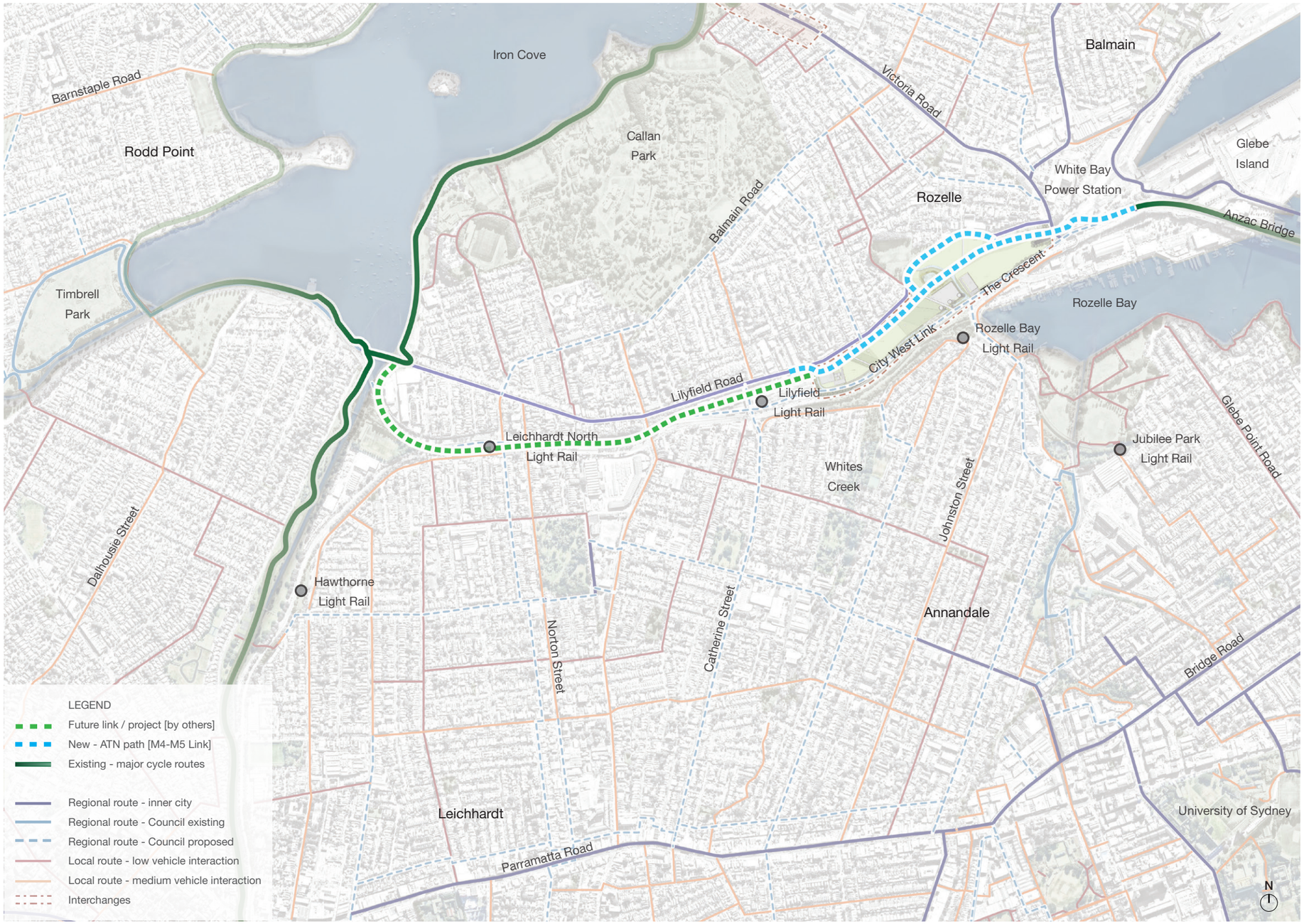


Figure 5.1 Rozelle Rail Yards future link

Whites Creeks link

A new pedestrian and cycle bridge would be provided by the project over City West Link at the northern extent of Whites Creek. There will remain future opportunities for Council and/or Roads and Maritime to formalise a shared path further south of the pedestrian and cycle bridge linking to existing shared paths that are already in place further south along Whites Creek.

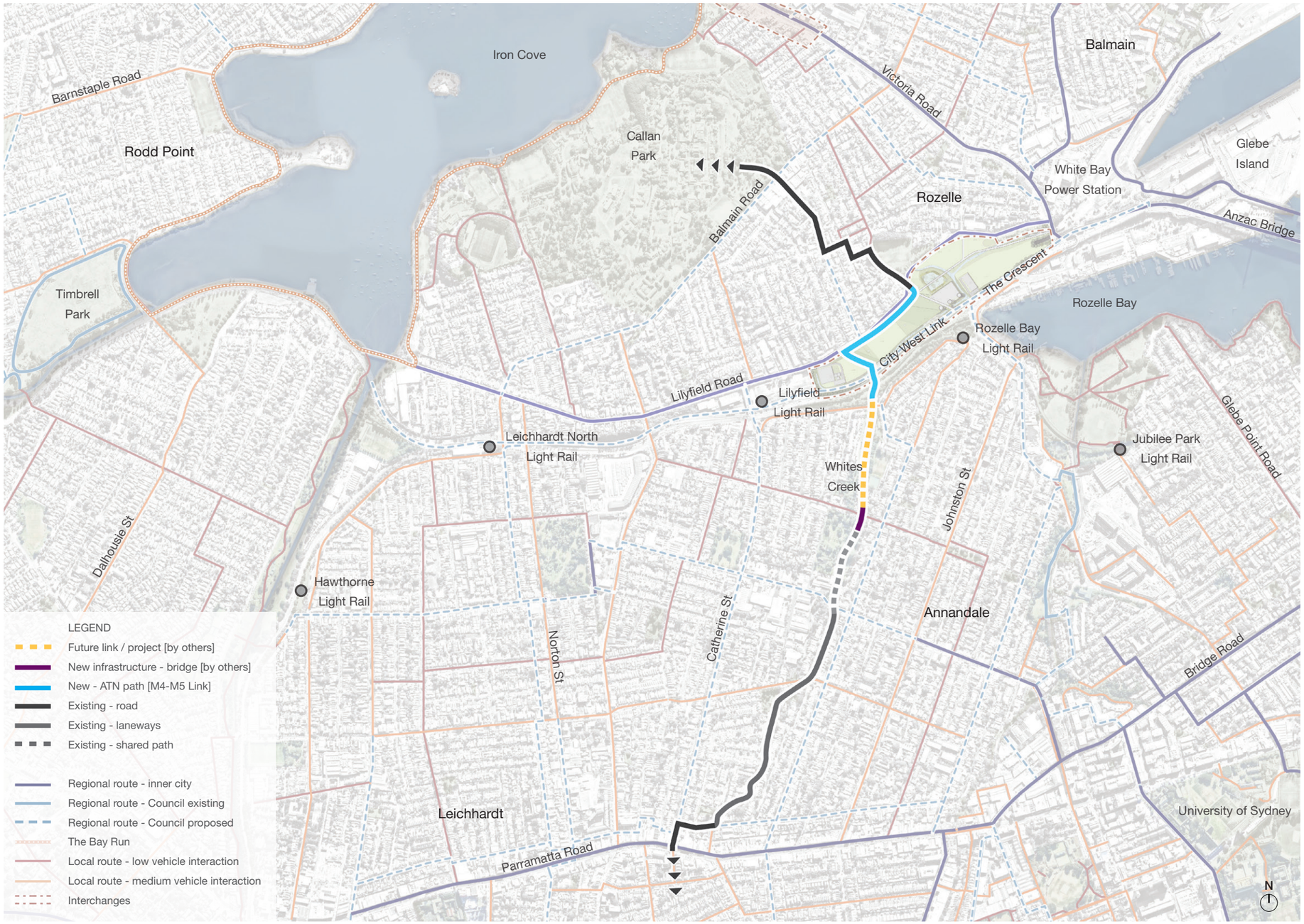


Figure 5.2 Whites Creek future link

Victoria Road

The project would create a pedestrian and cycle path along the western side of Victoria Road where the project would have a surface intervention. A future project would be possible along the remainder of Victoria Road between Springside Street and Robert Street for a new pedestrian and cycleway. This link would be contingent upon revisions to the Victoria Road carriageway that would be made possible due to the anticipated traffic reductions as a result of the Iron Cove Link.



Figure 5.3 Victoria Road Iron Cove ATN link

Johnstons Creek Valley link

This proposed link is a key regional connector route that would:

- Extend the existing Johnstons Creek pathway to Parramatta Road
- Extend the existing Johnstons Creek pathway to connect into the Rozelle Rail Yards via the Rozelle Rail Yards land bridge
- Link Glebe Foreshore and parklands to the Rozelle Rail Yards and Parramatta Road and The Bays Precinct
- Link Glebe to Lilyfield and Rozelle
- Be a predominantly off-road ATN link along Johnstons Creek
- Provide connectivity and links to an existing and proposed network of off-road ATN routes
- Provide a relatively flat, at-grade ATN along the Johnstons Creek section of the route
- Link significant open space to new development areas, including Harold Park redevelopment and The Bays Precinct.

This link would complement the works proposed to Pyrmont Bridge Road under the UrbanGrowth NSW Parramatta Road Urban Transformation Strategy, Urban Amenity Improvement Program. The key route requirements are to:

- Address connectivity from Johnstons Creek to the Rozelle Rail Yards
- Provide as flat a route as possible from the interchange to Parramatta Road
- Ensure suitable connectivity along Johnstons Creek ensuring minimal conflict between park users and cyclists
- Transform the Johnstons Creek easement and laneway into a safe and accessible active transport link

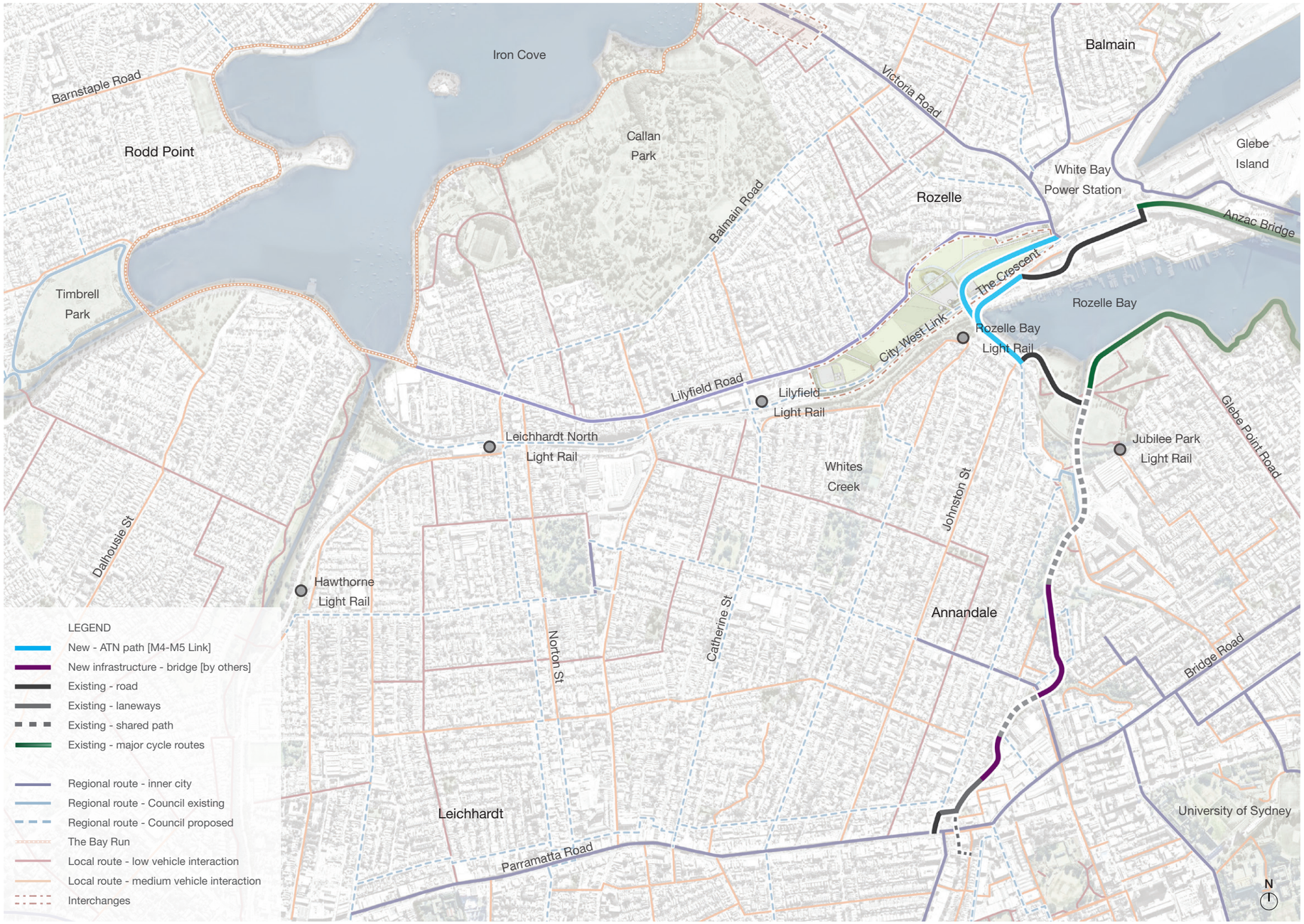


Figure 5.4 Johnstons Creek Valley link

Johnston Street link

The Johnston Street ATN link is a key connector that would:

- Link the inner western suburbs to the Glebe Foreshore and Rozelle Rail Yards
- Link into the existing retail centres of Annandale and Parramatta Road as well as local schools and other community services
- Provide space for a separated cycleway, owing to the width of the road
- Link to ATN routes on local roads
- Provide a relatively flat route
- Link significant open space to new development areas including Harold Park redevelopment and The Bays Precinct
- Take advantage of the street not being used by buses.

The key issues for this link that need to be further investigated include:

- Potential impacts on street parking and street trees
- Resolve movement through intersections, including intersections with traffic lights at Booth Street and Collins Street
- Connectivity through the intersection at Parramatta Road
- Connectivity through the intersection at The Crescent.

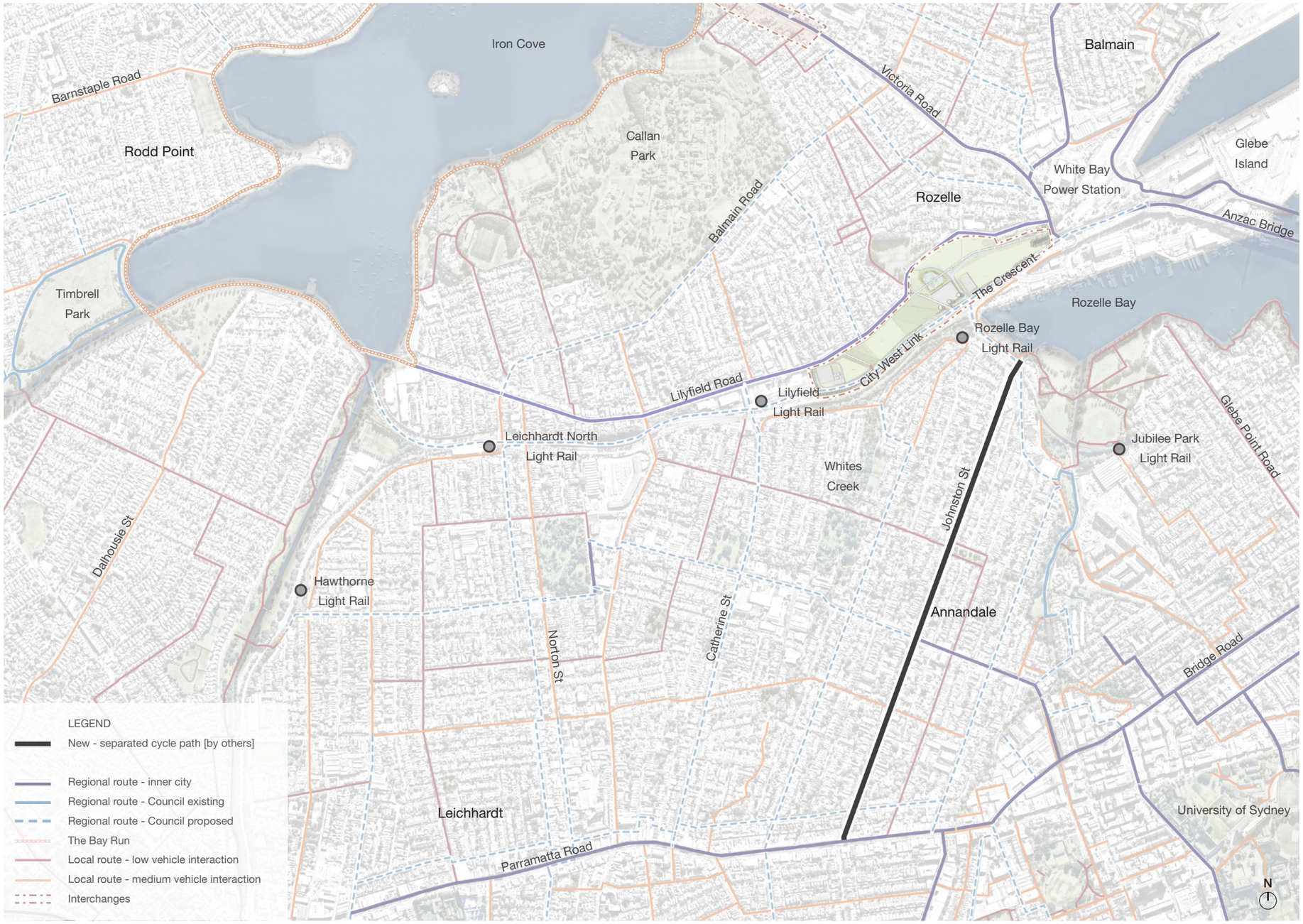


Figure 5.5 Johnstons Street link

Whites Creek to Marrickville link

This proposed link is a key regional connector route that would:

- Link a number of inner west destinations including train stations at Petersham, Stanmore, and Marrickville, as well as local town centres
- Link to other major cycleway routes including the regional route along the main Western rail line, Cooks River cycle path, and the proposed Sydenham to Bankstown path
- Form part of a key local north south route from Rozelle to the Cooks River
- Be an on-road ATN using cycle paths on predominantly quiet local streets
- Provide connectivity and links to an existing network of on-road ATN routes
- Require a connection along Crystal Street to cross the rail line.

The route is located on local and regional roads. The streets are typically narrow and the majority of the streets consists of two travel lanes and two parking lanes. Further investigations would need to assess safety implications of vehicle and pedestrian/cyclist interaction and the potential loss of street parking and street trees.



Figure 5.6 Whites Creek to Marrickville link

Johnstons Creek to St Peters link

This link is a key proposed regional connector route which would:

- Use a relatively direct route from Johnstons Creek to the St Peters interchange through Enmore
- Be an on-road ATN using separated cycle paths on regional roads and quiet local streets
- Provide connectivity and links to an existing and proposed network of on-road ATN routes, such as Wilson Street and the inner west railway regional route
- Link to significant proposed ATN at St Peters along Campbell Road and through to Bourke Street
- Require the construction of a separated cycleway along Edgeware Road as a key connection
- Link inner western suburbs of Enmore, St Peters and Stanmore to Rozelle and the Balmain Peninsula
- Provide a relatively flat at-grade ATN for most of the route.

The route is located on local and regional roads. The streets are typically narrow and typically consist of the following configurations:

- Two travel lanes and two parking lanes on regional roads such as Edgeware Road, Bedwin Road, Enmore Road and Liberty Street
- Two travel lanes and two parking lanes on local roads such as Cardigan Street, London Street and Cambridge Street.



Figure 5.7 Johnstons Creek to St Peters link

Orphan School Creek to Sydney Park link

This link is a key proposed regional connector route that would:

- Link key inner west destinations such as Sydney University, King Street Newtown, Carriageworks and Eveleigh, and Erskineville village
- Be an on-road ATN using separated cycle paths on regional roads and quiet local streets
- Provide connectivity and links to an existing network of on-road ATN routes
- Link to other major cycleway routes including routes through Sydney University and Wilson Street, which link to the CBD as well as routes through Erskineville including Concord Street and Flora Street
- Require the construction of a separated cycleway along Lyons Road and Missenden Road
- Provide potential future linkages to development in North Eveleigh, Australian Technology Park and Ashmore Estate as well as connections east to Green Square.

The route is located on local and regional roads. The streets are typically narrow and typically consist of the following configurations:

- Two travel lanes and two parking lanes [Missenden Road, Lyons Road, Burren Road, Alexandra Drive, Bridge Street]
- One travel lane and one parking lane [eg Bucknell Road, Wilson Street, Flora Street]
- Mini plazas at King Street and Erskineville Road, Ashmore Estate.

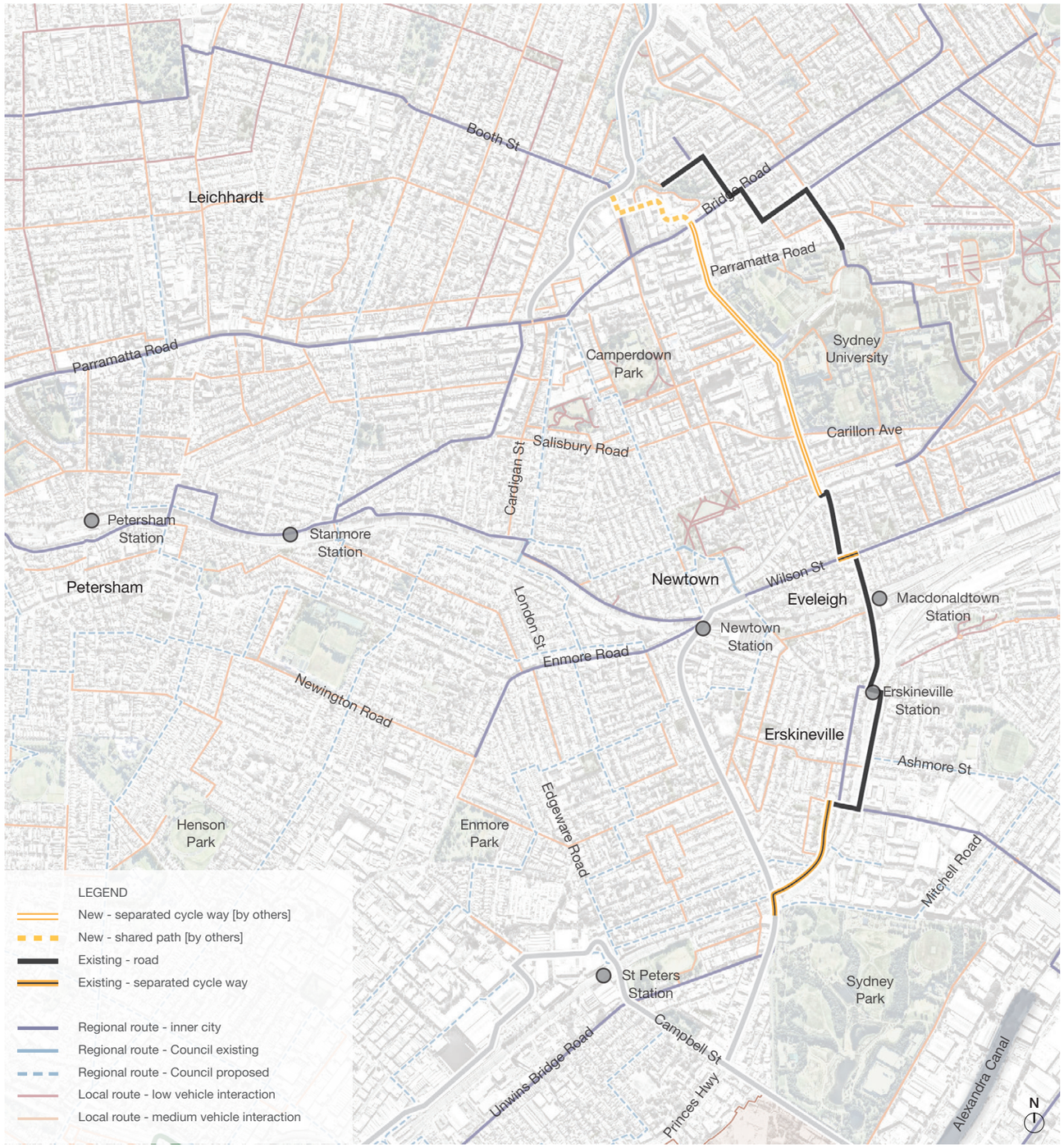


Figure 5.8 Orphan School Creek to Sydney Park link

6.0 Future Consultation

The proposed active transport routes provided in this report outline a possible future form for the ATN within and around the M4-M5 Link corridor. To realise the routes proposed, further consultation would be carried out with local councils, Transport for NSW, bicycle user groups, the community and adjacent land holders and developers.

The routes identified as being delivered by M4-M5 Link [see section 4.1] would be developed further in the UDLPs to be prepared for the project. The UDLPs would cover detail including:

- Path width
- Path delineation [eg separated cycleways and pedestrian paths, shared paths]
- Path connections to the existing network.

See images on this page for examples of typologies.

The above would be developed in accordance with:

- Austroads Guidelines
- NSW Bicycle Guidelines
- Planning Guidelines for Walking and Cycling.

The routes identified as potential future projects [section 5] would be made available for incorporation into the Roads and Maritime Principle Bicycle Network. This would enable these routes to be developed by either Roads and Maritime or local councils following further consultation with landowners and the community.

Principles for wayfinding would be considered in the development of these routes [see Annexure 4].



Cooks River



George Street Cycle Way



The Bay Run



Sydney Olympic Park



Kent Street Cycle Way



Bourke Street Cycle Way



Cycle Way - Vancouver, Canada

7.0 Summary

The M4-M5 Link would deliver a significant addition to the ATN within the project corridor. The following table summarises the delivery of active transport routes as contained within this report. The routes are illustrated in Figure 7.1. Those that would be delivered by the project are shown in bold text.

	Route	Rationale	Type	Approx. Length	Delivery
A	Rozelle Rail Yards link				
	Links the Bay Run, The Bays Precinct and the GreenWay in the west to Anzac Bridge and the CBD in the east	1. Links Anzac Bridge through The Bays Precinct to Lilyfield Road at the western end of the Rozelle Rail Yards	**Separated cycle path**	**250m**	**M4-M5 Link and UrbanGrowth NSW**
		2. Provides the junction connecting Rozelle Rail Yards and Victoria Road to The Bays Precinct	**Underpass**	**150m**	**M4-M5 Link**
		3. Provides the link between Victoria Road and the CSELR Rozelle Maintenance Depot	**Separated cycle path**	**1000m**	**M4-M5 Link**
		4. Connecting the CSELR Rozelle Maintenance Depot to Charles Street and Canal Road linking onto the Bay Run	Separated cycle path	1800m	Inner West Council/Roads and Maritime/Transport for NSW
B	Johnstons Street link				
	Links the inner western suburbs to the Glebe Foreshores and the Rozelle Rail Yards	1. Connecting Parramatta Road to The Crescent	Separated Cycle Way	1800m	Inner West Council and Roads and Maritime
C	Victoria Road - Iron Cove link				
	Links the northern suburbs of Drummoyne and Russell Lea and Chiswick to The Bays Precinct and the CBD	1. Connecting the eastern side of the Rozelle Rail Yards along Victoria Road to the intersection of Robert Street	**Separated Cycle Way**	**250m**	**M4-M5 Link**
		2. Connecting the intersection of Robert Street up and over Victoria Road to the intersection of Springside Street	Separated Cycle Way	900m	Inner West Council
		3. Linking the intersection of Springside Street to the Iron Cove Bridge and the Bay Run	**Separated Cycle Way**	**450m**	**M4-M5 Link**
		4. Connecting Victoria Road to The Crescent over the Rozelle Rail Yards	**Bridge**	**200m**	**M4-M5 Link**
		5. Connecting Victoria Road to The Crescent	**Shared Path**	**400m**	**M4-M5 Link**
		6. Connecting The Crescent to James Craig Road existing ATN	**Shared Path**	**500m**	**M4-M5 Link**
D	Whites Creek link				
	Links Parramatta Road to the Rozelle Rail Yards and onto Callan Park	1. Linking the intersection of Brenen Street and Railway Parade over or under City West Link connecting to the Rozelle Rail Yards link	**Bridge**	**200m**	**M4-M5 Link**
		2. Links Railway Parade through Cohen Park, Whites Creek Valley Park and connects onto Whites Creek Lane	Shared path	750m	Inner West Council
		3. Following Whites Creek Lane, connecting Whites Creek Valley Park to Macquarie Street and further onto Parramatta Road	Laneway	1000m	Inner WestCouncil
E	Johnston Creek Valley link				
	Extends the existing Johnston Creek pathway to connect Glebe Foreshore to Parramatta Road	1. Connecting Easton Park to The Crescent through the Rozelle Rail Yards	**Bridge/Shared path**	**300m**	**M4-M5 Link**
		2. Providing a suitable cycling space for the connection along The Crescent, into Jubilee Park and linking to the existing Glebe Foreshore	**Shared path**	**500m**	**M4-M5 Link**
		3. Using the existing pedestrian infrastructure to link the Glebe Foreshore to the north end of Taylor Street along side Johnstons Creek	Existing Shared path	500m	Inner West Council
		4. Following the creek line, continue from the north end of Taylor Street, under the Wigram Road bridge, under the Booth Street bridge and linking onto the Douglas Grant Memorial Park	Bridge over canal	500m	Sydney Water and Inner West Council
		5. Providing the connection through Douglas Grant Memorial Park	Existing Shared path	100m	Sydney Water and Inner West Council
		6. Following the creek line, connect Douglas Grant Memorial Park to the laneway to the east of Susan Street	Bridge over canal	50-100m	
		7. Connect the north end of the laneway to Cahill Lane then onto Parramatta Road	Shared path	200m	Inner WestCouncil

Table 7.1 Rozelle delivery of routes

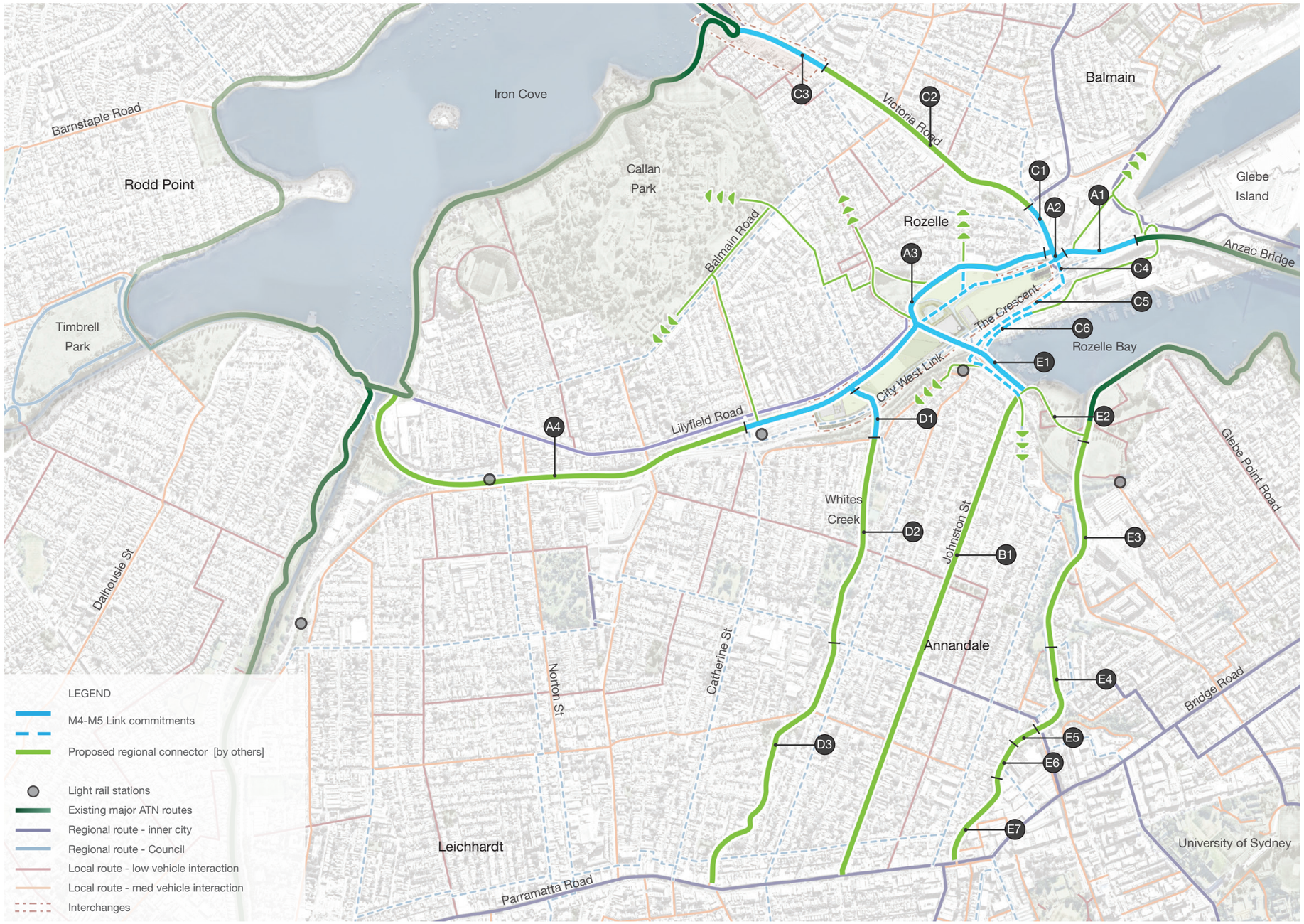


Figure 7.1 Rozelle delivery of routes

8.0 References

The following plans and policies were utilised in development of this report:

- Sydney's Cycling Future, December 2013
- Inner Sydney Regional Bicycle Network, April 2010
- Leichhardt Council Bike Plan, October 2015
- Marrickville Council Bike Plan, August 2007
- City of Sydney Cycle Strategy and Action Plan, February 2007
- City of Sydney Living Green Network, May 2011
- NSW Bicycle Guidelines, July 2005
- NSW Long Term Transport Master Plan, December 2012
- Transformation Plan: The Bays Precinct, Sydney, October 2015
- Parramatta Road Corridor Urban Transformation Strategy, November 2016.

ANNEXURE 1

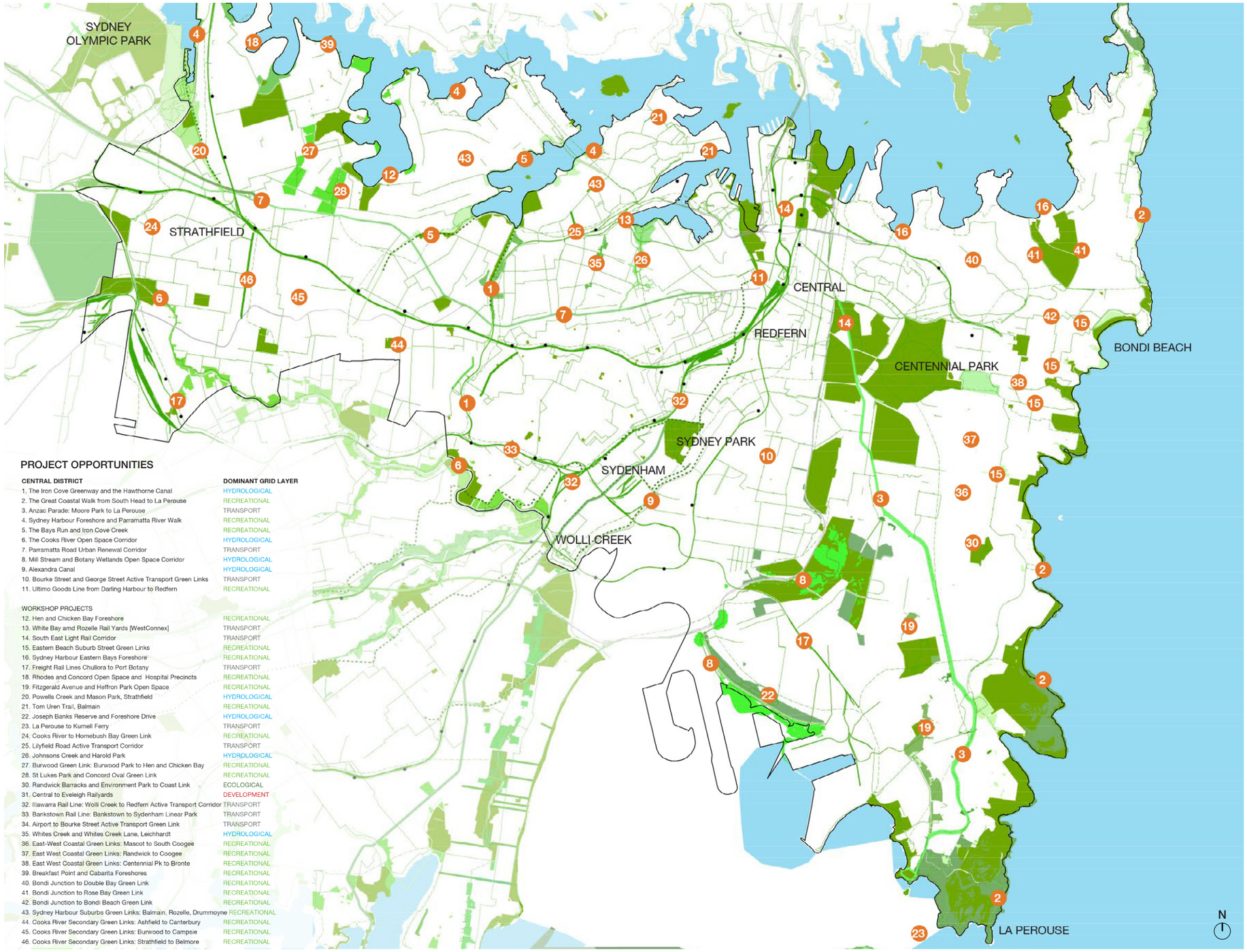
Analysis of regional connectivity for the M4-M5 Link.

This Annexure contains information that assisted in the review of the existing active transport network in and around the M4-M5 Link corridor.

Green Grid

The Green Grid is an initiative of the NSW Government [2016] as part of 'A Plan for Growing Sydney'. The Green Grid aims to create a network of interlinked multipurpose and open and green spaces across Sydney. The Green Grid contributes to the goal of creating a great place to live with communities that are strong, healthy and well-connected.

The Green Grid integrates a range of open space in a network that connects our homes to centres, public transport, jobs and recreation.



PROJECT OPPORTUNITIES

CENTRAL DISTRICT	DOMINANT GRID LAYER
1. The Iron Cove Greenway and the Hawthorne Canal	HYDROLOGICAL
2. The Great Coastal Walk from South Head to La Perouse	RECREATIONAL
3. Anzac Parade: Moore Park to La Perouse	TRANSPORT
4. Sydney Harbour Foreshore and Parramatta River Walk	RECREATIONAL
5. The Bays Run and Iron Cove Creek	RECREATIONAL
6. The Cooks River Open Space Corridor	HYDROLOGICAL
7. Parramatta Road Urban Renewal Corridor	TRANSPORT
8. Mill Stream and Botany Wetlands Open Space Corridor	HYDROLOGICAL
9. Alexandra Canal	HYDROLOGICAL
10. Bourke Street and George Street Active Transport Green Links	TRANSPORT
11. Ultimo Goods Line from Darling Harbour to Redfern	RECREATIONAL
WORKSHOP PROJECTS	
12. Hen and Chicken Bay Foreshore	RECREATIONAL
13. White Bay amd Rozelle Rail Yards [WestConnex]	TRANSPORT
14. South East Light Rail Corridor	TRANSPORT
15. Eastern Beach Suburb Street Green Links	RECREATIONAL
16. Sydney Harbour Eastern Bays Foreshore	RECREATIONAL
17. Freight Rail Lines Chullora to Port Botany	TRANSPORT
18. Rhodes and Concord Open Space and Hospital Precincts	RECREATIONAL
19. Fitzgerald Avenue and Heffron Park Open Space	RECREATIONAL
20. Powells Creek and Mason Park, Strathfield	HYDROLOGICAL
21. Tom Uren Trail, Balmain	RECREATIONAL
22. Joseph Banks Reserve and Foreshore Drive	HYDROLOGICAL
23. La Perouse to Kurnell Ferry	TRANSPORT
24. Cooks River to Homebush Bay Green Link	RECREATIONAL
25. Lilyfield Road Active Transport Corridor	TRANSPORT
26. Johnsons Creek and Harold Park	HYDROLOGICAL
27. Burwood Green Link: Burwood Park to Hen and Chicken Bay	RECREATIONAL
28. St Lukes Park and Concord Oval Green Link	RECREATIONAL
30. Randwick Barracks and Environment Park to Coast Link	ECOLOGICAL
31. Central to Eveleigh Railyards	DEVELOPMENT
32. Illawarra Rail Line: Wolli Creek to Redfern Active Transport Corridor	TRANSPORT
33. Bankstown Rail Line: Bankstown to Sydenham Linear Park	TRANSPORT
34. Airport to Bourke Street Active Transport Green Link	TRANSPORT
35. Whites Creek and Whites Creek Lane, Leichhardt	HYDROLOGICAL
36. East-West Coastal Green Links: Mascot to South Coogee	RECREATIONAL
37. East West Coastal Green Links: Randwick to Coogee	RECREATIONAL
38. East West Coastal Green Links: Centennial Pk to Bronte	RECREATIONAL
39. Breakfast Point and Cabarita Foreshores	RECREATIONAL
40. Bondi Junction to Double Bay Green Link	RECREATIONAL
41. Bondi Junction to Rose Bay Green Link	RECREATIONAL
42. Bondi Junction to Bondi Beach Green Link	RECREATIONAL
43. Sydney Harbour Suburbs Green Links: Balmain, Rozelle, Drummoyne	RECREATIONAL
44. Cooks River Secondary Green Links: Ashfield to Canterbury	RECREATIONAL
45. Cooks River Secondary Green Links: Burwood to Campsie	RECREATIONAL
46. Cooks River Secondary Green Links: Strathfield to Belmore	RECREATIONAL

Figure 8.1 Draft Green Grid project opportunities
Transport for NSW

Major development zones

Property development offers a significant opportunity to develop active transport networks, including:

- New connectivity for pedestrian and cyclists with new roads, lanes, pedestrian and cyclist links, particularly in former industrial areas which have large lot sizes
- Opportunities for new ATN infrastructure including dedicated on-road and off-road active transport networks
- Increased demands for ATN as households which are located close to work are increasingly carless households
- New areas which attract people as an end-destination such as new retail centres and new transport nodes.

In the vicinity of the Rozelle interchange development is dominated by The Bays Precinct which has a number of new development zones adjacent to the Rozelle interchange including:

- White Bay Power Station
- Glebe Island
- Rozelle Bay
- White Bay
- Bays Market District

The Bays Precinct will include significant opportunities for new regional foreshore connectivity and connected active transport networks as well as open space through:

- Foreshore walk- Bays Promenade along White Bay, Rozelle Bay and Blackwattle Bay linking Balmain to the CBD
- Open space upgrades such as Wentworth Park
- New public open space associated with the development precincts

There are also new developments in close proximity to the Rozelle Rail Yards including the Harold Park redevelopment and associated open space upgrades at Johnstons Creek and new trip generators such as the Tramsheds.

In the vicinity of the St Peters interchange there is a major transformation of the former industrial lands into high density residential and mixed use development. The area around the St Peters interchange will transform significantly both in the near and long term. In the short term redevelopment is occurring at areas such as:

- Green Square Town Centre
- St Peters Triangle
- Ashmore Estate
- Industrial land adjacent to Sydney Park
- Victoria Road Precinct, Sydenham
- Mascot Town Centre
- Wolli Creek

St Peters interchange will also include significant redevelopment into the longer term with large areas of redevelopment likely to occur in the following areas:

- Greater Green Square
- Southern employment lands including Rosebery North
- Cooks Cove
- Sydney Airport lands

The area's strategic location between the airport and the CBD as well as the eastern suburbs and inner western suburbs of Sydney means that this will be a dynamic area of change with major opportunities for new ATN infrastructure as part of the new development.

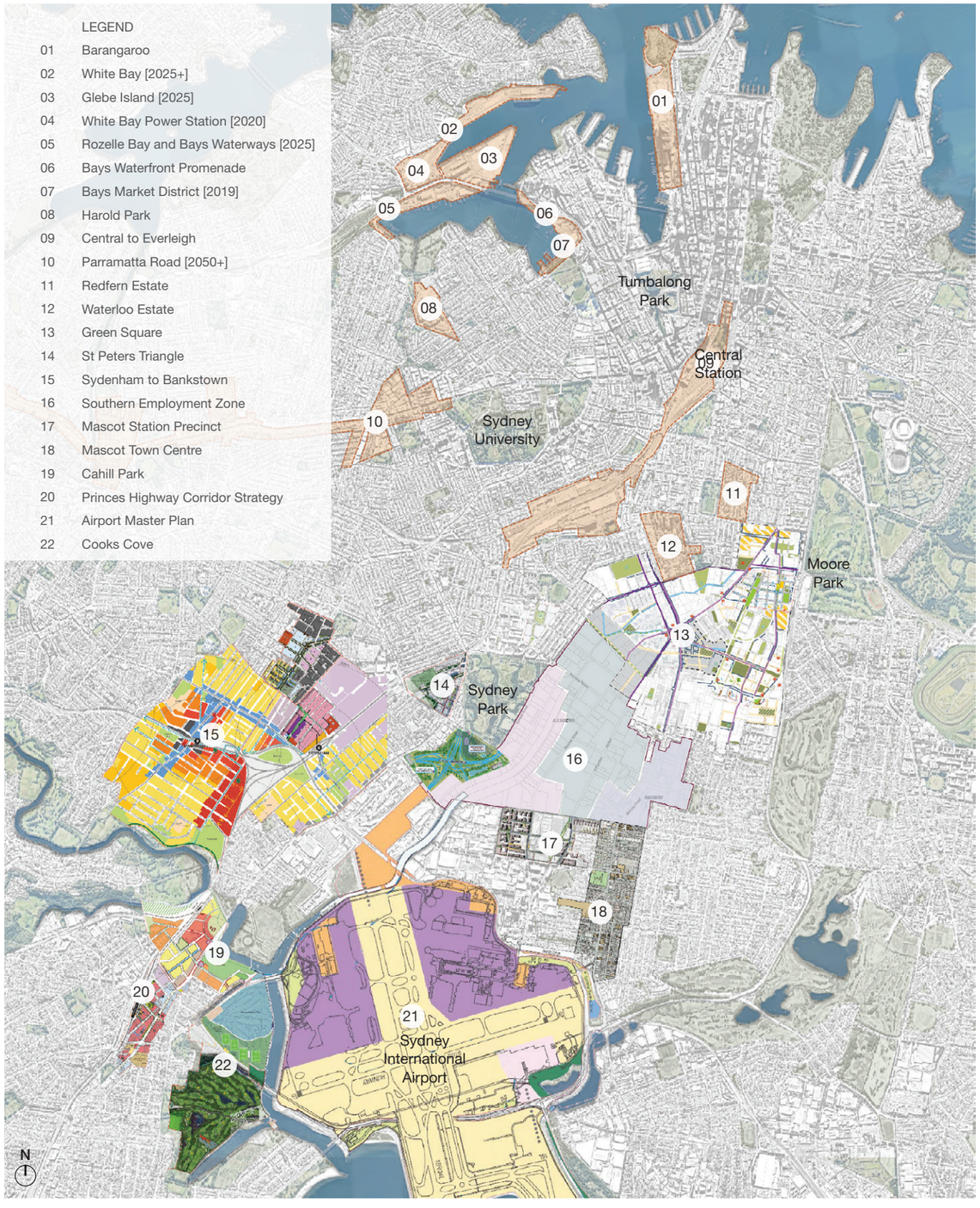


Figure 8.2 Major development zones

Inner City regional routes

The Inner Sydney Regional Bicycle Network is a plan that has been developed with a number of councils to identify cross regional cycling links within inner Sydney. The project was undertaken in 2010 and included an economic analysis of the route including a cost/benefit ratio. The network has been refined on a number of occasions since its original development.

