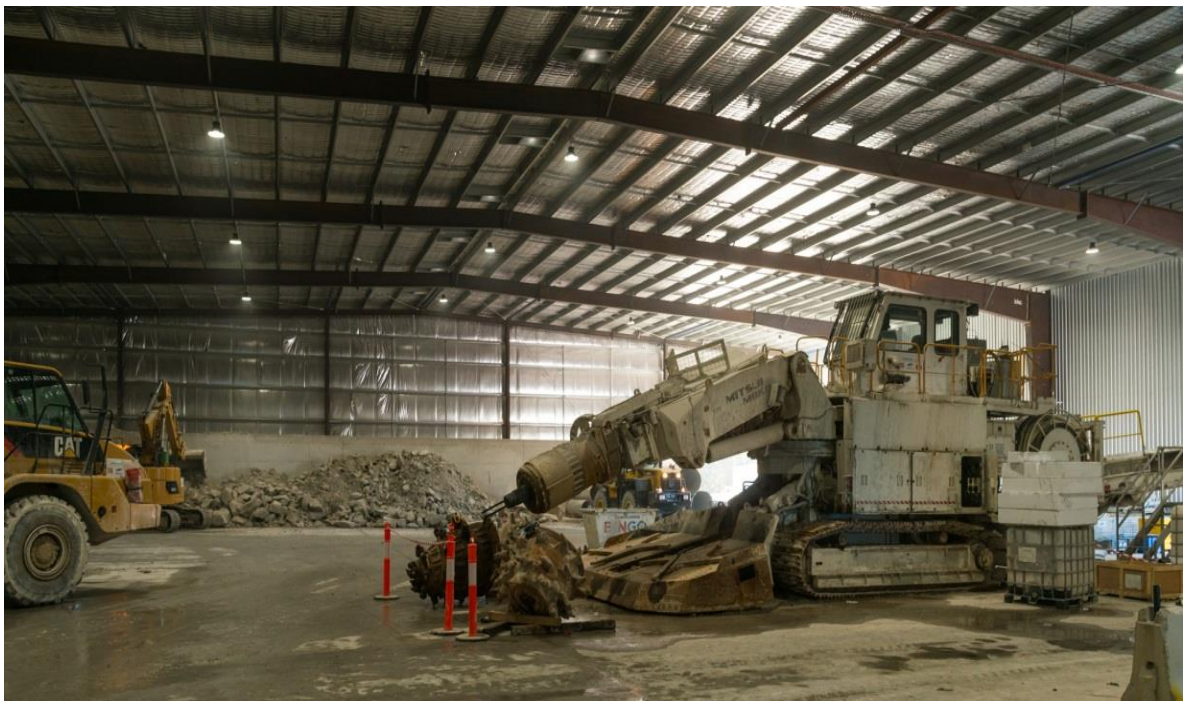
STATE SIGNIFICANT INFRASTRUCTURE ASSESSMENT:
WestConnex Stage 3 – M4-M5 Link
SSI 7485



Environmental Assessment Report under
Section 5.18 of the
Environmental Planning and Assessment Act 1979

March 2018

Cover Photograph: Roadheader within an acoustic shed (Source: EIS)

Published March 2018
NSW Department of Planning & Environment
www.planning.nsw.gov.au

EXECUTIVE SUMMARY

The Proposal

Roads and Maritime Services (the Proponent), proposes to construct the M4-M5 Link proposal (the project), as part of the WestConnex program of works. WestConnex comprises a 33 kilometre motorway designed to improve connections between industrial, commercial and residential areas in Sydney's west, east and south-west, by creating road network links between the Sydney Central Business District (CBD) and the Parramatta CBD. The M4-M5 Link is the third and final stage of WestConnex, forming the link between the M4 East at Haberfield and New M5 at St Peters. The component stages and projects of WestConnex are summarised in the table below.

WestConnex Stages	Projects	Current Status
Stage 1	M4 Widening (Parramatta to Homebush)	Construction complete
	M4 East	Approved and under construction
Stage 2	The New M5	Approved and under construction
	King Georges Road Interchange Upgrade	Construction complete
Stage 3	**M4-M5 Link**	**The subject of this report**

The M4-M5 Link involves building twin tunnels of approximately 7.5 kilometres in length between Haberfield and St Peters, including associated surface works to connect to the existing road network. It also includes an interchange at Rozelle with provision for a future connection to the Western Harbour Tunnel and Beaches Link as well as an underground tunnel from the Rozelle Interchange to Victoria Road near Iron Cove Bridge, known as the 'Iron Cove Link'. Construction and operation of the project will be in two stages with the mainline tunnel (stage 1) opened to traffic in 2022 and the Rozelle Interchange and the Iron Cove Link (stage 2) becoming operational approximately 12 months later.

Motorway operation centres would be established at 7 Darley Road, Leichhardt, the former Rozelle Rail Yards (two), Victoria Road near Iron Cove and Campbell Road at St Peters. Three ventilation outlet facilities would be constructed – one at Iron Cove on Victoria Road, one in the former Rozelle Rail Yards and one at the future St Peters Interchange.

The project will involve the transformation of the disused Rozelle Rail Yards into up to a 10 hectare parcel of open space which will be available for use by the community. New and upgraded pedestrian and cyclist infrastructure will also be provided at Rozelle and Annandale, including a land bridge linking the open space at Rozelle to the foreshore parks adjacent to Rozelle Bay at Annandale.

The Sydney Motorway Corporation is responsible for the delivery of WestConnex, on behalf of RMS, with construction by the private sector. However, RMS will deliver the proposed Rozelle Interchange and the Iron Cove Link.

Need and Justification

Sydney's road and motorway network support economic growth across NSW by connecting people to jobs, facilitating trade between businesses and providing infrastructure to support freight movements. As Sydney's population and economy continue to grow, efficient transport systems become increasingly important in servicing future growth.

The *Future Transport Strategy 2056* (2018) indicates that growth in the population in Sydney will mean that transport networks will need to handle 28 million trips a day. Further, freight movements are expected to double in Greater Sydney over the next 40 years. Consequently, congestion on the road network will increase if improvements are not made. WestConnex is expected to deliver broad economic benefits to NSW in the order of $24.3 billion over its lifespan through improved access to and reliability of the motorway network, enabling more efficient freight movements, journeys to work and connectivity to and from businesses and services (*WestConnex Strategic Business Case 2015*).

The Department considers that the M4-M5 Link will increase the efficiency of the road network by providing a link between the M4 East and the New M5 tunnels, thereby completing the WestConnex network. Specifically, the project will:

- assist in reducing future traffic volumes on north-south and east-west road corridors, including City West Link and parts of Victoria Road;
- enhance the benefits achieved by the operations of the M4 East and New M5 projects by reducing traffic volumes on Parramatta Road, Southern Cross Drive, the Princes Highway, King Georges Road and the M5 East Motorway;
- facilitate enhanced connectivity between the western suburbs, and provide links to population and employment growth centres in Parramatta and Western Sydney;
- provide safer, faster and more reliable travel times for motorists, bus services and freight journeys on Sydney's road network; and
- enable future opportunities for improved connectivity in Sydney's transport network to be realised by allowing for connections to the proposed Western Harbour Tunnel and Beaches Link project to the north and to the proposed Sydney Gateway project and the proposed future F6 Extension (via the New M5 project) to the south.

Furthermore, the project is strategically justified and consistent with the government's key priorities and transport planning framework and is one of a number of road and public transport priority projects being undertaken by the NSW government.

State Significant Infrastructure
The proposal is State Significant Infrastructure (SSI) and has also been declared Critical State Significant Infrastructure (CSSI) because it is deemed essential for the State. The Minister for Planning is the approval authority.

Consultation
The Environmental Impact Statement (EIS) was publicly exhibited from Friday 18 August 2017 until Monday 16 October 2017 (a total of 60 days). More than 13,300 submissions were received from 7,951 individual submitters, special interest groups and businesses. Three submissions were received from local councils and nine submissions from State government agencies. One supplementary public submission and nine additional public submissions were received outside of the exhibition period.

Key issues raised in the submissions included:

- traffic and transport impacts, including road and pedestrian safety;
- noise and vibration;
- air quality and human health impacts;
- groundwater and surface water impacts;
- urban design and visual amenity; and
- social and economic impacts.

Following the exhibition period, the Department of Planning and Environment directed the Proponent to prepare a response to the submissions. The Proponent provided a Submissions

and Preferred Infrastructure Report (SPIR) which addressed the issues raised in the submissions and changes to the project since the exhibition of the EIS. The SPIR was published on the Department's website on 5 February 2018.

The Department has undertaken and participated in stakeholder and community consultation as part of its assessment of the project. This has included engagement with Leichhardt Against WestConnex on two occasions to discuss its concerns with the project, particularly the use of 7 Darley Road, Leichhardt for both the construction and operation of the project. In addition, the Department has responded to enquiries from the general public on the planning assessment process and impacts of the project. Ongoing engagement with agencies and councils has also occurred throughout the assessment process.

The Department considers that community engagement should be ongoing throughout the detailed design and construction of the project. Consequently, the recommended conditions of approval provide for the appointment of a Public Liaison Officer charged with responsibility for assisting the public with questions that they may have on construction activities. The Department has also recommended the appointment of a Community Complaints Mediator, and for the community to be represented on the Air Quality Community Consultative Committee which would be involved with establishing air quality monitoring stations. The community would also be consulted on a range of management plans that must be developed and implemented during the construction of the project including Construction Environmental Management Plans and the Urban Design and Landscape Plan.

Key Assessment Issues

Traffic and Transport

The Department has considered traffic and transport impacts during the construction and operational stages, which included advice and recommendations from an independent traffic consultant.

High volumes of heavy vehicle movements are an inevitable consequence of construction on such a large scale as that for the M4-M5 Link, especially when tunnelling will generate significant quantities of spoil. The establishment of the proposed truck marshalling facility at White Bay will alleviate some of the key community concerns as it will provide a location where haulage vehicles can wait thereby reducing the potential for heavy vehicles to park, circle through and idle in local neighbourhoods while waiting to be called onto a construction site.

Although construction traffic impacts will be unavoidable, they can be appropriately managed and would be addressed through the implementation of a Construction Traffic and Access Management Plan, a Construction Parking and Access Strategy, and the Site Establishment Management Plan. In combination, implementation of the management measures detailed in these plans would ensure that traffic, parking and access management measures are implemented to minimise impacts on the surrounding road network, ensure that spoil haulage occurs along approved routes, and facilitate the safe movement of construction traffic to and from compound sites and safe pedestrian and cyclist access around construction sites.

A key operational benefit of the project will be to remove vehicles from surface roads into the tunnel system and free up capacity on the broader surface network for shorter point-to-point trips. The project is also a critical connection for the future Western Harbour Tunnel and Northern Beaches projects which will create a bypass of the Sydney CBD, ANZAC and Sydney Harbour Bridge.

Although the project will provide regional benefits, localised impacts are predicted to occur with increased traffic volumes forecast along surface roads in the vicinity of the proposed interchanges. The Department has recommended the preparation and implementation of a Road Network Performance Plan prior to the operation of the project which sets out measures to manage predicted

localised traffic impacts. The measures would be implemented by the Proponent in consultation with local councils. The Department has also recommended the preparation of an Operational Road Network Performance Review post operation to confirm the adequacy of the implemented mitigation measures and consider whether further measures may be required. Any further measures would be implemented in accordance with the timeframes set out in the Review.

Noise and Vibration

Noise and vibration impacts are expected to occur throughout the construction of the project with surface road and interchange works likely to have the greatest noise impacts. The degree of construction noise and vibration impacts reflects the scale of the project and surrounding urbanised environment. Noise impacts would occur around construction ancillary facilities and surface works sites, with site establishment and utility works generating significant noise, even with standard mitigation applied.

Tunnelling will take place 24 hours a day, seven days a week and should not generate perceivable air borne noise. Noise from spoil management activities will be largely mitigated as they will be undertaken inside acoustic sheds.

The Proponent has committed to a range of mitigation measures to improve the management of noise and vibration impacts and the Department is supportive of these measures. However, the Department considers that the Proponent must be more proactive in its management of noise impacts, particularly as there will be substantial amount of works being undertaken outside of standard construction hours.

Of particular concern to the Department is the need to address highly noise affected receivers, the engagement of the community in relation to respite, the management of respite periods, and the need to address construction fatigue associated with concurrent infrastructure projects. The Department has recommended conditions to address these matters, which will be managed through the preparation and implementation of a Construction Noise and Vibration Management Plan and Noise Insulation Program. These measures will be overseen by an Acoustic Advisor.

To manage noise impacts once the project is operational, a combination of project controls and property treatments are proposed. These measures are supported by the Department and the Department requires the implementation of these measures as early as possible during construction to minimise construction noise impacts. The Department has also recommended the implementation of an Operational Noise Management Plan and Operational Noise and Vibration Review to ensure that noise and vibration levels generated by the project would comply with project specific noise criteria.

Air Quality

The qualitative risk assessment of construction air quality impacts identified the generation and control of fugitive dust emissions to be the main air quality issue. The Department is satisfied that construction air quality impacts can be effectively managed to acceptable levels through the implementation of the best practice control measures proposed by the Proponent.

The Department has considered the air quality outcomes during the operational stage (both in-tunnel and adjacent to the ventilation facilities), which included advice and recommendations from an independent air quality specialist. The Department has recommended ambient air quality goals and limits on in-tunnel concentrations of key pollutants to ensure acceptable air quality outcomes. Strict notification and reporting requirements for exceedances of ambient and in-tunnel air quality limits have also been imposed. These

conditions, and the Department's assessment have been informed by the advice provided by the Advisory Committee on Tunnel Air Quality, NSW Health and EPA.

The Department has also recommended an Air Quality Community Consultative Committee be established comprising representative from the community and local councils. The Committee would have a consultative role on the air quality management plans and the siting of monitoring locations.

Under the Premier's recently announced reforms for regulation of emissions from tunnel ventilation facilities, the Environment Protection Authority will be responsible for regulating the ventilation outlets of the M4-M5 Link, including setting emission limits.

The Department is satisfied that the changes in health risk associated with the project across the local area will be acceptable and will include improvements in some areas, including when measured against a no project scenario. However, it is acknowledged that elevated levels of pollutants will occur at some locations, such as adjacent to ANZAC Bridge and St Peters, under the worst-case scenario as a result of increased vehicle numbers and emissions along surface roads on the approach to and exiting from the St Peters and Rozelle surface Interchanges. However, the health risk associated with these increases is predicted to be acceptable.

Open Space, Urban Design, Trees and Landscaping

Visual impacts of the project primarily relate to surface infrastructure, in particular the ventilation outlets at the Rozelle Interchange and Iron Cove, the motorways operation complexes, and elevated pedestrian and cycle paths. The greatest visual change resulting from the project will be the transformation of the Rozelle Rail Yards from a disused parcel of land into up to 10 hectares of accessible and valuable open space for the local community.

The Department engaged an independent urban design consultant to review the urban design elements of the project and provide recommendations for enhancing the design outcomes. The independent consultant commended the design and recommended eight consolidated principles for the project to better align with the intention of the NSW Government Architect Office's *Better Placed: A design led approach.*

To ensure design excellence and enhancement of the public domain, the Department considers it necessary for the project to be refined in collaboration with design experts and has proposed the establishment of a Design Review Panel. The Department has also recommended the preparation of an Urban Design and Landscape Plan to ensure that the final project design, particularly of ventilation outlets, is sympathetic with the surrounding urban context and built form, and that opportunities to enhance visual amenity, landscaping and usability of open spaces have been incorporated into the design.

The Proponent has proposed new active transport network infrastructure connecting the Rozelle Rail Yards with the wider pedestrian and cyclist network, including two north–south pedestrian and cyclist bridges over City West Link (one of which will be a land bridge) and an east-west underpass below Victoria Road. The new infrastructure will reduce the risk for conflict between user groups whilst providing north/south connectivity across an otherwise impermeable corridor. The Department considers that the active transport network could be further enhanced through the provision of improved connectivity for cyclists and pedestrians between Roberts and Springside Streets, Rozelle and has recommended this action.

Land Use, Social and Economic

The acquisition of land is an unavoidable impact of delivering major road infrastructure projects in highly urbanised environments. However, this impact has been greatly reduced with most of the project being below ground. The Proponent has committed to providing assistance to

those households and businesses being acquired. Not all of the lands acquired for construction will be needed for the operation of the project (or future road projects). The return of such land will be managed through a Residual Land Management Plan, prepared in consultation with the relevant local councils.

There is the potential for damage to property and infrastructure to occur as a result of settlement induced by tunnelling and groundwater drawdown. To minimise the potential for settlement impacts, the Department has recommended a suite of settlement-related conditions including preparation of a geotechnical model to assess potential settlement, settlement criteria, monitoring requirements, pre- and post-construction dilapidation surveys, and requirements for rectifying any damage to property and infrastructure arising from settlement.

Groundwater

The project alignment is located in an area of varied geological composition and aquifers. Tunnelling will result in groundwater drawdown which in turn will affect groundwater flows and potentially result in diminished groundwater quality as a result of saline intrusion.

The Department engaged an independent groundwater consultant to provide recommendations for managing potential groundwater impacts. Based on the consultant's advice and recommendations made by the Department of Primary Industries, the Department has recommended the Proponent undertake further groundwater modelling and monitoring and produce a Groundwater Modelling Report to confirm the project impacts based on detailed design. "Make good" provisions for groundwater users must be applied where construction or operation of the project is found to impact on registered groundwater bores.

The design standard for groundwater inflows, based on other tunnels in the Sydney Basin, is one litre per second over any given kilometre of tunnel (1L/s/km). The Proponent has indicated uncertainty in achieving this design standard for the entire tunnel length in a cost-effective manner. Approximately three kilometres of the mainline tunnels will be tanked to reduce excessive groundwater inflows with shotcreting proposed in areas of lesser inflow rates. The Department considers that all practical engineering measures should be applied throughout the length of the tunnel to achieve the 1L/s/km inflow rate and where this cannot be achieved justification must be provided.

Utility Works

Utility works have the potential to adversely impact on the amenity of the community as a large portion of the works may need to be undertaken outside of standard construction hours and will generate high levels of noise. The number, duration and management of utility relocations and upgrades associated with the WestConnex program of works is of significant concern to the community and they are seeking assurances that the management of both contestable and non-contestable utilities works will be improved in the case of the M4-M5 Link.

The Proponent has prepared a Utilities Management Strategy which includes the establishment of a Utilities Coordination Committee to coordinate contestable and non-contestable utilities works, with an outcome of ensuring respite periods are provided. The Committee will comprise representatives from the utility providers, the construction contractors, and key stakeholders including local and state government agencies.

The appointment of a Utility Coordination Manager with responsibility for the coordination of utilities works and provision of advice on upcoming utility works, has been recommended by the Department. The Utility Coordination Manager would also investigate complaints regarding utility works that are referred via the Proponent's complaint management system, and from the Community Complaints Mediator.

Other Issues
The assessment concludes that relevant impacts of other issues such as fire and hazard risks, flooding, soils and contamination, water quality, greenhouse gas emissions and heritage can be appropriately managed through the implementation of mitigation measures and safeguards, as proposed in the Environmental Impact Statement and as recommended by the Department.

Conclusions and Recommendations
The M4-M5 Link is a critical component of the WestConnex program of works which in turn is key to achieving the Government's transport policy and objectives and providing an efficient link in the Sydney orbital motorway network and in the national freight network. The project is justified by providing safer, faster and more reliable travel for motorists, and an alternative route for heavy vehicles.

The Department has assessed the Proponent's EIS, SPIR and submissions on the project and considers that there are a number of constraints to the project that will need to be carefully managed. These include construction noise, air quality (operational), construction traffic, groundwater, social and land use impacts. Consequently, the Department has recommended stringent conditions of approval in regards to these matters.

Overall, the potential environmental impacts associated with construction and operation would be acceptable subject to the implementation of appropriate mitigation measures. On balance, the project's benefits outweigh its potential impacts and it is therefore in the public interest that the project proceeds.

The project would comply with the objects of the *Environmental Planning and Assessment Act 1979*, including the new objects relating to the sustainable management of built and cultural heritage and to promote good design and amenity of the built environment. It would also comply with the principles of Ecologically Sustainable Development and can proceed in a sustainable manner.

ABBREVIATIONS

ACTAQ	NSW Advisory Committee for Tunnel Air Quality
ADT	Average Daily Traffic
ANZECC	Australian and New Zealand Environment Conservation Council
ARI	Average Recurrence Interval
ASS	Acid Sulfate Soils
ATC	Automated Traffic Count
AWT	Average Weekday Traffic
CBD	Central Business District
CPTED	Crime Prevention Through Environmental Design
CSSI	Critical State Significant Infrastructure
Department	Department of Planning and Environment
DPI	Department of Primary Industries
DRP	Design Review Panel
EIS	Environmental Impact Assessment
EPA	Environment Protection Authority
EP&A Act	*Environmental Planning and Assessment Act 1979*
EPL	Environment Protection Licence
ESD	Ecologically Sustainable Development
ICNG	Interim Construction Noise Guideline
INP	NSW Industrial Noise Policy
ISCA	Infrastructure Sustainability Council of Australia
LGA	Local Government Area
LoS	Level of Service
Minister	Minister for Planning
NCA	Noise Catchment Areas
NML	Noise Management Level
NSW Health	Department of Health
OEH	NSW Office of Environment and Heritage
PMF	Probable Maximum Flood
Proponent	Roads and Maritime Services
RMS	NSW Roads and Maritime Services
RNP	NSW Road Noise Policy
RWR receptors	Residential, workplace and recreational receptors
Secretary	Secretary of the Department of Planning and Environment
SPIR	Submissions and Preferred Infrastructure Report
UDLP	Urban Design and Landscape Plan
WRTM	WestConnex Road Traffic Model

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1. BACKGROUND

WestConnex is a proposed 33 kilometre motorway linking western Sydney with south-western Sydney via the Inner West. It is being delivered by the Sydney Motorway Corporation (SMC) on behalf of Roads and Maritime Services (RMS, the Proponent) in three stages, with Stages 1 and 2 (M4 Widening, M4 East, King Georges Road Interchange Upgrade and New M5) having already been approved. The M4-M5 Link proposal (the project) is the third and final stage, forming the link between the M4 East at Haberfield and New M5 at St Peters. **Figure 1** shows the location of the M4-M5 Link within the broader WestConnex Motorway program.

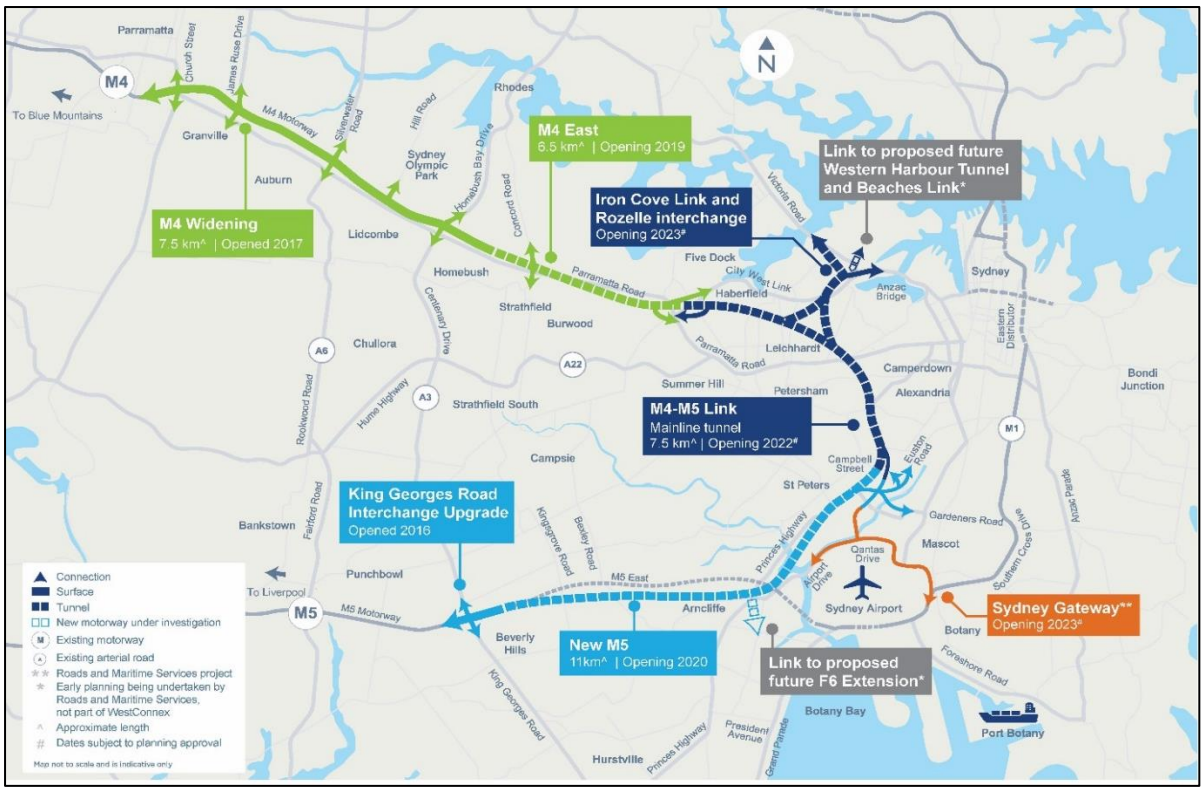

Figure 1: WestConnex overview (Source: EIS)

The M4-M5 Link involves the construction of twin tunnels between Haberfield and St Peters, including associated surface works to connect to the existing road network. It also includes an interchange at Rozelle with provision for a future connection to the Western Harbour Tunnel and Beaches Link as well as an underground tunnel from the Rozelle Interchange to Victoria Road near Iron Cove Bridge, known as the 'Iron Cove Link' (see **Figure 2**).

The project spans two local government areas (LGAs) - Inner West and City of Sydney with the twin tunnels, interchanges and major operational facilities (motor operation complexes and ventilation facilities) traversing the suburbs of Ashfield, Haberfield, Leichhardt, Lilyfield, Rozelle, Annandale, Stanmore, Camperdown, Newtown and St Peters.

The route and interchanges (and associated construction ancillary facilities) are in an urbanised area with diverse land uses along the route alignment, including low to medium density residential communities around Haberfield, Ashfield, Rozelle, Leichhardt, Pyrmont and St Peters. Other uses include recreation, commercial and light-industrial and transport activities.

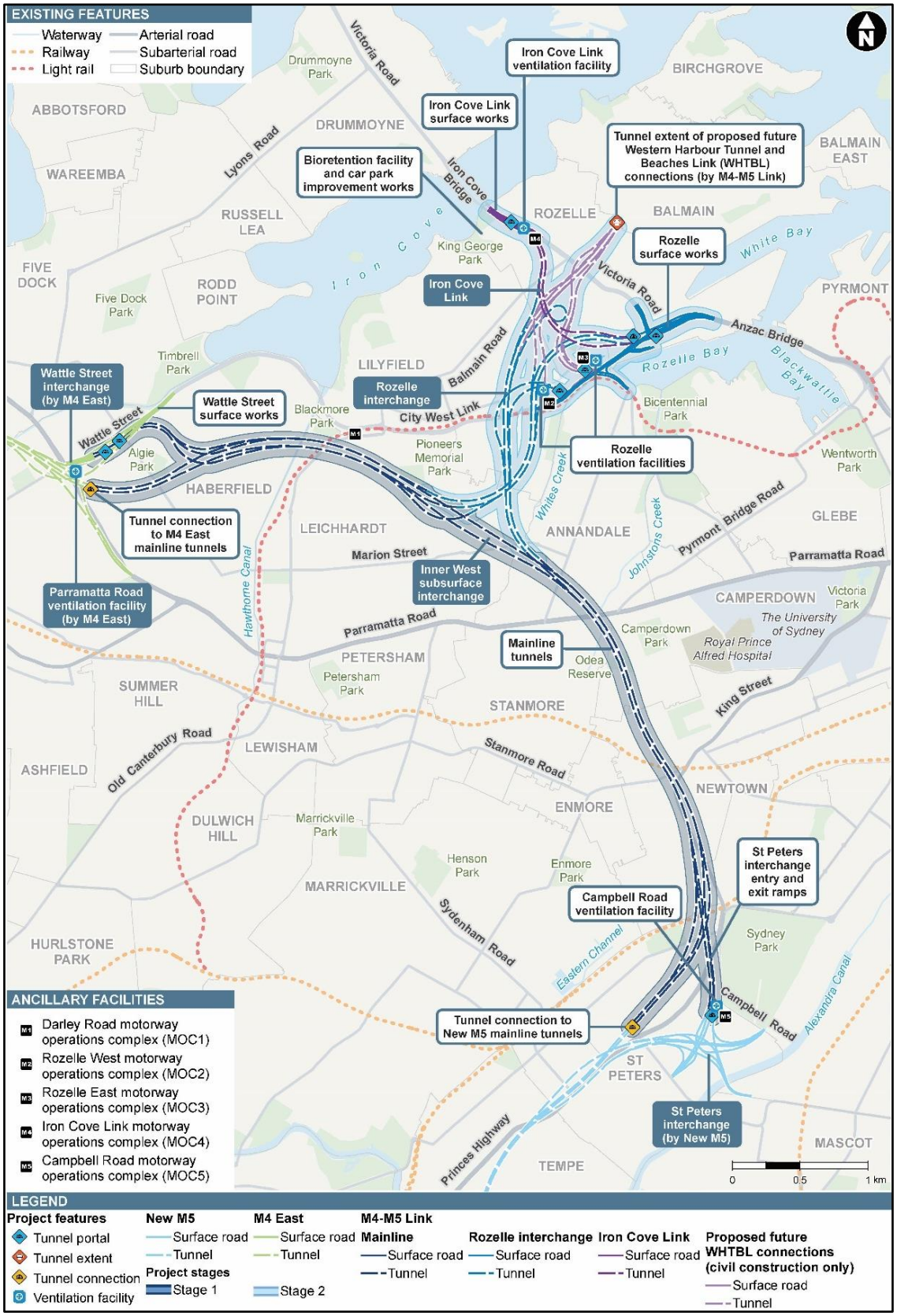

Figure 2: Project location and design elements (Source: EIS)

Significant community land uses within or near the surface elements of the project area include, but are not limited to Yasmar Juvenile Justice Centre (Haberfield), the Bay Run (Rozelle), Glebe Foreshore Park / Jubilee Park (Glebe) and Sydney Park (St Peters).

2. PROPOSED PROJECT

2.1. Project Description

This project involves the construction of twin tunnels of approximately 7.5 kilometres in length, between Haberfield and St Peters. Stub tunnels are being constructed as part of the M4 East and New M5 projects at the Wattle Street (Haberfield) and St Peters Interchanges, respectively, to facilitate connection to the M4 East and New M5 mainline tunnels. Connections from the mainline tunnels to the Iron Cove Bridge (Iron Cove Link) would also be provided, via underground interchanges at Rozelle/Lilyfield (Rozelle Interchange) and Leichhardt/Annandale (Inner West Interchange). Stub tunnels for the proposed Western Harbour Tunnel and Beaches Link would be constructed at the Rozelle Interchange as part of this project.

Construction and operation of the project is proposed to occur in two stages with the mainline tunnel (stage 1) opened to traffic in 2022 and the Rozelle Interchange and the Iron Cove Link (stage 2) becoming operational approximately 12 months later.

The mainline tunnels would be built with the capacity of up to four traffic lanes in each direction, but initially marked for only two traffic lanes until the opening of the Rozelle Interchange. Upon operation of the entire network, the mainline tunnels would be marked as four traffic lanes between Haberfield and St Peters, except in the vicinity of the underground Inner West Interchange, where the road will be marked as three lanes. The Iron Cove Link will be constructed for two lanes in each direction.

Key components and operational features of the project are described in **Table 1** and shown in **Figure 3**, **Figure 4** and **Figure 5**.

Table 1: Key project components of the M4-M5 Link

Aspect	Description
Tunnels	• Approximately 7.5 kilometres of twin mainline tunnels between the M4 East at Haberfield and the New M5 at St Peters. Each tunnel would be sized to accommodate up to four lanes of traffic in each direction. • Iron Cove Link comprising an approximate 1.5 kilometres twin tunnel with two lanes in each direction between Victoria Road near the Iron Cove Bridge and the Rozelle Interchange. • Stub tunnels for the proposed Western Harbour Tunnel and Beaches Link. • Tunnel depths vary between 35 and 65 metres for the mainline tunnels and the Iron Cove Link. The tunnels become shallower towards the interchanges.
Interchanges	• Rozelle Interchange (subsurface) located in Rozelle/Lilyfield, providing connections between the mainline tunnels with the Iron Cove Link, the existing surface road network at City West Link, The Crescent and Victoria Road, and the proposed future Western Harbour Tunnel and Beaches Link. • Inner West Interchange located underground at Leichhardt/ Annandale. This interchange will link the mainline tunnel at two locations enabling free flow of traffic between the M4 East and New M5 and the Rozelle Interchange. There are no portals associated with this interchange.

	• Entry and exit ramps to the St Peters and Wattle Street Interchanges which are being constructed under the New M5 and M4 East projects.
Ventilation	• Rozelle ventilation facility located within the Rozelle Rail Yards, along with a ventilation supply facility. • Iron Cove ventilation facility located near the tunnel portals on Victoria Road, Rozelle. • Campbell Road ventilation facility, located at the St Peters Interchange. • A longitudinal ventilation system (with no portal emissions) comprising around 120 jet fans in the mainline northbound and around 120 in the mainline southbound tunnel. Around 200 jet fans would be installed in the Rozelle Interchange and the Iron Cove Link tunnels. • Ventilation tunnels connecting the road tunnels and the ventilation facilities. • Mechanical and electrical fit-out of the M4-M5 Link component of the Parramatta Road ventilation facility at Haberfield (being constructed as part of the M4 East project). • Emergency smoke extraction facilities at Campbell Road, St Peters (motorway operation complex 5 (MOC5)). • Air intake at Rozelle West (MOC2), Iron Cove Link (MOC4), Campbell Road (MOC5) and fit out of Parramatta Road Haberfield (being constructed as part of the M4 East project).
Bridges	• New road bridge at Victoria Road, to tie into the reconstructed Victoria Road/The Crescent intersection. • New road bridge over Whites Creek as part of The Crescent realignment.
Surface road network changes	• Realignment of The Crescent and creation of new intersection at City West Link. • Realignment of the westbound carriageway of Victoria Road, between Springside Street and the eastern abutment of Iron Cove Bridge. • Modifications to intersections of Victoria Road, with Terry Street, Toelle Street and Callan Street. • Permanent closure and establishment of a cul-de-sac at Clubb Street. • Permanent realignment of Bignell Lane. • Minor works to integrate the Wattle Street Interchange and the St Peters Interchange with the project.
Ancillary Infrastructure	• Five motorway operations complexes located in Leichhardt (MOC1), Rozelle (Rozelle West (MOC2), Rozelle East (MOC3), Iron Cove (MOC4)) and Campbell Road (MOC5). These will include substations, water treatment plants, ventilation facilities, offices, on-site storage and parking for employees. • Deluge systems. • Fire and life safety systems. • CCTV in the tunnel and approaches. • Vehicle cross passages for emergency use. • Pedestrian cross passages between the two main tunnel alignments. • Drainage infrastructure, including an operational water treatment plant at the Leichhardt and Rozelle. • Incident response systems.

	• Signage including traffic, locational, directional, warning and variable message signs within the tunnels and at the surface connections approaching the tunnels.
Pedestrian facilities	• Two new pedestrian and cycle bridges over City West Link, connecting Lilyfield Road and Victoria Road, with The Crescent and the Rozelle Light Rail stop. • New pedestrian and cycle underpass below Victoria Road, connecting Lilyfield Road with Anzac Bridge.
Tolling infrastructure	• Wattle Street Interchange, entry and exit ramps. • St Peters Interchange, entry and exit ramps. • Within the Rozelle Interchange.

2.2. Construction Works

Construction of the M4-M5 project, if approved is expected to take approximately four years with the mainline tunnels open to traffic in 2022. Construction of the Rozelle Interchange would commence 12 months later, and would open to traffic in 2023. The NSW Government has established the Sydney Motorway Corporation to deliver WestConnex. However, the Rozelle Interchange, including the Iron Cove Link, will be delivered by RMS.

The total area required for construction of the project is approximately 118 hectares, comprising 52 hectares at surface level and 67 hectares below ground. The key construction works are summarised in **Table 2**. **Table 3** sets out the indicative construction timeframe. The majority of above ground infrastructure is proposed to be constructed between 7:00 am and 6:00 pm weekdays and 8:00 am to 1:00 pm on Saturdays. However, some works would need to be undertaken outside of these hours for safety and operational reasons. Tunnelling and associated support facilities are proposed to be constructed 24 hours a day, seven days a week, except at the proposed Darley Road construction ancillary facility where tunnelling support facilities would be restricted to the above standard construction hours.

Fourteen construction compounds have been identified along the project corridor, although only eleven are proposed to be used. Two options for sites along Parramatta Road, Haberfield have been identified (refer **Section 5.7**) and each has three separate compounds. The location of the construction compounds is shown in **Figure 6**. **Table 4** sets out the proposed activities to be carried out at each compound.

2.3. Project Need and Justification

Overall WestConnex Scheme

Sydney's road and motorway network supports economic growth across NSW by connecting people to jobs, facilitating trade between business and providing the required infrastructure for efficient freight movements. Efficient transport systems are becoming increasingly important in facilitating future population and economic growth.

