WestConnex

Australian Government
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NSW GOVERNMENT

M4-M5 Link

Environmental Impact Statement

August 2017

Appendices O to P

Volume 2G

Since finalisation of the Environmental Impact Statement, the project has been declared by Ministerial Order to be State significant infrastructure and critical State significant infrastructure under sections 115U (4) and 115V of the *Environmental Planning and Assessment Act 1979*. The Ministerial Order also amended Schedule 5 of *State Environmental Planning Policy (State and Regional Development) 2011*. The project remains subject to assessment under Part 5.1 of the *Environmental Planning and Assessment Act 1979* and requires the approval of the Minister for Planning.

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Volume 2G

Appendices

WestConnex

Appendix O

Technical working paper: Landscape and visual impact

WestConnex

Roads and Maritime Services

WestConnex – M4-M5 Link

Technical working paper: Landscape and visual impact

August 2017

Client: Roads and Maritime Services

ABN: 76 236 371 088

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Glossary of terms and abbreviations

Term	Definition
A	
Aboriginal Heritage Information Management System (AHIMS)	A register of NSW Aboriginal heritage information maintained by the NSW Office of Environment and Heritage
Alignment	The geometric layout (eg of a road) in plan (horizontal) and elevation (vertical)
AM peak hour	Unless otherwise stated, this refers to vehicle trips arriving at their destination during the average one-hour peak period between 7am-9am on a normal working weekday
Arterial roads	The main or trunk roads of the State road network
At-grade	A road at ground level, not on an embankment or in a cutting
B	
Bioretention facility	Landscaped depression designed to treat stormwater runoff to remove contaminants and sediment
C	
Campbell Road civil and tunnel site	A construction ancillary facility for the M4-M5 Link project at St Peters
Campbell Road motorway operations complex	An area where operational ancillary facilities are established. Located within the St Peters interchange, south of Campbell Road at St Peters, on land occupied during construction by the Campbell Road civil and tunnel site
Campbell Road ventilation facility	Ventilation supply and exhaust facilities, axial fans, ventilation outlets and ventilation tunnels. Located at St Peters, within the St Peters interchange site
Carriageway	The portion of a roadway used by vehicles including shoulders and ancillary lanes
Concept design	Initial functional layout of a road/road system or other infrastructure. Used to facilitate understanding of a project, establish feasibility and provide basis for estimating and to determine further investigations needed for detailed design
Congruent / congruous	A term used within the context of landscape character assessment meaning to agree or be harmonious or consistent in character
Construction	Includes all physical work required to construct the project
Construction ancillary facilities	Temporary facilities during construction that include, but are not limited to construction sites (civil and tunnel), sediment basins, temporary water treatment plants, pre-cast yards and material stockpiles, laydown areas, parking, maintenance workshops and offices
Cul-de-sac	A street or road that is open for vehicular traffic at one end only
Cumulative impacts	Impacts that, when considered together, have different and/or more substantial impacts than a single impact assessed on its own
Cut-and-cover	A method of tunnel construction whereby the structure is built in an open excavation and subsequently covered
Cutting	Formation resulting from the construction of the road below existing ground level, the material is cut out or excavated
D	
Darley Road civil and tunnel site	A construction ancillary facility for the M4-M5 Link project located at Leichhardt

Term	Definition
Darley Road motorway operations complex	An area where operational ancillary facilities are established. Located at Leichhardt, south of City West Link and the Inner West Light Rail line on land occupied during construction by the Darley Road civil and tunnel site
NSW Department of Planning and Environment (DP&E)	A department of the NSW Government responsible for effective and sustainable planning to support the growth in the state
Detailed design	The phase of the project following concept design where the design is refined, and plans, specifications and estimates are produced, suitable for construction
E	
Earthworks	All operations involved in loosening, excavating, placing, shaping and compacting soil or rock
Egress	Exit
Embankment	An earthen structure where the road (or other infrastructure) subgrade level is about the natural surface
Enabling works	Works which are required to enable the commencement of the main construction works
Entry ramp	A ramp by which one enters a limited-access highway/tunnel
Exit ramp	A ramp by which one exits a limited-access highway/tunnel
F	
F6 Extension (previously referred to as SouthLink)	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. The project is being delivered by NSW Roads and Maritime Services and would be subject to separate assessment and planning approval
Feasible and reasonable	Consideration of standard or good practice taking into account the benefit of proposed measures and their technological and associated operational application in the NSW and Australian context. 'Feasible' relates to engineering considerations and what is practical to build. 'Reasonable' relates to the application of judgement in arriving at a decision, taking into account mitigation benefits and cost of mitigation versus benefits provided, community expectations and nature and extent of potential improvements
G	
Grade	The rate of longitudinal rise (or fall) with respect to the horizontal expressed as a percentage or ratio
Grade separation	The separation of road, rail or other traffic so that crossing movements at intersections are at different levels
H	
Haberfield civil and tunnel site/Haberfield civil site	Construction ancillary facilities for the M4-M5 Link project located at Haberfield
Heritage item	Any place, building or object listed on a statutory heritage register
I	
Impact	Influence or effect exerted by a project or other activity on the natural, built and community environment
Inner West Council/ Inner West LGA	The amalgamation of the former local government areas of Ashfield Leichhardt and Marrickville, proclaimed on 12 May 2016
Inner West subsurface interchange	A subsurface interchange at Leichhardt and Annandale that would link the mainline tunnels with the Rozelle interchange and the Iron Cove Link

Term	Definition
Interchange	A grade separation of two or more roads with one or more interconnecting carriageways
Intrusive item	Place within a heritage conservation area that detracts from its heritage significance
Iron Cove Link	A one kilometre twin two-lane tunnel link to provide a connection between the Rozelle interchange and Victoria Road near the eastern abutment of Iron Cove Bridge
Iron Cove Link civil site	A construction ancillary facility for the M4-M5 Link project located at Rozelle
Iron Cove Link motorway operations complex	An area where operational ancillary facilities are established. Located south of the realigned Victoria Road carriageway between Callan Street and Springside Street at Rozelle, on land occupied during construction by the Iron Cove Link civil site
Iron Cove Link ventilation facility	Ventilation supply and exhaust facilities, axial fans, ventilation outlets and ventilation tunnels. Located at Rozelle
K	
King Georges Road Interchange Upgrade	A component of the WestConnex program of works. 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
L	
Landscape character	The aggregate of built, natural and cultural aspects that make up an area and provide a sense of place. Includes all aspects of a tract of land – built, planted and natural topographical and ecological features
Landscape design	The design of the natural and built environment. Soft landscape design involves design using vegetative materials such as trees, shrubs, groundcovers. Hard landscape design involves design using hard materials such as pavement, walls and ramps
Lane	A portion of the carriageway allotted for the use of a single line of vehicles
Landscape character zone or LCZ	An area of landscape with similar properties or strongly defined spatial qualities, distinct from areas immediately adjacent
M	
M4 East Motorway/project	A component of the WestConnex program of works. 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
M4 Widening	A component of the WestConnex program of works. Widening of the existing M4 Motorway from Parramatta to Homebush
M4-M5 Link	The project which is the subject of this EIS. A component of the WestConnex program of works
M5 East Motorway	Part of the M5 Motorway corridor. Located between Beverly Hills and Sydney Airport (General Holmes Drive)
M5 Motorway corridor	The M5 East Motorway and the M5 South West Motorway
M5 South West Motorway	Part of the M5 Motorway corridor. Located between Prestons and Beverly Hills
Mainline tunnels	The M4-M5 Link mainline tunnels connecting with the M4 East at Haberfield and the New M5 at St Peters
Median	The central reservation which separates carriageways from traffic travelling in the opposite direction