The network was developed to ensure a coordinated and connected network was developed for inner Sydney. The network includes 160 kilometres of cycleways which are separated from general traffic and 70 kilometres of upgraded shared paths.

This strategy is shown in Figure 8.3.

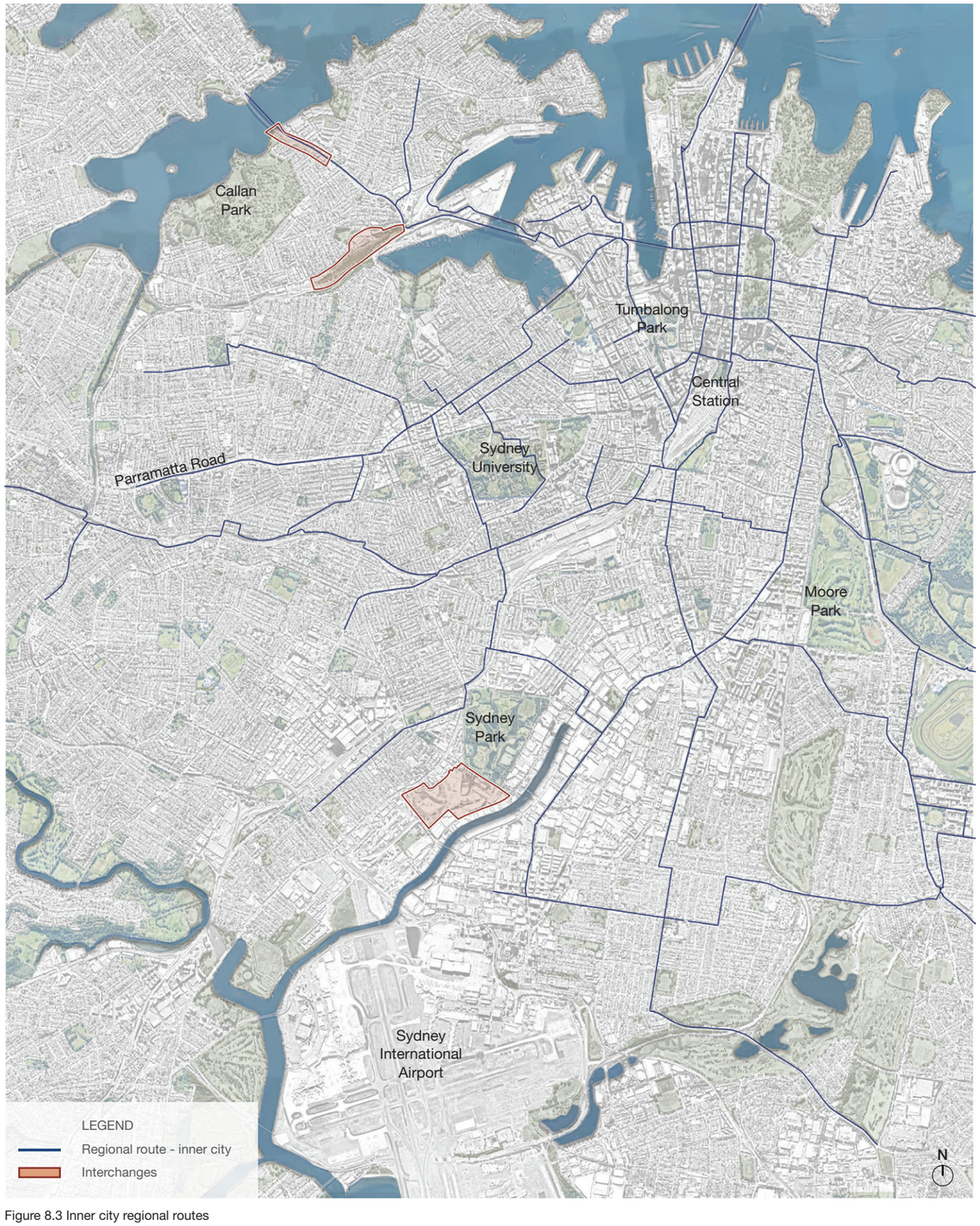


Figure 8.3 Inner city regional routes

City of Sydney and Inner West Council regional routes

In addition to the inner Sydney Regional Bicycle Network, inner Sydney councils including the former Leichhardt Council, the former Marrickville Council and the City of Sydney Council have developed cycling strategies. These strategies identify a number of regional routes and local routes which supplement and support the Inner Sydney Regional Bicycle Network.

The City of Sydney has also developed a Liveable Green Network which includes a pedestrian network in addition to the cycle network. The routes in the network are designed to encourage walking to local destinations and include footpath widening, lower speed limits and improved crossings as well as facilities such as seating and bubblers.

These regional, local and pedestrian active transport networks were reviewed and mapped and are shown in the Figure 8.4.



Figure 8.4 City of Sydney and Inner West Council regional routes

ANNEXURE 2

New M5 Pedestrian and Bicycle Network Review.



WESTCONNEX NEW M5 PEDESTRIAN & BICYCLE TRANSPORT NETWORK REVIEW

Sydney, NSW

Sydney
21C Whistler Street
Manly NSW 2095
PO Box 1083 Manly NSW 1655
Ph +61 [0]2 9977 3853
Fax +61 [0]2 9976 5501
sydney@mcgregorcoxall.com

Melbourne
Level 3, 246 Bourke Street
Melbourne VIC 3000
GPO Box 1634 Melbourne VIC 3000
Ph +61 [0]3 9999 1608
Fax +61 [0]3 8669 4414
melbourne@mcgregorcoxall.com

www.mcgregorcoxall.com
www.biocitystudio.com

ABN 17 082 334 290
© McGregor Coxall

Prepared for Roads and Maritime Services (RMS) by McGregor Coxall [Sydney]
Proj No: 0573SYD **Report Contact:** David Knight

Revision	Status	Date	by	Checked
0	For Issue	21.02.17	LP	DK
1	For Issue	24.03.17	LP	DK
2	Revised For Issue	17.05.17	LP	DK

DISCLAIMER

This Study is for the confidential use only of the party to whom it is addressed (the client) for the specific purposes to which it refers. We disclaim any responsibility to any third party acting upon or using the whole or part of its contents or reference thereto that may be published in any document, statement or circular or in any communication with third parties without prior written approval of the form and content in which it will appear. This Study and its attached appendices are based on estimates, assumptions and information sourced and referenced by McGregor Coxall and its sub consultants. We present these estimates and assumptions as a basis for the reader's interpretation and analysis. With respect to forecasts we do not present them as results that will actually be achieved. We rely upon the interpretation of the reader to judge for themselves the likelihood of whether these projections can be achieved or not. If financial models have been included, they have been prepared from the best information available at the time of writing, no responsibility can be undertaken for errors or inaccuracies that may have occurred both with the programming or the financial projections and their assumptions. In preparing this Study we have relied upon information concerning the subject property and/or study area provided by the client and we have not independently verified this information except where noted in this Study.

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Appendix 68

1. Stakeholder Workshop Meeting Minutes - WestConnex Stage 2: Planning Conditions B50 Pedestrian and Cycle Implementation Strategy.
2. Stakeholder Workshop Meeting Presentation
3. Sample notifications of road and pathway modifications around SPI
4. Safety Audit
5. M5 Linear Park - Shared Path Upgrade





1.0 Introduction

1.1 PROJECT INTRODUCTION

WestConnex Project

The New M5 tunnel, Stage 2 of WestConnex, is being delivered by Sydney Motorway Corporation (SMC) on behalf of the NSW Government.

The New M5 will run via twin tunnels from the existing M5 East at Kingsgrove to a new interchange at St Peters, more than doubling capacity of the corridor and substantially improving east west corridor access between the Sydney CBD, Port Botany and Sydney Airport precincts and the South West growth areas.

The New M5 will deliver approximately nine kilometres of new tunnels, motorway to motorway connections to the King Georges Road Interchange Upgrade at Beverly Hills, which is currently under construction, and a new interchange at St Peters. This is shown in Figure 1.01.



Figure 1.01 - WestConnex Project



Figure 1.02 - St Peters Interchange Location

What is active transport?

Active transport is non-motorised forms of transport which include physical activity, for example walking or cycling (examples below). An Active Transport Network (ATN) provides infrastructure to enable convenient, pleasant and safe walking and cycling trips.

WestConnex and Active Transport

Inner Sydney and inner western Sydney has had significant increase in active transport and there has been significant growth over the last 10 years in trips undertaken by active transport. This growth has occurred due to a combination of the provision of infrastructure, changing inner Sydney demographics, and in-fill development in the region. A significant barrier to increased active transport is the lack of adequate infrastructure.

Cycle and pedestrian paths form part of the WestConnex project to improve connectivity and safety and contribute to the ATN. The New M5 includes a number of active transport measures including new and improved pedestrian / cycle paths which consists of the following:

- Cycling / pedestrian bridge over Alexandra Canal
- Connection linking Mascot town centre with St Peters and Sydney Park
- A new cycling / pedestrian bridge over Campbell Road connecting Sydney Park with future open space at St Peters Interchange.

This report outlines the investigation of active transport at the St Peters Intersection (SPI) as well as a review of the M5 Linear Park and the M5 East Green Link ATN route from Kingsgrove to St Peters.

Examples of Active Transport Networks in Sydney



Cooks River - Sydney



George Street Cycle Way - Sydney



The Bay Run - Sydney



Sydney Olympic Park - Sydney

1.2 NETWORK REVIEW OBJECTIVES AND METHODOLOGY

This review has been undertaken to address planning condition B50 of the New M5 planning approval. The B50 planning condition requires that the following be undertaken:

The Proponent must undertake a Pedestrian and Cycleway Network Review. The Review must be prepared and approved by the Secretary within six months from the date of this approval (or as otherwise agreed by the Secretary) to identify pedestrian and cycle facilities that are to be provided by the Proponent as part of the SPI. The Review must be prepared by a suitably qualified and experienced person(s) that has been approved by the Secretary. The Review must be undertaken in consultation with the relevant councils and Bicycle NSW and address the matters raised during consultation. The Review must identify (and consider), but not be limited to:

- *A. Current and future land use and associated pedestrian and cycle demand and needs;*
- *B. Pedestrian and cycle impacts associated with the project;*
- *C. The King Street Gateway Project, including potential Princes Highway traffic calming initiatives;*
- *D. Alexandria Canal initiatives;*
- *E. Regional and local pedestrian and cycling strategies;*
- *F. Pedestrian and cycle safety, accessibility and connectivity, including to the public realm;*
- *G. Intersection and signal phasing opportunities to reduce waiting and crossing times for pedestrians and cyclists;*
- *H. Provision of upgraded cycle and pedestrian facilities within 1,000 metres of the boundary of the SPI, apart from the areas addressed in conditions B62(c) and B64; and*
- *I. Concept designs for pedestrian and cycleway infrastructure and implementation timeframes.*

The Review is also to consider the delivery of the 'M5 East Green Link' between Kingsgrove and Mascot approved as part of the M5 East Motorway project. The review shall address past constraints to the delivery of this project and options to overcome these constraints.

The Review must not result in a reduced level of cycle and pedestrian infrastructure as identified in the documents referred to in condition A2, unless required by these conditions.

Our approach is to undertake a review of the ATN proposed as part of the New M5. In this review we have identified gaps between the proposed ATN and the existing ATN. The second stage of the project will be to develop a strategy to address the identified gaps. A summary of how the planning conditions have been addressed in this report are shown in Table 1.01

Project Method

Figure 1.01 shows our approach and method in undertaking this review:

Report Structure

The following describes the structure of this report:

Section 2: Analysis

This section of the report provides an overview of the existing ATN in the M5 East Green Link to St Peters corridor including trip generators, and existing and proposed ATN routes and a summary of the outcomes from the stakeholder workshop.

Section 3: Review of St Peters Interchange ATN

This section of the report reviews the ATN at SPI within a 1km boundary to understand and improve connectivity.

Section 4: Review of M5 East Green Link

This section of the report reviews the previous history of the proposed routes and the outcomes of the proposed routes as they where investigated from 1994 to 2004 as part of the M5 East.

Section 5: Review of M5 East Linear Park

This section of the report provides an analysis on the existing ATN around the M5 East Linear Park and its close surroundings.

A. Current and future land use and associated pedestrian and cycle demand and needs	Refer section 2
B. Pedestrian and cycle impacts associated with the project	Refer section 2.8
C. The King Street Gateway Project, including potential Princes Highway traffic calming initiatives	Refer section 2.5
D. Alexandria Canal initiatives	Refer section 2.6
E. Regional and local pedestrian and cycling strategies	Refer Section 2.3 & 2.4
F. Pedestrian and cycle safety, accessibility and connectivity, including to the public realm	Refer Section 2.12 & 3
G. Intersection and signal phasing opportunities to reduce waiting and crossing times for pedestrians and cyclists	Refer Section 2.10
H. Provision of upgraded cycle and pedestrian facilities within 1,000 metres of the boundary of the SPI, apart from the areas addressed in conditions B62(c) and B64	Refer Section 3.2.1
I. Concept designs for pedestrian and cycleway infrastructure and implementation timeframes	Refer Section 3.3
The Review must not result in a reduced level of cycle and pedestrian infrastructure as identified in the documents referred to in condition A2 unless required by these conditions	Refer Section 6.1
The Review is also to consider the delivery of the 'M5 East Green Link' between Kingsgrove and Mascot approved as part of the M5 East Motorway project. The review shall address past constraints to the delivery of this project and options to overcome these constraints.	Refer Section 4

Table 1.01 - Planning Conditions Summary
* Safety of the existing and planned network is considered in detail in the safety audits undertaken as part of the B51 report.

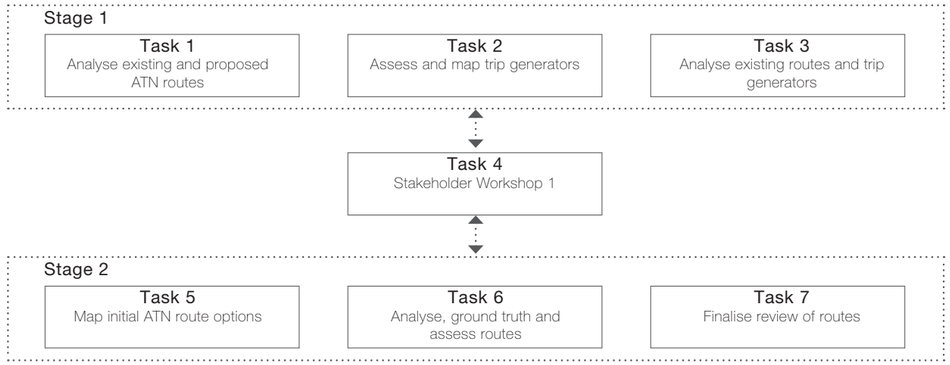


Figure 1.01 - Approach and Method





2.0 Analysis

2.1 TRIP GENERATORS

An analysis of the key trip generators was undertaken within the corridor to understand the key origins and destinations for trips, particularly local trips. A large proportion of trips are local trips.

The key trip generators included the following groups:

- Employment zones including the CBD, industrial zones, Green Square, Mascot
- Major education institutions including Sydney University, UTS
- Transportation centres including Sydney Airport
- Train stations including Sydenham, Green Square, Mascot, Newtown, St Peters
- Major public open space including Sydney Park, Camdenville Park, Enmore Park and Pool
- Major shopping areas including Marrickville Metro, King Street
- Existing major route destinations including Cooks River, Bourke Rd cycle way
- Major town centres including Newtown, Marrickville, Green Square, Rockdale

The major trip generators are shown in Figure 2.01.



Cooks River Foreshore



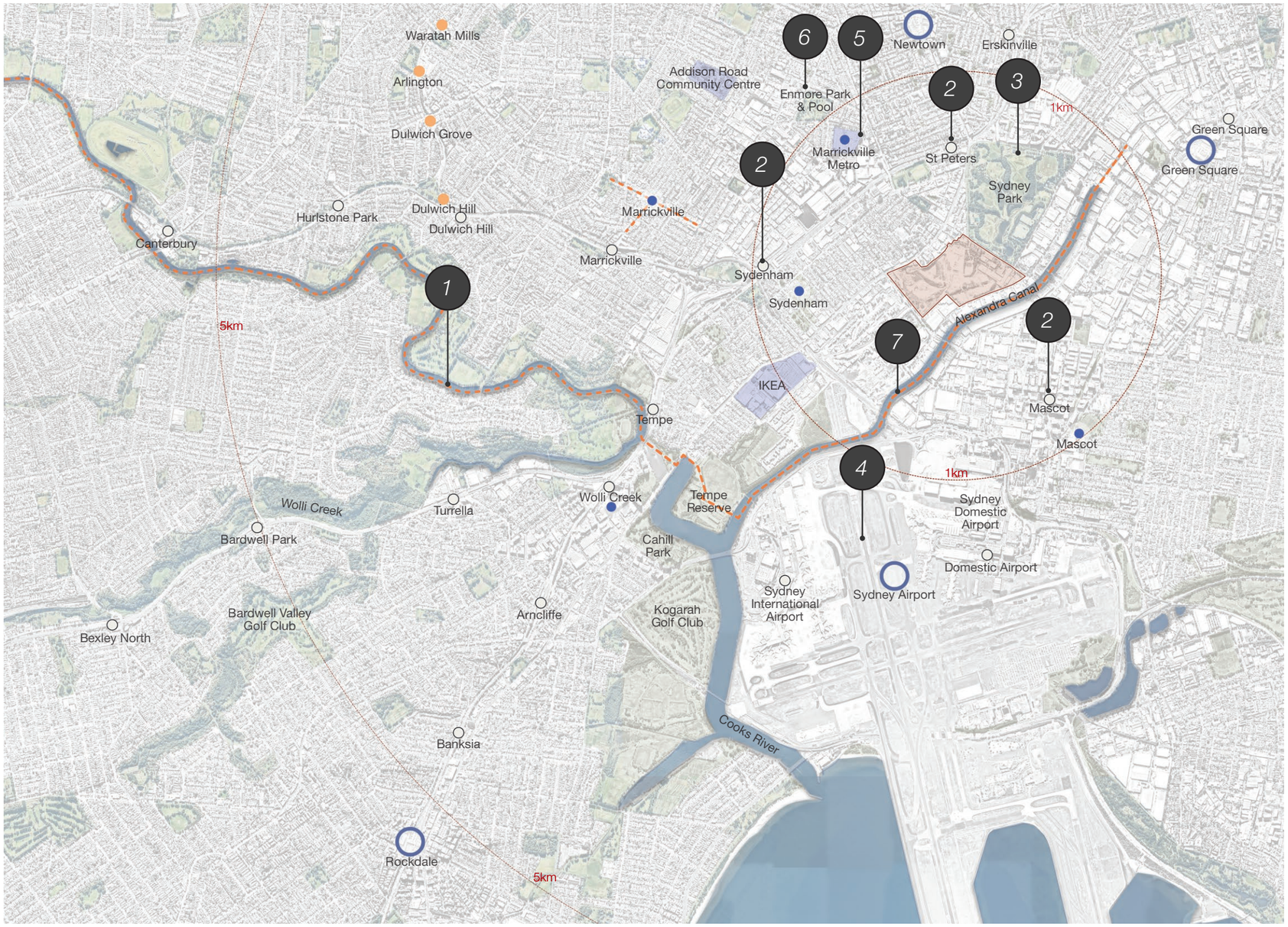
Sydney Railway Stations



Sydney Park - St Peters



Sydney Airport



Legend

- Major Centres
- Minor Centres
- Train Stations
- Light Rail Stations
- Trip Generators
- St Peters Interchange Site
- 1km & 5km Boundary from Interchange
- 1 Cooks River Foreshore
- 2 Sydney Railway Stations (St Peters, Sydenham, Mascot)
- 3 Sydney Park - St Peters
- 4 Sydney Airport
- 5 Marrickville Metro
- 6 Enmore Park & Pool
- 7 Alexandria Canal

Figure 2.01 - Trip Generators

2.2 SURROUNDING NODES

A summary of the trip generators and their connectivity is shown in the Figure 2.02. This shows the desired paths of movement however it is important to note that there are a range of additional destinations that are not shown. Figure 2.02 is a summary of the key drivers for the connectivity required and route selection.

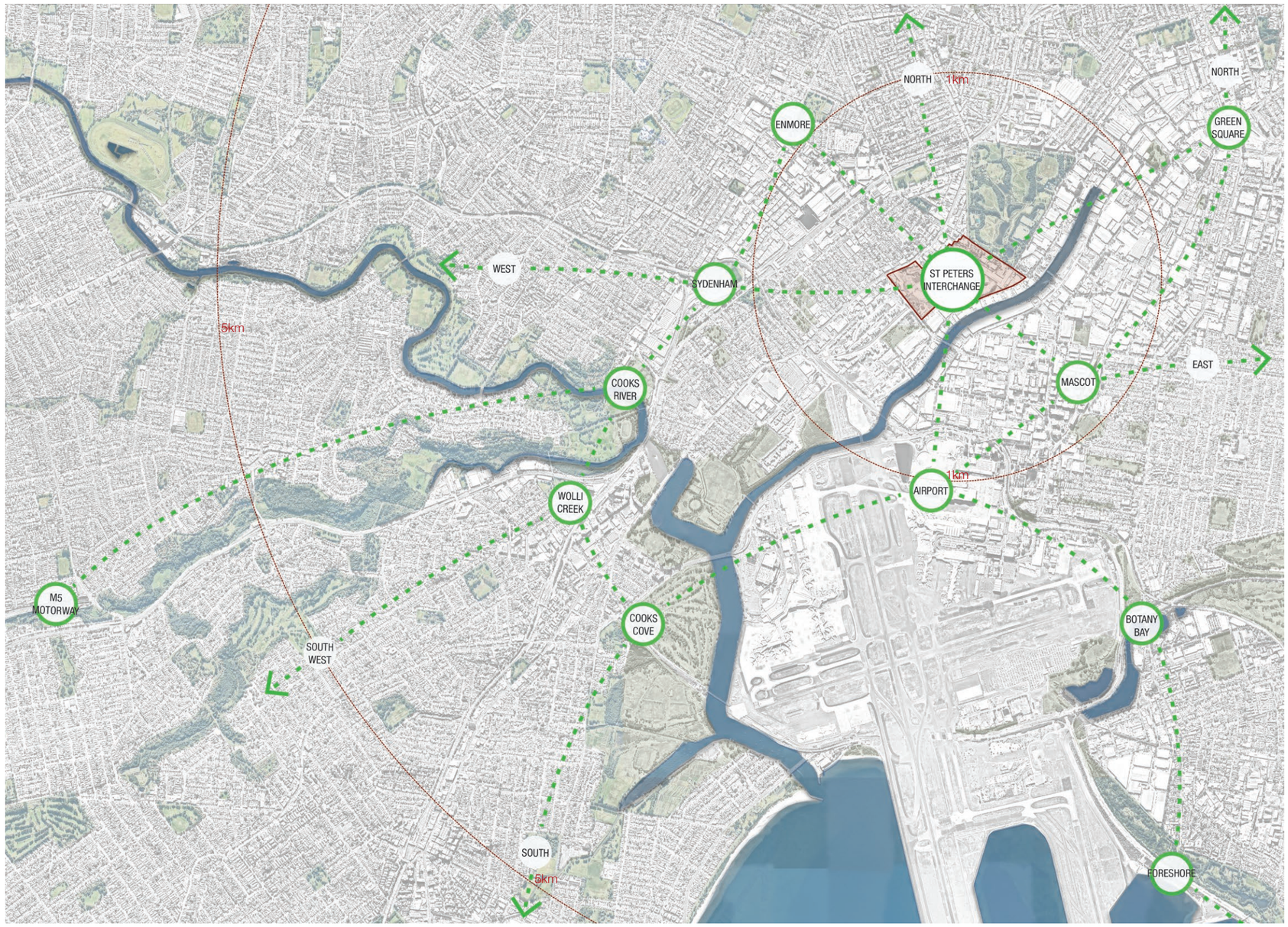


Figure 2.02 - Surrounding Nodes

2.3 INNER CITY REGIONAL ROUTE

The Inner Sydney Regional Bicycle Network is a plan that was developed with a number of councils to identify cross regional cycling links within inner Sydney. The project was undertaken in 2010 and included an economic analysis of the route including a cost/benefit ratio. The network plan has been refined on a number of occasions since its original development.

The plan was developed to ensure a coordinated and connected network was developed for inner Sydney. The network includes 160 kilometres of cycleways which are separated from general traffic and 70 kilometres of upgraded shared paths.

The relevant sections of the network plan is shown in Figure 2.03.



Figure 2.03 - Inner City Regional Routes

2.4 CITY OF SYDNEY AND INNER WEST COUNCIL REGIONAL ROUTES

In addition to the inner Sydney Regional Bicycle Network, Inner Sydney Councils including the former Leichhardt Council, former Marrickville Council, Rockdale, Botany Bay, Cantebury and the City of Sydney have developed cycle strategies. These strategies identify a number of regional routes and local routes which supplement and support the Inner Sydney Regional Bicycle Network.

The City of Sydney has also developed a Liveable Green Network which includes a pedestrian network in addition to the cycle network. The routes in the network are designed to encourage walking to local destinations and include footpath widening, lower speed limits and improved crossings as well as facilities such as seating and bubblers.

These regional active transport networks are shown in the Figure 2.04.

There are a number of local strategy documents that are relevant to this report and these are outlined below.

The NSW Government's Long Term Transport Master Plan (2012) sets the framework for the NSW Government to deliver an integrated, modern transport system. The final version sets out short, medium and long term actions to integrate and manage the transport network across NSW. The Master Plan contains a specific target to double the number of bicycle trips in Metropolitan Sydney by 2016, with further growth in cycling for all trips in NSW by 2031, particularly in urban centres.

The NSW Government's Sydney's Cycling Future (2013) develops a strategy for bicycle infrastructure planning in metropolitan Sydney. The focus of the strategy is people who would like to ride more often if cycling was made safer and more convenient. The strategy aims to prioritise investment on projects that have the greatest potential to get the most people to shift transport trips to bicycle. The priority is to invest in routes within 5 kilometres of major centres and public transport interchanges. It proposes a three-tier hierarchy of safe cycleways to major centres and seeks to invest in state priority corridors to safely link with inner Sydney.

The CBD, Sydney Airport and Green Square are the most relevant trip generators for this project that have been identified in the strategy.

The key objectives of the City of Sydney's Cycle Strategy and Action Plan (2007) are

"The City aims to making cycling an equal transport choice for residents, workers and visitors by 2017. Specific aims of the Strategy are:

- Creating and maintaining a comfortable and bicycle friendly environment in Sydney to encourage more residents, visitors and workers onto bicycles;
- Improving cycling safety.
- Promoting the benefits of cycling; and
- Increasing the number of trips made by bicycle in Sydney"

The key objectives of the former Marrickville Council's Marrickville Bicycle Strategy (2007) is to:

- Develop a coherent bicycle network plan
- Bicycle parking plan
- Develop better integration with public transport
- Bicycle friendly streets neighbourhoods

The key objectives of the (former) Canterbury City Council's Bike Plan (Draft, 2016) is

"integration with other transport modes and connections to surrounding LGAs…to create cycling environments that engage people who otherwise would not regularly ride and reduce the reliance on private car use to help achieve a more efficient transport network."

The former Councils of Hurstville and Rockdale Council have cycle network maps. The former Botany Council is currently developing a cycle strategy.

This report objectives are consistent with the regional strategies and aims to:

- Increase the number of trips made active transport and providing a network to encourage more people to use active transport
- Develop a safe, coordinated bicycle network
- Integrate with key destinations including public transport including Sydney Airport, the CBD and Green Square and other main centres



NOTE: 'Regional Route - Council' include both existing and planned routes

Figure 2.04 - Council Regional Routes

2.5 KING STREET GATEWAY

Project Overview

Roads and Maritime Services (RMS) is developing a concept design for the King Street Gateway project. The concept design will provide positive public domain outcomes for the vibrant and diverse community of Newtown and St Peters.

The project will provide an opportunity to tackle the significant issues surrounding vehicular, bicycle and pedestrian traffic while reinstating the streets and creating dynamic pubic spaces. The concept design will also look to revitalize the existing amenity at Sydney Park and improve the landscape and urban design outcomes for this area.

The project is being developed in consultation with both City of Sydney and Inner West Council. The site is on the boundary of these two local government areas. Princess Highway and Barwon Park Road form part of the Inner West Council while Sydney Park and Sydney Park Road fall into the City of Sydney local government area.

Project Location

The project is located at the southern end of King Street beginning at the Princes Highway, ends with Campbell Street intersection, Barwon Park Road and extending to the intersection of Sydney Park Road and Euston Road as shown in the Figure 2.05.

South King Street, St Peters Triangle and Sydney Park have been included as part of the study area.

At each end of the site the project will be integrated with WestConnex Stage 2 which is currently being undertaken by the Sydney Motorway Corporation. This project has so far highlighted the need to reconfigure the intersection between Princes Highway, King Street and Sydney Park Road. This site will be significant for the development of the concept design.

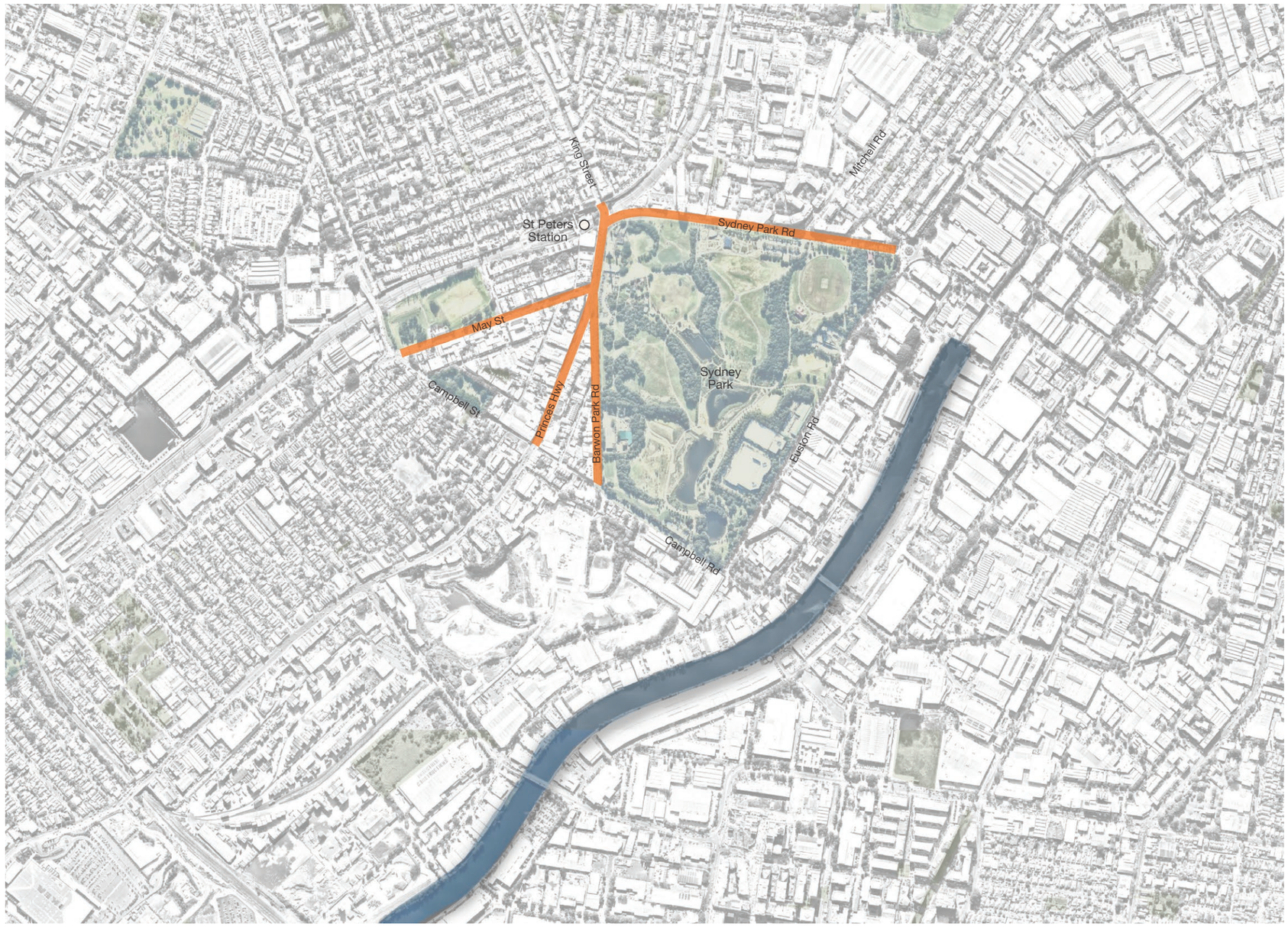
The King Street Gateway will function as a transition route as driver's move from the motorway system back to the local road network. This shift will afford the street to function as a high street with more emphasis upon pedestrian movement and will create further urban design opportunities.

Project Objectives

The following project objectives have been proposed for King Street Gateway:

- Improve the 'gateway' to King Street by changing the area around the entry to St Peters station and the entry to Sydney Park and the movement between these areas to provide a better pedestrian environment.
- Downgrade of Princes Highway and Sydney Park Road by limiting capacity of Princes Highway north of Campbell Street to achieve a balance for all users.
- Improve the footpath environment through widening and other measures.
- Improve the environment for "Active Transport" - cyclists and pedestrians.
- Reduce lane widths on Princes Highway north of Campbell Street and on Sydney Park Road and increase space for pedestrians and cyclists consistent with proposed road usage and place making.
- Improve at-grade pedestrian and cyclist access to Sydney Park across the Princes Highway (north of Campbell Street) and across Sydney Park Road, including amendments to ensuring these are single-leg crossings for pedestrians where appropriate. Include new mid-block crossings on Princes Highway and Sydney Park Road aligned to pedestrian and cyclist desire lines.

King Street Gateway completion date (2020) is subject to approval. Works will commence on opening of WestConnex Stage 2 New M5 in 2019.



Legend

Streets investigated as part of King Street Gateway

Figure 2.05 - King Street Gateway Project

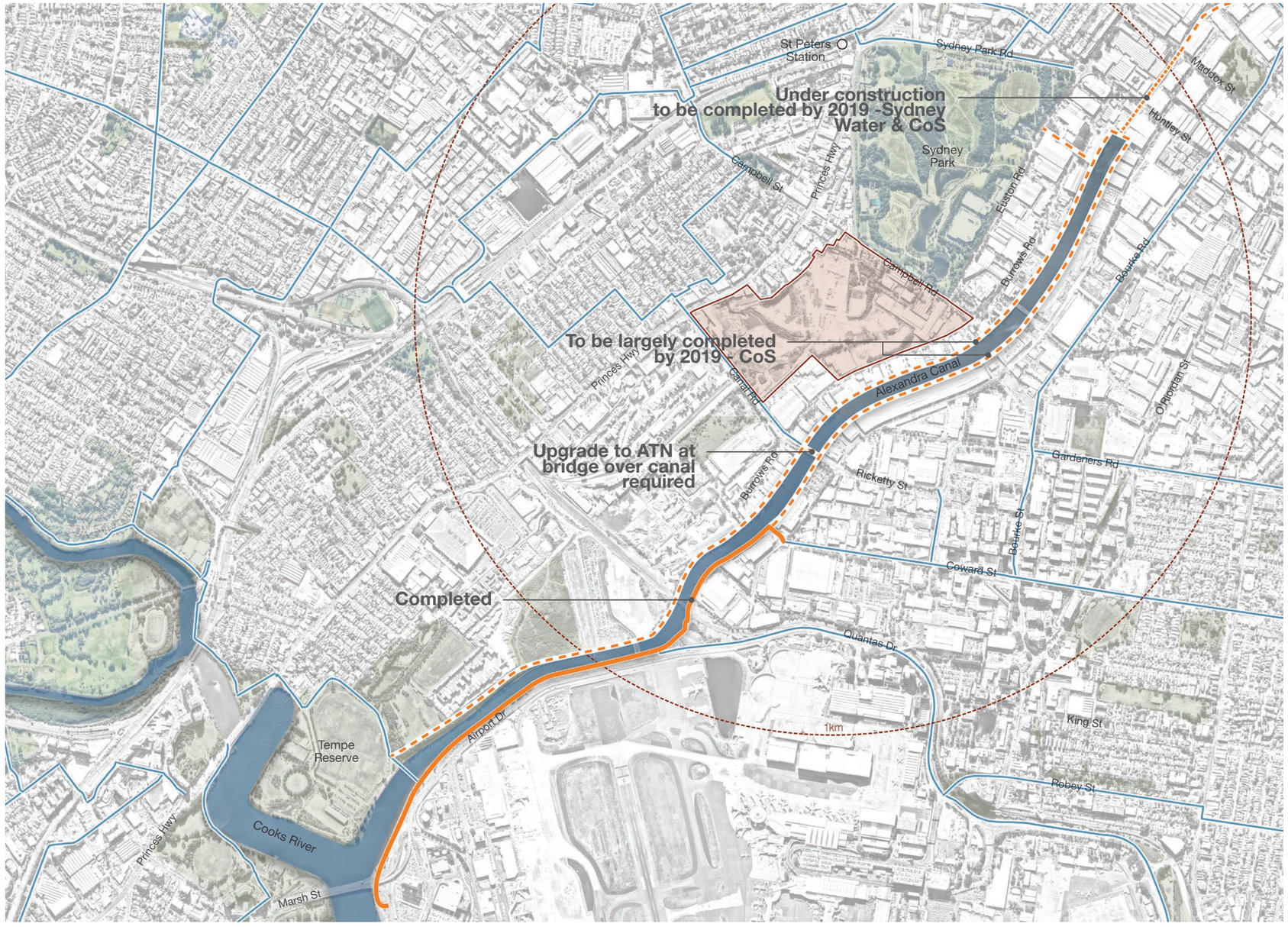
2.6 ALEXANDRA CANAL INITIATIVES

City of Sydney has developed a strategy that promotes Alexandra Canal to be a part of the regional cycle network for the Sydney Region.

The route begins at the north of Alexandra Canal at Maddox Street as a part of the ‘Green Square Trunk Drain Project.' Sydney Water is providing a shared cycle and pedestrian path as a part of these works.

City of Sydney is currently developing concept designs for the remaining sections (both east and west sides of the canal).

Updates on the Alexandra Canal staging of works are shown in the Figure 2.06.



NOTE: 'Regional Route - Council' include both existing and planned routes

Figure 2.06 - Alexandra Canal Initiatives

2.7 DEVELOPMENT SITES

Property development offers a significant opportunity to develop ATN, including:

- New connectivity for pedestrians and cyclists with new roads, lanes, pedestrian and cyclist links, particularly in former industrial areas which have large lot sizes
- New infrastructure including dedicated on road and off road ATNs
- Increased demands for ATN as households which are located close to work are increasingly carless households
- New areas which attract people as an end destination such as new retail centres, new transport nodes, etc.

In the vicinity of the SPI there is a major transformation of the former industrial lands into high density residential and mixed use development. SPI will transform significantly both in the short and long term in areas such as:

- Green Square Town Centre
- St Peters Triangle,
- Ashmore Estate
- Industrial land adjacent to Sydney Park
- Sydenham Victoria Rd Precinct
- Mascot town centre
- Wolli Creek

SPI will also include significant redevelopment in the longer term with redevelopment likely to occur in the following areas:

- Greater Green Square
- Southern employment lands including Rosebery North
- Cooks Cove
- Sydney Airport lands

SPI is strategically located between the airport and the CBD with close links to the Eastern suburbs and Inner West. This is a dynamic area with major opportunities for ATN infrastructure.



Mascot Town Centre, Mascot


Green Square Cycle Way, Zetland

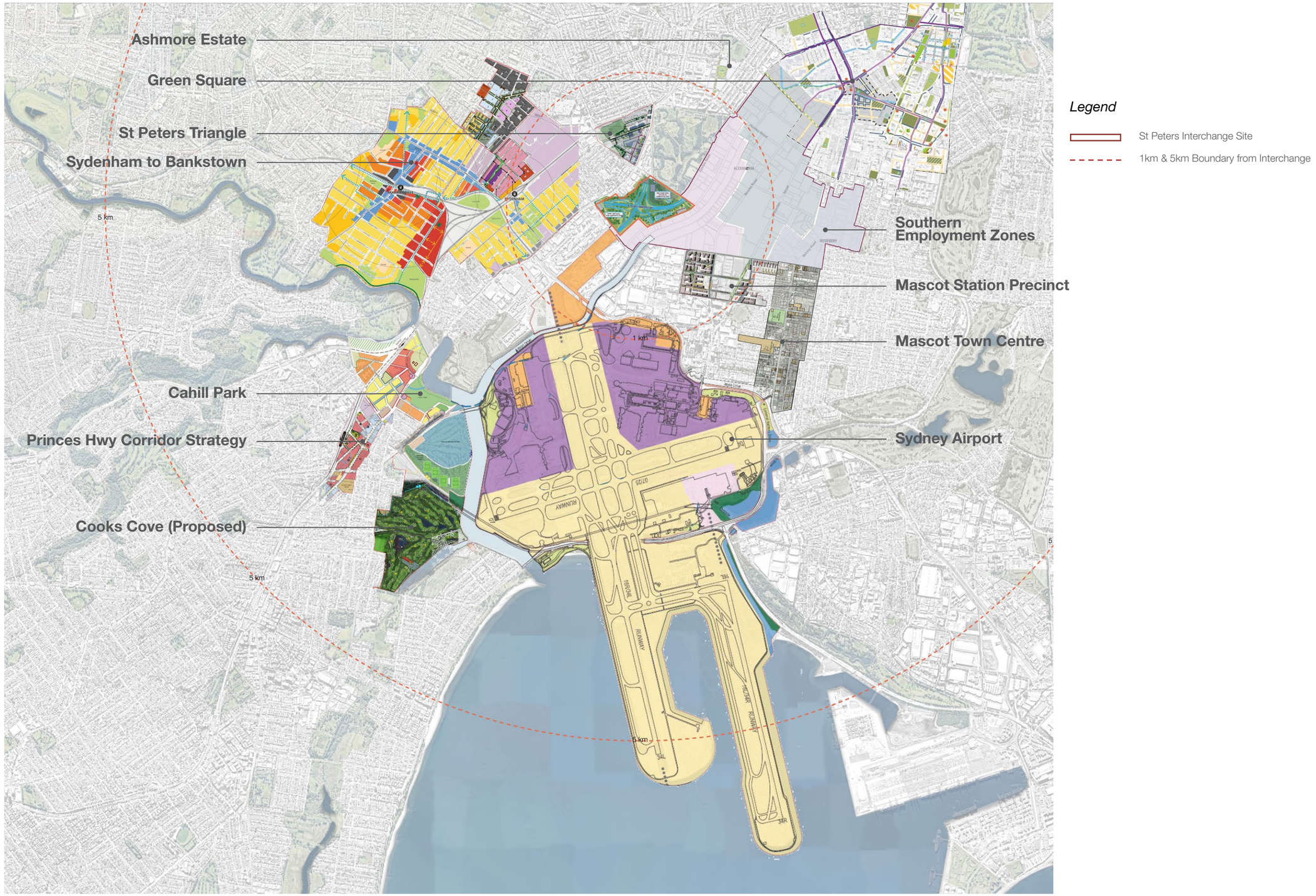


Figure 2.07 - Development Sites

2.8 CONSTRUCTION IMPACTS

During construction on the M5 East Motorway, existing shared pedestrian and cycle paths will be impacted.

As a part of construction management, access to properties will be maintained, traffic control will be ensured and residents will receive 5 days' notice prior to the closure of any footpaths.

The construction of SPI will impact surrounding local roads, however there are no existing pedestrian or cycle paths within the SPI area to be impacted by construction of the SPI. The local roads construction works on Campbell Rd and Euston Rd will have construction impacts, however Campbell Rd and Euston Rd are not existing identified bicycle routes and Sydney Park shared pathways will remain open to allow safe connections through this area.

There are temporary removals of the shared paths within the M5 Linear Park related to the construction works for the New M5 tunnel portals. In all cases temporary safe diversions have been provided to ensure uninterupted access for pedestrians and cyclists along the M5 corridor. Figure 2.08 below provides a copy of communications provided to the public identifying the temporary diversions in the M5 Linear Park. The temporary closures around the King Georges Rd intersection have now been removed.

In the vicinity of the SPI there are no existing shared paths or cycle paths which are impacted by construction works due to the SPI. The roads in the vicinity of the SPI are very low volume cycle traffic due to the lack of dedicated infrastructure, use of routes by heavy vehicles and relatively narrow roads. With the exception of Campbell St they are also relatively low pedestrian traffic due to the industrial nature of the adjacent development and absence of retail or commercial development.