The *NSW Long Term Transport Master Plan* (Transport for NSW, 2012) anticipates that congestion will increase if improvements are not made to the road network. The Plan notes that congestion currently costs the NSW economy approximately $5.1 billion a year, largely due to time delays. This is forecast to increase to $8.8 billion by 2020 if no improvements are not made. The Plan identifies the WestConnex project as an integral part of a long-term transport solution. WestConnex is also identified as a committed initiative in the *Future Transport Strategy 2056* and the supporting plan the *Greater Sydney Services and Infrastructure Plan.*

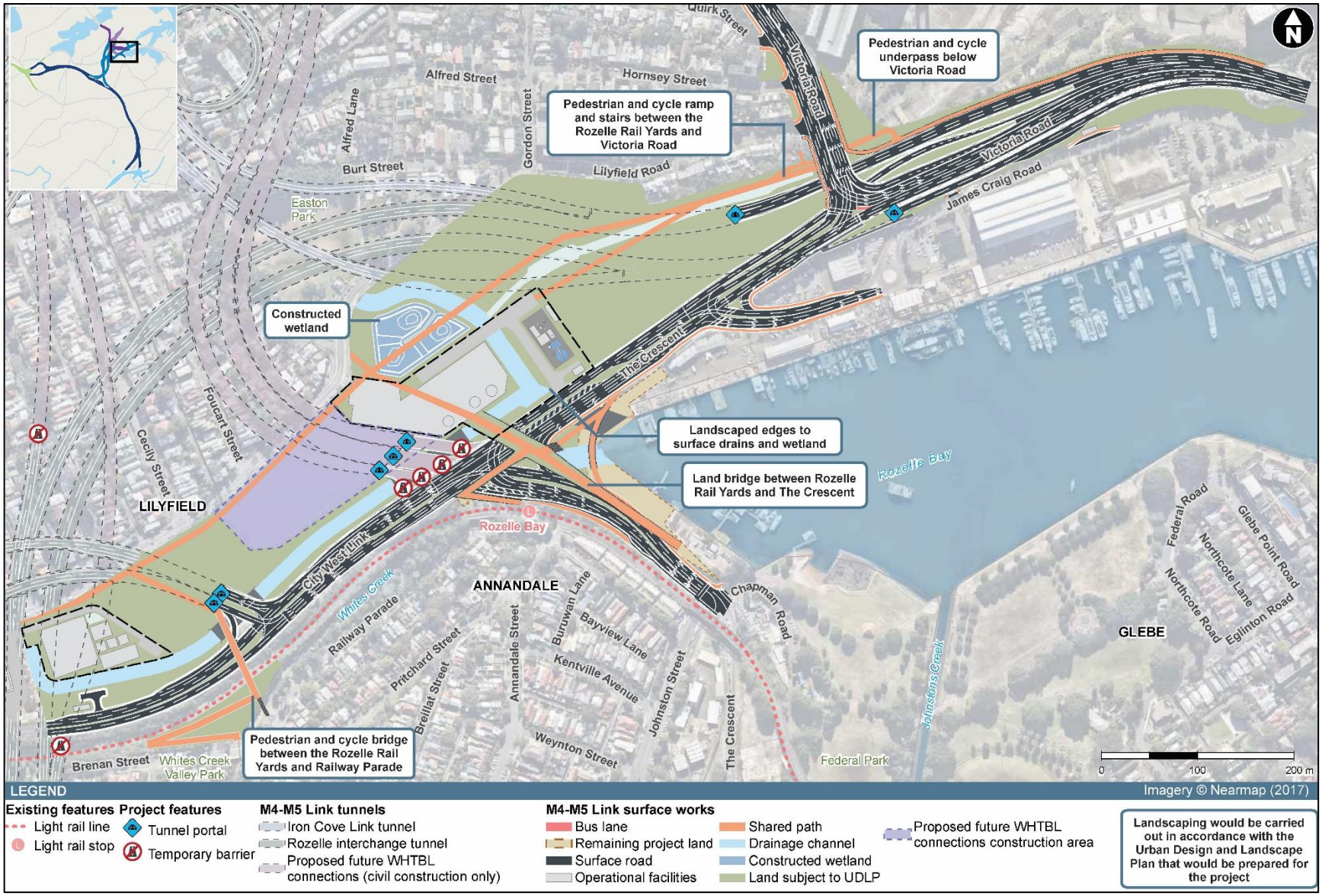

Figure 3. Proposed project elements at the Rozelle Rail Yards (Source: EIS)

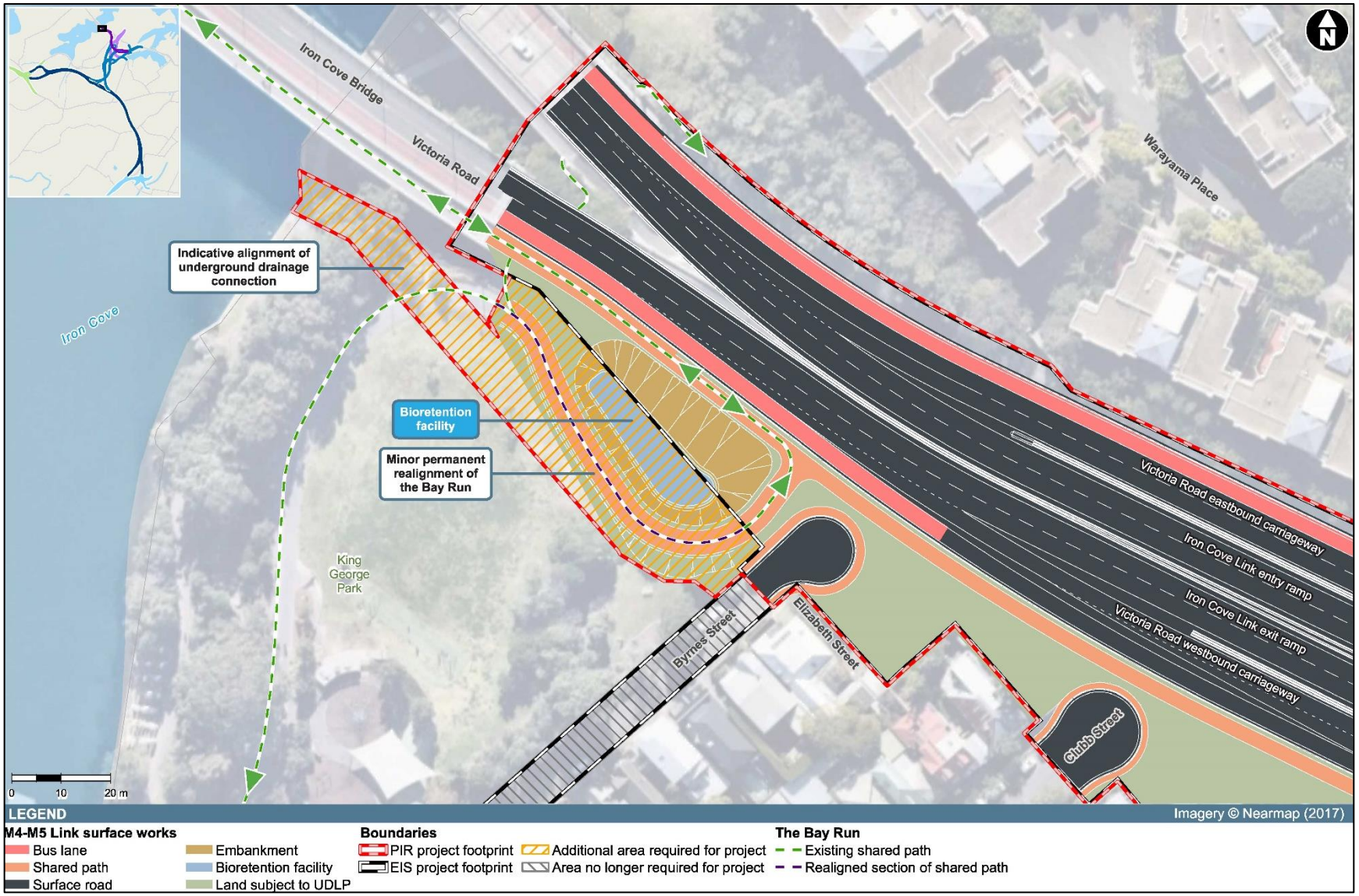

Figure 4. Proposed operational layout and infrastructure at the Iron Cove Link along Victoria Road (Source: SPIR)

Figure 5. Proposed operational layout and infrastructure at the Iron Cove Link along Victoria Road (Source: EIS)

Table 2: Construction works overview - WestConnex M4-M5 Link

Component	Activities
Enabling Works	• Property acquisition • Demolition of existing buildings • Traffic management changes and measures • Installation of safety and environmental controls • Establishment of construction compounds and access • Set up of monitoring equipment • Relocation of utilities
Tunnelling	• Construction of declines and shafts • Excavation of mainline tunnels (including blasting if required) • Spoil management • Finishing works and provision of permanent tunnel services • Testing of plant and equipment
Surface earthworks and structures (including portals)	• Vegetation clearance and topsoil stripping • Excavation of new cut and fill areas • Construction of dive and cut and cover tunnel structures • Stabilisation and excavation support works • Construction of retaining structures • Installation of utility infrastructure • Finishing works
Bridge works	• Construction of piers, abutments, headstocks, bridge deck, slab and girders • Demolition and removal of redundant pedestrian/cyclist bridges over Victoria Road and City West Link at Rozelle
Drainage	• Construction of new pits, pipes, drainage channels onsite detention tanks and sumps in tunnels as required, • Construction of new groundwater drainage systems • Connection of drainage to the existing network, and adjustments to the existing drainage infrastructure where impacted • Construction of water quality basins, constructed wetlands and bioretention facility • Construction of spill containment basin • Carry out widening and naturalisation of a section of Whites Creek • Demolition and removal of redundant drainage
Road upgrades	• Removal of existing road pavements • Earthwork and excavation • Installation of new road base, kerb and guttering • Asphalting and finishing works
Operational ancillary facilities	• Ventilation systems and facilities • Fresh air supply facilities • Water treatment facilities • Motorway operations complexes • Electrical substations • Test plant and equipment
Finishing works	• Line marking of new road surface • Erect directional signage and other roadside furniture such as street lighting • Erect toll gantries and other control systems • Construction of pedestrian and cycle paths and walkways • Landscaping and rehabilitation works • Closure and backfill of temporary access tunnels (except where these are to be used for inspection and/or maintenance purposes) • Site demobilisation and rehabilitation of temporary construction ancillary facilities and surface works areas (not required for operation) for future use.

Table 3: 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																			■	■	■	■		

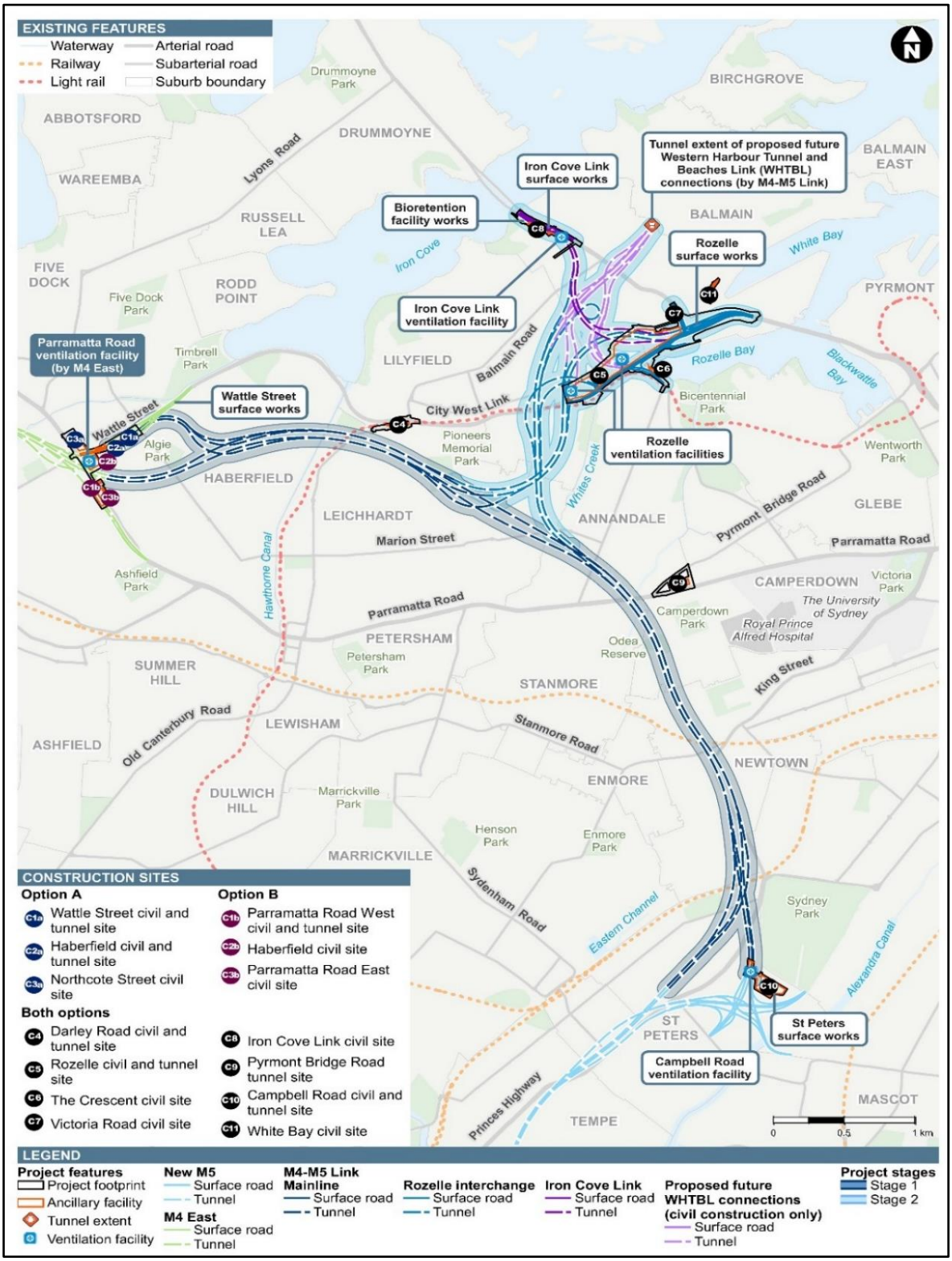

Figure 6: Location of construction ancillary facilities (Source: SPIR)

Table 4: Proposed construction ancillary facilities and their functions (Source: EIS)

No.	Site	Temporary facilities												Permanent facilities						
		Site offices	Staff and workforce amenities	Stores and laydown	Workshop/maintenance	Tunnel launch & support	Tunnel spoil management	Civil and surface works	Construction water treatment plant	Sedimentation pond	Temporary ventilation plant	Temporary substation	Parking	Ventilation facility	Ventilation supply facility	Substation	Motorway operations complex(es)	Workshop facilities/bulky equipment store	Operational water treatment facility	Fire pump room and water tanks
C1a	Wattle Street civil and tunnel site	✓	✓			✓	✓	✓			✓		✓							
C2a	Haberfield civil and tunnel site[1]	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓		✓
C3a	Northcote Street civil site			✓				✓					✓							
C1b	Parramatta Road West civil and tunnel site	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓							
C2b	Haberfield civil site[2]	✓	✓	✓	✓			✓					✓	✓	✓	✓		✓		✓
C3b	Parramatta Road East civil site	✓	✓										✓							
C4	Darley Road civil and tunnel site	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓			✓	✓		✓	✓
C5	Rozelle civil and tunnel site	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
C6	The Crescent civil site	✓	✓	✓	✓			✓	✓	✓			✓							
C7	Victoria Road civil site	✓	✓	✓	✓			✓		✓			✓							
C8	Iron Cove Link civil site	✓	✓	✓	✓		✓	✓	✓	✓			✓	✓		✓	✓			
C9	Pyrmont Bridge Road tunnel site	✓	✓	✓	✓	✓	✓		✓	✓	✓	✓	✓							
C10	Campbell Road civil and tunnel site	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓			✓
C11	White Bay civil site		✓	✓									✓[3]							

Notes:

1. The permanent facilities being provided at the Haberfield civil and tunnel site, including the Parramatta Road ventilation facility, are being built on the corner of Parramatta Road and Wattle Street at Haberfield as part of WestConnex M4 East. Fitout works to prepare these facilities for use by the M4-M5 Link would be carried out as part of the project.
2. Temporary and permanent facilities may change when the construction contractor is engaged and detailed construction methodologies are developed.
3. Includes heavy vehicle truck marshalling.

Delivery of WestConnex is in addition to the delivery of other non-motorway projects detailed in the *NSW Long Term Transport Master Plan,* the *State Infrastructure Strategy 2018-2038* and *Future Transport Strategy 2056*, with more than $60 billion in transport infrastructure committed over the next four years to facilitate the transport needs of Sydney and meet the future growth requirements.

WestConnex is expected to deliver broad economic benefits to NSW in the order of $24.3 billion over its lifespan through improved access to and reliability of the motorway network, enabling more efficient freight movements, journeys to work and connectivity to and from businesses and services (*WestConnex Strategic Business Case 2015*).

Journey to work data compiled by the Bureau of Transport Statistics shows that 72 per cent of journeys to work in the greater metropolitan area are by private vehicle, either as a driver or a passenger. The Department accepts that many of these journeys are from dispersed locations and are best served by road transport and recognises the importance of WestConnex in providing more efficient connections between varied destinations across the metropolitan area.

Modelling figures by the Bureau of Freight Statistics estimates that on an average weekday, the number of trips made by rigid trucks would increase by approximately 30 per cent from 271,000 to 355,000 between 2011 and 2031 with the number of trips made by articulated trucks increasing by around 65 per cent from 95,000 to 157,000. The Department recognises the importance of WestConnex in facilitating these freight movements.

<u>WestConnex M4-M5 Link</u>

The project is the final stage of the WestConnex scheme, and is justified in that it will provide a link between the M4 East and the New M5 tunnels, thereby completing the WestConnex network. Specifically, this project will:

- assist in reducing future traffic volumes on north-south and east-west road corridors, including City West Link and parts of Victoria Road;
- enhance the benefits achieved by the operations of the M4 East and New M5 projects by reducing traffic volumes on Parramatta Road, Southern Cross Drive, the Princes Highway, King Georges Road and the M5 East Motorway;
- facilitate enhanced connectivity between the western suburbs, and provide links to population and employment growth centres in Parramatta and Western Sydney;
- provide safer, faster and more reliable travel times for motorists, bus services and freight journeys on Sydney's road network; and
- enable future opportunities for improved connectivity in Sydney's transport network to be realised by providing connections to the proposed further Western Harbour Tunnel and Beaches Link project to the north and to the proposed Sydney Gateway project and the proposed future F6 Extension (via the New M5 project) to the south.

In addition to traffic benefits, the project would facilitate opportunities for future urban renewal in precincts adjoining the project, including the Bays Precinct (in accordance with *The Bays Precinct Transformation Plan*), along Parramatta Road east of Haberfield (in accordance with the *Parramatta Road Corridor Urban Transformation Strategy*), and along Victoria Road between Iron Cove Bridge and City West Link.

The project would also deliver around four kilometres of new and upgraded pedestrian and cycling infrastructure at Rozelle. New active transport around Rozelle would improve and encourage active transport use by both commuters and recreational users. The project will also provide up to 10 hectares of open space at Rozelle.

The M4-M5 Link project is expected to create up to approximately 56,700 full-time construction jobs over the five-year construction period, including:

- 14,350 full-time workers directly employed on the project; and
- 42,350 indirect full-time jobs.

Construction of the project is predicted (using economic multiplies) to generate $5.8 billion of activity in production induced effects and $7.7 billion in consumption included effects.

In addition, the project is consistent with NSW strategic planning policy and framework, including:

- ***Future Transport Strategy 2056 (2018)*** - WestConnex is recognised as part of the solution to the much needed road infrastructure for Sydney;
- ***State Infrastructure Strategy 2018-2038 (2018)*** – the Strategy reiterates the importance of WestConnex in improving intercity and intracity general and freight transport connections and providing improved travel times and increased network capacity;
- ***NSW State Priorities (2015)*** – the project constitutes the delivery of infrastructure aligned with the government's commitment to build extra road capacity, and would contribute to growth of the NSW economy;
- ***A Plan for Growing Sydney (2014)*** – WestConnex is consistent with several key directions including delivering infrastructure, enhancing capacity at Sydney's gateways and freight networks, and expanding the reach of the Global Economic Corridor;
- ***NSW Freight and Ports Strategy (2013)*** – WestConnex is consistent with the strategic action programs which include improving network efficiency and capacity. The Strategy recognises that WestConnex is a key component in expanding capacity on NSW roads which would provide benefits of freight movements, particularly around major freight centres including Port Botany and Sydney Airport;
- The ***Central City District Plan*** and ***Eastern City District Plan*** - WestConnex is consistent with the district priorities for a productive city by improving access to employment and the efficiency of freight movements;
- ***National Infrastructure Plan (2013)*** – WestConnex is identified with the primary objective to improve accessibility, speed, congestion, reliability and connectivity of the roads linking Sydney's international gateways and places of business across the city. Action 6 of the Plan is to 'create a complete national freight network'. WestConnex would improve connection to Sydney Airport and Port Botany;
- ***Infrastructure Priority List*** of the ***Australian Infrastructure Plan (2017)*** – WestConnex is identified as a high priority project; and
- ***National Land Freight Strategy (2013)*** – WestConnex is consistent with the Strategy's goals of improving access arrangements for heavy vehicle freight.

2.4. Project Development and Alternatives

The Environmental Impact Statement (EIS) considers the merits of the project in the context of a number of alternative project options, including:

- 'do nothing/do minimum';
- undertake improvements to the existing road network;
- investment in alternative transport modes; and
- demand management.

<u>Alternative 1 – 'Do Nothing/Do Minimum'</u>

The 'do nothing/do minimum' scenario includes all approved components of the WestConnex scheme (being: the M4 Widening, King Georges Road Interchange Upgrade, the M4 East and the New M5 projects being operational), but no link provided between the M4 East and New M5. Only minor improvements would be provided over time to improve capacity such as

routine road and intersection upgrades of local and arterial roads. Should the M4-M5 Link not be constructed, through traffic would need to utilise the existing arterial road network, which would lead to increased congestion on these roads, particularly during peak periods.

The Department is satisfied that this is not a feasible alternative as the current road network would not support a growing population and the arterial and sub-arterial roads would operate beyond capacity resulting in increased congestion and travel times, particularly for businesses and commuters travelling to and from south-western Sydney, the city and western suburbs.

Alternative 2 – Improvements to the existing road network

This alternative considered several improvements to the existing road network that would assist in improving the network performance and included:

- improving intersection performance, implementing traffic calming measures, or lane closures and clearways, on key roads such as Parramatta Road, City West Link, Victoria Road and the A3 (Centenary Drive/Roberts Road/King Georges Road) and M1 Motorway (Eastern Distributor/Southern Cross Drive/General Holmes Drive) corridors;
- improvements through RMS's 'Easing Sydney's Congestion' initiatives, such as the Pinch Points Program and Clearways Strategy. Some relevant pinch point projects include Parramatta Road and Great North Road (Five Dock) and the Princes Highway and Railway Road (Sydenham); and
- improving/widening existing arterial roads to meet traffic demands. Widening of arterial roads would have impacts, including property acquisitions due to limited road reserves. There are no existing arterial roads connecting the M4 East and New M5 that could be improved/widened without significant impacts.

The Department agrees with the Proponent's assessment that major arterial road network improvements are an inadequate response to the significant traffic and transport challenges along inner city and CBD road corridors. The existing arterial road network has limited capacity for widening and/or upgrades which means that any improvements would require considerable social (acquisition), amenity and environmental impacts. Further, this option would provide only incremental improvements to relieve traffic congestion, rather than supporting the additional capacity required to meet future demands.

Alternative 3 – Investment in alternative transport modes

A common issue raised in public submissions is that the NSW Government should provide further investment in public transport infrastructure, rather than construct the M4-M5 Link. The Government has several key public infrastructure projects that will assist with increasing capacity of the public transport network. These include: Sydney Metro (Northwest and City and Southwest – Stage 1); CBD and South-East Light Rail which are currently under construction; Sydney Metro City and Southwest – Stage 2; Parramatta Light Rail - Stages 1 and 2; and future Sydney Metro West. However, improved public transport would only partly contribute to relieving congestion on arterial roads.

A key focus of the project is on longer distance passenger movements, as well as the movement of heavy and light freight and commercial goods and services. Travel patterns for these sectors are dispersed and disparate in nature. Currently 63 per cent of freight in NSW is moved by road and 37 per cent on rail, with just 14 percent of all container freight moved by rail to and from Port Botany. Shifting more freight onto rail remains a priority for the NSW Government. However, assuming the target of doubling the share of container freight moved by rail is achieved by 2020, more than 70 per cent of Port Botany's projected trade would continue to be moved by road. In addition, freight services and commercial businesses within the Sydney metropolitan area rely on dispersed point-to-point transport connections to customers and this cannot be met by public transport option or freight improvements in isolation of improvements to the road network.

The Department notes that the WestConnex project does not represent the NSW Government's total investment in transport infrastructure planning or expenditure, with Government investing in several public transport projects across the greater Sydney region (as noted above), and improved freight rail transport. Public transport and rail freight projects are generally complementary services supporting the project and the broader WestConnex scheme.

Alternative 4 – Demand management

Demand management relates to reducing individual car trips and making various transport options more viable. Options include land use planning policies which promotes urban consolidation particularly around public transport, restrictions on parking provisions in new developments and pricing transport options to reduce travel demand (e.g. tolling). Demand management measures can take many years to achieve changes in travel behaviour and would require changes in social attitudes and government policy. While demand management may help spread the demand for peak travel to less congested times periods, it would be limited by other constraints including the availability of alternative forms of travel at the user's origin and destination, and flexibility of working arrangements to take advantage of travel outside of peak periods.

3. STATUTORY CONTEXT

3.1. State Significant Infrastructure

The project is critical State significant infrastructure (CSSI) pursuant to Section 5.13 of the *Environmental Planning and Assessment Act 1979* (EP&A Act). The Minister for Planning is the approval authority for the project.

3.2. Permissibility

The proposal is for development permitted without consent, in accordance with clause 94 of *State Environmental Planning Policy (Infrastructure) 2007*.

3.3. Environmental Planning Instruments

In accordance with Section 5.22(2) of the EP&A Act, the only environmental planning instruments that apply to the proposal are *State Environmental Planning Policy (Infrastructure) 2007* (insofar as it relates to the declaration of development that does not require consent) and *State Environmental Planning Policy (State and Regional Development) 2011* (as it pertains to the declaration of infrastructure as State significant infrastructure. There are no other environmental planning instruments that substantially govern the carrying out of the project.

3.4. Objects of the Environmental Planning and Assessment Act 1979

The determination must have regard to the objects of the EP&A Act. The Department has given consideration to the objects of the EP&A Act including:

- economic sustainable development (see **Sections 2** and **5**);
- social and economic welfare (see **Section 5**);
- protection of the environment, including in relation to biodiversity, traffic, noise and vibration, air quality, utility management, water hydrology, urban design, amenity and socioeconomic issues (see **Section 5**);

- sustainable management of built and cultural heritage, including Aboriginal cultural heritage (see **Section 5**);
- good design and amenity of the built environment (see **Section 5**);
- the principles of ecologically sustainable development (see **Section 3.5**);
- promote the sharing of the responsibility for environmental planning and assessment between the different levels of government (see **Section 4**); and
- community participation in the assessment of the proposal (see **Section 4**).

3.5. Ecologically Sustainable Development (ESD)

The EP&A Act adopts the definition of ESD found in the *Protection of the Environment Administration Act 1991*. Section 6(2) of that Act states that ESD requires the effective integration of economic and environmental consideration in decision-making process and that ESD be achieved through the implementation of:

a) the precautionary principle;
b) inter-generational equity;
c) conservation of biological diversity and ecological integrity; and
d) improved valuation, pricing and incentive mechanisms.

Project objectives which guide the delivery and operation of the proposal would contribute to the sustainability of the project and the meeting of ESD principles. In addition to the objectives, the Proponent has addressed the above principles directly in the EIS and has identified a broad range of mitigation measures to manage impacts associated with these issues.

The Department has also recommended conditions of approval requiring:

- the preparation of a Sustainability Strategy that will be implemented throughout the design, construction and operation of the project;
- the project to achieve a minimum "Excellent" 'Design' and 'As built' rating under the Infrastructure Sustainability Council of Australia infrastructure rating tool; and
- the Proponent to investigate opportunities to reduce operational greenhouse gas emissions, and these initiatives must be implemented, reviewed and regularly updated.

The precautionary principle is applied throughout the EIS and the Department considers the assessment and the range of mitigation measures adequately adopt the principle. The Department is also satisfied that the valuation and pricing of the environmental resources associated with the project have been adequately undertaken and internalised through the project design and mitigation measures.

3.6. Air Quality Reforms

On 17 February 2018, the NSW Premier, Minister for the Environment and Minister for Roads announced reforms regarding the assessment and regulation of emissions from tunnel ventilation facilities. Under the reforms, the NSW Environment Protection Authority (EPA) will be responsible for regulating tunnel ventilation facilities through an Environment Protection Licence (EPL) issued under the *Protection of the Environment Operations Act 1997* (rather than the Department regulating emissions under an infrastructure approval). The EPL will set strict emission limits and requirements for emissions monitoring.

For proposed motorways that have not progressed to the EIS stage, the Advisory Committee on Tunnel Air Quality (ACTAQ) will provide a scientific review of the project's air emissions from ventilation outlets for the Minister for Planning's consideration. In addition, the NSW Chief Health Officer will release a statement on the potential health impacts from tunnel ventilation outlets.

As such, should the WestConnex M4-M5 Link be approved, the EPA will regulate air emissions from the ventilation outlets. As the EIS for the project was prepared prior to the reforms, there will be no review and statements issued by the ACTAQ or the NSW Chief Health Officer. However, it should be noted that both of these have provided submissions on the EIS for the M4-M5 Link, including recommended conditions which have been included in the recommended instrument of approval.

4. CONSULTATION AND SUBMISSIONS

4.1 Consultation

The Department has undertaken and participated in stakeholder and community consultation as part of its assessment of the project. This has included engagement with the Leichhardt Against WestConnex, both during exhibition period and after the publication of the SPIR, to discuss its concerns with the project, particularly the use of 7 Darley Road for both the construction and operation of the project. Ongoing engagement with agencies and councils has also occurred during the assessment process. The Department has considered the issues raised during the engagements and in the submissions as part of its assessment.

The Department considers that community engagement should be ongoing throughout the detailed design and construction of the project. Consequently, the recommended conditions of approval provide for the appointment of a Public Liaison Officer charged with responsibility for assisting the public with questions that they may have on construction activities. The Department has also recommended the appointment of a Community Complaints Mediator, and for the community to be represented on the Air Quality Community Consultative Committee which would be involved with establishing air quality monitoring stations. The community would also be consulted on a range of management plans that must be developed and implemented during the construction of the project including Construction Environmental Management Plans and the Urban Design and Landscape Plan.

4.2 Exhibition

Under Schedule 1 of the EP&A Act, the Department is required to make the EIS publicly available for a minimum period of 28 days. The Department exhibited the EIS (**Appendix A**) from Friday 18 August 2017 until Monday 16 October 2017 (a total of 60 days). The EIS was published on the Department's website, and also made available for viewing at the following locations:

- Roads and Maritime Services: 20-44 Ennis Rd, Milsons Point
- City of Sydney Council: Town Hall House, Level 2, 456 Kent St, Sydney
- Inner West Council: Ashfield Customer Service Centre: 260 Liverpool Rd, Ashfield
- Inner West Council: Leichhardt Customer Service Centre: 7-15 Wetherill St, Leichhardt
- Inner West Council: Petersham Customer Service Centre: 2-14 Fisher St, Petersham
- Ashfield Library: Level 3, 260 Liverpool Rd, Ashfield
- Balmain Library: 370 Darling St, Balmain
- Emanuel Tsardoulias Community Library: 362-372 New Canterbury Road, Dulwich Hill
- Five Dock Library: 4-12 Garfield St, Five Dock
- Glebe Library: 186 Glebe Point Rd (corner Wigram Road), Glebe
- Haberfield Library: 78 Dalhousie St, Haberfield
- Leichhardt Library: Piazza Level, Italian Forum, 23 Norton St, Leichhardt
- Marrickville Library: Corner Marrickville Rd and Petersham Rd, Marrickville
- Newtown Library: 8-10 Brown St, Newtown
- St Peters Library: St Peters Town Hall, Unwins Bridge Road, Sydenham
- Stanmore Library: Stanmore Reserve, Douglas St, Stanmore

- Ultimo Library: Level 1, Ultimo Community Centre, 40 William Henry St, Ultimo
- Redfern Neighbourhood Service Centre: 158 Redfern St, Redfern
- Nature Conservation Council of NSW: Level 14, 338 Pitt Street, Sydney

The Department advertised the public exhibition in the Sydney Morning Herald, Daily Telegraph, Inner West Courier, and the CityHub. The Department also notified State and relevant local government councils of the exhibition in writing.

More than 13,300 submissions were received from 7,951 individual submitters, special interest groups and businesses during the exhibition period. Three submissions were received from local councils and nine submissions from government agencies. The Department received one supplementary submission, and nine submissions from the public following the closure of the exhibition period. A summary of the key issues raised in the submissions follows. A copy of submissions can be found at **Appendix B.**

4.3 Submissions from the Public and Special Interest Groups

There was a diverse range of issues raised from members of the public, businesses operating in the local area, and special interest groups. The main issues raised in the submissions are summarised below. Further details of the issues raised in submissions are provided for each of the key issues in **Chapter 5.**

Strategic

- The project construction costs are not justified given the predicated travel savings, as well as the social and economic impacts that would be experienced.
- The project is dependent on other projects to meet the stated objectives of the WestConnex Scheme, such as the Western Harbour Tunnel and the Sydney Gateway projects.
- The project is not a suitable long-term solution to Sydney's traffic congestion.
- The EIS fails to compare the project to alternative public transport options and discourages investment in public transport.
- The costs of the project outweigh the benefits and the project fails to provide value for money.
- The EIS presents an indicative, concept design which may change during detailed design hence there is uncertainty in the extent and nature of impacts.

Traffic and Transport

- The project encourages increased private vehicle usage instead of promoting the use of public transport.
- The EIS has not adequately assessed the impact of induced traffic.
- The EIS fails to consider potential changes in travel demands and behaviours, particularly toll avoidance.
- Traffic modelling assumptions and traffic demand forecasts are not reliable.
- Concern regarding cumulative construction traffic impacts from overlapping projects.
- Increased traffic volumes on streets surrounding construction ancillary facilities will result in impacts on traffic flows, speeds and safety.
- Concern over loss of on-street parking during construction.
- Increase in rat runs through local streets to avoid construction zones.
- Potential impacts / safety risk to road users during construction arising from increased heavy vehicle movements associated with spoil haulage.
- Impacts on pedestrian and bicycle connectivity and the need to improve connectivity in and around the works at Haberfield.

- Concern over levels of service within Rozelle Interchange and on ANZAC Bridge in the absence of the Western Harbour Tunnel / Beaches Link being operational.
- Changes to public transport, including bus stops, during construction.

Noise and Vibration Impacts

- Adverse impacts on acoustic amenity of sensitive receivers arising from construction and operational noise and vibration.
- Proposed construction noise mitigation measures are inadequate and will not effectively protect the acoustic amenity of sensitive receivers.
- The level of noise generated by construction traffic (particularly spoil haulage) is underestimated and fails to take into account engine and wheel breaking noises.
- Proposed construction hours, particularly out-of-hours works and sleep disturbance.
- The need to consider alternative alignments of the tunnel to reduce construction noise and vibration impacts to receivers located above the tunnel.
- Potential structural damage to residences from construction vibration and the need for building condition surveys prior to construction.
- The need for noise mitigation measures to be in place prior to construction commencing.
- Requests that a transparent process be established for noise mitigation.
- On-going construction noise resulting in construction fatigue for residents, particularly around Haberfield/Ashfield and St Peters.
- Effectiveness of proposed noise attenuation measures, including requests for at-property architectural treatment.

Air Quality

- Inappropriate location of the ventilation facilities in close proximity to residents, schools and public open space and consequent potential to impact on human health.
- Co-location of ventilation outlets at Rozelle.
- Requests to provide filtration at all ventilation facilities.
- Inadequacy of the air quality modelling and its appropriateness in reliably determining air quality impacts as it has not previously been used in Australia (other than for WestConnex projects).
- Request for air quality monitoring to commence prior to construction around schools to ensure that air quality does not deteriorate as a result of the project.
- Concern that there could be a potentiallyl higher rate of respiratory and other illnesses arising as a result of direct traffic emissions on surface roads and emissions from ventilation outlets.
- Concerns over dust generation during construction and the need for dust monitoring.

Land use and urban design

- Potential reduction in local property values and rental incomes and associated requests for compensation.
- Concerns regarding the use of residual land as no details are provided.
- Concerns that the designs shown in the Concept Plan and EIS for the Rozelle Rail Yards will not by fulfilled by the project.
- The potential impact of the ventilation facilities within the proposed public open space at the former Rozelle Rail Yard on the usability of the site.
- Lack of ability to comment on the final urban design as this will be deferred to detailed design and the urban design and landscape plan which will be developed post approval.
- Objection to the use of 7 Darley Road, Leichhardt and acquisition of commercial properties along Lilyfield Road, Rozelle.
- Concern over the uncertainty as to the preferred location of construction ancillary facilities at Haberfield (the EIS presents two options - A and B).

Social and economic considerations

- Impacts to sensitive businesses (e.g. medical) and educational facilities.
- Incorrect identification of sensitive receivers in the EIS.
- Impact of additional acquisitions within communities already impacted by acquisition and construction for the M4 East or New M5 projects.
- Impacts to communities from on-going construction, leading to construction fatigue.
- Concern about impacts from rezoning of land and future development.
- No positive outcomes for residents located adjacent to construction works, construction ancillary facilities or the final motorway, only adverse amenity impacts (acoustic, visual and traffic).

Other issues raised include flooding (at 7 Darley Road, Leichhardt and Bignell Lane, Camperdown), vegetation clearing, demolition of local heritage items, soil / land contamination at the Rozelle Rail Yards and St Peters construction compound, lack of meaningful consultation with the community prior to and during exhibition of the EIS, inadequate exhibition period, and the need to publicly exhibit the Preferred Infrastructure Report so as to provide the community with the opportunity to comment on any proposed changes to the project.

4.4 State Government Agency Submissions

Nine submissions were received from State government agencies. None of the agencies objected to the proposal, however, they did raise issues for the Department's consideration including noise, air quality, water quality, fire safety, traffic, heritage and asset protection.

The **Department of Primary Industries** (DPI) questioned how long-term tunnel inflow rates would be maintained and the likelihood of salt water intrusion, and stressed the need for increased and continuous groundwater monitoring as well as detailed investigation into groundwater treatment.

The **Environment Protection Authority** (EPA) raised issues relating to construction noise and vibration (including a lack of justification for out-of-hours works), the adequacy of the adopted water quality objectives, level of wastewater treatment, and the need to provide predicted air quality impacts for both expected and regulatory worst-case scenarios including the maximum impacted receptor. The EPA also questioned the fleet emission factors used in the air quality assessment. In addition, the EPA expressed concern regarding the impacts associated with long-term construction on the communities at Haberfield and St Peters. The EPA also raised concern that the EIS deferred the characterisation of environmental impacts to the detailed design stage and therefore indicated that it was unable to determine whether the proposed mitigation measures were appropriate.

NSW Health raised concerns in relation to human health from the changes to ambient (surface) air quality, dust generation during construction, duration and level of noise exposure during construction, and operational noise exposure. It questioned the application of a reduction factor to peak hour traffic volumes and the impact of this on the health risk estimates.

The **Office of the Chief Scientist and Engineer** engaged two independent experts to review the EIS on its behalf. The experts' report expressed concerns regarding the assumptions in the air quality model but indicated that these did not have a significant impact on the modelling results. The report concluded that the EIS presented a thorough review of air quality impacts but noted that although the EIS clearly indicates where there will be improvements to air quality as well as worsening, it does not discuss the change in absolute concentrations.

The **Heritage Council of NSW** raised concerns about impacts on locally listed and potential heritage items and how impacts would be mitigated. The Heritage Council questioned the need for the two additional construction ancillary facility sites at Haberfield/Ashfield (under Option B). In addition, the Heritage Council made recommendations for retaining certain heritage items within the project boundary and requested that the design and placement of operational facilities give consideration to the surrounding character and setting. It also recommended further archaeological investigations in a number of the historical archaeological management units. The Heritage Council did not support the demolition of Cadden Le Messurier and the Former Hotel at Lilyfield.

The **Port Authority of NSW's** submission addressed issues relating to potential cumulative impacts to traffic using James Craig Drive, arising from concurrent construction of multiple developments in the area, and requested further consultation during detailed design to reduce the impact on Port Authority land. The Port Authority requested to be represented on the Construction Project Working Group and Utilities Coordination Committee.

The **Office of Environment and Heritage** advised that it had no comments.

Fire and Rescue NSW proposed several recommended conditions of approval, including the preparation of an Emergency Response Plan, a Fire Engineering Brief and Fire Engineering Reports covering the management of fire and smoke hazard, and ongoing annual hazard reviews during the first five years of operation.

Sydney Water commented on the need to protect, monitor and have continual use of Sydney Water assets during construction and operation, and to be consulted during detailed design to ensure Sydney Water can continue to maintain services to its customers. Sydney Water raised concern over the quality of wastewater that would be discharged from the project into its assets and recommended that appropriate tunnel water discharge targets be determined by a suitable independent expert. It also advised that Sydney Water's stormwater quality targets will apply when a connection to its asset is required.

4.5 Local Government Submissions

Submissions were received from three local government councils – City of Sydney, Inner West and City of Canada Bay.

City of Sydney Council objected to the project noting that the strategic rationale does not meet the stated objectives of the project including providing a connection to Sydney Airport and the Port of Sydney, relieving congestion, supporting economic growth and creating opportunities for urban renewal. The Council criticised the EIS for failing to undertake a comprehensive assessment of alternative options. Key concerns expressed by the Council included:

- construction fatigue for residents around Haberfield/Ashfield and St Peters arising from the long-term use of construction ancillary facilities;
- predicted construction and operational traffic, air quality, health, noise and vibration impacts of the project on communities adjacent to the project;
- flaws in the strategic traffic modelling and as a consequence the validity of the noise and air quality modelling and health risk assessment;
- impacts on land use, property values and businesses resulting from acquisition and the operation of the project, and lack of certainty on how land acquired for the project will be used in the future, in particular at St Peters and Rozelle;
- lack of assessment of longer term impacts on communities;
- treatment of groundwater and other wastewater discharges and their impact on receiving waterways;

- inadequate assessment of flood risk;
- impact on local heritage items; and
- sustainability of the project, including inadequate targets for renewable energy and carbon offsets.

The **Inner West Council** objected to the proposal stating that there was an inadequate analysis of alternatives to the project, the broader impacts of the project, and its impact on the long-term viability of public transport and active transport network. The Council also stated that the proposal is inconsistent with NSW Government planning policies and the aims of the proposal. Specific environmental issues raised included:

- construction fatigue;
- air quality and health impacts arising from emissions from ventilation facilities and increased surface traffic;
- construction and operational noise and vibration impacts;
- adverse impact of construction and operational traffic on acoustic amenity and road and pedestrian safety;
- social and economic impacts of compulsory acquisitions and final uses of acquired land at Rozelle, Annandale and Pyrmont;
- settlement impacts;
- the need to include lessons learned from the construction of Stages 1 and 2 of WestConnex into the approval and management measures for the M4-M5 Link;
- traffic, safety and amenity impacts associated with the use of Darley Road, Leichhardt as a construction ancillary facility;
- the need to enhance active transport connectivity;
- inadequate assessment of flooding, drainage and water quality impacts; and
- request to retain and conserve some heritage items at the Rozelle Rail Yards.

The **City of Canada Bay Council** indicated that it generally supports the Project, although it has some concerns regarding traffic impacts resulting from the construction of the Rozelle Interchange, provision of public transport along Parramatta Road and Victoria Road, and impacts to the Bay Run during construction.

4.6 Proponent's Response to Submissions

Following completion of the formal exhibition period, the Department directed the Proponent to prepare a response to the submissions received. The Proponent's consideration of submissions led to changes to the project. Consequently, a Submissions and Preferred Infrastructure Report (SPIR) was prepared (refer **Appendix C**). The changes to the project design included:

- establishment of an additional construction ancillary facility, for truck marshalling and some light vehicle parking, on land owned by the Port Authority of NSW at White Bay; and
- relocation of the bioretention basin at Iron Cove from the Manning Street unformed carpark approximately 150 metres to the north within King George Park, adjacent to the eastern abutment of the Iron Cove Bridge.