Term	Definition
Methodology	The method for analysis and evaluation of the relevant subject matter
Motorway	Fast, high volume controlled access roads. May be tolled or untolled
N	
New M5 Motorway/project	A component of the WestConnex program of works. Located from Kingsgrove to St Peters (under construction)
Northcote Street civil site	A construction ancillary facility for the M4-M5 Link project located at Haberfield
O	
Overbridge	Bridge which conveys another road, rail or pedestrians over the described road
P	
Parcel of land	Refers to an individual lot number (lot) and deposited plan (DP)
Parramatta Road corridor	The Parramatta Road corridor is the area from Parramatta CBD to Sydney CBD, generally between the Main Western Rail Line in the south and the Parramatta River to the north
Parramatta Road East civil site	A construction ancillary facility for the M4-M5 Link project at Haberfield
Parramatta Road ventilation facility	A ventilation facility located on the south-eastern corner of the Parramatta Road / Wattle Street intersection (referred to as the Eastern ventilation facility in the M4 East project EIS). The facility is being built as part of the M4 East project. As part of the M4-M5 Link project, fitout works would be carried out on a section of this facility
Parramatta Road West civil and tunnel site	A construction ancillary facility for the M4-M5 Link project at Ashfield
Pavement	The portion of a carriageway placed above the subgrade for the support of, and to form a running surface for, vehicular traffic
PM peak hour	Unless otherwise stated, this refers to trips travelling on the network during the average one-hour peak period between 3pm–6pm on a weekday
Portals	The locations where a tunnel meets a surface road
Project	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
Project footprint	The land required to construct and operate the project. This includes permanent operational infrastructure (including the tunnels), and land required temporarily for construction
Project land	Land that would be required to construction and operate the project
Property	Based on ownership, with the potential to contain more than one lot and Deposited Plan (DP)
Proponent	The person or organisation that proposes to carry out the project or activity. For the purpose of the project, the proponent is NSW Roads and Maritime Services
Pyrmont Bridge Road tunnel site	A construction ancillary facility for the M4-M5 Link project at Annandale

Term	Definition
R	
Remaining project land	Subject to future detailed design and the requirements of the project, parts of the project footprint not required for operational infrastructure and/or landscaping may be contemplated for separate future redevelopment. In some instances, areas of land may also be retained by Roads and Maritime for future (separate) road infrastructure projects. Where this is the case, the land would be rehabilitated and stabilised in preparation for the potential future use. This land is identified as remaining project land
Residual land	Land used to construct the project that is not required to operate the project or any other future (separate) road infrastructure project
Road reserve	A legally defined area of land where facilities such as roads, footpaths and associated features may be constructed for public travel
Roads and Maritime	NSW Roads and Maritime Services
Rozelle civil and tunnel site	A construction ancillary facility for the M4-M5 Link project located at Lilyfield and Rozelle
Rozelle East motorway operations complex	An area where operational ancillary facilities are established. Located at the western end of the Rozelle Rail Yards on land occupied during construction by the Rozelle civil and tunnel site
Rozelle interchange	A new interchange at Lilyfield and Rozelle that would connect the M4-M5 Link mainline tunnels with City West Link, Anzac Bridge, the Iron Cove Link and the proposed future Western Harbour Tunnel and Beaches Link
Rozelle Rail Yards	The Rozelle Rail Yards is bound by City West Link to the south, Lilyfield Road to the north, Balmain Road to the west, and White Bay to the east Note that the project only occupies part of the Rozelle Rail Yards site
Rozelle ventilation facility	Ventilation supply and exhaust facilities, axial fans, ventilation outlets and ventilation tunnels. Located at the Rozelle Rail Yards, the ventilation supply facility is located at the Rozelle West motorway operations complex and a ventilation exhaust facility at the Rozelle East motorway operations complex
Rozelle West motorway operations complex	An area where operational ancillary facilities are established. Located at the central/eastern end of the Rozelle Rail Yards, on land occupied during construction by the Rozelle civil and tunnel site
S	
Secretary's Environmental Assessment Requirements	Requirements and specifications for an environmental assessment prepared by the Secretary of the Department of Planning and Environment under section 115Y of the *Environmental Planning and Assessment Act 1979* (NSW)
Sensitive receiver/receptor	Includes residences, educational institutions (including preschools, schools, universities, TAFE colleges), health care facilities (including nursing homes, hospitals), religious facilities (including churches), child care centres, passive recreation areas (including outdoor grounds used for teaching), active recreation areas (including parks and sports grounds), commercial premises (including film and television studios, research facilities, entertainment spaces, temporary accommodation such as caravan parks and camping grounds, restaurants, office premises, retail spaces and industrial premises)
SMC	Sydney Motorway Corporation

Term	Definition
St Peters interchange	A component of the New M5 project, located at the former Alexandria Landfill site at St Peters. Approved and under construction as part of the New M5 project. Additional construction works proposed as part of the M4-M5 Link project
Staging	Refers to the division of the project into multiple contract packages for construction purposes, and/or the construction or operation of the overall project in discrete phases
Stockpile	Temporary stored materials such as soil, sand, gravel, spoil/waste
Stub tunnel	Driven tunnels constructed to connect to potential future motorway links
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
T	
The Crescent civil site	A construction ancillary facility for the M4-M5 Link project located at Annandale
Tunnel portal	The entrance/exit to the tunnel
Typical cross section	A cross section of a carriageway showing typical dimensional details, furniture locations and features of the pavement construction
U	
Urban design	The process and product of designing human settlements, and their supporting infrastructure, in urban and rural environments. Soft urban design involves design using vegetative materials such as trees, shrubs, groundcovers. Hard urban design involves design using hard materials such as pavement, walls and ramps
UDLP	Urban Design and Landscape Plan
V	
Ventilation facility	Facility for the mechanical removal of air from the mainline tunnels, or mechanical introduction of air into the tunnels. May comprise one or more ventilation outlets
Ventilation outlet	The location and structure from which air within a tunnel is expelled
Victoria Road civil site	A construction ancillary facility for the M4-M5 Link project located at Rozelle
Visual absorption capacity	This refers to the capacity of a landscape to accept a particular type of change without that change adversely impacting upon its character
Visual amenity	Pleasantness or attractiveness of a place or area
Visual ‘fit’	A term used within the context of landscape character assessment, describing the extent to which a project would be visually congruent with or absorbed into an existing landscape
VIA	Visual impact assessment
W	
Wattle Street civil and tunnel site	A construction ancillary facility for the M4-M5 Link project located at Haberfield
Wattle Street interchange	An interchange to connect Wattle Street (City West Link) with the M4 East and the M4-M5 Link tunnels. Approved and under construction as part of the M4 East project. Additional construction works proposed as part of the M4-M5 Link project

Term	Definition
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
WestConnex program of works	A program of works that includes the M4 Widening, King Georges Road Interchange Upgrade, M4 East, New M5 and M4-M5 Link projects

Executive summary

Project overview

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.

The concept design for the project is the subject of this Landscape and Visual Impact Assessment (LVIA) which provides:

- A project footprint, including for construction and operation
- A clear description of project elements and extent of impacts
- Design principles to inform development of the detailed design to a standard required to support project delivery.

The concept design presented in this report would continue to be refined through detailed design where relevant to improve road network and safety performance, minimise impacts on receptors and the environment and in response to feedback from the community and stakeholders.