There will be temporary impacts to a number of pedestrian paths during construction including the following pedestrian paths:

- Temporary closures of footpaths on Euston Rd due to road widening and footpath re-construction works
- Temporary impacts to the footpath on Sydney Park Rd due to footpath re-construction works
- Temporary impacts to the footpath on Campbell Rd due to road widening and footpath re-construction works
- Temporary impacts to the footpath on Canal Rd due to road widening and footpath re-construction works
- Temporary impacts to the footpath on Canal Rd due to road widening and footpath re-construction works

In all cases pedestrian access will be provided through the diversion of pedestrians onto a footpath on the opposite side of the road to the road works, or alternative temporary access will be provided along the road through the use of temporary barriers or equivalent. In all cases the footpaths will be reinstated and detour routes for cyclists and pedestrians will be adequately sign posted. Refer to B51 report for full details of reinstatement of footpath/shared path/separated cycle path details.

Refer appendix 3 for copies of notifications that have been issued via the WestConnex website detailing changes to roads, paths, cycleways, during construction of the SPI local road upgrades. Additional similar notifications will continue to be issued as the work progresses.

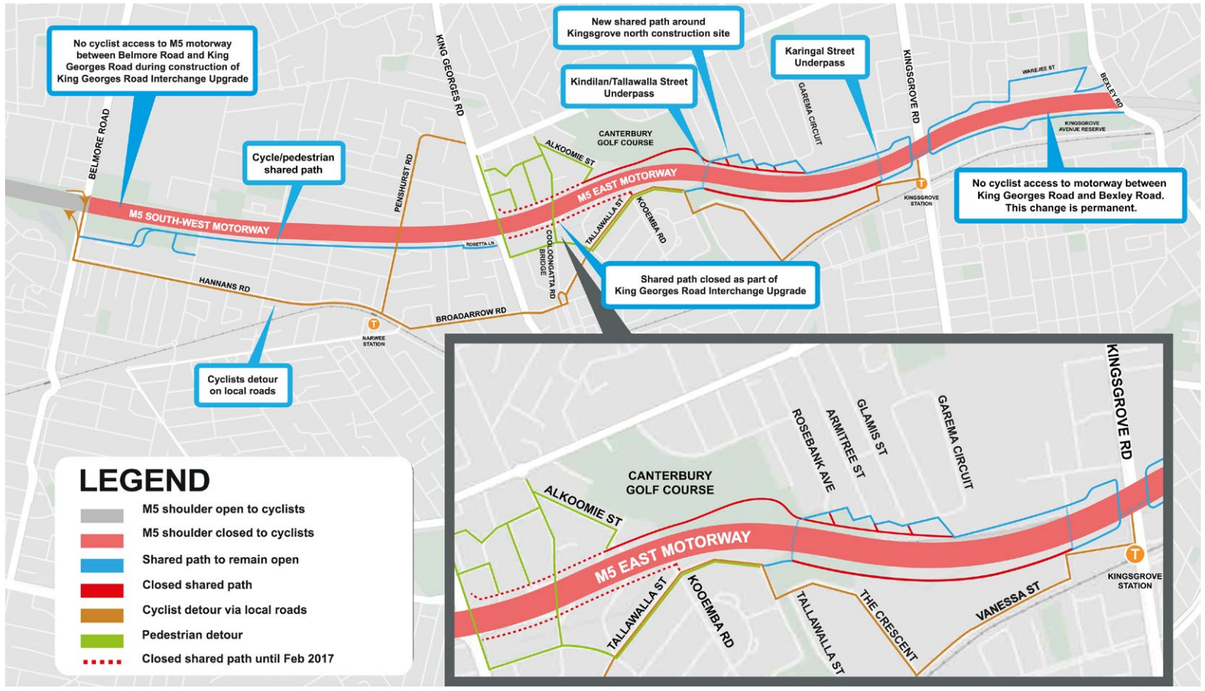


Figure 2.08 - Changes to shared pedestrian and cyclist paths between Bexley Road and Belmore Road as part of WestConnex New M5 - WestConnex

2.9 INTERSECTION UPGRADES

Intersection upgrades create a number of opportunities to reduce waiting and crossing times for pedestrians and cyclists. The intersections are categorised into four upgrade types:

New Signalised Intersections:

Campbell Road - Bourke Road

The intersection of Bourke Road and Campbell Road is proposed to be signalised with the provision of three pedestrian crossings. Cyclists have the opportunity to use a shared path on the northern side of the new Campbell Road Bridge.

Upgrade to Signalised Intersections:

Sydney Park Road - Euston Road

Adequate pedestrian connectivity is maintained through the upgrade of the intersection of Euston Road with Sydney Park Road from a round-a-bout to a signalised intersection.

Campbell Street - St Peters Street

The intersection of St Peters Street and Campbell Street will be upgraded to a signalised intersection with two pedestrian crossings providing pedestrian access between the northern and southern side of side of Campbell Street.

Campbell Street - Albert Street

An at grade pedestrian crossing at the signalised intersection proposed at Albert Street.

Realignment and Upgrade of Intersections:

Campbell Street - Unwins Bridge Road

Adequate pedestrian connectivity is maintained through the realignment and upgrade of the intersection. As with the existing intersection of Unwins Bridge Road with Campbell Street four pedestrian crossings have been provided.

Major Intersection Upgrade and tie-in Works to New M5 Ramps

Campbell Road - Euston Road

Adequate pedestrian connectivity is maintained through the upgrade of the intersection. Signalised pedestrian and cyclist crossings have been provided across Campbell Road and Euston Road.

Location	Crossing Configuration	Cycle Times
Campbell St / May St / Unwins Bridge Rd	Equivalent access. Fourth leg of pedestrian crossing added.	Improved. Single crossing of Campbell St. Traffic island removed. Additional crossing of Campbell St added.
Campbell St / Hutchinson St	Equivalent access	Improved. Dedicated cycle crossing. Raised threshold
Campbell St / Brown St	Equivalent access	No change
Campbell St / Florence St	Equivalent access	No change
Campbell St / St Peters St	Equivalent access	Improved. New signalised pedestrian crossing s on two legs of intersection
Campbell St / Church St	Equivalent access	No change
Campbell St / Princes Hwy	Equivalent access. Fourth leg of pedestrian crossing added.	Improved. Additional crossing of Princes Highway added. Campbell Road wider than previous.
Campbell St / Crown St	No change	Improved. Dedicated cycle crossing. Raised threshold.
Campbell St / Barwon Park Rd	No change	Improved. Dedicated cycle crossing. Raised threshold. Reduced crossing length.
Campbell St / Harber St	No change	Improved. Dedicated cycle crossing. Raised threshold.
Campbell Rd / Euston Rd	New 4 way intersection crossings to 3 sides of intersection	Slower crossing due to size of intersection. Includes dedicated cycle crossing on north side
Campbell Rd / Burrows Rd	New 4 way intersection crossings of Burrows only	Improved. Slower crossing due to size of intersection. Includes dedicated cycle crossing on north side and pedestrian crossing on south side.
Euston Rd / Sydney Park entries	New single leg pedestrian crossings of Euston Rd added	Improved. New signalised crossing of Euston Rd at Park entry points.
Euston Rd / Sydney Park Rd / Huntley St	Removal of round about. Full 4 way signalised intersection including pedestrian crossings	Improved. Wider intersection but signalised pedestrian crossing on all 4 links
Gardeners Rd / Kent Rd	No change	Widened intersection with signalised crossings
Gardeners Rd / Bourke Rd	No change	Widened intersection with signalised crossings
Campbell Rd / Bourke	New intersection	Widened intersection with signalised crossings and dedicated cycle crossing
M5 / King Georges Road	Pedestrian crossing added to north side King Georges Road	Improved. Reduced crossing time due to added pedestrian crossing
Princes Hwy / Canal Rd	No change	No change. Identified for improvement under Condition B51

Figure 2.09 - Impacted Intersections

2.10 STAKEHOLDER WORKSHOP

A stakeholder workshop was held 18th November 2016. The stakeholder workshop included representatives from Roads and Maritime Service, City of Sydney, Inner West Council, Bicycle NSW, Bayside Council and Canterbury Bankstown Council.

The workshop was undertaken to identify the following:

- Gaps in the mapping analysis of existing and proposed routes and trip generators that had been undertaken to date
- Current infrastructure works that were being undertaken or where currently being planned or designed
- Issues with the current network and required improvement upgrades
- Significant projects and opportunities in the existing ATN which would provide significant gains in the regional network

The key outcomes of the workshop were as follows (see appendix for meeting minutes and presentation):

St Peters Interchange

- All routes as proposed at the SPI where considered desirable including the proposed shared path between the SPI and behind the properties identified as 178 to 310 Princes Hwy, St Peters.
- The shared path behind the properties at 178 to 310 Princes Highways was seen as an important addition to the ATN as it provides an alternate route to Princes Highway and link between the suburbs of St Peters and Sydenham to the south and Sydney Park and the city to the north.
- It was noted that the shared path needed to be safe and meet Crime Prevention Through Environmental Design (CPTED) principles. Work is being undertaken by the nominated contractor to address safety concerns including ensuring sight lines, lighting, CCTV and other safety design principles.
- It has been identified that proposed connectivity at either end of the proposed route through the western side of SPI is inadequate and requires attention.
- Works focused on the safety of these routes have been undertaken by the nominated contractor (straight lines lighting, CCTV)

M5 East Green Link

- The M5 East Green Link was supported as a future initiative
- The M5 East Green Link was considered a regional route and the infrastructure needed to reflect that of a regional route
- There was a general preference for an off road route, despite the reduced connection to local routes that an off road route would require due to the physical geography of Wolli Creek

M5 East Linear Park

- Connectivity at a number of the proposed locations need better connection to integrate with the surrounding ATN
- Improve connections west across King Georges Road
- Discussion about whether the existing ATN met the current design standard

	Attendees	Apologies
RMS	– Grant Sutton – Bob McCulloch – Wayde Hazelton	– Leon Paap
City of Sydney	– Bryony Cooper	– Fiona Campbell
Inner West Council	– Simon Lowe – Kendall Banfield	
Bicycle NSW	– Ray Rice	
Georges River Council		– Shereny Selim
Bayside Council	– Michael Lee	– Colin Mable
Canterbury Bankstown Council	– Rene Chau	– Peter Lay
McGregor Coxall	– David Knights – Logan Pennington	
Department of Planning and Environment		– Swati Sharma – Jacqui Mcleod

Table 2.10.1 Stakeholder Workshop Attendees

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2.11 SITES OF INTEREST

The structure of the report has been divided into the following sections (also seen in Figure 2.11)

- St Peters (refer section 3)
- M5 East Green Way (refer section 4)
- M5 Linear Park (refer section 5)

These sites are discussed in further detail in the following sections.



Figure 2.11 - Sites of Interest

2.12 ST PETERS SAFETY AUDIT

A safety Audit was undertaken of the selected local routes surrounding the SPI. These local routes consisted of the following 4 sites as follows:

- Mitchell Road: Mitchell Road between the intersection of Mitchell Road and Sydney Park Road and Belmont Street
- Campbell Street: The intersection of Campbell Street and May Street including Bedwin Road Bridge and the entrance to Camdenville Park from May Street
- Princes Hwy Intersection: The intersection of Princes Hwy and Canal Road
- Canal Road: Canal Road between Princes Hwy and Ricketty Street

The audit results can be found in appendix 04.

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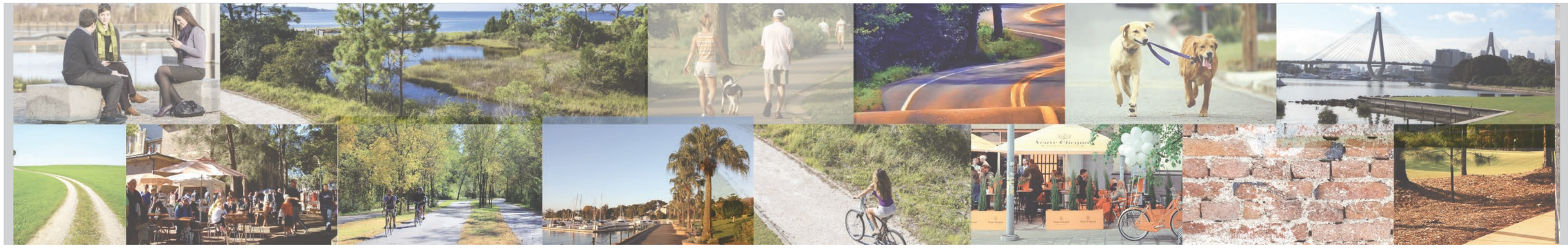




3.0 St Peters Review

3.1 ST PETERS OVERVIEW

St Peters and the surrounding area incorporates the suburbs of Newtown, Erskineville, Sydenham, Tempe and Mascot.

The area includes industrial land uses to the south and east, including supporting facilities for Port Botany and the Airport, and residential land uses to the west. The residential areas include former industrial areas currently undergoing transformation to multi-dwelling residential including Ashmore Estate. There is limited open space in the industrial areas to the south and east of the interchange.

The area is also significantly influenced by Sydney Park, a large regional open space immediately to the north of the interchange.

The area has a number of distinct characteristics. The industrial areas are dominated by heavy vehicle movements, poor streetscapes and limited pedestrian and cycle movement. The residential areas to the north are undergoing transformation to high density apartments buildings and the areas to the west are dominated by single dwelling residential areas.

The area also includes the significant and highly valued ATN including the Cooks River shared path as well as the proposed Alexandra Canal cycleway and Bourke Street cycleway.

Currently there is poor connectivity between these regional links. In particular the industrial areas act as a significant barrier east to west as well as from north to south. The road network within the residential areas to the established residential suburbs to the west are also relatively narrow, and there is limited off street parking.



1

Princess Highway


2

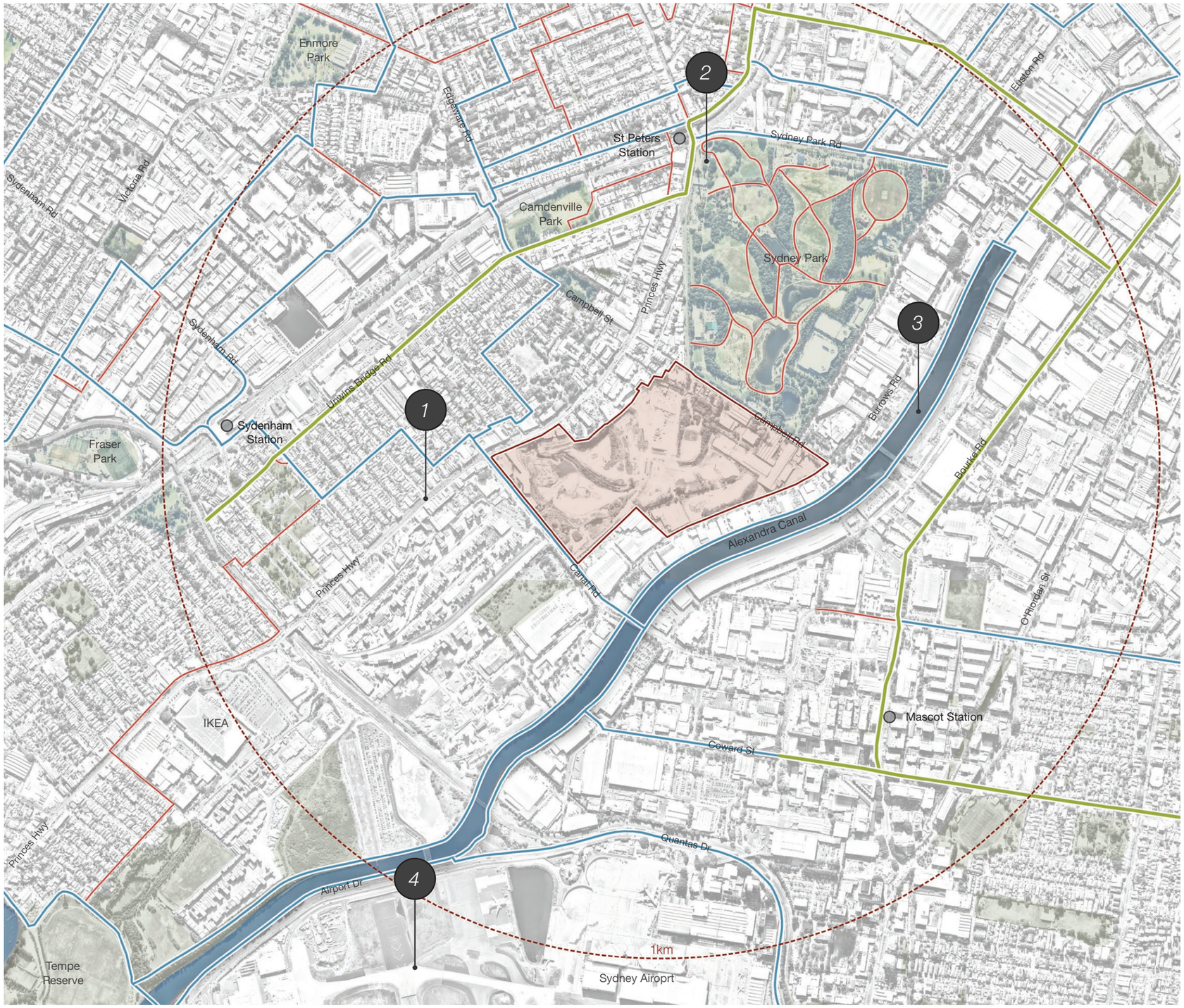
Sydney Park Chimneys


3

Alexandra Canal


4

Sydney Airport



Legend

- Regional Route - Inner City
- Regional Route - Council
- Local Route - Council
- St Peters Interchange Boundary
- 1km Boundary from Interchange
- 1 Princess Highway
- 2 Sydney Park Chimneys
- 3 Alexandra Canal
- 4 Sydney Airport

NOTE: 'Regional Route - Council' include both existing and planned routes

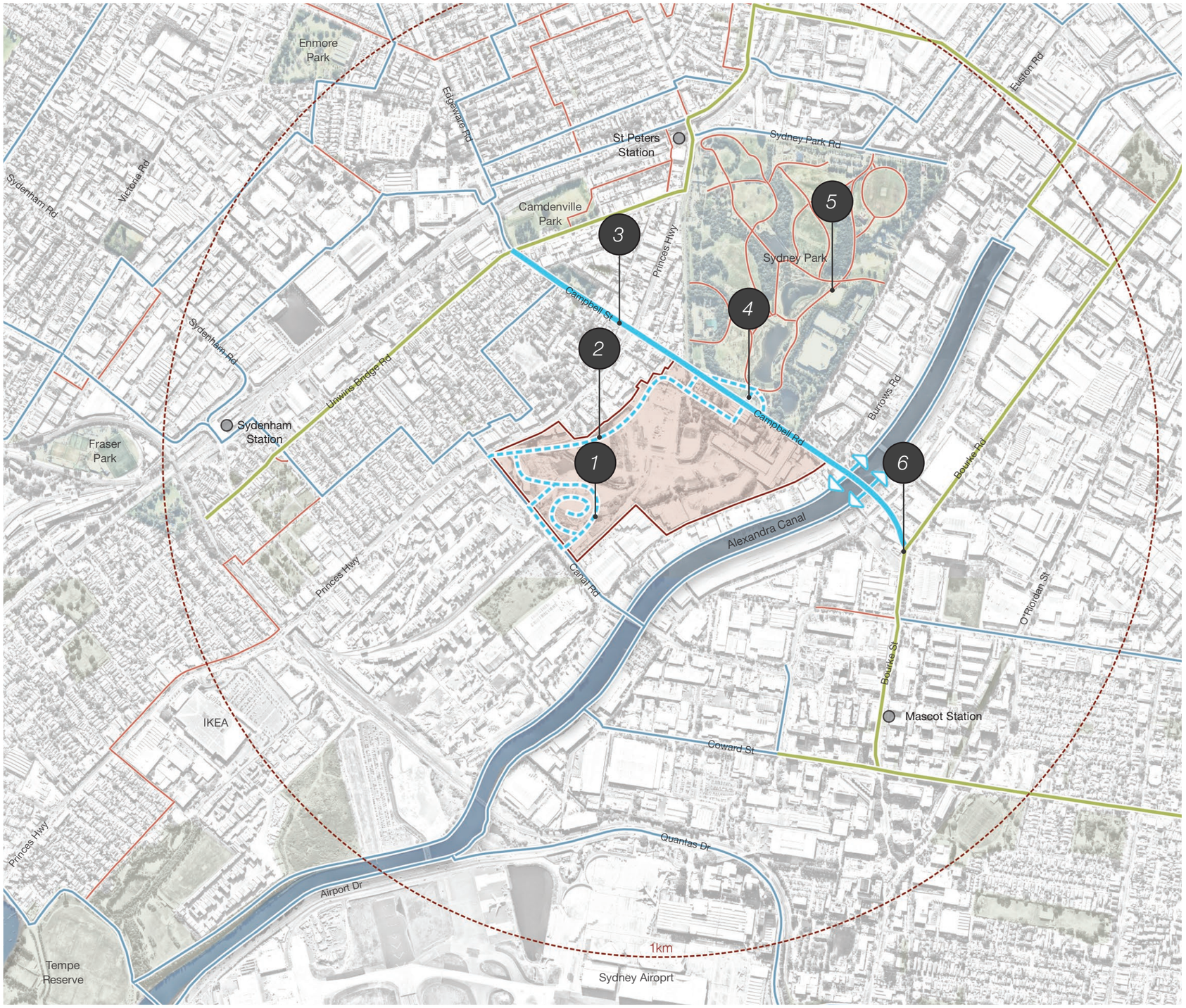
Figure 3.01 - Existing Network Plan

3.2 ST PETERS INTERCHANGE ATN - PLANNED

As part of the SPI works for the New M5, a number of initiatives are being planned and are proposed to be constructed by WestConnex. These works include the following:

1. An off-road shared path running on the western side of the interchange
2. An off-road shared path running on the northern side of the interchange (subject to modification of Ministers Condition of Approval B67 to enable public access along this route).
3. A separated cycleway along the eastern edge of Campbell Street from Unwins Bridge Road to Bourke Street
4. A bridge into Sydney Park from the SPI over Campbell Road
5. CoS council proposal to direct cyclists through Sydney Park via Mitchell Road and Harber Street has been considered by RMS as an alternate to the Euston Road shared path.
6. Cycleway along Bourke Road from Campbell Street. Ongoing discussions to determine type of cyclepath at this location.

These routes are shown in Figure 3.02. Note that the exact configuration and design for some of these routes are still being finalised.



Legend

- WCX Commitments - Separated Cycleway
- WCX Commitments - Shared Cycleway
- Regional Route - Inner City
- Regional Route - Council
- Local Route - Council
- St Peters Interchange Boundary
- 1km Boundary from Interchange
- 1 Interchange West
- 2 Interchange North
- 3 Campbell St
- 4 Campbell Road Pedestrian Bridge
- 5 Sydney Park
- 6 Bourke Road

NOTE: 'Regional Route - Council' include both existing and planned routes

Figure 3.02 - St Peters Interchange ATN Review

3.3 ST PETERS INTERCHANGE ATN - REVIEW

Due to the location of the SPI, it plays a significant role in providing connectivity to a number of regional ATN routes. This includes links to the

- Existing regional route along Bourke Street providing connectivity to Green Square, Mascot and the city
- Airport and southern suburbs of Sydney through the Alexandra Canal and Cooks River cycle path
- South west of Sydney through future proposed regional Sydenham to Bankstown route as part of the Sydenham to Bankstown corridor redevelopment
- Proposed regional route through Erskineville and Alexandria connecting to Redfern and the city

Connectivity of ATN's is a key element of a well planned system. Hence, the proposed ATN works, as part of the SPI for the New M5, have been reviewed in terms of their connectivity to existing and planned ATN. This connectivity review has identified the following:

A. Airport Connection: The connectivity at Canal Road is currently limited as it connects to a narrow footpath with poor connectivity over the bridge over Alexandra Canal. This is a key link to connect to the future Sydney Gateway ATN which provides an important connection to Sydney Airport.

B. Sydenham Connection: South west connection at Princes Highway has limited connectivity to the surrounding network and is a current gap in the proposed network. Currently the ATN ends at Princes Highway at the footpath a short distance from the intersection with Canal Road.

C. Enmore/Marrickville Connection: Connectivity to the west is limited at the Western end of Campbell Road. The connection across the Bankstown Rail line is currently poor with limited potential on the existing bridge and narrow lanes over the rail overpass. ATN links along Unwins Bridge Road are also currently poor.

D. Newtown Connection: There is good potential for future connection to Newtown through the provision of a proposed ATN route along Princes Highway between Campbell Road and Lord Street as part of the King Street Gateway project.

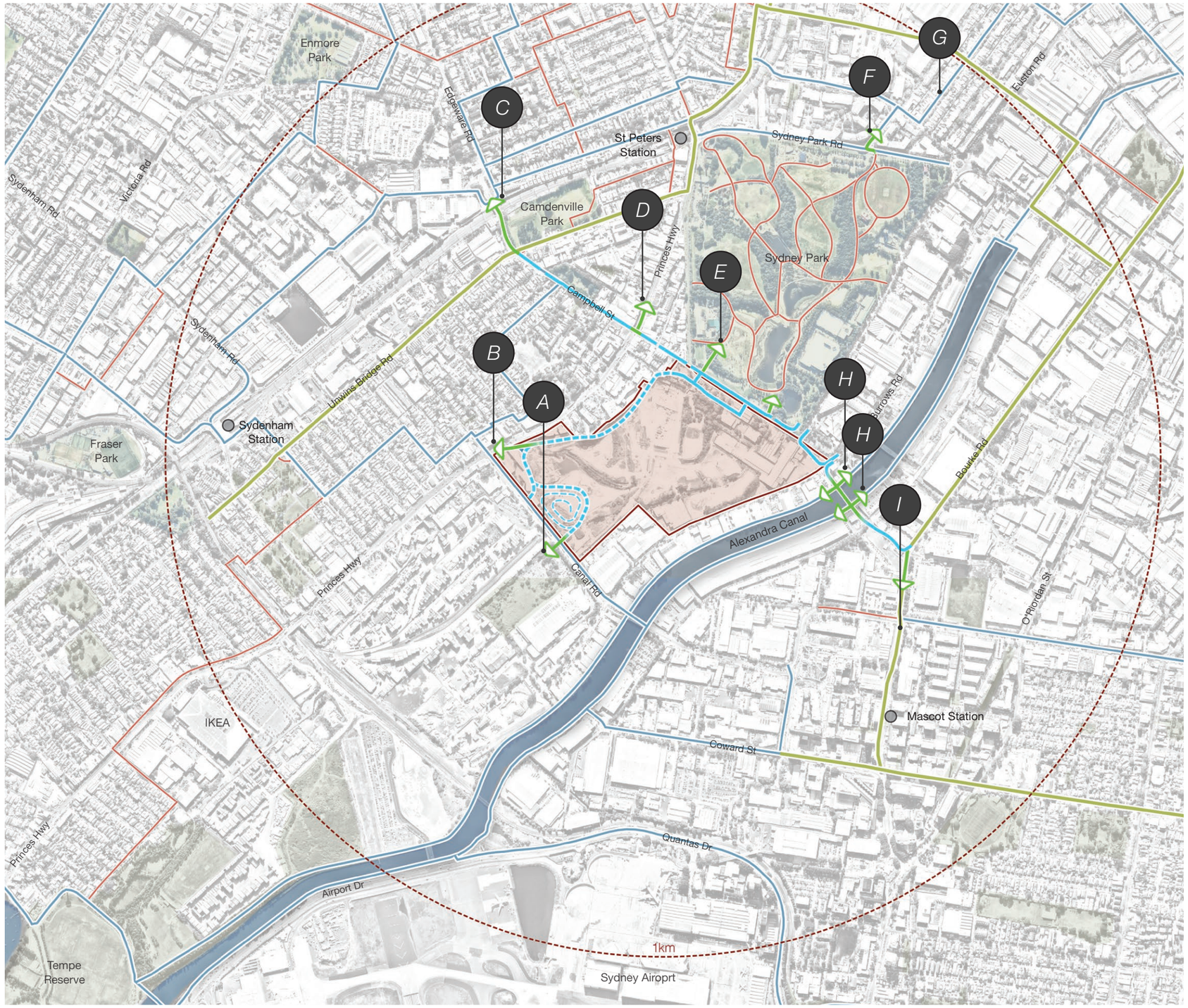
E. Sydney Park Connection: Access into Sydney Park from Campbell Road is currently limited due to the change in elevation and lack of paths on the southern boundary of Sydney Park. Better access would facilitate movement north and south through Sydney Park to the proposed SPI ATN.

F. Erskineville Connection: Connection to the north through Erskinville is provided by the route along Euston Road or through Sydney Park and Sydney Park Road. However there is currently poor connectivity along Mitchell Road and Huntley Street. Both roads contain shared paths on existing footpaths which are relatively narrow and are constrained by trees, poles and driveways. There is also a relatively poor crossing at Huntley Street to access Belmont Street.

G. Alexandria to Moore Park (A2MP) Connection: There is a current gap between the end of the SPI ATN, existing and proposed ATN, and the Alexandria to Moore Park ATN.

H. Alexandra Canal Connection: WestConnex will enable a connection between the future Alexandra Canal ATN and the Campbell Road bike path.

I. Mascot Connection: Access to the south east is good with important connections into the existing Bourke St ATN route and surrounding area.



Legend

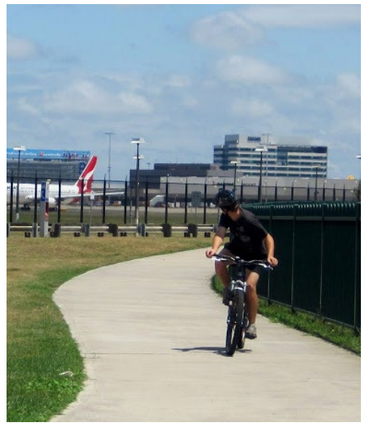
- WCX Commitments - Separated Cycleway
- WCX Commitments - Shared Cycleway
- Connectivity Analysis
- Regional Route - Inner City
- Regional Route - Council
- Local Route - Council
- St Peters Interchange Boundary
- 1km Boundary from Interchange
- A — Airport Connection
- B — Sydenham Connection
- C — Enmore/ Marrickville Connection
- D — Newtown Connection
- E — Sydney Park Connection
- F — Erskineville Connection
- G — A2MP Connection
- H — Alexandra Canal Connection
- I — Mascot Connection

NOTE: 'Regional Route - Council' include both existing and planned routes

Figure 3.03 - St Peters Interchange ATN Review

3.4 ST PETERS INTERCHANGE ATN - MISSING CONNECTORS

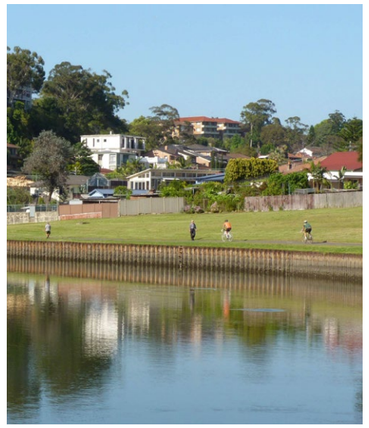
	Name	Summary	Status	Completion Date	Delivered by
A	Airport Connection/Canal Road	Currently limited connectivity to Airport and along Canal Road	Gap. Being addressed as part of Sydney Gateway project	2023	RMS
B	Sydenham Connection (Princes Highway)	Currently limited connectivity into Inner West Council ATN to access Sydenham Station	Gap. To be addressed in Condition B51	2020	RMS and Councils
C	Enmore/Marrickville Connection	Currently limited connectivity into Inner West Council ATN to access Enmore/Marrickville and Camdenville Park	Gap. To be addressed in Condition B51	2020	RMS and Councils
D	Newtown Connection	Currently limited connectivity into Newtown town centre and existing Lord/Concord Street ATN	Gap. To be addressed as part of King St Gateway, which is implemented after opening of WCX New M5	2021	RMS
E	Sydney Park Connection	Currently limited connectivity from Campbell Road to Sydney Park	Gap. Being addressed as part of Condition B62 Campbell Rd Bridge	2020	RMS
F	Erskineville/Alexandra Connection	Connection to the north through Belmont Street regional route Existing shared path to Belmont Street ATN is not adequate.	Gap. To be addressed in Condition B51	2020	RMS
G	Alexandria to Moore Park Connection	Currently limited connectivity from Sydney Park Road/Euston Road to planned A2MP ATN	Gap. To be addressed in Condition B51 via Mitchell Road, Harley Street and McEvoy Street	2020	RMS
H	Alexandra Canal Connection	Facilitating City of Sydney's planned Alexandra Canal cycle path	Planned as part of existing Westconnex works – bridge design does not impact councils proposal	2020	WCX
I	Mascot connection	Connectivity to Bourke Road ATN and Mascot town centre	Planned as part of existing Westconnex works	2020	WCX



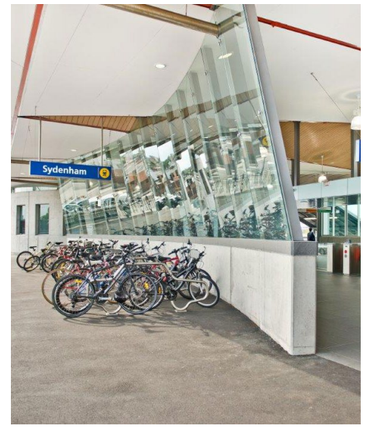
Connecting Inner West suburbs to the Airport via the Sydney Gateway

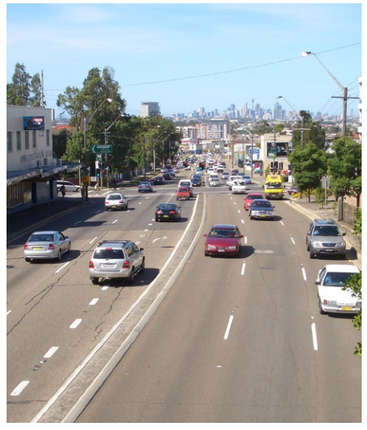


Connecting Princess Highway with Canal Road



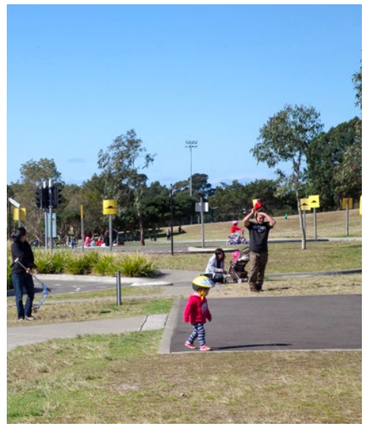
Connecting Cooks River to inner west stations via the Sydenham creative industries precinct



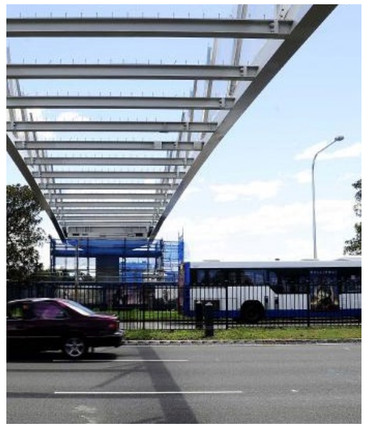


Providing a connection from Sydenham & St Peters to Newtown along the major arterial route of Princes Hwy and King St





Closing the gap between Euston Road to Maddox Street and the A2MP



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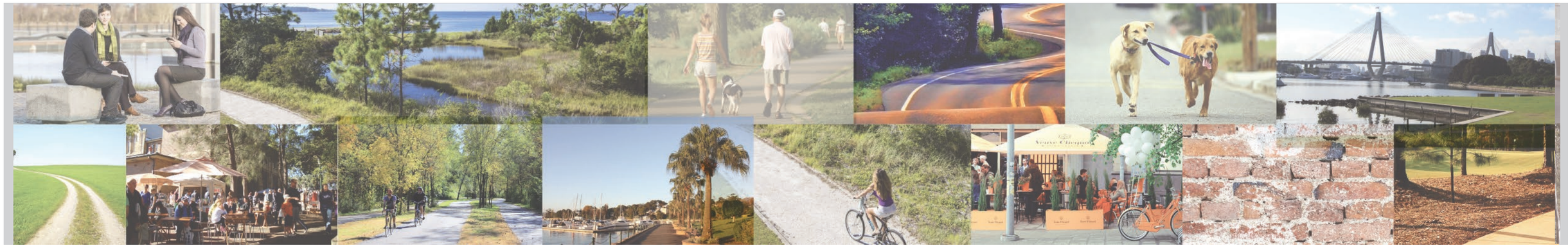




4.0 M5 East Green Link

4.1 M5 EAST GREEN LINK OVERVIEW

The M5 East Green Way and the surrounding area includes the suburbs of Kingsgrove, Bexley North, Turrella, Wolli Creek, Bardwell Park and Arncliffe.

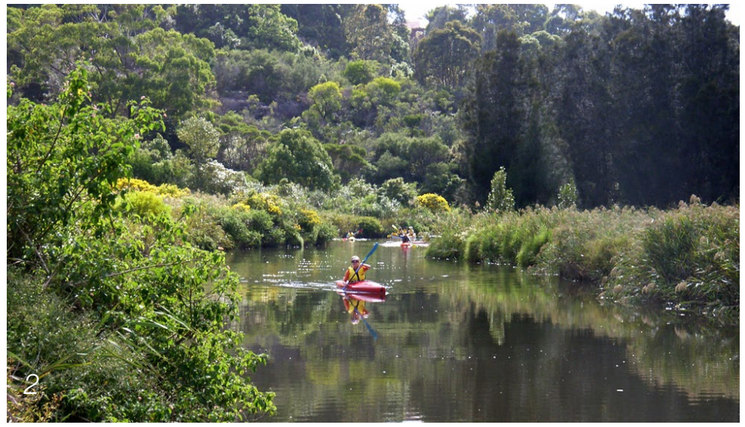
The area includes Wolli Creek Reserve and the adjoining Cooks River with their accompanied qualities. Outside these water systems, residential housing populates the majority of the area with new development to the east, between Arncliffe and Wolli Creek Stations, and a major rail line travelling southwest from Sydney.

At a regional level, currently, there is poor connectivity between frequently used existing routes including the Cools River shared path, the M5 East Linear Park and the Alexandra Canal cycle path. In particular there is a lack of ATN infrastructure linking these routes resulting in poor connectivity.

The following sub sections (4.2 and 4.3) review the history (1994-2016) of previous works towards the implementation of a shared path / cycle way connecting Alexandra Canal to Turrella Station and Bexley North Station.



Bexley Road Pedestrian Bridge



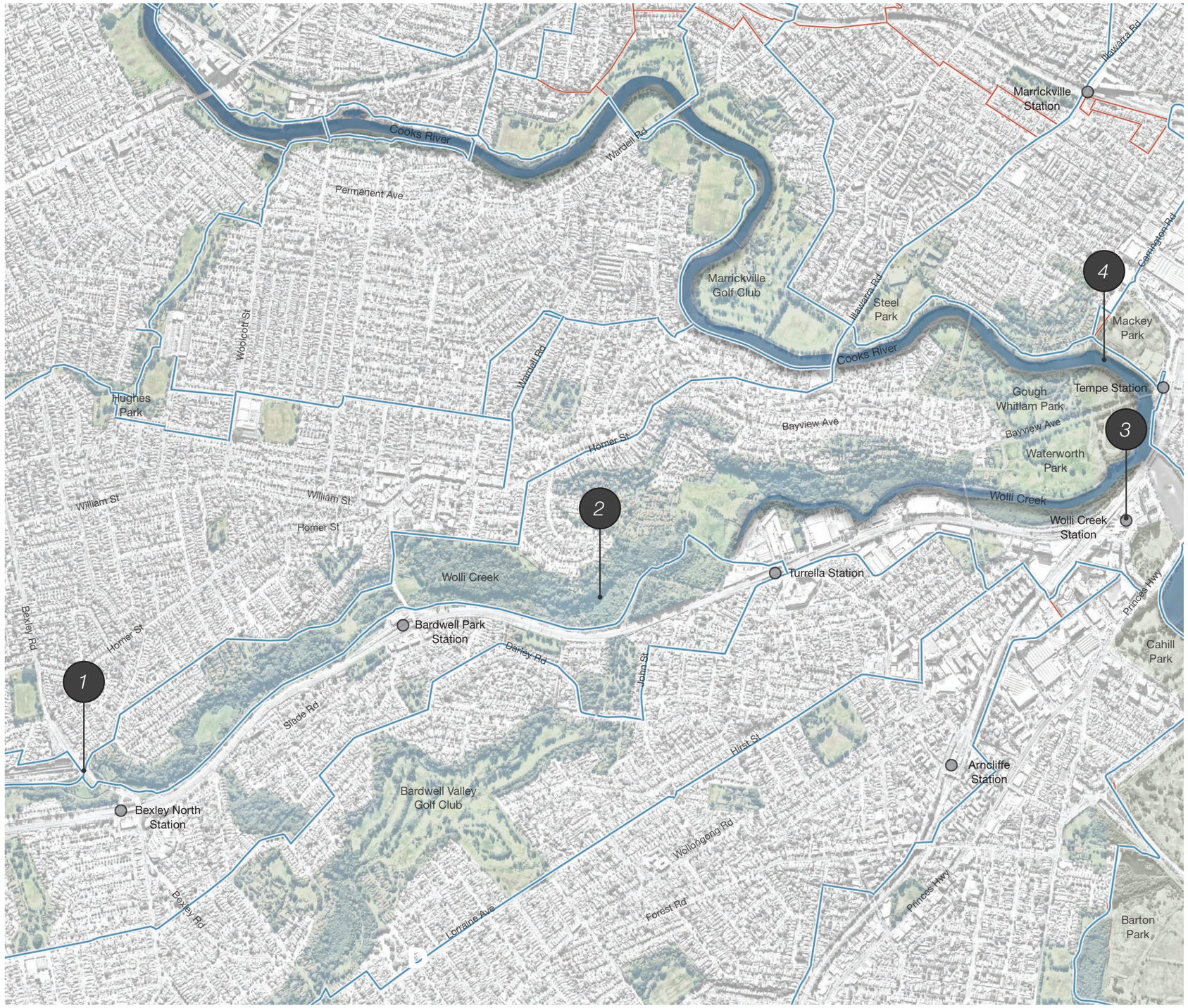
Wolli Creek



Wolli Creek Train Station



Cooks River



Legend

- Regional Route - Council
- Local Route - Council

1. Bexley Road Pedestrian Bridge
2. Wolli Creek
3. Wolli Creek Train Station
4. Cooks River

NOTE: 'Regional Route - Council' include both existing and planned routes

Figure 4.01 - Existing Network Plan

4.2 TURRELLA TO ALEXANDRA CANAL - REVIEW

2002 February - M5 East Cycleways

Description

An update on the progress on the M5 East Cycle way states the following:

- A new shared 3 meter wide pedestrian and cycle path has been constructed along both sides of the M5 East between King Georges Road and Bexley Road.
- The section of path along Alexandra Canal from Coward Street to Giovanni Burnetti Bridge was constructed
- The connection from Turrella Station to Giovanni Burnetti Bridge and Alexandra Canal was not further planned due to the significant development proposed at Wolli Creek Station and Turrella Station. It was considered that the cycleway would be constructed as part of the future development. This section did not get completed as part of the re-development hence the gap that still remains in the present route.
- A shared path along Tempe Recreational Reserve included a cycle bridge over the canal. This was not constructed.
- The section between Princes Highway bridge and Turrella station was not constructed due to the significant amount of redevelopment occuring. It was understood that the route from Princes Highway bridge and Turrella station would be constructed by future development. This did not occur.

Legend

Proposed Route (not constructed)

Completed Cycleway

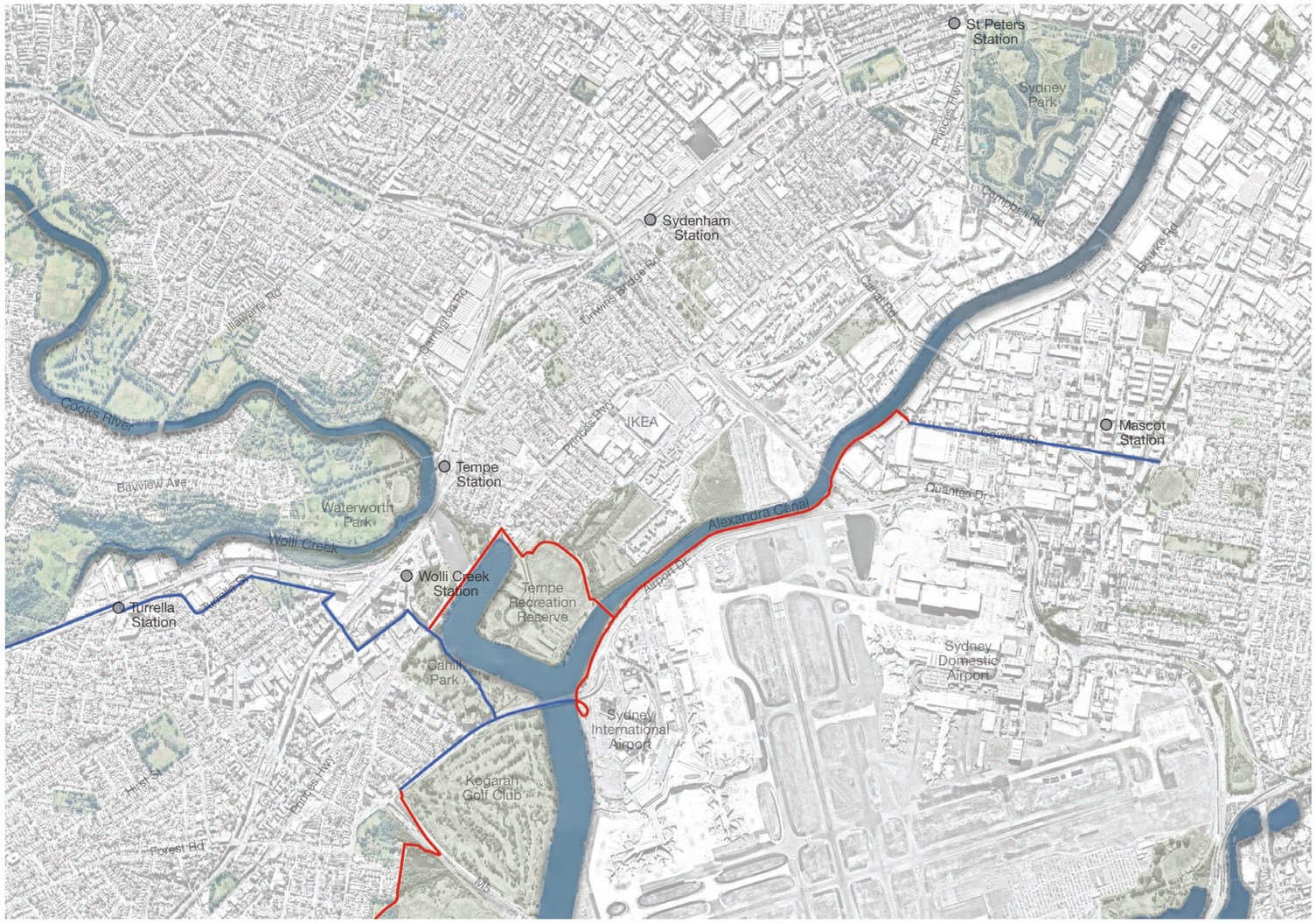


Figure 4.02 - 2002 M5 East Cycleways
Source: Roads and Traffic Authority NSW

2016 - M5 East Cycleways

Description

At present, Sydney Water is constructing a shared pedestrian and cycle way from Maddox Street to the north end of the Alexandra Canal as part of the 'Green Square Trunk Stormwater Drain' project. Recent meetings with stakeholders have also noted that the western and eastern sides of the canal have a proposed cycleway that will be predominantly constructed by 2019.