The Department determined that public exhibition of the Submissions and Preferred Infrastructure Report (SPIR) was not required, given the minor nature of the changes, and that the amendments to the project do not have significant environmental impacts. Notwithstanding, the SPIR was placed on the Department's website on 5 February 2018.

Nine State government agencies and two local government councils (Inner West and the City of Sydney) provided comments on the SPIR. The State Government agencies and councils reiterated a number of the issues raised in their original submissions as well as recommending

conditions should the project be approved. The residual issues raised by the State government agencies have been considered by the Department in its assessment and are addressed in **Chapter 5** and the recommendations integrated into the recommended instrument of approval, as appropriate. New or residual issues raised by State government agencies and Inner West and the City of Sydney Councils are detailed below.

The **Heritage Council of NSW** reiterated its concern that the work exclusion zone provided for the southern penstock associated with the White Bay Power Station is too limited to provide protection and should be increased from three metres to 10 metres. Comments were also provided on the potential reuse of removed rail-related infrastructure and the need to consider the former industrial landscape in the final landscape design. Conditions relating to the protection of heritage items were also recommended.

The **EPA** provided details in line with the regulatory reforms noting that the project will trigger an EPL should the project be approved. The Authority recommended conditions of approval relating to water, noise and air quality.

NSW Health raised concern that the cumulative impact assessment for the White Bay Civil Site does not appear to have included other impacts (noise and air quality) which may affect the community adjacent to the White Bay. NSW Health also raised concerns regarding human health impacts from 'construction fatigue' and recommended conditions of approval in regards to the issues raised.

The **Department of Primary Industries** reiterated its concern of the potential connection between the tunnel and any palaeochannels is high. Further, DPI requested that the Proponent consult with DPI on its requirements for water licensing and activities on waterfront land.

The **Port Authority of NSW** raised concerns regarding cumulative traffic impacts on James Craig Road, and around the port area, resulting from the inclusion of the White Bay Civil Site and recommended conditions in this regard.

The Department offered to meet with members of the City of Sydney Council, Inner West Council and the City of Canada Bay Council. Only the Inner West Council accepted the invitation and the Department met with council representatives on 1 March 2018.

The Department met with and received a further submission from the **Inner West Council.** Key issues raised by Council included:

- the need to exhibit the SPIR;
- opposition to the project remains unaltered;
- local construction and operational impacts;
- recommended mitigation measures, including stricter conditions of approval;
- truck routes associated with the White Bay truck marshalling area; and
- the progression of Council's Local Area Improvement Strategy through the conditions of approval

The **City of Sydney Council** did not take up the offer to meet and instead wrote to the Department regarding the SPIR. The Council reiterated its concerns about the project.

5. ASSESSMENT

5.1. Traffic and Transport

The M4-M5 Link will provide a new underground motorway connection between the M4 East at Haberfield and the New M5 at St Peters thereby aiding in reducing surface traffic volumes on north-south and east-west road corridors, including City West Link and parts of Victoria Road, Parramatta Road, Southern Cross Drive, the Princes Highway, King Georges Road and the M5 East Motorway. The project aims to relieve congestion, reduce travel times, increase speed and reliability and improve road network safety.

The traffic modelling used is the WestConnex Road Traffic Model (WRTM). The WRTM is a network-wide model that outlines potential changes in travel patterns under different scenarios. These scenarios included assumptions on land use change, introduction of new transport infrastructure, induced traffic, road tolls, and traffic impacts with and without the project. The modelled scenarios are outlined in **Table 5**.

Table 5: Modelled Traffic Scenarios – WestConnex M4-M5 Link (Source: EIS)

Scenario	Assumptions
Base case (2015)	The road network prior to the commencement of the M4 East and New M5 or other new projects or upgrades.
Construction (2021)	Future road network assessed with NorthConnex, M4 Widening, M4 East, King Georges Road Interchange Upgrade (KGRIU) and New M5 complete and operational. Nominal construction year adopted as representative of the peak construction traffic generation of the project.
Operation 'do minimum' or 'without project' (2023)	Includes the M4 Widening and KGRIU being operational and assumes that NorthConnex, M4 East, and New M5 are complete, but that the M4-M5 Link has not been built. It assumes ongoing improvements would be made to the broader road and public transport network over time including some new infrastructure and intersection enhancements to improve capacity and cater for traffic growth.
Operation 'with project' (2023)	Includes the 2023 'do minimum' completed projects and the M4-M5 Link being complete and open to traffic.
Operation 'cumulative' (2023)	Includes 2023 'do minimum' completed projects and the M4-M5 Link and proposed future Sydney Gateway and Western Harbour Tunnel projects operational.
Operation 'do minimum' or 'without project' (2033)	Includes the same 2023 'do minimum' completed projects and some upgrades to the broader road and public transport network over time to improve capacity and cater for traffic growth, but does not include the M4-M5 Link.
Operation 'with project' (2033)	Includes the 2033 'do minimum' completed projects and the M4-M5 Link completed and open to traffic.
Operation 'cumulative' (2033)	Includes the 2033 'do minimum' projects, M4-M5 Link completed, and the proposed future Sydney Gateway, Western Harbour Tunnel, Beaches Link and F6 Extension projects complete and operational.

An independent traffic consultant (Bitzios Consulting) was engaged to assist the Department in undertaking a technical review of the Proponent's traffic and transport assessment. The review report is provided at **Appendix D**.

Existing Traffic Volumes

The Proponent's traffic assessment focused on the proposed Haberfield, Rozelle and St Peters interchanges, and the corridors between each of the interchanges. The existing traffic conditions around the Haberfield and St Peters interchanges reflect conditions prior to the commencement of construction of the M4 East and the New M5. Traffic conditions around the proposed Rozelle Interchange were based on traffic surveys and mid-block Level of Service (LoS) modelling.

Rozelle

Automated Traffic Count (ATC) surveys were taken between 2014 and 2016 at three locations near the proposed Rozelle Interchange (see **Figure 7**). The data recorded at each survey site is provided in **Table 6**.

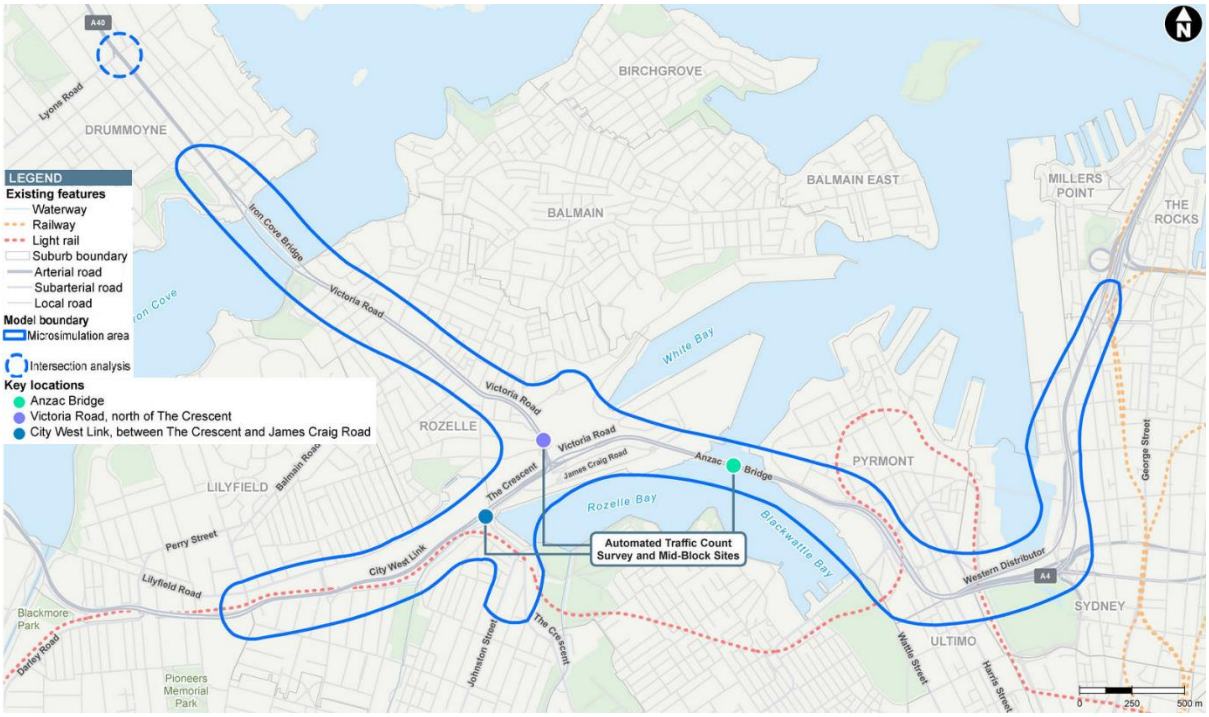

Figure 7: Rozelle Interchange study area (Source: EIS)

Table 6: Summary of Traffic Volumes around Rozelle (Source: EIS)

Direction	AM Peak *(HCV %)	PM Peak *(HCV %)	Average Weekday Traffic *(HCV %)	Average Daily Traffic
Victoria Road, north of The Crescent				
Southbound	4,050 (4%)	2,900 (2%)	46,000 (5%)	45,000
Northbound	2,000 (8%)	3,500 (3%)	40,500 (5%)	40,000
Two-way	6,010 (5%)	6,330 (3%)	86,500 (5%)	85,000
City West Link, between The Crescent and James Craig Road				
Eastbound	3,340 (6%)	2,950 (3%)	46,000 (7%)	45,500
Westbound	2,210 (7%)	2,680 (2%)	43,000 (7%)	43,000
Two-way	5,550 (7%)	5,630 (3%)	89,000 (7%)	88,500
Anzac Bridge				
Eastbound	5,890	4,400	71,500	70,000
Westbound	3,060	4,950	63,500	62,500
Two-way	8,780	9,350	135,000	132,500

*Percentage of vehicles that comprise heavy commercial vehicles

The data indicates that average weekday traffic (AWT) and average daily traffic (ADT) are similar at all three locations, indicating that Victoria Road, the City West Link and ANZAC Bridge accommodate consistently high volumes of traffic that are not biased towards weekday work-related trip purposes. However, the weekday peak hour traffic flows are higher than the weekend peak hour flows.

The AM and PM peaks are based on the highest one hour of traffic volume recorded during these periods. The AM peak hour citybound traffic flows are slightly higher than the PM peak hour outbound traffic flows, indicating a sharper AM peak profile than PM peak profile.

A LoS assessment was undertaken of key intersections and roads in the area, with LoS A representing optimum conditions and LoS F the worst. The existing mid-block LoS currently experienced during the AM and PM peak periods for key intersections at Rozelle is shown in **Figure 8**. The intersection performance results show that several intersections along Victoria Road in Rozelle experience poor levels of service during the PM peak hour. The poor level of service indicates that the intersections are at or close to capacity and small increases in demand would result in large additional delays and queuing.

Under existing conditions, the ANZAC Bridge/Western Distributor eastbound capacity is affected during AM peak hour by the following:

- the 'zipper' merge between The Crescent underpass and Victoria Road left turn;
- general weaving on the ANZAC Bridge deck and the Western Distributor and the general constrained nature and complexity of the Western Distributor alignment and environment, worsened by short ramps and merge and diverge areas;
- weaving effects of traffic flows to Pyrmont Bridge Road, Allen Street and King Street exit ramps and Sydney Harbour Bridge approach;
- weaving effects of traffic flows from Pyrmont Bridge Road and Harris Street entry ramps;
- tidal operations and capacity constraints on Sydney Harbour Bridge, combined with weaving and merging on the Sydney Harbour Bridge deck and approach; and
- queue back effects from downstream capacity constraints at Bathurst Street.

During the PM peak hour, westbound traffic experiences long delays at the Victoria Road/The Crescent intersection because the intersection does not have sufficient capacity to accommodate the large westbound demands across the intersection. Long delays and queuing is also observed eastbound on Darling Street at the Victoria Road intersection and northbound on The Crescent at the Johnston Street intersection.

5.1.1 Construction Traffic

Issue

Construction works associated with the project could create congestion on the surrounding road network through the introduction of heavy and light construction vehicles. These vehicles will be needed to support activities such as tunnelling, construction of portals and interchanges, utility works, temporary road closures, diversions of roads, and construction of pedestrian and cyclist facilities. Construction is expected to occur over a five-year period from the end of 2018 to 2023.

Construction traffic

A total of 14 construction ancillary facilities were assessed, the location of which is shown in **Figure 6** (**Section 2.2**). Spoil haulage routes have been nominated on the basis of minimising impacts on local residential streets and maximising movements along State and regional roads. Spoil haulage would occur at seven of the construction ancillary facilities as shown in **Table 4** (**Section 2.2**).

The majority of the construction ancillary facilities would be accessed via arterial roads. However, access would be required along a number of local roads including but not limited to Walker Avenue at Haberfield (C2a), Wolseley Street at Haberfield (C3a), Alt Street at Haberfield (C1b and C3b), Walker Avenue at Haberfield (C2b), Bland Street at Haberfield (C3b), Lilyfield Road, Rozelle (C5), Hornsey Road, Rozelle (C7), Toelle and Callan Street at Rozelle (C8), Albert Street and Campbell Road, St Peters (C10). The proximity of arterial roads to each site means construction traffic would avoid extensive travel through established residential areas, with the major compound at Rozelle having direct access to the arterial road network.

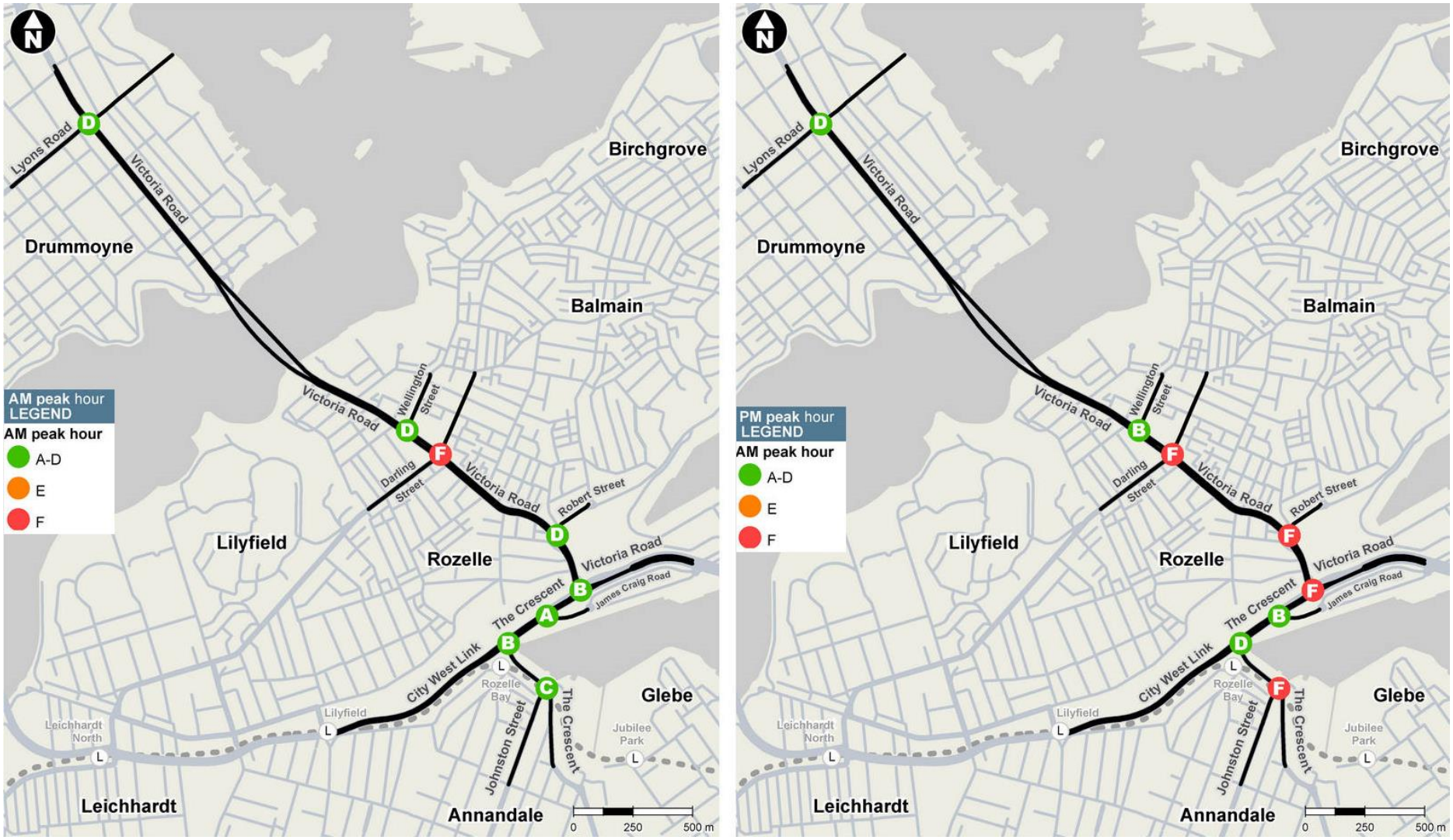

Figure 8: LoS of key intersections around Rozelle – 2015 AM and PM peak hour (Source: SMC)

The forecast daily light and heavy construction vehicle numbers accessing each of the construction ancillary facilities is detailed in **Table 7**.

Table 7: Indicative daily and peak period construction traffic volumes (Source: EIS and SPIR)

Construction Ancillary Facility	Vehicle Type	AM Peak (Vehicles/hour) 7:30 – 8:30		PM Peak (Vehicles/hour) 4:15 – 5:15		Daily Vehicles
		Arrive	Depart	Arrive	Depart	
Wattle Street civil and tunnel site (C1a)	Heavy	7	7	7	7	133
	Light	10	-	-	50	50
Haberfield civil and tunnel site (C2a)	Heavy	7	7	7	7	136
	Light	30	-	-	90	90
Northcote Street civil site (C3a)	Heavy	5	5	5	5	100
	Light	50	-	-	150	150
Parramatta Road West civil and tunnel site (C1b)	Heavy	7	7	7	7	140
	Light	10	-	-	10	10
Haberfield civil site (C2b)	Heavy	2	2	2	2	10
	Light	10	-	-	10	20
Parramatta Road East civil site (C3b)	Heavy	3	3	3	3	30
	Light	50	-	-	150	150
Darley Road civil and tunnel site (C4)	Heavy	7	7	7	7	100
	Light	10	-	-	70	70
Rozelle civil and tunnel site (C5)	Heavy	23	23	23	23	517
	Light	100	-	-	350	350
The Crescent civil site (C6)	Heavy	2	2	2	2	10
	Light	0	-	-	5	20
Victoria Road civil site (C7)	Heavy	2	2	1	2	42
	Light	0	-	-	0	140
Iron Cove Link civil site (C8)	Heavy	2	2	2	2	42
	Light	15	0	-	140	140
Pyrmont Bridge Road tunnel site (C9)	Heavy	7	7	7	7	133
	Light	20	-	-	70	70
Campbell Road civil and tunnel site (C10)	Heavy	7	7	7	7	133
	Light	20	-	-	70	70
White Bay Truck Marshalling Area (C11)	Heavy	21	21	10	21	284
	Light	50	50	50	50	100

Intersection LoS and Mid-Block Performance - Construction

Construction traffic impacts were assessed at the year 2021 as this is when peak works will occur. The M4 East and New M5 projects are expected to be operational by 2019/2020. Therefore, there is no overlap in the 2021 assessment year. The assessment indicates in the overlapping years prior to 2021, the main construction works for the M4 East and the New M5 projects would be completed and the main construction works for the M4-M5 Link would not have commenced.

The traffic assessment considered potential impacts to key intersections affected by construction. The LoS assessment indicates that construction traffic will have negligible impacts on the existing road network. Though some intersections may experience a decrease in LoS, the overall network still has capacity to cater for additional traffic. Currently there are some intersections across the project alignment which experience a LoS of F during AM or PM peaks. Project related traffic is only predicted to cause a LoS of F at Princess Highway/Mary Street/Canal Street during PM periods. However, this intersection currently experiences a LoS of E during PM peaks. A full breakdown of LoS impacts during construction is presented in **Appendix E, Tables 1 to 4**.

Construction Parking
To support the delivery of the project, construction parking on site will be required. The Proponent advises that construction personnel will be encouraged to use shuttle buses, public transport, active transport and car-pooling. The total number of construction car park spaces to be provided is outlined in **Appendix E, Table 5.** The car parking demand is based on demand of 0.7 spaces per worker allowing for some public transport use and carpooling. Where there is a shortfall of on-site parking the Proponent indicates that workers will park on local roads near the construction compounds.

Under option A scenario (Haberfield A and all other compounds) there is a predicted shortfall of 182 parking spaces. While under option B scenario (Haberfield B and all other compounds) there is a short fall of 202 spaces. Under the worst-case scenario where all workers drive, the predicted short fall is approximately 600 parking spaces across the entire project.

Temporary Road Closures During Construction
Temporary road closures and diversions would be required throughout construction of the project. **Table 8** outlines the locations and timeframes for the required closure.

As part of the extensive works required around the Rozelle Interchange, there are three key areas of the project which will require the preparation of detailed traffic staging plans during construction:

- Victoria Road/City West Link/ANZAC Bridge approach intersection – reconstructing the intersection to accommodate existing connectivity, the M4 East Motorway/Iron Cove Link to ANZAC Bridge connections and construction of a new bridge at Victoria Road;
- City West Link/The Crescent intersection – realigning The Crescent to the west, building a new bridge over Whites Creek and modifying the intersection; and
- Victoria Road at Iron Cove – realigning the westbound (southern) carriageway of Victoria Road to create sufficient space to build new tunnel portals and entry and exit ramps for the Iron Cove Link.

Submissions
Public Submissions
Key issues raised in public submissions regarding construction traffic included:

- traffic management along Darley Road, Leichhardt;
- increased traffic volumes around construction compounds;
- trucks queuing on local roads to gain access to tunnel excavation compounds;
- construction worker parking on local roads;
- temporary loss of parking due to construction work;
- longer travel times and reliability, changed transport routes and access to public transport facilities resulting from construction activities; and
- potential safety issues between construction activities, pedestrians and cyclists.

Government Agency and Council Submissions
The **City of Sydney Council** suggested that weekend peak periods should be included in the assessment of construction traffic impacts. The Council recommended that all construction heavy vehicles should use approved routes and that construction traffic parking should be managed so as not to impact local roads. It also raised concern regarding the closure of pedestrian and cycling links during construction activities and questioned the predicted level of service of the temporary traffic lights on City West Link, west of the Crescent.

Table 8: Temporary Road Closures and Diversions During Construction (Source: EIS**)**

Location	Description	Duration
Wattle Street interchange	• Northcote Street would be closed at the intersection with Parramatta Road for the duration of construction.	Until completion of tunnel works in 2022
Darley Road civil and tunnel site (C4)	• Temporary diversions along Darley Road may be required. • On street parking removed. • Kiss and ride for light rail removed.	Throughout the construction period
City West Link at Lilyfield and Rozelle)	• Establishment temporary intersections, slip lanes and driveways. • Under existing and diverted arrangements, all traffic lanes in each direction would generally be maintained with some short-term lane closures.	Outside of peak periods where feasible and reasonable and subject to road occupancy licences
The Crescent at Annandale and Rozelle	• The new alignment of The Crescent would be constructed 'offline' (next to the existing alignment). Traffic would be switched onto the new alignment when ready, and the old alignment of The Crescent would be demolished. • Temporary changes to the intersection of The Crescent/Chapman Road may be required.	Outside of peak periods where feasible and reasonable and subject to road occupancy licences
Victoria Road at Rozelle	• Short-term lane closures. • Temporary diversions at the intersection with The Crescent to allow for construction of the new bridge in line with the permanent design. A temporary bridge/ramp will be constructed to allow traffic to access Victoria Road from the City West Link.	Throughout construction period
Gordon Street south of Lilyfield Road at Rozelle	• Gordon Street between Lilyfield Road and the Rozelle Rail Yards would be permanently closed as part of the project.	Permanent closure
Lilyfield Road at Rozelle	• Temporary closures to one lane would be required for short periods of time. • Access to Lilyfield Road from Victoria Road may be temporarily restricted to allow for integration with the revised Victoria Road alignment.	Throughout construction period. Closures would be outside of peak periods.
Hornsey Street at Rozelle	• Access to Hornsey Street from Victoria Road would require full closure for short periods of time. • On-street parking along the eastbound carriageway west of Victoria Road would be removed (about four spaces) during construction.	Throughout construction period.
Quirk Street at Rozelle	• Access to Quirk Street from Victoria Road would require full closure for short periods of time.	Throughout construction period.
Iron Cove Link civil site (C8) and Victoria Road	• Short-term lanes closures.	Outside of peak periods, subject to road occupancy licences, throughout construction period.
Byrnes Street, Moodie Street, Callan Street and Toelle Street at Rozelle	• Temporary closures at the intersection with Victoria Road. • Limited on-street parking, would be removed.	Throughout construction period.
Clubb Street at Rozelle	• Permanently closed and converted into a cul-de-sac.	Permanent closure
Pyrmont Bridge Road tunnel site (C9)	• Short-term, temporary closure of Bignell Lane.	Throughout construction period.

The **Inner West Council** raised ongoing construction traffic impacts currently occurring across other WestConnex projects, construction vehicles parking on local roads, construction heavy vehicles using local roads, and inadequate truck marshalling and queuing arrangements. It also indicated that it did not support the heavy vehicles using roads that have adjoining town centres and schools, particularly the proposed use of the Hume Highway through Ashfield.

Council raised concerns regarding the use of Darley Road, Leichhardt due to potential safety issues arising from the interaction of heavy vehicles with pedestrians, cyclists and light rail users, and recommended that alternative methods should be investigated to remove spoil offsite, such as alternative access from City West link or the use of conveyer belts. It also raised similar concerns in regards to the Pyrmont Bridge Road construction compound as there is a potential for conflicts between project vehicles, buses, cyclists and pedestrians wherever trucks cross the paths of these other road users.

Council also expressed concern that the proposed temporary (and permanent) closures of streets between Victoria Road and King George Park would create access difficulties for residents and park users. Proposed temporary walk/cycle path diversions in this area were also raised as a concern in light of the proximity of the area to the Bay Run path and the high volume of pedestrian and cyclist traffic that uses footpaths along this part of Victoria Road.

The **Port Authority of NSW** advised of proposed developments occurring within Glebe Island and the White Bay precinct, including a multi user facility (for the import by sea of sand and other bulk dry construction materials) and the relocation of the Hanson concrete batching plant and the potential for conflicts in traffic movements due to the developments. In particular, the Port Authority raised concern regarding the capacity of James Craig Road to accommodate cumulative traffic volumes, noting that the traffic assessment did not take into account traffic associated with the development and relocation proposals.

Department's consideration

Construction traffic

The Department acknowledges there will be unavoidable traffic impacts during construction due to the scope and nature of the works required. The Department accepts that at some key intersections around the construction compounds, levels of service will decline, however the decline would be relatively minor as most sites will have direct access to the arterial road network and this network has the capacity to accommodate the construction heavy vehicle movements to and from the construction sites.

Once the M4 East and New M5 tunnels become operational, there will altered traffic conditions at Haberfield and St Peters. The tunnels will provide ease of access for heavy vehicles removing spoil from construction compounds. In the case of Haberfield Option A, heavy vehicles would be loaded with spoil underground and directly access the M4 East tunnel, avoiding the surface road network.

To facilitate the improved management of construction traffic, the Department's independent traffic consultant recommended the following:

- contingencies should be prepared if the M4 East and New M5 tunnels are delayed and cannot cater for the current projects haulage routes;
- a strategy should be prepared to address on-street parking impacts within residential areas;
- methods to maintain pedestrian and cyclist connectivity during construction should be developed; and
- bus shuttle services should be provided to transport construction workers to work sites from the White Bay marshalling area.

The Department concurs with the recommendations of the independent traffic consultant and as such has recommended the Proponent prepare a Construction Traffic and Transport Management Plan in consultation with the relevant council(s) and the Port Authority of NSW which details management measures to minimise construction traffic impacts. The Department has also recommended conditions limiting the use of local roads in response to

the community's and councils' concerns relating to spoil haulage and construction traffic impacts on local streets.

In response to council and community concerns regarding pedestrian and cyclist access, the Department has recommended that safe pedestrian and cyclist access must be maintained around all work sites at all times and where such access is restricted, an alternate route must be provided and sign posted.

The Department has also recommended that a Construction Parking and Access Strategy be prepared to identify measures to manage on- and off-street parking requirements during construction. Such a strategy is essential to manage the potential shortfall of between 200 to 600 car spaces required for the construction personnel across the project. Though the Proponent has indicated that construction personnel may park on public roads, the Department does not support this approach. It is considered that construction vehicles should be managed to avoid parking on public roads, specifically at Rozelle and Iron Cove where on street parking is limited. The Department's preferred option is for the Proponent to provide a centralised parking area on site or on other appropriate vacant land near the construction compounds. By undertaking this approach, a shuttle bus service can be used to transport personnel to work zones.

Issues raised in submissions received from the public and from the Inner West Council also focussed on the potential safety and traffic impacts associated with the use of 7 Darley Road, Leichhardt. The Proponent's traffic assessment indicates that both Darley Road and the City West Link are able to accommodate the heavy vehicle movements that would be generated by the project during construction. Further, the establishment of the truck marshalling facility at White Bay will reduce the potential for trucks to circle or idle in surrounding local roads and eliminates the need to establish a right hand turning lane on the City West Link into Darley Road, reducing the potential for conflicts with pedestrians and vehicles.

White Bay Truck Marshalling Area

In response to ongoing community, council and government agency concerns relating to truck queuing and circling on local roads, the Proponent is proposing to establish a truck marshalling area and additional construction worker parking at White Bay. The White Bay (C11) construction ancillary facility will support spoil haulage activities from Darley Road (C4), Pyrmont Bridge Road (C9) and Parramatta Road West civil (C1b) construction ancillary facilities. Although this approach is supported as it will address community concerns, the Department acknowledges there could be cumulative traffic impacts around White Bay due to other activities occurring concurrently.

The Department's independent traffic consultant has raised concerns regarding possible queuing of constructing vehicles along The Crescent/James Craig Road and The Crescent/City West Link intersections, due to timing of traffic signals. The Proponent will work with the Sydney Coordination Office to ensure appropriate phasing of the signalised intersections.

In response, the Proponent has committed to continue to consult with the Port Authority of NSW and other stakeholders as appropriate on the use of James Craig Road to ensure coordination of heavy vehicle movements, with a focus on reducing the proportion of vehicle trips (especially inbound from the east) during the PM peak. this approach is supported and can be addressed as part of the Construction Traffic and Traffic Management Plan.

Conclusion

The Department's assessment concludes that impacts associated with construction traffic are unavoidable but that these impacts can be appropriately managed by a Construction Traffic and Access Management Plan, Construction Parking and Access Strategy, and Site

Establishment Management Plan. These plans would ensure that traffic, parking and access management measures are implemented to minimise impacts on the surrounding road network, ensure that spoil haulage occurs along approved routes, facilitate the safe movement of construction traffic to and from compound sites, and facilitate safe pedestrian and cyclist access around construction sites.

5.1.2 Operational Traffic

Issue
The project will provide the connection between the M4 and M5 as well as to the Western Distributor, Cross City Tunnel and the M1 Motorway. While the project provides a key link in Sydney's road network it aims to reduce surface traffic on Parramatta Road (east of the M4 East Parramatta Road ramps), City West Link, Victoria Road (south of Iron Cove Bridge), M5 East, Southern Cross Drive, King Georges Road and roads through the Inner West. However, the project will increase daily traffic on the ANZAC Bridge/Western Distributor and on surface roads between the St Peters Interchange and Sydney Airport.

The Department's assessment of operational impacts has considered intersection LoS, mid-block analyses and screenline assessments of both the M4-M5 link corridor and modelling undertaken in the area around the proposed Haberfield, St Peters and Rozelle interchanges. It also takes into account the outcomes of the review by the Department's independent traffic specialist.

Screenline Analysis
A screenline analysis involving traffic counts at theoretical boundaries was undertaken by the Proponent. The analysis compared the forecast AWT volumes at each screenline location for the years 2023 and 2033, both 'with' and 'without' the project and cumulative scenarios as discussed previously. Due to the geographic scale of the project, four screenlines were selected and their locations are indicated in **Figure 9**. The four screenlines include:

- east–west screenline captures changes in east–west traffic movement between Wattle Street and Rozelle interchanges, as well as on four parallel corridors (City West Link, Darley Road, Marion Street and Parramatta Road). This screenline also includes a location on Lyons Road, which would reflect any changes in traffic using Lyons Road to travel to and from Victoria Road;
- upper north–south screenline captures changes in vehicle travel patterns on north–south links north of Parramatta Road, including Norton Street, Balmain Road, Catherine Street, Johnston Street, Booth Street (north of Pyrmont Bridge Road) and Ross Street (north of Bridge Road);
- lower north–south screenline captures changes between the Rozelle and the St Peters interchanges, as well as locations on north–south regional connector roads (Stanmore Road, Addison Road, Sydenham Road, Marrickville Road, King Street, Wyndham Street, Botany Road, Elizabeth Street, South Dowling Street and the Southern Cross Drive); and
- cross-harbour screenline looks at changes on the Sydney Harbour Bridge, Sydney Harbour Tunnel and the Gladesville Bridge. It also includes a location on the proposed future Western Harbour Tunnel and Beaches Link in the 2023 and 2033 'cumulative' scenarios.

Key observations from the screenline analysis for the year 2023 between 'without' and 'with' project indicate that once the project is operational traffic will shift onto the motorway and traffic volumes on the surface road network would decrease substantially in most cases except along the Sydney Harbour Bridge, Gladesville Bridge, as vehicles are attracted to use the Iron Cove Link, and on Johnston Street and Ross Street as traffic seek to access the Rozelle Interchange.

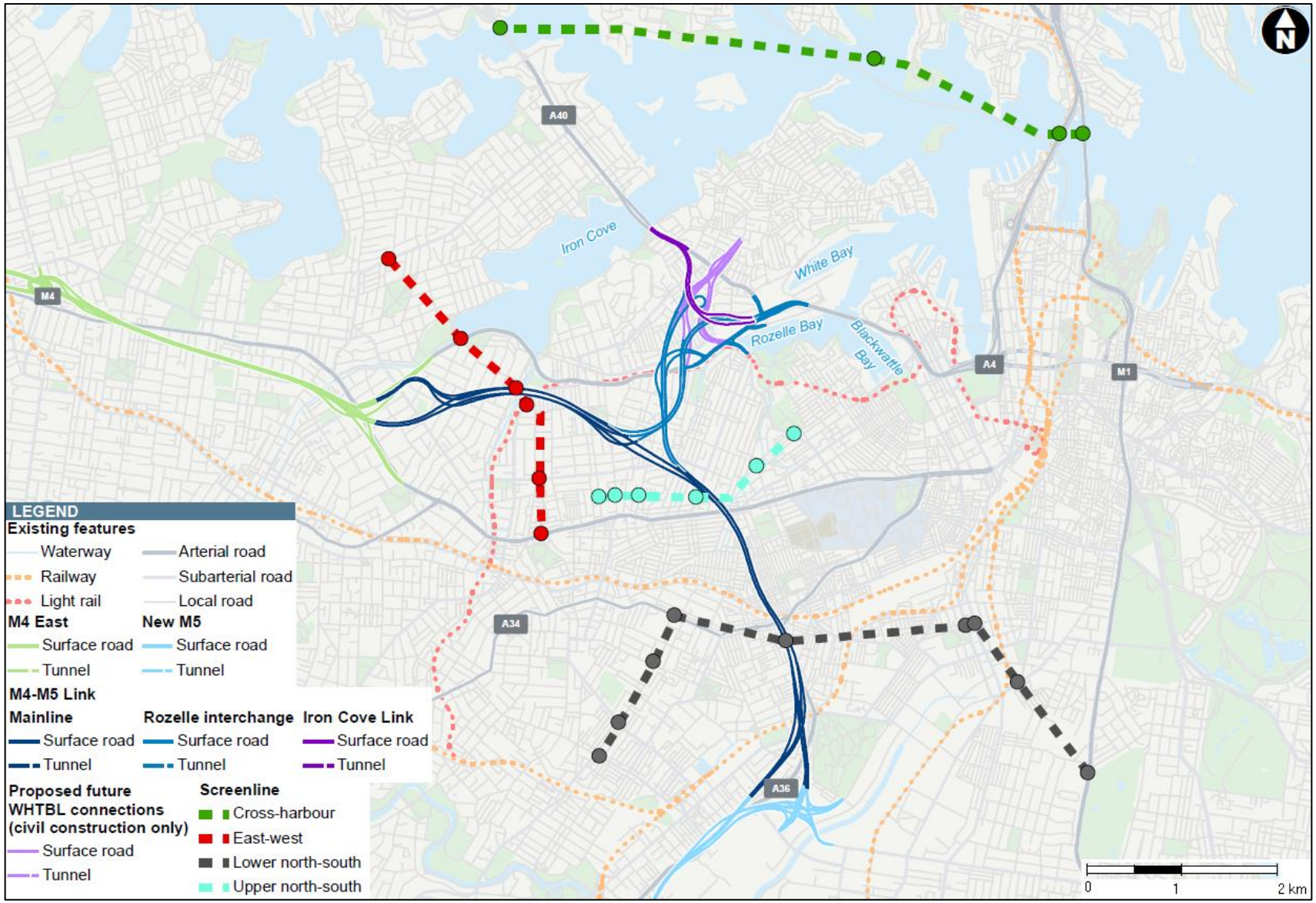

Figure 9: Screenline locations (Source: EIS)

Key observations from the screenline analysis for the year 2033 between 'without' and 'with' project are similar to the 2023 predictions.

Key observations comparing the 'cumulative' to the 'without project' scenarios for 2023 and 2033 are that the patterns of change are similar to those observed in the comparison of 'with project' to 'without project'. In relation to the cross-harbour screenline, there is a predicted shift in traffic from the Sydney Harbour Bridge and the Sydney Harbour Tunnel onto the proposed future Western Harbour Tunnel, with two-way AWT numbers forecast to decrease by six per cent on the Sydney Harbour Bridge and by 23 per cent in the Sydney Harbour Tunnel. Two-way AWT numbers are predicted to increase by 13 per cent on the Gladesville Bridge reflecting traffic accessing the M4-M5 Link including the Iron Cove Link on the Gladesville Bridge.

A detailed analysis of the screenline assessment is outlined in **Appendix E, Tables 6 to 13**.

Intersection Levels of Service
Although the screenline assessment indicates positive regional benefits in traffic movements, the project will have localised impacts on key intersections around the portals, as additional traffic volumes seek to access the mainline tunnel.

Tables 14 to **16 of Appendix E** outline the predicted intersection LoS around the Haberfield, Rozelle, St Peters and Iron Cove localities for peak periods in 2023 and 2033, both with and without the project. The following summarises the predicted operational LoS at key intersections.

Haberfield - Wattle Street interchange
During the 2023 and 2033 AM peak hour, the performance at the Parramatta Road/Wattle Street intersection is forecast to worsen in the 'with project' scenario (from C in 2023 'without project' scenario to E in 2023 'with project'), despite vehicle volumes using the surface road network reducing. The reason for this, is that the reduction in through lanes for surface traffic from Wattle Street to Frederick Street results in queuing on the southbound approach and increases the overall intersection delay. Elsewhere, intersection performance is forecast to be similar to the 'without project' scenario.

During the 2023 PM peak hour, the performance of the Parramatta Road/Liverpool Road intersection is forecast to improve in the 'with project' scenario, as a result of reduced demand for the intersection as traffic shifts to the M4-M5 Link. Elsewhere, performance remains relatively consistent with the without project' scenario.

Rozelle interchange
In the 2023 AM peak hour, the forecast intersection performances are similar in the 'without project' and 'with project' scenarios. However, in the 2033 AM peak hour, due to forecast demand from Victoria Road to The Crescent, delays are forecast at the Victoria Road/The Crescent intersection in the 'with project' scenario with the LoS going from B to D. The southbound queuing at this intersection is forecast to also result in a poor level of service at the Victoria Road/Robert Street intersection. The reason for this, is the exiting of traffic from the tunnels onto the surface road network at Rozelle.

In the PM peak hour 'with project' scenario, the intersections along Victoria Road and City West Link are forecast to operate at an improved level of service compared with the 'without project' scenario, due to the direct link from Anzac Bridge to the M4 and Iron Cove Link.

The Victoria Road/Lyons Road intersection in both peak hours, the Victoria Road/Darling Street and Victoria Road/Robert Street intersections in the AM peak hour and The Crescent/Johnston Street intersection in the PM peak hour remain at or over capacity based

on forecast demands. Upgrades are proposed as part of the project at The Crescent/Johnston Street intersection, but any further upgrades at this intersection to improve performance are constrained by the existing light rail bridge.