Approach to landscape character and visual impact assessment

Secretary's Environmental Assessment Requirements (SEARs) have been issued for the project. This report responds to these requirements as they relate to visual amenity matters, specifically:

- Assessment of the visual impact of the project and any ancillary infrastructure on:
  - Views and vistas
  - Streetscapes, key sites and buildings
  - Heritage conservation areas and heritage items including Aboriginal places and environmental heritage
  - The local community (including view loss and overshadowing)
- 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.

The study area comprises land surrounding the project footprint where there is potential for landscape and visual impact. Specifically, the study area comprises a range of Landscape Character Zones (LCZs) that surround areas where operational facilities are proposed. These LCZs are determined based on factors such as topography, mix and period of housing types, diversity and mix of land uses. The study area also incorporates all identified sensitive visual receptor locations. The study area extents are shown in **Figure 5-1**, **Figure 5-12**, **Figure 5-64** and **Figure 5-87**.

Potential impacts on landscape character and sensitive visual receptors within the study area were assessed using the methods and techniques described in the *Environmental Impact Assessment Practice Note – Guidelines for Landscape Character and Visual Impact Assessment* (Roads and Maritime, 2013).

Existing environment

The existing environment of the study area is highly urbanised, comprising broadly of:

- Major roads such as City West Link and Parramatta Road and road/ commercial corridors such as Victoria Road and Princes Highway
- Residential areas including established low-density residential areas in parts of Lilyfield, Rozelle and Leichhardt and medium-density and high-density residential development, including parts of Rozelle and St Peters
- Commercial and industrial areas, predominantly alongside Sydney Park, Victoria Road, Rozelle Rail Yards and the marine and port areas of Rozelle Bay and White Bay
- Open space including King George Park and Easton Park in Rozelle, Buruwan Park and the Whites Creek corridor in Annandale, Blackmore Oval in Leichhardt and Sydney Park in St Peters.

This assessment assumes that the Rozelle Rail Yards site management works have been completed. These works include removal of waste, existing stockpiles and vegetation, removal of existing above ground rail infrastructure, and site stabilisation.

Overview of potential impacts

Impacts avoided or minimised

The project has gone through a process of design development, gradually refining it to the concept design that is presented within the environmental impact statement (EIS). The concept design has been developed and refined to avoid or minimise impacts where possible, including:

- The majority of road infrastructure is located below ground
- The Rozelle interchange was moved mostly underground, reducing visual impacts and facilitating the provision of open space including two major north south pedestrian / cycle connections over City West Link, linking Lilyfield with Rozelle, and one east west pedestrian / cycle connection under Victoria Road, with potential for future connection to The Bays Precinct
- Proposed ramps on Parramatta Road at Camperdown (the Camperdown interchange) were removed from the project which avoided visual impacts in a heritage sensitive area adjacent to the University of Sydney and Victoria Park
- Development of urban design master plans for Rozelle and Iron Cove, to guide future creation of landscaping and open space. Future development of the landscaping and open space areas would be subject to urban design and landscape plans (UDLP) as part of the detailed design of the project
- Relocation of proposed construction sites to avoid construction impacts to Easton Park, Blackmore Oval and Sydney Secondary College (Leichhardt)
- Revised design in the area east of Victoria Road to reduce land take surrounding the White Bay Power Station which is a State heritage listed item
- Re-use of existing construction sites from the M4 East at Haberfield and the New M5 at St Peters, to avoid further property acquisitions in those areas
- Investigation of the use of the M4 East mainline tunnels (when open to traffic) to remove/reduce spoil haulage from the surface road network where possible
- Where feasible, ventilation facilities have been located to provide reasonable separation distance to the closest sensitive receivers (at Rozelle, Iron Cove and St Peters).

Construction impacts

Through the assessment of construction sites, construction visual impacts have been identified to be highest (rated as either High or High-Moderate) for residential receptors. In particular, receptors in close proximity to the Wattle Street (C1a), Haberfield (C2a/C2b), Parramatta Road West (C1b), Darley Road (C4), Rozelle (C5), The Crescent (C6), Victoria Road (C7), Iron Cove Link (C8), Pyrmont Bridge Road (C9) and Campbell Road (C10) construction ancillary facilities.

Visual impacts during construction relate to building and tree removal, proximity of construction works to residences, potential visual impacts and overshadowing of residences from acoustic sheds, noise walls and hoardings, proximity to the construction of large elements such as ventilation facilities and night-time lighting impacts.

Operational impacts

Landscape character impact assessment

A total of 33 LCZs have been identified as described in **section 5.3**. The assessment of LCZs focuses on areas where permanent operational facilities are proposed. The assessment found the impacts on landscape character would be highest (rated as either High or High-Moderate) at the following locations (see **section 7.1**):

- LCZ 13 – Easton Park residential precinct (Rozelle) – while there would be no physical change or addition of project elements within this LCZ, the proposed ventilation facility and outlets within the Rozelle interchange (as part of the motorway operations complex) would comprise a new and uncharacteristic element in the outlook from this LCZ in terms of scale, mass and form of the structures
- LCZ 15 – White Bay Power Station precinct (Rozelle) – existing Victoria Road bridge (identified as a potential local heritage item) would be demolished and replaced with a new structure. Proposed planting of trees along Victoria Road south of power station would seek to minimise the visual impacts of the road infrastructure on the White Bay Power Station precinct. It is recommended that future planting in this area be undertaken in consultation with UrbanGrowth NSW to ensure a balanced outcome is achieved from a visual/landscape, heritage and active transport perspective
- LCZ 24 – Callan Park residential precinct (Rozelle) – comprising the loss of the 'protective' built form edge (from the demolition of properties along the southern side of Victoria Road) which provides visual and noise protection from the road corridor, with some residences likely to have increased views to Victoria Road. Land in this location that is not required for the operation of the project would be subject to future landscaping as outlined in the UDLP to be prepared in consultation with the local community
- LCZ 30 – Barwon Park precinct (St Peters) – adjoining Sydney Park. While this area will have undergone significant change in the landscape context due to the construction of the St Peters interchange and ancillary infrastructure and the widening of Campbell Road as part of the New M5 project, the ventilation facility proposed as part of the M4-M5 Link project (Campbell Road motorway operations complex) would nonetheless contribute to a substantial change in the outlook from, and backdrop, to this substantially residential precinct.

All State and locally listed Aboriginal and non-Aboriginal heritage items located within the LCZs have been taken into consideration when assessing the sensitivity of these zones and potential impacts. The desired future character for each of the LCZs was drawn from the objectives and controls/provisions set out in relevant strategic and statutory planning documents, and considered as part of the landscape character impact assessment.

Visual impact assessment

A total of 18 representative receptor locations with views across the project footprint were assessed for visual impact. Each of these was assessed for a range of different visual receptor types depending on the location. Visual receptor types include residents, pedestrians, public transport users, cyclists, motorists and recreational users.