In 2016 a new pedestrian cycle bridge was constructed over Princes Highway. Bayside Council has also under taken planning for cycleways through Wolli Creek and Cahill Park.



Figure 4.03 - 2016 M5 East Cycleways
Source: Roads and Traffic Authority NSW

4.3 BEXLEY NORTH TO TURRELLA - REVIEW

1994 - M5 East Motorway Bicycle Planning Report (ARUP)

Description

This report adressed the bicycle planning routes which relate to the proposed tunnel section of the M5 East Motorway

A number of alternative schemes where developed for the tunnel section of the M5 East. They break down into four categories:

1. Do nothing
2. Provide lanes in the M5 Tunnel
3. A cycle path in the Wolli Creek Valley
4. An on-road cycle route

Category 1 and 2 were not considered feasible. Three options / routes had been identified for each of the last two categories, routes 3, 4 & 5 are shown in fig 4.04 and are as follows:

- Route 3: Dual use cycle / pedestrian path through Wolli Creek Valley
- Route 4: High quality cycle path through Wolli Creek Valley
- Route 5: Cycle path parallel to the East Hills rail reservation

Preferred Route

The preferred alternative bicycle route scheme, based on a variety of weighted criteria ranking costs and benefits was Route 5, a high quality bicycle path along side or within the railway reserve for the tunnel section of the M5.'

Outcomes

- The preferred route was taken forward for further investigation. In Jan 1999 and again in August 2001 in principle agreement was received from the then 'Rail Infrastructure Corporation'
- The cycleway planning was being further developed for the preferred route.

Legend

- Wolli Creek Valley Route - 3 & 4
- East Hill Rail Line Route - 5
- Possible Extension to Connect to Cook's River Cycleway

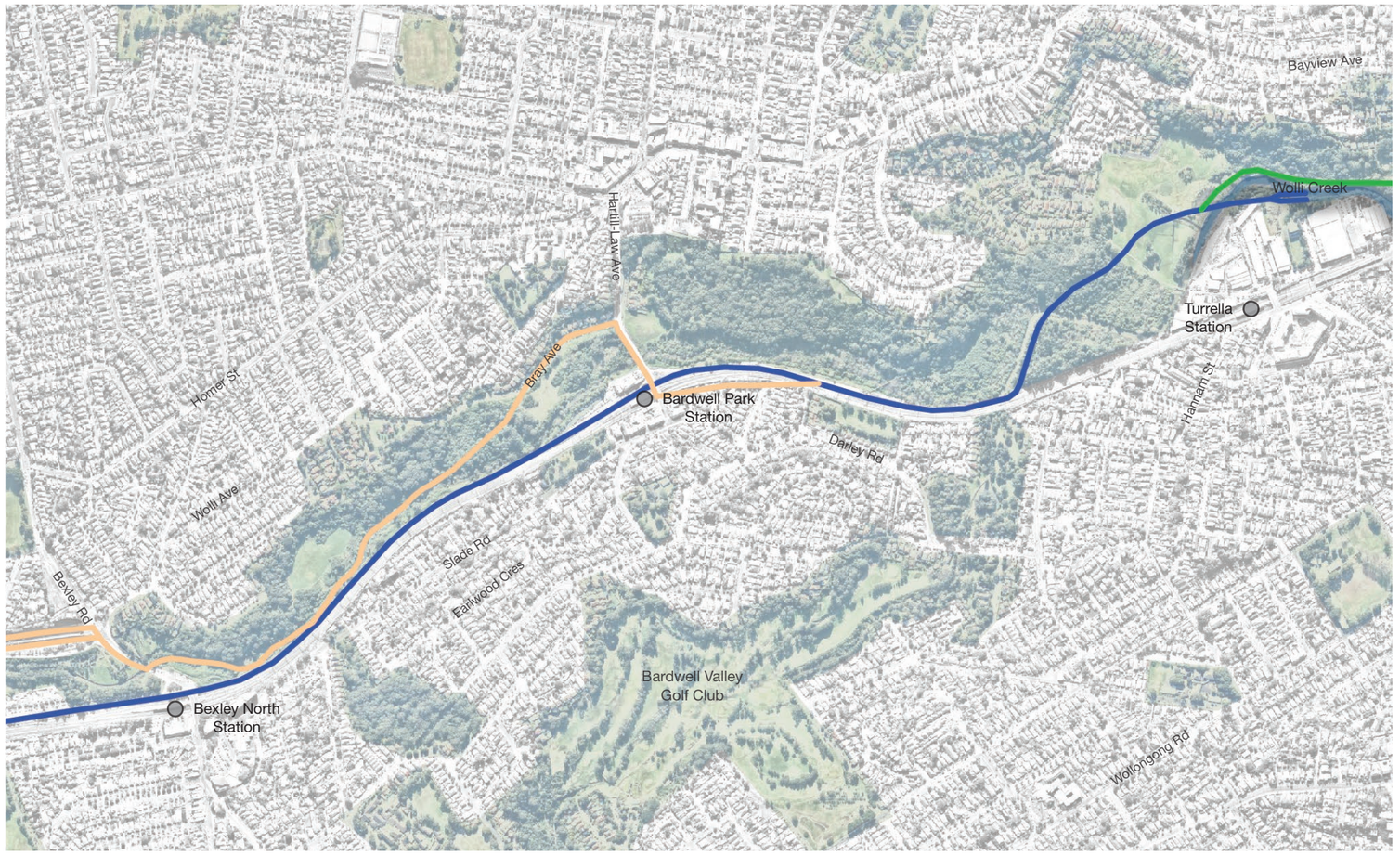


Figure 4.04 - M5 East Motorway Bicycle Planning Report
Source: ARUP 1994

2001 October - M5 East Cycle Way

Description

Up until mid 2001 the preferred route was consistently identified as the route through Rail Infrastructure Corporation (RIC) Land adjacent to the East Hill rail line. This was consistent with the preferred route identified in the original 1994 planning report. During this period substantial planning and design work was progressed including a Review of Environmental Factors for the project and completion of 90% documentation for the preferred route.

However from mid 2001 concerns began to be raised about the feasibility of this route. While informal and in-principle approval had been provided by RIC on a number of occasions including in mid 2000, there was no formal approval from RIC for the use of the rail corridor.

Hence, as a result, three routes were considered at a schematic level for further discussion internally within RMS. These routes included an on-road route, a Wolli Creek Reserve route and the original rail corridor option. These alternate options were developed because concerns were being raised about the potential for delays to the project.

Preferred Route

The rail corridor route was confirmed as the preferred route and it was resolved to continue progressing this route. The on-road route was not considered a suitable route for a regional level of cycle path and this route was identified as being opposed by Bicycle NSW while Wolli Creek reserve was not considered suitable due to the steep grades that needed to be traversed and potential requirement for steps.

Outcomes

- The rail corridor option was still considered as the preferred route.
- Cycleway planning and design was further developed for the preferred route.

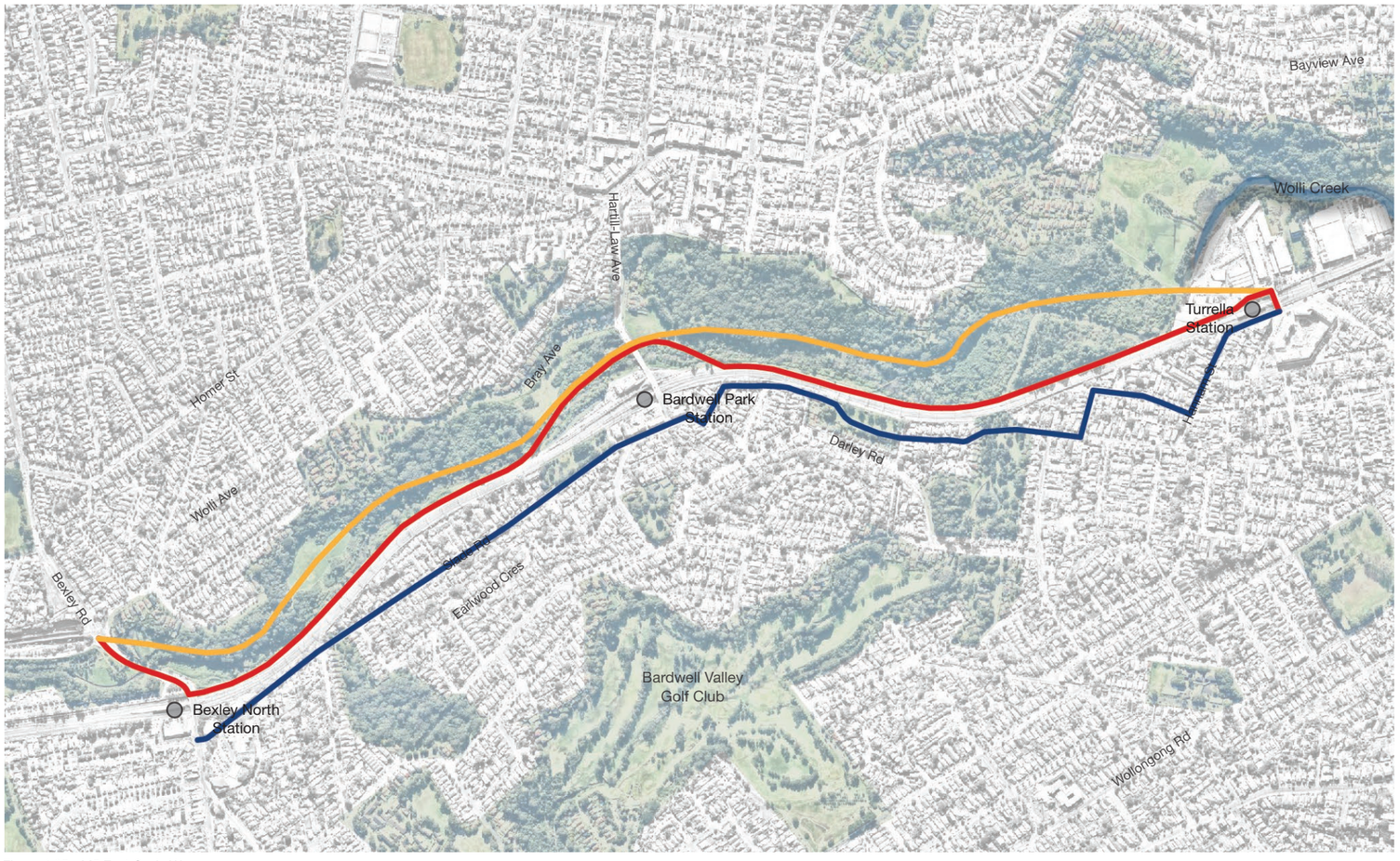


Figure 4.05 - M5 East Cycle Way
Source: Roads and Traffic Authority NSW 2001

2002 February - M5 East Cycleway

Description

In February 2002 a Ministerial briefing note was issued which confirmed that further support for use of RIC land had been sought and been confirmed in late January 2002. As a result of discussions with RIC, the former Road and Traffic Authority (RTA) were notified that relocation of RIC infrastructure (such as signalling equipment) was required to accommodate the cycle path along the rail embankment.

It was agreed that RIC would investigate what rail infrastructure was required to be relocated and to advise on the costs to relocate this infrastructure to accommodate the cycleway.

Based on the ongoing discussions and progression of the project with RIC, the original preferred route was confirmed and a construction program was developed in consultation with RIC with the expectation that construction work would commence in April 2002.

Progress on routes

The preferred route remained the route along the rail corridor.

Outcomes

Investigations for the relocation and costing of the RIC infrastructure were being undertaken by RIC. Planning and design for the preferred route were further progressed including a proposed program which anticipated that construction would commence in 2012.

Legend

- Completed Cycleway
- Under Construction - RTA
- Under Construction - Relevant Councils

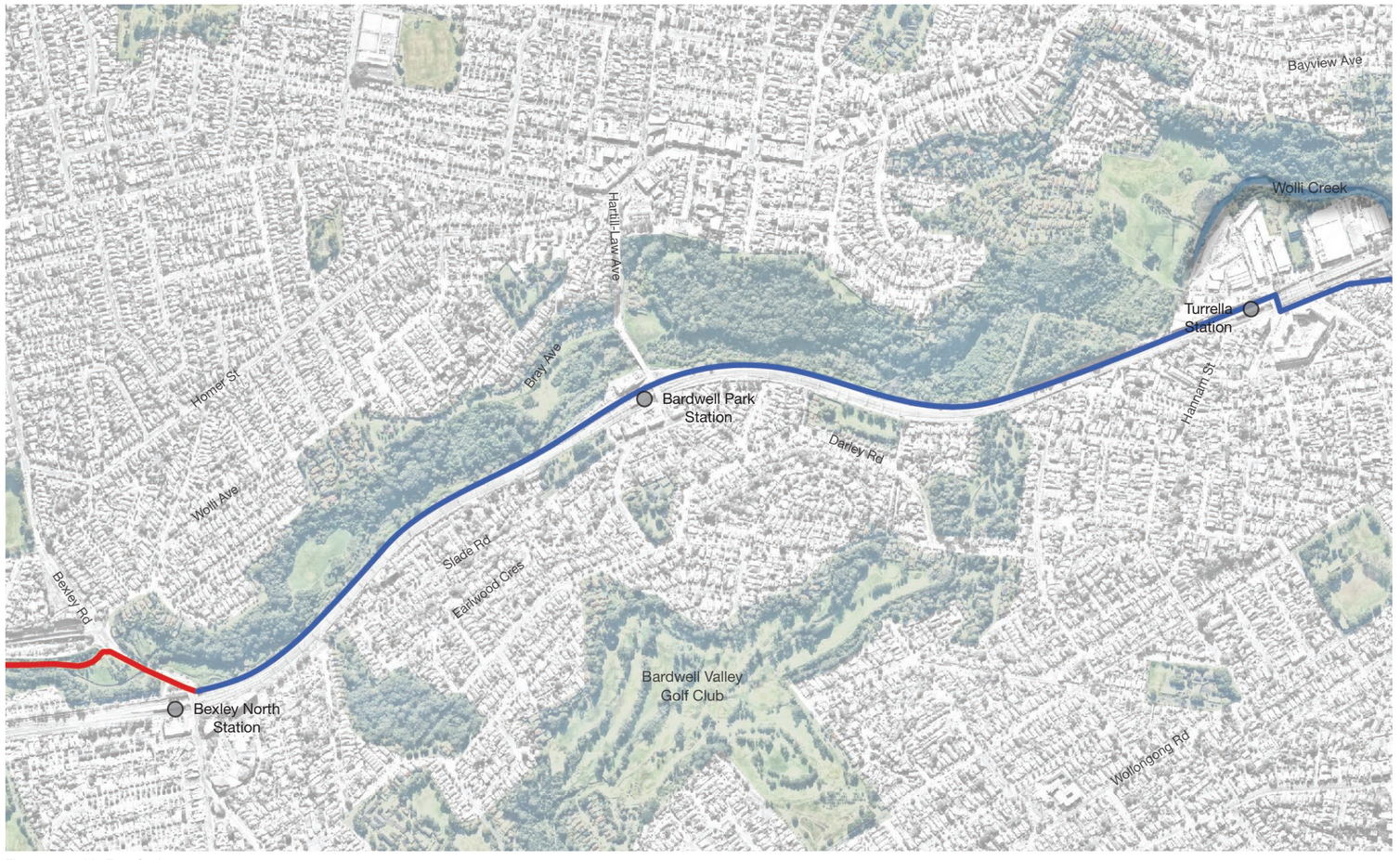


Figure 4.06 - M5 East Cycleway
Source: Roads and Traffic Authority NSW 2002

2002 November - M5 East Cycle Ways Options A-E

Description

Additional route planning was undertaken by RTA resulting in the identification and development of five alternative routes (Options A to E). These routes all considered alternate routes on the southern side of the rail corridor using a combination of on-road routes and open space. A route along the northern side of the rail was not considered feasible due to the steep grades and topography.

These routes were being considered due to concerns over cost and delays in approval on the original preferred route along the rail corridor. RIC had completed investigations into relocating rail infrastructure and had advised RTA that the cost to relocate this infrastructure would be approximately $2.6M. Most of these costs were associated with relocating infrastructure in the proximity of Turella Station.

The following concerns were raised:

- Delays in approval from RIC
- Lack of support from RIC management for a cycle path in the rail corridor
- Lack of access to and from the route as access was only available at Turella Station, Bardwell Park Station and Kingsgrove Station with no access outside of these locations

Preferred Route

The additional route planning did not state a preference for a preferred route out of the five options that were developed for the southern side of the rail corridor.

Outcomes

It was recommended that the alternate routes be further considered prior to the final decision on the preferred route.

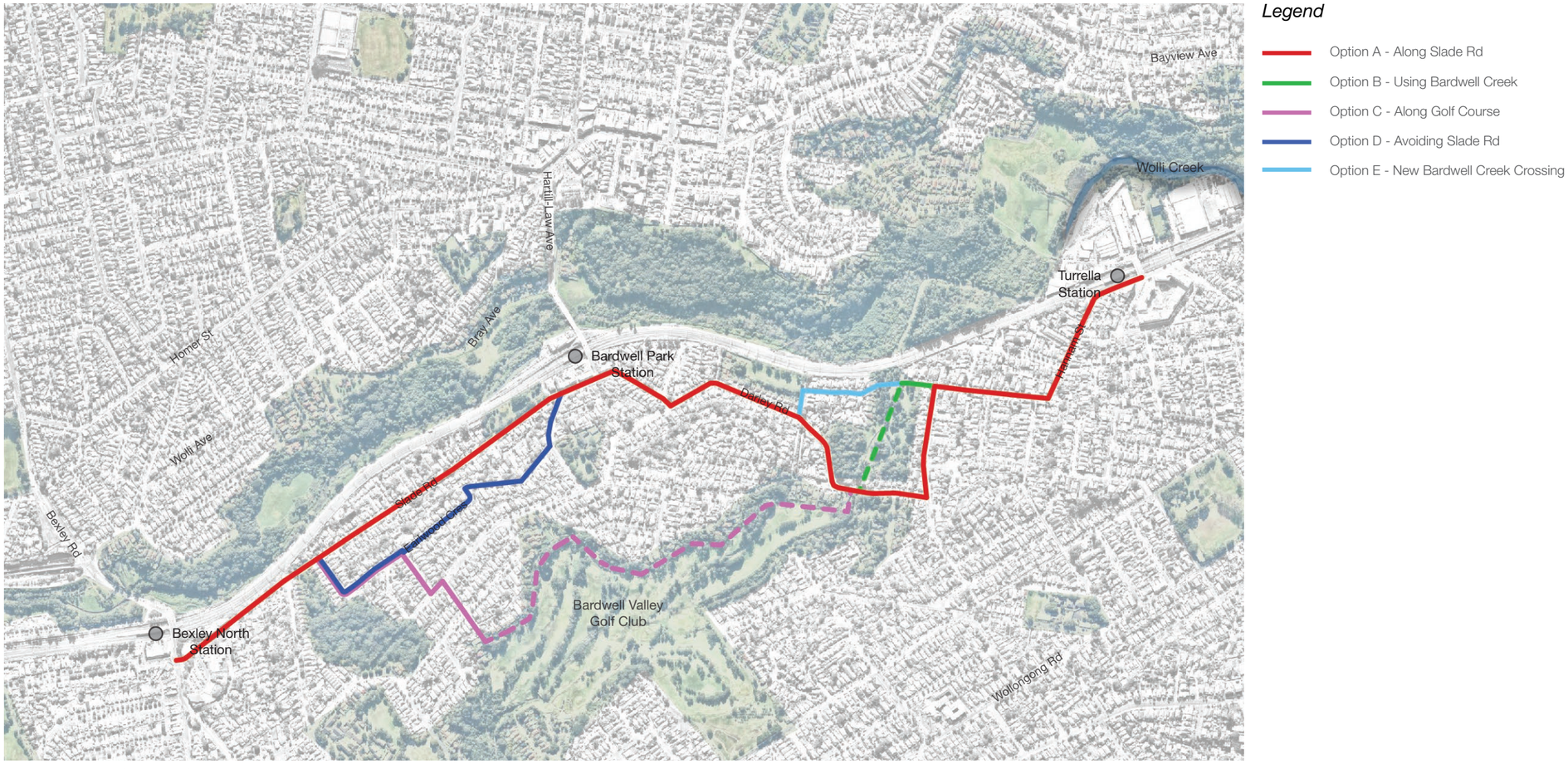


Figure 4.07 - M5 East Cycle Ways Options A-E
Source: Roads and Traffic Authority NSW 2002

2003 February - Bush Bikes & Bitumen

Description

A community group, the “Wolli Pathfinders” raised objections to the original preferred route through the bushland of the Wolli Creek Valley. The group prepared a report on the existing route identifying the issues with the existing route and also proposed alternative routes.

The group’s main concern was the potential impacts on the bushland due to the construction of a regional cycle path and the subsequent use of that cycle path. It was considered that this regional cycle path would significantly impact on one of the remaining remnant bushland zones in the region. The report noted that the Wolli Creek Valley was a narrow ecological zone and particularly south east of Bardwell Park station was considered to have high value including providing habitat for water birds which would be disturbed by the cycle path.

The report investigated a number of routes which are discussed further below and recommended an on-road route on the southern side of the rail line. The report noted that while not the groups preferred option, if they had to choose a portion of the Wolli Creek Valley to install a cycleway they would choose the western end of the route and preserve the eastern end.

Preferred route

The proposed route involves a mix of on road routes, traffic calming, and some off road construction in areas much less sensitive than the banks of Wolli Creek including:

- An on road route starting at Slade Road, continuing on through quiet streets towards Rickard Street and onto Turrella Station with a new bridge over Bardwell Creek between Edith Street and Hannam Street
- An option to avoid Slade Road which runs on the south side of the rail corridor through a grassed park.
- A northern option on road along Bray Ave, Forrest Ave and Johnston Street then linking with a cycle bridge across the railway and onto the southern route.

Outcomes

Based on the ongoing uncertainty and increasing cost of the rail corridor route option and the objections raised in the report to the use of the Wolli Creek Valley as a regional cycle route RTA resolved to undertake further route planning analysis including a review of the recommendations in the report.

Legend

- Option A - Creek Side Cycle Plan - RTA
- Option B - Wolli Pathfinders Routes

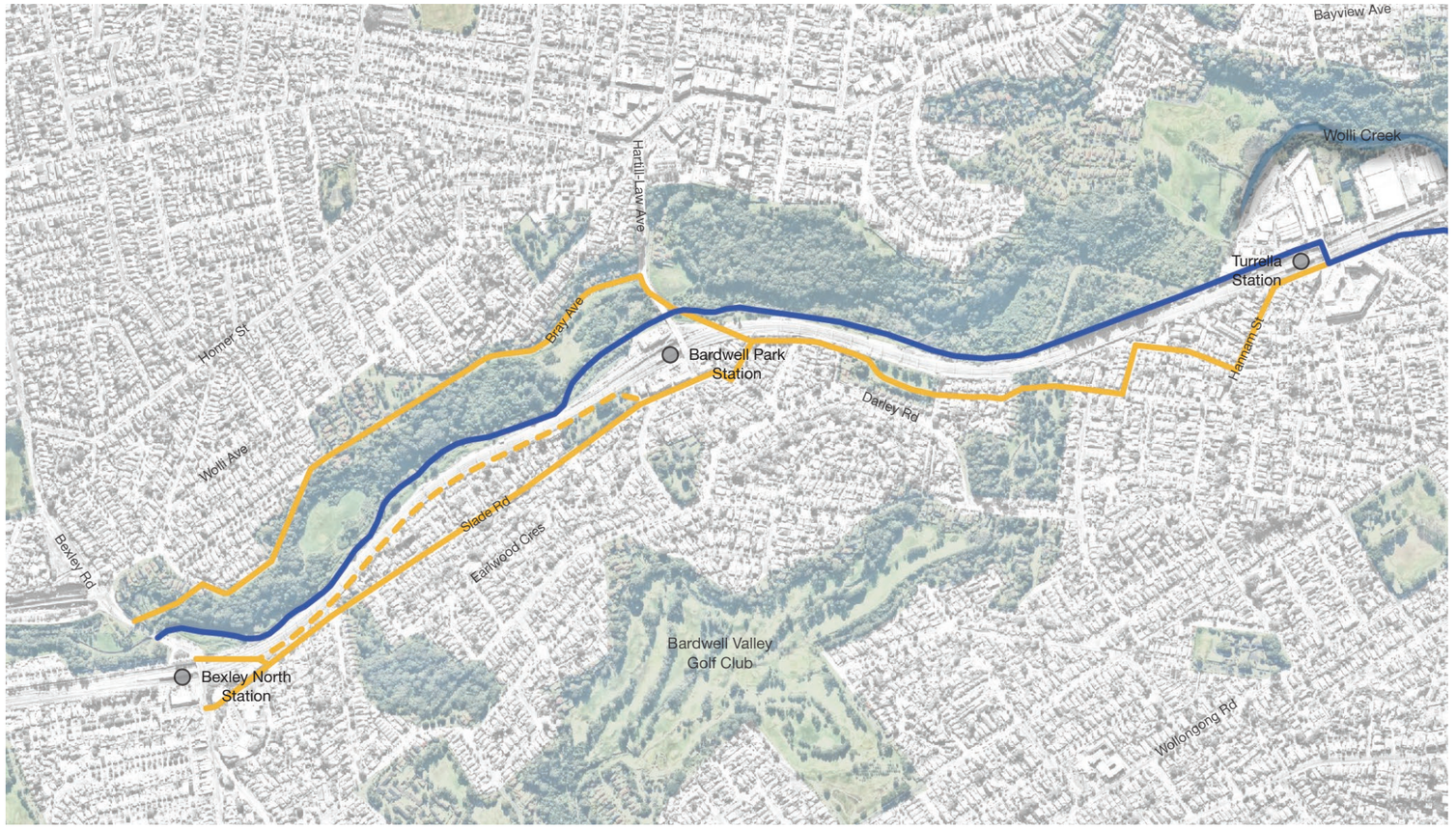


Figure 4.08 - Bush Bikes & Bitumen
Source: The Wolli Pathfinders 2003

2003 March - M5 East Cycleways

Description

This report reviewed alternative options developed in February 2003 as a result of opposition from the community and additional information from RIC relating to costs of relocating infrastructure in the rail corridor.

Rail Infrastructure Corporation provided an estimate for the relocation of rail utilities required to be undertaken as part of the project. The estimated cost of the project (rail corridor option – red colour) increased to $9.5M, which excluded any track possession costs that may be required during the works. The original strategic cost estimate was $4.8M.

Given the estimated cost of the current route and resistance from RIC to construct the cycleway in the rail corridor, particularly adjacent to Turrella Station, alternative options developed in February 2003 were assessed.

Preferred Route

Option E: Composite Road / Rail as it avoided the most sensitive bushland areas and also high cost of RIC infrastructure location.

Outcomes

The preferred route was investigated further and additional options were considered

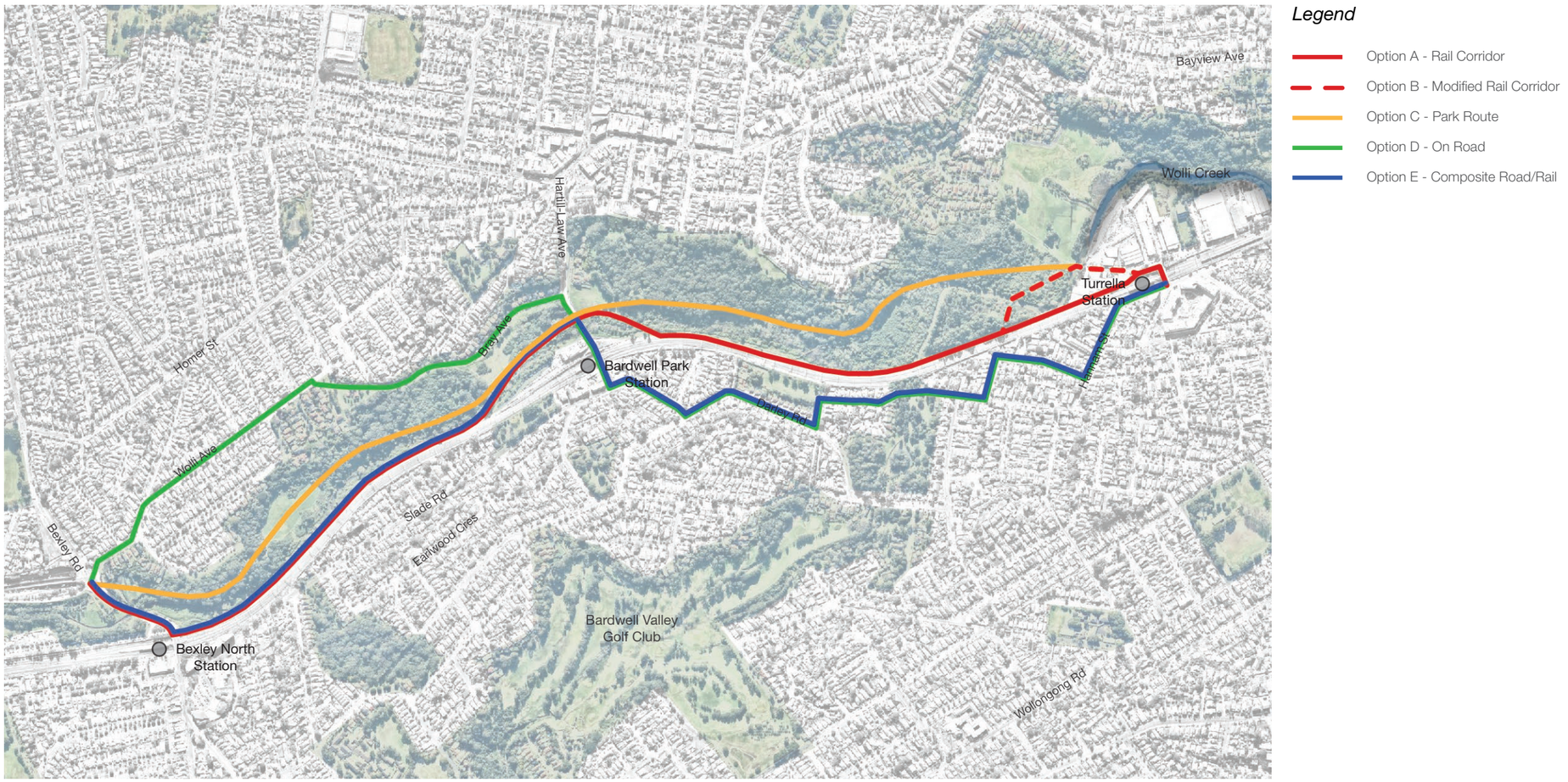


Figure 4.09 - M5 East Cycleways
Source: Roads and Traffic Authority NSW 2003

2003 April - Bexley North to Turrella Cycleway

Description

Further route planning and investigations were undertaken to further develop those routes previously identified in March 2003. An additional route, Route F, was developed in addition to the 5 previous route options. This route was the original rail corridor option from Bexley North Station to Bardwell Park Station and an on-road option between Bardwell Park Station and Turella Station. The option included use of predominantly local roads and a crossing of Bardwell Valley Creek.

Preferred route

Internal discussions within the RTA identified that Option F was the preferred route out of the 6 options that had been developed. The route was chosen as a 'compromise' route which partially met the preferences of Bicycle NSW for a dedicated off-road regional route and partially met the concerns raised by the local community with regards to the potential impacts of a regional cycle path on Wolli Creek Valley.

Outcomes

Further investigation of the preferred route was undertaken

Legend

- Option A - Rail Corridor
- Option B - Modified Rail Corridor
- Option C - Park Route
- Option D - On Road
- Option E - Composite Road/Park
- Option F - Composite Rail/Road

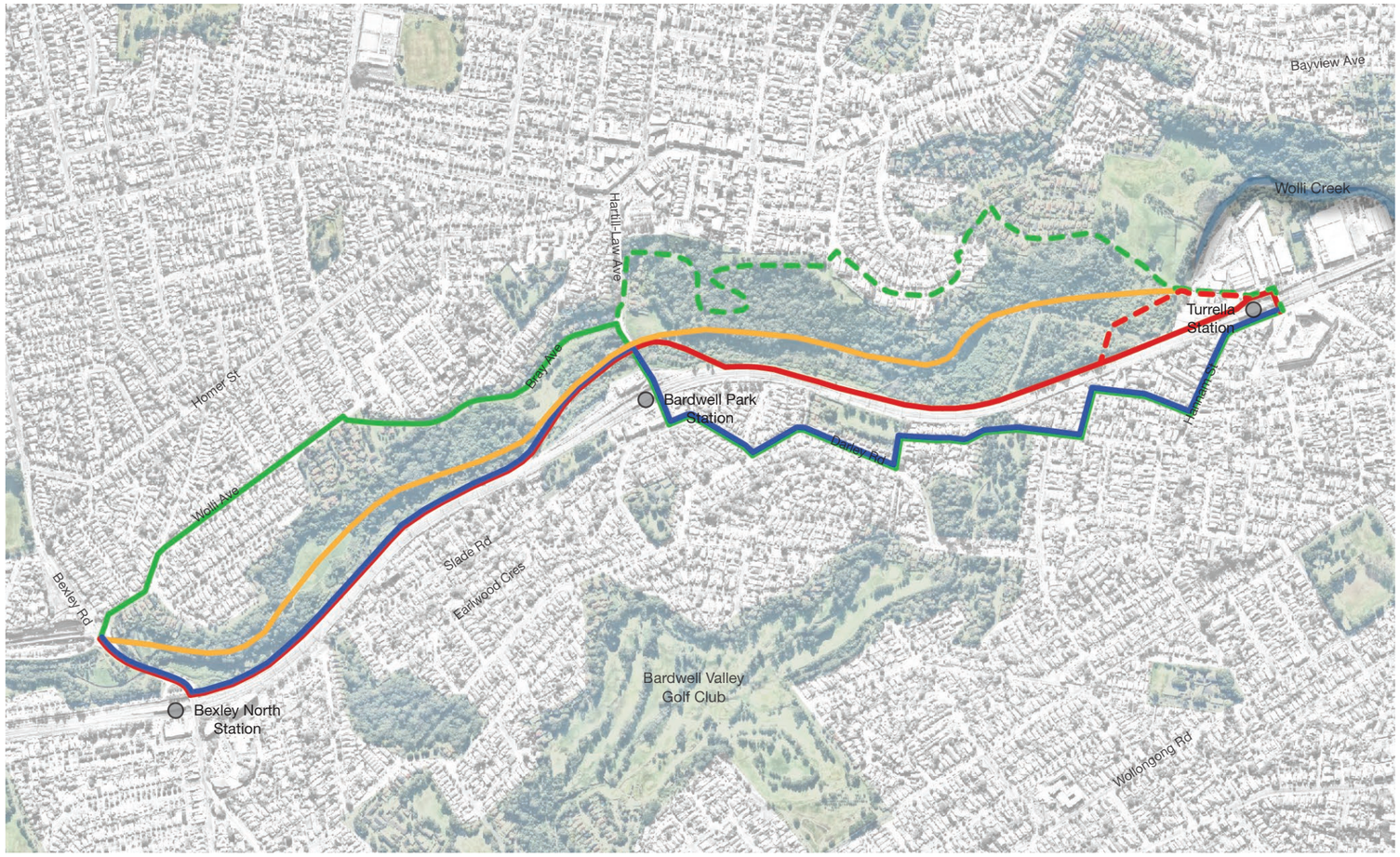


Figure 4.10 - Bexley North to Turrella Cycleway
Source: Roads and Traffic Authority NSW 2003

2004 March - Turrella Cycleway Options Assessment

Description

Geotech investigation on the rail embankment between Bexley North and Bardwell Park Stations was undertaken in October 2003 and found that the embankment was unstable. Due to cost impacts, an on road route was further considered. These included a series of routes for the Bexley to Turrella cycleway through a range of land ownership groups. These routes consisted of sections that were both on road and off road. Each route had identified preliminary design nonconformities such as grades, speed limits, detour factors and stops per average km. Preliminary major risks were identified such as environmental disturbances, flooding, personal safety, railway protection and geotechnical stability. The identified routes are shown in figure 4.11.

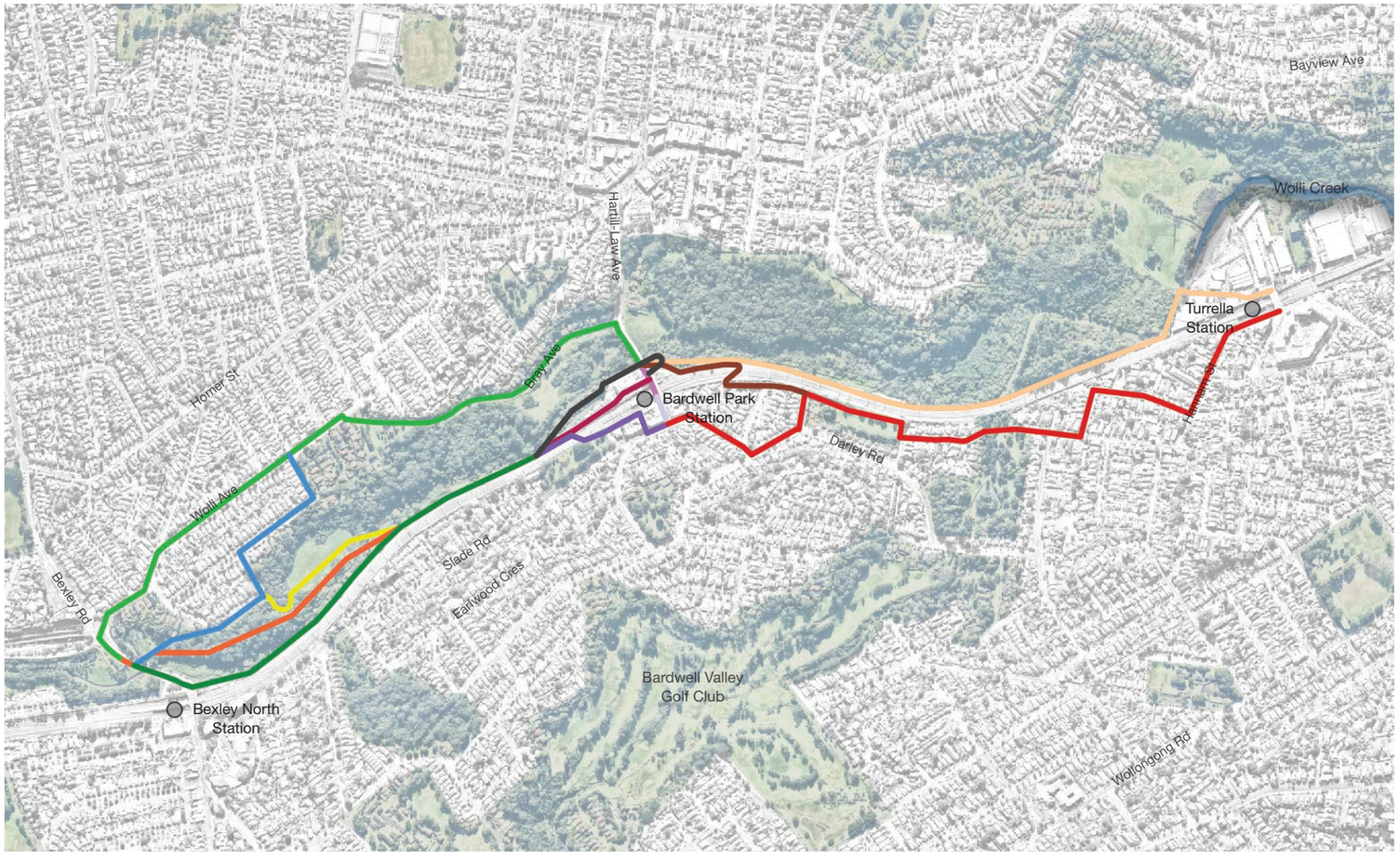
Preferred Route

No preferred route was identified, but routes that have been noted as 'Feasible Option' are as follows:

- A5: Rail Corridor BN-BP - off road 3m wide concrete path, bridge
- B5: Bridge over railway west of Bardwell Station - 3m wide concrete path, bridge
- B6: Bridge over railway east of Bardwell Station - 3m wide concrete path, bridge
- B7: Through RSL car park adjacent to railway - on road
- B8: RSL adjacent to Wolli Creek - 3m wide concrete path
- C2: Rail corridor BP-T - on road, some off road sections

Outcomes

- Key stakeholders were identified
- Strategic estimated costs were identified
- No preferred route was identified



Legend

- A1: Wolli Ave - on and off road
- A2: Through Reserve and Laneway - off road 3m wide concrete path
- A3: From Johnston St over Wolli Creek to Railway - off road 3m wide concrete path, bridge
- A4: Through Wolli Creek Regional Park - off road 3m wide concrete path, bridge
- A5: Rail Corridor BN-BP - off road 3m wide concrete path, bridge
- B1: Hartill-Law Ave Lane reconfiguration - on road
- B2: Hartill-Law Ave Bridge Widening - on road
- B3: Through shopping strip, awning adjustment - on road
- B4: Through shopping strip, minimum treatment - on road
- B5: Bridge over railway west of Bardwell Station - 3m wide concrete path, bridge
- B6: Bridge over railway east of Bardwell Station - 3m wide concrete path, bridge
- B7: Through RSL car park adjacent to railway - on road
- B8: RSL adjacent to Wolli Creek - 3m wide concrete path
- C1: On road through mostly local roads - on road, some off road sections
- C2: Rail corridor BP-T - on road, some off road sections

Figure 4.11 - Turrella Cycleway Options Assessment
Source: Roads and Traffic Authority NSW 2004

2004 March - Turrella Cycleway Options Assessment Preferred Routes

Description

As an outcome of the 'Turrella Cycleway Options Assessment', five preferred routes were selected which are shownin figure 4.12.