St Peters interchange
The modelling results show that in the AM peak hour, under the 2023 'with project' scenario, the intersections around the interchange generally record similar LoS compared with the 'without project' scenario, except for the Campbell Road/Bourke Road and Gardeners Road/Bourke Road intersections (which worsen), while by 2033, all of the intersections perform similar or better in the 'with project' scenario, with the exception of the Campbell Road/Bourke Road intersection.

In the 2023 PM peak hour, the intersections generally forecast similar LoS compared with the 'without project' scenario, except for the Campbell Road/Euston Road, Princes Highway/Campbell Street and Gardeners Road/Bourke Road intersections. In the 2033 PM peak hour, most intersections are forecast to operate poorly at LoS D and F (with the majority at F).

Staged operation – mainline tunnel
The mainline tunnels are planned for completion in 2022, while the Rozelle interchange is planned for completion in 2023. In a 'mainline only' scenario, the Haberfield and St Peters Interchanges are the only entry and exit points for M4-M5 Link traffic.

The traffic assessment indicates that without the Rozelle and Iron Cove sections, the potential traffic impacts around the Haberfield and St Peters interchanges would be reduced. Traffic impacts are reduced in this scenario because traffic from Rozelle and Iron Cove will have to use existing surface roads to reach their destinations.

Permanent Street Modifications
The project proposes the closure of a number of local roads in Rozelle on the southern side of Victoria Road to enable the construction of the project. In addition, the Proponent proposes to permanently realign Bignell Lane at Pyrmont.

Submissions
Public Submissions
Key issues raised in public submissions included:
- increased traffic volumes around the interchanges which will impact road network performance;
- accuracy of the traffic modelling;
- no operational modelling for Erskineville Road, King Street or Enmore Road;
- concern that there will be congestion and backing up of traffic at entry and exit ramps;
- the potential impact on parallel routes due to drivers avoiding tolls or congestion;
- impediments on pedestrian connectivity and access as the project does not incorporate adequate new pedestrian and cyclist infrastructure in the project design; and
- operational parking impacts.

Council Submissions
The **City of Sydney** questioned the traffic assessment methodology and raised concerns that the project will worsen the LoS for intersections around all the interchanges. Council raised concern that the project does not assess the additional traffic volumes that will be directed into the CBD once the project is operational and questioned how a operational review will be undertaken. Council was also of the opinion that the proposed active transport infrastructure presented in the EIS lacks detail and no commitment has been given to delivery of the active transport links.

The **City of Canada Bay Council** acknowledged that Lyons Road and Victoria Road currently operate at a LoS of F and that the project would worsen the functionality of the intersection. Council raised concerns that parking along Victoria Road outside of peak times may be removed to accommodate additional traffic. Council suggested that the proposed Iron Cove Link be extended to Huntleys Point to capture all through traffic on Victoria Road. The Council also indicated that additional consideration is required to adopt public transport solutions.

The **Inner West Council** raised concerns over the operational traffic impacts around the interchanges and other significant streets such as The Crescent and Johnston Street. Council indicated support for the proposed active transport plan, however considers that additional north-south connections are required. Council raised concern that no parking facilities are proposed within the Rozelle recreational area and called for optimisation of the recreational areas at Rozelle. The Council also raised concern regarding the realignment of Bignell Lane, Pyrmont and permanent street closures around Rozelle / Iron Cove.

Department's Consideration

Local traffic impacts

Whilst the Department notes that the WRTM included provisions for the impact of toll avoidance on surrounding local roads, it is acknowledged that the project would increase traffic volumes in the area surrounding the tunnel portals. The Department has therefore recommended that the Proponent prepare a Road Network Performance Plan prior to commencement of the CSSI. The Road Network Performance Plan is to be prepared in consultation with the relevant council(s) and must include modelling of traffic impacts to the adjoining road network as a consequence of the project, and include mitigation measures to manage localised traffic impacts.

Once the project is operational, the Proponent will prepare an Operational Road Network Performance Review. The Department has recommended that two road network reviews be undertaken – one within 12 months of operation and one at five years after the commencement of operation. The Review will consider the performance of the CSSI on the adjoining road network, while confirming the adequacy of the mitigation measures implemented. The Operational Review will also consider whether further measures are required.

Intersection Performances

Although the project will provide benefits by reducing surface road traffic, it will have localised impacts on the traffic network adjoining the Haberfield, St Peters, Rozelle and Iron Cove Interchanges.

Haberfield Interchange

A key constraint on the existing road network is the interface with Frederick Street (southbound), Parramatta Road (eastbound) and City West Link (citybound). The Department's independent traffic consultant identified that operational modelling indicates that the exit from the motorway onto Frederick Street can be constrained. The Proponent has committed to investigating mitigation measures to remedy this situation. This approach is supported and it is considered that the Department's recommendation for an Operational Network Review will confirm whether the mitigation measures developed will remedy the impacts or whether additional measures are required.

St Peters Interchange

The traffic modelling indicates a deterioration in traffic network performance in the St Peters and Mascot areas regardless of whether or not the project is constructed in the absence of the Sydney Gateway project. In the 'with project' scenario, the network is overly saturated with many intersections still operating over capacity in both peak periods. The Department

understands that the Sydney Gateway project is being progressed by the NSW Government as a priority to manage congestion between the St Peters and the airport corridor.

In the absence of Gateway project, the Proponent has committed to undertaking a detailed review of key intersections for future upgrades. The Department supports this approach and considers it should form part of the recommended Road Network Performance Plan. This process is considered appropriate as the Gateway project will be developed in parallel with the Proponent's requirement to mitigate and manage congestion within the St Peters locality.

Rozelle Interchange

Currently, the ANZAC Bridge/Western Distributor is at capacity and cannot accommodate more demand, especially in the eastbound AM peak period. This is due to the existing operational constraints of the road network within the CBD. To aid in alleviating traffic congestion on the Western Distributor and ANZAC Bridge, the NSW Government is in the process of progressing a new Western Harbour Tunnel project. The M4-M5 Link project currently provides for a stub tunnel to facilitate a tie in with a future harbour tunnel crossing. The Project's operational modelling includes a cumulative scenario where the proposed Western Harbour Tunnel project is operational. In this scenario, the modelling indicates that the impacts will be alleviated by the proposed Western Harbour Tunnel project.

The Proponent has advised that a strategy for the Rozelle Interchange and it surroundings is being developed to manage traffic in the absence of the harbour crossing. The strategy will include consideration of capacity improvement measures (including through phasing of signalised intersections) and project staging options

The City of Sydney Council raised concerns that the modelling did not consider wider impacts to the CBD road network resulting from traffic leaving the interchange and heading into the city. The Department notes that the project's microsimulation model extends partly into the CBD (see **Figure 7**) and accepts the Proponent's response that it has not included the entire CBD as traffic in this area is influenced by a number of factors beyond the scope of the project.

Permanent Street Modifications

The Department notes that the closure of Clubb Street, Rozelle is required due to grade differences with Victoria Road. Access impacts associated with the closure of Clubb Street are likely to generate from the reduced direct access to Victoria Road resulting in increased times to access this main road via Toelle Street or Darling Street. However, this impact will be offset in part by the improved amenity resulting from the closure of Clubb Street and subsequent reduction in traffic.

The Proponent also proposes to permanently realign Bignell Lane, Camperdown. Both the public and Inner West Council requested that the lane be returned to its original configuration post construction. The commercial brewer adjacent to the proposed construction ancillary facility at Camperdown raised concerns regarding access, amenity and parking issues associated with the two land uses operating in close proximity.

The Proponent has advised that the permanent realignment of Bignell Lane is necessary to ensure property owners have ongoing access to properties during construction and operation. Further, the permanent realignment would not affect the achievement of the outcomes intended in the *Parramatta Road Urban Transformation Strategy*. The Department notes the need for the realignment of Bignell Lane to ensure property access is maintained to adjacent properties during construction. However, the Department does not consider the permanent realignment of Bignell Lane is justified nor would such a realignment be in accordance with the planning and urban design outcomes envisioned for the Camperdown Precinct as outlined in the *Parramatta Road Corridor Urban Transformation Strategy: Planning and Design Guidelines*. As such, the Department has recommended a condition requiring the Proponent

reinstate Bignell Lane to its original alignment prior to the commencement of operation of the project unless otherwise approved by the Secretary, in consultation with Inner West Council.

Conclusion
The Department notes that the project will not eliminate current levels of traffic congestion on the surface road network at St Peters, Haberfield/Ashfield, Rozelle or Iron Cove but does assist in catering for future increases in traffic volumes. The key benefit of the project is to remove vehicles from surface roads into the tunnel system and free up capacity on the broader surface network for shorter point-to-point trips. In addition, the project will provide the missing link between the M4 East and New M5 projects, resulting in improved travel times between south-western Sydney and the west, and the inner west and west.

The NSW Government's proposed future Western Harbour Tunnel and Northern Beaches Link crossing will create a bypass of the Sydney CBD which will aid in relieving congestion along the existing Harbour Bridge, Spit Bridge and ANZAC bridge network. The M4-M5 Link is a critical component in ensuring the connectivity of the existing road network with the future harbour crossing project.

Although the project provides a regional benefit to traffic mobility, localised impacts are predicted to occur as traffic volumes around interchanges and on the surrounding road network are expected to increase. To manage these localised impacts, the Department has recommended that a Road Network Performance Plan be prepared prior to operation of the CSSI. The Plan must identify mitigation measures to manage predicted localised traffic impacts. The Department has also recommended an Operational Road Network Performance Review to be undertaken to confirm the adequacy of the implemented mitigation measures and consider whether further measures may be required. The Department is satisfied the recommended conditions of approval would assist in the management and mitigation of impacts on the local road network as a result of the operation of the project.

5.2. Noise and Vibration

Issue
The existing noise environment along the project corridor is dominated by road traffic from State Roads. Other key noise sources include aircraft and light rail noise in some of the noise catchments. In addition, construction noise from the other WestConnex projects i.e. M4 East and New M5 will provide cumulative impacts for residents in these areas.

A noise assessment was undertaken by the Proponent in accordance with NSW government noise guidelines and included the prediction of the worst-case noise scenarios across 56 Noise Catchment Areas (NCAs) within 600 metres of the project corridor (refer to **Figure 10** to **Figure 12**).

Construction Noise
Hours of construction / works would be 7:00 am to 6:00 pm, Monday to Friday and 8:00 am to 6:00 pm on Saturday. However, due to construction practicalities, for example the closure of State roads, works outside these hours will occur. Tunnelling and associated activities will occur over a 24-hour period. **Table 9** below provides a summary of when certain activities will occur.

Airborne noise
An assessment of potential construction noise impacts was undertaken in accordance with the *Interim Construction Noise Guideline* (ICNG, Department of Environment and Climate Change, 2009). The ICNG outlines Noise Management Levels (NMLs) that are used to assess the impact at a sensitive receiver. If levels are exceeded then management and mitigation measures must be implemented.

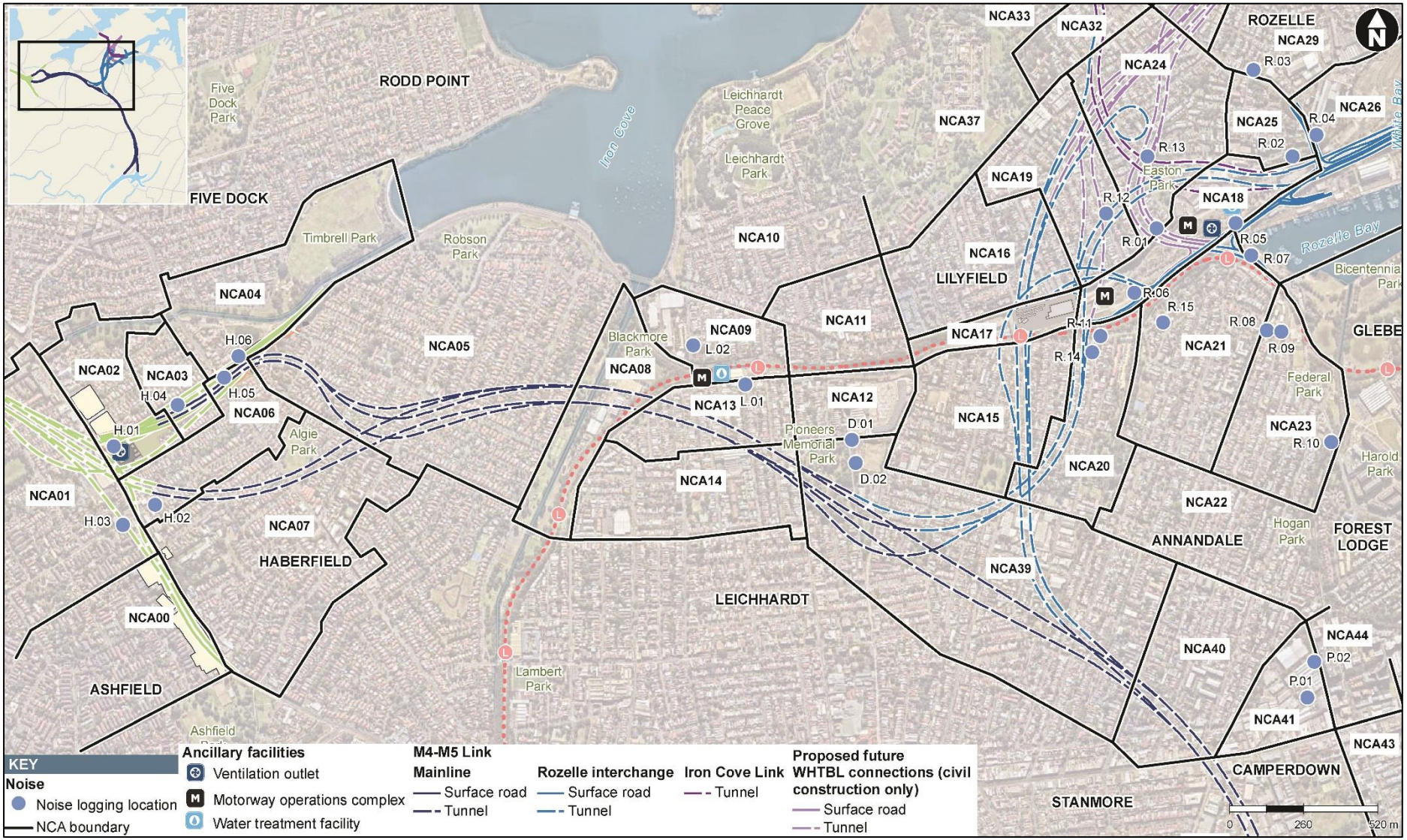

Figure 10: Project footprint, noise catchment areas and noise logging locations (western section) (Source: EIS)

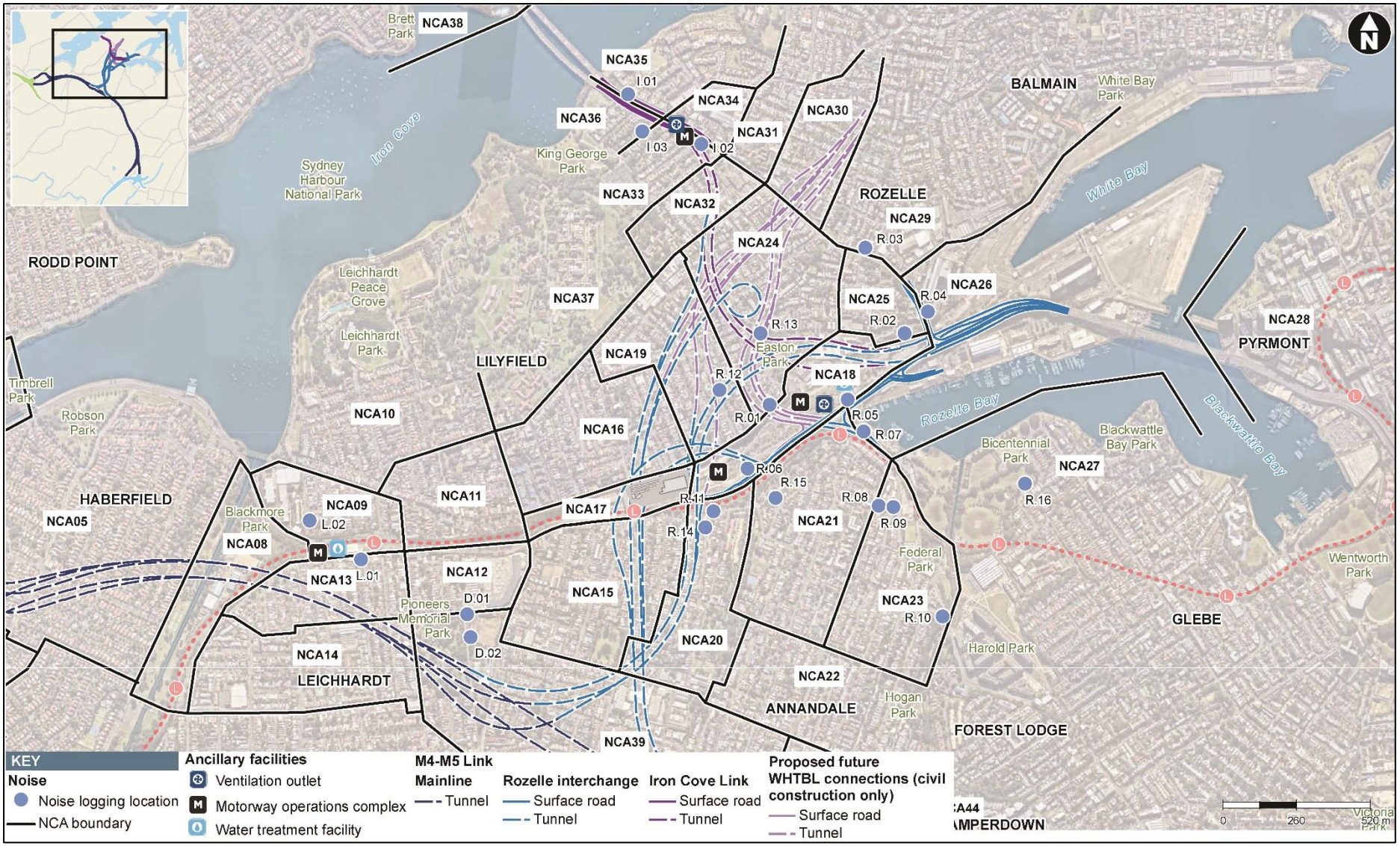

Figure 11: Project footprint, noise catchment areas and noise logging locations (northern section) (Source: EIS)

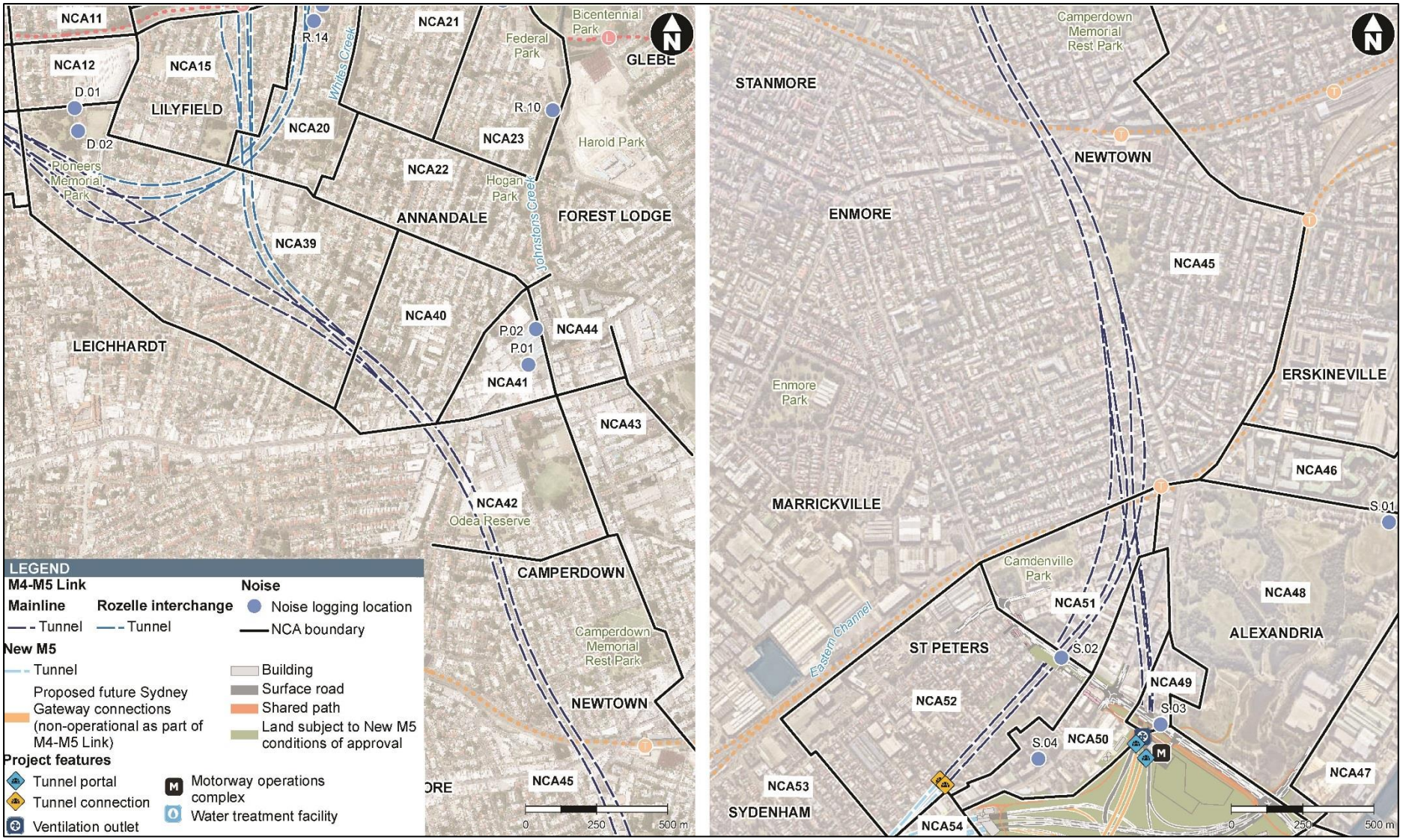

Figure 12: Project footprint, noise catchment areas and noise logging locations (southern section) (Source: EIS)

Table 9: Construction activities (Source: EIS)

Activity	Construction hours	Comments and Justification
Tunnelling, tunnelling support and underground construction activities		
Tunnelling and underground excavation	24 hours a day, up to seven days a week	• Activities that support tunnelling works may need to occur 24 hours a day, up to seven days a week
Underground construction and tunnel fit out	24 hours a day, up to seven days a week	• Activities that support underground construction and tunnel fit out may need to occur 24 hours a day, up to seven days a week • Deliveries for underground construction and tunnel fit out may need to occur 24 hours a day, up to seven days a week
Surface construction activities		
Demolition and surface construction activities	7.00 am to 6.00 pm on weekdays, 8.00 am to 1.00 pm on Saturdays, no works on Sundays or public holidays	• Non-intrusive preparatory work, repairs or maintenance may be carried out on Saturday afternoons between 1.00 pm and 5.00 pm and on Sundays between 8.00 am and 5.00 pm. • Activities requiring the temporary possession of roads or to accommodate road network requirements may need to be carried out outside the standard daytime works hours during periods of low demand to minimise safety impacts and inconvenience to commuters
Construction traffic for material supply and spoil handling		
Construction traffic for material supply to, and spoil handling from, tunnelling and underground excavation	24 hours a day, up to seven days a week.	• Spoil handling from the Darley Road construction ancillary facility (C4) would only occur between 7.00 am and 6:00 pm Monday to Friday and 8.00 am and 1.00 pm on Saturdays. No spoil would be removed from this site on Sundays or public holidays.
Blasting and rock-breaking		
Blasting	Between 9.00 am and 5.00 pm, Mondays to Fridays and 9.00 am to 1.00 pm on Saturdays	• Blasting would occur up to six days a week (Monday to Saturday). Blasts would be limited to one single detonation in any one day per receiver group, unless otherwise agreed by the NSW EPA through consultation on the project Construction Noise and Vibration Management Sub-plan.
Rock-breaking (with potential for impulsive or tonal noise impact at a sensitive receiver)	Between 8.00 am and 6.00 pm Monday to Friday and 8.00 am to 1.00 pm Saturdays, with respite periods	• Respite periods would be scheduled to minimise the frequency and duration of extended rock-breaking activities with potential for impulsive or tonal noise emissions.
Minor or ancillary activities		
Minor activities	At any time	• Minor activities would include activities that do not lead to an exceedance of the applicable noise management level at an affected receiver.
Activities authorised by an Environment Protection Licence	As specified in the Environment Protection Licence	• Construction activities would be managed as required by the Environment Protection Licence.

Activity	Construction hours	Comments and Justification
Emergency or directed activities		
Emergency or directed activities	At any time	• Activities would be carried out as directed by a relevant authority • Activities would be carried out if required to prevent an imminent loss of life or environmental damage.
Activity	**Construction hours**	**Justification for out-of-hours activities**
Road tie-ins works, temporary diversions, traffic switches, pavement works and line marking	Out-of-hours as required	• Completing or installing these items at night when traffic flows are low would minimise disruption to traffic and minimise any potential safety conflict between construction personnel and traffic.
Delivery of oversized material, plant and equipment	Out-of-hours as required	• Delivery of materials and equipment may require oversized loads when vehicle numbers on the road network are lower.
Utility works	Out-of-hours as required	• Some utilities will cross major State and local roads, which will need to be closed or partially closed to facilitate extension, augmentation and adjustment. This work will be undertaken in line with the requirements of road occupancy licences issued by the Transport Management Centre and relevant roads authorities, as required.

Table 10: Worst-case dB(A) exceedances of NML during all periods (Source: EIS)

Types of works	Impacts on	1 to 5 dBA	6 to 10 dBA	11 to 15 dBA	16 to 20 dBA	20 to 25 dBA	> 25 dBA	Highly Noise Affected Receivers	Highest Noise Level LAeq	Exceeds Sleep Screening Criteria	Number of Lmax Levels >65
Short Term[1]	Residential	2671	1487	699	353	154	153	172	91	6602	1928
	Other	21	16	7	4	-	-	n/a	87	n/a	n/a
	Commercial	49	20	7	3	1	-	n/a	77	n/a	n/a
Long Term[2]	Residential	1579	616	298	193	103	75	54	86	1305	347
	Other	12	9	9	-	-	-	n/a	84	n/a	n/a
	Commercial	12	4	3	4	1	-	n/a	79	n/a	n/a
Utility Works[3]	Residential	649	249	76	75	74	81	33	86	546	297
	Other	15	6	3	-	-	-	n/a	84	n/a	n/a
	Commercial	15	5	5	1	-	-	n/a	74	n/a	n/a

Note:
1: site establishment works
2: activities required to deliver the project
3: utility activities for Rozelle have been included as part of the long term works due their predicated duration

The noise assessment predicted that construction NMLs would be exceeded in the majority of NCAs during short-term works, long-term works and utility relocation scenarios as detailed in **Table 10** above. The assessment indicates that NMLs will be exceeded during various scenarios and some receivers will be impacted during multiple types of works. Short-term works generally include site establishment works, demolition, installation of environmental controls and pavement modifications. Long-term works include spoil handling, truck movements, on-site car parking, construction of operational facilities, bridge works, rehabilitation works and all other required activities to deliver the project.

To remedy noise impacts, the Proponent has committed to providing upgraded acoustic sheds, increasing the height of site hoardings, limiting the use of noisy equipment, provision of at-property treatments, respite offers and alternate accommodation.

Works associated with utility relocation and diversion works would likely be required at most construction ancillary facilities. Works would also be required along various streets in the vicinity of the construction ancillary facilities and within associated work areas to allow access to and modification of utilities. The assessment indicates that these works will be short term with high noise levels.

Ground-borne noise

Mainline tunnelling activities would be undertaken by road headers and blasting, which will generate ground-borne noise (noise generated by vibration). The ICNG sets out internal ground-borne noise levels for evening and night-time periods of 40 dB(A) and 35 dB(A), respectively. The use of road headers would exceed the ground-borne noise levels at a number of locations, including at:

- Haberfield in NCA05 (near Wattle Street, north of Martin Street), 46 receivers are predicted to experience ground-borne noise levels, up to 9 dB(A) above the night-time criteria;
- Rozelle interchange, in NCA16, NCA19 and NCA24 (north of Lilyfield Road and around Catherine Street), 225 receivers are predicted to experience ground-borne noise levels, up to 10 dB(A) above the night-time criteria;
- Iron Cove Link tunnel portals in NCA32 and NCA33 (south of Victoria Road between Toelle Street and Cambridge Street), 29 receivers are predicted to experience ground-borne noise levels up to 7 dB(A) above the night-time criteria; and
- St Peters interchange in NCA49 and NCA50 (west of Sydney Park), 39 receivers are predicted to experience ground-borne noise levels, up to 9 dB(A) above the night-time criteria.

It is expected that mainline tunnelling would progress on average 20-25 metres a week with any one receiver experiencing ground-borne noise for approximately 14-20 days. Tunnelling works associated with excavating access tunnels to the mainline tunnel alignment will result in ground-borne noise impacts at the nearest sensitive receivers. The following areas will have exceedances in night time periods:

- Haberfield, Option B, 8 receivers are predicted to experience ground-borne noise levels up to 18 dB(A) above the night-time criteria;
- Darley Road, 10 receivers are predicted to experience ground-borne noise levels, up to 4 dB(A) above the night-time criteria;
- Rozelle Ventilation facilities, 63 receivers are predicted to experience ground-borne noise levels, up to 18dB(A) above the night-time criteria; and
- Pyrmont Bridge Road access tunnel, 2 receivers are predicted to experience ground-borne noise levels, up to 5 dB(A) above the night-time criteria.

Blasting would be limited to between 9:00 am to 5:00 pm, on weekdays and 9:00 am and 1:00 pm on Saturday, while rock-breaking would be limited to between 8:00 am to 6:00 pm on

weekdays and 8:00 am to 1:00 pm on Saturday, resulting in road headers being the only source of ground-borne noise during evenings and night-times.

Sleep disturbance

The sleep disturbance criterion (i.e rating background level plus 15 dB(A)) is likely to be exceeded for the majority of the construction scenarios except for the construction of ancillary facilities and the demolition of properties (as these activities will occur during standard construction hours). The most significant exceedances would be during the road works and work area establishment which are expected to occur for up to eight weeks per locality.

Construction Vibration

The main sources of construction vibration would be tunnelling, blasting, piling, compaction of road surfaces, excavation and jack hammering. As shown in **Table 11**, there is the potential for vibration to result in cosmetic damage to 438 buildings within 25 NCAs and to exceed the human comfort criterion in 24 NCAs without mitigation measures. Structural damage criteria would not be exceeded.

Table 11: Construction Vibration Assessment Summary (Source: EIS)

NCA	Number of buildings within safe working distance			
	Cosmetic damage criteria			Exceed Human Comfort
	Residential and Mixed Use	Group 2 (Typical)	Group 3 (Structurally Unsound[1])	
NCA00	-	-	-	2
NCA01	10	10	-	25
NCA06	9	11	-	23
NCA07	3	7	-	17
NCA09	-	-	1	25
NCA13	5	5	-	49
NCA15	-	-	-	1
NCA16	1	3	-	13
NCA17	-	1	-	2
NCA18	-	-	6	-
NCA19	11	15	-	51
NCA20	-	-	-	21
NCA21	22	22	6	78
NCA23	-	-	1	1
NCA24	6	15	2	67
NCA25	49	60	-	100
NCA26	7	8	1	10
NCA27	-	-	-	1
NCA33	23	29	-	62
NCA34	1	1	-	16
NCA35	11	15	-	29
NCA41	21	25	2	41
NCA42	-	6	2	17
NCA43	-	-	-	3
NCA44	2	2	1	12
Total	**181**	**235**	**22**	**666**

Note 1: This group identifies Heritage listed items only

Operational Noise

Road traffic

Operational noise impacts resulting from road traffic have been assessed in accordance with *NSW Road Noise Policy* (RNP - Department of Environment, Climate Change and Water, 2011) and *Noise Criteria Guideline* (RMS, 2015).

The noise assessment indicates that the project would result in a decrease in road traffic noise along a significant length of the project area in both 2023 and 2033 as traffic would be diverted from surface roads to the tunnels. Minor increases of 1 to 2 dB(A) are predicted on The Crescent, Johnston Street, and Gordon Street, which is associated with increased volume due to redistribution of traffic.

However, increases in noise (up to around +15 dB(A)) are identified in NCA33 and NCA36 (on the southern side of Victoria Road at Iron Cove near the proposed Iron Cove Link tunnel portals) and NCA25 (near the new Victoria Road bridge), where the project results in traffic lanes being moved closer to receivers, in combination with removing existing screening due to property acquisitions.

Approximately 431 receivers are predicted to exceed operational noise criteria and will require noise mitigation. To aid in reducing noise impacts the Proponent has committed to investigating using low noise pavement during the detailed design stage, while the existing noise barriers along Victoria Road and the southern side of City West Link would be retained. No new noise barriers are proposed as part of this project, with the preferred approach being at-receiver property treatment. This is particularly the case at Iron Cove where noise barriers, if installed, would potentially result in amenity and overshadowing impacts. Though no new noise barriers are proposed, the Proponent has committed to undertaking a review of the need for noise barriers as a form of noise mitigation during detailed design.

Permanent operational facilities

Noise impacts from operational facilities have been predicted to comply with the night-time criterion of 45 dB(A) (as per the *NSW Industrial Noise Policy*) in the Haberfield, Darley Road, Rozelle and St Peters areas. The noise assessment indicates that the substation at Iron Cove will exceed the criterion by 12 dB(A) at the nearest sensitive residential receiver. The Proponent has committed to reviewing the mechanical equipment for each facility against the relevant operational noise criteria at the detailed design stage of the project.

Submissions

Public Submissions

Key issues raised in the public submissions included:

- quality of the noise assessment;
- construction noise and vibration impacts on sensitive receivers including cumulative impacts and out-of-hours activities;
- concerns whether construction noise mitigation measures will be implemented;
- adequacy of noise mitigation measures;
- concerns regarding the duration of noisy activities;
- the need for more direct consultation with each potentially affected receiver prior to approval of night-time works;
- increase in noise resulting from increased traffic and operational facilities; and
- operational vibration impacts on receivers located near portals.

Government Agency and Council Submissions

City of Sydney Council raised concerns regarding construction noise and vibration impacts and potential noise impacts from operational facilities.

Inner West Council expressed concern over the ongoing construction impacts experienced by communities in Haberfield and Ashfield and the need for this to be mitigated and managed. Council also advised that further assessment of vibration impacts is required due to shallow depth of tunnelling.

The **EPA** raised concerns regarding ongoing construction impacts experienced by communities at Haberfield and St Peters. The EPA considers that additional justification is required for undertaking activities outside of standard construction hours.

The EPA recommended various conditions of approval, including appointing an independent Environmental Representative and Acoustic Advisor, construction management monitoring and auditing programs, preparation of a community strategy for out-of-hours works, respite periods, and operational monitoring programs.

NSW Health raised concerns about construction vibration impacts to the Royal Prince Alfred Hospital. It recommended that noise mitigation measures should be provided to sensitive residential receivers to reduce construction and operational noise impacts. NSW Health also raised health concerns regarding extended exposure to construction noise over a long period of time.

Department's Consideration

Construction Noise

Day time activities – Air Borne Noise

The Department recognises that multiple receivers will be impacted under various construction scenarios. Some of the construction activities may have short term or long term impacts depending on the type of works being undertaken.

The Proponent has proposed standard mitigation measures to manage construction noise such as:

- the use of temporary noise walls or hoardings around construction compounds;
- the erection of acoustic sheds at all spoil-handing construction ancillary facilities;
- locating fixed plant away from sensitive receivers; and
- offers of alternate accommodation to sensitive residential receivers affected by night-time construction activities which exceed NMLs.

These measures have been used on other large infrastructure projects to aid in reducing noise impacts. However, based on past experiences where works on large infrastructure projects have been undertaken outside of standard construction hours in highly urbanised environments, the Department considers that more proactive approach and stronger mitigation measures need to be pursued.

To facilitate a more proactive approach to the management of noise impacts, the Department considers the Proponent should implement a range of noise mitigation measures. The community expressed significant concern with the long construction timeframes and the prolonged noise exposure from concurrent infrastructure projects. The Department acknowledges that construction fatigue is an emerging issue resulting from unprecedented infrastructure delivery in highly urbanised environments. To address this issue, the Department has recommended additional mitigation measures be applied to receivers that will be exposed to high noise levels from consecutive projects. This is particularly pertinent for communities in Haberfield and St Peters, where at-property treatments need to be offered in addition to standard mitigation measures.

Furthermore, the Department has recommended that operational noise mitigation be implemented during the early stages of construction to assist in addressing construction noise

impacts. For example, the realignment of the Crescent and City West Link will result in the existing noise barrier at this location being reduced by 90 metres in length. The application of at-property treatment will assist in addressing the noise impacts associated with the shortening the length of this noise barrier.

Community submissions have raised concerns regarding noise impacts from the Darley Road construction ancillary facility. Activities at this site (excluding tunnelling) are proposed to be limited to standard construction hours and up to 6:00 pm on a Saturday to limit noise impacts to residents. The noisiest activities are considered temporary and short term as they are associated with site establishment works, utility adjustments, pavement and infrastructure works. Should any of these activities be required to be undertaken outside of standard hours, appropriate mitigation would need to be provided. Longer-term activities include 24-hour spoil handling within an acoustic shed, spoil haulage during standard construction hours and the erection of a permanent operational facility. Although concerns have been raised by the community in regards to the use of the site as a construction ancillary facility, the Department acknowledges longer-term activities are not predicted to exceed the highly noise affected criteria specified in the ICNG. Furthermore, with the implementation of required mitigation measures, noise impacts can be appropriately managed.

Night and evening activities
Spoil handing and haulage will occur 24 hours (except at Darley Road). Notwithstanding, some activities (such as utility relocations, line marking, road paving and widening) will need to be undertaken at night to minimise traffic impacts on the road network.

The project will be subject to an EPL and therefore most works outside of standard construction hours will be subject to review by the EPA. For works that are not subject to an EPL, the review of the need for the works and their management will be addressed under an Out-of-Hours Protocol to be approved by the Department. The Protocol will outline the process for preparing, assessing, managing and approving work not subject to an EPL. The Protocol would facilitate the identification of mitigation and notification requirements for high and low risk out-of-hours works.

In acknowledging the need for works outside of standard construction, amidst existing construction fatigue, the Department considers a proactive approach to manage noise impacts is necessary. Accordingly, the Proponent is required to implement at-property treatment in a timely manner as part of a Noise Insulation Program aimed at minimising construction noise impacts. The Program will identify the scope of the insulation package, and timing of implementation, which may include installing at-property treatments as defined in RMS's *Noise Mitigation Guideline,* or acoustic curtains or magnetite windows. This would supplement standard mitigation measures including respite periods.

The provision of appropriate respite is a major concern for the community and the Department. Accordingly, the Department considers that respite periods should be defined in consultation with the community and has included a condition to this effect. During the consultation process, the community may identity that certain works should only be scheduled during certain periods; however, some members of the community may agree to prolonged works to occur over consecutive nights to reduce overall construction duration. To assist the community in its consideration of respite periods, and the EPA and the Department in their consideration of requests for approval of out-of-hours works, a schedule of the works will need to be provided. Coordination of respite periods is addressed in **Section 5.3**. The Department has recommended the appointment of a Utility Coordination Manager to manage the coordination of all utility works with the outcome of managing works to avoid consecutive night-time works and ensure provision of respite periods.

Ground-borne Construction Noise
The generation of ground-borne noise, predominantly through road header activity, may cause exceedance of NML's in some areas along the tunnel alignment. The Department is satisfied that the mitigation measures committed to by the Proponent are adequate, including confining vibration intensive construction works to less sensitive daytime periods and undertaking further ground-borne vibration assessments once additional geo-technical investigations are completed.

Vibration
Construction vibration can generate impacts on human comfort and the structural integrity of adjacent buildings. The Department is satisfied that the Proponent has sufficiently identified the vibration-generating activities that are likely to cause discomfort to the surrounding community and/or property damage.

Whilst the Department is generally satisfied that the Proponent has identified appropriate safeguards to manage vibration impacts, in noting the scope of tunnelling works, the Department has strengthened these commitments by recommending:

- compliance with construction vibration criteria for human comfort and structural integrity;
- the preparation of a land use survey to identify properties that are sensitive to construction vibration;
- pre- and post- construction dilapidation surveys;
- rectification of damage caused by the construction of the project; and
- measures and procedures for minimising construction vibration impacts.

Independent Acoustic Advisor
The Proponent proposes to engage an independent Acoustic Advisor to oversee construction noise and vibration planning, management, monitoring and mitigation. The Department supports this approach and has recommended that the Acoustic Advisor be approved by the Secretary. The Acoustic Advisor will be required to consider matters relating to noise and vibration and provide information to the Secretary on the CSSI's noise impacts, while also advising the Proponent on how to reduce noise impacts. Further, the Department has recommended that a Community Complaints Mediator be appointed to assist in resolving any outstanding concerns that individuals or businesses may have, including noise and vibration complaints.