The assessment identified that visual impacts may be beneficial in some instances (where the removal of industrial/commercial buildings may open or improve views, or the project would facilitate the development of open space, post-construction) and detrimental in other instances (where operational infrastructure is seen to be contrasting with existing views or settings). The assessment found that visual impacts of the project would be highest (rated as either High or High-Moderate) at the following locations:

- R5 (Rozelle Rail Yards (RRY)) – This receptor location is north of Easton Park. Visual impacts would be highest for residents surrounding Easton Park as well as recreational users of Easton Park, with a change to current views in response to the height and scale of the ventilation facility. The residences most impacted are between 250 and 350 metres from the ventilation facility, and are separated by some of the land within the Rozelle Rail Yards, Lilyfield Road and Easton Park. Recreational users, while experiencing a change in view, are temporary visitors to the area and would have shorter viewing durations of the project
- R6 (RRY) – This receptor location is Glebe Foreshore Parklands and represents views from passive and active recreational users (ie no residential receptors are represented by this view). Visual impacts to recreational users are anticipated, with a change to the current view across Rozelle Bay. This view currently includes the existing City West Link and The Crescent, and other significant infrastructure such as working port areas, White Bay Power Station, Glebe Island grain silos and Anzac Bridge. Visual impacts relate to the inability to screen a significant length of the project along the Victoria Road intersection, along the south side of City West Link between Anzac Bridge and James Craig Road. While the ventilation outlets would comprise contrasting elements within the immediate context, the separation distance (a minimum of 500 metres) and the overall extent of this view (having regard to the existing built form elements within the viewshed), would increase the capacity for the landscape to visually absorb these elements
- R7 (RRY) – This receptor location is the Rozelle Bay light rail stop adjacent to The Crescent, about 60 metres from the new land bridge crossing City West Link. Visual impacts would be highest for pedestrians, light rail patrons and nearby residents in Bayview Crescent and Railway Parade. These impacts relate to the change in view to the north, where the project would introduce new visual elements associated with the scale and contrasting form of the ventilation facility in the background, and the new pedestrian bridge in the foreground. The ventilation outlets would be highly visible given the removal of existing trees adjacent to the light rail stop, which currently provide visual screening from this outlook. However, landscaping has been recommended around all operational infrastructure within the new open space, which would provide screening of night lighting impacts viewed from this location and offer some softening of visual impacts of this infrastructure

  Increased night lighting impacts are also anticipated at this receptor location due to removal of screening vegetation at intersection of The Crescent/City West Link as viewed from multiple locations within nearby streets such as Bayview Crescent and Railway Parade, in contrast to the existing generally well screened and visually contained environment of Annandale
- IC4 (Iron Cove Link) – This receptor location is along Terry Street about 50 metres north of Victoria Road. Visual impacts would be highest for residents along the west side of Terry Street, as the ventilation outlet encroaches into the existing view seen from apartment balconies, partly obscuring distant views to Callan Park.

Two locations, located between 100 and 200 metres from the ventilation outlets, were assessed as having a high view loss impact as follows:

- Free-standing dwellings located on Foucart Street near the corner of Lilyfield Road – these dwellings look east across part of the Rozelle Rail Yards, and some have intermittent views of the city skyline
- Residences within the vicinity of Hutcheson Street and Denison Street near Lilyfield Road – these dwellings look south across the western part of the Rozelle Rail Yards, and have views east across Easton Park and part of the Rozelle Rail Yards to the city skyline.

The skyline views toward the city from these two locations have the potential to be interrupted by the ventilation facility, given the angle of view and the height and scale of the outlets extending into the view. Overall, the visual impacts of the project need to be considered within the context of the beneficial outcomes also arising from the project, including:

- The provision of open space by the project which would open up new views and active transport connections through the Rozelle Rail Yards
- Landscaping to enhance previously degraded areas and provide visual screening where appropriate
- Remaining project land that will be subject of UDLP, and developed in consultation with the local community.

Summary of mitigation response

Mitigation measures have been determined in response to identified local visual impacts. Some of these impacts can be mitigated by refinement of some aspects of the design during the detailed design phase. These include:

- Integrating the new open space at Rozelle with the Lilyfield Road streetscape through considered tree planting and associated landscape works
- Investigating measures during detailed design to reduce the height, bulk and scale of ventilation outlets at Rozelle, Iron Cove and St Peters, and provide materials/finishes that reduce impacts to sensitive visual receiver locations
- Consultation with UrbanGrowth NSW to ensure that in the area where the project interfaces with the White Bay Power Station precinct, the design achieves appropriate integration from a landscaping/ visual, heritage and active transport connectivity perspective
- At the St Peters interchange, making provision for soft landscape works within the motorway operations complex, which has substantial areas of hardstand visible from the public domain.

This landscape and visual impact assessment has taken a conservative approach within the context of the urban design process of the project. Infrastructure elements and facilities such as the ventilation outlets, water treatment plant and substations are at a conceptual stage of development, and are yet to have an architectural and urban design process applied to them. These infrastructure elements would be developed further during detailed design in accordance with the design principles detailed in the M4-M5 Link Urban Design Report Within this context, many of the assessment ratings within this report can be expected to be reduced as part of the detailed design phase.

1 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 (SSI) and also critical State significant infrastructure (CSSI). 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**.

Table 1-1 WestConnex and related projects

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.

Project	Description	Status
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). Also includes ramps and stub tunnels for 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.