Preferred route

From these five routes, a favoured route was not documented

Outcomes

There is no further archival records on the planning for the M5 East Green Link

Legend

Entire Route Option 1:
- A5: Rail Corridor BN-BP
- B8: RSL adjacent to Wolli Creek
- C2: Rail corridor BP-T

Entire Route Option 2:
- A5: Rail Corridor BN-BP
- B8: RSL adjacent to Wolli Creek
- B6: Bridge over railway east of Bardwell Station
- C1: On road through mostly local roads

Entire Route Option 3:
- A5: Rail Corridor BN-BP
- B5: Bridge over railway west of Bardwell Station
- C1: On road through mostly local roads

Entire Route Option 4:
- A5: Rail Corridor BN-BP
- B8: RSL adjacent to Wolli Creek
- B5: Bridge over railway west of Bardwell Station
- C1: On road through mostly local roads

Entire Route Option 5:
- A1: Wolli Ave - on and off road
- B6: Bridge over railway east of Bardwell Station
- C1: On road through mostly local roads

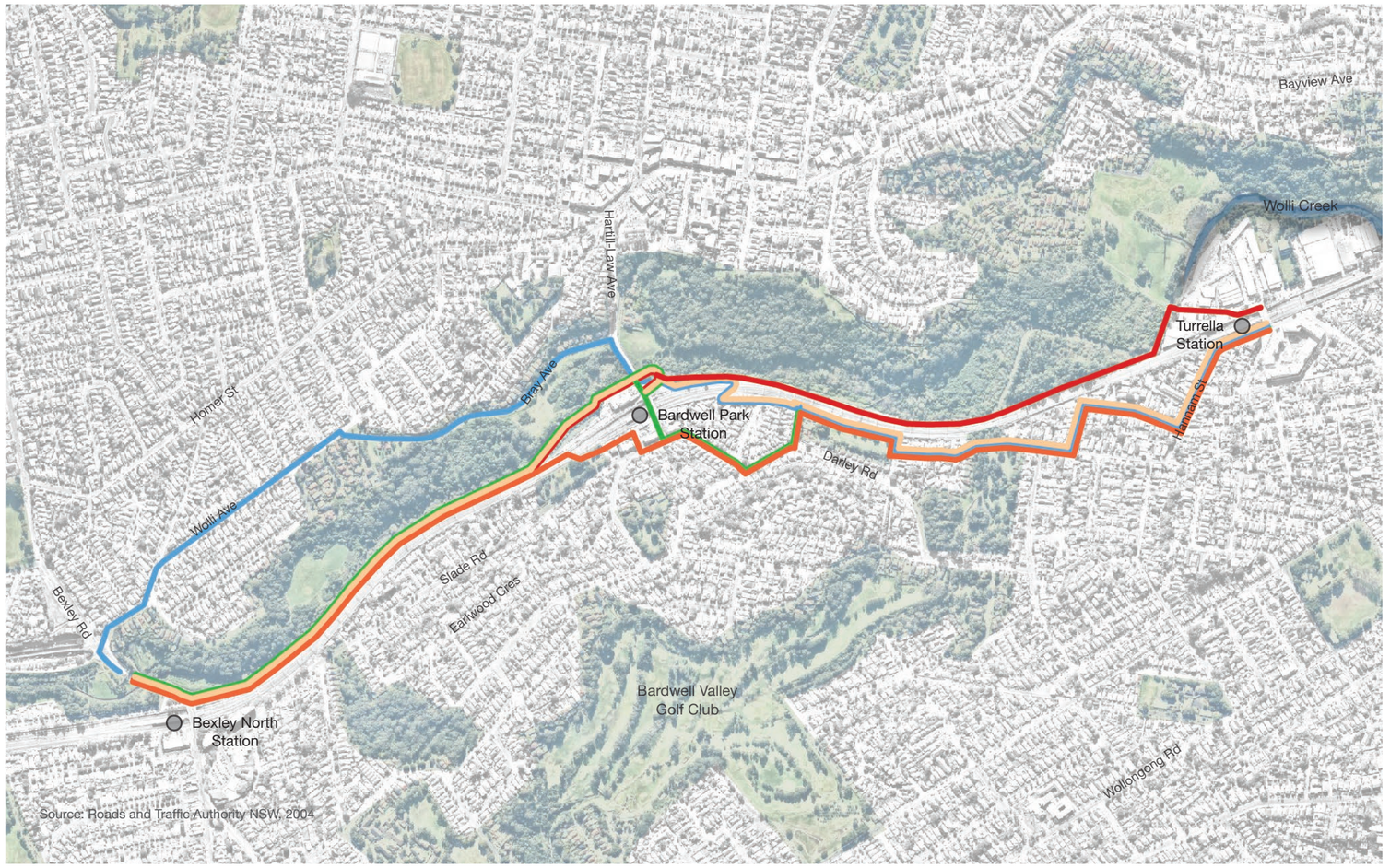


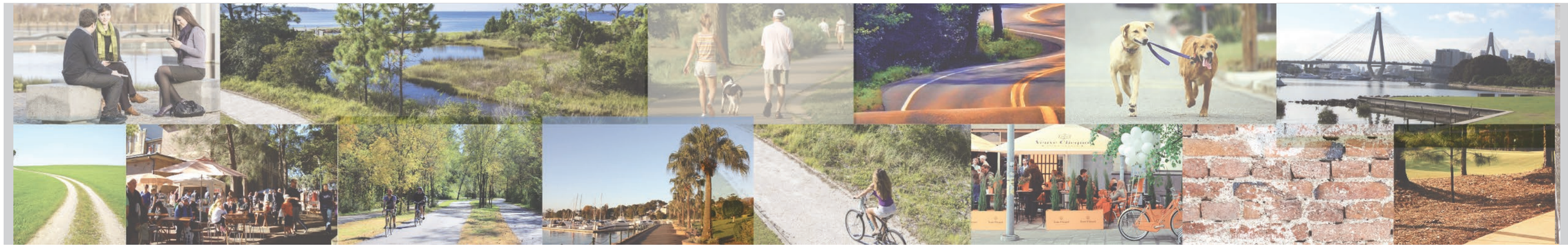
Figure 4.12 - Turrella Cycleway Options Assessment
Source: Roads and Traffic Authority NSW 2004

History Review - Summary of Turrella to Bexley North

A wide range of routes were investigated for a cycle path between Turella to Bexley North between 1994 to 2004. However despite substantial planning and design development, the original preferred route along the rail corridor was not considered feasible, at the time, due to the delays in obtaining RIC approval for use of the corridor, cost increases associated with the requirement to relocate RIC infrastructure, and community concerns raised over the potential impact on Wolli Creek Valley. Route planning considered on-road route options, however these were not favoured by Bicycle NSW, had considerable constraints in terms of the steep grades of the local topography and ability to achieve a reliable connected network due to pinch points in a number of locations, particularly along Slade Road. A summary of the route investigation and planning is included in Table 4.01

Year	Route Type	Description	Discussion / Outcome	Constraints Identified	Stakeholder Issues
1994	– Wolli Creek Valley – Rail Line	– Wolli Creek Valley: Route through Wolli Creek Valley – Rail Line: Route along side of the railway embankment on RIC land	Concepts were produced to identify a preferred cycle route for the tunnel section of the M5 East. Preferred route was the rail line route.	– Wolli Creek Valley: Concept stage only – Rail Line: Concept stage only	– None identified
2001 Oct	– On road – Wolli Creek Reserve – Rail Corridor	– Bicycle route along the south side of Wolli Creeks embankment – Route through Wolli Creek Valley – On road route from Bexley North Station to Turrella Station	Due to delayed approvals from RIC, additional routes were considered.	– On road: Steep grade on Slade Road and Darley Road – Wolli Creek Reserve: May impact on the health of the land – Rail Corridor: Relocation of RIC infrastructure	– RIC in-principle support was given
2002 Feb	– Rail line	– Rail Line: Route along the railway embankment on RIC land	Support from RIC was obtained.	– Rail Line: Relocation of RIC infrastructure	– Formal approval had not been achieved for use of RIC land
2002 Nov	– Entirely on road – Parklands route – Golf Club route – On road alternative – On and off road	– Entirely on road: On road route from Bexley North Station to Turrella Station – Parklands Route: Diverting through Coolibah Reserve and connecting back on road at Hannam Street – Golf Club route: Route through Bardwell Valley Golf Club and Coolibah Reserve – On road alternative: Using Earlwood Crescent as an alternative to a section of Slade Road – On and off road: Diverting off of Darley Road to a bridge crossing over Bardwell Creek then connecting back onto Hannam Street	RIC investigated the relocation of infrastructure cost to be $2.6M, alternative routes were proposed.	– Entirely on road: Steep grade on Slade Road and Darley Road – Parklands Route: New infrastructure through parklands – Golf Club route: Bardwell Valley Golf Club – On road alternative: Steep grade on Earlwood Crescent – On and off road: New Infrastructure through parklands	– RIC approval had not been achieved
2003 Feb	– Wolli Creek side – On road and off road – Entirely on road – Rail line	– Wolli Creek side: Bicycle route along the south side of Wolli Creeks embankment – On road and off road: Off road through Illoura Reserve, on road to Turrella Station – Entirely on road: On road route from Bexley North Station to Turrella Station – Rail line: Bicycle route along the south side of the rail line	RTA proposed a route along the Wolli Creek embankment, 'Wolli Creek Pathfinders' proposed alternative routes as the RTA proposal impacted the health of the land.	– Wolli Creek side: May impact on the health of the land – On road and off road: Infrastructure requirements through Illoura Reserve – Entirely on road: Steep grade on Slade Road and Darley Road – Rail line: Disruption of private properties	– Significant community approval concerns were raised over impacts on Wolli creek
2003 Mar	– Rail corridor – Rail corridor modified – Park route – On road – Road/Rail	– Rail corridor: Bicycle route along the south side of Wolli Creeks embankment – Rail corridor modified: Bicycle route along the south side of Wolli Creeks embankment – Park route: Route through Wolli Creek Valley – On road: On road route north of Wolli Creek, crossing Bardwell Park Station and continuing on road on the south side of Wolli Creek – Road/Rail: Route along the rail line from Bexley North to Bardwell Park Stations then on road towards Turrella Station	Further investigation into alternative routes led to a preferred route that was both on road and in the rail corridor.	– Rail corridor: May impact on the health of the creek – Rail corridor modified: May impact on the health of the creek – Park route: May impact on the health of the creek – On road: Steep grade on Bray Ave – Road/Rail: Relocation of RIC infrastructure	– Bicycle NSW opposed on-road option
2003 Apr	– Rail corridor – Rail corridor modified – Park route – On road – Road/park – Road/rail	– Rail corridor: Bicycle route along the south side of Wolli Creeks embankment – Rail corridor modified: Bicycle route along the south side of Wolli Creeks embankment – Park route: Route through Wolli Creek Valley – On road: On road route north of Wolli Creek, crossing Bardwell Park Station and continuing on road on the south side of Wolli Creek – Road/Park: On road route north of Wolli Creek then off road through the north side of the Wolli Creek Valley until conecting to Turrella Station – Road/Rail: Route along the rail line from Bexley North to Bardwell Park Stations then on road towards Turrella Station	Further investigations towards a preferred route were undertaken. A hybrid (option F) was selectedas the preferred option for further planning.	– Rail corridor: May impact on the health of the land – Rail corridor modified: May impact on the health of the creek – Park route: May impact on the health of the land – On road: Steep grade on Bray Ave – Road/Park: New infrastructure through park – Road/Rail: Relocation of RIC infrastructure	– Concerns of stakeholders including Bicycle NSW, Friends of Wolli Creek and RIC were considered in route investigation
2004 Mar	– Rail Corridor – Road/Rail – Road/Rail – Road/Rail – On road	– Rail corridor: Bicycle route along the south side of Wolli Creeks embankment – Road/Rail: Route along the rail line from Bexley North to Bardwell Park Stations then on road towards Turrella Station – Road/Rail: Route along the rail line from Bexley North to just before Bardwell Park Station then on road towards Turrella Station – Road/Rail: Route along the rail line from Bexley North to Bardwell Park Stations then on road towards Turrella Station – On road: On road route north of Wolli Creek, crossing Bardwell Park Station and continuing on road on the south side of Wolli Creek	Geotech investigation found that the Wolli Creek embankment was unstable. Further investigations towards alternative routes were undertaken yet no preferred route was agreed.	– Rail corridor: May impact on the health of the creek – Road/Rail: New infrastructure over rail corridor – On road: Steep grade on Bray Ave	– Concerns of stakeholders including Bicycle NSW, Friends of Wolli Creek and RIC were considered in route investigation

Table 4.01 - Summary of route investigation





5.0 M5 East Linear Park

5.1 M5 EAST LINEAR PARK OVERVIEW

The M5 East Linear Park consists of open space adjacent to the north and south of the M5 between Bexley North and Kingsgrove. The open space varies in width along the route and is typically 10 to 30m in width along its route on both sides of the M5. The park consists of a shared path along the length of the park on both sides of the M5. The M5 Linear Park contains of four underpasses which enables pedestrian and cycle connectivity across the M5.

Currently, a regional cycle route runs parallel to the M5 East Motorway on both the north and south providing good quality access for pedestrians and cyclists travelling from King Georges Road in the west to Bexley Road in the east. This route consists of a 3 meter wide shared path with lighting on north and south of the M5 along its extent. The M5 East Linear Park cycle way access to this route from the north is relatively good while access to the south is limited due to the large industrial lots and Wolli Creek channel providing barriers to the shared path. Access from the east is limited as there is lack of connections beyond Bexley Road towards the east. Connections to the M5 East Linear Park to the west exit via the improved pedestrian crossings at King Georges Road. Paths then continue west on the south side of the M5.

A section of the M5 Linear Park ATN will be temporarily removed as part of the construction of the New M5 western tunnel entry and exit portals. The ATN network will be reinstated after the construction works to its equivalent condition.

A copy of the design drawings for the new sections of 3m shared pathway delivered by the King Georges Road Interchange Upgrade Project and the New M5 Project are included as appendix 05.



King Georges Road Overpass



M5 East Cycleway



Wolli Creek Channel alongside the M5 East Motorway



Kingsgrove Avenue Reserve



Legend

Regional Route - Council

1. King Georges Road Overpass
2. M5 East Cycleway
3. Wolli Creek Channel
4. Kingsgrove Avenue Reserve

NOTE: 'Regional Route - Council' include both existing and planned routes

Figure 5.01 - M5 East Linear Park Overview
Source: Roads and Traffic Authority NSW 2004

5.2 KING GEORGES ROAD INTERSECTION

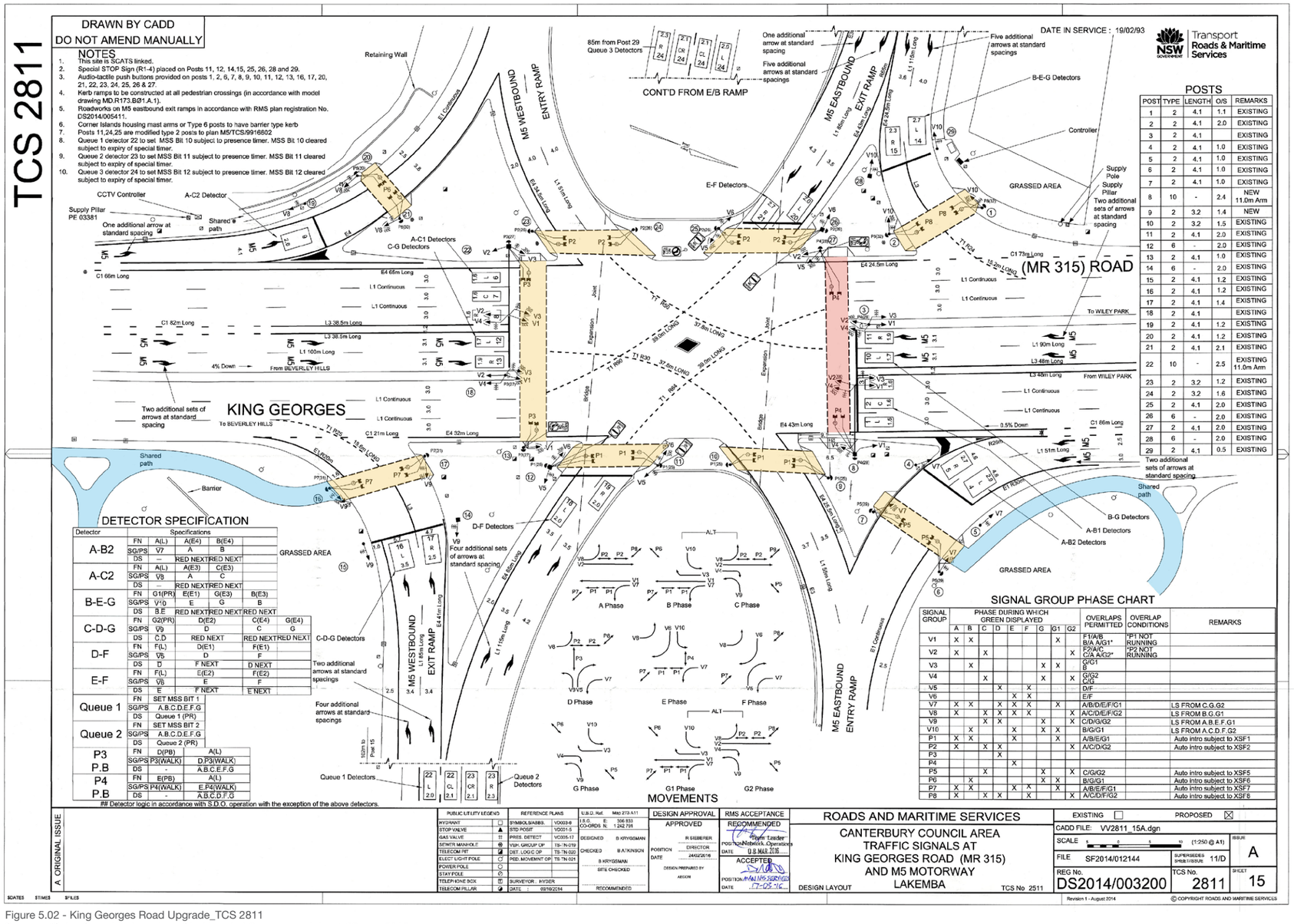
The Westconnex Stage 2 M5 King Georges Road Interchange Upgrade investigated options to improve the King Georges Road intersection for pedestrians and cyclists. This was addressed as part of the “Cyclist and Pedestrian Access Strategy: Part 2 Implementation”.

Westconnex completed a design review and feasibility assessment of the options presented in the EIS. An option to modify the signals at the intersection was also considered which included introducing a signal to the northern side of the intersection.

This option was accepted and the design for a modified signal intersection was further progressed. The approved design is shown in the following Figure 5.02.

It will enable a pedestrian or cyclist to cross from the north western corner to the north eastern corner of King Georges Road during peak periods within 1 minute of activating the crossing request. The study notes that the validity of this option is predicated on low pedestrian and cyclist use in peak periods in order not to compromise the vehicle traffic efficiency at the intersection.

The TCS 2811 option is a better solution than the proposals put forward in the EIS which will result in an improved outcome for pedestrians and cyclists. This scope of work has been included in the King Georges Road Interchange Upgrade Project, with the work currently in progress. The revised traffic intersection will be completed and operational by the end of February 2017.



POST	TYPE	LENGTH	O/S	REMARKS
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3	2	4.1		EXISTING
4	2	4.1	1.0	EXISTING
5	2	4.1	1.0	EXISTING
6	2	4.1	1.0	EXISTING
7	2	4.1	1.0	EXISTING
8	10	-	2.4	NEW 11.0m Arm
9	2	3.2	1.4	NEW
10	2	3.2	1.5	EXISTING
11	2	4.1	2.0	EXISTING
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21	2	4.1	2.1	EXISTING
22	10	-	2.5	EXISTING 11.0m Arm
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24	2	3.2	1.6	EXISTING
25	2	4.1	2.0	EXISTING
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27	2	4.1	2.0	EXISTING
28	6	-	2.0	EXISTING
29	2	4.1	0.5	EXISTING

Detector		Specifications			
A-B2	FN	A(L)	A(E4)	B(E4)	
	SG/PS	V7	A	B	
	DS	–	RED NEXT	RED NEXT	
A-C2	FN	A(L)	A(E3)	C(E3)	
	SG/PS	V8	A	C	
	DS	–	RED NEXT	RED NEXT	
B-E-G	FN	G1(PR)	E(E1)	G(E3)	B(E3)
	SG/PS	V10	E	G	B
	DS	B,E	RED NEXT	RED NEXT	RED NEXT
C-D-G	FN	G2(PR)	D(E2)	C(E4)	G(E4)
	SG/PS	V9	D	C	G
	DS	C,D	RED NEXT	RED NEXT	RED NEXT
D-F	FN	F(L)	D(E1)	F(E1)	
	SG/PS	V5	D	F	
	DS	D	F NEXT	D NEXT	
E-F	FN	F(L)	E(E2)	F(E2)	
	SG/PS	V6	E	F	
	DS	E	F NEXT	E NEXT	
Queue 1	FN	SET MSS BIT 1			
	SG/PS	A,B,C,D,E,F,G			
	DS	Queue 1 (PR)			
Queue 2	FN	SET MSS BIT 2			
	SG/PS	A,B,C,D,E,F,G			
	DS	Queue 2 (PR)			
P3 P.B	FN	D(PB)	A(L)		
	SG/PS	P3(WALK)	D,P3(WALK)		
	DS	-	A,B,C,E,F,G		
P4 P.B	FN	E(PB)	A(L)		
	SG/PS	P4(WALK)	E,P4(WALK)		
	DS	-	A,B,C,D,F,G		

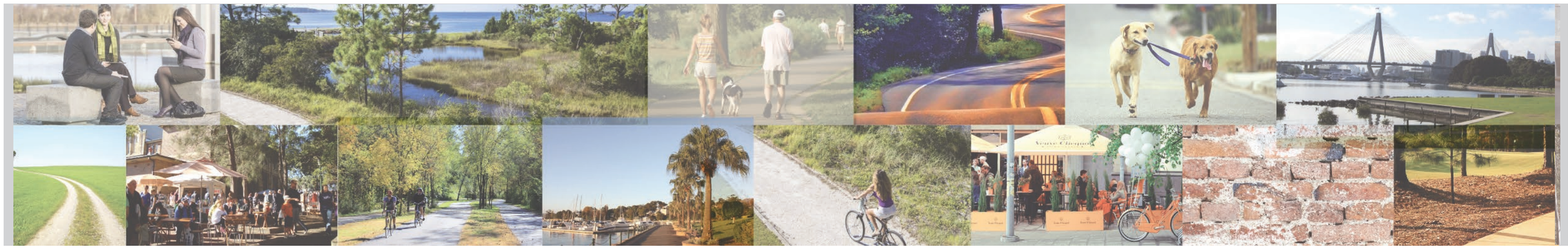
Detector logic in accordance with S.D.O. operation with the exception of the above detectors.

SIGNAL GROUP	PHASE DURING WHICH GREEN DISPLAYED								OVERLAPS PERMITTED	OVERLAP CONDITIONS	REMARKS
	A	B	C	D	E	F	G	G1 G2			
V1	X	X						X	F1A/B B/A A/G1*	*P1 NOT RUNNING	
V2	X		X					X	F2/A/C C/A A/G2*	*P2 NOT RUNNING	
V3		X					X	X	G/G1 B		
V4			X				X	X	G/G2 C/G		
V5				X		X			D/F		
V6					X	X			E/F		
V7	X	X			X	X		X	A/B/D/E/F/G1		LS FROM C,G,G2
V8	X		X	X	X	X		X	A/C/D/E/F/G2		LS FROM B,G,G1
V9			X	X			X	X	C/D/G/G2		LS FROM A,B,E,F,G1
V10		X			X		X	X	B/G/G1		LS FROM A,C,D,F,G2
P1	X	X			X			X	A/B/E/G1		Auto intro subject to XSF1
P2	X		X	X				X	A/C/D/G2		Auto intro subject to XSF2
P3				X							
P4					X						
P5			X				X	X	C/G/G2		Auto intro subject to XSF5
P6		X					X	X	B/G/G1		Auto intro subject to XSF6
P7	X	X				X		X	A/B/E/F/G1		Auto intro subject to XSF7
P8	X		X	X		X		X	A/C/D/F/G2		Auto intro subject to XSF8

Legend

- Proposed Pedestrian / Cycle Crossing
- Existing Pedestrian / Cycle Crossing
- Existing Pedestrian / Cycle Shared Path

Figure 5.02 - King Georges Road Upgrade_TCS 2811
Source: KGRIU Cyclist & Pedestrian Strategy Part 2: Implementation V02 may 2016





6.0 Conclusion

6.1 CONCLUSION

This report has reviewed the existing ATN network route plans, existing ATN routes and the proposed routes as part of WestConnex New M5. A condition of this review is that there is not a reduced level of cycle and pedestrian infrastructure. With regards to the condition this review has found that there is not a reduced level of cycle and pedestrian infrastructure and specifically:

- There is an improved level of pedestrian and cycling infrastructure at St Peters Interchange including construction of a number of shared and separated paths
- There is a similar level of pedestrian and cycling structure in Kingsgrove/Bexley North after the reinstatement of the M5 East Linear Path northern shared path
- There is no substantive change to the pedestrian and cycling infrastructure along the “M5 East Green Link”

The following sections summarises the outcomes of this review on the impacts on pedestrian and cycling infrastructure as well as identification of proposed changes to improve the connectivity of the proposed New M5 pedestrian and cycling network to existing and planned local and regaional networks.

St Peters Interchange

The current ATN network is limited in the vicinity of the SPI. The SPI will add connectivity to the former landfill, a site that currently has no connectivity and will provide further connectivity, to the south through the future Sydney Gateway proposal. After completion of these two projects there will be a link from the airport and Alexandra Canal ATN in the south to Sydney Park and Bourke St Cycleway in the north.

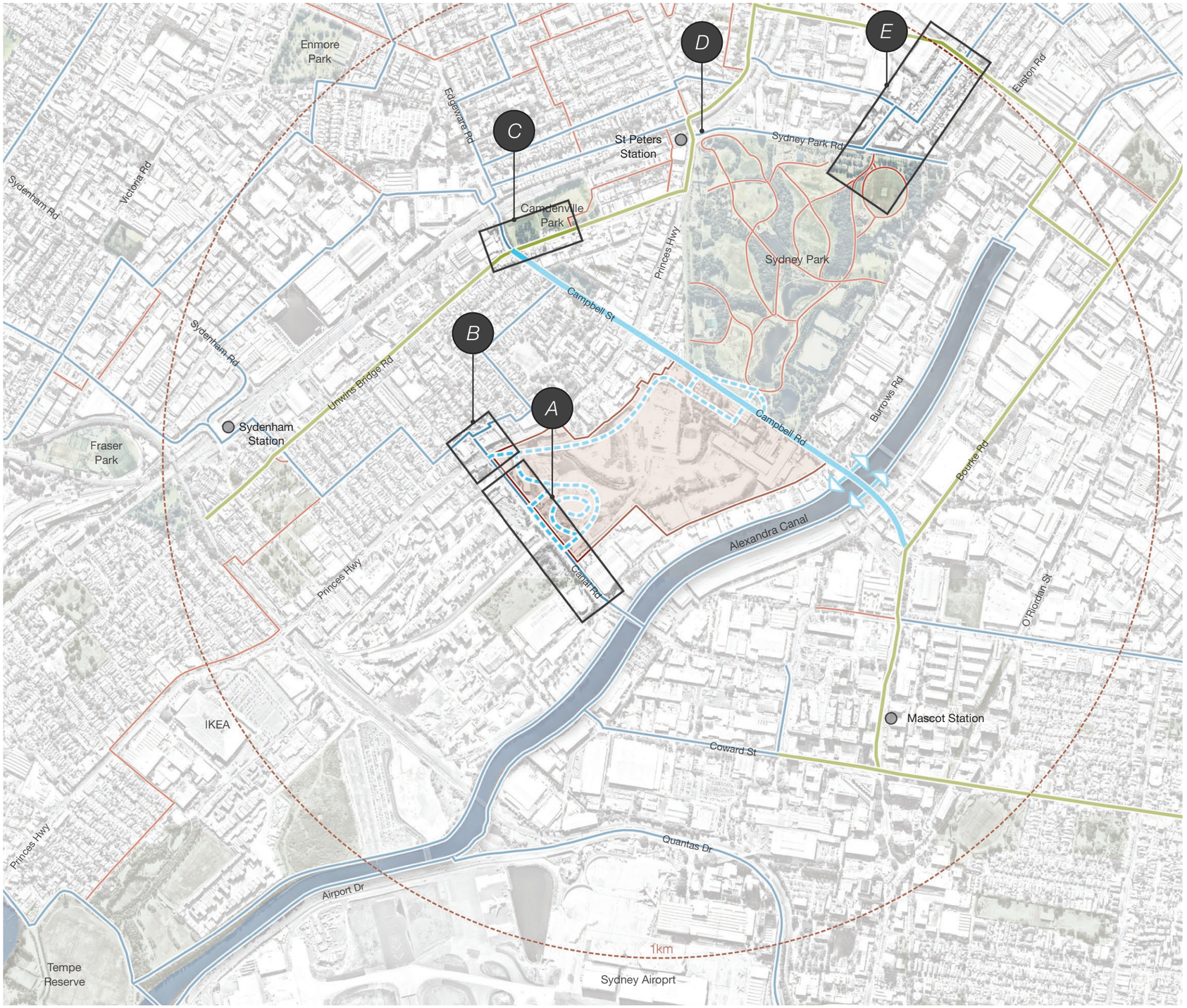
As well as key regional level connectivity, there is enhanced local ATN connectivity to be provided as part of the SPI. This is outlined in the table below.

A number of connection links for further investigation were identified for the ATN at

Element	Description	Length
Campbell Road cycle path	Separated cycleway along Campbell Road between Bourke Street and Unwins Bridge Road	1300 m
Alexandra Canal Bridge	New bridge providing connectivity between Mascot and St Peters and Sydney Park	100 m
Bourke Road separated cycle path	Shared cycleway along Bourke Road between Campbell Road and Church Ave	650 m
Campbell Road Landbridge	Improved connectivity into Sydney Park over Campbell Road	20-50 m
SPI Shared path	Behind properties 178-310 to Princes Highway	750 m
SPI Shared path	Along Canal Road linking to future Sydney Gateway ATN	500 m
Euston Road shared path (subject to further discussion with CoS)	Shared path along Euston Road between Campbell Road and Sydney Park Road	700 m
Sydney Park Road shared path	Shared path along Sydney Park Road between Mitchell Road and Euston Road	250m
New signalised intersection	Providing improved connectivity at Euston Road and Campbell Street	N/A
New signalised intersection replacing 2 lane round-about	Providing improved connectivity at Euston Road and Sydney Park Road	N/A
New signalised intersection replacing zebra crossing	Providing improved connectivity at Campbell St and St Peters St	N/A

Option		Description	Next Steps
A	Airport Connection	Connectivity to future Sydney Gateway	Develop concept as part of Sydney Gateway & Canal Road investigated as part of B51 planning condition
B	Sydenham Connection	Connecting St Peters Interchange to the residents of Sydenham and Sydenham Station across Princes Highway	Develop concept as part of B51 planning condition
C	Enmore & Marrickville connection	Connecting end of Campbell Street, across railway and south west towards Cooks River	Develop concept as part of B51 planning condition
D	Newtown Connection	King Street Gateway & Newtown link	Develop concept as part of King Street Gateway
E	A2MP Connection	Connecting Sydney Park Road to the beginning of the Alexandria to Moore Park Upgrade	Develop concept as part of B51 planning condition

The following figure shows the connectivity gaps which are to be addressed in planning condition B51 and as part of the King Street Gateway.



Legend

- Connectivity Gaps to be addressed in B51
- WCX Commitments - Separated Cycleway
- WCX Commitments - Shared Cycleway
- Regional Route - Inner City
- Regional Route - Council
- Local Route - Council
- St Peters Interchange Boundary
- 1km Boundary from Interchange
- A — Airport Connection (indicative)
- B — Sydenham Connection
- C — Enmore & Marrickville Connection
- D — Newtown Connection
- E — A2MP Connection

NOTE: 'Regional Route - Council' include both existing and planned routes

Figure 6.01 - Connectivity gaps to be addressed in B51

The ATN at SPI plays an important component in linking concurrent and future ATN projects which are planned including:

- City of Sydney Alexandra Canal path
- King St Gateway ATN network
- Sydney Gateway path network
- Alexandria to Moore Park path network

M5 Green Link (Mascot to Bexley North)

A review of the M5 Green Link has been undertaken. This review found that:

- The eastern section along Alexandra Canal from Coward Street to Marsh Street was constructed including a link to Tempe Recreational Reserve in the south
- The central eastern section was not constructed between Princes Highway and Turella as considerable re-development was under construction (e.g. Discovery Point at Wolli Creek) and this infrastructure was expected to be completed as part of the re-development. However this infrastructure was not constructed as part of the re-development.
- The central western section between Turella and Bexley North was not constructed. The original preferred route along the rail line was not achievable due to a combination of technical cost and timing constraints. Alternate routes were considered including a route along Wolli Creek which was not considered acceptable by sections of the local community due to its potential impacts on the health of the Wolli Creek bushland reserve. A large number of on-road routes were considered but each of these routes included constraints which limited suitability including steep terrain and/or narrow road carriageways
- The western section along the M5 Linear Park between Bexley North and Kingsgrove was constructed as a shared path on both sides of the existing M5.

The key existing impediment to the M5 Green Link is the section between Turella and Bexley North. A number of recent strategies, including by Council and RMS, have considered sections of this route but are not considered to have fully resolved the constraints or provided a regional 'Green Link' connection.

This review found that the M5 Green Link between Turella and Princes Highway is an important link in a regional ATN, as it links key destinations and existing ATN routes. This review has identified a number of issues in the historical implementation of the M5 East Green Link. All of these historical issues remain to date as do the various preferences and requirements of landowners and stakeholders regarding the preferred route.

Resolution of these issues and determination of the preferred route would require more time and resources due to the complexity of the route planning, the land ownership, the local site factors and the preferences of the various landowners and stakeholders.

As the M5 East Green Link is an important regional link it is recommended that further options be developed and a preferred route is identified. The key step for this to occur is discussions with landowners and stakeholders. It is noted that while there may be differences in the preferred route alignment between stakeholders, there is general agreement on the requirement for the M5 East Green Link as in important component of regional ATN infrastructure.

A process to identify and further develop the preferred option for the M5 East Green Link is outlined below

- Meet with key landowners, particularly Railcorp, NPWS, local Councils and Discovery Point development as well as local Councils to obtain their current position on co-location of regional ATN infrastructure within their land
- Identify and meet with relevant stakeholders and their key contacts (including Bicycle NSW, community groups such as the Wolli Creek Preservation Society, local residents) and obtain their current position on the development of the regional ATN infrastructure
- Document key issues and outcomes of stakeholder and landowners
- Develop route options based on stakeholder and landowner consultation
- Undertake consultation with landowners on the route options focussing on the proposed routes on their land
- Shortlist route options based on discussions with landowners and present shortlisted route options to all relevant stakeholders to determine preferred routes
- Refine shortlisted route options based on discussion with stakeholders and undertake further focussed consultation with relevant landowners as required
- Document and report on outcomes of route planning options and preferred route option

M5 East Linear Park (Kingsgrove to Bexley North)

There are temporary impacts associated with construction due to the impacts on sections of the shared path along the M5 Linear Path. However these impacts are minor due to the alternatives available including use of alternate shared paths. Post construction, the existing level of cyclist and pedestrian will be maintained after the re-construction of the existing shared paths to the same standards as existing shared paths.

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APPENDIX

1. Stakeholder Workshop Meeting Minutes - WestConnex Stage 2: Planning Conditions B50 Pedestrian and Cycle Implementation Strategy.
2. Stakeholder Workshop Meeting Presentation
3. Sample notifications of road and pathway modifications around SPI
4. Safety Audit
5. M5 Linear Park - Shared Path Upgrade

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MCGREGOR
COXALL

APPENDIX 01

WCX Stage 2 – Planning Condition B50 – Pedestrian and Cycle Implementation Strategy



Roads & Maritime

Name of meeting:	WestConnex Stage 2 - Planning Conditions B50 Pedestrian and Cycle Implementation Strategy
Location of meeting:	City of Sydney Council, Town Hall House
Meeting facilitator:	Grant Sutton, Project Manager, RMS
Date:	18 November 2016
Attendees:	Bryony Cooper (BC), CoS Elise Webster (EW), CoS Rene Chau (RC), Canterbury Bankstown Council Simon Lowe (SL), Inner West Council Michael Lee (ML), Bayside Council Ray Rice (RR), Bicycle NSW Leon Paap (LP),RMS Wayde Hazelton (WH), RMS Grant Sutton (GS), RMS David Knights (DK), McGregor Coxall Logan Pennington (LoP), McGregor Coxall
Subject:	Review of Pedestrian and Cycling Network and M5 East Green Link

	Meeting Minutes	**ACTION**
1	The Review of the WestConnex and Council existing and / or proposed cycleways and routes were presented and the previous state of planning for the M5 East Green Link (refer attached presentation) Comments: • A comment was received on inclusion of Alexandra Canal and it was an agreed that this was an error that this was not included	DK to amend plans DK to include in next revision
2	**St Peters Interchange** Refer attached presentation for information presented on overall area and existing, planned and proposed New M5 Routes. It was noted that there was substantial redevelopment occurring and connectivity to key areas was discussed. • Discussion was held on the provision of facilities along the Sydney	Noted

	Meeting Minutes	ACTION
	Gateway project • The loss of connection along Qantas Drive was discussed and raised as a major issue. Councils and RMS support keeping the ATN link on Qantas Drive (BC/SL/RR/ML) • Discussion was held on Euston Rd and the provision of ATN infrastructure along Euston Rd and street tree planting. It was noted that there were ongoing discussions about Euston Rd with City of Sydney which impacted on the proposed ATN along Euston Rd (BC) • Alexandra Canal Bike Paths: Intended for eastern side to be completed by 2019 and western side was to be implemented by ongoing projects as they occurred (BC) • The shared path along the northern boundary of the St Peters Interchange was supported, and it was noted that the safety (CPTED) for users of the shared path, width of the path and links at the south western end were the main outstanding concerns that needed to be addressed (SL/BC)	DK, GS to confirm Noted. Noted, DK to ensure consistency. Noted, allowance for connectivity to be provided. Noted. DK/GS to investigate
3	**M5 Linear Park** • Connectivity across King Georges Rd was raised as an issue and the requirement to minimise waiting times for cyclists and pedestrians to cross the interchange (RR) • Bridge across King Georges Rd was discussed (RR). It was noted that a bridge was not currently proposed as part of the KGRI upgrade works (DK/GS) • A query was raised about the existing widths and lighting of the shared paths in the linear park and whether they met current standards (RR) • A query was raised about the proposed widths and lighting of the shared paths to be replaced in the linear park and what standards were to be provided (RR)	DK to further investigate DK to investigate DK to investigate
4	**M5 East Green Link** WH discussed his latest strategy as part of the principle bicycle network planning. Noted: • The M5 Green Link was noted as an important link between south-western Sydney and the airport (RR, WH) • Canterbury Council has proposed an on-road route along the north side, but that this was only considered as a local route/connection (RC) • There was discussion about the route and the preferred route and potential options (All) • Bicycle NSW indicated that there was a preference for an important regional route such as this to be an off road route, as direct as possible (RR) • It was noted that previous historical concerns about impacts on Wolli Creek may have changed with time due to improvements in	DK to include comments in report.

	Meeting Minutes	ACTION
	construction approaches • It was noted that alternate designs to allow simpler construction along the rail corridor could make the rail option simpler and more feasible • It was noted that at the western end of the route the rail corridor was generally preferred	
5	Further Actions: • RMS to finalise and issue B50 report • RMS to incorporate comments and to further develop concepts as part of B51 report	DK/GS GS

APPENDIX 02

M5 East Green Link Presentation

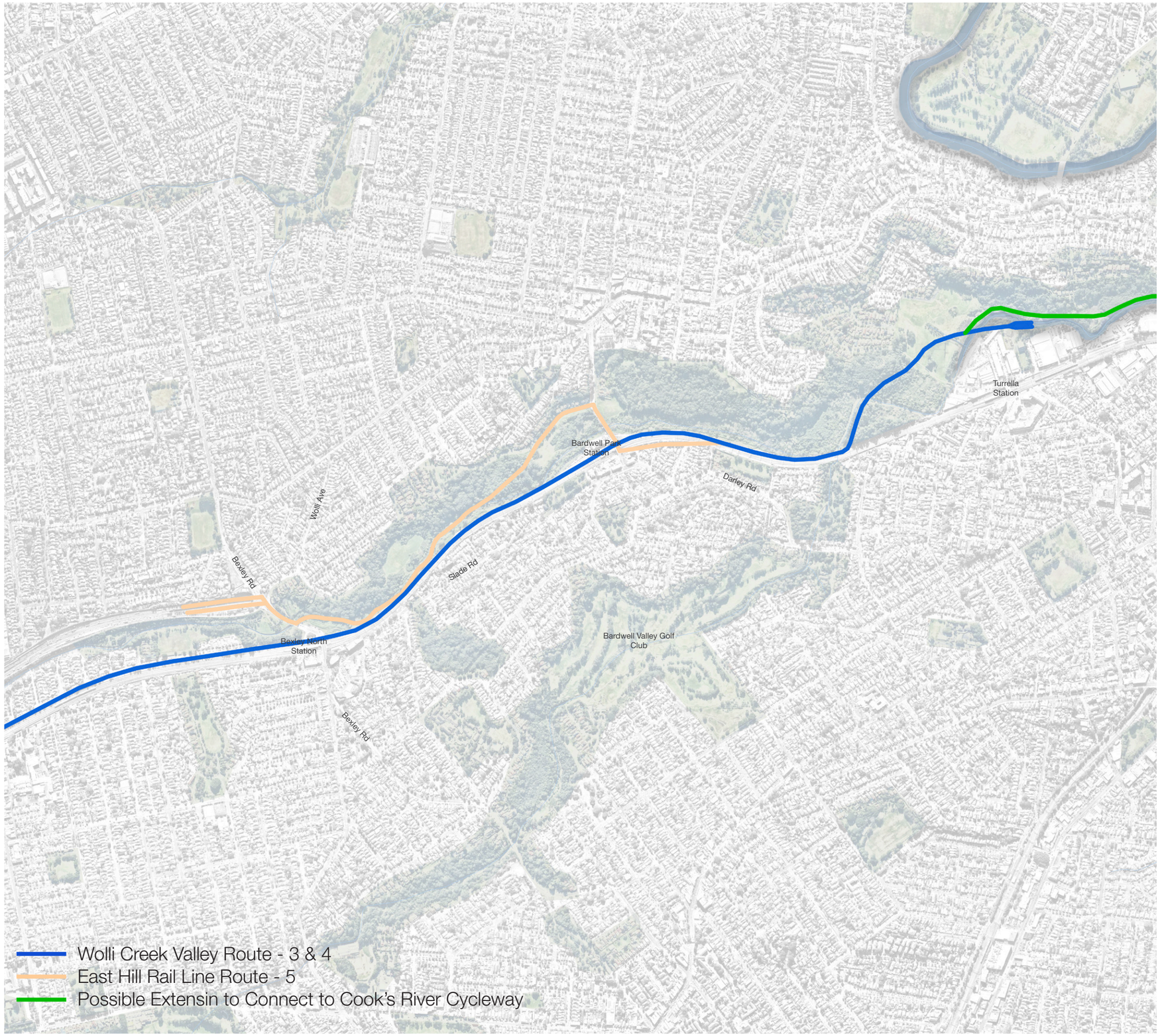


M5 EAST GREEN LINK ACTIVE TRANSPORT NETWORK

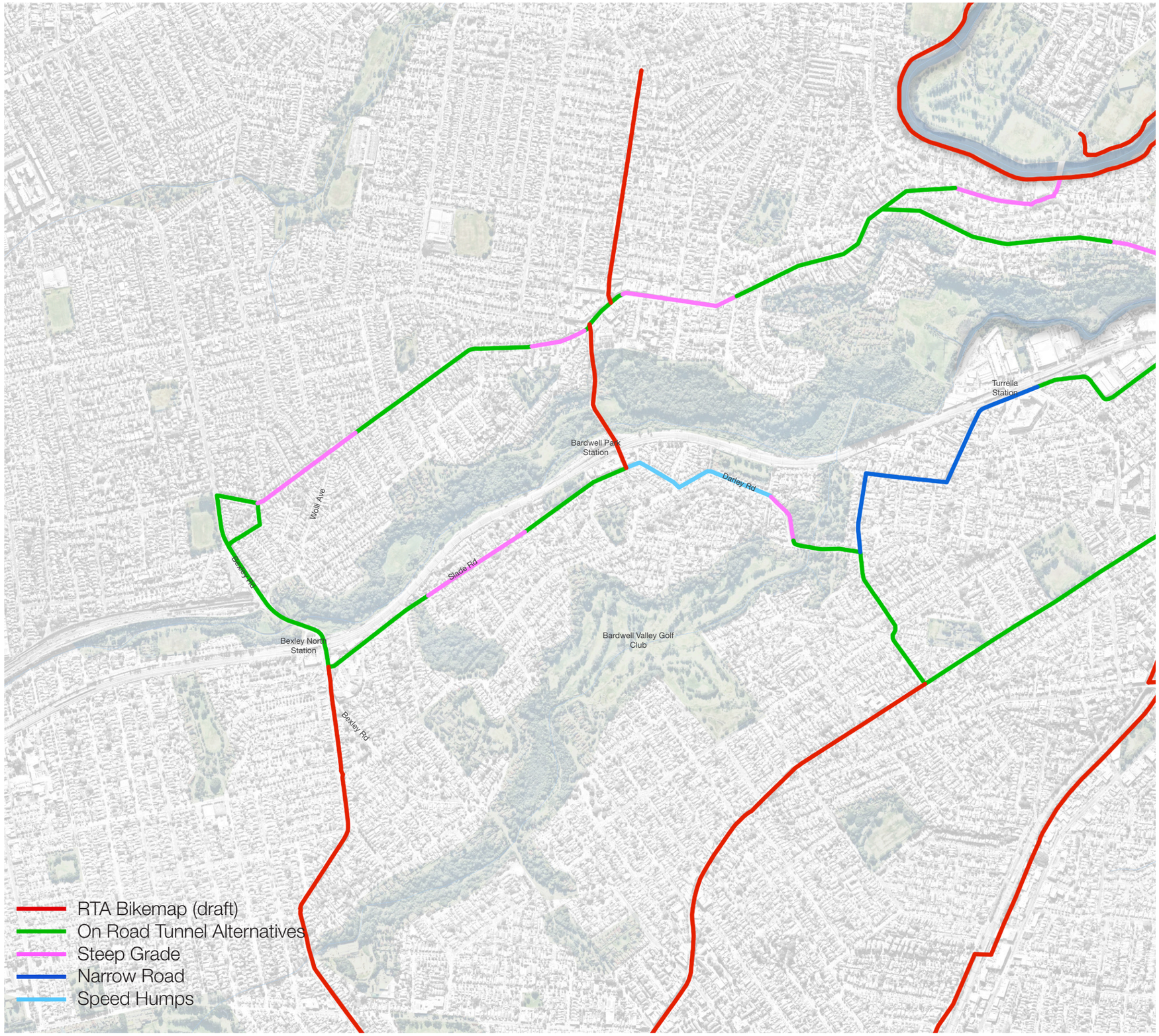
Workshop

18.11.2016

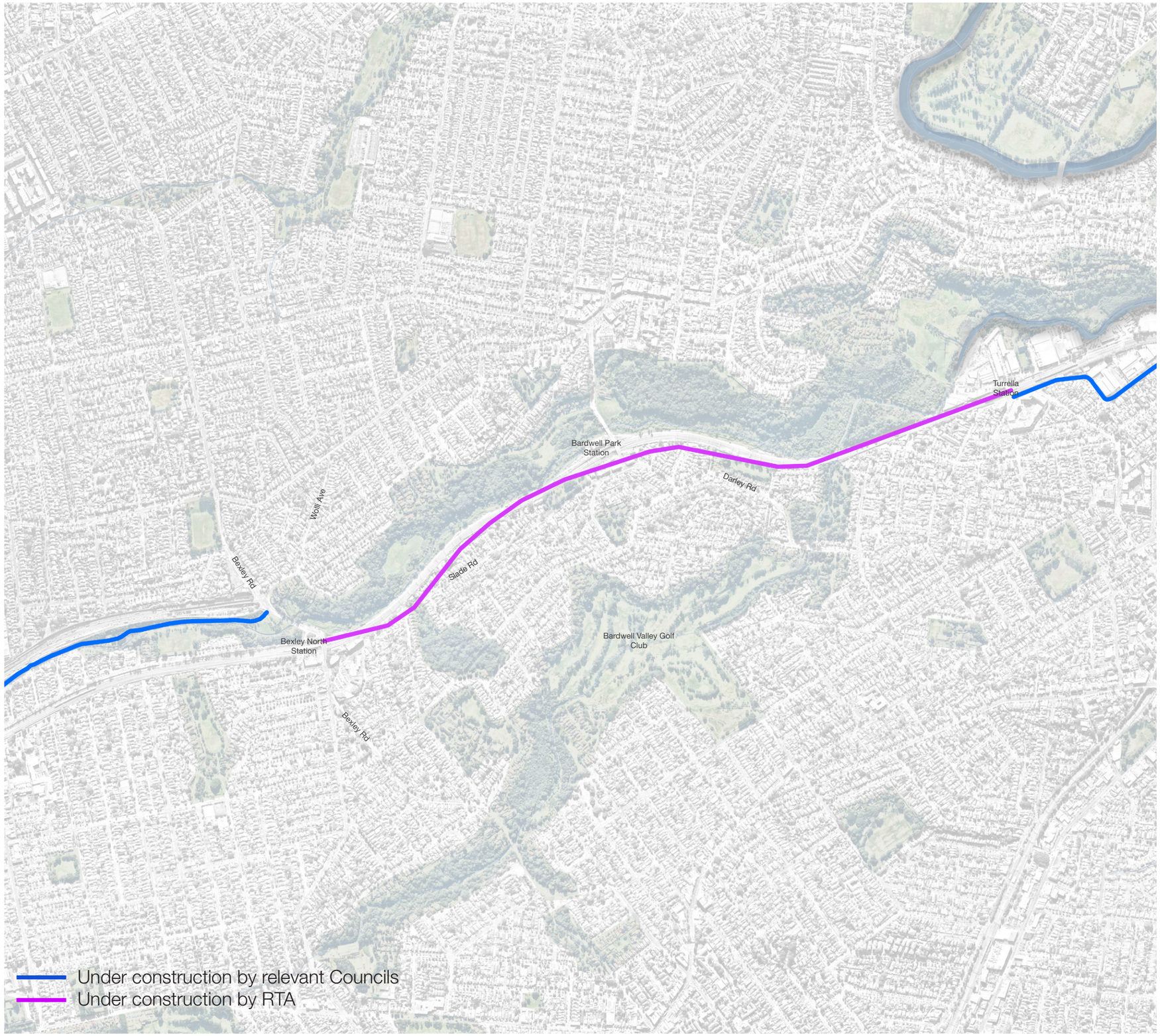
M5 East Motorway Bicycle Planning Report 1994