Construction Hours
Standard construction hours on a Saturday are 8.0 0am to 1.00 pm. However, the Department considers that activities on Saturday can conclude at 6:00 pm, which is reflective of current community attitudes. By permitting additional hours this will provide flexibility to the Proponent to schedule a full day of work on a Saturday with the potential of reducing out-of-hours work requests.

<u>Operational Noise</u>
Operational Mitigation Measures
Traffic noise is predicted to increase along Victoria Road between Iron Cove Bridge and the new Iron Cove link portal, as existing noise screening (i.e. buildings) will be removed to allow for the widening of Victoria Road to accommodate the Iron Cove link connection.

The assessment indicates that approximately 431 receivers are predicted to exceed operational noise criteria and will require operational noise mitigation. Noise barriers are not proposed as part of the project as they do not provide adequate noise mitigation benefits.

The Department has recommended that the Proponent:

- undertake operational noise and vibration monitoring and assess performance against the predicted noise and vibration levels for the project as part of an Operational Noise and Vibration Review; and
- should the Review indicate noise levels in excess of the criteria, develop and implement additional mitigation measures.

Permanent Ancillary Facilities and Equipment
Only the Iron Cove substation is predicted to exceed noise criteria up to 12 dB(A) at the nearest sensitive residential receiver. Further validation of the assessed impacts, noise goals and plant design will be undertaken. Should noise exceedances be unable to be resolved during detailed design, noise mitigation will be addressed as part of the Operational Noise and Vibration Review, including at-property treatment solutions.

Conclusion
The Department acknowledges that the construction of the project will have construction noise impacts at sensitive receivers. This impact is a significant community concern which is amplified by the scale of the project and of the concurrent construction of infrastructure in a highly urbanised environment.

The Department has recommended conditions that require the Proponent to improve its standard approach to noise mitigation and to proactively manage works and to implement mitigation measures that address key community concerns in relation to construction fatigue and works undertaken outside of standard construction hours. These conditions include provision of periods of respite, the appointment of an Acoustics Advisor and implementation of a construction Noise Insulation Program.

Whilst noise and vibration impacts cannot be eliminated and there will be circumstances which will create inconvenience to the community, the implementation of the mitigation measures proposed by the Proponent and the Department's recommended conditions, noise and vibration impacts can be managed.

5.3. Utilities Management

Issue
Relocation and upgrades to existing utilities required for the project are largely located outside the primary construction boundaries and will usually be undertaken by the respective utility provider.

A large portion of the utility works will need to be undertaken of an evening or night time as the services are located in arterial and sub-arterial road reserves and the road lanes can only be closed to traffic during the evening or night time period if severe disruptions to traffic are to be minimised. A recurring concern expressed in community submissions is the number, duration and management of utility relocations or upgrades. These concerns are based on the experiences of the community from the utilities works for other WestConnex projects, particularly the M4 East and New M5. Consequently, the community is seeking assurances that the management of both contestable and non-contestable utilities works will be improved from the experiences of those living adjacent to the M4 East and New M5 construction works areas.

Submissions
Public Submissions
The major concern raised by the community was utility works being undertaken by the utility providers during project nominated respite periods, resulting in no respite for the community. Other issues raised included:

- the need to coordinate utilities works;
- duration of the proposed utilities works;
- the need to implement mitigation measures prior to undertaking utility works;
- what types of mitigation measures would be employed;
- requests to employ a utilities coordinator to ensure respite periods are provided, and to ensure that the same level of controls are imposed on works undertaken by the utility providers as on the main construction works;
- noise and sleep disturbance associated with out-of-hours works, in particular around the Darley Road construction ancillary facility;
- impacts to Byrnes Street residents arising from utility works at the Iron Cove construction ancillary facility; and
- air quality and noise impacts to the community from the use of off-road diesel generators for utilities works.

Government Agency and Council Submissions

The **Inner West Council** also raised concern over utility works being undertaken during designated respite periods. This concern was informed by the experiences of residents who are currently impacted by other WestConnex projects. The works in question are non-contestable as they are not specifically part of the project, but are required for the project. The Council recommended that a Utilities Manager be appointed who has enforcement powers to coordinate project and utility works so that cumulative construction impacts on residents around worksites are minimised.

Sydney Water indicated that continued access to its assets needs to be provided to ensure that it can maintain services to its customers. It stated that the Proponent must protect and monitor potential impacts to Sydney Water's assets, noting that that there is limited information available on the condition of its pressure main and hence potential impact from construction works. Therefore, Sydney Water requested that it is closely consulted during detailed design to ensure that these assets are protected.

The Port Authority of NSW supported the establishment of a Utilities Coordination Committee and requested membership on the committee. It also requested that it be consulted during detailed design to ensure that services required for port operations are maintained, including Ausgrid 132 kV and 33 kV transmission feeders, Telstra multi-fibre optic cable and Sydney Water sewer and water mains.

While the **EPA** did not specifically comment on the nature of the utility works, it did raise concerns regarding utility works being undertaken outside of standard construction hours, given the impact to communities from other WestConnex projects. The EPA recommended that a condition be imposed requiring the appointment of a Utility Management Coordination Agency to oversee development and implementation of a Utility Management Strategy so as to avoid out-of-hours works by utility providers on nights when the Proponent had planned respite, should out-of-hours works be approved.

Department's Consideration

The Department acknowledges the concerns raised in submissions by the community and Inner West Council relating to utility works being undertaken during respite periods and the need for coordination of the contestable works and non-contestable works. The Department also notes that works that are non-contestable cannot be directly regulated by this approval, that there are limited courses of action that can be taken, and this is adding to the construction and complaint fatigue felt by the community.

The Department notes the extended duration of utilities works that are required for this project, in particular, up to two years at Iron Cove. These works have the potential to adversely impact

the amenity of the surrounding community if not appropriately managed. Whilst it is unlikely to be two years of continuous utility works, the duration will only be fully understood during the detailed design phase of the project.

To reduce the impact of relocating or upgrading utilities for the M4-M5 Link, the Proponent has developed a Utilities Management Strategy as part of the EIS. The Utilities Management Strategy identifies which utilities are within and outside the primary construction boundaries, and outlines mitigation measures to reduce impacts to the community. Further, the Utilities Management Strategy details the utilities that are likely to be impacted by the project, and provides options for either relocation or upgrading.

Given the long duration over which the utilities works are to be undertaken, the Department considers that the community needs to be informed of upcoming works in their area, and recommends that advice of all works be provided to the community well in advance of the works occurring. This advice will include details of the works being undertaken, by which utility provider(s), and contact details for the community to register complaints. The Department recommends that this process be addressed in the Communication Strategy.

The Department considers that the provision of adequate respite periods is critical for the community to be able to tolerate the impact of the works. The Department understands that communities across Sydney are experiencing longer duration infrastructure projects than in the past, and some of these projects are impacting on the same communities concurrently and/or consecutively. This has magnified the need for respite periods to be better managed. The Proponent is proposing to establish a Utilities Coordination Committee, as part of the Utilities Management Strategy, with representatives from the utility providers, the construction contractors, and key stakeholders including local and state government agencies. The Utilities Coordination Committee will coordinate the timing of contestable and non-contestable utilities works, to ensure respite periods are provided. The Department considers that this initiative together with the Proponent's proposal to prepare and implement a Utilities Management Strategy is a positive move to reduce the impact to communities affected by proposed utilities relocations or upgrades.

The Department has reinforced the Proponent's commitment to develop and implement a Utilities Management Strategy in the recommended conditions of approval. It has also recommended the appointment of a Utility Coordination Manager to be responsible for the coordination of utilities works, and provide advice on upcoming utility works to the Public Liaison Officer. The Utility Coordination Manager would also investigate complaints regarding utility works that have been referred via the Proponent's complaint management system and the Community Complaints Mediator.

Conclusion
The Department recognises that necessary utility works have the potential to adversely impact on the amenity of the community as a large portion of the works may need to be undertaken outside of standard construction hours and will generate high levels of noise. Although the community may tolerate some out of hours works, appropriate respite must be provided. The Department considers that the proposed management measures committed to by the Proponent and the Department's recommended conditions of approval will assist in providing communities with appropriate respite periods.

5.4. Air Quality

Issue
The construction and operational air quality impacts of the project were assessed by the Proponent in terms of:

- construction impacts, through a qualitative risk analysis;

- in-tunnel air quality, through calculation from vehicle emission factors; and
- ambient (external) air quality, through detailed air quality dispersion modelling, including surface roads and emissions from ventilation outlets.

The Proponent's air quality assessment indicates that the project has the potential to impact on local air quality in the following ways:

- vehicle emissions at surface roads and at interchanges, associated with traffic travelling to and from the motorway;
- vehicle emissions in the tunnel;
- emissions from the tunnel ventilation outlets resulting in increased ground level concentrations of pollutants in the vicinity of the outlets;
- dust and vehicle emissions generated during construction; and
- gaseous emissions and odour impacts associated with construction in (and/or remediation of) contaminated areas.

Whereas the generation and control of fugitive dust emissions is the main air quality issue during construction, the key operational air quality issues for the project are in-tunnel air quality and impacts of vehicular emissions along surface roads and from ventilation outlets. The Proponent's air quality assessment predicts compliance with in-tunnel air quality goals.

The key pollutants associated with vehicle emissions include oxides of carbon and nitrogen, particulate matter (from fuel combustion and from vehicle wear and tear such as brakes and tyre wear), ozone, polycyclic aromatic hydrocarbons and volatile organic compounds. The continued improvement in engine and fuel technology, along with stricter standards for new vehicles and fuel quality has reduced the concentration of these pollutants in motor vehicle emissions over the past 20 years. Road transport emissions are predicted to continue to improve, although particulate matter emissions are unlikely to reduce at the same rate. However, this improvement has been tempered by the increased intensity of motor vehicle use (Climate Change Authority, 2012).

Although ambient air quality goals would be met at most locations, elevated levels of nitrogen oxide are predicted to occur adjacent to the ANZAC Bridge and around Sydney Airport and elevated levels of $PM_{2.5}$ are predicted at locations near the ANZAC Bridge and St Peters under the worst-case future scenario, which includes the Sydney Gateway, F6 and Western Harbour Tunnel road proposals being operational. These elevated levels are primarily the result of vehicle emissions along surface roads on the approach to and exiting the surface interchanges at St Peters and Rozelle. No emissions are proposed from the entrances and exits (portals) to the tunnels and hence these would not be a source of pollutants.

Conversely, the project would lead to improved roadside air quality conditions in some locations, including Paramatta Road, Victoria Road and City West Link, due to reduced emissions resulting from changes in traffic conditions, such as reduced congestion and removal of vehicles from surface roads through the increased use of tunnels.

As discussed in the ACTAQ technical paper *Health Effects of Traffic-Related Air Pollution* (NSW Health, July 2014), sufficient exposure to pollutants in vehicle emissions is linked to a range of adverse health incomes including respiratory illnesses and cancer. A health risk assessment was undertaken by the Proponent to assess the impact of vehicular emissions and involved predicting the risk of changes in pollution concentrations arising from the project on two classes of receptors - approximately 86,375 residential, workplace and recreational (RWR) receptors, and 40 community facilities including schools, child care centres and medical centres. The risk assessment indicates that the maximum increases to health risk during the operation of the project are 'acceptable' or better at all but one receiver location, an industrial workplace near Sydney Airport (discussed further below).

Submissions

Public Submissions

The key air quality and health issues raised in public submissions included:

- reduced local air quality and associated impacts on amenity and health, particularly vehicle emissions from unfiltered ventilation outlets and from surface roads, and increases in dust and vehicle emissions during construction activities;
- concerns with the methodology and accuracy of the Proponent's air quality assessment; and
- concerns with the proposed tunnel ventilation design and in-tunnel air quality.

Government Agency and Council Submissions

The **City of Sydney Council** raised concerns about the potential air quality and human health impacts caused by tunnel ventilation outlets and widened surface roads leading to increased traffic volumes. The Council recommended an independent review of the assessment be undertaken and assessment of impacts associated with emissions standards and ozone. Council also recommended conditions to manage construction air quality impacts and for filtration requirements to be imposed on ventilation outlets. It also recommended planning controls for future development in the vicinity of the project and a suite of monitoring and reporting requirements.

The **Inner West Council** provided recommendations regarding the assessment of air quality impacts including cumulative impacts, impacts on nearby sensitive receivers, roadside emissions at surrounding roads, filtration of ventilation outlets, in-tunnel air-quality and emergency scenarios. Council also recommended conditions requiring validation of modelling results, monitoring and limiting in tunnel and ambient air quality pollutant concentrations, and construction air quality management.

The Inner West Council commissioned a review by Beca which concluded that the air quality assessment is consistent with previous assessments and noted there were no significant gaps. The Beca review identified issues to be addressed including construction air quality impacts and monitoring, limitations of the modelling, the need for independent validation of tunnel ventilation design, further consideration of the most impacted residential-workplace-recreational (RWR) receptors, and operational monitoring requirements.

The **NSW Chief Scientist and Engineer** (chair of ACTAQ), appointed two international experts to review the project. The review considered that the operational air quality assessment was a thorough review of high quality. The expert review noted the project is likely to lead to overall improvements in air quality at the majority of receptors and some worsening of air quality in some locations.

The review noted the potential implications of the under-representation of European diesel emission factors in the modelling and the consequences of non-compliance with emissions standards. It also noted some issues with the data used for modelling emissions but remarked that this would not substantially affect the conclusions in the EIS. Similarly, it identified some weaknesses in the background air quality assessment but concluded that this would not influence the EIS conclusions.

The review agreed with the findings of the health risk assessment.

The **EPA** sought further information about predicted impacts at receptors based on expected traffic and the regulatory worst-case scenarios, and noted vehicle emissions estimates may be inaccurate based on the predicted vehicle fleet composition.

NSW Health advised the air quality models used were adequate and indicated its satisfaction with the approach adopted for the Human Health Risk Assessment. NSW Health advised that exposure to any level of traffic related air pollution can cause health effects and recommended all reasonable and feasible measures be adopted to minimise the exposure of the population to traffic related air pollution. NSW Health supported the National Health and Medical Research Council position that exposure to pollution around tunnel portals and ventilation outlets be limited.

NSW Health also recommended that planning controls for future high-rise development (above 10 metres) near ventilation facilities be developed to ensure the protection of human health. It also recommended that drivers be encouraged to use recirculated air in vehicles to reduce exposure to vehicle emissions.

Fire and Rescue NSW recommended conditions on emergency management systems and maintenance, testing and auditing of these systems.

Department's Consideration

To assist in the assessment of air quality impacts and obtain independent expert analysis of the Proponent's air quality assessment, the Department engaged Todoroski Air Sciences to undertake a specialist review. The full review report is provided in **Appendix F**. The engagement of the independent reviewer is consistent with the recommendation of the City of Sydney Council.

Construction

The Proponent has committed to implementing a number of control measures to limit construction air quality impacts including;

- measures to reduce and monitor dust emissions from stockpiles, acoustic sheds and disturbed surfaces;
- coordination with other construction sites to reduce cumulative construction dust generation;
- preventing the tracking of dust onto roads and regularly inspecting and cleaning roads;
- monitoring meteorological and air quality conditions; and
- modifying or ceasing dust generating activities during adverse conditions.

The Department accepts the Proponent's conclusion that construction air quality impacts could be effectively managed to acceptable levels by implementing the above control measures and standard best practice measures for controlling dust and other fugitive emissions. To ensure that construction air quality impacts are effectively mitigated and managed, the Department has recommended a condition of approval requiring the Proponent to prepare and implement a Construction Air Quality Management Sub-plan.

Operation

Modelling Approach for Ambient (external) Air Quality

As with the previous WestConnex projects, the Proponent assessed external (outlet and surface road) air quality impacts using the GRAL/GRAMM dispersion modelling software. While the software is not listed in the *Approved Methods for the Modelling and Assessment of Air Pollutants in New South Wales (*the *Approved Methods* – DEC, 2005), the Proponent received the EPA's agreement to use the model, which is a process allowed for under the Approved Methods.

The modelling approach was subject to detailed review by the ACTAQ and the Department's independent peer reviewer and both advised that the assessment approach used is adequate. Therefore, the Department is satisfied that the modelling provides suitable prediction levels to assess the likely air quality impacts of the operation of the project.

Ambient Air Quality

The EIS modelled the potential impacts on air quality at receivers surrounding the road network where traffic changes may be influenced by the project. This included surface interchanges at St Peters and Rozelle, and existing roads in the network that may be used by drivers accessing the motorway intersections or may be used less because of the project.

The assessment modelled emissions of carbon monoxide, oxides of nitrogen (including nitrogen dioxide (NO_2)), particulate matter (PM_{10} and $PM_{2.5}$), total hydrocarbons and air toxics. The modelled worst-case scenario includes operation of the project combined with traffic from other WestConnex projects and the proposed Western Harbour Tunnel, Sydney Gateway and F6 Extension.

The modelling predicts that air quality impacts would range from reductions in some areas due to reduced traffic congestion, to increases in other areas due to a localised increase in traffic volumes. A summary of the predicted maximum increase in pollutant levels is summarised in **Table 12**. Air toxics are not included in the table as the EIS found all contributions would be well below the relevant criteria.

Table 12: Maximum Predicted Increase in Ambient Air Quality Due to the Project (Source: EIS)

Pollutant	Air quality goal	Time period	Maximum total concentration	Maximum Project Contribution		
				Surface Roads	Ventilation Outlet	Comments
Carbon monoxide	10 mg/m^3	Rolling 8-hour	~3 mg/m^3	0.6 mg/m^3	negligible	-
NO_2	62 $\mu g/m^3$	Annual Mean	43.7 $\mu g/m^3$	21.6 $\mu g/m^3$	0.6 $\mu g/m^3$	> 2 $\mu g/m^3$ increase at 0.1% of receivers
	246 $\mu g/m^3$	1-hour	**516.2** $\mu g/m^3$	**319** $\mu g/m^3$	N/A[1]	< 20 $\mu g/m^3$ change at 93% of receivers
PM_{10}	25 $\mu g/m^3$	Annual mean	**26.5** $\mu g/m^3$	9.8 $\mu g/m^3$	0.37 $\mu g/m^3$	> 2.5 $\mu g/m^3$ increase at one receptor
	50 $\mu g/m^3$	24-hour	**86.7** $\mu g/m^3$	13.3 $\mu g/m^3$	1.9 $\mu g/m^3$	> 5 $\mu g/m^3$ increase at 0.1% of receivers
$PM_{2.5}$	8 $\mu g/m^3$	Annual mean	**14.2** $\mu g/m^3$	2.3 $\mu g/m^3$	0.17 $\mu g/m^3$	> 0.1 $\mu g/m^3$ increase at 2-3% of receivers
	25 $\mu g/m^3$	24-hour	**48.5** $\mu g/m^3$	8.7 $\mu g/m^3$	1.2 $\mu g/m^3$	> 2.5 $\mu g/m^3$ increase at 0.2 - 0.3% of receivers

Notes:

[1] Separation of ventilation outlets contributions to surface NO_2 could not be predicted. The EIS predicts ventilation outlets would contribute a maximum NO_X of 57 $\mu g/m^3$. Due to the rapid decay of NO_X to NO_2 in sunlight it is expected that the NO_2 contribution from ventilation outlets would be minimal.

On average across the modelled domain of the RWR receptors, and compared with the equivalent year without the project, the assessment predicted minor increases in carbon monoxide (3.2 per cent), oxides of nitrogen (4.2 per cent), particulate matter ($PM_{2.5}$ and PM_{10}) (approximately five per cent) and hydrocarbon emissions (1.1 per cent). The regional impacts of the project on ozone were found to be negligible.

The EIS discussed the high predictions for one-hour nitrogen dioxide and 24-hour $PM_{2.5}$, indicating that they are due to the conservative assessment approach. For NO_2, this is because the conversion of nitrogen oxides to NO_2 overestimates concentrations, and by combining the highest background level with the highest increase from the project. The Department notes that the combination of conservative factors in the assessment ranging from traffic volumes, vehicle emissions and background levels has contributed to these high predictions and accepts that it would be unlikely to occur. As indicated in **Figure 13**, the receptor locations with the highest predictions are also located adjacent to the ANZAC Bridge and around Sydney Airport which would currently experience elevated levels of vehicle emissions.

Similarly, the high predictions of 24-hour $PM_{2.5}$ were identified at receptor locations near ANZAC Bridge and St Peters, with those at St Peters adjacent to the anticipated footprint of the Sydney Gateway project, which was included in the modelling but for which a project application is yet to be submitted and assessed (see **Figure 14**).

Ambient Air Quality Changes and Health Impacts
The human health risk assessment indicates that the maximum increases to risk during the operation of the project are 'acceptable' or better at all but one receiver location. The calculated maximum increase in human health risks in 2023 and 2033 is 2 in 10,000, which is considered an unacceptable risk level change as it is above the threshold of 1 in 10,000.

NSW Health noted a potentially unacceptable health risk predicted for the area around surface roads in Mascot and sought further justification for the proposed design and mitigation measures to reduce those risks, and recommended consideration of planning controls to restrict rezoning for residential purposes in these areas if mitigation of air quality impacts is not feasible. Analysis of this location revealed that it is an industrial workplace near Sydney Airport in the modelled footprint of the Sydney Gateway project which is not part of the project under assessment. The health risk assessment notes that the risks are likely to be overestimated as the duration of exposure would be less given it is a workplace (and not a residential use) and would therefore likely be in the acceptable range.

All potentially sensitive community locations such as schools and aged care facilities were in the acceptable range and the majority of community receptors were likely to experience lowered health risks due to the project, associated with the improved air quality along surface roads.

Monitoring, Reporting and Response to Exceeding Standards
To address concerns raised by the public, Sydney City Council and Inner West Council regarding potential impacts on ambient air quality, the Department has prioritised the implementation of effective monitoring and reporting, and compliance-based conditions derived from enforceable limits and goals. These conditions emphasise measureable standards, and require reporting and analysis of exceedances of standards. The monitoring and reporting framework includes:

- establishing monitoring stations in agreement with an Air Quality Community Consultative Committee (refer to *Community Participation* below);

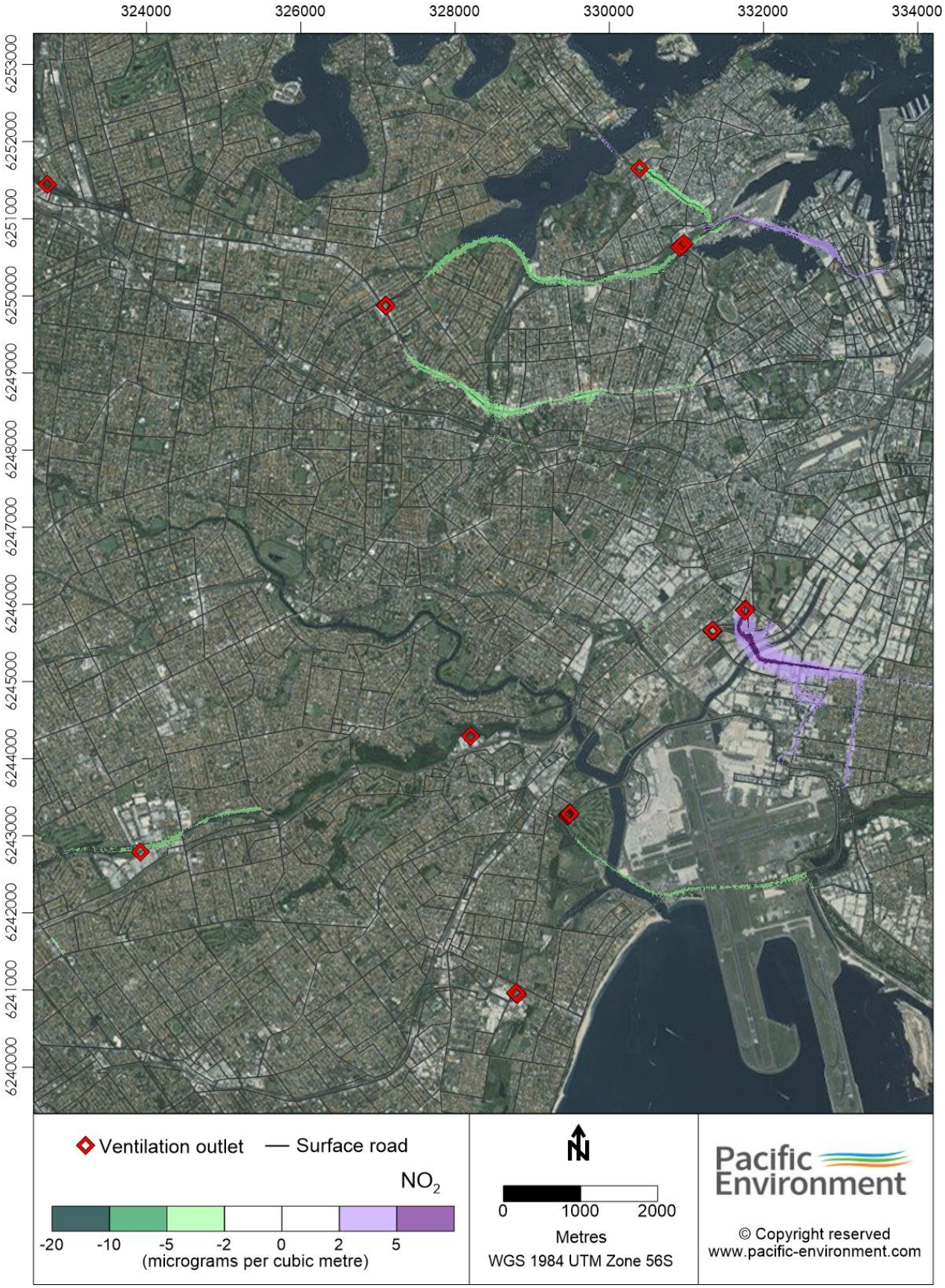

Figure 13: Contour plot of change in annual mean NO2 concentration with the project (2033-DS Scenario) (Source: EIS)

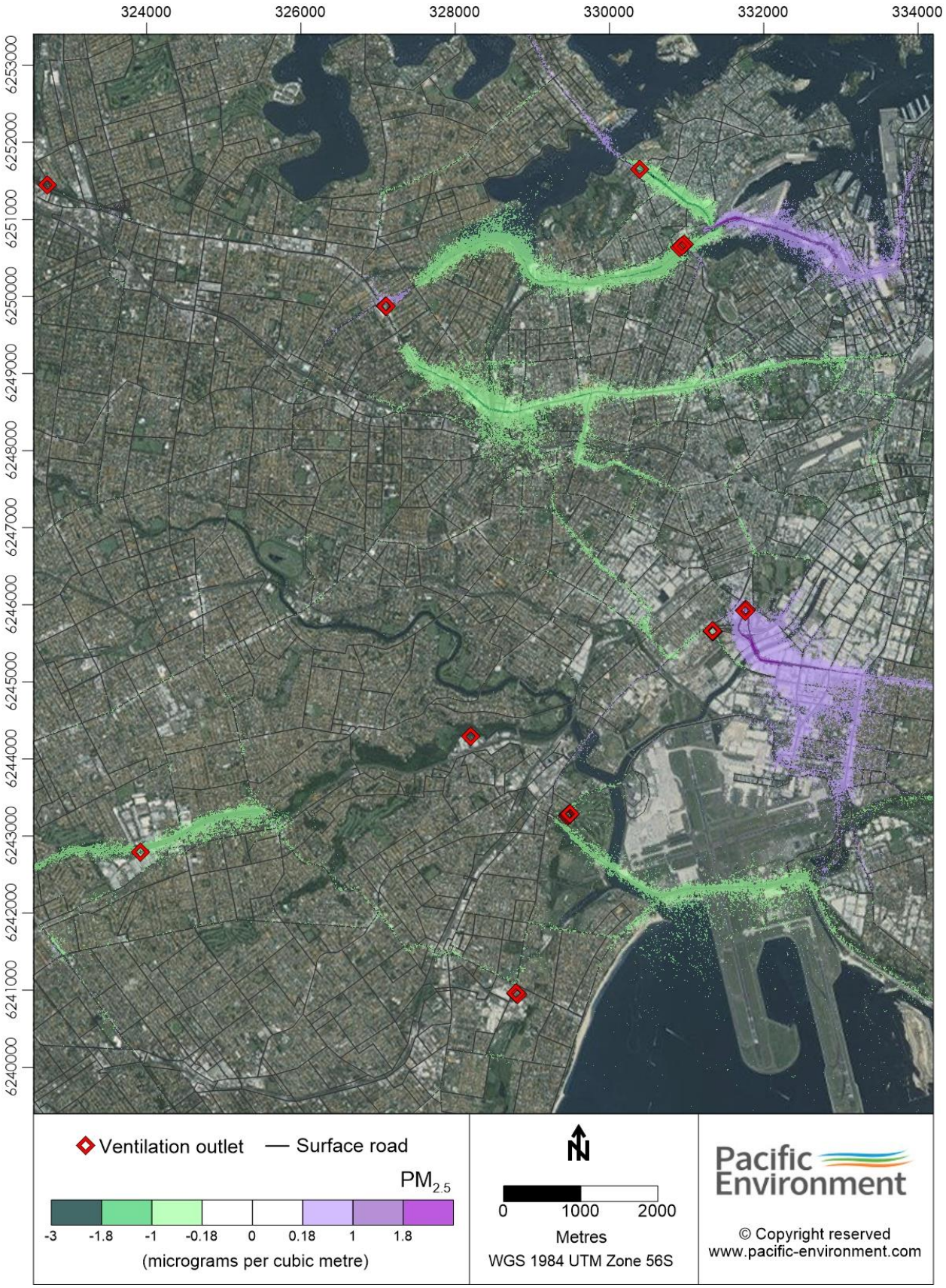

Figure 14: Contour plot of change in annual mean $PM_{2.5}$ concentration (2033-DS scenario) (Source: EIS)

- providing real time data on air quality levels recorded at air quality monitoring stations;
- quality assurance and control measures for monitoring data, including independent external auditing; and
- reporting to the Department and relevant agencies when external air quality goals are exceeded.

Community Participation
The Department considers that continued community participation would benefit the operation of the project and has recommended that the Proponent establish an Air Quality Community Consultative Committee comprising representatives from the community and councils. The Committee would be consulted on the air quality management plans and the siting of monitoring locations. This is consistent with the approach taken on recent major road projects, including the M4 East and New M5 and the committees established under these projects could be adopted for the same areas affected by the M4-M5 Link Project.

Ventilation Outlet Emissions
The majority of public submissions, and the submissions from Inner West and City of Sydney Councils, raised major concern over the potential for adverse health impacts to arise due to increased levels of pollutants being emitted into the air from the ventilation outlets. The results of the air quality assessment predict that the maximum contribution from ventilation outlets to air quality impacts in surrounding areas would be low to marginal during all likely traffic scenarios (refer **Table 12**).

The Department accepts that emitting in-tunnel air pollutants through elevated ventilation outlets, via a mechanical ventilation system, remains current best practice for managing major road tunnels. Consistent with the approach adopted for the M4 East and New M5 approvals, the Department has recommended a condition requiring the ventilation system to be designed to avoid emissions from the entry and exit portals, except in emergency situations and periodic testing.

The use of elevated ventilation outlets delivers more effective dispersal and dilution of air pollutants than through portal emissions, and is a key driver in achieving acceptable air quality at surrounding receptors. The air from the tunnel is discharged into the atmosphere at height, where it mixes in atmospheric winds to reduce the concentration of pollutants at surrounding receptors.

In February 2018, the NSW Premier announced that all future road ventilation outlets would be regulated by the EPA, with requirements relating to emission concentrations, monitoring and reporting therefore being included in an environment protection licence. Consequently, the Department has not included conditions relating to the operation of the ventilation outlets in the recommended instrument of approval.

Filtration
Consequent to concerns over the potential health effects of emissions from ventilation outlets, a substantial number of the submissions from the community and the Inner West and City of Sydney Councils requested that the project be modified to include filtration. Based on the predicted air quality outcomes and low human health risk, the Department is satisfied that the proposed ventilation management system would deliver appropriate local air quality and filtration is not required.

The Department considers that there are alternate cost-effective initiatives (beyond the scope of this assessment) that would help manage emissions from the project as well as addressing surface road emissions including:

- *NSW Cleaner Vehicles and Fuels Strategy* (Department of Environment and Climate Change, 2008) including vapour recovery at service stations, stricter emission levels and the Diesel Retrofit Program;
- Smoky Vehicle Enforcement Project is an initiative under the *NSW Cleaner Vehicles and Fuels Strategy* comprising fines for operators of smoky vehicles; and
- adoption of Australian Design Rules governing on-road motor vehicle emission limits which have been progressively tightened based on United States and European standards.

The Department is satisfied that the predicted external air quality impacts are acceptable, but the Proponent should continue to review and refine its tunnel ventilation design to reduce the level and concentrations of pollutants, particularly nitrogen dioxide. Consequently, the Department has recommended that the design of the ventilation system allows for future modification if future policies are introduced and/or strengthened, ensuring any changes can be retrofitted with minimal disruption.

Elevated Receptors
Community submissions, NSW Health and local government councils expressed concerns about potential impacts on elevated receptors, such as those living and working in multi-storey buildings or on hills surrounding the ventilation outlets. This issue is of importance in the areas surrounding the ventilation outlets at St Peters and Rozelle given the potential future growth in medium and high density residential development such as the Bays Precinct.

Air quality predictions in the EIS demonstrate the project would cause minimal change to annual average $PM_{2.5}$ concentrations at heights of 10 metres and 30 metres. The analysis indicates that changes are generally small at 10 metres and less than the predicted ground concentration increases. The impacts at 30 metres are essentially limited to the immediate vicinity of the ventilation outlet and while particle concentrations would rise around the stacks at this height, they decrease at 10 metres high. This reflects the physics of dispersion from the outlets, where emissions rise then disperse, dilute and drop to ground level. The nearest existing multi storey buildings to the proposed ventilation outlets are below 10 metres high.

The Department considers that all future medium to high-rise development adjacent to the ventilation facilities should consider the impacts of, and their impacts on, air dispersal from the ventilation outlets. The imposition of development controls around the ventilation outlets is outside the scope of the project approval. Consequently, the Department has recommended a condition of approval requiring the Proponent to assist UrbanGrowth NSW and the relevant councils in developing required air quality assessment processes or controls to manage development around the outlets.

In-tunnel Air Quality
In-tunnel air quality determines both driver exposure in the tunnel and changes to external air quality from ventilation outlets emissions. The nature of road tunnels concentrates emissions in a confined airspace, increasing motorists' exposure while travelling through the tunnel.

The vehicle emissions in the tunnels would be pushed via the piston effect of the moving vehicles towards the tunnel exit portals, accentuated and diluted by fans drawing outside air through the tunnel. Because the project has been designed to prevent tunnel portal emissions, the tunnel ventilation system is designed to extract the tunnel air before it reaches the portals.

The M4-M5 Link would enable a journey of up to 22 kilometres in tunnel from the M5 Motorway through to the M4 Motorway. As vehicle emissions accumulate along the length of a tunnel, the worst-case conditions considered in the EIS is when vehicles travel at an average of

20 kilometres per hour for the full 22 kilometres of tunnel. The EIS modelled a range of scenarios including the expected traffic conditions at each hour of the day in the years 2023 and 2033.

The EIS considered three key pollutants for assessing in tunnel air quality: carbon monoxide, NO_2 and visibility, the latter being a function of the particulate matter in the tunnel air. The project was evaluated against the NO_2 limits set out in the *In-tunnel Air Quality (Nitrogen Dioxide) Policy* (ACTAQ, 2016), carbon monoxide limits adopted for recent projects and visibility limits recommended by the Permanent International Association of Road Congresses. These are the adopted limits for the approved NorthConnex, M4 East and New M5 projects.

In both the worst case and predicted traffic scenarios, concentrations of carbon monoxide and visibility levels are anticipated to peak well under the relevant in-tunnel limits. Consequently, NO_2 is the key pollutant of concern in designing the ventilation of major road tunnels.

The NO_2 concentrations are predicted to exceed the target of 0.5 parts per million at the latter stages (approximately the last kilometre) of travel in the tunnel from the M5 to the M4, during expected peak hour traffic in 2023 and 2033 project scenarios. Since the length and duration of travel in this section would be short, the air quality is expected to meet the rolling 15-minute average over the length of the tunnel. The ACTAQ did not recommend any conditions in regards to in-tunnel NO_2 concentrations.

For the 2033 cumulative scenario (including traffic from Western Harbour Tunnel, Sydney Gateway and F6 Extension) the NO_2 concentrations would exceed 0.5 parts per million for approximately four kilometres at the end of the tunnel journey during the peak hours, and shorter distances at other times. When averaged over the length of the tunnel, it would comply with the rolling 15-minute average criterion. For the modelled worst-case conditions, (i.e. when the tunnel is at full capacity at 20 kilometres per hour) the average NO_2 level is predicted to reach 0.44 ppm and would comply with the limit.

Tunnel Ventilation Design and Operation

The Proponent has committed to design the tunnels and ventilation systems so that in-tunnel air quality would meet the relevant criteria under all traffic scenarios, including low speed and emergency situations. Key design factors include limiting the design slope of the tunnel to four per cent (compared with up to eight per cent in the M5 East tunnel) to reduce engine demand and a sufficient tunnel cross-section area to allow effective dispersion and dilution of vehicle emissions.

Similarly, the number and location of the proposed ventilation and emergency exhaust outlets, fresh air intakes and tunnel ventilation fans have been designed to ensure the air quality along the full length of the tunnels is maintained to achieve the established in-tunnel air quality standards. Sensors would continuously monitor air quality conditions in the tunnel, which would activate the ventilation system to maintain compliance with in-tunnel air quality limits.

The Proponent also proposes to monitor traffic flows and composition entering and in the tunnel. Cameras would be used to detect smoky vehicles, with the drivers of offending vehicles to be subject to penalties as a deterrent, consistent with the RMS smoky vehicle enforcement programs.

To educate the tunnel users to further minimise exposure to in-tunnel emissions the Department has adopted measures recommended by NSW Health. This includes a recommended condition requiring the use of signage at the tunnel entrance and in the tunnels which instructs drivers to use recirculated air when in the tunnel, and to provide additional information about this on its website.

The Department is satisfied that these measures would manage the concentration of vehicle emissions in the tunnel to meet the relevant criteria and has recommended a condition requiring the implementation of the above procedures during the operation of the tunnels, and for these to be described in a Tunnel Ventilation, Traffic Incident Response and Traffic Management Systems Integration Protocol. This protocol will be reviewed by an independent person, who will also review the ventilation design of the project to verify that it would perform as predicted in the EIS.

In addition to the above, the Department has also recommended:

- limits on in-tunnel concentrations of key pollutants;
- in-tunnel air quality monitoring and reporting requirements; and
- the Proponent commission an independent person to verify compliance with the in-tunnel air quality limits.

Conclusion

The Department acknowledges that comprehensive air quality and health risk assessments have been undertaken to predict the potential impacts of the project. The Department's assessment has been informed by specialist advice from the ACTAQ and the Department's independent air quality specialist, which has largely verified the modelling predictions and conservative approach.

The project is predicted to result in both improvements and reductions in air quality in areas surrounding the project. The Department considers that the project would have a minor impact on local air quality in certain locations, and that the effects on human health in those areas would be small and in the range of the current variations in air quality in the area.

Overall, the Department is satisfied that the proposed construction and operational air quality outcomes would be acceptable, and it has recommended a comprehensive suite of conditions to manage air quality impacts and protect amenity and human health.

5.5. Open Space, Visual Amenity, Urban Design, Trees and Landscaping

Issue

The Proponent undertook an assessment of urban design, landscape and visual amenity based on a sensitivity analysis that compared the magnitude of change to the sensitivity of receivers. The key areas impacted by the project, without mitigation, include areas around the proposed Iron Cove Link, Rozelle Rail Yards and St Peters Interchange and are a result of impacts associated with built form outcomes, landscape character impacts, access and connectivity and overshadowing.

Concept plans were presented in the EIS for various operational infrastructure along the project's alignment and detailed Urban Design Landscape Plans (UDLPs) for various components of the project would be developed. Urban design principles would guide the detailed design of the project and include: integrated design solutions developed in collaboration across disciplines, the community and stakeholders; an environmental vision for a sustainable and enduring design which enhances and connects local ecologies and green spaces; cross-scale connection of spaces between neighbourhoods; a motorway integrated within its context; and place sensitive design.

Rozelle Rail Yards

The Rozelle Rail Yards currently comprise disused rail infrastructure with large amounts of exotic vegetation. The surrounding urban landscape includes the City West Link and the Inner West Light Rail to the immediate south and Victoria Road to the east. Further to south and north is largely residential areas comprising low rise Federation and Victorian era architectural

styles with some Californian Bungalows. The site is also surrounded by a number of parklands including the Glebe Foreshore Parklands and Easton Park. Buruwan Park, which lies directly south of the City West Link is predominantly an active transport thoroughfare with access to the Rozelle bay light rail stop and will be removed as a result of the project. To the east of the site across Victoria Road is the White Bay port facility and disused White Bay Power Station. The ANZAC Bridge and Grain Silos lie further east and operating port and water related facilities operate to the south-east fronting Rozelle Bay.