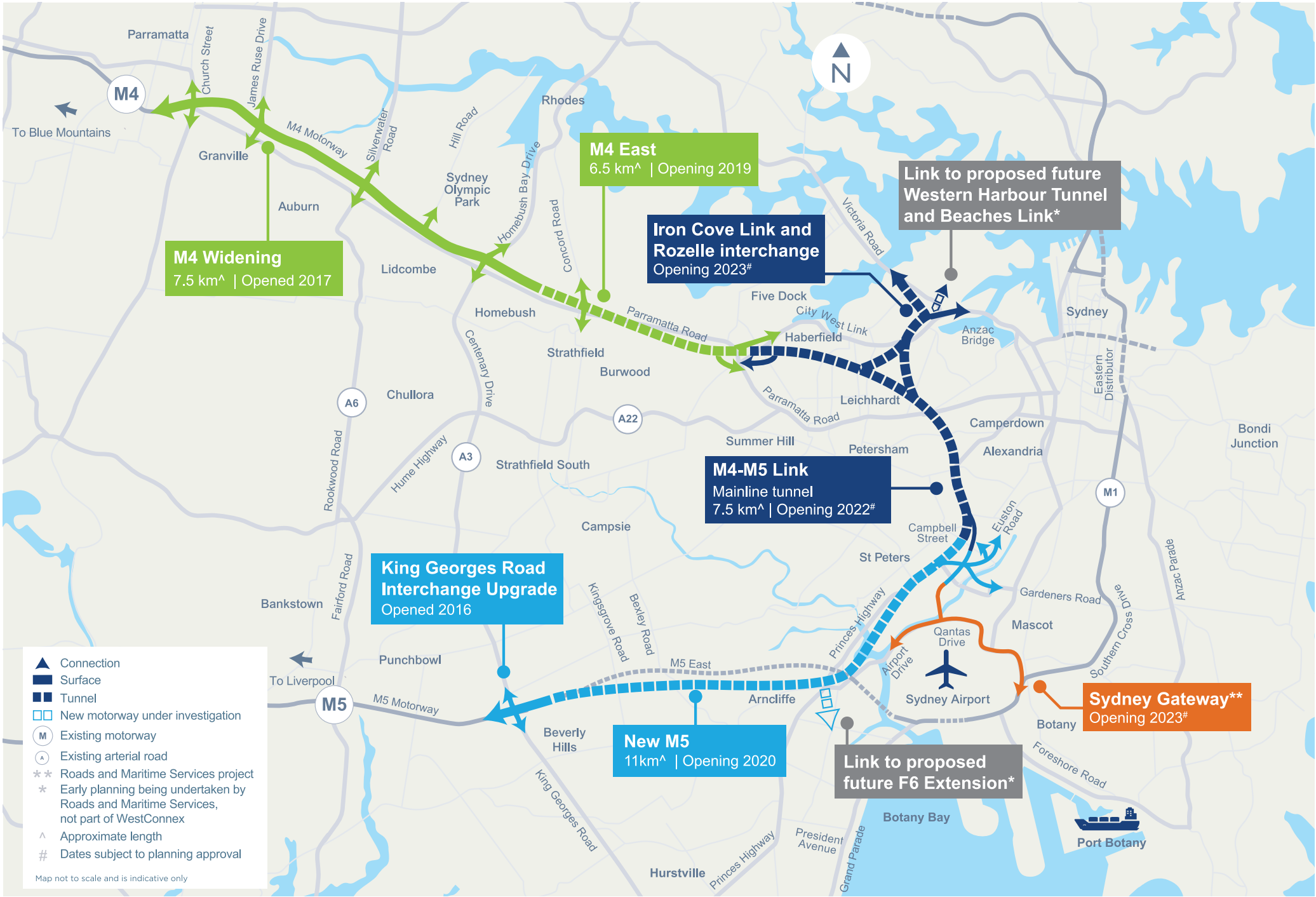

Figure 1-1 Overview of WestConnex and related projects

1.2 Purpose of this report

The purpose of this report is to inform the EIS for the project, including:

- Addressing the Secretary's Environmental Assessment Requirements (SEARs)
- Provision of a landscape character and visual impact assessment that considers the potential impacts (adverse and beneficial) that are likely to occur as a result of the project
- Identifying mitigation measures and design recommendations to avoid, minimise or improve, potential landscape and visual impacts.

It is noted that for the M4-M5 Link project, a design and construction contractor would be appointed to undertake the detailed design and construction planning following determination of this EIS, should it be approved. This means that the detail of the design and construction approach presented in this EIS (and this Landscape and Visual Impact Assessment (LVIA)) is indicative only and is subject to detailed design and construction planning to be undertaken by the successful contractor. However, the design presented by the contractor would need to be consistent with any environmental management measures and conditions of approval for the project.

1.3 Secretary's Environmental Assessments Requirements

The NSW Department of Planning and Environment (DP&E) has issued revised SEARs on 3 May 2017 that inform the environmental impact assessment. **Table 1-2** displays the SEARs that are specific to landscape and visual impact assessment, and also provides a cross reference to the relevant section(s) of this report that address these requirements.

Table 1-2 Relevant SEARs addressed in this report

SEARs		
Visual Amenity Requirements		
Requirement	**Desired Performance Outcome**	**Section where addressed in report**
8. Visual Amenity 1) Assess the visual impact of the project and any ancillary infrastructure on: a) views and vistas; b) streetscapes, key sites and buildings; c) heritage conservation areas and heritage items including Aboriginal places and environmental heritage; and d) the local community (including view loss and overshadowing). 2) 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.	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.	**Chapter 6** and **Chapter 7** **Appendix U** (Technical working paper: Non-Aboriginal heritage) of the EIS **Appendix M** (Shadow diagrams and overshadowing) of the EIS **Chapter 7** and **Chapter 9**

SEARs		
Urban Design Requirements		
Requirement	**Desired Performance Outcome**	**Section where addressed in report**
7. Urban Design 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 b) Identify measures aimed at improving 'north-south' connectivity between Balmain/Rozelle and Sydney Harbour c) Identify measures aimed at preserving the 'east-west' connectivity between White Bay and the Rozelle Rail Yards 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 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 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 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 h) Identify urban design strategies and opportunities to enhance healthy, cohesive and inclusive communities i) Describe urban design and landscape mitigation measures, having regard to the urban design and landscape objectives for the proposal	The project design complements the visual amenity, character and quality of the surrounding environment. The project contributes to the accessibility and connectivity of communities.	These requirements are addressed in **Appendix L** (Urban Design Report) of the EIS Evaluation of the visual impacts and urban design aspects of the proposal (7f) is addressed in this Landscape and Visual Impact Assessment Report in Sections 7.1 and 7.2. Urban design and landscape mitigation measures (i) are addressed in this Landscape and Visual Impact Assessment Report in **Chapter 9**.

1.4 Relationship to other reports in the EIS

The LVIA should be read in conjunction with the following EIS chapters and appendices:

- EIS **Chapter 5** (Project description): this chapter describes the project, including detailed description of infrastructure to be delivered by the project through to operation
- EIS **Chapter 6** (Construction work): this chapter describes the activities to be undertaken within the construction footprint for the project
- EIS **Chapter 12** (Land use and property): this chapter details the assumptions for future use of sites not required for the ongoing use of the motorway
- EIS **Appendix L** (Urban Design Report): this describes the master plan for the Rozelle interchange and Iron Cove Link, as well as the urban design principles to be adopted by the project throughout design development
- EIS **Appendix M** (Shadow diagrams and overshadowing): this provides shadow diagrams that depict potential overshadowing impacts provided by the key built form elements of the project
- EIS **Appendix N** (Technical working paper: 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 U** (Technical working paper: Non-Aboriginal heritage): this report identifies listed and potential heritage items that may be impacted by the project, and provides an assessment of these items with regard to direct (ie demolition) and indirect (ie visual, vibration) impacts.

1.5 Structure of this report

The document has been divided into the following key sections:

Chapter 2 – Describes the project

Chapter 3 – Outlines the assessment methodology undertaken

Chapter 4 – Describes the policy and planning framework context for the landscape and design elements of the project

Chapter 5 – Describes the existing landscape character and visual setting of the project

Chapter 6 – Assesses the potential visual impacts of the project during construction

Chapter 7 – Assesses the potential visual and landscape character impacts and urban design components of the project during operation

Chapter 8 – Assesses the potential cumulative impacts of the project

Chapter 9 – Details the proposed management measures required to mitigate impacts

Chapter 10 – Provides a conclusion to the report.

2 The project

2.1 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 2-1**.

2.2 Overview of the project

Key components of the project are shown in **Figure 2-1** 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 east of Parramatta Road near Alt Street at Haberfield
  - Entry and exit ramp connections between the mainline tunnels and the Wattle Street interchange at Haberfield. With the exception of the entry and exit ramp connections, the Wattle Street interchange is being constructed as part of the M4 East project
  - Minor physical integration works with the surface road network at the Wattle Street interchange (constructed as part of the M4 East project) 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 Canal Road and Bakers Lane at St Peters
  - Entry and exit ramp connections between the mainline tunnels and the St Peters interchange at St Peters. The St Peters interchange will be built as part of the New M5 project
  - Minor physical integration works with the surface road network at the St Peters interchange (constructed as part of the New M5 project) 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 mainline tunnels with:
  - City West Link
  - Anzac Bridge
  - The Iron Cove Link (see below)
  - The proposed future Western Harbour Tunnel and Beaches Link (see below)
- 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 works, 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 the 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 proposed 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.

2.2.1 Staged construction and opening of the project

It is anticipated the project would be constructed and opened to traffic in two stages (as shown in **Figure 2-1**).

Stage 1 would include:

- Construction of the mainline tunnels between the M4 East at Haberfield and the New M5 at St Peters, stub tunnels to the Rozelle interchange (at the Inner West subsurface interchange) and ancillary infrastructure at the Darley Road motorway operations complex (MOC1) and Campbell Road motorway operations complex (MOC5)
- These works are anticipated to commence in 2018 with the mainline tunnels open to traffic in 2022. At the completion of Stage 1, the mainline tunnels would operate with two traffic lanes in each direction. This would increase to generally four lanes at the completion of Stage 2, when the full project is operational.