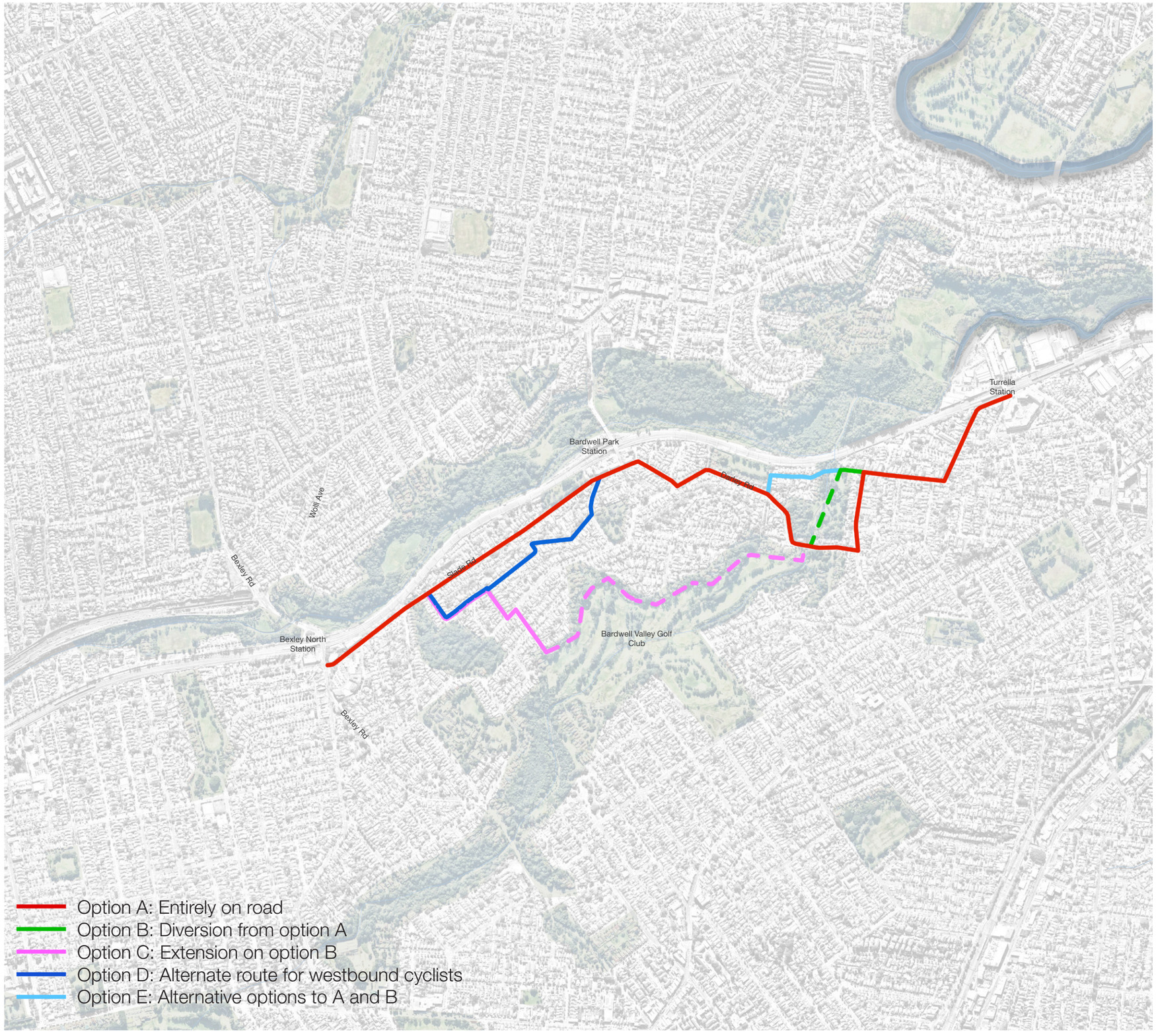
M5 East Motorway Bicycle Planning Report 1994



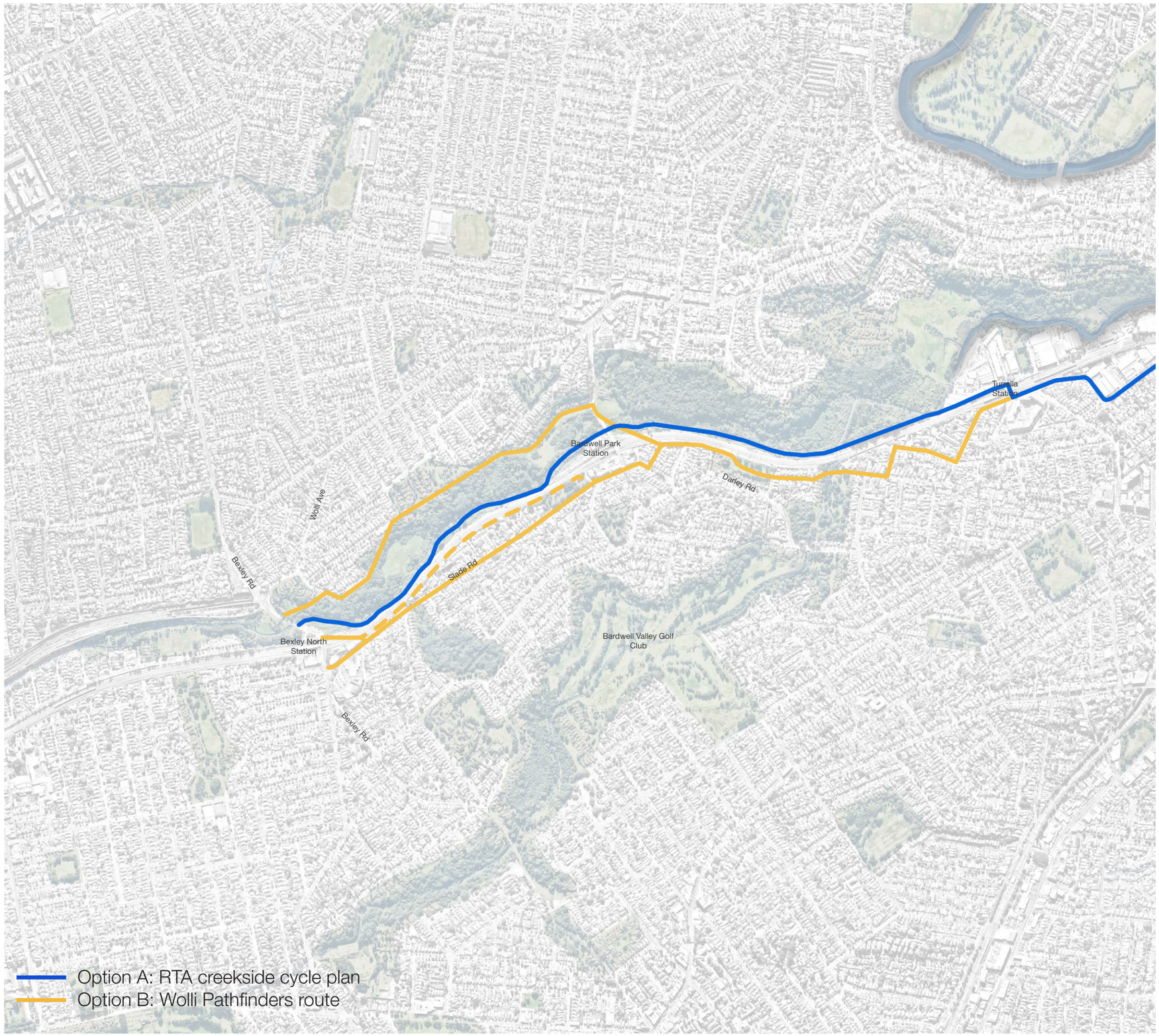
M5 East Cycleways
August 2001



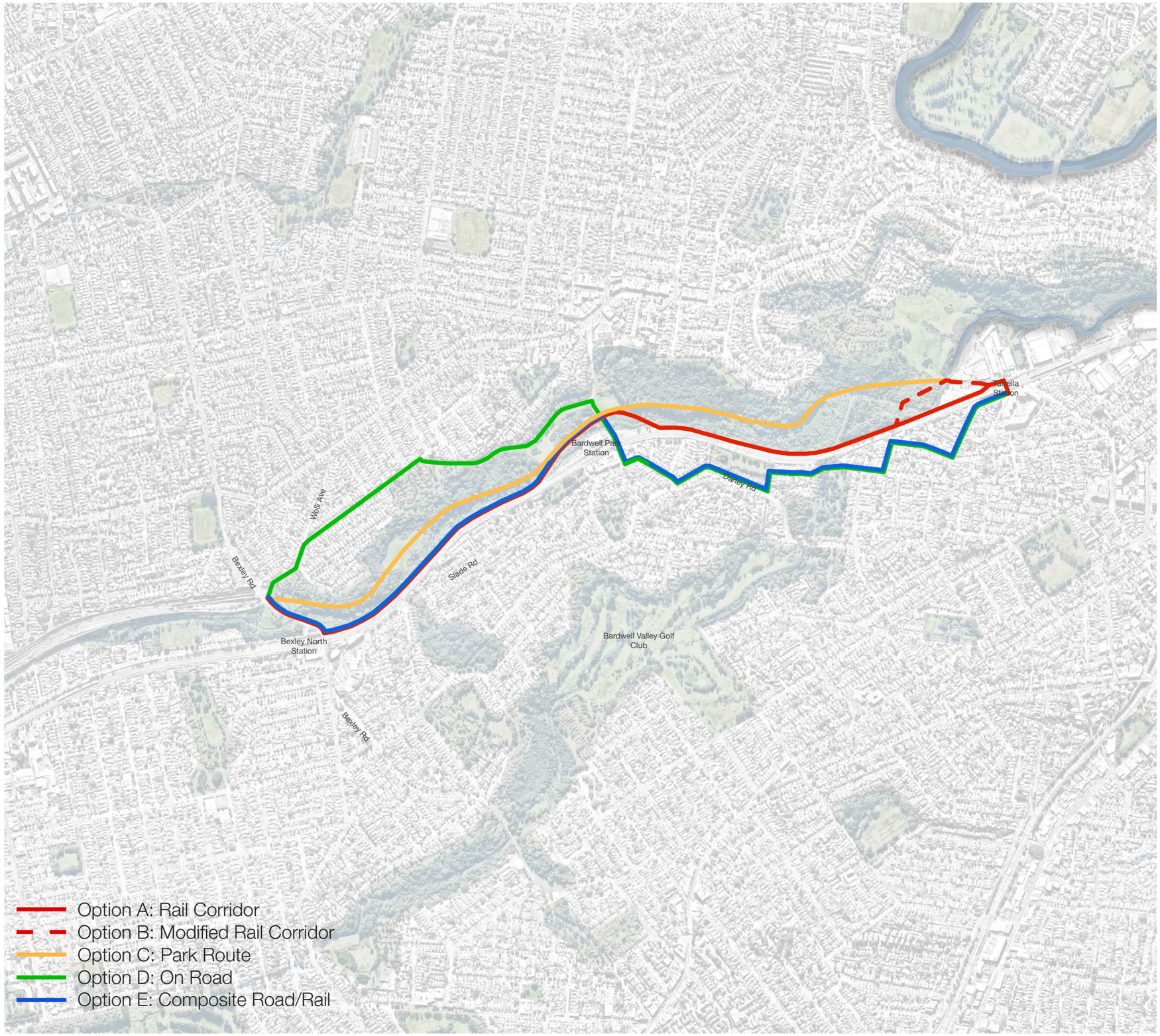
M5 East Cycleways
Options A-E
July 2002



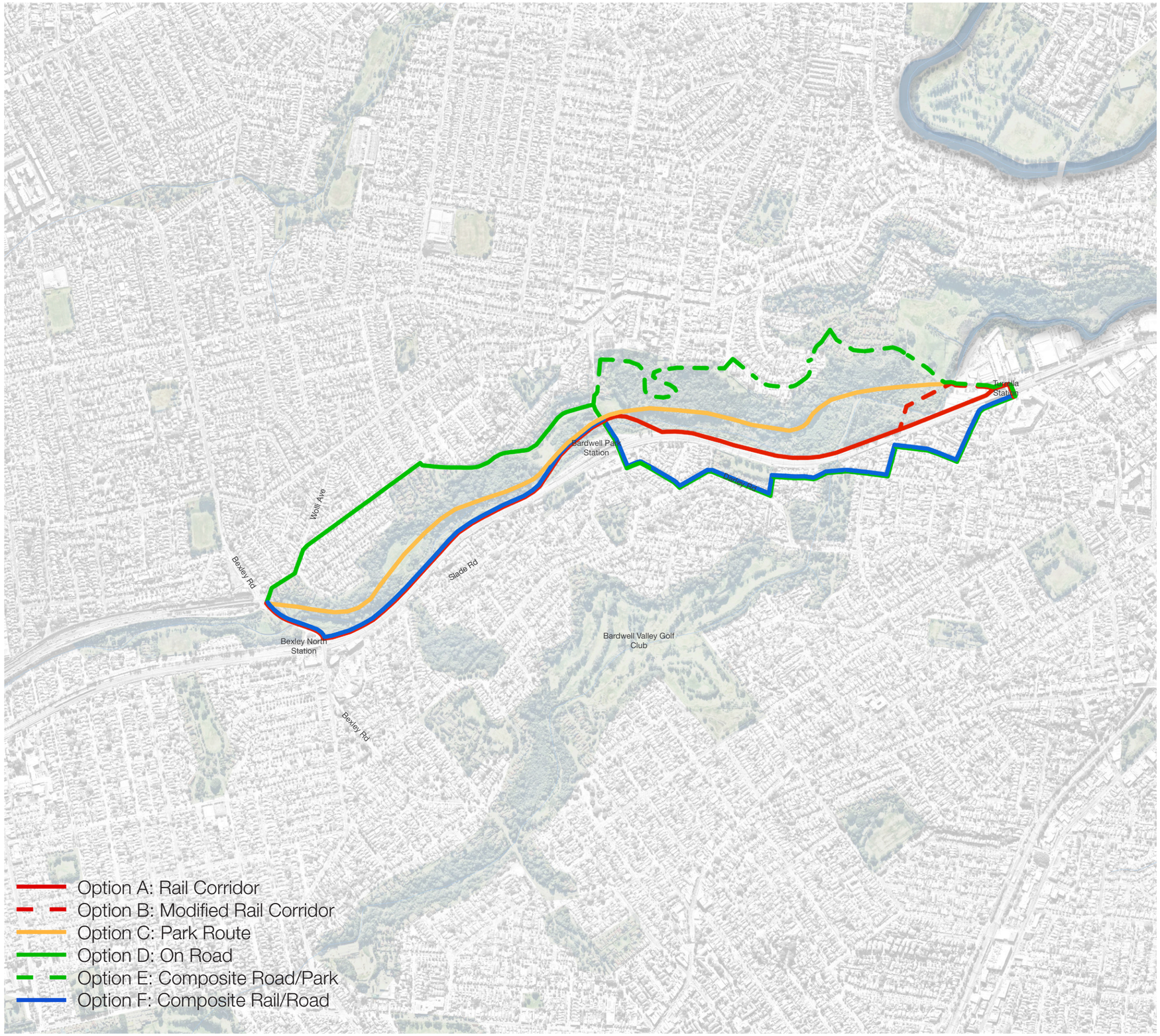
Bush, bikes & bitumen February 2003



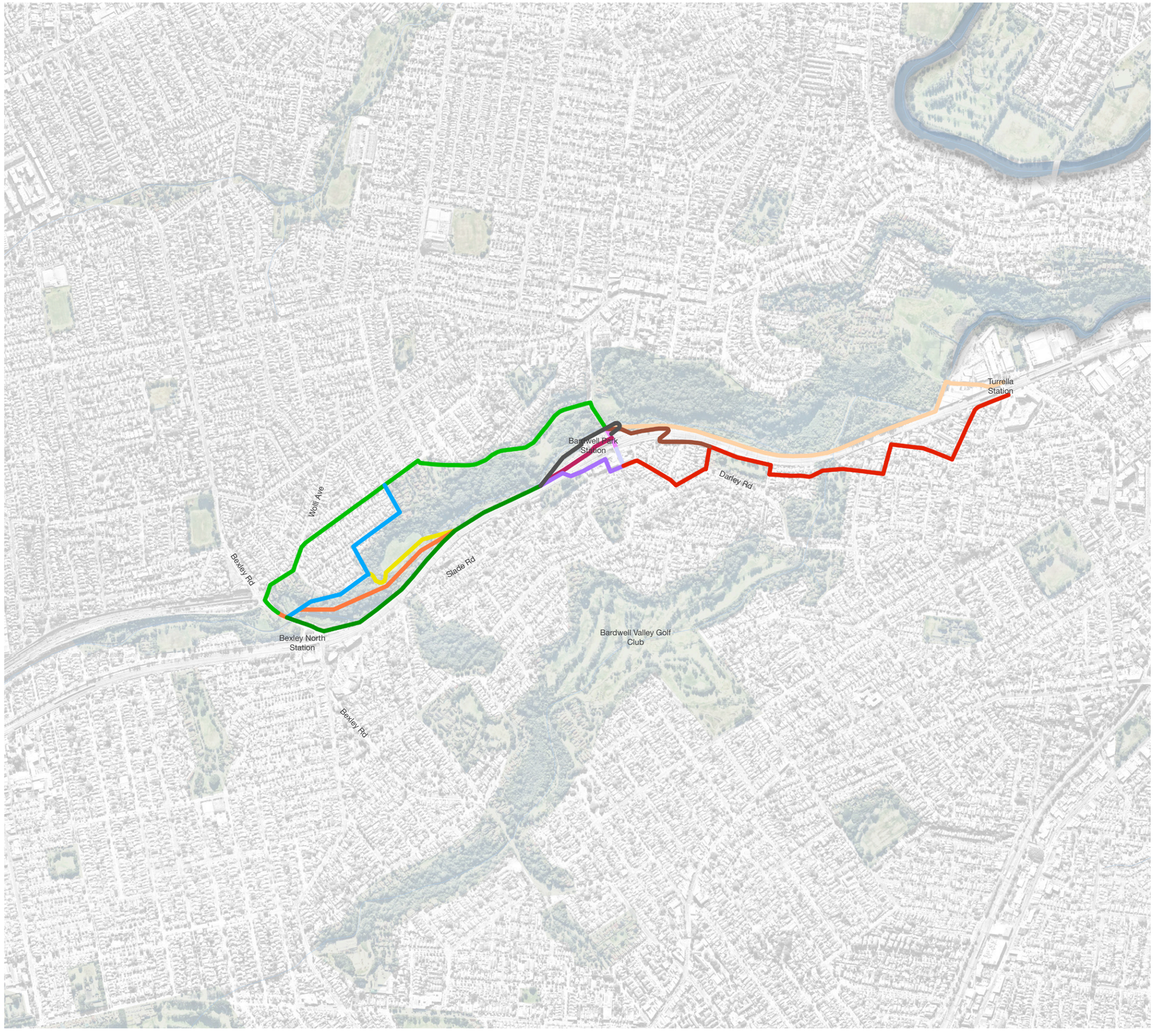
M5 East Cycleways
March 2003



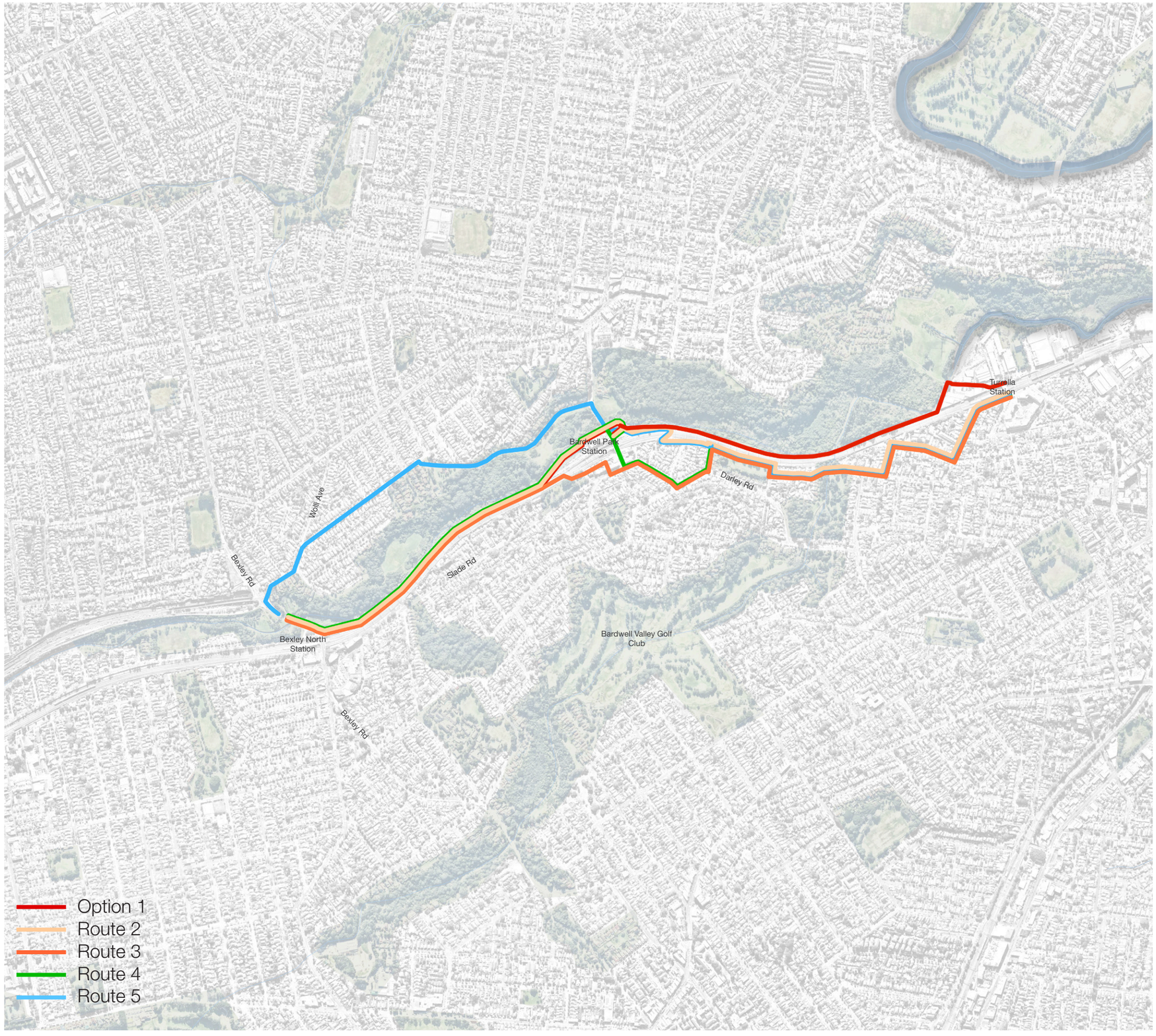
Bexley North to Turrella Cycleway April 2003



Turella Cycleway Options Assessment March 2004



Turella Cycleway Options Assessment Preffered Options March 2004



M5 EAST GREEN LINK ACTIVE TRANSPORT NETWORK

Workshop

18.11.2016

APPENDIX 03

Sample Notifications of Pathway Modifications around SPI



WestConnex

Australian Government
BUILDING OUR FUTURE

NSW MAKING IT HAPPEN

WestConnex New M5 **Notification | March 2017**

21 March 2017

Night work on Euston Road, Alexandria

Work is underway to establish the New M5 construction site along **Euston Road between Sydney Park Road and Maddox Street**. The project is expected to be completed by the start of 2020. We will advise residents of upcoming night works on a regular basis. This notification provides a summary of night work expected to occur over **March and April.**

Due to high traffic volumes on Euston Road, certain construction activities need to occur at night to ensure the safety of workers and road users. Construction activities will include:

- Utility investigations to inform design for service relocations
- Installation of electrical conduits to prepare for the widening of Euston Road
- Upgrading the signalised intersection at Maddox Street to prepare for the widening of Euston Road
- Commence construction at the roundabout of Sydney Park Road and Euston Road in preparation for the new signalised intersection

Timing and work hours

The first period of night work is expected to start on **Monday 27 March** at both the Sydney Park roundabout and Maddox Street intersection and will occur intermittently over four nights between **7pm and 5am**, weather permitting.

The second period of night work is expected to start on **Wednesday 26 April** at both the Sydney Park roundabout and midway up Euston Road between Sydney Park Road and Maddox Street, and will occur intermittently over six nights (into May) between **7pm and 5am**, weather permitting.

A calendar outlining the expected dates of work, subject to weather conditions, is provided overleaf. We will contact you prior to night work commencing and let you know if there are changes to the dates.

Equipment for this work include trucks, lighting towers, cranes, tipper trucks, excavator, vacuum truck, concrete saw, plate compactor, light vehicles, generators, power tools and hand tools.

Minimising community impact

You may experience some noise during this work. Every effort will be made to minimise noise and light spill associated with this work by:

- implementing noise mitigation equipment such as eco barriers and noise blankets
- scheduling noisy work to take place earlier in the night where possible
- turning off equipment and vehicles when not in use
- using non-tonal reversing beepers on all machinery
- directing noise generating equipment and lights away from residential properties where possible

Traffic changes

Changed traffic conditions will be in place throughout this night time work and will include:

- temporary lane closures at the roundabout located at Sydney Park Road and Euston Road
- temporary closure of the northbound and southbound median lanes along Euston Road. Slow lanes will remain open.
- temporary removal of street parking along southbound lane of Euston Road and the Maddox Street intersection
- reduced speed limits

For more information
info@newm5.com.au
1800 660 248
westconnex.com.au

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- footpath closures with detours provided

Traffic control and signage will be in place to assist local residents and road users, to navigate through the changes. Access to streets and properties adjoining Euston Road will be maintained, and impacts to access will be reinstated each day.

For more information about the changed traffic conditions during this night work, including maps showing the closure location and detour routes, please **visit westconnex.com.au/NewM5**. If you have a question about this work, please **call 1800 660 248** and ask to speak to a member of the New M5 community engagement team or **email info@newm5.com.au.** Alternatively, please feel free to visit the New M5 Community Information Centre located at 27 Burrows Road, St Peters. The centre is open Monday to Friday, 9am – 5pm.

Calendar of upcoming night work

March

Mon	Tues	Wed	Thurs	Fri	Sat	Sun
		1	2	3	4	5
6	7	8	9	10	11	12
13	14	15	16	17	18	19
20	21	22	23	24	25	26
27	28	29	30	31		

April

Mon	Tues	Wed	Thurs	Fri	Sat	Sun
					1	2
3	4	5	6	7	8	9
10	11	12	13	14	15	16
17	18	19	20	21	22	23
24	25	26	27	28	29	30

Location of night work on Euston Road, Alexandria



First period of night work (over four nights)

Second period of night work (over six nights which could continue into May)

Any changes to this calendar will be communicated with nearby residents. If you would like to receive updates via email, please provide your email address to info@newm5.com.au

20 March 2017

Update – Road closure Campbell Street, St Peters

Further to our previous notifications, utilities adjustment work is being carried out to accommodate the widening of Campbell Street and Campbell Road. To facilitate this work, changed traffic conditions will be in place intermittently on Campbell Street, St Peters.

Traffic Changes

Location	Date and time	Traffic management
Campbell Street between Unwins Bridge Road and Princes Highway	**Saturday 25th March** between **7am and 6pm** Saturday 1 April between 7am and 6pm (if required). Every effort will be made to complete this work on Saturday 25th March.	• Full road closure • Access for local residents and businesses will be maintained. • Refer to **Map A** overleaf for the location and detour route

Traffic control and signage are in place to assist local residents, road users, pedestrians and cyclists navigate through the changes. Access to streets and properties will continue to be maintained under traffic control.

Work hours

Our working hours are generally between **7am and 6pm, Monday to Friday** and **8am and 1pm on Saturdays**. There will be no works on Sundays or public holidays. Extended work hours are required on **Saturday 25th March** and 1st April (if required) between **7am and 6pm** as part of the utilities adjustment work.

If you have a question about this work, please call **1800 660 248** and ask to speak to a member of the New M5 community engagement team or email info@newm5.com.au.

1800 660 248 | info@newm5.com.au | westconnex.com.au

For more information
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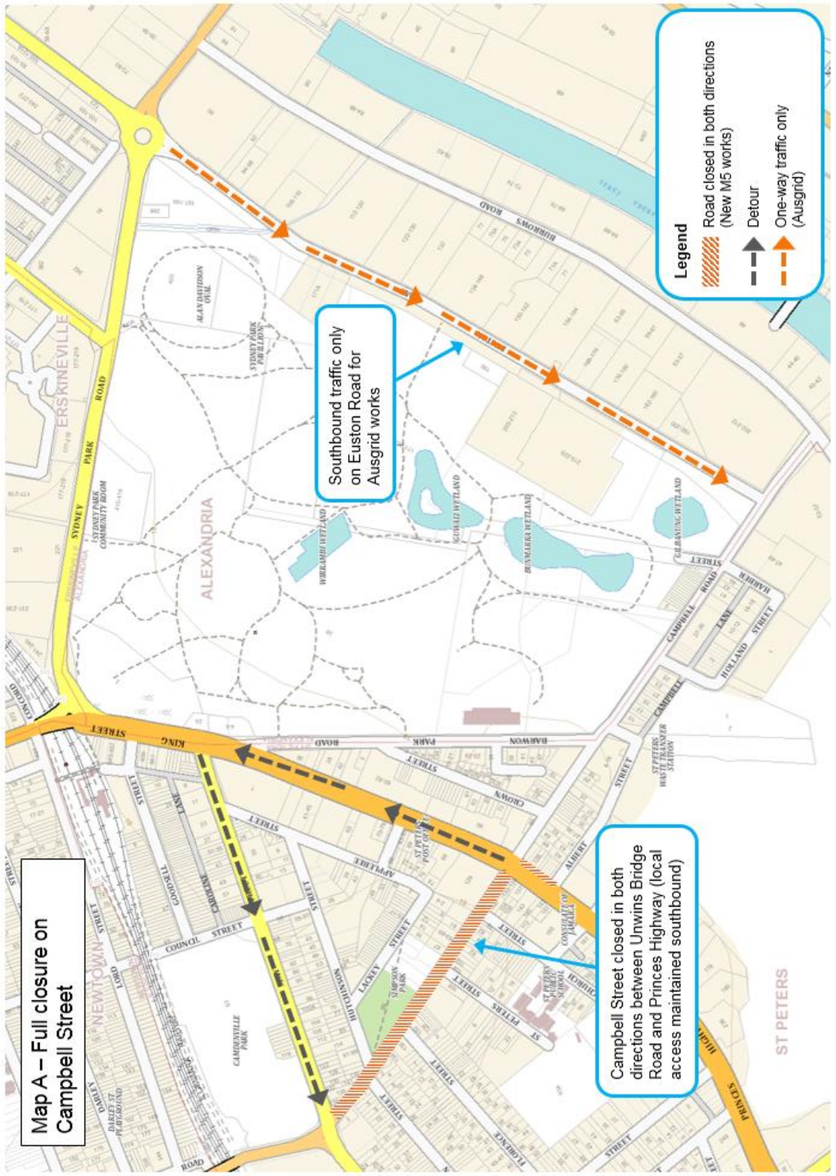
New M5 | Notification | February 2017

Traffic changes on Campbell Street, St Peters



28 February 2017

Update – Road closures on St Peters Street, Campbell Street / Campbell Road and Florence Street, St Peters

Further to our previous notifications, utilities adjustment work is being carried out to accommodate the widening of Campbell Street and Campbell Road. To facilitate this work, changed traffic conditions will be in place intermittently on St Peters Street, Campbell Street and Campbell Road and Florence Street, St Peters.

Traffic Changes

Location	Date and time	Traffic management
St Peters Street at the Campbell Street intersection	**Saturday 4th March** between **7am and 6pm**	• Partial road closure. One lane will be open. Access for local residents will be maintained.
Campbell Street / Campbell Road between Church Street and Burrows Road	**Thursday 9th March** between **6am and 6pm**	• Partial road closure. One way traffic travelling towards Princes Highway (eastbound) permitted. • Access for local residents will be maintained. • Refer to **Map A** overleaf for the location and detour route
Florence Street at the Campbell Street intersection	**Saturday 11th March** between **7am and 6pm**	• No entry into Florence Street from Campbell Street • Access for local residents via Silver Street
Campbell Street between Unwins Bridge Road and Princes Highway	**Saturday 11th March** between **7am and 6pm**	• Full road closure • Access for local residents will be maintained. • Refer to **Map B** overleaf for the location and detour route

Traffic control and signage are in place to assist local residents, road users, pedestrians and cyclists navigate through the changes. Access to streets and properties will continue to be maintained under traffic control.

Work hours

Our working hours are generally between **7am and 6pm, Monday to Friday** and **8am and 1pm on Saturdays**. There will be no works on Sundays or public holidays. Extended work hours are required on **Saturday 4th and 11th March** between **7am and 6pm** as part of the utilities adjustment work.

If you have a question about this work, please call **1800 660 248** and ask to speak to a member of the New M5 community engagement team or email info@newm5.com.au.

Notification No. 202

For more information
info@newm5.com.au
1800 660 248
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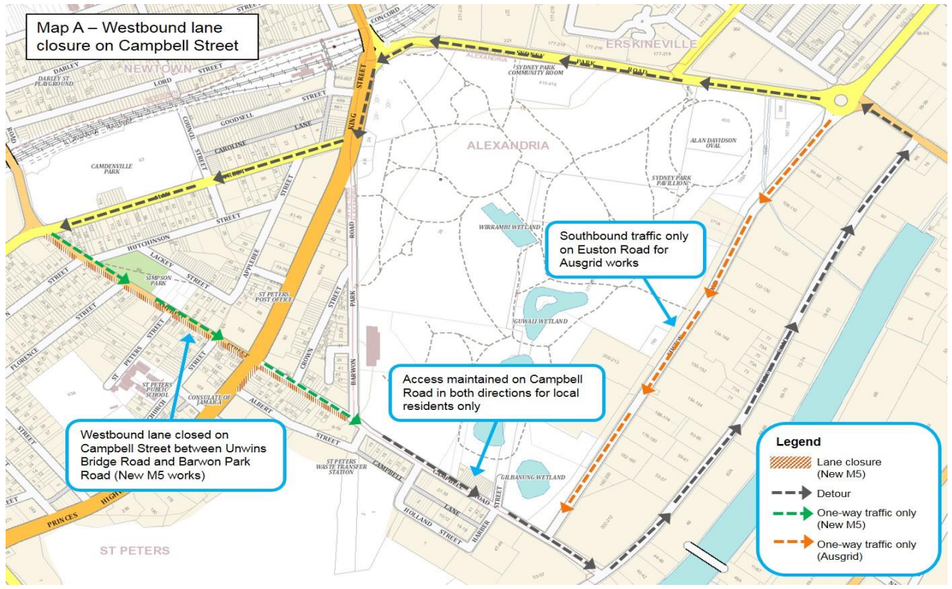
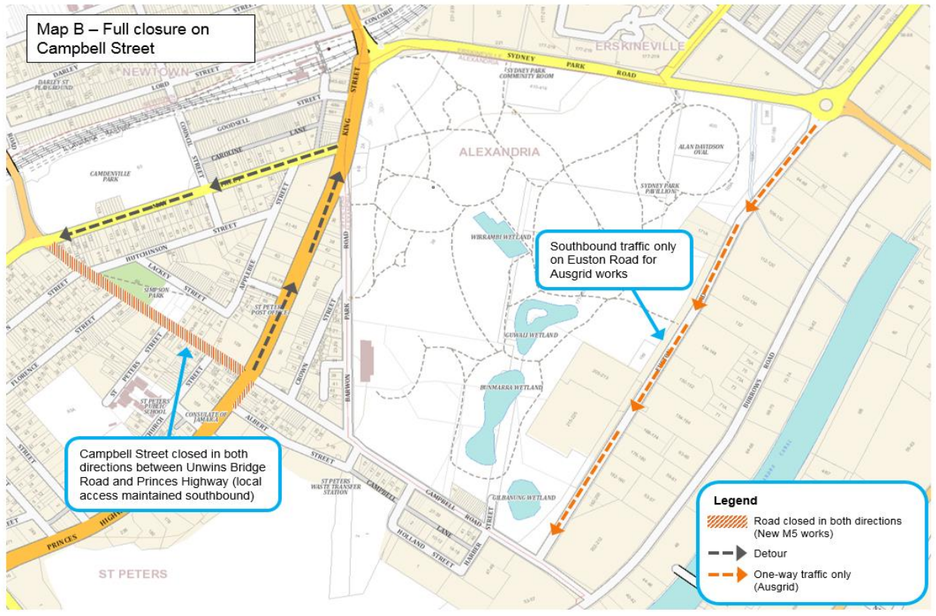
New M5 | Notification | March 2017

Traffic changes on St Peters Street, Campbell Street / Campbell Road and Florence Street, St Peters





10 March 2017

Site establishment – Bourke Road and Bourke Street near Gardeners Road, Mascot

As part of the WestConnex New M5 project, Bourke Road and Bourke Street will be upgraded to connect to the future St Peters Interchange at the former Alexandria Landfill.

The widening and upgrading work will be delivered progressively in stages and is expected to be completed by early 2020. The first stage of the upgrades will involve working along the western side of Bourke Road and the eastern side of Bourke Street. A map showing the work areas is provided overleaf.

In preparation for the start of construction, site establishment and preparatory work will be undertaken from **14 March 2017** and be ongoing for approximately four months.

Work activities

Site establishment will involve:

- installing concrete barriers and fencing
- trimming and clearing trees and vegetation
- geotechnical and environmental drilling and surveying
- identifying and adjusting existing utility services such as power, water and gas
- ongoing work to clear vacant buildings and structures within the project footprint
- implementing traffic management, including line marking and signage.

Traffic and transport changes

Changed traffic conditions will be in place during site establishment and ongoing throughout construction for the safety of road users, pedestrians, cyclists and workers. This includes reduced speed limits, footpath closures and detours and lane closures.

Traffic control and signage will be in place to guide motorists, pedestrians and cyclists safely past the work areas. If you are travelling through the area, please allow extra time for your journey and follow the signs and directions from traffic controllers.

Bus stops on Bourke Road near Gardeners Road will be closed for 18 months (northbound stop) and 24 months (southbound stop). Check the map overleaf for nearby bus stops. See signs at stops or visit transportnsw.info for more information.

Footpath and cycleway changes

The footpath on the eastern side of Bourke Road in front of Bunnings will be closed. Pedestrians will be detoured via the shared path on the western side of the road.

The cycleway on the western side of Bourke Street between Church Avenue and Gardeners Road will be closed. Cyclists will be detoured via the shared path on the eastern side of the road.

The Australia Post mail box on the western footpath on Bourke Road will be removed as it is within the work zone.

Some night work will be required for some activities, including the installation of concrete barriers on Bourke Road and Bourke Street. Residents will be notified in advance of any night work.

Notification No. 204

For more information

info@newm5.com.au

1800 660 248

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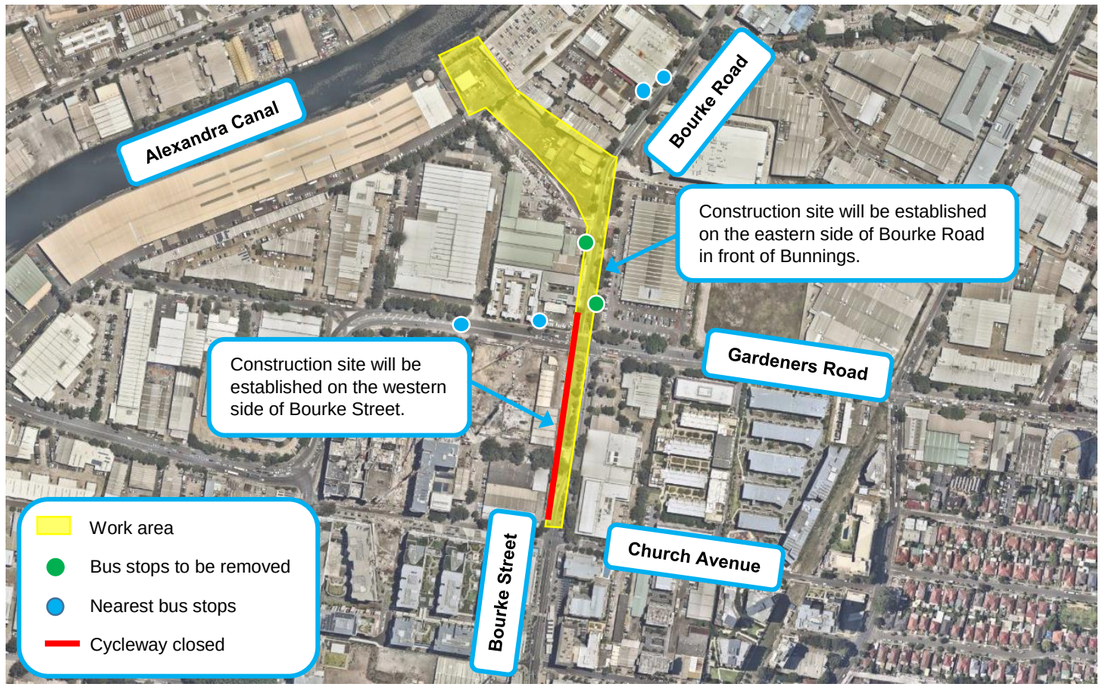
Work hours

Site establishment and construction work will generally be carried out between **7am and 6pm, Monday to Friday and 8am to 1pm on Saturdays**. There will be no work on Sundays or public holidays, unless notified otherwise.

More information

If you have any questions about this work, please call **1800 660 248** and ask to speak to a member of the New M5 Community Engagement Team or email **info@newm5.com.au**. You can also visit the New M5 Community Information Centre located at 27 Burrows Road, St Peters. The centre is open on weekdays from 9am to 5pm.

Location of site establishment on Bourke Road/Street, Mascot



28 February 2017

Update – Road closures on St Peters Street, Campbell Street / Campbell Road and Florence Street, St Peters

Further to our previous notifications, utilities adjustment work is being carried out to accommodate the widening of Campbell Street and Campbell Road. To facilitate this work, changed traffic conditions will be in place intermittently on St Peters Street, Campbell Street and Campbell Road and Florence Street, St Peters.

Traffic Changes

Location	Date and time	Traffic management
St Peters Street at the Campbell Street intersection	**Saturday 4th March** between **7am and 6pm**	• Partial road closure. One lane will be open. Access for local residents will be maintained.
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Florence Street at the Campbell Street intersection	**Saturday 11th March** between **7am and 6pm**	• No entry into Florence Street from Campbell Street • Access for local residents via Silver Street
Campbell Street between Unwins Bridge Road and Princes Highway	**Saturday 11th March** between **7am and 6pm**	• Full road closure • Access for local residents will be maintained. • Refer to **Map B** overleaf for the location and detour route

Traffic control and signage are in place to assist local residents, road users, pedestrians and cyclists navigate through the changes. Access to streets and properties will continue to be maintained under traffic control.

Work hours

Our working hours are generally between **7am and 6pm, Monday to Friday** and **8am and 1pm on Saturdays**. There will be no works on Sundays or public holidays. Extended work hours are required on **Saturday 4th and 11th March** between **7am and 6pm** as part of the utilities adjustment work.

If you have a question about this work, please call **1800 660 248** and ask to speak to a member of the New M5 community engagement team or email info@newm5.com.au.

Notification No. 202

We speak your language

To learn more simply visit westconnex.com.au/yourlanguage.