The urban design and landscaping elements that would be provided in this location include motorway-specific infrastructure such as portals, earthwork reshaping of the area, up to 10 hectares of landscaped open space, a land bridge spanning the City West Link, pedestrian overpass and underpasses, a motorway operations complex, ventilation facilities and three ventilation outlets up to 35 metres above ground (40 metres AHD), naturalised creek and a constructed wetland. An area to the west of the Rozelle Rail Yards will be kept as hard stand with no landscaping in the interim for potential use by the Western Harbour Tunnel and Warringah Freeway Upgrade project. **Figure 15** illustrates the proposed site masterplan.

The Proponent's landscape character and visual impact assessment indicates that a large number of high-moderate and high impact ratings are expected to surrounding properties and public areas as a result of the proposed operational infrastructure. Visual catchments significantly impacted are detailed in **Table 13** and would include views from the Rozelle Bay light rail stop (refer **Figure 16**), Easton Park (refer **Figure 17**), and dwellings located along Foucart Street (refer **Figure 18**).

Table 13: Operational impact ratings that are equal to or in exceedance of 'moderate' for the proposed Rozelle Rail Yards operational facilities and built form (Adapted from Proponent's EIS)

Landscape Character Impact	**Impact Rating**
LCZ 13 - Easton Park Residential Precinct	High - Moderate
LCZ 15 - White Bay Power Station	High - Moderate
Visual Impact	**Impact Rating**
R5 - 1 - Residents - Looking south from Easton Park to the Project	High
R5 - 2 - Passive Recreation Users - Looking south from Easton Park to Project	High - Moderate
R6 - 1 - Passive Recreation Users - Looking north from Glebe Foreshore Parklands to Project	High - Moderate
R7 - 1 - Light Rail Patrons - Looking north from Rozelle Bay light rail stop to Project	High - Moderate
R7 - 2 - Residents - Looking north from Rozelle Bay light rail stop to Project	High - Moderate
R7 - 3 - Pedestrians - Looking north from Rozelle Bay light rail stop to Project	High
Night Lighting	**Impact Rating**
R7 - 2 - Residents - Looking north from Rozelle Bay light rail stop to Project	High
R7 - 3 - Pedestrians - Looking north from Rozelle Bay light rail stop to Project	High - Moderate
View Loss	**Impact Rating**
Free-standing dwellings located on Foucart Street near corner of Lilyfield Road	High
Residences within vicinity of Hutcheson and Denison Street near Lilyfield Road	High

The high visual impact is primarily attributable to the degree of change in the visual landscape. The current landscape is dominated by overgrown vegetation and disused rail infrastructure. This will be transformed to an extensive area of open space, interspersed with trees and shrubs and motorway operational infrastructure. The most prominent visual features will be the ventilation outlets, the magnitude of which also contribute to the high impact rating.

Figure 15: Rozelle Rail Yards site masterplan (Source: EIS)

Figure 16: Artist's impression at 10 Years of operation looking north from Rozelle Bay Light Rail Stop (Source: EIS)

Figure 17: Artist's impression at 10 years looking south from Easton Park (Source: EIS)

Figure 18: Artist's impressions at 12-18 months of operation looking east from Foucart Street, Lilyfield (Source: EIS)

Iron Cove Link

The area surrounding the proposed Iron Cove Link works include a mix of residential and commercial businesses with residential areas to the north forming part of a wider heritage conservation area. An assortment of building scale and layouts exist in a light industrial area to the north of Victoria Road between Terry and Wellington Streets. To the west of the site is King George Park which forms a component of The Bay Run Route. To the west of the proposed site is Iron Cove and the Iron Cove Bridge.

The Iron Cove Link is proposed to consist of a tunnel portal and a ventilation outlet of 20 metres in height above ground level (43.2 metre AHD) within the Victoria Road carriageway (refer **Figure 19**) as well as a ventilation facility and substation to the south of the carriageway along Callan Street (refer **Figure 20**). The Proponent has also proposed, to construct a bioretention basin (refer **Figure 4**) on the northern side of King George Park adjacent to Victoria Road. Land between King George Park and Callan Street, on the southern side of the Victoria Road carriageway would be acquired for the project and the properties demolished to enable construction.

Figure 19: Artist's impression at 10 years of operation looking east from Victoria Road near Terry Street, Rozelle (Source: EIS)

The Proponent's landscape character and visual amenity assessments indicate that the Callan Park Residential Precinct to the south and residents along Terry Street would experience the most significant impacts to their views of the proposed infrastructure including the ventilation facility and outlet (refer **Table 14**). The Proponent's visual envelope mapping indicates that the potential views of the proposed operational infrastructure would extend along the Victoria Road Carriageway and Iron Cove Bridge to the east and west as well as along Springside, Moodie and Darling Streets to the south-east, as well as a large portion of Callan Park.

Figure 20: Artist's impression at 10 Years of operation looking west along Victoria Road from the Corner of Crystal Street, Rozelle (Source: EIS)

Table 14: Landscape character zones and visual catchments with high-moderate and high impact ratings in Proponents assessment for operational infrastructure at Iron Cove Link (Adapted form Proponent's EIS)

Landscape Character Impact	Impact Rating
LCZ 24 - Callan Park Residential Precinct	High - Moderate
Visual Impact	**Impact Rating**
IC4 - 3 - Residents - Negurra Place south side - Looking south along Terry Street towards Victoria Road	High - Moderate
IC4 - 4 - Residents - Terry Street west side - Looking south along Terry Street towards Victoria Road	High

Darley Road, Leichhardt

The surrounding urban form and landscape character of the Darley Road site consists of the light rail corridor and City West Link to the north, Blackmore Park and Hawthorne Canal to the west of the site, and low scale residential and warehousing to the south. Grid street pattern networks with tree line streets are characteristic of the area to the south of the site.

The Darley Road site would partly be utilised for the purposes of a motorway operations complex consisting of a water treatment plant, substation, car parking, storage and offices. A moderate landscape character impact is expected within the Darley Road Commercial Precinct without mitigation **Figure 21** provides an artist's impression of the proposed permanent operational complex at Darley Road.

Figure 21: Artist's impression at 10 years of operation looking east along Darley Road near the Corner of Charles Street (Source: EIS)

St Peters Interchange

The project will use of an area to the north-west of the St Peters Interchange, a future significant visual element, for the construction and operation of permanent operational infrastructure including a motorway operations complex and four ventilation outlets up to 22 metres in height above ground level (33 metres AHD).

The areas surrounding the proposed site include Sydney Park to the north-east and Barwon Park Precinct to the north-west which comprises, a mix of medium rise commercial, light industrial and residential buildings to the north-west and commercial and industrial uses to the south. The landscape character impact assessment indicates that the Barwon Park Precinct would experience high-moderate impacts. **Figure 22** is an illustrated artist's impression of views from Barwon Park Road and shows the high visual impact the operational facility would have on the visual landscape. All other landscape character zones and visual catchments would experience moderate to low visual impacts. The Proponent's visual envelope mapping assessment indicated that much of the new St Peters Interchange and its open space, as well as Sydney Park and properties east of Euston Road would have potential views of the proposed operational infrastructure at the St Peters Interchange. Upper storey areas of properties along Kent Road, Mascot may also have views of this infrastructure.

Overshadowing

The Proponent's overshadowing assessment indicated that the project would not result in overshadowing impacts to surrounding residential areas or open space, the exception being the operational infrastructure at the Iron Cove Link where:

- the proposed ventilation outlet would impact potential habitable rooms and private open space of an adjoining residential property on the west side of Callan Street; and
- ventilation facility would impact potential habitable rooms and private open space of an adjoining residential property on the eastern side of Callan Street and some adjoining residential properties on the west side of Springside Street.

Figure 22: Artist's impression at 10 years looking south from the Corner of Barwon Park Road and Campbell Road (Source: EIS)

Submissions

Public Submissions

Issues raised in public submissions included:

- inappropriate or poor assessment methodology;
- impacts to landscape character due to incompatibilities with surrounding streetscapes particularly within proximity to Darley Road, Rozelle Rail Yards and Alexandria;
- impact to the visual and landscape character of the Victoria Road area within proximity to the proposed Iron Cove Link ventilation facility due to its proposed size, position and bulk;
- removal of trees and the need to ensure mature trees are retained or sourced from other projects removing trees and reused for the project;
- lack of urban design and landscaping proposed at Haberfield;
- inadequate urban design and landscaping for proposed open space at Rozelle Rail Yards and the need to reduce bulk of operational facilities and noise walls at the site;
- concerns regarding the delay to urban design and landscaping outcomes at Rozelle Rail Yards due to the Western Harbour Tunnel project;
- impacts on connectivity for pedestrians and cyclists including the removal of Buruwan Park and pedestrian bridge spanning Victoria Road/City West Link and the need for a more efficient active transport network to be delivered with the project;
- the need to provide public art opportunities throughout the project alignment;
- request for community-accessible active recreation on the land between Springside and Byrnes Streets near the Iron Cove Link;
- intensity and spillage of construction lighting;
- the need for crime prevention through environmental design to be incorporated into the assessment and delivery of the project;

- the need to maximise passive surveillance, particularly at Rozelle Rail Yards; and
- potential overshadowing caused by the proposed project including from project elements such as the proposed Iron Cove and Rozelle ventilation facilities.

Government Agency and Council Submissions
Inner West Council raised the following key issues:
- inconsistencies of proposed Rozelle Rail Yards work with *The Bays Precinct Transformation Plan* particularly in regards to the mixed housing and employment uses envisioned in the Plan;
- the need for more detailed concept designs for Rozelle Rail Yards and Iron Cove Link and council and community involvement in the development of design plans;
- the need to consolidate operational facilities at Rozelle Rail Yards to maximise open space and active transport opportunities;
- a requirement for a Crime Prevention Through Environmental Design (CPTED) audit of the current concept designs as compliance with relevant guidelines has not been demonstrated;
- lack of definition regarding operational lighting of facilities and open spaces and the impacts this has on the validity of the lighting visual impact assessment;
- the need for a number of considerations in the development of the Rozelle Rail Yards including consideration of -
    - Council's Recreation and Open Space Needs Study,
    - pedestrian and cycle desire lines;
    - air quality impacts to the use of the land as open space;
    - safety-by-design,
    - links to wider network of active transport infrastructure and open space,
    - accessibility,
    - aesthetic and public art,
    - water sensitive urban design, and
    - Aboriginal and non-Aboriginal heritage;
- avoidance of pockets of open space that contain safety and security issues at Iron Cove Link with a preference for active frontages instead;
- visual amenity impacts during construction;
- the need to preserve public art including the Mural at Buruwan Park and The Guerrilla Gardeners Troll Sculpture under the Johnson Street Bridge; and
- visual impacts caused by operational infrastructure particularly resulting from the location, bulk and scale of the ventilation facilities at Rozelle Rail Yards and Iron Cove Link.

City of Sydney Council raised the following the key issues:
- lack of commitment and agreement to construct and manage open space at St Peters and the Rozelle Rail Yards resulting in grassed areas with little functionality and amenity; and
- the design of the proposed open space does not meet the City of Sydney's open space facility and environmental improvement standards.

Department's Consideration
The Department engaged an independent and expert urban design consultant (SJB Urban) to help inform its assessment of the urban design impacts of the proposed project, particularly in relation to works proposed at the Rozelle Rail Yards and the Iron Cove Link. The independent consultant's report is attached as **Appendix G.**

Construction Impacts
Visual impacts during construction would result from the introduction of construction ancillary facilities and works zones into the existing landscape. Moderate to high visual impacts will

occur where residents have direct views of the construction works and facilities, in particular at Rozelle, Lilyfield, Leichhardt (Darley Road) and at Pyrmont (Pyrmont Bridge Road). The Proponent proposes to erect hoardings and perimeter fencing and treatments to minimise visual impacts. Lighting controls are also proposed to minimise glare issues light spill onto adjoining properties. The Department considers that these measures are appropriate for construction sites of this scale.

Design Review Panel

The Proponent has committed to establishing a Design Review Panel (DRP) for the project to guide the development of the urban Design and Landscape Plan(s) (UDLP(s)). The Department commends this commitment which it has reinforced in the recommended conditions of approval as involvement of a DRP is critical to the built and landscaping outcomes of the project and aligns with the design review intentions of the NSW Government Architect Office's *Better Placed: A design led approach* (Better Placed). Following a review of the functioning of DRPs on other major infrastructure projects, the Department has recommended a number of changes to governance arrangements to improve the transparency, accountability and influence the DRP has over the design outcomes of the project, including the appointment of independent, experienced and suitably qualified professionals from a range of related fields as well as a dedicated and independent secretariat and the Government Architect as Chair. The Department has also recommended that the nomination and appointments of these roles comply with the Public Service Commission's *Appointment Standards: Boards and Committees in the NSW Public Sector.*

Urban Design Principles

The Department considers that the Proponent's urban design objectives and principles for the project achieve a good balance between broad contextual considerations and specific project and interchange design considerations. However, they do not refer to 'Better Placed' and a comparative review of the 'Better Placed' and the project's design principles identified one principle from 'Better Placed' that was not included in the project's design principles - an intent for the built environment to be designed for people with a focus on safety, comfort and the basic requirement of using public space. Further, the Department's urban design consultant recommended eight consolidated principles that could be adopted by the project to better account for 'Better Placed', these being:

- integrated and contextual;
- sustainable and enduring;
- connected and accessible;
- integrate Motorway into its context;
- distinctive and place sensitive;
- functional and responsive;
- create value; and
- safe, comfortable, liveable with an emphasis on people.

Consequently, the Department considers there is further scope to develop these design principles and has recommended conditions requiring the Proponent to refine the design principles (through demonstrated consideration of stipulated design objectives, principles and standards) as a first step in the preparation of the UDLP(s) and for the DRP to review the refined principles to ensure they are fit for purpose and appropriate to guide the development of the UDLP(s).

Urban Design and Landscape Plan

The Department recognises there are a number of locations along the surface footprint of the project alignment that would experience landscape character and visual amenity impacts as a result of the proposed project. The more significantly impacted areas include residents and open space users adjacent to both the Iron Cove Link and Rozelle Rail Yards.

The Department has taken into account the issues raised in submissions from the public and both Sydney City Council and Inner West Council in relation to the urban design and landscaped outcomes of the proposed project. In particular, the Department acknowledges the issues raised in relation to lack of detail of proposed urban design and landscaping elements, the need for CPTED audits of the design, consideration of water sensitive urban design (WSUD) principles, the need to improve the incorporation of heritage, and to provide more detail on built form textures and finishes.

The Proponent has committed to the development of an UDLP to guide the urban design outcomes for the project. The Department supports this approach, however, considers there is substantial scope to improve the preparation and implementation of the UDLP to enhance the urban design outcomes and has therefore recommended improvement related to:

- the design objectives and principles taking into account 'Better Placed' as well as further consideration of sustainable design, urban design context and local environment and heritage values;
- integration with the New M5 and M4 East to ensure a continuity of design outcomes at project tie-in points;
- further mitigation of visual impacts;
- incorporation of WSUD principles for water-based elements of the project; and
- refine and enhance safety and security across the proposed open spaces and active transport network taking into account CPTED principles.

The Department acknowledges that permanent built works that will occur along Wattle Street and Parramatta Road in Haberfield will be guided by a separate UDLP as required under the Minister's approval for the WestConnex M4 East project. As such, the Department is satisfied that a UDLP for this area of the M4-M5 Link is not required.

Overall, whilst the Department acknowledges the level of detail for open space and built form element finishes is relatively low, it considers the recommended UDLP would play a critical role in guiding the detailed design of the permanent built form and landscaping of project elements. In particular, the UDLP and its guidance through the DRP would ensure high quality building and facility finishes of operational infrastructure are of are contiguous with their surroundings and sympathetic to the landscape character and its history.

The Department recognises the importance that ventilation outlets should be designed in a manner that reduces any obtrusiveness whilst ensuring dispersion of collected pollutants remains an effective means of air quality control. The Department is satisfied the UDLP can provide the necessary mechanism to guide the design outcomes of the proposed ventilation outlets to this effect.

Importantly, the UDLP process recommended by the Department provides further opportunity for the community affected land owners and businesses to be involved during detailed design of permanent built and landscape components of the project through consultation during the UDLP development.

Rozelle Rail Yards

The proposed provision of up to 10 hectares of open space at the currently disused and inaccessible Rozelle Rail Yards is a substantial benefit of the project. The site will also provide benefit through the reuse of spoil (generated by tunnelling) for site levelling works. The Department considers the provision of open space at Rozelle Rail Yards, including the proposed land bridge across the City West Link, would assist in the delivery of a number of opportunities consistent with the *Sydney Green Grid Spatial Framework and Project Opportunities* policy (Green Grid Policy), prepared for the Department of Planning and Environment in association with the Office of the Government Architect. The provision of this

open space would assist in providing access to open space opportunities by linking open space at Blackwattle Bay, Rozelle Bay and White Bay into an open space network and by helping to increase public foreshore access within the Bays Precinct. It will also provide linkages between Lilyfield and Annandale. In addition, the Green Grid Policy identifies the creation of new open space at the Rozelle Rail Yards as a regional park and the improving of connections across major road corridors such as the City West Link to be a key project and strategic opportunity.

The Department considers the indicative designs provided in the EIS and SPIR, as well as the proposed urban design objectives for the project, would conform with the 'designing places for people' Direction in the *Eastern City District Plan* which include Planning Priority E6; 'creating and renewing great places and local centres, and respecting the District's heritage'.

The Bays Precinct Strategy, developed by UrbanGrowth NSW sets out a vision for the Rozelle Bay area which includes providing a mix of different housing choices and employment opportunities as well as providing new open space and providing active transport links between Lilyfield and Rozelle. The Department considers the provision of open space by this project would support the current vision within the Bays Precinct Strategy.

Rozelle Rail Yards Interim Park Uses

The Proponent has indicated that it will rehabilitate the Rozelle Rail Yards to a grassed, open space area including a constructed wetland and shared pedestrian/cycle paths. Upon completion of these works, the Proponent intends to transfer the land to UrbanGrowth NSW to facilitate the delivery of The Bays Growth Centre, although the timing of the delivery of this vision remains unclear at the time of the assessment. Given the demonstrated strategic importance of the land at Rozelle Rail Yards and the uncertainty of the time frame for the transfer to occur, the Department has recommended the Proponent provide interim park infrastructure to support passive recreational uses of the open space including toilet facilities, seating, bins and bicycle parking. In addition, the Department has recommended that the Proponent provide details of staging to maximise progressive public access to the site. Salvaged items from the Rozelle Rail Yards would also be reused at the site to ensure interpretative and innovative outcomes for the land.

The Department is satisfied that if the recommended park infrastructure is provided, the local community will have a valuable passive recreational space that is functional and accessible in the interim prior to UrbanGrowth taking over responsibilities for the land.

The Department is of the opinion that there is further scope to optimise the scale and location of the proposed operational infrastructure at the Rozelle Rail Yards whilst ensuring the permanent operational infrastructure on the site can operate effectively and maximising the potential open space made available to community. As such, a condition has been recommended to this effect.

Land Bridge

The Department considers green and open space to be critical assets to a growing city, particularly in areas where density is currently high or is increasing. In addition, the Department strongly encourages the connection of these green and open spaces to improve their accessibility and use, and promote active forms of transport between areas so that they are not solely reliant on vehicle corridors. Provision of the land bridge is a strong design element that recognises the need to connect the proposed green spaces at Rozelle Rail Yards with those green spaces within the Glebe Foreshore Parks as well as the Rozelle Bay light rail stop. The open space and land bridge will also provide a connection between Lilyfield and Annandale. In addition, this proposed green infrastructure is considered to align with the vision of the Government Architect NSW' *Draft Greener Places: Establishing an Urban Green Infrastructure Policy for NSW.*

The Department considers the provision of this important landscape and urban design element can be further enhanced to improve connectivity. To achieve this the Department has recommended a condition requiring the land bridge have a soil depth across its width that is capable of supporting a diverse range of vegetation that is consistent with plantings in the nearest park area of Glebe Foreshore Park. In addition, the Department has recommended the land bridge have a minimum width of 15 metres for its span from Rozelle Rail Yards until it crosses the complete road corridor of City West Link including the southbound slip lane entering the Crescent. From this point the Department has recommended the tapered bridge integrate with the open space and active transport infrastructure at the nearest park near Chapman Road to ensure there is continuity in access and connectivity by pedestrians and cyclists that maximises their safe movement between Rozelle Rail Yards and park adjoining Chapman Road.

Public Art

The Department acknowledges the importance to the community of both the mural along the north east facing wall of the light rail overpass along Victoria Road and the Guerilla Gardeners Troll Sculpture on Johnston Street under the light rail overpass. The Department has taken into account the concerns raised by Inner West Council and considers the Proponent's commitment, in response to this concern, to protect these public artworks during construction to be satisfactory. Opportunities for public art would be realised through the recommended UDLP.

Iron Cove

The Department notes the high visual impact associated with these works including the prominence of the ventilation facility. It also notes the locating of the supporting facilities is required to balance a range of considerations related to design and construction, operation and maintenance, and environmental and amenity impacts. Whilst the proposed landscaping of these facilities will assist in minimising these impacts, the Department has recommended the proposed landscaping be enhanced in order to improve the landscaping outcomes.

The Department concurs with the Inner West Council and the public that remaining project land alongside the Victoria Road westbound carriageway near the Iron Cove Bridge should be managed as residual land and has recommended a condition to this effect. To address any issues relating to the potential delay in developing this land the Department has recommended that the Residual Land Management Plan include a provision that requires the Proponent to manage the land through a UDLP until it is transferred or sold.

Darley Road

The Department is of the opinion that the Proponent should consider landscaping and building design opportunities to enhance the appearance of the motorways operation complex at Darley Road. A condition to this effect has been included as a requirement in the recommended UDLP and addresses all motorway operation complexes.

Active Transport and Connectivity

The Proponent has proposed to provide new active transport network infrastructure connecting the Rozelle Rail Yards with the wider pedestrian and cyclist network, including two north–south pedestrian and cyclist bridges over City West Link and an east–west underpass below Victoria Road. The Department supports the design outcomes of the pedestrian bridges as these result in a separation of pedestrians/cyclists and road vehicles, increasing safety outcomes by reducing risk of interaction between these two user groups of the corridor whilst providing north/south connectivity across an otherwise impermeable corridor.

The provision of cycle and pedestrian routes is encouraged and would form a distinct benefit to the local community. However, the Department concurs with the Inner West Council that

the design of these active transport links need to be consistent with the surrounding active transport network to ensure legibility for user groups and aid in wayfinding and general design continuity. As such, the Department has recommended the Proponent prepare a Pedestrian and Cycle Implementation Strategy in consultation with councils.

Although the project will provide a public benefit in upgraded active transport facilities around Rozelle, the Department considers that there are still further works that can be undertaken by the Proponent to further enhance the active transport outcomes. The Proponent is providing separated cycleway and footpath at either ends of Victoria Road along the project boundary. However, there will be a clear missing link between Roberts Street and Springside Street. Although no works are proposed to connect these two areas, the Department considers that the project can provide an enhanced outcome of providing the missing link. As such, the Department has recommended that the Proponent provide improved connectivity for cyclist and pedestrians between Roberts Street and Springside Street.

As the project also involves works near and providing enhanced connections to various Light Rail stops, the Department has recommended that the Proponent investigate opportunities to provide enhanced cycle facilities for cyclists and pedestrians at these stops.

The Department recognises the importance of The Bay Run as a high quality active transport network that is highly valued by the community. Whilst the Department acknowledges the proposed construction and operational elements of the project would have some impact on The Bay Run's route in King George Park, the Department considers this can be managed in a way that does not result in adverse impacts for patrons of the route. The Department has therefore recommended a condition requiring maintenance of all pedestrian access routes during construction or if diversions are unavoidable these must be provided in a manner that achieves the relevant standards and are clearly sign posted.

Lighting

The Department acknowledges the issues raised in submissions received from the public in relation to potential impacts as a result of light spillage on surrounding residential properties during construction and operation. To ensure impacts from lighting are minimised, the Department has recommended the Proponent construct and operate the project in accordance with the Australian Standard 4282-1997 Control of the obtrusive effects of outdoor lighting and *AS/NZ 1158 – Lighting for Roads and Public Spaces.*

Whilst lighting is often viewed as a functional means to achieve wayfinding and heightened security and safety, the Department is of the view that lighting can also be used as an opportunity to incorporate creative and place making public art whilst continuing to deliver this functionality. The use of lighting to achieve high quality public art is considered possible in a number of locations along the project's surface footprint with the most notable being the Rozelle Rail Yards. The Department has recommended a condition within the UDLP requiring the Proponent to explore innovative public art opportunities through the use of lighting.

Overshadowing

The primary impacts associated with overshadowing are to residential properties located around the ventilation outlet and ventilation facility at Iron Cove, particularly towards the north-eastern ends of Callan and Springside Streets as shown in **Figure 23**. The Department does not consider the loss of five hours of solar access between 9:00 am and 3:00 pm in mid-winter as a result of the project to be an acceptable outcome.

Both the Department's *Apartment Design Guide* and *Draft Medium Density Design Guide* stipulate that overshadowing should be minimised and aim to achieve no less than two hours of solar access between 9:00 am and 3:00 pm in mid-winter. Given the surrounding urban

context of the Iron Cove Link area, the Department considers a more stringent approach than proposed by the Proponent should be taken.

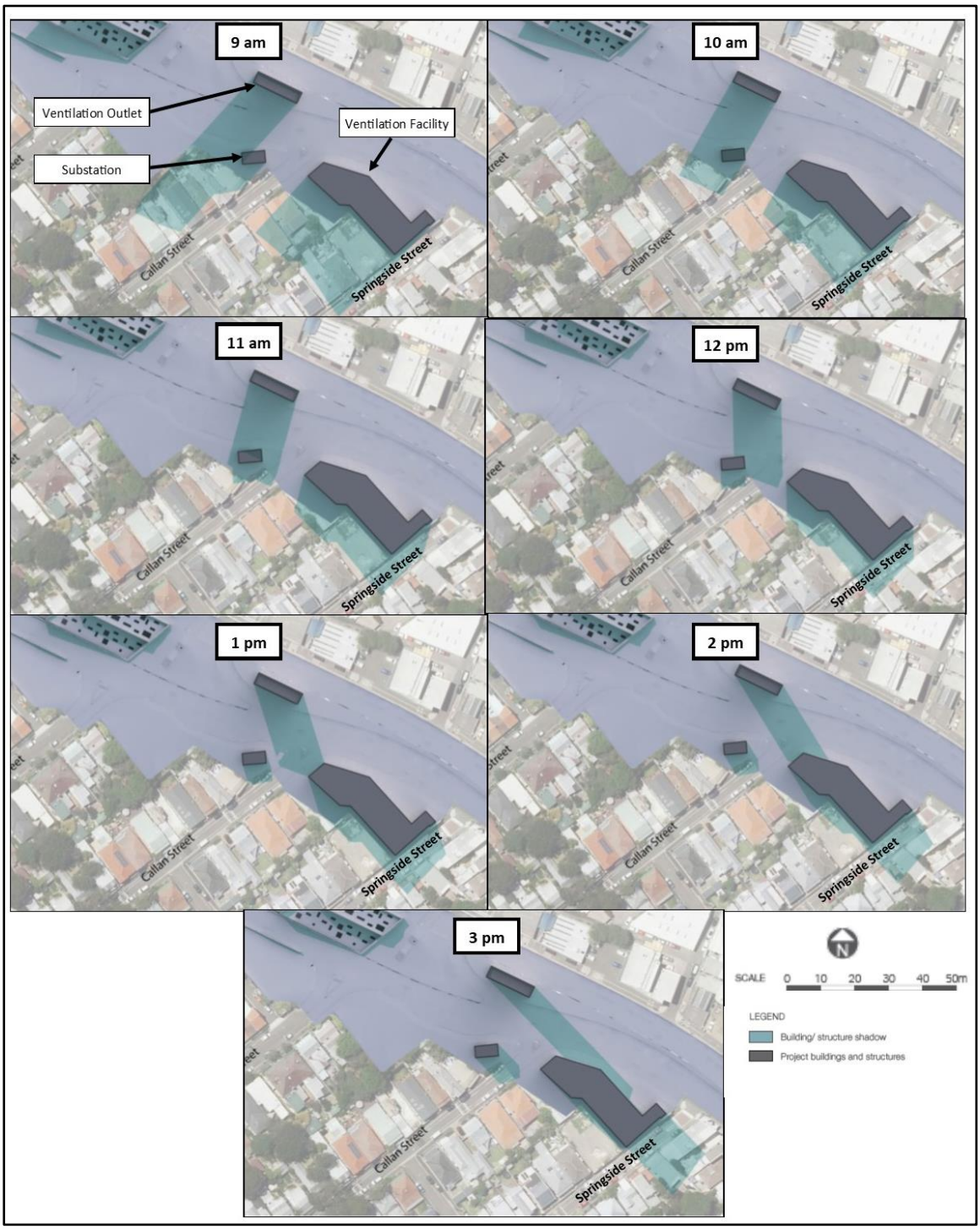

Figure 23: Overshadowing assessment of the Iron Cove Link MOC 4 as shown at hourly intervals between the hours of 9:00 am to 3:00 pm on 21 June 2017 (Adapted from Proponent's EIS)

As such, the Department has recommended a condition requiring any infrastructure related to the project be designed and positioned in such a way as to provide solar access to the habitable rooms and at least 50 per cent of principal private open space of any residential property impacted by the project for at least three hours between 9:00 am and 3:00 pm during mid-winter. This is consistent with the infrastructure approvals for the New M5 and M4 Widening. Should the Proponent not be able to meet this condition, alternative mitigation must

be provided to the land owner (which could include property acquisition) unless alternative arrangements can be agreed to with that property owner.

Considering the potential for overshadowing impacts, the Department has recommended the Proponent prepare a Solar Access and Overshadowing Report which assess the solar access impacts on residences potentially overshadowing by operational elements of the project. The report must include a consultation plan detailing how potential impacts and mitigation measures will be discussed and negotiated with potentially affected landowners impacted by overshadowing.

Conclusion
The Department acknowledges that there are a number of locations along the surface footprint of the tunnel alignment that would experience substantial changes to their respective landscape character and visual amenity. The Department recognises these impacts are significant and has recommended the Proponent prepare and implement a UDLP(s) that will require further refinement of design objectives and consideration of 'Better Placed'.

The Department considers the Proponent has made innovative commitments that also align with the intent of conditions applied by the Department on previous WestConnex and other linear transport infrastructure projects. The key urban design benefit that would be achieved should this project be approved is the provision of up to 10 hectares of open space at the former Rozelle Rail Yards, turning a disused parcel of land into a functional, accessibly and valuable space for the local community. Another benefit is improved connectivity through the provision of active transport routes. However, the Department considers there is further scope as a part of the M4-M5 Link project to explore interim use opportunities and has recommended conditions to this effect, including requirements for improved connectivity.

With these proposed conditions, and the Proponent's commitments, the Department is satisfied that the proposed project would achieve a high degree of design quality, function and value for the local community.

5.6. Land Use and Property

Issue
Key land use impacts include land acquisition, property access, residual land management (i.e. management of acquired land which is not required for construction or operation of the project or any other road project) and potential property damage from settlement (arising from tunnelling activities). Connectivity impacts to pedestrians and cyclists would also occur and are discussed in **Section 5.5** (Urban Design and Visual Impact). Impacts on property access due to local road modifications are discussed in **Section 5.1**.

The proposed project would require the acquisition of 51 properties - 26 residential properties (including multiple strata titles), as well as 24 commercial / industrial properties and one mixed use building resulting in the cessation of 48 businesses. The majority of the commercial and industrial properties to be acquired are located at the Iron Cove Link surface works and Pyrmont Bridge Road tunnel site.

There is the potential for settlement due to tunnel excavation and groundwater drawdwon. The areas most likely to be affected are where the proposed tunnel would be closer to surface level or intersect paleochannels. Areas to the north and northwest of Rozelle Rail Yards, north of Campbell Street, St Peters, and near Lord Street, Newtown, are expected to experience settlement in excess of 20 millimetres which is a typical criteria established for buildings of two storeys or lower above which physical impacts (such as cracking of walls) become more evident. Angular distortion is not anticipated to exceed established criteria for urban contexts.

Major infrastructure assets traversed by the project which require consideration include the Sydney Water Pressure Tunnel and City Tunnel, future Sydney Metro City and Southwest rail tunnels, the Inner West Light Rail Line and its maintenance depot, the future Sydney Metro West rail tunnels, as well as a series of other utilities.

The Proponent's assessment of expected rates of settlement on major infrastructure indicates that adverse impacts can be avoided.

Submissions

Public Submissions

Issues raised in public submissions included:

- property acquisition, in particular at 7 Darley Road;
- decreased amenity and reduced potential for higher density housing particularly in Alexandria;
- impacts to property values particularly in proximity to construction and operational compounds;
- incompatibilities of construction and operational compounds with surrounding land uses (e,g. Darley Road compound and Rozelle Public School, and Pyrmont Bridge Road compound and Forest Lodge Public School);
- management of residual land;
- provision of appropriate facilities (e.g. sporting fields, skate parks and community gardens) at the Rozelle Rail Yard;
- property access during construction and operation;
- settlement impacts, property damage and processes for property repairs; and
- impacts to businesses along Victoria Road during construction.

Government Agency and Council Submissions

Inner West Council raised the following key concerns:

- psychological impacts stemming from property acquisitions and the need to improve compulsory acquisition processes;
- the need to assess open space impacts particularly the permanent acquisition of parts of King George Park;
- opposition to the impacts to Buruwan Park; and
- the need for pre-construction dilapidation reports to be undertaken by an independent body.

Council recommended that residual land, particularly at the Rozelle Rail Yards and other areas along the project alignment, be provided as soon as possible and as open space and community uses except for the Pyrmont Bridge Road site which should be returned as a biomedical hub in accordance with the *Parramatta Road Corridor Urban Transformation Strategy.*

City of Sydney Council raised the following key concerns:

- reduction of land value, amenity and development value along roads where increased traffic from the project occurs;
- uncertainty of future uses of land not required for the project;
- the need to consolidate project elements and issues with acquisition of homes and businesses and incompatibility of construction sites with surrounding land uses;
- residual land at The Crescent should be returned as open Space and provided to City of Sydney
- consideration of the *Parramatta Road Corridor Transformation – Implementation Plan 2016-2023* during any redevelopment or rezoning of land in this corridor; and
- implications to the delivery of *The Bays Precinct Transformation Plan*.

Department of Primary Industries noted that any impacted Crown lands would need to be compulsorily acquired by the Proponent.

Port Authority of NSW supported the Proponent's proposal to establish a Project Working Group composed of key stakeholders to manage project impacts and requested it be considered a key stakeholder for this group. In addition, the Ports Authority requested further information regarding impacts to Port Authority land.

Sydney Water noted that it requires safe unrestricted access to Sydney Water assets for the life of the project**.**

Department's Consideration

Acquisition

The acquisition of land is necessary to provide significant infrastructure deemed critical to the State, particularly for linear transport infrastructure within highly urbanised contexts. A large proportion of the proposed motorway's footprint will be underground thereby limiting the extent of land use and property impacts. In addition, large portions of the land required in Haberfield and St Peters have already been acquired as part of the M4 East and New M5 projects. In this regard, the Department considers a tunnel linking the M4 East and New M5 to be an optimal design outcome by providing road transport infrastructure with the least impacts on land use and property.

The Proponent has committed to providing a counselling service to those households being acquired, an independent assistance service to vulnerable households being relocated and a community relations telephone line. The Department considers these measures to be a proactive response which aligns with the intent of conditions imposed on previous WestConnex projects. The measures also respond to the concerns relating to the wellbeing of those being acquired, as raised by Inner West Council and the community. To provide greater certainty to the affected communities the Department has recommended these commitments be enhanced through conditions requiring the Proponent operate a toll-free WestConnex Acquisition Assistance Line and by applying a minimum time frame for which ongoing support will be provided to affected households of six months following conclusion of the final acquisition.

Numerous submissions objected to the acquisition of 7 Darley Road, Leichhardt due to concerns relating to the acquisition process. Whilst the Department acknowledges these concerns, the relevant aspects of how this acquisition proceeded is not a planning consideration and therefore is not further addressed in this assessment.

The Department has carefully considered the open space acquisition requirements proposed for the project including the temporary 0.05 hectares and permanent 0.23 hectares acquisition of King George Park as well as the permanent acquisition of 0.3 hectares of Buruwan Park. King George Park is an open space area that has a particularly active focus catering to sporting fields, dog walking and the Bay Run. Buruwan Park forms a component of an active transport corridor through to Rozelle but is passive in nature.

Buruwan Park currently connects Railway Parade/Bayview Crescent to The Crescent, allowing for pedestrians and cyclist to avoid the need to travel further south to Johnson Street to access The Crescent. There is also northern access via staircase to the Rozelle Bay light rail stop from Buruwan Park. Access and connectivity issues as a result of the loss of Buruwan Park are further assessed in the **Section 5.5** of this report. During the exhibition of the EIS, the submissions received raised a number of issues in relation to the need to minimise impacts to King George Park and to protect Buruwan Park from removal. In addition, Inner West Council requested an open space impact assessment for King George Park.

The permanent loss of Buruwan Park would be offset by the substantial open space provided at the Rozelle Rail Yards approximately 100 metres to the north. Access to this new open space for the local community to the south to the City West Link would be adequately provided with the provision of a land bridge to the west and a Whites Creek pedestrian access bridge further east.

The Department notes the Proponent has responded to issues raised by Inner West Council and the community by amending the original proposal (though the SPIR) to relocate the required bioretention pond works from the King George Park car park to the area immediately adjacent to Victoria Road. This change avoids impacts to land which is currently the subject of an undetermined land claim by the Metropolitan Local Aboriginal Land Council, and avoids impacts to the existing car park. However, it would require a minor realignment of the Bay Run. The change to the project would increase the total impacted land to within King George Park to 0.23 hectares. The Department does not consider the area of land permanently acquired, as amended, would result in a reduced amenity or viability of King George Park and considers any temporary or permanent impacts to the Bay Run can be effectively managed.

The Department has taken into account the issue raised by Inner West Council regarding the need for an open space impact assessment for those areas of King George Park being permanently acquired as well as the objections to open space impacts as raised by the community. The Department considers the level of assessment of impacts and mitigation for social infrastructure is proportionate to the level of direct and indirect impacts identified. As such, the Department does not consider any further assessment of impacts to King George Park is required.

The Proponent has committed to the preparation of a social infrastructure plan to further detail community connectivity measures, provision of community and social facilities (including open space) as part of the project as well as community initiatives that could be contributed to by the Proponent. The Department supports this initiative and notes this is approach is consistent with conditions imposed on similar infrastructure projects the Department has assessed. Given the scale of direct impacts on social infrastructure is relatively low, the Department considers the measures committed to by the Proponent in this regard are adequate.

Future Land Uses of Construction Ancillary Facility Sites

Pyrmont Bridge Road Compound

The proposed Pyrmont Bridge Road site is currently used by light industrial, storage, commercial and retail premises. At completion of construction the Proponent intends to return all land at the site as residual land for which development could then occur under separate planning approvals. The land is located within the Camperdown Precinct of the Parramatta Road Transformation Strategy and is intended to be developed for enterprise and business purposes which could include activities related to health and research. The Department concurs with the Proponent's proposal to return the site in a state that is fit for the permitted future land uses.

Rozelle Surface Works

The Rozelle Rail Yards will be used for motorway operation activities and open space. The project would result in the provision of a largely underground interchange with surface road connections, a land bridge and pedestrian bridge across City West Link, an underpass under Victoria Road, a constructed wetland, internal active transport pathways, up to 10 hectares of open space, ventilation outlets and motorway support facilities. An area of this land will also be reserved for use by Roads and Maritime Service for the potential construction of the proposed Western Harbour Tunnel and Warringah Freeway Upgrade project.

The proposed open space does not include any proposal for specific active recreational facilities, instead it is proposed to be landscaped and managed through a UDLP (refer **Section**

5.5). The Department considers the provision of the substantial open space would be highly beneficial to the local and regional context whilst also working towards meeting the Direction for 'valuing green spaces and landscape' in the *Eastern City District Plan* which includes planning priorities such as 'increasing urban tree canopy cover and delivery Green Grid connections' (Planning Priority E17), and 'delivering high quality open space' (Planning Priority E18). The Department considers the change in use of this land, currently inaccessible to the public with poor connectivity and amenity, would be a substantial benefit to the local community.

The land at The Crescent Civil Site (C6) (see **Figure 24**), which is currently disused vacant land zoned Waterfront under SREP 26 – City West, will not be required for operations. The land to be used for the construction ancillary facility C7 along Victoria Road has been proposed to be retained and managed under a UDLP. The Department understands that the land at C6 and the land at Rozelle Rail Yards is of importance to the achievement of *The Bays Precinct Urban Transformation Program* (Bays Precinct Program) in which the vast majority of the land and its surrounds, designated Rozelle Bay and Bays Waterways in the Strategy, is considered a medium-term priority. As such, the Department supports the return of land at C6 as residual land following completion of construction.

