

WestConnex



NSW
MAKING IT HAPPEN

New M5

Submissions and Preferred Infrastructure Report

Main Volume Chapters 1 to 4

Volume 1A



March 2016



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Roads and Maritime Services

WestConnex New M5

Submissions and Preferred Infrastructure Report

March 2016

Prepared for

Roads and Maritime Services

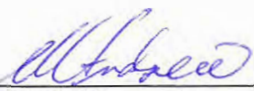
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Executive summary

The NSW Roads and Maritime Services (Roads and Maritime) proposes to build a new motorway between Kingsgrove and St Peters. The proposal includes twin tunnels of around nine kilometres in length and associated surface works to connect to the existing road network. These proposed works, described as the New M5 Motorway (the project), form one component of the overall WestConnex program of works.

WestConnex is a NSW Government initiative to provide a 33 kilometre motorway linking Sydney's west and southwest with NSW's international gateways, Sydney Airport and Port Botany. *A Plan For Growing Sydney* (NSW Government 2014) identifies WestConnex as essential to relieving congestion on key pinch points within the road network, while accommodating Sydney's future growth. The New M5 component of WestConnex would allow increased capacity on the network, improve the movement of freight by reducing congestion, and enhance connections to Sydney's south west.

WestConnex is part of an extensive plan to meet Sydney's growing transport and infrastructure needs and is fully integrated into the State's infrastructure transport and planning strategies, including the *State Infrastructure Strategy* and the *NSW Long Term Transport Master Plan*.

This submissions and preferred infrastructure report provides a response to the submissions received in relation to the New M5 Environmental Impact Statement (EIS), which was placed on public exhibition for 64 days from 27 November 2015 to 29 January 2016.

Project benefits

The project would deliver significant and lasting benefits for Sydney in terms of easing traffic congestion, creating new areas of public space, and providing safe, functional and appealing active transport infrastructure for cyclists and pedestrians. The project would also provide greater accessibility and connectivity between Sydney's regional centres and cities, improving the movement of people, goods and services, and allowing industries outside the Sydney CBD to prosper.

New active transport infrastructure in the St Peters, Mascot and Alexandria precincts would be significantly improved to encourage active transport use for commuters and recreational users, creating a vital new east–west active transport corridor and completing the missing north–south active transport connections to current and future active transport infrastructure.

Traffic benefits

The M5 Motorway corridor (comprising the M5 East Motorway and the M5 South West Motorway) is the main passenger, commercial and freight corridor between Port Botany, Sydney Airport and southwest Sydney. Traffic demand on the M5 East Motorway currently exceeds the design capacity of the roadway and presents a significant bottleneck in the M5 Motorway corridor, with motorists experiencing heavy congestion and unreliable journey times. The project would provide additional capacity along the M5 Motorway corridor, and would help create a more resilient and reliable transport network.

The key benefits of the project in terms of traffic outcomes would include:

- Quicker, more reliable trips between Western Sydney and the Sydney Airport/Port Botany precinct to support Sydney's urban freight movements, through a doubling of capacity in the M5 Motorway corridor
- Improved connections between employment and population centres along the M5 Motorway corridor and beyond to cater for existing and future demand. These would include:
 - A direct connection to employment zones within Sydney's global economic corridor, and specifically near Sydney Airport and Port Botany, via the St Peters interchange
 - Provision of two new bridge crossings of the Alexandra Canal to improve east–west connectivity across southern Sydney, and access to Sydney Airport for local traffic and to Sydney Park for the rapidly expanding Mascot Town Centre

- A reduction (almost by half) in average travel times on the M5 East Motorway between 2021 and 2031, along with a doubling of average travel speeds during the morning and afternoon peaks, which would deliver greater efficiencies for intrastate and interstate freight movements through savings in travel time and operating costs
- New connections for the residential, commercial and industrial growth in Sydney's southwest, including along the M5 Motorway corridor.

With the completion of the WestConnex program of works, average travel times and speeds would improve further. The project would have an average travel time of between nine and 10 minutes, at an average speed of 68 kilometres per hour, in both directions during the morning and afternoon peak in 2021 and in 2031.