Need an interpreter? Call the Translating and Interpreting Service on **131 450**

For more information
info@newm5.com.au
1800 660 248
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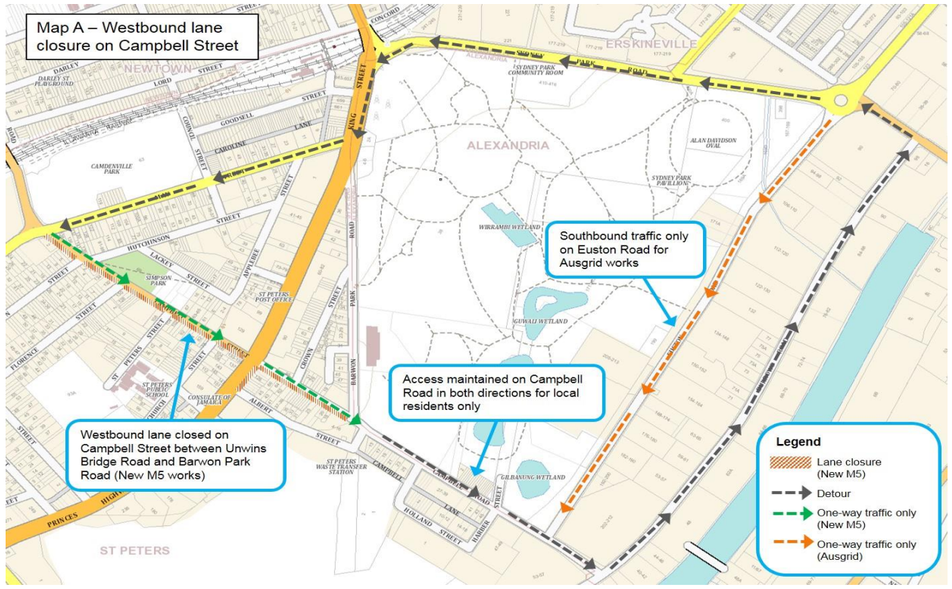
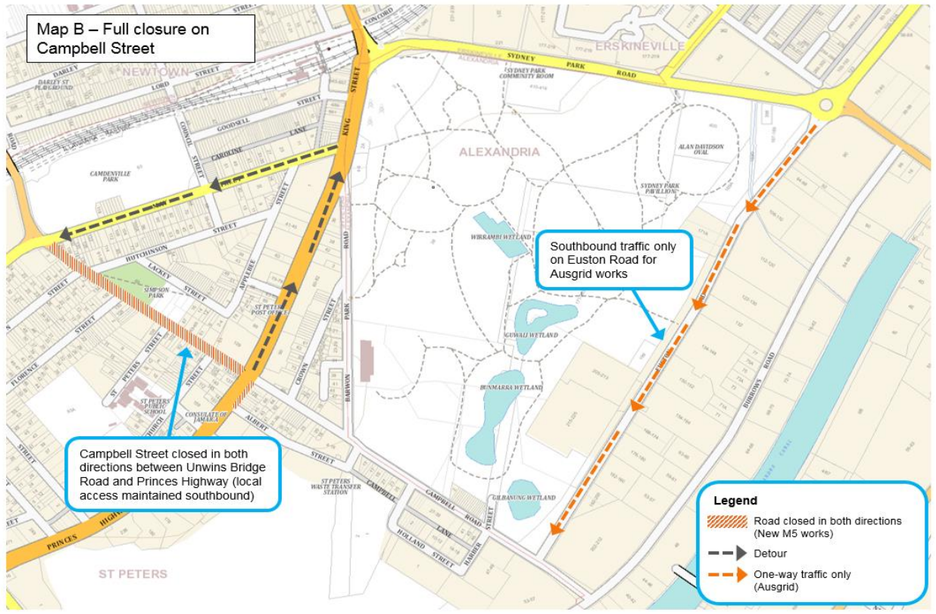
New M5 | **Construction update | Autumn 2017**

Traffic changes on St Peters Street, Campbell Street / Campbell Road and Florence Street, St Peters





1800 660 248 | info@newm5.com.au | westconnex.com.au

St Peters Interchange and local road upgrades

Welcome to the WestConnex New M5 autumn construction update for work occurring in the St Peters, Alexandria and Mascot area. This edition will provide an update about current construction and upcoming activities over the next three months.



Progress of St Peters New M5 tunnel, February 2017

Tunnelling has commenced for the New M5 with roadheader machines being deployed at the St Peters, Bexley and Arncliffe sites. There are currently three roadheaders working at these sites and this will increase to 16 roadheaders across the project when construction peaks.

Work is well underway to establish the sites at the St Peters Interchange and surrounding local roads in preparation for local roads upgrades, which includes new connections between St Peters and Mascot for motorists, pedestrians and cyclists.

Work hours

New M5 work will generally be carried out during standard construction hours between **7am and 6pm from Monday to Friday and 8am and 1pm on Saturday**. There will be no work on Sunday or public holidays unless notified otherwise.

For safety some activities may be undertaken at night time. Nearby residents and businesses will be notified in advance of any night work commencing. Every effort will be made to minimise the impact of work.

For more information

Drop in to the Community Information Centre
Open 9:00am to 5:00pm Monday to Friday (excluding public holidays)
27 Burrows Road,
St Peters, NSW 2134

1800 660 248

info@newm5.com.au

westconnex.com.au

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To learn more, visit westconnex.com.au. Need an interpreter? Call the Translating and Interpreting Service on **131 450.**

St Peters Interchange

The former Alexandria Landfill is taking shape to become the site for the future St Peters Interchange. Ongoing earthworks have been transforming the footprint since last year.

There are a number of upcoming construction activities taking place within the site, which include:

- ongoing earthworks including excavating, moving and compacting material
- continuing construction of the cut and cover tunnel near Canal Road and the Princes Highway, involving bored pile installation and concrete pours
- ongoing remediation work to formally close the Alexandria Landfill
- continuing 24-hour tunnelling excavation under the Princes Highway and tunnel support activities
- oversized deliveries to the Canal Road and Albert Street gates outside of standard construction hours

Euston Road

The past few months has seen site establishment work along Euston Road from Campbell Road to Sydney Park Road advancing.

The road is being widened and will include an upgrade of the intersection of Sydney Park Road and Euston Road to a signalised intersection. Activities over the next three months along Euston Road include:

- continuing property and vegetation removal and ground levelling within the established work site
- ongoing potholing to identify existing services
- ongoing excavation and backfilling ground to install conduits for new and relocated services
- installing new water mains and drainage systems
- installing a temporary site office within the established work site adjacent to Euston Road

Site establishment will soon begin on Euston Road between Sydney Park Road and Maddox Street in preparation for road construction. Site establishment is expected to take three months to complete and includes:

- installing temporary construction fencing and concrete barriers to establish the work site
- trees and vegetation removal within the project footprint. An arboriculture report has been prepared for this work and is available at **www.westconnex.com.au**
- levelling the ground in preparation for road construction



Euston Road construction area between Campbell Road and Sydney Park Road, February 2017

- excavating and backfilling ground to install conduits in preparation for new and relocated services
- installation of new drainage systems and various utilities
- implementing traffic changes to facilitate the work

Campbell Street/Road

Property clearing along Campbell Street/Road is almost complete with traffic in both directions now open again. Thank you for your patience while we completed this work.

Intermittent road and lane closures will be required throughout March while we finish the property clearing and power adjustment work. Upcoming construction activities include:

- permanently reinstating footpaths and roads along the underground power cable route in St Peters
- completing work to clear properties within the project footprint including removal of buildings, tree removal and levelling the ground
- ongoing power adjustment work including removing overhead power lines and installing new underground power cables, which will continue until late March



Aerial photograph of St Peters Interchange construction site, February 2017

- constructing temporary noise walls along the project boundary on Campbell Street and Road
- continuing geotechnical and utility investigations in the vicinity of the local road upgrades to inform the detailed design

Subject to approval, work to establish a temporary construction compound near Campbell Street at Camdenville Basin will commence to support local road upgrades.

Work is also progressing to establish the work compound on Campbell Street between the Princes Highway and Albert Street to support construction of the cut and cover tunnel structure that will connect to the future M4-M5.

Heritage salvage

Heritage salvage at properties along Campbell Street is complete, with the items now being catalogued and placed into storage. The salvaged items will either be reused within the urban design for the project or made available to the community, free of charge. We will provide an update when the items are ready to be distributed.

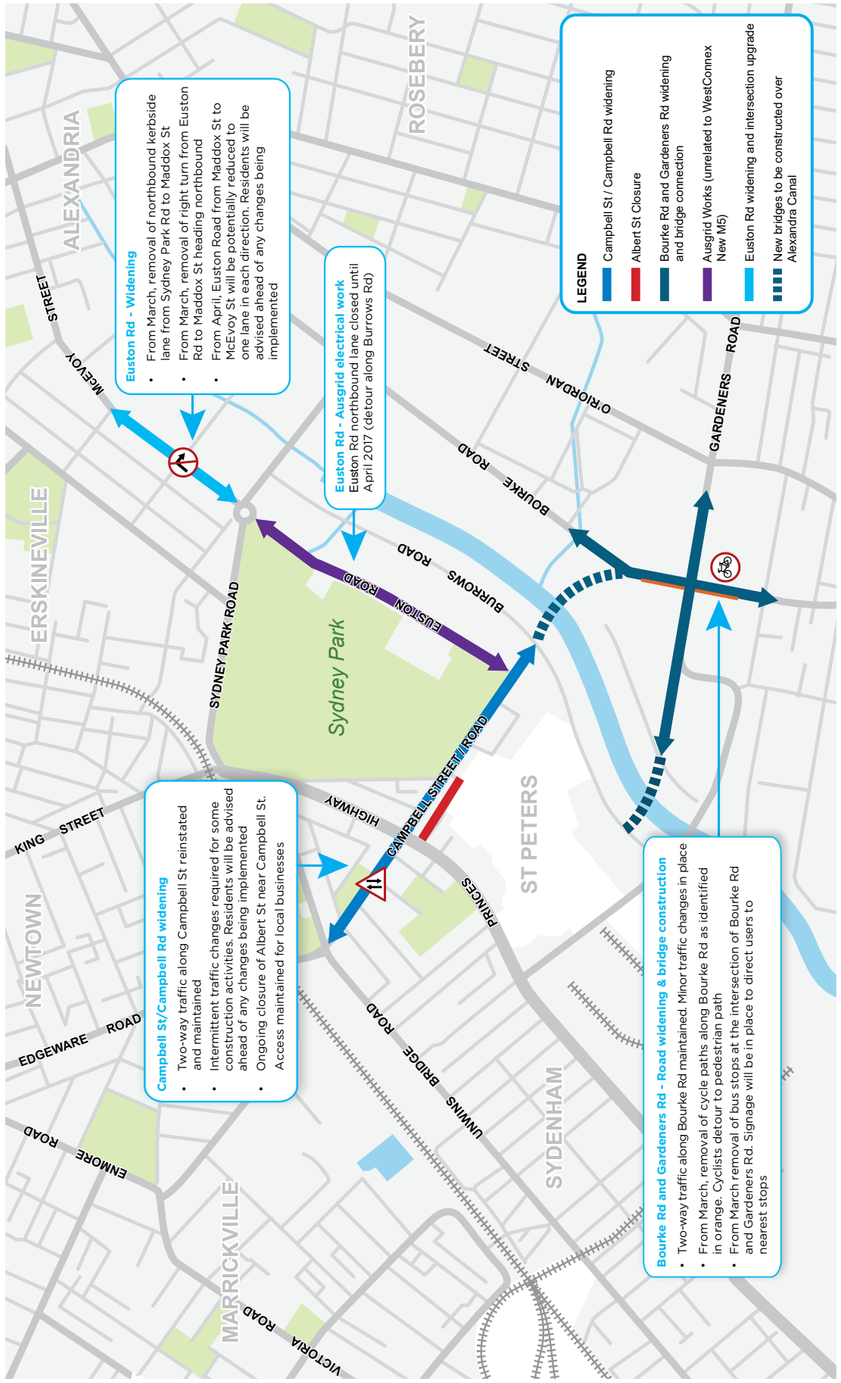
Gardeners Road & Bourke Road

Work is commencing on Gardeners Road and Bourke Road this month to establish the site for construction activities. When finished, the roads will be upgraded and widened to connect to the new bridges across Alexandria Canal.

Activities to be undertaken over the next three months will include:

- installing construction fencing and concrete barriers to establish the project footprint
- Ground levelling works in preparation for road construction
- Trees and vegetation removal within the project footprint. An arboriculture report has been prepared for this work and available at www.westconnex.com.au
- ongoing potholing to inform utility investigation and relocation work
- conducting structural assessment and hazardous materials removal in preparation for property clearing work on Gardeners Road within the project footprint
- implementing traffic changes to facilitate the work.

St Peters Construction Traffic Changes Map



APPENDIX 04

Condition B51 Safety Audit



WESTCONNEX RMS PLANNING
CONDITION B51 SAFETY AUDIT

Legend

- WCX Commitments - Separated Cycleway
- WCX Commitments - Shared Cycleway
- Regional Route - Council Existing
- Regional Route - Council Proposed
- Local Route - Low Vehicle Interaction
- Local Route - Med Vehicle Interaction
- St Peters Interchange Boundary
- 1km Boundary from Interchange

1km

Enmore Park

Victoria Rd

Edgeware Rd

St Peters Station

Sydney Park Rd

Camdenville Park

Metro Park

Princes Hwy

Sydney Park

Euston Rd

A2MP Shared Path

Sydenham Rd

Unwins Bridge Rd

Sydenham Station

Fraser Park

Burrows Rd

Bourke Rd

Alexandra Canal

Canal Rd

Airport Link

Princes Hwy

IKEA

Qantas Dr

Airport Dr

1km

Sydney Airoprt

Mascot Station

Coward St

O'Riordan St

Legend

- Connectivity Gaps to be addressed in B51
- WCX Commitments - Separated Cycleway
- WCX Commitments - Shared Cycleway
- Regional Route - Council Existing
- Regional Route - Council Proposed
- Local Route - Low Vehicle Interaction
- Local Route - Med Vehicle Interaction
- St Peters Interchange Boundary
- 1km Boundary from Interchange



SAFETY AUDIT - MITCHELL ROAD

Site	Code	Description	Safety issue	Probability	Severity of consequence
Mitchell Road					
	A 1	Accumulation of soil and other sediments at low point in pavement (various locations)	Cyclist may loose traction over dirt	Possible	Minor
	A 2	Uneven pavers due to tree roots (various locations)	Cyclist may hit uneven surface	Possible	Minor
	A 3	Overgrowth of plants narrows shared path (various locations)	May cause congestion and a collision	Likely	Minor
	A 4	Blind corner driveway	May cause congestion and a collision	Likely	Moderate
	A 5	Blind corner driveway	May cause congestion and a collision	Likely	Moderate
	A 6	Overgrowth of plants narrows shared path (various locations)	May cause congestion and a collision	Likely	Minor
	A 7	Uneven surface (various locations)	Cyclist may hit uneven surface	Possible	Minor
	A 8	Uneven surface (various locations)	Cyclist may hit uneven surface	Possible	Minor
	A 9	Uneven surface (various locations)	Cyclist may hit uneven surface	Possible	Minor
	A 10	Shared path narrows to 1.6m	May cause congestion and a collision	Possible	Minor
	A 11	Narrow shared path and edge level drop off	Cyclist may via off path and become unstable on level change	Possible	Minor
	A 12	Service pit lid provides uneven surface	Cyclist may hit uneven surface	Possible	Minor
	A 13	Accumulation of soil and other sediments at low point in pavement (various locations)	Cyclist may hit dirt	Possible	Minor
	A 14	Shared path ends, limited signage, no designated crossing	Confusing for cyclists, lack of priority	Possible	Not significant
	A 15	Accumulation of soil and other sediments at low point in pavement (various locations)	Cyclist may loose traction over dirt	Possible	Minor
	A 16	Pavement cycle symbol in car park zone	Cyclist may follow symbol too close to parked vehicles	Unlikely	Minor
	A 17	Road break	Cyclists have to merge onto footpath and may cause conflict with pedestrians	Likely	Not significant
	A 18	Tree roots	Tree roots may hinder future development of path	N/A	N/A

			Potential Consequences				
			L6	L5	L4	L3	L2
			Minor injuries or discomfort. No medical treatment or measureable physical effects.	Injuries or illness requiring medical treatment. Temporary impairment.	Injuries or illness requiring hospital admission.	Injury or illness resulting in permanent impairment.	Fatality
			Not Significant	Minor	Moderate	Major	Severe
Likelihood	Expected to occur regularly under normal circumstances	Almost Certain	Medium	High	Very High	Very High	Very High
	Expected to occur at some time	Likely	Medium	High	High	Very High	Very High
	May occur at some time	Possible	Low	Medium	High	High	Very High
	Not likely to occur in normal circumstances	Unlikely	Low	Low	Medium	Medium	High
	Could happen, but probably never will	Rare	Low	Low	Low	Low	Medium

SAFETY AUDIT - MITCHELL ROAD



MCGREGOR COXALL

McGregor Coxall Pty Ltd. ACN 082 334 290
Sydney: +61 2 9977 3853
Melbourne: +61 3 9999 1608
sydney@mcgregorcoxall.com
melbourne@mcgregorcoxall.com
Web: www.mcgregorcoxall.com

Client
Roads and Maritime Service

Project No. 0573SYD
WestConnex ATN Stage 2

Address
St Peters, Sydney

Phase
B51 Planning Condition

Key Plan

Scale & Orientation
1: 500 @ A3

0 2 4 6 8 10 M

All dimensions are in millimetres unless otherwise noted. Do not scale from this drawing.

Revision Log

Rev	Revision Description	By/Checked	Date
A	For Consultation	LP/DK	8/3/17

Sheet Title
Audit - Mitchell Road

Sheet No.
01-01-01

Rev
A

SAFETY AUDIT - MITCHELL ROAD



MCGREGOR COXALL

McGregor Coxall Pty Ltd. ACN 082 334 290
Sydney: +61 2 9977 3853
Melbourne: +61 3 9999 1608
sydney@mcgregorcoxall.com
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Revision Log

Rev	Revision Description	By/Checked	Date
A	For Consultation	LP/DK	8/3/17

Sheet Title
Audit - Mitchell Road

Sheet No. 01-01-02

Rev A

SAFETY AUDIT - MITCHELL ROAD



MCGREGOR COXALL

McGregor Coxall Pty Ltd. ACN 082 334 290
Sydney: +61 2 9977 3853
Melbourne: +61 3 9999 1608
sydney@mcgregorcoxall.com
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Revision Log

Rev	Revision Description	By/Checked	Date
A	For Consultation	LP/DK	8/3/17

Sheet Title
Audit - Mitchell Road

Sheet No. 01-01-03

Rev A

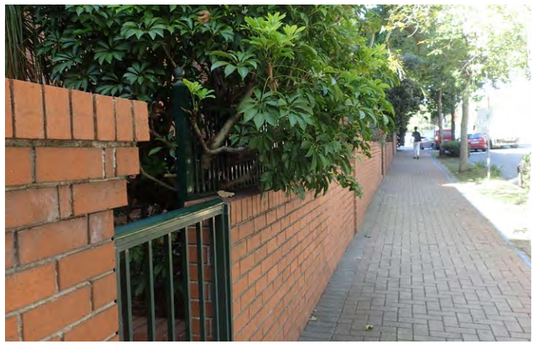
SAFETY AUDIT - MITCHELL ROAD



A 1



A 2



A 3



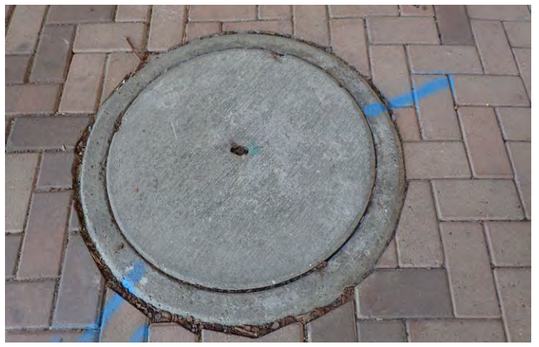
A 4



A 5



A 6



A 7



A 8



A 9



A 10



A 11



A 12

SAFETY AUDIT - MITCHELL ROAD



A 13



A 14



A 15



A 16



A 17



A 18

SAFETY AUDIT - CAMPBELL STREET

Site	Code	Description	Safety issue	Probability	Severity of consequence
Campbell Street					
	B 1	Footpath narrows due to light post (various locations)	May cause congestion and a collision	Likely	Minor
	B 2	Vehicle barrier narrows footpath	May cause congestion and a collision	Possible	Minor
	B 3	Footpath narrows to 1.5m on both sides of the bridge	May cause congestion and a collision	Likely	Minor
	B 4	Uneven surface (various locations)	Cyclist may hit uneven surface	Possible	Minor
	B 5	Narrow vehicle lanes on busy road	On road cyclist may get hit by a moving vehicle	Possible	Major
	B 6	Footpath narrows due to road signs (various locations)	May cause congestion and a collision	Likely	Minor
	B 7	Uneven surface (various locations)	Cyclist may hit uneven surface	Possible	Minor
	B 8	Footpath narrows due to road signs (various locations)	May cause congestion and a collision	Likely	Minor
	B 9	Footpath narrows due to over grown tree (various locations)	May cause congestion and a collision	Likely	Minor
	B 10	Excessive amount of signage, poor way-finding	May cause confusion to cyclist		
	B 11	Gap between fence and footpath (various locations)	Cyclist may fall down gap	Possible	Minor
	B 12	Footpath narrows due to over grown tree (various locations)	May cause congestion and a collision	Likely	Minor
	B 13	Footpath narrows due to rubbish bins on the street after rubbish day	May cause congestion and a collision	Likely	Minor
	B 14	Uneven surface (various locations)	Cyclist may hit uneven surface	Possible	Minor
	B 15	Gap between railing and footpath (various locations)	Cyclist may fall down gap	Possible	Minor
	B 16	Bollard in the middle of narrow shared path	Cyclist may hit bollard and bollard may be unseen at night	Likely	Minor

			Potential Consequences				
			L6	L5	L4	L3	L2
			Minor injuries or discomfort. No medical treatment or measureable physical effects.	Injuries or illness requiring medical treatment. Temporary impairment.	Injuries or illness requiring hospital admission.	Injury or illness resulting in permanent impairment.	Fatality
			Not Significant	**Minor**	**Moderate**	**Major**	**Severe**
Likelihood	Expected to occur regularly under normal circumstances	**Almost Certain**	**Medium**	**High**	**Very High**	**Very High**	**Very High**
	Expected to occur at some time	**Likely**	**Medium**	**High**	**High**	**Very High**	**Very High**
	May occur at some time	**Possible**	**Low**	**Medium**	**High**	**High**	**Very High**
	Not likely to occur in normal circumstances	**Unlikely**	**Low**	**Low**	**Medium**	**Medium**	**High**
	Could happen, but probably never will	**Rare**	**Low**	**Low**	**Low**	**Low**	**Medium**

SAFETY AUDIT - CAMPBELL STREET



MCGREGOR COXALL

McGregor Coxall Pty Ltd. ACN 082 334 290
Sydney: +61 2 9977 3853
Melbourne: +61 3 9999 1608
sydney@mcgregorcoxall.com
melbourne@mcgregorcoxall.com
Web: www.mcgregorcoxall.com

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WestConnex ATN Stage 2

Address
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Phase
B51 Planning Condition

Key Plan

Scale & Orientation
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A	For Consultation	LP/DK	8/3/17

Sheet Title
Audit - Campbell Street

Sheet No.
01-02-01

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Sydney: +61 2 9977 3853
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SAFETY AUDIT - CAMPBELL STREET



B 1



B 2



B 3



B 4



B 5



B 6



B 7



B 8



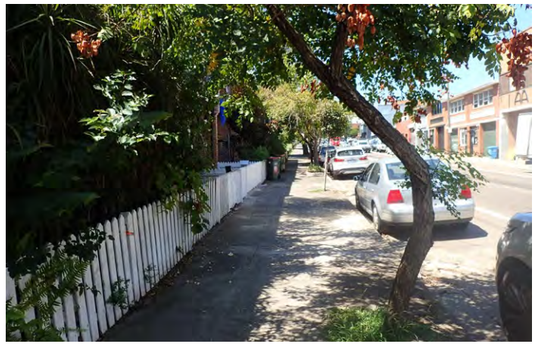
B 9



B 10



B 11



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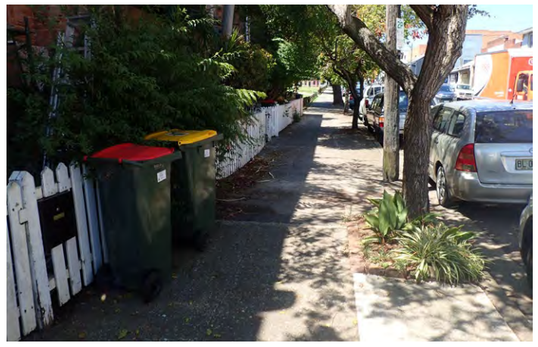
SAFETY AUDIT - CAMPBELL STREET



B 13



B 14



B 15



B 16

SAFETY AUDIT - PRINCES HWY / CANAL ROAD

Site	Code	Description	Safety issue	Probability	Severity of consequence
Princes Hwy / Canal Road					
	C 1	Overgrowth of plants narrows shared path (various locations)	May cause congestion and a collision	Likely	Minor
	C 2	Very busy intersection, long waiting times at pedestrian crossing	Pedestrian / cyclist may atempt to cross road before signalised crossing	Possible	Minor
	C 3	Lack of pedestrian ramps at crossing	Cyclist has to via off crossing to use ramp	Likely	Moderate
	C 4	Uneven surface (various locations)	Cyclist may hit uneven surface	Likely	Minor
	C 5	High volumes of traffic in narrow one way side street	Not much room for on road cyclist	Likely	Moderate
	C 6	Poor alignment for pedestrian crossing	Pedestrian / cyclist may atempt to short cut corner of crossing	Likely	Minor
	C 7	Excessive amount of signage at entrance to May Street, poor way-finding	Cyclist may hit sign posts	Possible	Moderate
	C 8	Uneven surface (various locations)	Cyclist may hit uneven surface	Likely	Moderate
	C 9	Narrow footpath due to road signage (various locations)	Cyclist may hit sign next to busy road	Possible	Moderate
	C 10	Bus stop narrows footpath	Cyclist may have to dismount to get around bus stop	Likely	Not significant
	C 11	No pedestrian crossing - Pedestrians have to use 3 crossings to cross south western side of Princes Hwy	Pedestrian / cyclist may atempt to cross road with no signalised crossing	Possible	Minor

			Potential Consequences				
			L6	L5	L4	L3	L2
			Minor injuries or discomfort. No medical treatment or measureable physical effects.	Injuries or illness requiring medical treatment. Temporary impairment.	Injuries or illness requiring hospital admission.	Injury or illness resulting in permanent impairment.	Fatality
			Not Significant	Minor	Moderate	Major	Severe
Likelihood	Expected to occur regularly under normal circumstances	Almost Certain	Medium	High	Very High	Very High	Very High
	Expected to occur at some time	Likely	Medium	High	High	Very High	Very High
	May occur at some time	Possible	Low	Medium	High	High	Very High
	Not likely to occur in normal circumstances	Unlikely	Low	Low	Medium	Medium	High
	Could happen, but probably never will	Rare	Low	Low	Low	Low	Medium

SAFETY AUDIT - PRINCES HWY / CANAL ROAD



MCGREGOR COXALL

McGregor Coxall Pty Ltd. ACN 082 334 290
Sydney: +61 2 9977 3853
Melbourne: +61 3 9999 1608
sydney@mcgregorcoxall.com
melbourne@mcgregorcoxall.com
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Sheet Title
Audit - Princes Hwy Intersection

Sheet No. 01-03-01

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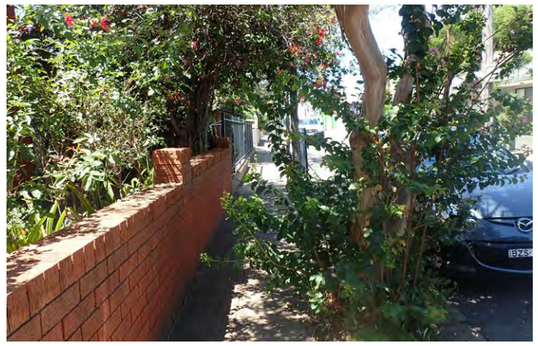
SAFETY AUDIT - PRINCES HWY / CANAL ROAD



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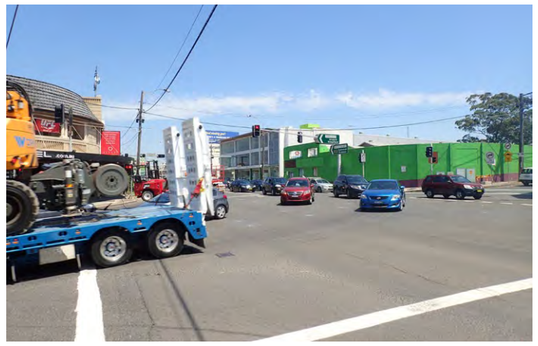


C 2



C 3



C 4



C 5



C 6



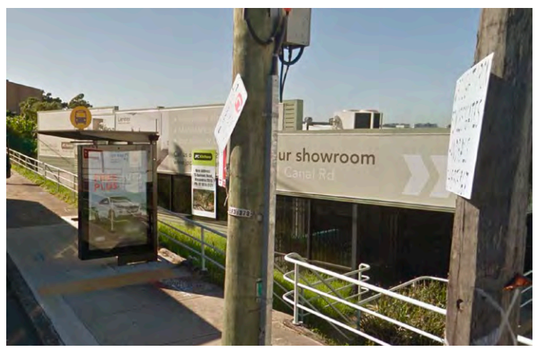
C 7



C 8



C 9



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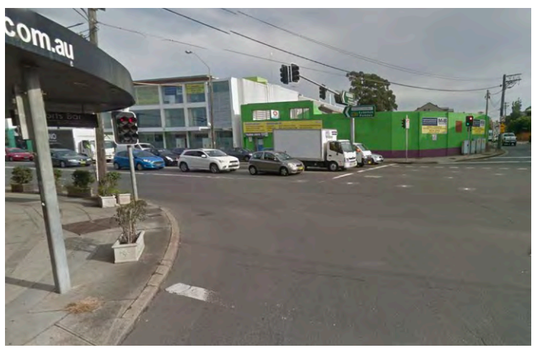

C 11

SAFETY AUDIT - CANAL ROAD

Site	Code	Description	Safety issue	Probability	Severity of consequence
Canal Road					
	D 1	Footpath narrows due to over grown grass (various locations)	May cause congestion and a collision	Likely	Minor
	D 2	Uneven surface (various locations)	Cyclist may hit uneven surface	Likely	Moderate
	D 3	Footpath narrows due to bus stop (various locations)	May cause congestion and a collision	Likely	Minor
	D 4	Footpath narrows due to over grown plants (various locations)	May cause congestion and a collision	Likely	Minor
	D 5	Uneven surface (various locations)	Cyclist may hit uneven surface	Likely	Moderate
	D 6	Uneven surface (various locations)	Cyclist may hit uneven surface	Likely	Moderate
	D 7	Leaf litter and dirt covering footpath (various locations)	cyclist may loose traction over leaf litter and dirt	Likely	Moderate
	D 8	Uneven surface (various locations)	Cyclist may hit uneven surface	Likely	Moderate
	D 9	Footpath narrows due to bus stop (various locations)	May cause congestion and a collision	Likely	Minor
	D 10	Footpath narrows due to over grown plants (various locations)	May cause congestion and a collision	Likely	Minor
	D 11	Small pedestrian crossing island	Pedestrians / cyclists are very close to miving vehicles	Possible	Moderate
	D 12	Footpath narrows due to hand rail and light post	May cause congestion and a collision	Likely	Minor
	D 13	Broken footpath at entrance to narrow bridge footpath	Pedestrians / cyclists are very close to vehicles	Possible	Severe
	D 14	Footpath narrows and kerb dissapears	Pedestrians / cyclists are very close to vehicles	Possible	Severe
	D 15	Uneven surface (various locations)	Cyclist may hit uneven surface	Possible	Minor
	D 16	No barrier between shop car park and footpath	Cyclist may get hit by vehicle	Possible	Minor
	D 17	Footpath narrows due to cuts in pavement	Cyclist may hit uneven surface	Possible	Minor
	D 18	Footpath narrows due to powerline post and services lid (various locations)	Cyclist may hit post or service lid	Possible	Minor
	D 19	Footpath narrows due to bus stop (various locations)	May cause congestion and a collision	Likely	Minor
	D 20	Footpath narrows due to cuts in pavement	Cyclist may hit uneven surface	Possible	Minor
	D 21	Footpath narrows due to sign post in pavement (various locations)	Cyclist may hit sign post	Likely	Minor
	D 22	Lack of pedestrian crossing infrastructure	Cyclist has to check with truck driver before crossing	Possible	Minor
	D 23	Footpath narrows due to powerline post (various locations)	Cyclist may hit powerline post	Likely	Minor
	D 24	Footpath narrows due to over grown plants (various locations)	May cause congestion and a collision	Likely	Minor
	D 25	Footpath narrows due to over grown plants and post	May cause congestion and a collision	Likely	Minor
	D 26	Footpath narrows due to over grown plants and post	May cause congestion and a collision	Possible	Minor
	D 27	Uneven surface (various locations)	Cyclist may hit uneven surface	Possible	Minor
	D 28	Footpath dissapears and narrows	Cyclist may loose traction over dirt, cause congestion or colision	Likely	Moderate
	D 29	Narrow bridge footpath	Pedestrians / cyclists are very close to vehicles	Possible	Moderate
	D 30	Light post in the middle of narrow footpath next to busy road	Cyclist may fall off trying to move around light pole	Possible	Major

			Potential Consequences				
			L6	L5	L4	L3	L2
			Minor injuries or discomfort. No medical treatment or measureable physical effects.	Injuries or illness requiring medical treatment. Temporary impairment.	Injuries or illness requiring hospital admission.	Injury or illness resulting in permanent impairment.	Fatality
			Not Significant	Minor	Moderate	Major	Severe
Likelihood	Expected to occur regularly under normal circumstances	Almost Certain	Medium	High	Very High	Very High	Very High
	Expected to occur at some time	Likely	Medium	High	High	Very High	Very High
	May occur at some time	Possible	Low	Medium	High	High	Very High
	Not likely to occur in normal circumstances	Unlikely	Low	Low	Medium	Medium	High
	Could happen, but probably never will	Rare	Low	Low	Low	Low	Medium

SAFETY AUDIT - CANAL ROAD



MCGREGOR COXALL

McGregor Coxall Pty Ltd. ACN 082 334 290
Sydney: +61 2 9977 3853
Melbourne: +61 3 9999 1608
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Sheet No.
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MCGREGOR COXALL

McGregor Coxall Pty Ltd. ACN 082 334 290
Sydney: +61 2 9977 3853
Melbourne: +61 3 9999 1608
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MCGREGOR COXALL

McGregor Coxall Pty Ltd. ACN 082 334 290
Sydney: +61 2 9977 3853
Melbourne: +61 3 9999 1608
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Sydney: +61 2 9977 3853
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SAFETY AUDIT - CANAL ROAD



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D 2



D 3



D 4



D 5



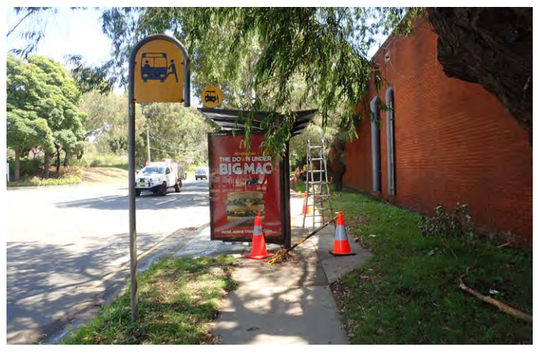
D 6



D 7



D 8



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D 10



D 11



D 12

SAFETY AUDIT - CANAL ROAD



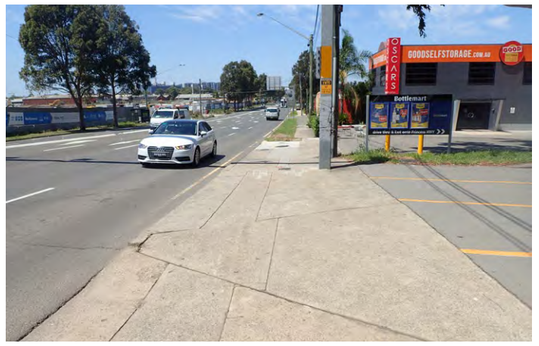
D 13



D 14



D 15



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D 17



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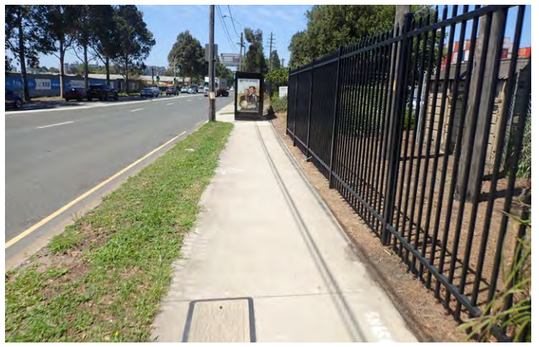

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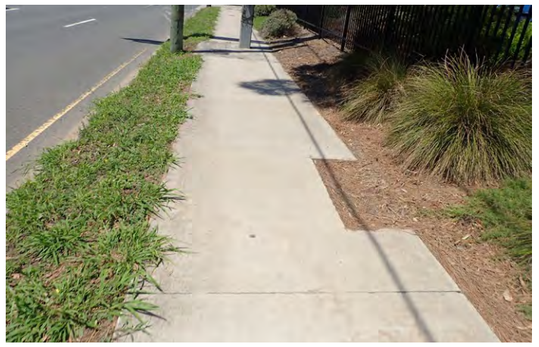

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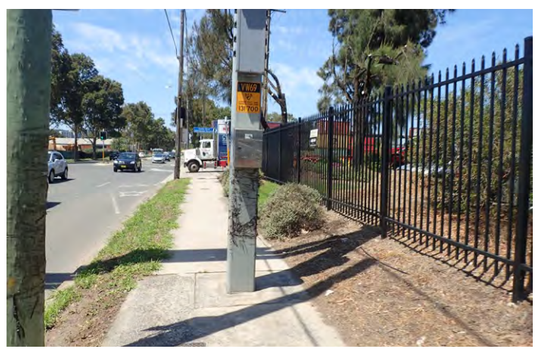

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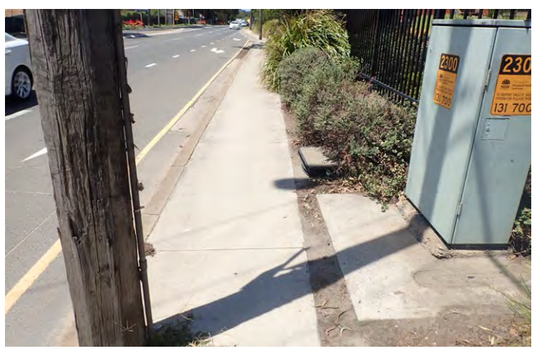

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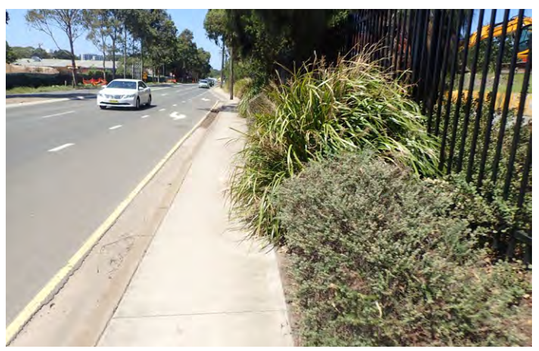

D 24

SAFETY AUDIT - CANAL ROAD



D 25



D 26



D 27



D 28



D 29



D 30



D 31

SAFETY AUDIT - SYDNEY PARK

Site	Code	Description	Safety issue	Probability	Severity of consequence
Sydney Park					
	E 1	Changes in pavement materials and no barrier infront of dropoff	May cause congestion and a collision	Likely	Minor
	E 2	Bollards are hard to see in low light	Cyclist may hit bollards	Possible	Minor
	E 3	Steep hill	Cyclist may loose control down hill	Unlikely	Minor
	E 4	Uneven surface due to tree roots (various locations)	Cyclist may hit uneven surface	Possible	Minor
	E 5	New path recently constructed	N/A	N/A	N/A

			Potential Consequences				
			L6	L5	L4	L3	L2
			Minor injuries or discomfort. No medical treatment or measureable physical effects.	Injuries or illness requiring medical treatment. Temporary impairment.	Injuries or illness requiring hospital admission.	Injury or illness resulting in permanent impairment.	Fatality
			Not Significant	Minor	Moderate	Major	Severe
Likelihood	Expected to occur regularly under normal circumstances	Almost Certain	Medium	High	Very High	Very High	Very High
	Expected to occur at some time	Likely	Medium	High	High	Very High	Very High
	May occur at some time	Possible	Low	Medium	High	High	Very High
	Not likely to occur in normal circumstances	Unlikely	Low	Low	Medium	Medium	High
	Could happen, but probably never will	Rare	Low	Low	Low	Low	Medium

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MCGREGOR COXALL

McGregor Coxall Pty Ltd. ACN 082 334 290
Sydney: +61 2 9977 3853
Melbourne: +61 3 9999 1608
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0 2 4 6 8 10 M

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MCGREGOR COXALL

McGregor Coxall Pty Ltd. ACN 082 334 290
Sydney: +61 2 9977 3853
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01-05-03

Rev
A

SAFETY AUDIT - SYDNEY PARK



E 1



E 2



E 3



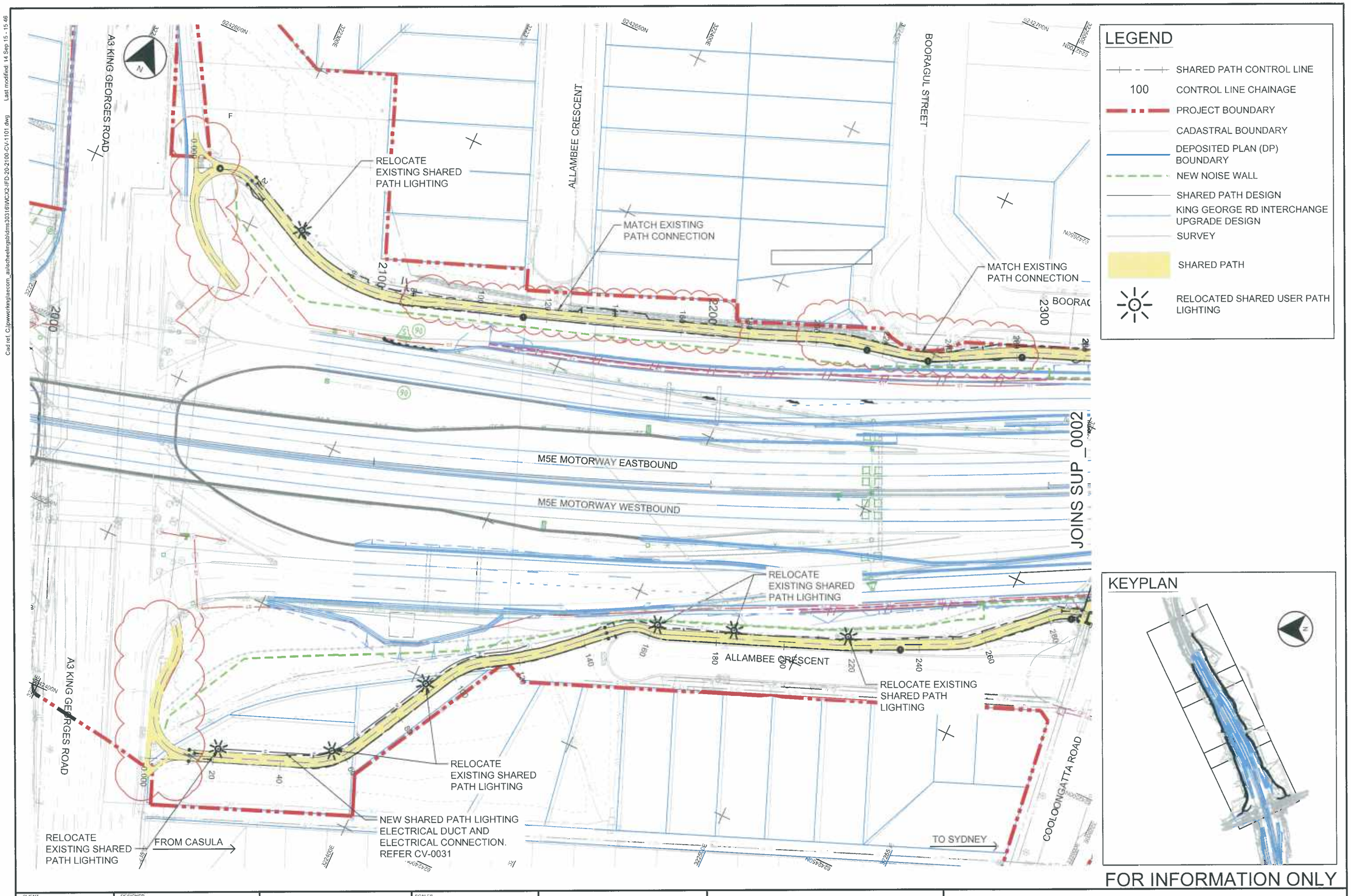
E 4

MCGREGOR
COXALL

APPENDIX 05

M5 Linear Park – Shared Path Upgrades





FOR INFORMATION ONLY

CLIENT	DESIGNER		SCALES			
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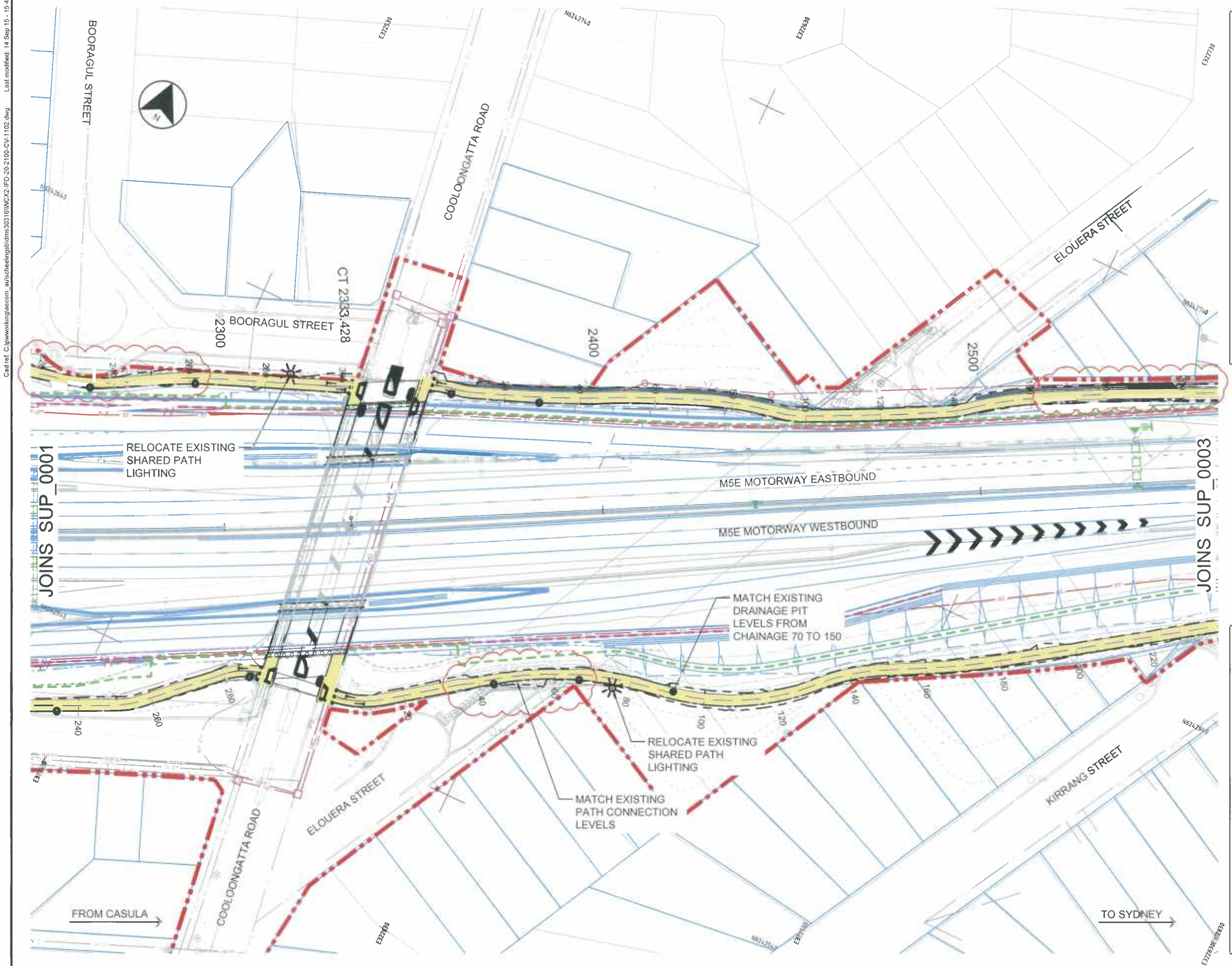

LEGEND

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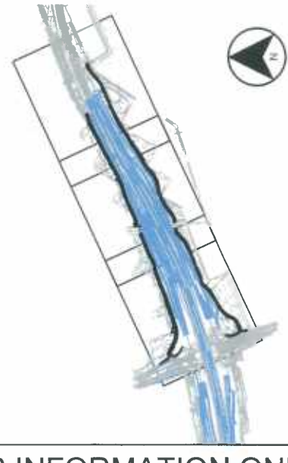
- 100 CONTROL LINE CHAINAGE
- PROJECT BOUNDARY
- CADASTRAL BOUNDARY
- DEPOSITED PLAN (DP) BOUNDARY
- NEW NOISE WALL
- SHARED PATH DESIGN
- KING GEORGE RD INTERCHANGE UPGRADE DESIGN
- SURVEY
- SHARED PATH
- RELOCATED SHARED USER PATH LIGHTING

KEYPLAN



FOR INFORMATION ONLY

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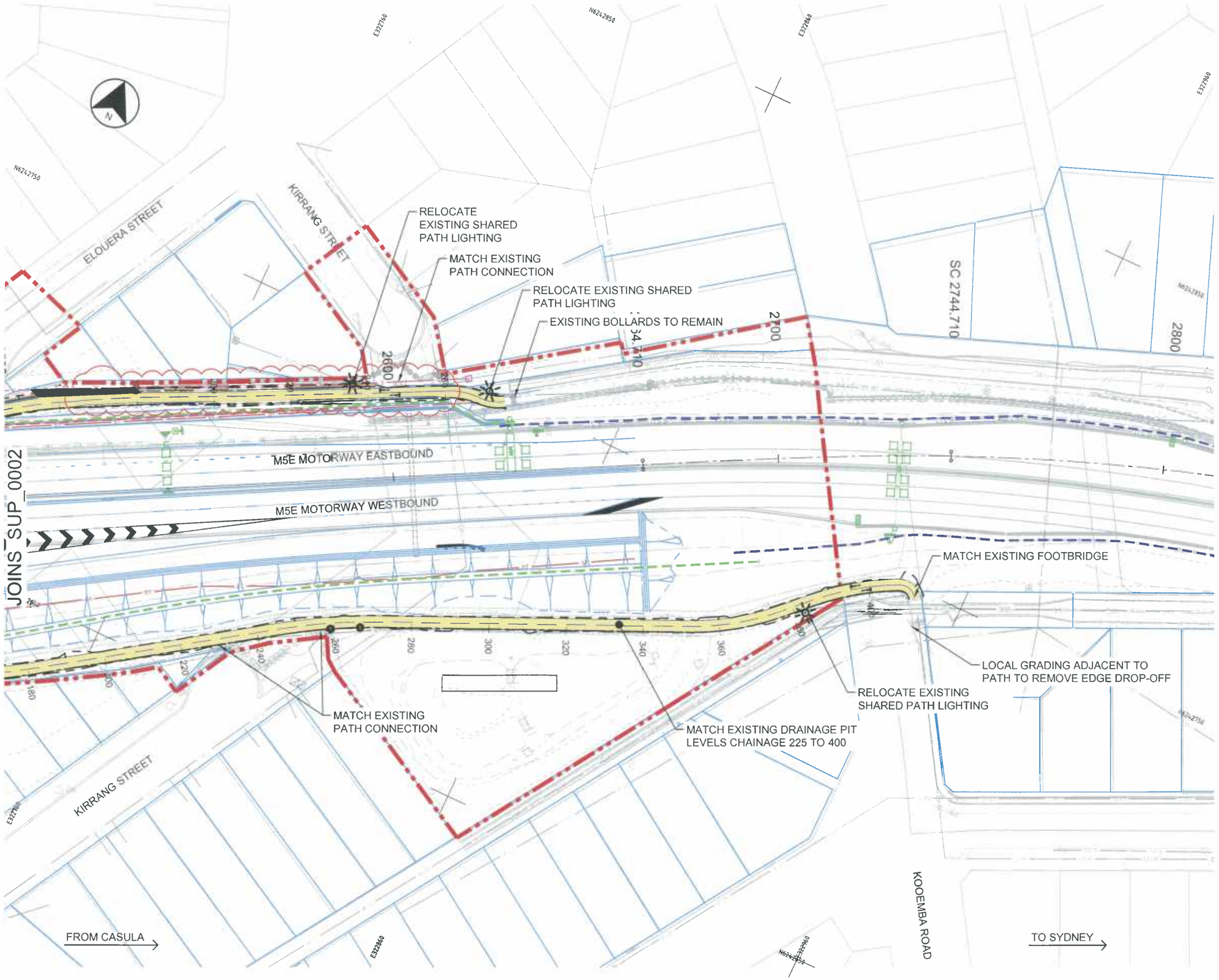
INFORMATION DOCUMENT

DOCUMENT NO

PROJECT NO - DOC TYPE - PROJECT PHASE - DISCIPLINE - DATE (YYYYMMDD) - DESCRIPTION.