However, the Department does not consider the land at the C7 Victoria Road Civil Construction Site (see **Figure 24**) should be retained by the Proponent nor should it be managed through a UDLP as pockets of open space. The Department considers, given the development potential at this site, that the land at C7 should be considered residual land (and therefore options such as residential or commercial development could be explored) and treated as such following the completion of construction. The Department has recommended a condition to this effect.

Darley Road Facility

Upon completion of construction, a large part of the Darley Road site will be used for a motorways operation complex. The Department considers that there is opportunity for the remaining project land to be utilised to enhance or support the existing Leichhardt North light rail stop. Noting the land will continue to be owned by Transport for NSW, the Department has recommended the Proponent investigate these opportunities in consultation with Transport for NSW with a view to assisting in the provision of supporting infrastructure that may be required at this location such as cycling facilities (for example, bicycle parking) and improved access to the light rail stop (including passive surveillance).

Victoria Road/Iron Cove Link

The establishment of a construction ancillary facility (C8) at Iron Cove would require the demolition of existing commercial premises, residential properties and works on areas of open space in King George Park. At completion of construction the site would be used as a motorway operations complex (MOC 4), a ventilation facility, substation, road infrastructure, a bioretention basin and would provide community and social uses such as passive recreation facilities along remaining land which is proposed to be managed through a UDLP (refer **Section 5.5**).

Concern was raised in community submissions and the submission received from Inner West Council in relation to the Proponent's intent for the land fronting Victoria Road between Springside Street and Byrnes Road to be returned as passive open space, once construction is completed. Whilst the Department encourages open space delivery in urbanised contexts, in this particular case, the Department does not support the use of any remaining land in this location for the purposes of pocket parks in lieu of any other design solution being found. The Department considers that the provision of pocketed open space does not have sufficient

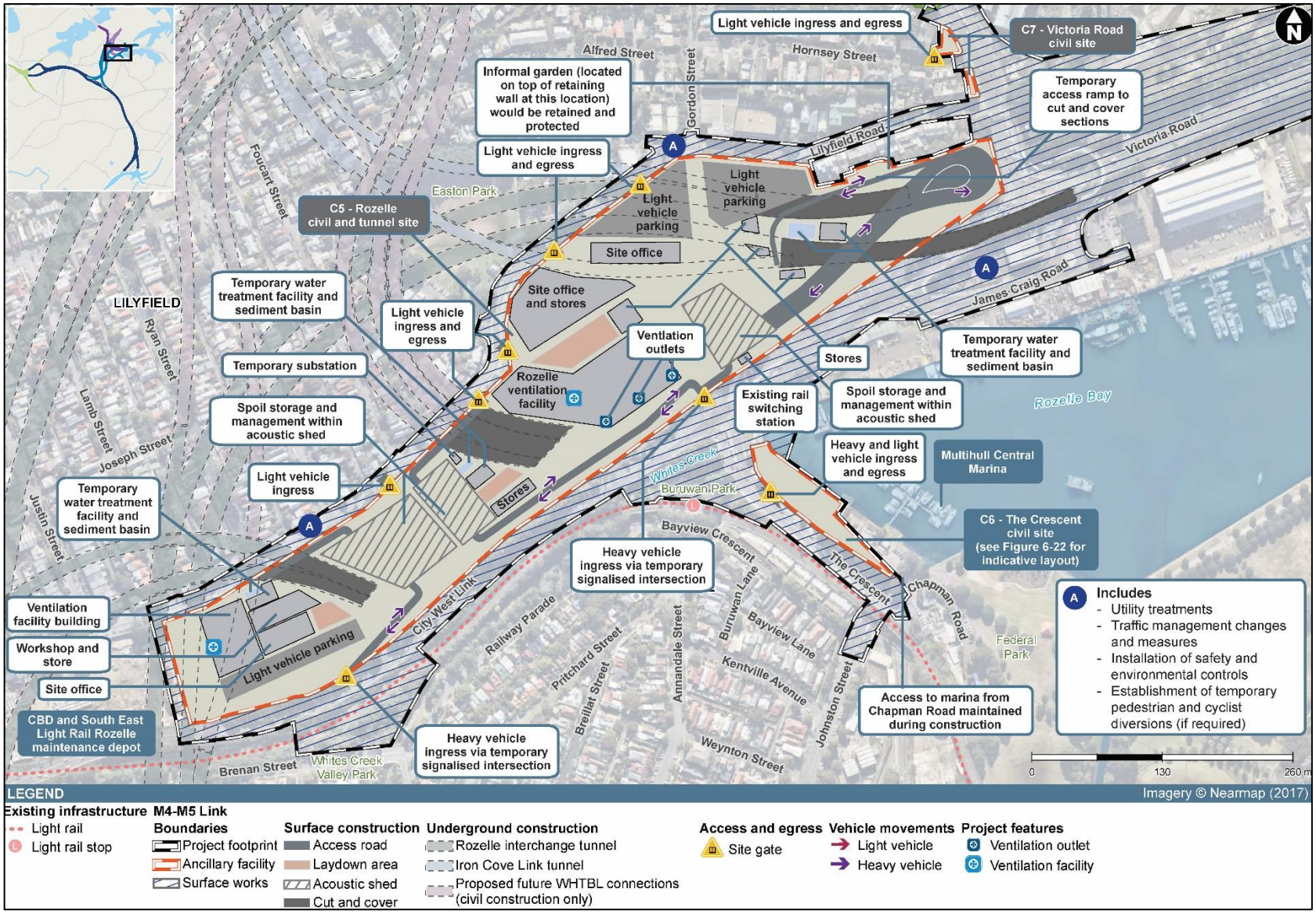

Figure 24: Construction sites C5, C6 and C7 within and surrounding Rozelle Rail Yards (Source: EIS)

tangible benefit as it is likely this open space would have poor amenity, be isolated with relatively poor accessibility and would not be adequately attractive to users to warrant such a dedicated use.

To avoid poorly designed and located open space at this location, the Department has included a condition requiring the Proponent to consider all land not required for operational facilities in this location as residual land rather than land to be retained and managed by the Proponent through a UDLP. In doing so, the Proponent will be required to manage its transfer through a Residual Land Management Plan in consultation with Inner West Council to determine the most appropriate uses for the site.

Residual Land

The Proponent intends to prepare a Residual Land Management Plan to manage the return of land not required for the construction and operation of the project or any future road projects, akin to those management plans required through conditions imposed in the approvals for the M4 East and New M5 projects.

The Department encourages the active management of residual land from government projects, particularly linear infrastructure developments within urbanised contexts, as managing this residual land can help offset impacts of the project relating to land use and provide positive outcomes to the community and urban fabric whilst assisting with the efficient management of land. The Department considers there remains opportunity to further offset residual impacts from surface acquisitions through the return of residual land to the market, potentially catalysing redevelopment of land uses.

The land uses along the alignment are highly varied and governed by a range of differing environmental planning instruments including local environmental plans and the *State Regional Environmental Plan Number 26 – City West*. In addition, the communities and strategic contexts also differ along the project's alignment. Whilst the Department acknowledges the Proponent's commitment to prepare a Residual Land Management Plan, it has recommended a condition strengthening this requirement, particularly in relation to timing and strategic planning considerations.

In acknowledgement of the differences in land uses and strategic contexts, the Department has included specific direction that the Residual Land Management Plan include identification of post-construction uses for residual land as governed by relevant environmental planning instruments and strategic planning documents such as *The Bays Precinct Urban Transformation Program, Eastern City District Plan* and the *Parramatta Road Corridor Urban Transformation Strategy,* as applicable. The Department has also recommended that all residual lands must be transferred or released to the market within 12 months of the completion of construction.

Property Access

The Department has taken into consideration the issues raised in public submissions relating to property access during construction and operation including access to residences, businesses and commercial premises (such as those on Victoria Road and near the proposed Pyrmont Bridge Road compound), educational establishments, recreational areas and utility infrastructure.

The Proponent's response to submissions includes a commitment to maintain property access throughout construction where feasible and reasonable and unless otherwise agreed to by the relevant owner of occupier. The Proponent also committed to returning any affected access to an equivalent standard. Property access is a critical consideration given the urbanised nature of the surrounding environment. As such the Department has recommended the

Proponent's commitments be included as conditions of approval and has recommended that access be reinstated to an equal or improved state.

The Department recognises that the Leichhardt North and Rozelle bay light rail stops are important stops along the light rail network that need to be considered in the delivery of the project. The Department has recommended a condition requiring access to all light rail stops be maintained at all times throughout construction and operation of the project.

The Department has noted the particular issue raised by Sydney Water in regards to maintaining access to infrastructure assets along the project alignment. The Department concurs this is an important issue and has recommended that the Proponent ensure utility (and transport infrastructure) providers retain access to their infrastructure throughout construction, where practicable.

Settlement and Property Damage

The Department acknowledges the concerns held by the public, as evidenced in submissions, regarding potential settlement induced by the construction of the tunnel. The Department also understands that further modelling is required during detailed design of the project to confirm settlement predictions. The Proponent has proposed a number of measures to manage settlement in areas identified as likely to be affected by settlement, including the implementation of a settlement monitoring program, building conditions surveys for landowners within the zone of influence of tunnel settlement (50 metres) and rectification of any property damage caused by settlement. Additional numerical modelling will also be undertaken during detailed design to refine the spatial extent of potential settlement impacts.

The Department considers that the design outcomes for the project should be guided by strict and contemporary settlement criteria similarly imposed on projects such as the WestConnex New M5 project (recently modified in relation to settlement). To ensure a conservative approach is adopted in managing settlement, the Department has recommended a suite of settlement-related conditions including preparation of a geotechnical model to assess potential settlement, settlement criteria, monitoring requirements, pre- and post-construction dilapidation surveys, and requirements for rectifying any damage to property and infrastructure arising from settlement. The settlement-related conditions are inclusive of both groundwater and tunnelling induced settlement.

The Department has not adopted the Proponent's proposed approach to limiting condition surveys to within 50 metres of the tunnel alignment and surface infrastructure. The Department considers that a more suitable approach is to use the recommended geotechnical model to identify at-risk properties to guide the choice of properties to receive building condition surveys and has recommended a condition to this effect.

The Proponent has committed to establishing an Independent Property Impact Assessment Panel. The Department considers that the Panel would provide a valuable contribution to the management and rectification of any property damage issues resulting from settlement and has reinforced the Proponent's commitment in the recommended conditions of approval. This approach is consistent with that taken by the Department in other large-scale tunnelling projects such as the Sydney CBD and Southwest Metro – Chatswood to Sydenham project.

Property Values

The Department acknowledges the issue raised in public submissions regarding the risk to property values as a result of the proposed project. However, it is an established principle that the impact of a project on surrounding property value is not a planning consideration (refer e.g. *Trinvass Pty Ltd and Ancor v Council of the City of Sydney* [2015] NSWLEC 151, [89]).

Notwithstanding, the Department considers that through appropriate design and the implementation of recommended management measures, impacts will be reduced to acceptable levels.

Conclusion
On balance, the project would provide substantial benefits to local and regional communities in relation to land use, particularly due to the significant improvements to accessibility and amenity of the proposed open space at the Rozelle Rail Yards (up to 10 hectares) and the enhancement of land connectivity as a result of the passive and active transport infrastructure.

Although, adverse impacts to property and land use are expected as a result of both construction and operation of the project, the Department considers the mitigation measures proposed by the Proponent are commensurate to the degree of impact and, coupled with the conditions recommended by the Department, residual impacts to property and land use would be acceptable.

5.7. Options for Construction Ancillary Facilities at Haberfield / Ashfield

Issue
The Proponent presented two options in the EIS for an arrangement of construction ancillary facilities at Wattle Street, Haberfield and Parramatta Road, Ashfield. The EIS indicated that clarity would be provided in the SPIR regarding which of the two options would be preferred. However, this clarification was not provided. **Table 15** outlines the facilities associated with each option, and **Figure 25** and **Figure 26** illustrate the proposed location and boundaries of each facility within the two options.

Table 15: Proposed Construction Ancillary Facility Options at Haberfield / Ashfield

Option	Site	Current Use	Proposed Construction Use	Operational Use
A	C1a	M4 East Construction Site	Civil and Tunnel Site	Road infrastructure
	C2a	M4 East Construction Site	Civil and Tunnel Site	Eastern Ventilation Facility (M4 East consent)
	C3a	M4 East Construction Site	Civil Site	Residual land to be managed under M4 East consent
B	C1b	Commercial Premises	Civil and Tunnel Site	Residual land to be governed by *Parramatta Road Urban Transformation Strategy*
	C2b	M4 East Construction Site	Civil and Tunnel Site	Eastern Ventilation Facility (M4 East consent)
	C3b	Commercial Premises	Civil Site	Residual land to be governed by *Parramatta Road Urban Transformation Strategy*

Submissions

Public Submissions
The key concerns raised in the public submissions relating to the options presented in the EIS:
- construction fatigue for residents already impacted by WestConnex construction, particularly around Haberfield / Ashfield and St Peters;
- the potential for a “hybrid” option at Haberfield / Ashfield with construction occurring at facilitates from both the Option A and Option B used; and
- proximity of Option B to the Haberfield Public School.

Figure 25: Proposed Option A layout including compounds C1a, C2a and C3a at Haberfield (Source: EIS)

Figure 26: Proposed Option B layout including compounds C1b, C2b and C3b and Haberfield Public School highlighted in red (Source: EIS)

Department's Consideration

The Department recognises that construction facilities are required near the Wattle Street Interchange at Haberfield to construct the project. However, the Department acknowledges that the communities adjacent to the current M4 East construction ancillary facilities are experiencing construction fatigue. Further, the community and regulatory authorities should have certainty regarding where construction activities are expected to occur should the M4-M5 Link be approved.

The Department has reviewed Options A and B as part of its assessment, in particular, the impacts on adjacent communities. The Department's consideration of the advantages and disadvantages of each option are presented in **Table 16**. Specific construction related impacts such construction traffic, noise, air quality and land use are discussed in greater detail in **Sections 5.1, 5.2, 5.3** and **5.6**.

A comparison of the indicative timeframes for the occupation and operation of construction facility sites for Options A and B is provided in **Table 17**. As shown, the use of Option A facilities would be delayed until the completion of the use of those sites for M4 East, resulting in a relatively longer duration of the use, and therefore associated impacts across the sites. The use of Option B facilities would allow for Parramatta Road sites (C1b and C3b) to be occupied and operated earlier (than Option A) by up to a year. However, the savings in overall duration of this occupation would be relatively minor. In addition, the predicted earlier commencement dates may not be realised due to the need to provide noise mitigation to impacted sensitive receivers surrounding the sites prior to commencing construction.

The Department notes the local community surrounding the Option A sites and some adjacent to Option B sites have experienced impacts since the commencement of operation of those compounds in May 2016 consequent to their use for the construction of the M4 East.

Should Option A be progressed, this would result in restricting construction impacts to those sites already being used for M4 East, potentially reducing the spread of cumulative impacts across the community. However, the use of Option A sites would lengthen the localised duration of existing impacts on an already impacted community, although traffic and noise amenity would improve from the current construction impacts, as the majority of the spoil handling and haulage would be undertaken underground. In addition, at-source and at-property noise mitigation measures would have been implemented as part of the operational noise requirements for the M4 East.

Should Option B sites be progressed, this would result in many of the current construction impacts being experienced by the community near the M4 East sites being reduced, particularly around Northcote Street, except at C2a/C2b. However, use of the Option B sites would result in a new portion of the community being impacted. Option B would also present a change (cumulative to M4 East) of existing commercial and residential uses to construction purposes.

On balance, whilst the Department acknowledges the location of construction facilities on the western end of the proposed project alignment is essential to the construction of the project, it considers Option A to be the superior option. The extension of traffic, noise amenity and land use impacts, particularly from a cumulative perspective, presents a greater impact to amenity, land use and property impacts to the Haberfield / Ashfield area as a result of Option B.

Table 16: Advantages and disadvantages of Option A and Option B

Option A	
Advantages	**Disadvantages**
+ Restricts impacts to the local community already impacted by M4 East	- Prolongs the construction impacts currently experienced by the local community adjacent to existing M4 East facilities
+ Restricts urban fabric impacts to those areas already impacted, reducing cumulative land use impacts	- Risk to project construction program due to dependency on land for M4 East construction ancillary facilities being available
+ Construction ancillary facilities would maintain current distances from existing M4 East construction ancillary facilities to Haberfield Public School	
+ Use of M4 East tunnel for in tunnel spoil haulage resulting in reduced heavy vehicle movements on the surface road network	
+ Improved noise amenity outcomes, as the spoil handling would occur underground and therefore not be audible at adjacent sensitive receivers. + Underground spoil haulage would eliminate noise associated with heavy vehicle movements (revving and idling motors, braking noises). This would provide most benefit during the night-time period where sleep disturbance arising from truck noise would be eliminated.	
+ Fewer highly affected residents, due to the majority of the works being undertaken underground, and operational noise mitigation measures (at-property treatments and noise barriers) having already been implemented	
Option B	
Advantages	**Disadvantages**
+ Reduces duration of cumulative impacts to local community around Northcote Street	- Spoil haulage is not proposed to be handled within the M4 East tunnels
+ Removal of current building at Parramatta Road could catalyse redevelopment in line with strategic context	- Restricted left in, left out movement from Parramatta Road
+ Provides alternative to M4 East sites, reducing risk to construction program	- Greater risk of trucks queueing due to spatial site constraints
	- Exposes new areas of the local community to construction impacts
	- Compound closer to Haberfield Public School
	- Expanded area of urban fabric impact cumulatively with M4 East

Table 17: Comparison of Indicative Construction Ancillary Facility Occupation Timeframes for Option A and Option B Sites (Adapted from Proponent's EIS)

	2018				2019				2020				2021				2022			
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
C1a																				
C1b																				
C2a																				
C2b																				
C3a																				
C3b																				

As the Proponent has not confirmed a preferred option and the Proponent's assessment infers that the degree of impacts associated with Option A would be less than for Option B, the Department recommends the following conditions should Option B be proposed to be implemented:

- preparation of a comparative analysis of the key environmental impacts for the options; and
- preparation of a report outlining the findings of the comparative analysis and detailing how management and mitigation measures would be implemented to achieve, on balance, comparable environmental outcomes when compared to Option A.

Conclusion

The Department acknowledges that the use of the Option A will prolong the current amenity impacts being experienced by a localised area of the community and recognises the impact on health and wellbeing this can have. However, the Department considers the enhanced recommended conditions, as discussed in the Noise and Vibration section of this report (**Section 5.2**), will provide additional protection to the local community to improve the acceptability of these impacts. Although Option B would reduce construction fatigue in the existing impacted community, it would result in impacts to communities previously unaffected by the construction of WestConnex. The Department considers that the recommended conditions of approval would ensure that should Option B be progressed, the level of predicted impacts would be similar to that of Option A.

5.8. Groundwater

Issue

The project is likely to intercept aquifers associated with Ashfield Shale, Mittagong Formation, Botany Sands and Hawkesbury Sandstone geological units, and would require dewatering during both construction and operation. During construction, groundwater inflows would be collected and pumped to water treatment facilities at the construction ancillary facilities. At this stage, water treatment facilities are proposed to be constructed at the Darley Road and Rozelle construction ancillary facilities. The treated wastewater would be either reused or discharged to surface waterways via the stormwater drainage system.

The total combined length of the mainline tunnels, Iron Cove Link and Rozelle Interchange tunnels is around 47,940 metres. The total tunnel length of drained (unlined) tunnel is 44,950 metres. Hence, the total length of undrained (tanked/lined) tunnel is 2,990 metres. The lengths of unlined tunnel will require the continuous management of groundwater once operational. This will include collecting and pumping the groundwater to water treatment facilities at the motorway operation complexes at Darley Road and Rozelle. Where tunnel lengths are lined, the groundwater will be tanked via the use of a structural lining and waterproofing system.

The tunnel and cut-and-cover sections through the Whites Creek alluvium beneath the Rozelle Rail Yards would be constructed as undrained to avoid the ingress of groundwater from the paleochannels.

In the EIS the Proponent committed to implementing a design that would restrict groundwater inflow rates during operation to up to one litre per second for any given kilometre of tunnel (1L/s/km). However, this commitment was revised in the SPIR to achieving such a rate "where reasonable and feasible". The Proponent's revised commitments also included identifying areas where groundwater flows to the tunnels would be elevated prior to construction activities, and using this information to guide detailed design and the construction methodology.

There are 197 registered bores within a two kilometre radius of the project, including one recreation bore used to irrigate Redfern Oval, four bores used for domestic use, and 61 used for groundwater monitoring. Additionally, it is expected that a large number of unregistered bores exist within a two kilometre project radius.

Modelling has identified that brackish water may infiltrate from Whites Creek, Johnsons Creek, Rozelle Bay and/or the Parramatta River into the aquifers if groundwater levels are lowered due to tunnel inflows. This may degrade groundwater quality by changing the salinity of the groundwater in this area over the life of the project. However, the Proponent is of the opinion that this should not affect the beneficial use category of any groundwater resources as drawdown would be less than two metres. No priority groundwater dependent ecosystems are located within the project corridor, with the nearest priority groundwater dependent ecosystem located five kilometres to the west in the Botany Sands at Centennial Park.

The Proponent's groundwater assessment also assessed the potential for groundwater drawdown to result in settlement. Potential settlement impacts and management measures are discussed in **Section 5.5** (Land Use and Property).

The Proponent contracted Dundoon Consulting Pty Ltd to carry out an Independent Peer Review of the Groundwater Impact Assessment, specifically the structure and parameters used in the groundwater model. The Proponent's consultant concurred with the geographic boundary used in the model, the type of groundwater model used by the Proponent, and agreed with the modelling of unconstrained inflows. The Proponent's consultant also supported the Proponent's decision to run further modelling with constrained inflows.

The Department engaged the University of New South Wales' Water Research Laboratory (UNSW Water Research Laboratory) to conduct an independent review of the Proponent's groundwater impact assessment (refer **Appendix H**). UNSW Water Research Laboratory concluded that the modelling outputs of the Proponent's groundwater model provided a plausible estimate of the likely range of groundwater impacts that might be associated with the project, and made recommendations in relation to the effective management of groundwater resources.

Submissions

Public Submissions

Key issues raised in public submissions included:

- groundwater drawdown;
- contamination of groundwater aquifers; and
- discharge of contaminated groundwater into the stormwater drainage network and waterways.

Government Agency and Council Submissions

Inner West Council expressed concern about saline water intrusion into foreshore areas due to groundwater drawdown.

The Council of the City of Sydney expressed concern about groundwater entering the stormwater network, as no contamination assessment was proposed prior to construction work beginning, and no detailed groundwater monitoring program had been proposed for the construction or operational stages. City of Sydney requested the Department include conditions of approval requiring the proponent carry out groundwater monitoring, prepare a water quality plan and monitoring program, and prepare a water reuse strategy.

DPI raised concerns about saline intrusion from tidal areas and advised that the Proponent should re-analyse saline water intrusions impacts on sensitive uses of the groundwater. DPI also recommended the Department impose a condition limiting groundwater tunnel inflows to one litre per second per kilometre, as per the groundwater modelling assumptions on which the tunnel design is based. In addition, DPI recommended groundwater monitoring for the life of the project and verbally requested for the results of groundwater monitoring be provided to it on an ongoing basis.

The **EPA** raised concern about the quality of discharges from the project (including treated groundwater) to water ways and recommended water quality criteria for the receiving waterways.

Sydney Water was concerned that the discharge of treated groundwater to the stormwater system would not meet its stormwater mean annual pollutant load reduction targets, and may overwhelm the benefits associated with current and future catchment wide stormwater management/treatment efforts.

Department's Consideration

Groundwater Modelling

The groundwater modelling has been based on the monitoring data available at the time of assessment. The Proponent has advised that additional baseline data has and continues to be collected and that re-calibration and conceptualisation would be undertaken during detailed design. The Department considers that the groundwater model should be updated once 12 months of groundwater baseline data are available and prior to any construction activities that would potentially impact on groundwater resources, to ensure that impacts are sufficiently predicted and appropriately managed. As such, the Department has recommended conditions requiring the Proponent to undertake further groundwater monitoring and modelling (in consultation with DPI Water) and to document the outcomes in a Groundwater Modelling Report. The Department has also recommended that the groundwater model and modelling report be updated once 24 months of post-construction monitoring data is available.

Construction Impacts

Tunnelling works would result in groundwater drawdown and have the potential to intercept deeper paleo channels and their associated alluvium and aquifers resulting in additional groundwater entering the tunnels, particularly around Rozelle. The Proponent proposes to pump groundwater inflows to the Darley Road and Rozelle water treatment facilities, where it would be treated and then discharged to the stormwater system in accordance with the proposed Construction Surface Water Management Plan. To ensure compliance, the Department has recommended that the Proponent develop and implement a Construction Groundwater Monitoring Plan which includes monitoring of groundwater levels and pressures to enable any groundwater impacts to be readily identified and management measures implemented. The Department has also recommended conditions requiring the Proponent to provide groundwater monitoring data every three months to Sydney Water and DPI, as requested by the agencies.

In light of concerns raised by DPI, Inner West Council and the UNSW Water Research Laboratory regarding potential saline intrusions, the Groundwater Monitoring Program also requires the Proponent to monitor electrical conductivity in key locations. The Department has also recommended a condition requiring further modelling of saline water migration prior ro finalising the detailed design.

The Department understands that the project may adversely impact groundwater resources and as such has recommended that the construction (and operational) groundwater management plan include 'make good' provisions for groundwater users in the event that groundwater monitoring indicates a decline in the quality or quantity of groundwater in existing registered bores resulting from the construction (or operation) of the project. The implementation of such provisions is consistent with the *Aquifer Interference Policy*.

In their submissions, Sydney Water, DPI, EPA and Inner West Council raised concern over the quality of discharges from the water treatment plants into the stormwater drainage system and receiving waterways. The EIS indicates that the *Australian and New Zealand Guidelines for Fresh and Marine Water Quality* (Australian and New Zealand Environment and Conservation Council/ Agriculture and Resource Management Council of Australia and New Zealand, 2000) (ANZECC guidelines) 'marine' default trigger values for 90 per cent level of species protection for a highly disturbed ecosystem are considered appropriate for establishing discharge criteria for parameters which require treatment, where practical and feasible. As noted by the EPA in its submission on the SPIR, the ANZECC guidelines recommend that guideline trigger values for slightly-moderately disturbed ecosystems should also be applied to highly disturbed ecosystems wherever possible so as to improve the quality of the ecosystems over time, especially where discharges will be ongoing for a considerable length of time. Further, the EPA recommended that any discharge water quality is consistent with at least the 95 per cent protection level for the appropriate receiving environment (i.e. slightly-moderately disturbed ecosystem) and that a 99 per cent protection level be applied for contaminants that bioaccumulate. The Department concurs with this approach and has recommended such discharge criteria for the operation of the project. The Department has also recommended a condition requiring the Proponent to monitor the quality of discharges from the construction water treatment plants.

Sydney Water requested that the water treatment discharge treatment targets be reviewed and determined by a suitable independent expert and advised that its stormwater quality targets will apply where a connection is made to its assets. The Department considers that this is not required in light of the EPA's advice as the appropriate regulatory authority.

Operational Impacts

The Proponent's original commitment in the EIS was to design the tunnels to meet a 1L/s/km inflow rate. This is the design standard based on other tunnels in the Sydney Basin. However, the Proponent has since raised uncertainty regarding the achievability of this commitment and revised the inflow rate to 1.5 L/s/km, indicating that a 1L/s/km inflow rate would be applied "where reasonable and feasible". DPI has recommended that the Department condition groundwater tunnel inflows so they do not exceed 1L/s/km, noting that this flow rate was used as the 'worst case' scenario in the groundwater impact assessment and all modelling of groundwater extraction impacts was based on this assumption. The Department concurs with DPI's recommendation and considers that a 50 per cent increase in the inflow rate is not acceptable noting that the design standard is based on achieving acceptable levels of impact. Further, the Department's independent expert has advised that a 1L/s/km inflow rate is achievable with appropriate engineering measures in place. Consequently, the Department has recommended that the Proponent must take all measures to limit groundwater inflows be limited to a 1L/s/km inflow rate.

In acknowledgement of DPI's and Inner West Council's concerns that groundwater drawdown during operations could impact on the quantity and quality of groundwater reserves, the Department has extended the requirement for groundwater monitoring and reporting into the operation of the project. The Proponent has committed to undertaking operational groundwater monitoring for three years. DPI recommended that monitoring be undertaken for a minimum 10 years post operation while the Department's independent expert recommended that monitoring continue until such time that the groundwater system has reached a new steady-state equilibrium. The Department is of the opinion that operational groundwater monitoring should be undertaken for at least five years following the completion of construction of the Rozelle Interchange (and commence once the mainline tunnels are operational), followed by a review of future monitoring requirements at that time, and has recommended a condition to this effect. The review must be undertaken in consultation with DPI and would include establishing a timeframe for continued monitoring, should further monitoring be required.

Conclusion

Construction and operation of the project have the potential to result in groundwater drawdown which, if unmitigated, could impact the quality, quantity and directional flow of local groundwater resources. The Department is satisfied that these impacts could be acceptably managed through the Proponent's proposed partial lining of the tunnels and implementation of the groundwater management framework envisaged in the Department's recommended conditions of approval and Proponent's committed management measures. However, the Department acknowledges that residual risks would occur and has consequently recommended conditions of approval requiring further groundwater modelling and monitoring.

5.9. Other Issues

The Proponent has also assessed the potential impacts of the project in relation to biodiversity, soils and water, flooding and drainage, heritage, resource use and waste generation, hazards and risks, climate change and sustainability. The Department is of the opinion that the Proponent has undertaken an adequate assessment of the issues. Although these issues can generally be managed through the use of standard best practice management procedures, conditions are required to ensure that all impacts are appropriately mitigated and managed. The Department's consideration of these issues is provided in **Table 18** below.

Table 18: Department's Consideration of Other Environmental Issues

Issue	Details	Consideration
Biodiversity	• Most of the study area is urbanised, and comprises of disturbed communities, with exotic species and planted natives and non-natives (in parks and along the road verges). • While 16 threatened ecological communities (TECs) were identified during a desktop study, none were recorded or assessed as likely to occur within the project footprint. • Two threatened microbat species (Eastern Bentwing Bat and Yellow-bellied Sheathtail-bat) were recorded during targeted surveys.	• The Department considers that the project footprint is largely disturbed and the potential for the project to impact threatened species is minor. Should any threatened species be encountered within the project footprint, the Department considers that they can be adequately managed through a Construction Flora and Fauna Management Plan and has recommended that such a plan be prepared as part of the CEMP for the project.

	• Grey-headed Flying-fox, is listed as "vulnerable" under the EPBC Act. No individuals were recorded during the surveys; and the assessment in accordance with the *Matter of National Environmental Significance Significant Impact Guidelines* concluded that the project is unlikely to have a significant impact on the Grey-headed Flying-fox.	
Soils	• The project has a risk of disturbing Acid Sulfate Soils (ASS), particularly around Rozelle Rail Yards and Campbell Road. Testing of soils likely to be ASS will occur prior to disturbance to confirm the presence of ASS. • The EIS indicates that there is low level contamination throughout the project boundary, including at the construction ancillary facility sites. The EIS identified a number of contaminants likely to be present including heavy metals, PAHs, petroleum and asbestos. • Contaminated material is expected to be encountered during tunnelling works. • During operation the project may further contribute to soil contamination via leaks/spills on roads and via inadequately treated waste water being discharged into local waterways.	• The Department acknowledges that there is a risk to the surrounding environment from the disturbance from ASS. The Department considers that the risk to the environment from ASS can be effectively reduced and managed through the development and implementation of an Acid Sulfate Soils Management Plan, as proposed by the Proponent. • The Department acknowledges that past land uses has resulted in contamination throughout the project boundary. The Department further acknowledges community concerns that contaminated material becoming airborne and impacting the community as a result of the construction. • The Department recognises the potential for further discovery of contaminated land across the project area during surface excavation, tunnelling and construction works. • The Department has recommended that the Proponent undertakes Phase 1 and Phase 2 contamination assessments in accordance with the guidelines under the *Contaminated Land Management Act 1997* and that. should a site audit be required, a Site audit Statement and Site Audit Report must be prepared by a NSW EPA Accredited Site Auditor. • The Department notes that the sites are within urban

		catchments that are largely disturbed. The Department considers that erosion and sedimentation can be effectively managed onsite through the recommended Construction Soil and Surface Water Management Plan.
Water Quality and Drainage	• The works occur mainly within the Parramatta River, Sydney Harbour catchment, with a small portion within with Cooks River catchment. • Receiving water environments are within urbanised catchments, and are not in a pristine state. The EIS states that water (groundwater and surface runoff from the Rozelle Rail Yards) discharged from the project during construction and operation will be treated to reduce the amount of total suspended solids; total phosphorus; total nitrogen; and gross pollutants to meet set water quality criteria. • The Proponent has committed to further modelling to determine whether the local stormwater drainage systems have the capacity to convey the additional flows from the project. The modelling will be in consultation with the relevant local council(s) and reported in a Stormwater Drainage Report.	• The Department notes that the level of treatment being proposed to reduce pollutants in water discharges is not to the levels set within the ANZECC guidelines or recommended by the EPA. The Department has recommended water quality criteria for wastewater discharges which take the ANZECC guidelines and recommendation of the EPA into account (refer **Section 5.8**). • The Department considers that the proposed management of stormwater drainage is adequate to address any impacts on stormwater drainage systems as a result of the project. However, to ensure the predicted impacts do not exceed the capacity of the receiving stormwater drainage systems, the Department has recommended conditions that require further hydrological and hydraulic modelling to be undertaken and the outcomes documented in a Stormwater Drainage Report.
Flooding	• Some of the works will be constructed on flood prone land, particularly around the former Rozelle Rail Yards, and will need to be managed to ensure that the infrastructure will not have an adverse flooding impact to the project or on surrounding properties and infrastructure. • Flood modelling has been undertaken for the existing flood conditions and for construction and operational conditions for the 10 year ARI, 100 year ARI and probable maximum flood (PMF) events.	• The Rozelle Rail Yards is flood prone and acts as a flood storage area. Filling of the site, and consequently raising site levels, has the potential to alter flood levels if left unmitigated. The Department considers that the approach taken by the Proponent to use the site for flood conveyance rather than flood storage and constructing large transverse conveyance systems will effectively reduce potential flood impacts and limit them to the project boundary in events up to the 100 year ARI.

	• The model predictions will be validated following the first occurrence of the defined flood event, and reported on within a Flood Review Report(s). Where the actual flood extent, level, velocity and duration exceeds the predicated levels, further measures will be taken to protect the properties or infrastructure impacted by the project. • The Proponent has committed to mitigation measures to ensure that properties that are not currently flood affected will remain so, and to minimise the impact that the project has on flooding, both during construction and operation.	The risk associated with use of the site for flood conveyance is considered to be minor as the area will be predominantly open space, with motorway operational facilities set above the PMF level. The Department has recommended flood characteristics which are not to be exceeded to ensure that the risk for flooding of adjacent lands remains minor. • The Department notes that the construction of waterways that can carry both low-level flows and flood waters through the site, discharging them into Rozelle Bay, should ensure that neighbouring properties are not adversely impacted by any flooding arising from the project.
Aboriginal Heritage	• The Proponent undertook an Aboriginal Heritage assessment in consultation with the Metropolitan Local Aboriginal Land Council. • The assessment did not reveal any surface expressions of Aboriginal objects or places within the project footprint, and noted that the potential for subsurface Aboriginal archaeology was negligible. • The Land Council Aboriginal Sites Officer did not identify any specific areas of Aboriginal cultural attachment or intangible cultural heritage values within the project footprint. • As such, impacts on identified objects or places of Aboriginal heritage are considered unlikely.	• The Department considers that the Proponent's mitigation and management measures are adequate to avoid, minimise or mitigate impacts on unidentified Aboriginal heritage objects or places. • The Department has recommended the preparation of an Unexpected Heritage Finds Procedure to manage any previously unidentified Aboriginal objects that may be discovered during construction. It has also recommended the preparation and implementation of an Construction Aboriginal Cultural Heritage Management Plan.
Non-Aboriginal Heritage	• The Proponent's Non-Aboriginal Heritage assessment identified direct impacts to five heritage items, of which three locally listed items would be demolished completely, one locally listed item would be partially demolished, and there would be temporary encroachment on the curtilage of a State heritage item (White Bay Power Station).	• The Department acknowledges that impacts to a number of locally listed heritage items is unavoidable as demolition of these is required to facilitate the construction of the project. However, there are opportunities for mitigation and the Department has recommended conditions to protect the Southern Penstock associated with White Bay

	• A further 18 local heritage items and five heritage conservation areas would potentially experience minor indirect impacts associated with vibration, settlement and visual setting. • Field studies undertaken by the Proponent identified 10 items of potential local heritage significance which would be directly impacted, of which nine would be demolished completely, and one would be partially demolished. • A further seven potential heritage items would be subject to indirect impacts through potential vibration, settlement and visual setting. One of these items has been assessed as having potential State heritage value (the Southern Penstock associated with the White Bay Power Station). The others are potential local heritage items. • The Historical Archaeological Assessment identified the potential for archaeological remains, in the following locations: ▪ Lilyfield Road and Gordon Street; ▪ Rozelle Rail Yards (East); ▪ Bignell Lane; and ▪ Parramatta Road / Pyrmont Bridge Road. • There is potential for excavation at White Bay to impact on any remaining archaeological resources associated with the White Bay Power Station, and for the site to have an indirect impact on the visual setting of the power station.	Power Station and 5 Lilyfield Road, Rozelle. It has also recommended that the Proponent investigate the feasibility of retaining: ▪ Cadden Le Messurier (84 Lilyfield Road); ▪ Former Hotel (78 Lilyfield Road); and ▪ the former Bank of NSW building (164 Parramatta Road). • The Department considers that given the heritage significance of Whites Creek Stormwater Channel No. 95, works on Whites Creek Stormwater Channel No. 95 must be undertaken in consultation with a suitably qualified and experienced heritage consultant and Sydney Water and has recommended a condition to this effect. • To further manage impacts to heritage items the Department has also recommended that the Proponent prepare and implement the following: ▪ Construction Non-Aboriginal Heritage Management Sub-Plan; ▪ Heritage Archival Recording and Salvage Report; ▪ Historical Archaeological Research Design and Excavation Methodology; ▪ Archaeological Heritage Report; and ▪ Unexpected Heritage Finds Procedure. • The Department has also recommended the appointment of an Excavation Director to oversee excavation works in areas of potential archaeological significance.

Resource use & waste (excluding spoil haulage)	**Resource use:** • Construction of the project will require a significant consumption of water. During operation, water will be required for the tunnel deluge systems, for tunnel wall washing, staff ablutions at the motorway complexes, and irrigation of landscaping. • To reduce the demand on potable water sources, the Proponent has committed to reusing non-potable water sources, where possible. • The Proponent has committed to sourcing at least 20 per cent of its power from renewable energy sources and/or accredited Green Power energy suppliers during construction and (consistent with the M4 East and New M5 projects) at least 6 per cent during operation. **Solid waste management:** • Solid waste is proposed to be minimised by using hierarchy approach to waste avoidance and resource recovery before consideration of waste disposal, where possible. Where the waste is contaminated it will be disposed of at a suitably licenced facility. • All wastes created by the project will be managed in accordance with relevant waste provisions within *Protection of the Environment Operations Act 1997*.	**Resource use** • The Department acknowledges that a significant volume of water will be required for the project during construction. To reduce the amount of potable water used during construction, the Department has recommended that the Proponent develop and implement a Water Reuse Strategy. **Solid waste management** • The Department is satisfied that the standard waste management practices of reduce, reuse and recycle proposed by the Proponent and reinforced in the recommended conditions of approval will limit waste generation and ensue its effective handling, reuse and disposal.
Hazards & Risks	• Potential construction hazards and risks include: ▪ accidents resulting from improper handling, storage and transportation of hazardous goods and substances; ▪ fuel or chemical leaks/spills from plant; and ▪ safety hazards and dangers to construction workers, road users and the community associated with	• The Department considers that the construction hazards and risks can be adequately managed by the Proponent and its contractors adhering to the relevant regulations, policies, standards and legislation and implementation of emergency management plans. • Operational hazards and risks can also be adequately managed through the implementation of relevant

	the potential risk of tunnel collapse, tunnel fires or explosions and rock falls at cuttings. ▪ Hazards and risks associated with the operation of the project include: ▪ accidents resulting from improper handling, storage and transportation of hazardous goods and substances; ▪ crashes and incidents in the mainline tunnels or entry and exit ramps, or on surface roads; and ▪ aviation hazards from high exit velocities from the ventilation outlets.	regulations, policies, standards and legislation, and emergency management plans and response procedures developed specifically for operation of the tunnel. • The Department has adopted the recommendations of Fire and Rescue NSW including requirements relating to hazard reviews, preparation of a Fire Engineering Brief and Fire Engineering Report and maintenance testing of the fire and life safety systems in the tunnels. • A separate approval is required from the Commonwealth under the *Airports Act 1996* to ensure that the velocities from the ventilation outlets are below specified criteria so that they do not interfere with aircraft. This approval was granted by the Commonwealth Department of Infrastructure and Regional Development to the Proponent on 23 November 2017.
Climate Change	• The Proponent has considered the risks of climate change and identified extreme rainfall and seal level rise as an extreme risk to the project and extreme heat and bushfires as a high risk as they have the potential to result in power and communication failures.	• The Department has considered the adaptation measures that have been incorporated into the project design (including measures for flood immunity at tunnel portals and power redundancy) and accepts that these measures are adequate.
Sustainability	• The Proponent has commitment to meeting the Infrastructure Sustainability Council of Australia (ISCA) Infrastructure Sustainability (IS) Rating Tool of 'excellent'. • The Proponent has outlined several measures that will be undertaken during construction and operation that will enable the project to reach the 'excellent' rating of the IS tool.	• To ensure that the ISCA rating of 'excellent' is achieved the Department has recommended conditions regarding the application of the ISCA rating tool.