Stage 2 would include:

- Construction of the Rozelle interchange and Iron Cove Link including:
  - Connections to the stub tunnels at the Inner West subsurface interchange (built during Stage 1)
  - Ancillary infrastructure at the Rozelle West motorway operations complex (MOC2), Rozelle East motorway operations complex (MOC3) and Iron Cove Link motorway operations complex (MOC4)
  - Connections to the surface road network at Lilyfield and Rozelle
  - Construction of tunnels, ramps and associated infrastructure as part of the Rozelle interchange to provide connections to the proposed future Western Harbour Tunnel and Beaches Link project
- Stage 2 works are expected to commence in 2019 with these components of the project open to traffic in 2023.

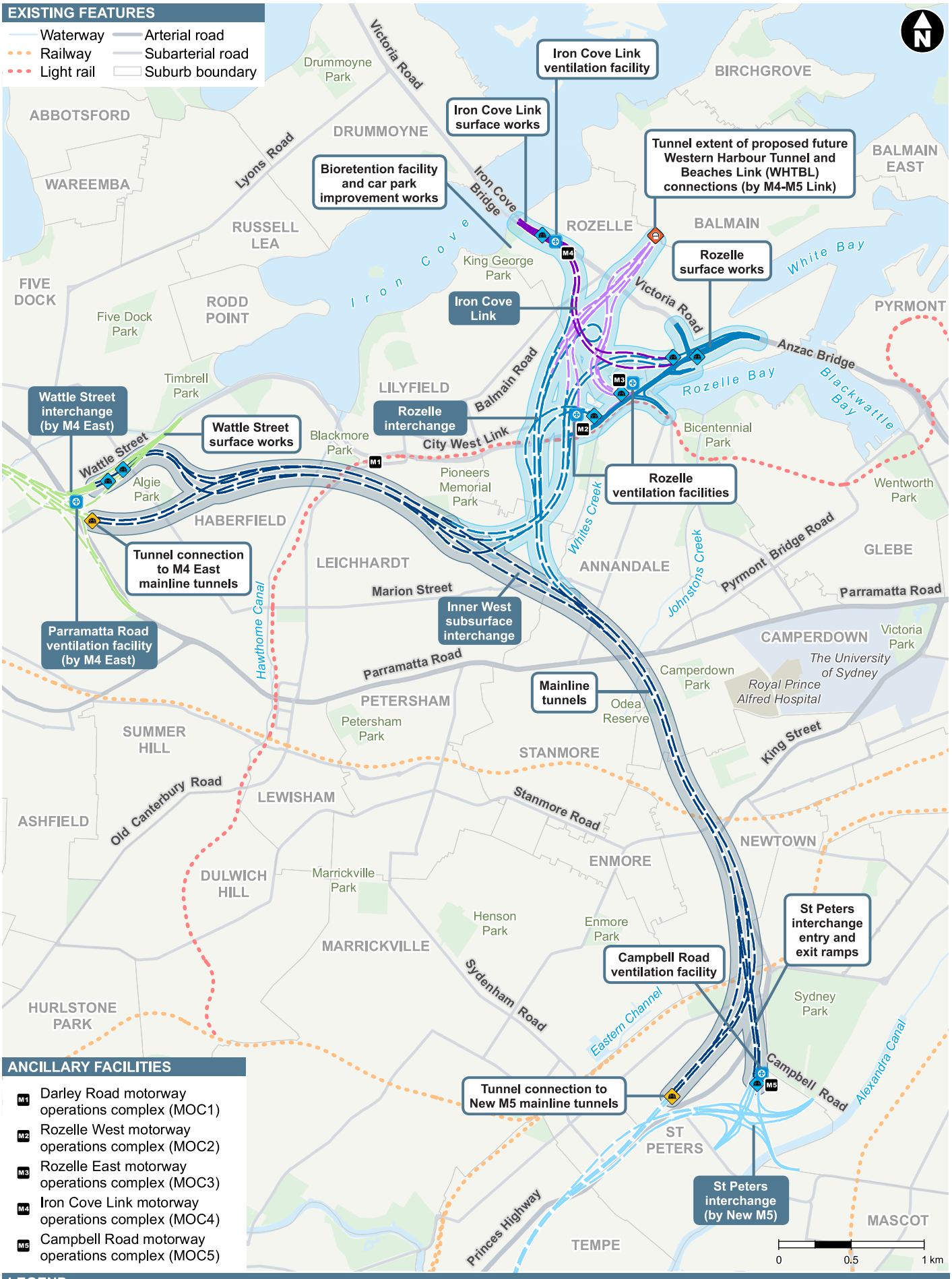

Figure 2-1 Overview of the project

2.3 Construction activities

An overview of the key construction features of the project is shown in **Figure 2-2** and would generally include:

- Enabling and temporary works, including provision of construction power and water supply, ancillary site establishment including establishment of acoustic sheds and construction hoarding, demolition works, property adjustments and public and active transport modifications (if required)
- Construction of the road tunnels, interchanges, intersections and roadside infrastructure
- Haulage of spoil generated during tunnelling and excavation activities
- Fitout of the road tunnels and support infrastructure, including ventilation and emergency response systems
- Construction and fitout of the motorway operations complexes and other ancillary operations buildings
- Realignment, modification or replacement of surface roads, bridges and underpasses
- Implementation of environmental management and pollution control facilities for the project.

A more detailed overview of construction activities is provided in **Table 2-1**.

Table 2-1: Overview of construction activities

Component	Typical activities
Site establishment and enabling works	• Vegetation clearing • Utility works • Traffic management changes and measures • Install safety and environmental controls • Install site fencing and hoarding • Demolition of buildings and structures and site clearing • Heritage salvage or conservation works (if required) • Establish construction ancillary facilities and access • Supply utilities (including construction power) to construction facilities • Establish temporary pedestrian and cyclist diversions
Tunneling	• Construct temporary access tunnels • Excavation of mainline tunnels, ramps and associated tunneled infrastructure • Spoil management and haulage • Finishing works in tunnel and provision of permanent tunnel services • Testing of plant and equipment
Surface earthworks and structures	• Vegetation clearance and topsoil stripping • Excavate new cut and fill areas • Construct dive and cut-and-cover tunnel structures • Construct required retaining structures • Excavate new road levels
Bridge works	• Construct piers and abutments • Construct headstock • Construct bridge deck, slab and girders • Demolish and remove redundant bridges

Component	Typical activities
Drainage	• Construct new pits and pipes • Construct new groundwater drainage system • Connect drainage to existing network • Construct sumps in tunnels as required • Construct water quality basins, constructed wetlands and bioretention facility • Construct drainage channels • Construct spill containment basin • Construct onsite detention tanks • Adjustments to existing drainage infrastructure where impacted • Carry out widening and naturalisation of a section of Whites Creek • Demolish and remove redundant drainage
Pavement	• Lay select layers and base • Lay road pavement surfacing • Construct pavement drainage
Operational ancillary facilities	• Install ventilation systems and facilities • Construct water treatment facilities • Construct fire pump rooms and install water tanks • Test and commission plant and equipment • Construct electrical substations to supply permanent power to the project
Finishing works	• Line marking of new road surfaces • Erect directional and other signage and other roadside furniture such as street lighting • Erect toll gantries and other control systems • Construct pedestrian and cycle paths and walkways • Earthworks at disturbed areas to establish the finished landform • Landscaping works • Site demobilisation and preparation of the site for a permissible future use

Twelve construction ancillary facilities are described in this EIS (as listed below). To assist in informing the development of a construction methodology that would manage constructability constraints and the need for construction to occur in a safe and efficient manner, while minimising impacts on local communities, the environment, and users of the surrounding road and other transport networks, two possible combinations of construction ancillary facilities at Haberfield and Ashfield have been assessed in this EIS. The construction ancillary facilities that comprise these options have been grouped together in this EIS and are denoted by the suffix a (for Option A) or b (for Option B).