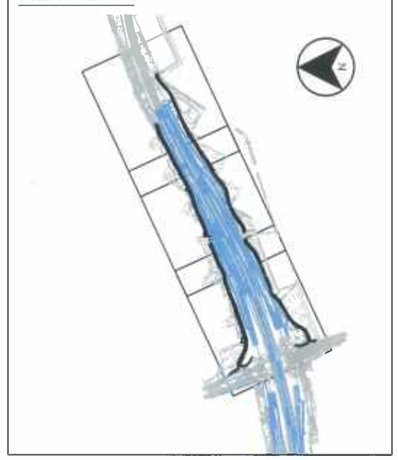
WCX2-IFD-20-2100-CV-20150914_SUP_0002



LEGEND

- SHARED PATH CONTROL LINE
- 100 CONTROL LINE CHAINAGE
- PROJECT BOUNDARY
- CADASTRAL BOUNDARY
- DEPOSITED PLAN (DP) BOUNDARY
- NEW NOISE WALL
- SHARED PATH DESIGN
- KING GEORGE RD INTERCHANGE UPGRADE DESIGN
- SURVEY
- SHARED PATH
- RELOCATED SHARED USER PATH LIGHTING

KEYPLAN



FOR INFORMATION ONLY

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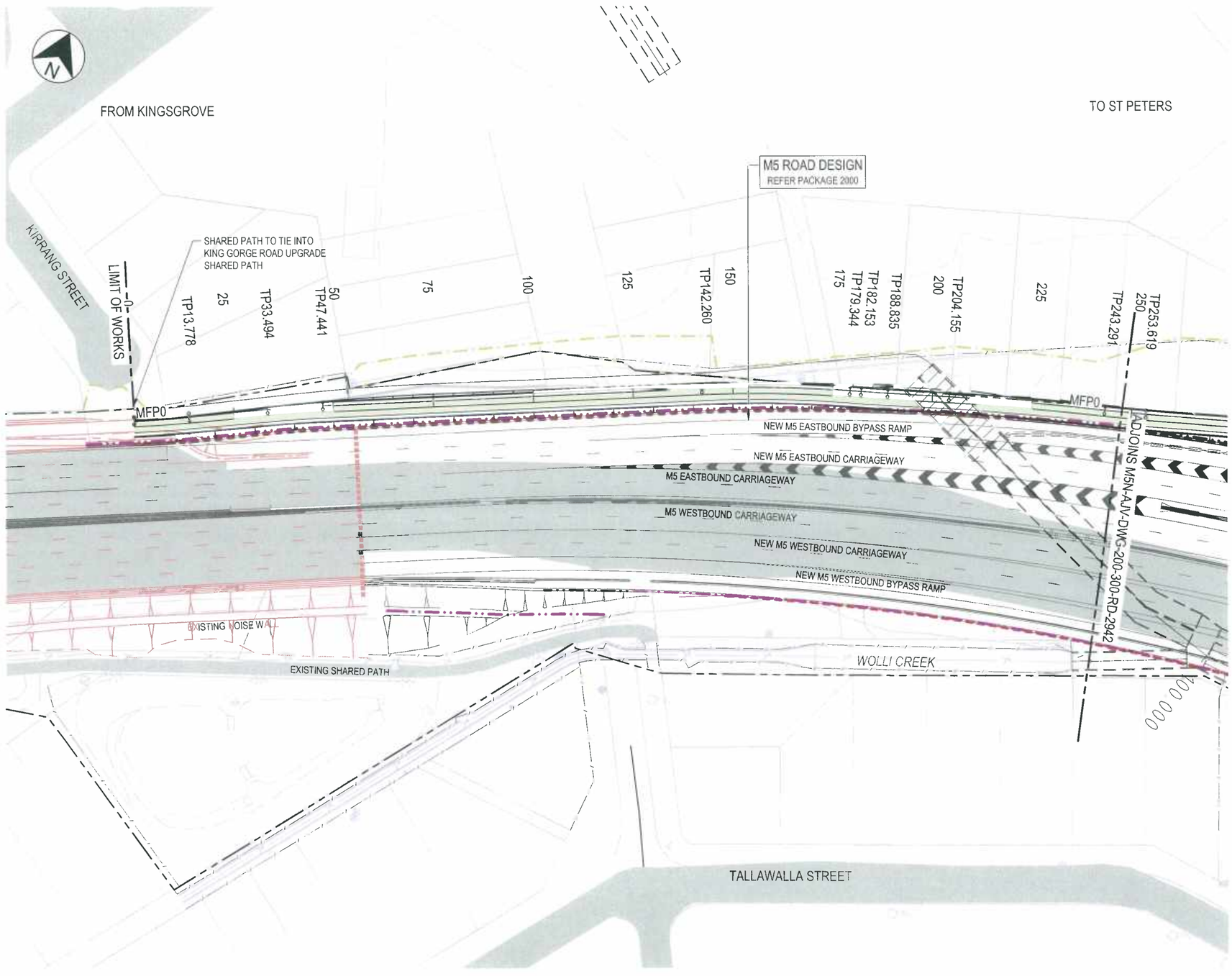

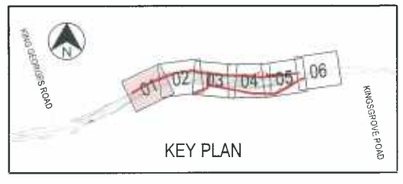

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REV	DATE	AMENDMENT / REVISION DESCRIPTION	APPROVAL
A	22.04.2016	DEVELOPED CONCEPT DESIGN	M.P

PROJECT BREAKDOWN STRUCTURE
M5N-AJV-DPK-200-300-RD-2010

SCALES ON A3 SIZE DRAWING
SCALE 1:1000 10 0 10 20 AT A3

CO-ORDINATE SYSTEM: MGA ZONE 56
HEIGHT DATUM: AHD

WestConnex New M5
CPB CONTRACTORS | DRAGADOS | SAMSUNG | SAMSUNG C&T | Golder Associates | AJJV AURECON JACOBS NEW M5 JOINT VENTURE | HASSELL

PLOT DATE / TIME	PLOT BY
22/04/2016 9:54:37 AM	mthatcher

TITLE	NAME	DATE
DRAWN	C.BROCK	22.04.2016
DRG CHECK	S. BYRNE	22.04.2016
DESIGN	M. JAMES	22.04.2016
DESIGN CHECK	A.GOSBY	22.04.2016
ZONE MANAGER	J. YIP	22.04.2016
DESIGN MANAGER	M.PERCIVAL	22.04.2016

CLIENT

DOCUMENT NUMBER
M5N-AJV-DWG-200-300-RD-2941

WESTCONNEX NEW M5 — A3
WESTERN INTERCHANGE AND PORTALS
SHARED USE PATH GEOMETRY
PLAN
SHEET 1 OF 6

RMS REGISTRATION No.

ISSUE STATUS	EDMS No.	SHEET No.	REV
DEVELOPED CONCEPT DESIGN		RD-2941	A

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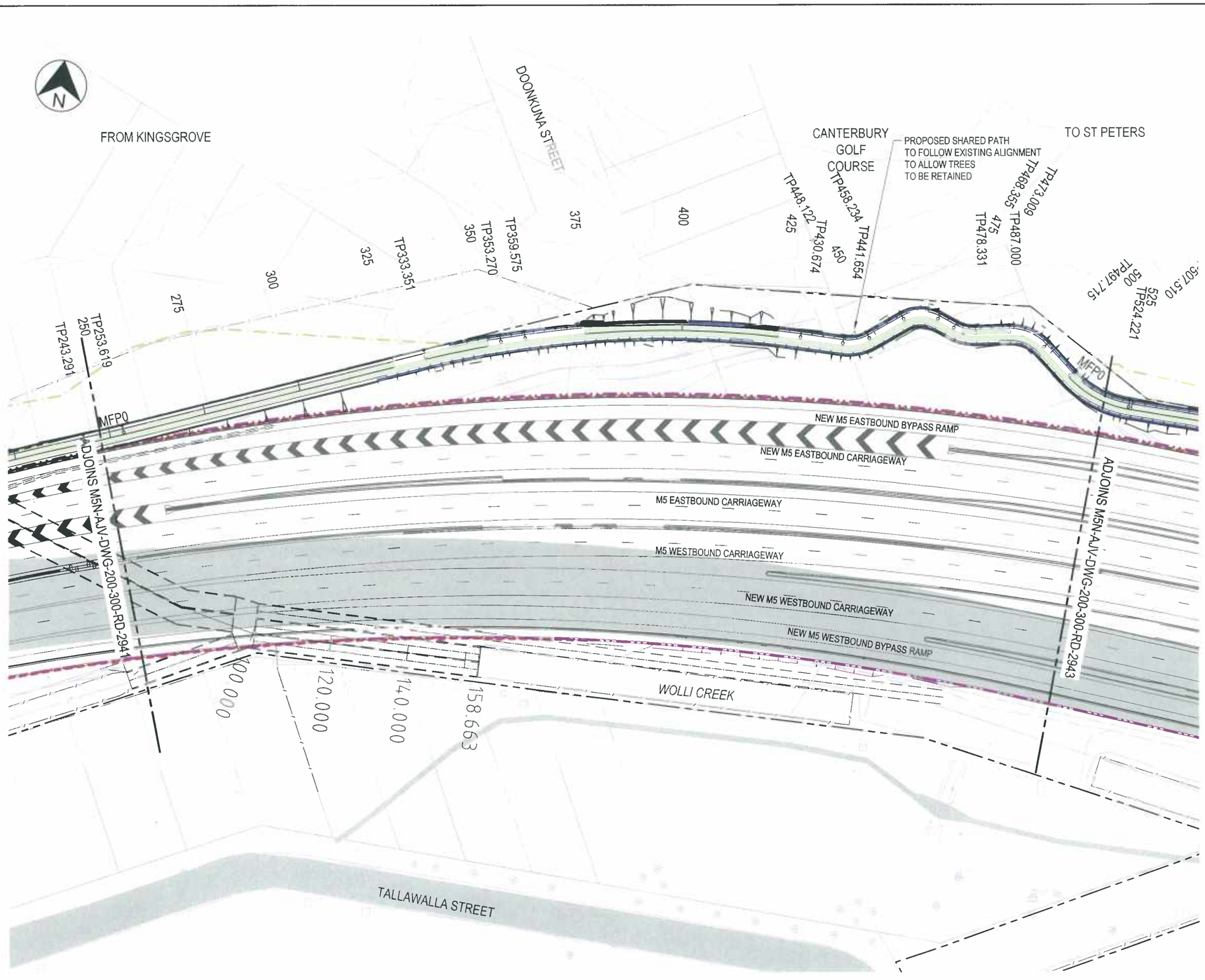

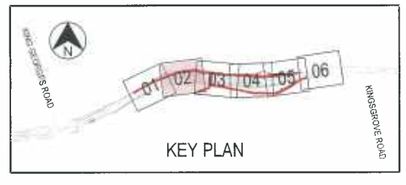

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PROJECT BREAKDOWN STRUCTURE: M5N-AJV-DPK-200-300-RD-2010

SCALES ON A3 SIZE DRAWING

SCALE 1:1000 10 0 10 20 AT A3

CO-ORDINATE SYSTEM: MGA ZONE 56 | HEIGHT DATUM: AHD

WestConnex New M5

AURECON JACOBS NEW M5 JOINT VENTURE

PLOT DATE / TIME: 22/04/2016 9:55:06 AM | PLOT BY: mthatcher

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DRG CHECK	S. BYRNE	22.04.2016
DESIGN	M. JAMES	22.04.2016
DESIGN CHECK	A.GOSBY	22.04.2016
ZONE MANAGER	J. YIP	22.04.2016
DESIGN MANAGER	M.PERCIVAL	22.04.2016

CLIENT

DOCUMENT NUMBER: M5N-AJV-DWG-200-300-RD-2942

WESTCONNEX NEW M5

A3

WESTERN INTERCHANGE AND PORTALS
SHARED USE PATH GEOMETRY
PLAN

SHEET 2 OF 6

RMS REGISTRATION No.

ISSUE STATUS	EDMS No.	SHEET No.	REV
DEVELOPED CONCEPT DESIGN		RD-2942	A

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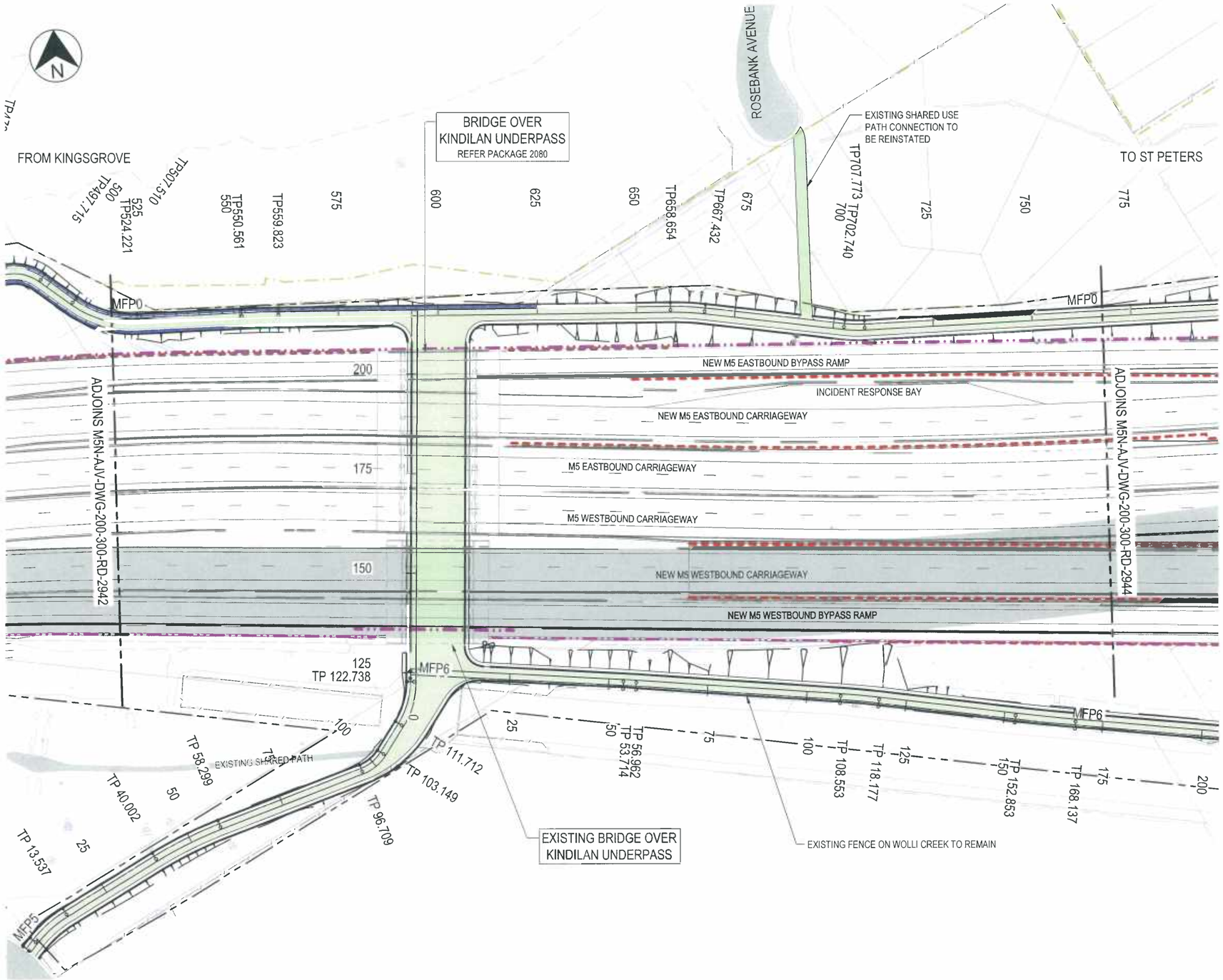
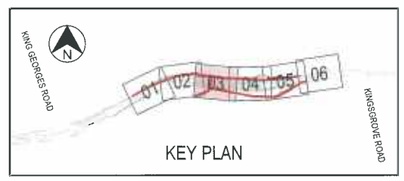


LEGEND

- PERMANENT WORKS BOUNDARY
- TEMPORARY WORK BOUNDARY
- SURVEY
- CADASTRAL
- KING GEORGE ROAD UPGRADE (BY OTHERS)
- EXISTING PAVEMENT
- CUT AND COVER STRUCTURE
- SHARED PATH
- MAINLINE TUNNEL
- RETAINING WALL
- NOISE WALL
- MAINTENANCE GATE FOR CROSS CARRIAGEWAY ACCESS
- BOUNDARY FENCE
- CYCLE SAFE BALUSTRADE
- MFPX — CONTROL LINE - SHARED PATH



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PROJECT BREAKDOWN STRUCTURE: M5N-AJV-DPK-200-300-RD-2010

SCALES ON A3 SIZE DRAWING

SCALE 1:1000 (10 0 10 20) AT A3

CO-ORDINATE SYSTEM: MGA ZONE 56 | HEIGHT DATUM: AHD

WestConnex New M5

CPB CONTRACTORS | DRAGADOS | SAMSUNG C&T | Golder Associates | HASSELL | AJJV

AURECON JACOBS NEW M5 JOINT VENTURE

PLOT DATE / TIME: 22/04/2016 9:55:26 AM | PLOT BY: mthatcher

CLIENT

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DRG CHECK	S. BYRNE	22.04.2016
DESIGN	M. JAMES	22.04.2016
DESIGN CHECK	A.GOSBY	22.04.2016
ZONE MANAGER	J. YIP	22.04.2016
DESIGN MANAGER	M.PERCIVAL	22.04.2016

DOCUMENT NUMBER: M5N-AJV-DWG-200-300-RD-2943

WESTCONNEX NEW M5

A3

WESTERN INTERCHANGE AND PORTALS
SHARED USE PATH GEOMETRY
PLAN

SHEET 3 OF 6

RMS REGISTRATION No.

ISSUE STATUS	EDMS No.	SHEET No.	REV
DEVELOPED CONCEPT DESIGN		RD-2943	A

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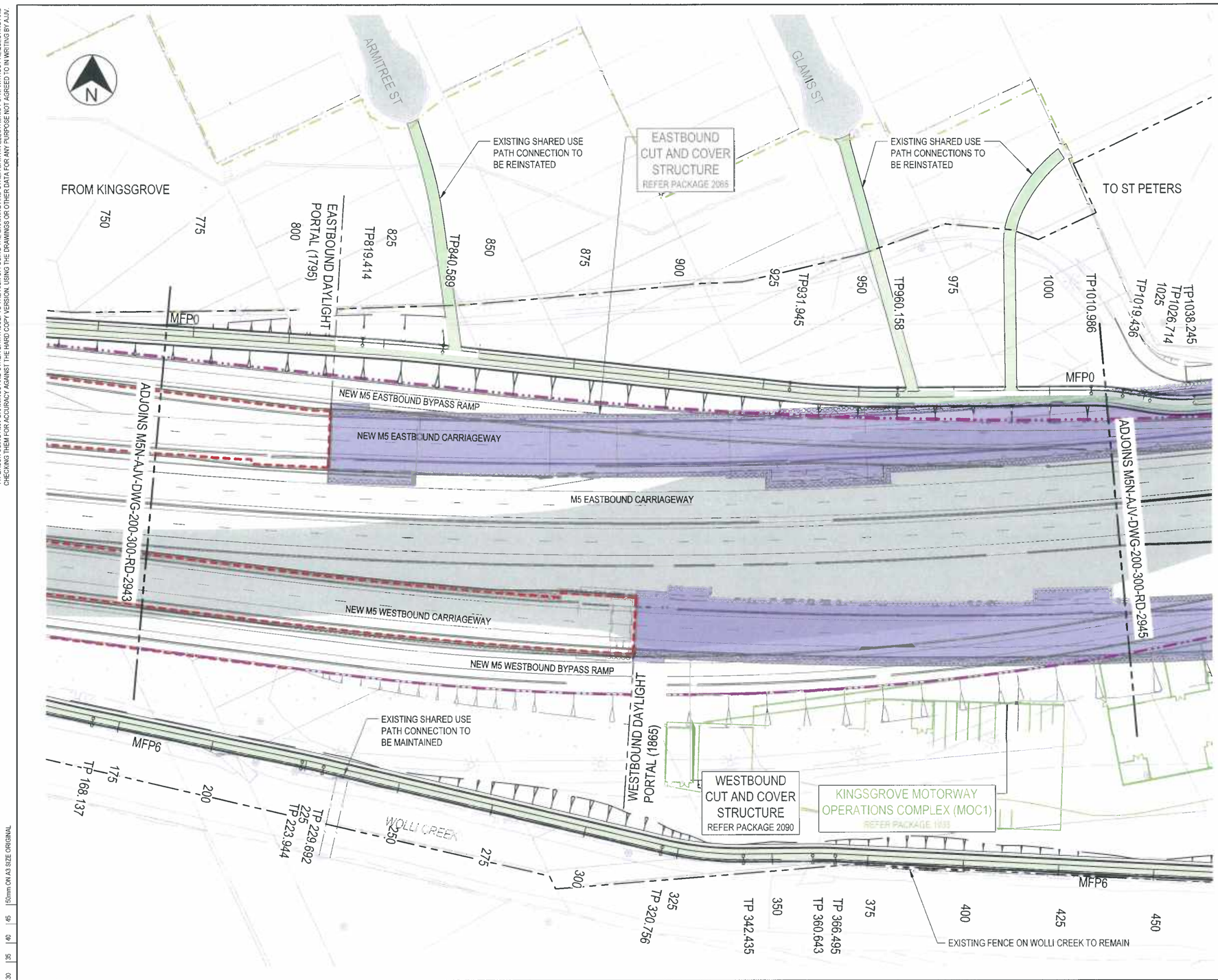

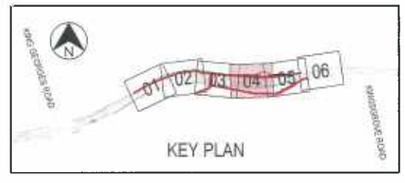

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A	22.04.2016	DEVELOPED CONCEPT DESIGN	M.P

PROJECT BREAKDOWN STRUCTURE: M5N-AJV-DPK-200-300-RD-2010

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CO-ORDINATE SYSTEM: MGA ZONE 56

HEIGHT DATUM: AHD

WestConnex New M5

AURECON JACOBS NEW M5 JOINT VENTURE

PLOT DATE / TIME: 22/04/2016 9:55:45 AM

PLOT BY: mthatcher

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DESIGN	M. JAMES	22.04.2016
DESIGN CHECK	A.GOSBY	22.04.2016
ZONE MANAGER	J. YIP	22.04.2016
DESIGN MANAGER	M.PERCIVAL	22.04.2016

CLIENT

DOCUMENT NUMBER: M5N-AJV-DWG-200-300-RD-2944

WESTCONNEX NEW M5

A3

WESTERN INTERCHANGE AND PORTALS
SHARED USE PATH GEOMETRY
PLAN

SHEET 4 OF 6

RMS REGISTRATION No.

ISSUE STATUS: DEVELOPED CONCEPT DESIGN

EDMS No.

SHEET No.: RD-2944

REV: A

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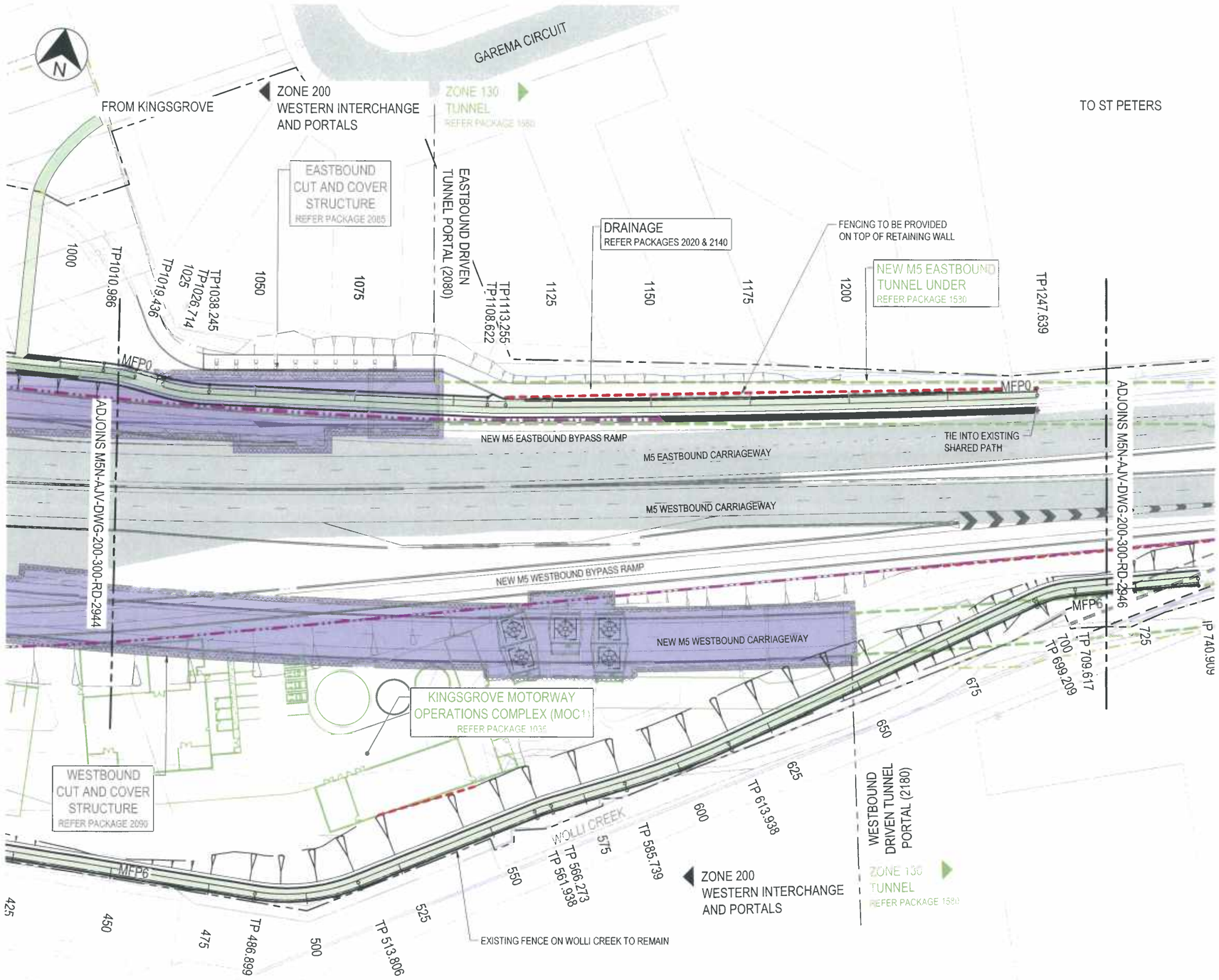

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- TEMPORARY WORK BOUNDARY
- SURVEY
- CADASTRAL
- KING GEORGE ROAD UPGRADE (BY OTHERS)
- EXISTING PAVEMENT
- CUT AND COVER STRUCTURE
- SHARED PATH
- MAINLINE TUNNEL
- RETAINING WALL
- NOISE WALL
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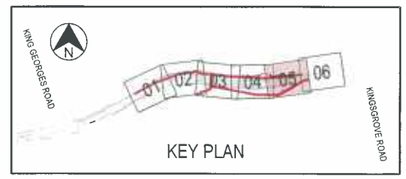
- BOUNDARY FENCE
- CYCLE SAFE BALUSTRADE
- MFPX — CONTROL LINE - SHARED PATH



KEY PLAN

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PROJECT BREAKDOWN STRUCTURE
M5N-AJV-DPK-200-300-RD-2010

SCALES ON A3 SIZE DRAWING
SCALE 1:1000 10 0 10 20 AT A3

CO-ORDINATE SYSTEM: MGA ZONE 56
HEIGHT DATUM: AHD

WestConnex New M5
CPB CONTRACTORS · DRAGADOS · SAMSUNG C&T · Golder Associates · HASSELL
AJV AURECON JACOBS NEW M5 JOINT VENTURE

PLOT DATE / TIME: 22/04/2016 9:56:04 AM
PLOT BY: mthatcher

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DESIGN CHECK	A.GOSBY	22.04.2016
ZONE MANAGER	J. YIP	22.04.2016
DESIGN MANAGER	M.PERCIVAL	22.04.2016

CLIENT

DOCUMENT NUMBER
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WESTCONNEX NEW M5

A3

WESTERN INTERCHANGE AND PORTALS
SHARED USE PATH GEOMETRY
PLAN

SHEET 5 OF 6

RMS REGISTRATION No.

ISSUE STATUS	EDMS No.	SHEET No.	REV
DEVELOPED CONCEPT DESIGN		RD-2945	A

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ANNEXURE 3

Inner West Bicycle Coalition response to cycling paths relating to the proposed M4-M5 Link.

342 Livingstone Road, Marrickville NSW 2204

20 June 2017

Tom Kennedy
Development Director
Sydney Motorway Corporation
Level 33, 259 George St Sydney NSW 2000

RE: Provision of Cycling Paths Relating to Proposed M4-M5 Motorway Link

Dear Tom,

The NSW Government, in the executive summary of SYDNEY'S CYCLING FUTURE Cycling for everyday transport, December 2013, states that "Our target is to increase the mode share of cycling in the Sydney metropolitan region for short trips that can be an easy 20 to 30 minute ride."
"The needs of people on bikes will be included throughout the planning of new and upgraded road, rail, bus and interchange projects, including corridor protection and the provision of infrastructure when projects are designed or constructed. Bicycle facilities will be identified and delivered parallel to major transport corridors, in partnership with local councils."

It also states that
"Future investment will aim for separation of bikes, vehicles and pedestrians wherever possible. Shared paths for bike riders and pedestrians will only be used where there are no other options and will be carefully designed to minimise conflict."

To this end, we propose the following Veloways and relate them to the additions listed on Pages 54 and shown in Figure 14.1 P55 of the Westconnex M4-M5 Link Concept Design May 2017

CityWest Cycle Link
This is a separated path from Iron Cove to Pyrmont Via the Glebe Island Bridge and would incorporate the following additions noted in the Concept Design:

1. A separated cycleway along Victoria Rd to the intersection of Roberts St ✓
2. A separated cycleway Springside St to the Iron Cove Bridge and the Bay Run ✓
3. An underpass under Victoria Rd to Bays Precinct ✓
4. A path from Victoria Rd to Lilyfield Light Rail Depot ✓
5. A path from Easton Park to the Crescent? If this goes to Whites Creek ✓

The following works are needed to make this a direct easy well-connected route route for all people to use:

A. Separated cycle and pedestrian paths along Iron Cove Creek from Parramatta Rd to Timbrell Park
B. A widened cutting on the north side of the light rail from Leichhardt North Light Rail Station to past Balmain Rd with parallel separated cycle and pedestrian paths installed along full length
C. a new bridge over Victoria Rd to join the new connection 1. Above
D. Link to Anzac Bridge
E. Link across refurbished old Glebe Island Bridge

342 Livingstone Road, Marrickville NSW 2204

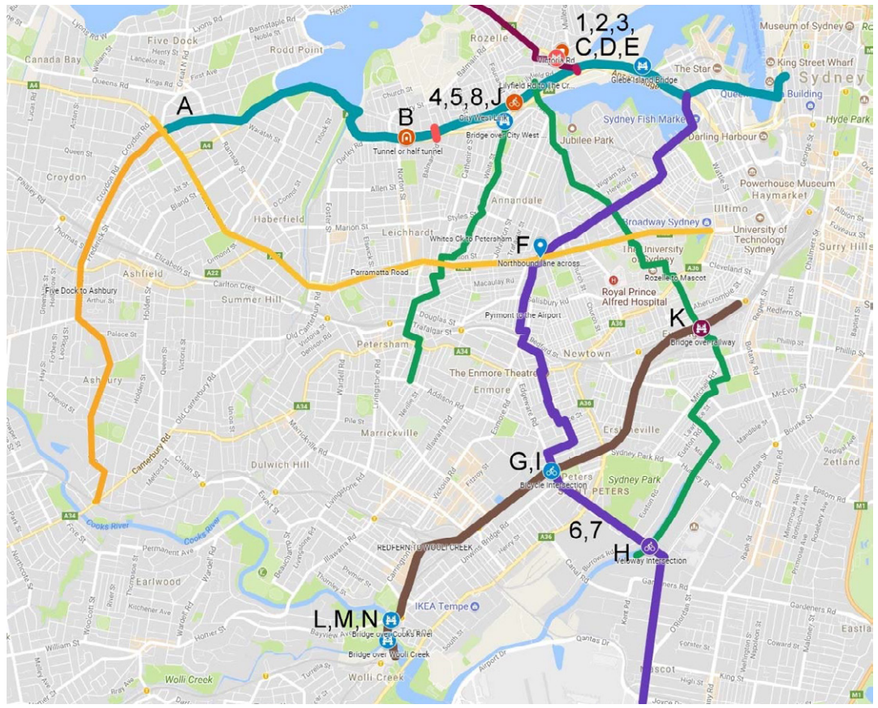


Fig 1 Key to Location of Projects

Pyrmont to the Airport
This route provides a central spine for those travelling from the city to the airport and would incorporate the following additions noted in the Concept Design:

6. A connection from Bedwin to Bourke Rd - see G below
7. Connect to North Side of Alexandria Canal Path?

The following works are needed to make this a direct easy well-connected route route for all people to use:

F. A new crossing over Parramatta Rd from Denison to Pyrmont Bridge Rd northbound
G. Extend the separate cycle path over railway to Darley St
H. Connect to the Alexandria Canal cycle Path (South side)
I. Connect to Camdenville Oval - see Inner West Council plans for a BMX park

342 Livingstone Road, Marrickville NSW 2204

Rozelle to Mascot
This Route links Rozelle to Mascot via Sydney University and the Advanced Technology Park and would incorporate the following additions noted in the Concept Design:

8. A connection to Lilyfield Rd on Gordon St✓

The following works are needed to make this a direct easy well-connected route route for all people to use:

J. A crossing of City West Link Rd to new separated cycle path to Jubilee Park
K. A bridge across the railway corridor at carriageworks

Redfern to Wolli Creek
This route will be formed along the rail corridor through the Everleigh redevelopment and the Bankstown Metro Rail line. The following works are needed to make this a direct easy well-connected route route for all people to use:

L. a cycle and pedestrian bridge over the Cooks River
M. a separated path along the Cooks River From Bayview Avenue to Discovery Point Park
N. A cycle and pedestrian bridge over Wolli Creek

These Veloways need to be separate from Pedestrian Paths
This is very important! Shared paths should be avoided where there is high use of cycling for transport, as per the NSW policy. People riding bicycles are required to give way to all pedestrians, and there are no rules about where pedestrians should walk etc, so progress on a bicycle can be very slow on a shared path.

6/20/2017 Bicycle Infrastructure as Part of M4-M5 Link Concept V2 - Google Docs

342 Livingstone Road, Marrickville NSW 2204



We would expect that these features be included in the conditions of consent provided by the Department of Planning for the M4-M5 Link ensuring a viable active transport network is provided as part of the project, in accordance with NSW Government policies.

regards,

John Caley,
President
Bike Marrickville
bikemarrickville@gmail.com

Neil Tonkin,
Advocacy Coordinator
Inner West Bicycle Coalition
neil.tonkin@ozemail.com.au

ANNEXURE 4

Wayfinding and signage.

WAYFINDING AND SIGNAGE

A key ATN design principle is to provide a direct route which is based on clear desire lines and is coherent in linking potential origins and destinations. This design principle is also reflected in the requirement to plan for an ATN which avoids complicated navigational requirements and enables cyclists to maintain momentum. Where a route is not direct these principles are typically compromised.

A key issue for the routes through the inner west is that the main direct routes are on heavily trafficked major regional roads. These direct routes typically require navigating bus stops, signalised intersections, greater conflict with requirements for parking and without separated cycleways provide a significantly lower levels of safety and significantly less attractive routes.

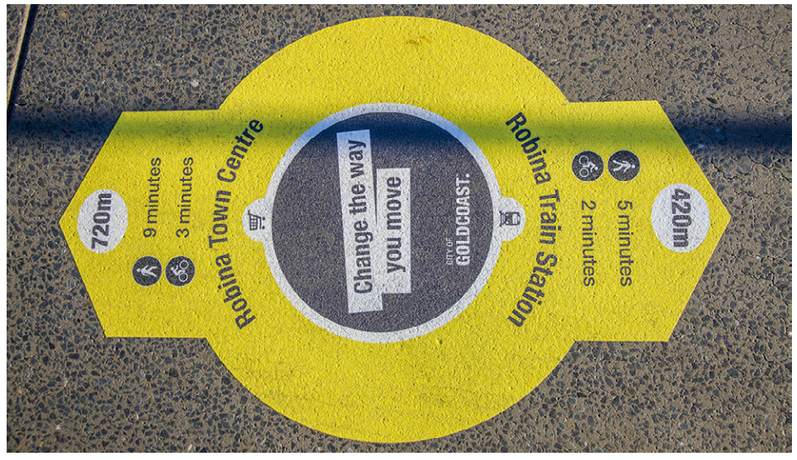
The alternative to these direct heavily trafficked routes is to use low traffic volume local streets. These streets generally provide more attractive routes for cycling, provide more interesting routes, involve less conflict with parking, typically do not have buses and have less complex intersections. However the main disadvantage of these routes is that they are not direct, and require linkages back into the main trip origins and trip destinations. These routes are also often not located on obvious desire lines as these routes tend to have less apparent connectivity compared to the main direct routes.

Hence there is a requirement for high quality wayfinding and signage. This is particularly important as many of the routes are not able to be followed intuitively. At present the current signage provides:

- Limited warning of route changes and route choices
- Limited information about destinations
- Often compromised locations of signage which may not be in a cyclist line of vision
- Are not consistently applied to the whole of a route such that it is not possible to rely on the signage for navigation
- Are not consistently applied at all points of route choices.



Cycle Path - London, England



Robina Town Centre Wayfinding - Gold Coast, Australia



Bike Parking - Copenhagen, Denmark



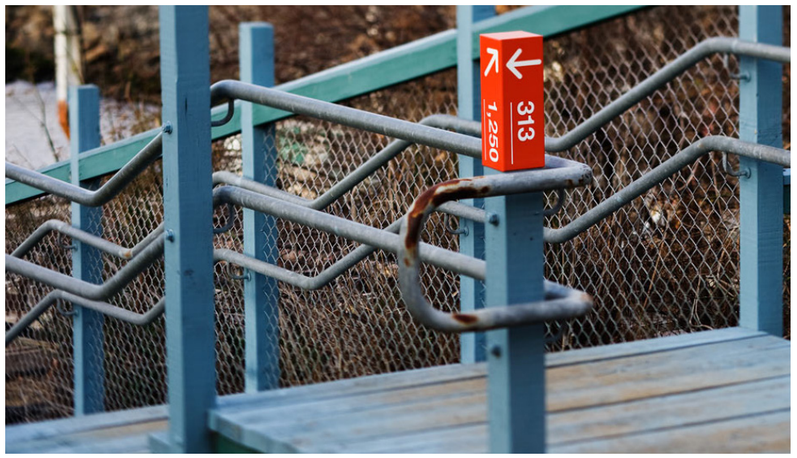
Cyclist Street Art

It is proposed to develop a high quality street signage strategy to be applied across the routes. This high quality signage is proposed to address the above issues by using clearly marked routes where navigation is necessarily complex. This signage is proposed to use distinct signage for different routes such that a route can be easily followed.

A well designed and creative example of this is the Battery Point Sculpture Trail which uses interpretive signage on existing street furniture elements in bright orange colour which are easily able to be spotted at distance and typically at or near eye level.

This could be combined with signage on the pavement which indicates that a route change or route choice is occurring such as the signage examples of Robina Town Centre Wayfinding and Frome Bikeway. These signages should be used to warn of an impending route change such that there is time to find the next route indicator and understand what is required to manoeuvre.

This signage strategy in the inner west could be creatively linked to the vibrant street art culture that is evident throughout the inner west including Council sponsored street art.



Battery Point Sculpture Trail - Hobart, Australia



Frome Bikeway - Adelaide, Australia



River Side - Los Angeles, California



Frome Bikeway - Adelaide, Australia

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