6. CONCLUSIONS AND RECOMMENDATIONS

Need and Justification
Sydney's road network will to be put under increasing pressure over the next 20 years as vehicle numbers and trips rise in accordance with population growth. *A Plan for Growing Sydney* (NSW Government, 2014) indicates that from 2011 to 2031 Sydney's population is forecast to increase from 4.3 million to 5.9 million and that the number of vehicle trips around Sydney is predicted to rise from 16 million to 21 million vehicle trips.

Sydney's road and motorway network supports economic growth across NSW by connecting people to jobs, promoting trade between businesses and providing infrastructure to support freight movements. However, users of the road network are experiencing increased congestion, slow travel speeds and unreliable travel times. The WestConnex program of works is a critical component of the Government's transport policy and will provide an efficient link in the Sydney orbital motorway network and in the national fright network. The program of works are consistent with the *Future Transport Strategy 2056, State Infrastructure Strategy 2018-2038*, *NSW State Priorities (2015), A Plan for Growing Sydney (2014), Eastern City District Plan (2018) and NSW Freight and Ports Strategy (2013).*

The WestConnex M4 Widening and King Georges Road Intersection Upgrade projects have been completed and construction is now underway on the M4 East and New M5. However, the full benefit of these network upgrades cannot be realised until the M4-M5 Link is constructed.

Key Considerations
Key impacts of the proposal include traffic and transport, noise and vibration, air quality, urban design and visual amenity, land use and property, and groundwater. Other issues raised include heritage, water and soils, fire and hazard risks, greenhouse gas emissions and sustainability.

The Department has assessed the merits of the proposal taking into consideration the issues raised in all submissions and is satisfied that the key issues and impacts have been satisfactorily addressed in the Proponent's EIS, SPIR and the Department's recommended conditions of approval. The Department considers that the provision of an essential road transport solution through a tunnel design linking the M4 East and New M5 is a planning outcome that reduces land use conflicts and other impacts associated with road projects in urbanised areas.

Whilst some residual impacts are expected, the Department has recommended a number of conditions that provide social benefit for the locally impacted communities including:

- stringent requirements relating to noise mitigation including periods of respite, implementation of a construction Noise Insulation Program and appointment of an Acoustics Advisor and Community Complaints Mediator;
- preparation of Road Network Performance Plan aimed at developing management measures that would be implemented to manage local traffic impacts that could arise upon commencement of operation, prior to opening of the project;
- strict and transparent air quality provisions informed by advice provided by the ACTAQ, NSW Health and the EPA;
- urban design requirements to improve the amenity and community connectivity including active transport;
- appointment of a Public Liaison Officer;
- requirements for the protection of property and access including dilapidation surveys and settlement criteria;

- coordination of utility works to ensure adequate respite is provided to local communities during construction, including implementation of a Utilities Management Strategy and appointment of a Utility Coordination Manager; and
- groundwater quality and quantity provisions aimed at protecting groundwater resources.

The proposal would comply with the objects of the *Environmental Planning and Assessment Act (1979)* and with the principles of Ecologically Sustainable Development.

Recommendations

The Department considers that on balance the project is in the public interest and is justified in terms of increasing the reliability and capacity of the Sydney road network and meeting the State government's objectives and priorities for an improved transport network. The Proponent has undertaken an adequate assessment of the impacts of the project, and demonstrated that it can be constructed and operated within acceptable environmental limits. Overall, the Department is satisfied that, with the implementation of the Proponent's proposed mitigation measures and the controls and requirements outlined in the recommended conditions of approval, the potential impacts would be acceptable.

David Gainsford 28/3/18
Executive Director
Priority Projects Assessments

Marcus Ray
Deputy Secretary
Planning Services
29/03/2018

APPENDIX A - ENVIRONMENTAL IMPACT STATEMENT

See the Department's website at
http://majorprojects.planning.nsw.gov.au/index.pl?action=view_job&job_id=7485

APPENDIX B - SUBMISSIONS

See the Department's website at
http://majorprojects.planning.nsw.gov.au/index.pl?action=view_job&job_id=7485

APPENDIX C - PROPONENT'S SUBMISSIONS AND PREFERRED INFRASTUCTURE REPORT

See the Department's website at
http://majorprojects.planning.nsw.gov.au/index.pl?action=view_job&job_id=7485

APPENDIX D - INDEPENDENT TRAFFIC REVIEW

APPENDIX E - TRAFFIC IMPACTS

Table 1: Option A – 2021 AM peak hour intersection operational performance summary
(Source: EIS & SPIR)

Cluster	Intersection	Without construction		With construction	
		Volume (PCU)[1]	LoS	Volume (PCU)[1]	LoS
1	Parramatta Road | Harris Road	2,550	B	2,650	C
	Parramatta Road | Croydon Road | Arlington Street	3,280	B	3,370	C
	Parramatta Road | Great North Road	3,810	C	3,940	C
	Parramatta Road | Frederick Street | Wattle Street	4,880	D	4,960	D
	Parramatta Road | Bland Street	2,870	F	2,870	F
	Wattle Street | Ramsay Street	3,260	C	3,280	C
	Dobroyd Parade | Waratah Street	3,470	B	3,710	B
	Dobroyd Parade | Timbrell Drive | Mortley Avenue	5,530	F	5,780	F
2	City West Link | James Street	5,530	F	5,790	F
	City West Link | Norton Street	5,290	C	5,540	C
	Darley Road | C4 site access	–	–	1,200	A
3	The Crescent | James Craig Road	6,730	B	6,940	B
	City West Link | The Crescent	6,800	D	7,010	E
	City West Link | C5 site access	–	–	4,860	A
4	Victoria Road | Wellington Street	6,510	F	6,600	F
	Victoria Road | Darling Street	6,980	E	7,030	E
	Victoria Road | Evans Street	5,850	B	5,870	B
5	Parramatta Road | Pyrmont Bridge Road	5,050	C	5,090	C
	Pyrmont Bridge Road | Booth Street | Mallett Street	1,970	B	1,990	B
	Pyrmont Bridge Road | C9 site access[2]	–	–	950	A
	The Crescent | Johnston Street | Chapman Road	2,650	C	2,700	C
	Parramatta Road | Johnston Street | Northumberland Avenue	5,210	E	5,250	E
6	Princes Highway | Railway Road	5,370	F	5,400	F
	Princes Highway | Mary Street | Canal Road	4,910	F	4,940	F
	Princes Highway | Campbell Street	5,260	F	5,290	F
	Campbell Street | Albert Street	5,090	A	5,130	A

Notes:

1. Traffic volume rounded to nearest 10.
2. Rozelle civil and tunnel site (C5).

Table 2: Option A – 2021 PM peak hour intersection operational performance summary
(Source: EIS & SPIR)

Cluster	Intersection	Without construction		With construction	
		Volume (PCU)[1]	LoS	Volume (PCU)[1]	LoS
1	Parramatta Road | Harris Road	3,040	B	3,240	C
	Parramatta Road | Croydon Road | Arlington Street	3,610	D	3,710	E
	Parramatta Road | Great North Road	3,820	F	3,920	F
	Parramatta Road | Frederick Street | Wattle Street	4,950	E	5,200	E
	Parramatta Road | Bland Street	2,500	B	2,530	B
	Wattle Street | Ramsay Street	3,080	D	3,330	E
	Dobroyd Parade | Waratah Street	2,960	B	3,280	B
	Dobroyd Parade | Timbrell Drive | Mortley Avenue	5,450	F	5,800	F
2	City West Link | James Street	5,640	F	6,030	F
	City West Link | Norton Street	5,700	C	6,030	C
	Darley Road | C4 site access	–	–	1,210	A
3	The Crescent | James Craig Road	6,500	B	6,870	C
	City West Link | The Crescent	6,690	C	7,070	C
	City West Link | C5 site access	–	–	4,800	A
4	Victoria Road | Wellington Street	6,780	B	6,980	C
	Victoria Road | Darling Street	7,180	F	7,380	F
	Victoria Road | Evans Street	6,210	C	6,280	E
5	Parramatta Road | Pyrmont Bridge Road	4,970	F	5,040	F
	Pyrmont Bridge Road | Booth Street | Mallett Street	2,110	B	2,150	B
	Pyrmont Bridge Road | C9 site access	–	–	1,120	A
	The Crescent | Johnston Street | Chapman Road	2,520	C	2,600	D
	Parramatta Road | Johnston Street | Northumberland Avenue	4,900	D	4,980	D
6	Princes Highway | Railway Road	5,730	F	5,780	F
	Princes Highway | Mary Street | Canal Road	5,090	E	5,140	F
	Princes Highway | Campbell Street	5,510	F	5,590	F
	Campbell Street | Albert Street	5,110	A	5,100	A

Notes: [1]Traffic volume rounded to nearest 10

Table 3: Option B – 2021 AM peak hour intersection operational performance summary
(Source: SPIR)

Cluster	Intersection	Without construction		SPIR Option B	
		Volume (PCU)	LoS	Volume (PCU)	LoS
1	Parramatta Road | Harris Road	2,550	B	2,620	B
	Parramatta Road | Croydon Road | Arlington Street	3,280	B	3,350	B
	Parramatta Road | Great North Road	3,810	C	3,880	C
	Parramatta Road | Frederick Street | Wattle Street	4,880	D	4,970	D
	Parramatta Road | Bland Street	2,870	F	2,930	F
	Wattle Street | Ramsay Street	3,260	C	3,310	C
	Dobroyd Parade | Waratah Street	3,470	B	3,730	B
	Dobroyd Parade | Timbrell Drive | Mortley Avenue	5,530	F	5,790	F
2	City West Link | James Street	5,530	F	5,800	F
	City West Link | Norton Street	5,290	C	5,550	C
	Darley Road | C4 site access	–	–	1,200	A
3	The Crescent | James Craig Road	6,730	B	6,950	B
	City West Link | The Crescent	6,800	D	7,020	E
	City West Link | C5 site access	–	–	4,870	A
New cluster	The Crescent | Johnston Street | Chapman Road	2,650	C	2,700	C
	Parramatta Road | Johnston Street | Northumberland Avenue	5,210	E	5,250	E

Notes: [1] Rounded to nearest 10

Table 4: Option B – 2021 PM peak hour intersection operational performance summary
(Source: SPIR)

Cluster	Intersection	Without construction		SPIR Option B	
		Volume (PCU)	LoS	Volume (PCU)	LoS
1	Parramatta Road | Harris Road	3,040	B	3,170	B
	Parramatta Road | Croydon Road | Arlington Street	3,610	D	3,730	D
	Parramatta Road | Great North Road	3,820	F	3,950	F
	Parramatta Road | Frederick Street | Wattle Street	4,950	E	5,080	E
	Parramatta Road | Bland Street	2,500	B	2,630	B
	Wattle Street | Ramsay Street	3,080	D	3,120	D
	Dobroyd Parade | Waratah Street	2,960	B	3,300	B
	Dobroyd Parade | Timbrell Drive | Mortley Avenue	5,450	F	5,780	F
2	City West Link | James Street	5,640	F	6,020	F
	City West Link | Norton Street	5,700	C	6,020	C
	Darley Road | C4 site access	–	–	1,210	A
3	The Crescent | James Craig Road	6,500	B	6,860	C
	City West Link | The Crescent	6,690	C	7,060	D
	City West Link | C5 site access	–	–	4,790	A
New cluster	The Crescent | Johnston Street | Chapman Road	2,520	C	2,600	D
	Parramatta Road | Johnston Street | Northumberland Avenue	4,900	D	4,980	D

Notes: [1]Traffic volume rounded to nearest 10

Table 5: Construction Worker Car Parking Supply and Demand

Site	Employee peak	Estimate parking demand (0.7 spaces per staff)	On-site car parking supply	Difference worst cast (+/-)	Difference 0.7 parking required (+/-)
(C1a) Wattle Street civil and tunnel site	70	49	20	**-50**	**-29**
(C2a) Haberfield civil and tunnel site	150	105	0	**-150**	**-105**
(C3a) Northcote Street civil site	30	21	150	**+120**	**+129**
(C1b) Parramatta Road West civil and tunnel site	150	105	0	**-150**	**-105**
(C2b) Haberfield civil site	40	28	10	**-30**	**-18**
(C3b) Parramatta Road East civil site	60	42	140	**+80**	**+98**
(C4) Darley Road civil and tunnel site	100	70	10	**-90**	**-60**
(C5) Rozelle civil and tunnel site[1]	500	350	400	**-100**	**+50**
(C6) The Crescent civil site	10	7	0	**-10**	**-7**
(C7) Victoria Road civil site	200	140	0	**-200**	**-140**
(C8) Iron Cove Link civil site	200	140	20	**-180**	**-120**
(C9) Pyrmont Bridge Road tunnel site	100	70	40	**-60**	**-30**
(C10) Campbell Road civil and tunnel site	100	70	150	**+50**	**+80**
(C11) White Bay	0	0	50	**+50**	**+50**
Total	**Total - 1710** **Op A - 1460** **Op B - 1460**	**Total - 1197** **Op A - 1022** **Op B - 1022**	**Total - 990** **Op A - 840** **OP B - 820**	**Total - 720** **Op A - 620** **OP B - 640**	**Total -** **Op A - 182** **OP B - 202**

Table 6: East–west screenline: WRTM comparison for with and without project scenarios – AWT volumes (Source: EIS)

Direction	Location	2023 'without project'		2023 'with project'		Change	2033 'without project'		2033 'with project'		Change
		Volume	Share	Volume	Share		Volume	Share	Volume	Share	
Eastbound	Lyons Rd	17,400	19%	14,800	13%	-15%	20,800	21%	16,800	13%	-19%
	City West Link	33,500	38%	25,500	22%	-24%	34,300	35%	28,100	22%	-18%
	M4-M5 Link	–	–	43,700	38%	–	–	–	49,600	39%	–
	Darley Rd	8,800	10%	8,500	7%	-3%	9,000	9%	8,700	7%	-3%
	Marion St	3,500	4%	1,600	1%	-54%	4,300	4%	2,000	2%	-53%
	Parramatta Rd	26,100	29%	20,400	18%	-22%	29,100	30%	22,300	17%	-23%
	Total	**89,300**		**114,500**		**28%**	**97,500**		**127,500**		**31%**
Westbound	Lyons Rd	18,600	20%	16,300	13%	-12%	20,300	20%	17,300	13%	-15%
	City West Link	30,300	32%	23,800	20%	-21%	31,700	31%	25,500	19%	-20%
	M4-M5 Link	–	–	45,100	37%	–	–	–	49,800	38%	–
	Darley Rd	9,200	10%	9,600	8%	4%	10,200	10%	10,700	8%	5%
	Marion St	2,800	3%	2,100	2%	-25%	3,400	3%	2,600	2%	-24%
	Parramatta Rd	34,400	36%	24,600	20%	-28%	37,000	36%	26,200	20%	-29%
	Total	**95,300**		**121,500**		**27%**	**102,600**		**132,100**		**29%**
Two-way	Lyons Rd	36,000	20%	31,100	13%	-14%	41,100	21%	34,100	13%	-17%
	City West Link	63,800	35%	49,300	21%	-23%	66,000	33%	53,600	21%	-19%
	M4-M5 Link	–	–	88,800	38%	–	–	–	99,400	38%	–
	Darley Rd	18,000	10%	18,100	8%	1%	19,200	10%	19,400	7%	1%
	Marion St	6,300	3%	3,700	2%	-41%	7,700	4%	4,600	2%	-40%
	Parramatta Rd	60,500	33%	45,000	19%	-26%	66,100	33%	48,500	19%	-27%
	Total	**184,600**		**236,000**		**28%**	**200,100**		**259,600**		**30%**

Table 7: East–west screenline: WRTM comparison for without project and cumulative scenarios – AWT volumes (Source: EIS)

Direction	Location	2023 'without project'		2023 'cumulative'		Change	2033 'without project'		2033 'cumulative'		Change
		Volume	Share	Volume	Share		Volume	Share	Volume	Share	
Eastbound	Lyons Rd	17,400	19%	14,500	12%	-17%	20,800	21%	16,000	12%	-23%
	City West Link	33,500	38%	23,900	20%	-29%	34,300	35%	26,400	19%	-23%
	M4-M5 Link	–	–	52,400	43%	–	–	–	63,800	46%	–
	Darley Rd	8,800	10%	8,400	7%	-5%	9,000	9%	8,600	6%	-4%
	Marion St	3,500	4%	1,500	1%	-57%	4,300	4%	1,900	1%	-56%
	Parramatta Rd	26,100	29%	20,200	17%	-23%	29,100	30%	22,200	16%	-24%
	Total	**89,300**		**120,900**		**35%**	**97,500**		**138,900**		**42%**
Westbound	Lyons Rd	18,600	20%	15,100	12%	-19%	20,300	20%	16,200	11%	-20%
	City West Link	30,300	32%	24,100	18%	-20%	31,700	31%	25,800	18%	-19%
	M4-M5 Link	–	–	54,800	42%	–	–	–	62,300	43%	–
	Darley Rd	9,200	10%	9,600	7%	4%	10,200	10%	10,700	7%	5%
	Marion St	2,800	3%	2,100	2%	-25%	3,400	3%	2,600	2%	-24%
	Parramatta Rd	34,400	36%	24,900	19%	-28%	37,000	36%	26,300	18%	-29%
	Total	**95,300**		**130,600**		**37%**	**102,600**		**143,900**		**40%**
Two-way	Lyons Rd	36,000	20%	29,600	12%	-18%	41,100	21%	32,200	11%	-22%
	City West Link	63,800	35%	48,000	19%	-25%	66,000	33%	52,200	18%	-21%
	M4-M5 Link	–	–	107,200	43%	–	–	–	126,100	45%	–
	Darley Rd	18,000	10%	18,000	7%	0%	19,200	10%	19,300	7%	1%
	Marion St	6,300	3%	3,600	1%	-43%	7,700	4%	4,500	2%	-42%
	Parramatta Rd	60,500	33%	45,100	18%	-25%	66,100	33%	48,500	17%	-27%
	Total	**184,600**		**251,500**		**36%**	**200,100**		**282,800**		**41%**

Table 8: Upper north–south screenline: WRTM comparison for with and without project scenarios – AWT volumes (Source: EIS)

Direction	Location	2023 'without project'		2023 'with project'		Change	2033 'without project'		2033 'with project'		Change
		Volume	Share	Volume	Share		Volume	Share	Volume	Share	
Northbound	Norton Street	3,500	11%	3,600	12%	3%	4,100	11%	4,400	12%	7%
	Balmain Road	6,900	21%	5,600	18%	-19%	7,300	20%	5,900	16%	-19%
	Catherine Street	3,100	10%	3,000	10%	-3%	3,400	9%	3,400	9%	0%
	Johnston Street	7,800	24%	8,700	28%	12%	9,700	26%	10,100	28%	4%
	Booth Street	4,200	13%	3,600	12%	-14%	4,800	13%	4,200	12%	-13%
	Ross Street	7,000	22%	6,700	21%	-4%	8,000	21%	7,900	22%	-1%
	Total	**32,500**		**31,200**		**-4%**	**37,300**		**35,900**		**-4%**
Southbound	Norton Street	5,900	22%	4,500	17%	-24%	7,200	24%	5,200	17%	-28%
	Balmain Road[1]	–	–	–	–	–	–	–	–	–	–
	Catherine Street	6,100	23%	6,100	23%	0%	6,100	21%	6,600	22%	8%
	Johnston Street	5,300	20%	6,200	23%	17%	6,300	21%	7,100	23%	13%
	Booth Street	3,500	13%	3,600	14%	3%	3,700	13%	4,200	14%	14%
	Ross Street	5,500	21%	6,200	23%	13%	6,300	21%	7,500	25%	19%
	Total	**26,300**		**26,600**		**1%**	**29,600**		**30,600**		**3%**
Two-way	Norton Street	9,400	16%	8,100	14%	-14%	11,300	17%	9,600	14%	-15%
	Balmain Road	6,900	12%	5,600	10%	-19%	7,300	11%	5,900	9%	-19%
	Catherine Street	9,200	16%	9,100	16%	-1%	9,500	14%	10,000	15%	5%
	Johnston Street	13,100	22%	14,900	26%	14%	16,000	24%	17,200	26%	8%
	Booth Street	7,700	13%	7,200	12%	-6%	8,500	13%	8,400	13%	-1%
	Ross Street	12,500	21%	12,900	22%	3%	14,300	21%	15,400	23%	8%
	Total	**58,800**		**57,800**		**-2%**	**66,900**		**66,500**		**-1%**

Note: Balmain Road is northbound only between Parramatta Road and Leichhardt Street

Table 9: Upper north–south screenline: WRTM comparison for without project and cumulative scenarios – AWT volumes (Source: EIS)

Direction	Location	2023 'without project'		2023 'cumulative'		Change	2033 'without project'		2033 'cumulative'		Change
		Volume	Share	Volume	Share		Volume	Share	Volume	Share	
Northbound	Norton Street	3,500	11%	3,900	12%	11%	4,100	11%	4,500	12%	10%
	Balmain Road	6,900	21%	5,700	17%	-17%	7,300	20%	5,900	16%	-19%
	Catherine Street	3,100	10%	3,000	9%	-3%	3,400	9%	3,500	9%	3%
	Johnston Street	7,800	24%	8,800	27%	13%	9,700	26%	10,700	28%	10%
	Booth Street	4,200	13%	3,600	11%	-14%	4,800	13%	4,100	11%	-15%
	Ross Street	7,000	22%	7,900	24%	13%	8,000	21%	9,200	24%	15%
	Total	**32,500**		**32,900**		**1%**	**37,300**		**37,900**		**2%**
Southbound	Norton Street	5,900	22%	4,400	16%	-25%	7,200	24%	5,200	17%	-28%
	Balmain Road[1]	–	–	–	–	–	–	–	–	–	–
	Catherine Street	6,100	23%	6,100	23%	0%	6,100	21%	6,700	21%	10%
	Johnston Street	5,300	20%	6,300	23%	19%	6,300	21%	7,200	23%	14%
	Booth Street	3,500	13%	3,600	13%	3%	3,700	13%	4,200	13%	14%
	Ross Street	5,500	21%	6,600	24%	20%	6,300	21%	7,900	25%	25%
	Total	**26,300**		**27,000**		**3%**	**29,600**		**31,200**		**5%**
Two-way	Norton Street	9,400	16%	8,300	14%	-12%	11,300	17%	9,700	14%	-14%
	Balmain Road	6,900	12%	5,700	10%	-17%	7,300	11%	5,900	9%	-19%
	Catherine Street	9,200	16%	9,100	15%	-1%	9,500	14%	10,200	15%	7%
	Johnston Street	13,100	22%	15,100	25%	15%	16,000	24%	17,900	26%	12%
	Booth Street	7,700	13%	7,200	12%	-6%	8,500	13%	8,300	12%	-2%
	Ross Street	12,500	21%	14,500	24%	16%	14,300	21%	17,100	25%	20%
	Total	**58,800**		**59,900**		**2%**	**66,900**		**69,100**		**3%**

Note: Balmain Road is northbound only between Parramatta Road and Leichhardt Street

Table 10: Lower north–south screenline: WRTM comparison for with and without project scenarios – AWT volumes (Source: EIS)

Direction	Location	2023 'without project'		2023 'with project'		Change	2033 'without project'		2033 'with project'		Change
		Volume	Share	Volume	Share		Volume	Share	Volume	Share	
Northbound	Stanmore Road	16,700	10%	13,800	7%	-17%	17,900	10%	14,900	7%	-17%
	Addison Road	4,200	2%	3,700	2%	-12%	4,500	2%	4,000	2%	-11%
	Sydenham Road	15,000	9%	13,500	7%	-10%	15,400	8%	14,200	7%	-8%
	Marrickville Road	7,600	5%	7,000	4%	-8%	8,400	5%	7,700	4%	-8%
	M4-M5 Link	–	–	32,900	17%	–	–	–	37,200	18%	–
	King Street	10,500	6%	8,600	5%	-18%	12,000	7%	9,600	5%	-20%
	Wyndham Street	16,500	10%	15,900	8%	-4%	17,900	10%	17,400	8%	-3%
	Botany Road	12,200	7%	11,700	6%	-4%	13,700	8%	13,400	6%	-2%
	Elizabeth Street	9,300	6%	9,000	5%	-3%	10,300	6%	9,900	5%	-4%
	Southern Cross Drive	76,700	45%	73,300	39%	-4%	81,800	45%	78,400	38%	-4%
	Total	**168,700**		**189,400**		**12%**	**181,900**		**206,700**		**14%**
Southbound	Stanmore Road	19,600	11%	16,600	8%	-15%	20,400	10%	17,800	8%	-13%
	Addison Road	3,600	2%	2,400	1%	-33%	4,200	2%	2,900	1%	-31%
	Sydenham Road	15,600	9%	14,100	7%	-10%	16,100	8%	14,800	7%	-8%
	Marrickville Road	8,800	5%	7,900	4%	-10%	9,700	5%	8,600	4%	-11%
	M4-M5 Link	-	-	28,500	14%	-	-	-	32,800	15%	-
	King Street	10,400	6%	8,400	4%	-19%	12,100	6%	9,900	5%	-18%
	Wyndham Street	7,300	4%	6,500	3%	-11%	7,700	4%	7,200	3%	-6%
	Botany Road	19,900	11%	19,500	10%	-2%	21,500	11%	21,400	10%	0%
	Elizabeth Street	12,200	7%	11,600	6%	-5%	13,700	7%	13,100	6%	-4%
	Southern Cross Drive	85,800	47%	83,700	42%	-2%	90,100	46%	87,200	40%	-3%
	Total	**183,200**		**199,200**		**9%**	**195,500**		**215,700**		**10%**
Two-way	Stanmore Road	36,300	10%	30,400	8%	-16%	38,300	10%	32,700	8%	-15%
	Addison Road	7,800	2%	6,100	2%	-22%	8,700	2%	6,900	2%	-21%
	Sydenham Road	30,600	9%	27,600	7%	-10%	31,500	8%	29,000	7%	-8%
	Marrickville Road	16,400	5%	14,900	4%	-9%	18,100	5%	16,300	4%	-10%
	M4-M5 Link	–	–	61,400	16%	–	–	–	70,000	17%	–
	King Street	20,900	6%	17,000	4%	-19%	24,100	6%	19,500	5%	-19%
	Wyndham Street	23,800	7%	22,400	6%	-6%	25,600	7%	24,600	6%	-4%
	Botany Road	32,100	9%	31,200	8%	-3%	35,200	9%	34,800	8%	-1%
	Elizabeth Street	21,500	6%	20,600	5%	-4%	24,000	6%	23,000	5%	-4%
	Southern Cross Drive	162,500	46%	157,000	40%	-3%	171,900	46%	165,600	39%	-4%
	Total	**351,900**		**388,600**		**10%**	**377,400**		**422,400**		**12%**

Table 11: Lower north–south screenline: WRTM comparison for without project and cumulative scenarios – AWT volumes (Source: EIS)

Direction	Location	2023 'without project'		2023 'cumulative'		Change	2033 'without project'		2033 'cumulative'		Change
		Volume	Share	Volume	Share		Volume	Share	Volume	Share	
Northbound	Stanmore Road	16,700	10%	13,900	7%	-17%	17,900	10%	15,000	7%	-16%
	Addison Road	4,200	2%	3,800	2%	-10%	4,500	2%	4,100	2%	-9%
	Sydenham Road	15,000	9%	13,900	7%	-7%	15,400	8%	14,500	7%	-6%
	Marrickville Road	7,600	5%	7,500	4%	-1%	8,400	5%	8,500	4%	1%
	M4-M5 Link	–	–	47,200	24%	–	–	–	58,000	26%	–
	King Street	10,500	6%	9,100	5%	-13%	12,000	7%	11,200	5%	-7%
	Wyndham Street	16,500	10%	15,400	8%	-7%	17,900	10%	17,400	8%	-3%
	Botany Road	12,200	7%	9,000	5%	-26%	13,700	8%	10,500	5%	-23%
	Elizabeth Street	9,300	6%	8,900	4%	-4%	10,300	6%	9,800	4%	-5%
	Southern Cross Drive	76,700	45%	69,700	35%	-9%	81,800	45%	71,900	33%	-12%
	Total	**168,700**		**198,400**		**18%**	**181,900**		**220,900**		**21%**
Southbound	Stanmore Road	19,600	11%	16,700	8%	-15%	20,400	10%	17,800	8%	-13%
	Addison Road	3,600	2%	2,500	1%	-31%	4,200	2%	3,000	1%	-29%
	Sydenham Road	15,600	9%	14,500	7%	-7%	16,100	8%	15,000	7%	-7%
	Marrickville Road	8,800	5%	8,300	4%	-6%	9,700	5%	9,000	4%	-7%
	M4-M5 Link	–	–	48,800	24%	–	–	–	61,300	27%	-
	King Street	10,400	6%	10,600	5%	2%	12,100	6%	12,800	6%	6%
	Wyndham Street	7,300	4%	8,300	4%	14%	7,700	4%	8,900	4%	16%
	Botany Road	19,900	11%	20,300	10%	2%	21,500	11%	21,400	9%	0%
	Elizabeth Street	12,200	7%	13,000	6%	7%	13,700	7%	14,600	6%	7%
	Southern Cross Drive	85,800	47%	60,400	30%	-30%	90,100	46%	62,200	28%	-31%
	Total	**183,200**		**203,400**		**11%**	**195,500**		**226,000**		**16%**
Two-way	Stanmore Road	36,300	10%	30,600	8%	-16%	38,300	10%	32,800	7%	-14%
	Addison Road	7,800	2%	6,300	2%	-19%	8,700	2%	7,100	2%	-18%
	Sydenham Road	30,600	9%	28,400	7%	-7%	31,500	8%	29,500	7%	-6%
	Marrickville Road	16,400	5%	15,800	4%	-4%	18,100	5%	17,500	4%	-3%
	M4-M5 Link	–	–	96,000	24%	–	–	–	119,300	27%	–
	King Street	20,900	6%	19,700	5%	-6%	24,100	6%	24,000	5%	–
	Wyndham Street	23,800	7%	23,700	6%	0%	25,600	7%	26,300	6%	3%
	Botany Road	32,100	9%	29,300	7%	-9%	35,200	9%	31,900	7%	-9%
	Elizabeth Street	21,500	6%	21,900	5%	2%	24,000	6%	24,400	5%	2%
	Southern Cross Drive	162,500	46%	130,100	32%	-20%	171,900	46%	134,100	30%	-22%
	Total	**351,900**		**401,800**		**14%**	**377,400**		**446,900**		**18%**

Table 12: Cross-harbour screenline: WRTM comparison for with and without project scenarios – AWT volumes (Source: EIS)

Direction	Location	2023 'without project'		2023 'with project'		Change	2033 'without project'		2033 'with project'		Change
		Volume	Share	Volume	Share		Volume	Share	Volume	Share	
Northbound	Gladesville Bridge	41,700	21%	43,800	21%	5%	44,800	21%	46,500	22%	4%
	Western Harbour Tunnel	–	–	–	–	–	–	–	–	–	–
	Syd Harbour Bridge	106,400	52%	108,300	53%	2%	111,800	52%	114,300	53%	2%
	Syd Harbour Tunnel	54,800	27%	52,400	26%	-4%	56,500	27%	55,100	26%	-2%
	Total	**202,900**		**204,500**		**1%**	**213,100**		**215,900**		**1%**
Southbound	Gladesville Bridge	48,200	24%	51,600	26%	7%	49,000	23%	52,000	25%	6%
	Western Harbour Tunnel	–	–	–	–	–	–	–	–	–	–
	Syd Harbour Bridge	87,800	44%	87,100	43%	-1%	94,600	45%	93,800	44%	-1%
	Syd Harbour Tunnel	64,000	32%	63,100	31%	-1%	66,100	32%	65,300	31%	-1%
	Total	**200,000**		**201,800**		**1%**	**209,700**		**211,100**		**1%**
Two-way	Gladesville Bridge	89,900	22%	95,400	23%	6%	93,800	22%	98,500	23%	5%
	Western Harbour Tunnel	–	–	–	–	–	–	–	–	–	–
	Syd Harbour Bridge	194,200	48%	195,400	48%	1%	206,400	49%	208,100	49%	1%
	Syd Harbour Tunnel	118,800	29%	115,500	28%	-3%	122,600	29%	120,400	28%	-2%
	Total	**402,900**		**406,300**		**1%**	**422,800**		**427,000**		**1%**

Table 13: Cross-harbour screenline: WRTM comparison for without project and cumulative scenarios – AWT volumes (Source: EIS)

Direction	Location	2023 'without project'		2023 'cumulative'		Change	2033 'without project'		2033 'cumulative'		Change
		Volume	Share	Volume	Share		Volume	Share	Volume	Share	
Northbound	Gladesville Bridge	41,700	21%	49,900	24%	20%	44,800	21%	50,400	22%	13%
	Western Harbour Tunnel	–	–	16,900	8%	–	–	–	25,600	11%	–
	Syd Harbour Bridge	106,400	52%	95,800	46%	-10%	111,800	52%	106,100	47%	-5%
	Syd Harbour Tunnel	54,800	27%	45,400	22%	-17%	56,500	27%	45,000	20%	-20%
	Total	**202,900**		**208,000**		**3%**	**213,100**		**227,100**		**7%**
Southbound	Gladesville Bridge	48,200	24%	51,900	25%	8%	49,000	23%	52,800	23%	8%
	Western Harbour Tunnel	–	–	22,400	11%	–	–	–	29,500	13%	–
	Syd Harbour Bridge	87,800	44%	86,600	42%	-1%	94,600	45%	92,200	41%	-3%
	Syd Harbour Tunnel	64,000	32%	46,400	22%	-28%	66,100	32%	50,500	22%	-24%
	Total	**200,000**		**207,300**		**4%**	**209,700**		**225,000**		**7%**
Two-way	Gladesville Bridge	89,900	22%	101,800	25%	13%	93,800	22%	103,200	23%	10%
	Western Harbour Tunnel	–	–	39,300	9%	–	–	–	55,100	12%	–
	Syd Harbour Bridge	194,200	48%	182,400	44%	-6%	206,400	49%	198,300	44%	-4%
	Syd Harbour Tunnel	118,800	29%	91,800	22%	-23%	122,600	29%	95,500	21%	-22%
	Total	**402,900**		**415,300**		**3%**	**422,800**		**452,100**		**7%**

Table 14: Wattle Street interchange: key intersection performance (LoS) – 2023 and 2033 'with project' scenarios (Source: EIS)

Key intersections	2015 'base case'	2023 'without project'	2023 'with project'	2023 'cumulative	2033 'without project'	2033 'with project'	2033 'cumulative'
AM peak hour							
Parramatta Road/Sloane Street	B	B	B	B	B	C	C
Parramatta Road/Liverpool Road	C	C	C	C	C	C	C
Parramatta Road/Dalhousie Street	B	B	B	B	C	B	B
Parramatta Road/Bland Street	B	B	B	B	C	B	B
Parramatta Road/Wattle Street	E	C	E	D	C	E	E
Parramatta Road/Great North Road	B	B	B	B	B	B	B
Parramatta Road/Arlington Street	B	C	C	C	C	D	D
Frederick Street/Church Street	B	B	C	C	B	C	D
Wattle Street/Ramsay Street	C	C	C	C	C	C	C
Dobroyd Parade/Waratah Street	A	A	A	B	B	B	B
City West Link/Timbrell Drive	C	D	D	C	F	D	C
PM peak hour							
Parramatta Road/Sloane Street	B	B	B	B	F	C	B
Parramatta Road/Liverpool Road	B	F	C	B	F	E	C
Parramatta Road/Dalhousie Street	B	B	B	B	B	B	B
Parramatta Road/Bland Street	B	B	B	B	B	B	B
Parramatta Road/Wattle Street	D	D	D	D	D	D	D
Parramatta Road/Great North Road	B	B	B	B	B	B	B
Parramatta Road/Arlington Street	B	C	C	C	C	D	D
Frederick Street/Church Street	B	B	B	B	B	B	B
Wattle Street/Ramsay Street	C	C	C	C	C	C	C
Dobroyd Parade/Waratah Street	A	B	A	A	B	A	A
City West Link/Timbrell Drive	D	F	E	D	F	F	F

Table 15: Rozelle interchange: key intersection performance (LoS) – 2023 and 2033 'with project' scenarios (Source: EIS)

Key intersections	**2015** Base	2023 'without project'	2023 'with project'	2023 'cumulative'	2033 'without project'	2033 'with project'	2033 'cumulative'
AM peak hour							
Victoria Road/Lyons Road	D	F	F	F	F	F	F
Victoria Road/Wellington Street	D	D	C	C	D	D	C
Victoria Road/Darling Street	F	F	F	F	F	F	F
Victoria Road/Robert Street	D	D	C	C	D	F	E
Victoria Road/The Crescent	B	B	C	C	C	D	D
The Crescent/James Craig Road	A	A	B	A	B	B	B
City West Link/The Crescent	B	B	C	C	B	D	C
The Crescent/Johnston Street	C	C	C	C	D	C	F
The Crescent/M5 ramps	–	–	B	B	–	B	B
PM peak hour							
Victoria Road/Lyons Road	D	F	F	F	F	F	F
Victoria Road/Wellington Street	B	D	B	B	D	C	C
Victoria Road/Darling Street	F	F	D	D	F	D	D
Victoria Road/Robert Street	F	F	C	C	F	C	C
Victoria Road/The Crescent	F	F	C	C	E	C	C
The Crescent/James Craig Road	B	C	A	A	B	A	A
City West Link/The Crescent	D	F	B	C	D	C	C
The Crescent/Johnston Street	F	F	F	F	E	F	F
The Crescent/M5 ramps	–	–	B	B	–	B	C

Table 16: St Peters interchange: key intersection performance (LoS) – 2023 and 2033 'with project' scenarios (Source: EIS)

Key intersections	2015 Base	2023 'without project'	2023 'with project'	2023 'cumulative'	2033 'without project'	2033 'with project'	2033 'cumulative'
AM peak hour							
Princes Highway/Sydney Park Road	C	C	C	C	F	C	C
Princes Highway/May Street	D	C	C	C	F	D	C
Princes Highway/Canal Road	D	F	F	E	F	F	F
Princes Highway/Railway Road	F	F	F	F	F	F	F
Sydney Park Rd/Mitchell Road	C	B	C	B	F	C	D
Euston Road/Sydney Park Road	A	C	C	C	F	D	E
Unwins Bridge Road/Campbell Street	C	D	D	D	F	F	E
Campbell Road/Euston Road	A	C	C	D	F	D	E
Campbell Road/Bourke Road	-	B	D	C	B	F	E
Princes Highway/Campbell Street	C	F	F	F	F	F	F
Ricketty Street/Kent Road*	C	E	D	D	F	F	F
Gardeners Road/Kent Road*	A	C	D	C	F	F	F
Gardeners Road/Bourke Road	C	F	E	C	F	F	F
Gardeners Rd/O'Riordan Street*	D	F	F	F	F	F	F
PM peak hour							
Princes Highway/Sydney Park Road	D	B	B	C	C	C	F
Princes Highway/May Street	F	C	C	B	B	B	C
Princes Highway/Canal Road	D	D	C	F	F	E	D
Princes Highway/Railway Road	D	D	F	F	F	F	F
Sydney Park Rd/Mitchell Road	D	C	C	C	D	D	C
Euston Road/Sydney Park Road	B	D	D	C	D	D	D

Unwins Bridge Road/Campbell Street	D	E	E	D	F	F	F
Campbell Road/Euston Road	A	E	D	D	E	F	F
Campbell Road/Bourke Road	-	B	C	D	B	F	D
Princes Highway/Campbell Street	D	F	E	E	F	E	F
Ricketty Street/Kent Road*	C	C	D	B	F	F	C
Gardeners Road/Kent Road*	A	B	D	B	D	F	C
Gardeners Road/Bourke Road	D	D	F	D	F	F	F
Gardeners Rd/O'Riordan Street*	E	F	F	F	F	F	F

Note: *These intersections have upgrades in the ‘with project’ scenarios

APPENDIX F - INDEPENDENT AIR QUALITY REVIEW

APPENDIX G - INDEPENDENT URBAN DESIGN REVIEW

APPENDIX H - INDEPENDENT GROUNDWATER REVIEW