The construction ancillary facilities required to support construction of the project include:

- Construction ancillary facilities at Haberfield (Option A), comprising:
  - Wattle Street civil and tunnel site (C1a)
  - Haberfield civil and tunnel site (C2a)
  - Northcote Street civil site (C3a)
- Construction ancillary facilities at Ashfield and Haberfield (Option B), comprising:
  - Parramatta Road West civil and tunnel site (C1b)
  - Haberfield civil site (C2b)
  - Parramatta Road East civil site (C3b)
- Darley Road civil and tunnel site (C4)

- Rozelle civil and tunnel site (C5)
- The Crescent civil site (C6)
- Victoria Road civil site (C7)
- Iron Cove Link civil site (C8)
- Pyrmont Bridge Road tunnel site (C9)
- Campbell Road civil and tunnel site (C10).

The number, location and layout of construction ancillary facilities would be finalised as part of detailed construction planning during detailed design and would meet the environmental performance outcomes stated in the EIS and the Submissions and Preferred Infrastructure Report and satisfy criteria identified in any relevant conditions of approval.

The construction ancillary facilities would be used for a mix of civil surface works, tunnelling support, construction workforce parking and administrative purposes. Wherever possible, construction sites would be co-located with the operational footprint to minimise property acquisition and temporary disruption. The layout and access arrangements for the construction ancillary facilities are based on the concept design only and would be confirmed and refined in response to submissions received during the exhibition of this EIS and during detailed design.

2.3.1 Construction program

The total period of construction works for the project is expected to be around five years, with commissioning occurring concurrently with the final stages of construction. An indicative construction program is shown in **Table 2-2**.

Table 2-2: Indicative construction program

Construction activity	Indicative construction timeframe																							
	2018				2019				2020				2021				2022				2023			
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
Mainline tunnels																								
Site establishment and establishment of construction ancillary facilities			■	■	■	■	■	■	■	■														
Utility works and connections			■	■	■	■	■	■																
Tunnel construction				■	■	■	■	■	■	■	■	■	■											
Portal construction				■	■	■	■	■																
Construction of permanent operational facilities												■	■	■	■	■								
Mechanical and electrical fitout works														■	■	■								
Establishment of tolling facilities															■	■								
Site rehabilitation and landscaping																■	■	■	■					
Surface road works																	■	■	■					
Demobilisation and rehabilitation																			■	■				
Testing and commissioning																■	■	■	■	■				
Rozelle interchange and Iron Cove Link																								
Site establishment and establishment of construction ancillary facilities				■	■	■	■	■																
Utility works and connections and site remediation				■	■	■	■	■																
Tunnel construction									■	■	■	■	■	■	■	■	■							
Portal construction						■	■	■	■															
Construction of surface road works						■	■	■	■	■	■	■	■	■	■	■	■	■	■	■				
Construction of permanent operational facilities						■	■	■	■	■	■	■	■	■	■	■								
Mechanical and electrical fitout works													■	■	■	■	■	■	■	■				
Establishment of tolling facilities																		■	■					
Site rehabilitation and landscaping																			■	■				
Demobilisation and rehabilitation																						■	■	
Testing and commissioning																			■	■	■	■	■	

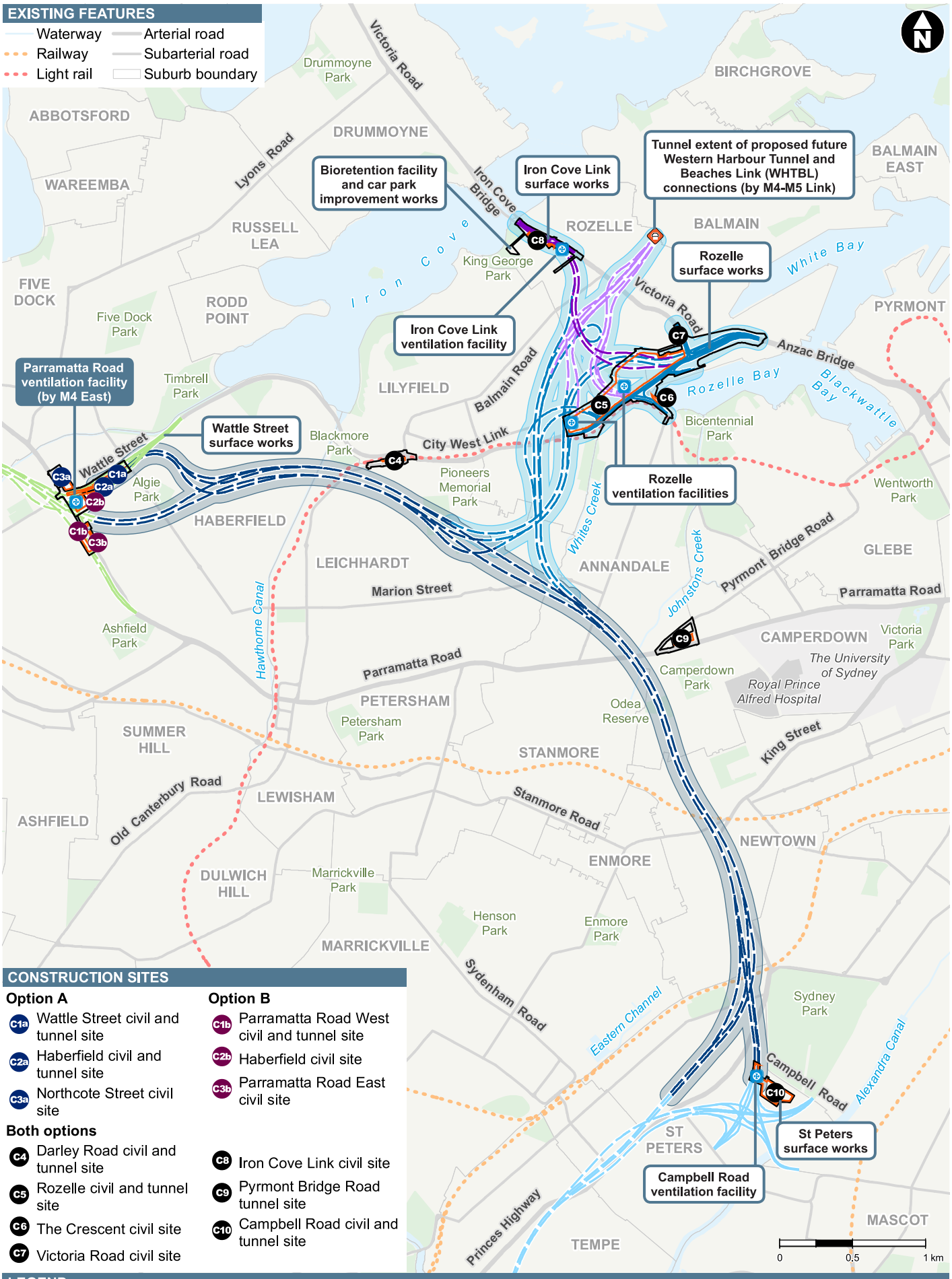

Figure 2-2 Overview of project footprint and ancillary facilities

2.4 Overview of urban design

This section provides a brief summary of the urban design for the project. For further detailed information, refer to **Appendix L** (Urban Design Report) of the EIS. The urban design of the M4-M5 Link project is concentrated on the following locations where permanent infrastructure would be constructed:

- Wattle Street interchange at Haberfield (subject of the M4 East urban design and landscape plan (UDLP))
- Darley Road motorway operations complex (MOC1) at Leichhardt
- Rozelle interchange at Lilyfield and Rozelle and ancillary infrastructure including the Rozelle West motorway operations complex (MOC2) and the Rozelle East motorway operations complex (MOC3), including the ventilation outlets
- Iron Cove Link tunnel portals and ancillary infrastructure comprising the Iron Cove Link motorway operations complex (MOC4), including the ventilation outlet, at Rozelle
- St Peters interchange at St Peters (subject of the New M5 UDLP) and ancillary infrastructure comprising the Campbell Road motorway operations complex (MOC5), including the ventilation outlets (subject to UDLP for M4-M5 Link project)
- Other areas of remaining project land that would be subject to the M4-M5 Link UDLP.

The concepts and principles outlined in the M4-M5 Link UDLP would be developed during detailed design. The M4-M5 Link UDLP would relate to the UDLPs that would be prepared for the other stages of WestConnex, particularly at Haberfield and St Peters. The detailed design for these sites would include:

- Land use for remaining project land
- Design and material composition for built form structures
- Landscape design
- Heritage interpretation where nominated
- Crime Prevention Through Environmental Design (CPTED) review of design.

The urban design of the M4-M5 Link project would seek to integrate with surrounding neighbourhoods, particularly at these areas of surface intervention, guided by the urban design principles outlined in **Appendix L** (Urban Design Report) of the EIS. The urban design principles that have been developed for the project are consistent with the key urban design guidelines and policies including *Beyond the Pavement: Urban Design Procedures and Design Principles* (Roads and Maritime, 2014) and include:

- 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 space
- 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.

Further detail on these urban design principles can be found in **Appendix L** (Urban Design Report) of the EIS.

2.4.1 Wattle Street interchange

The urban design outcome at the Wattle Street interchange would be delivered to be consistent with the M4 East UDLP, which is being prepared to be consistent with the EIS and conditions of approval for the M4 East project. The design for the Wattle Street interchange as outlined in the Draft M4 East UDLP (Hassell, 2016) draws on the character of the adjoining Reg Coady Reserve and the parklands that run alongside Iron Cove Creek, which consist of large canopy trees and open grassed parkland. It includes widened verges and a widened central median area of the reconstructed Wattle Street to present significant and extensive new areas of 'green volume'.

The proposed landscape works of the Wattle Street interchange, taken from **Appendix L** (Urban Design Report) of the EIS, is shown in **Figure 2-3**. An artist impression of the Wattle Street interchange, as presented in the Draft M4 East UDLP (Hassell, 2016), is provided in **Figure 2-4**.

Figure 2-3 Haberfield master plan (source: Appendix L (Urban Design Report) of the EIS)

Figure 2-4 Artists impression of the Wattle Street interchange (source: Draft M4 East UDLP (Hassell, 2016)

2.4.2 Darley Road

A motorway operations complex would be located at Leichhardt, at part of the Darley Road site, on land between City West Link to the north and Darley Road to the south, adjacent to the Leichhardt North Light rail stop. The motorway operations complex would be located on the western portion of the site and would include the following elements as shown on **Figure 2-5**:

- Water treatment plant
- Substation
- Car parking for maintenance staff
- Access from Darley Road into the site.

Key urban design and landscape principles proposed for the motorway operations complex would include ensuring the scale of built form respects the existing landscape character with materiality that is sympathetic to the quality of the local area, and providing landscape works around the motorway operations complex. The remainder of the Darley Road site would be remaining project land and rehabilitated for future development or use in accordance with the Residual Land Management Plan (RLMP).

Figure 2-5 Artist's impression at 12–18 months of operation from near the corner of Darley Road and Charles Street looking east to the Darley Road motorway operations complex

Note: Photomontage prepared by McGregor Coxall (2017)

2.4.3 Rozelle Interchange and surrounding surface works

A new interchange at Lilyfield and Rozelle would connect the mainline tunnels with the Iron Cove Link and the surface road network at City West Link and Victoria Road/Anzac Bridge. It would also allow for the future connection to the Western Harbour Tunnel and Beaches Link.

The final urban design form being delivered by the project for the Rozelle interchange, comprising open space, landscaping and active transport links, would be refined during detailed design. The urban design master plan in Figure 2-6 has been prepared to demonstrate how the principles established for the final end state would be implemented in the development and refinement of the project. This is shown in more detail on **Figure 2-7** to **Figure 2-11**. Future development possibilities within the new open space created by the project at Rozelle are presented in Chapter 6 of **Appendix L** (Urban Design Report) of the EIS. While such future development is not proposed to be delivered by the project, the project would help facilitate such development opportunities, including active recreational uses, to be coordinated and delivered by others.

Above ground motorway structures

The three ventilation outlets at the Rozelle ventilation facility would be 35 metres in height (above existing ground level) and would be sited near the intersection of City West Link, The Crescent and the proposed future Western Harbour Tunnel and Beaches Link entry and exit ramps. Their design, including material and colour choice, would respond to the local character which includes the White Bay Power Station chimneys and Anzac Bridge pylons.

The air intake facility, water treatment facility and electricity substation within the Rozelle interchange would be designed in a manner that allows them to become recessive elements within the overall park design. Elements such as the water treatment facility and ventilation facilities are co-located within the landscape to offer more functional space to the community.

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

Active transport links

The design for the interchange aims to connect currently separated communities by the inclusion of new active transport links. Connections are proposed between Rozelle, White Bay and the Inner West Light Rail, with active transport links along the spine of the site. This includes two bridges which would create north–south connections across City West Link - a pedestrian and cycle land bridge near The Crescent which would feature planting across its span and a bridge further to the west near Brennan Street.

Recreational open space

With the intended future growth in the area (particularly with regard to The Bays Precinct), the Rozelle master plan aims to deliver much needed quality open space and passive recreational space. This open space could be further developed in the future for specific recreational purposes based on community consultation/feedback. Significant tree planting along the perimeter of the site would continue the canopy of surrounding areas. Large grassed areas would be complemented by tree planting and garden beds to create a series of spaces that could accommodate a range of future uses according to community needs.

Whites Creek naturalisation

Flood mitigation works would be undertaken along Whites Creek between the light rail bridge and Rozelle Bay. The flood mitigation works would include widening and improvement works to the channel and naturalisation of the creek banks downstream of the new The Crescent bridge. The creek design would aim to deliver a similar outcome to that of the planned Sydney Water – Whites Creek Naturalisation works upstream, including sandstone block walls and saltmarsh area.

Heritage interpretation

Heritage interpretation would be developed as part of the UDLP and implemented to identify and interpret the key heritage values and stories of the heritage areas affected by the project, in accordance with the NSW Heritage Division guidelines. This may include interpretative initiatives including integration of the rail related infrastructure (lighting tower and rail gantries) which are being salvaged as part of the Rozelle Rail Yards site management works into the design of the open space at the Rozelle Rail Yards, where possible.

Figure 2-6 Rozelle interchange Master Plan