Social, environmental and economic benefits

The New M5 would provide social, environmental and economic benefits, including:

- Improved shared path facilities in Kingsgrove
- Remediation of the Alexandria landfill site, with associated environmental gains such as protecting the Botany Sands aquifer. Use of the landfill site for the St Peters interchange and associated motorway facilities minimises impacts on properties and other public infrastructure, and facilitates greater vehicle, pedestrian and cyclist accessibility while delivering approximately six hectares of open space for surrounding residential communities
- An integrated land use, transport and urban design solution for the St Peters interchange and its surrounding settings which would:
 - Reconnect the residential areas to the north and west of Sydney Park. The widening of Campbell Street and Euston Road would create a more efficient through route adjacent to the industrial development to the park's south and east, and would divert traffic from the Princes Highway and Sydney Park Road
 - Facilitate the ongoing redevelopment of the Princes Highway south of King Street (to the west of Sydney Park) and the King Street Gateway, the concept for which will be developed and implemented by Roads and Maritime, City of Sydney and Marrickville Council, in consultation with other stakeholders and the community
 - Extend the public open space south of Campbell Road. Following construction of the St Peters interchange, the portion of reclaimed Alexandria landfill not required for operation would be returned to the community
 - Extend Campbell Street west over Alexandra Canal to Bourke Road, linking the residential and industrial/commercial areas to the east and west of the St Peters interchange
 - Connect the Bourke Road segregated cycle path to Sydney Park, Simpson Park and Camdenville Park with a dedicated, separated shared path, including a connection to the proposed Alexandra Canal cycle path
 - Connect the residential areas of St Peters and the Mascot Town Centre via an east–west link
 - Extend the Mitchell Street cycle path across Sydney Park Road into Sydney Park, onto the east–west shared path and across the St Peters interchange site, to connect to a future extension along Airport Gateway to Tempe Recreation Reserve.

The project would also contribute to meeting the objectives of NSW Government's broader strategic active transport framework, which includes future works such as the Canal Cycleway, Sydney Gateway and the M4-M5 Link, by delivering significant improvements to pedestrian and bicycle connectivity in south Sydney and the inner west:

- Through and around public open spaces at the St Peters interchange, with a network of shared paths linking the Princes Highway, Canal Road and Campbell Road/Street
- Between Mascot Town Centre, Alexandria, Sydney Park and St Peters, through the provision of dedicated pedestrian and cycle facilities

- Across Alexandra Canal, the B-double route on Burrows Road, Campbell Road and the northern motorway ramps at the St Peters interchange, with grade separated pedestrian and cycle facilities
- By linking the shared path network in Sydney Park with Simpson Park, Camdenville Park and public open space within the St Peters interchange, through the provision of dedicated pedestrian and cycle facilities
- By linking to the future Alexandra Canal, Sydney Gateway and M4–M5 Link active transport facilities
- By providing the ‘missing link’ between the existing Bourke Road cycleway and the new Bourke Street cycleway currently being constructed through Mascot Town Centre
- By providing a shared pedestrian and cycle path to the curtilage of Sydney Park along Campbell Road, Euston Road and Sydney Park Road linking to the existing shared path network in Sydney Park.

The project would also facilitate upgrades of the drainage and flooding provisions in and around Camdenville Park, and on Euston Road near Sydney Park, to reduce the frequent flooding issues currently experienced in these locations.

Environmental impact statement

The project EIS was placed on public exhibition for 64 days from 27 November 2015 to 29 January 2016. During this period, the community, interest groups, key stakeholders, local councils and relevant Government departments were invited to provide submissions on the project for consideration by the NSW Department of Planning and Environment as part of the planning process.

Interested parties were also invited to attend a number of information forums, meetings and displays where specialists in air quality, health assessment, tunnel design, noise, traffic and other project specifics were available to answer questions and record feedback.

Workshops were held with each of the councils in the New M5 study area (City of Sydney, Marrickville Council, City of Botany Bay, Hurstville City Council, City of Canterbury and Rockdale City Council), to provide detailed information to inform the councils’ submissions on the New M5 EIS and to provide direct access to the New M5 EIS team and technical specialists.

Submissions and preferred infrastructure report

This submissions and preferred infrastructure report outlines Roads and Maritime’s response to submissions on the New M5 EIS.

To prepare this report, Roads and Maritime has reviewed all submissions and prepared clarifications and responses to the issues raised. Amendments to the project have also been identified to further reduce environmental impacts and address stakeholder and community concerns.

Information is set out in this report in the following format:

- Introduction is in **Chapter 1**
- A summary of community involvement is outlined in **Chapter 2**
- A summary of submissions received is provided in **Chapter 3**
- Issues raised in submissions from government agencies and councils are addressed in **Chapter 4**
- Issues raised in community submissions are addressed in **Chapter 5**
- Clarifications in response to issues raised are addressed in **Chapter 6**
- The preferred infrastructure report, which identifies the changes made to the project since exhibition of the EIS, is described and assessed in **Chapter 7**
- An updated summary of environmental management measures is provided in **Chapter 8**
- Conclusions and next steps are summarised in **Chapter 9**.

Issues raised in submissions

The EIS detailed the rationale, approach and opportunities associated with the project, and demonstrated how these would contribute to achieving the project objectives. The EIS also detailed a range of outcomes that would be delivered for the benefit of the local community and wider Sydney, and described the measures that would be implemented to avoid, minimise or mitigate project impacts.

As would be expected on a project of this significance, submissions have nonetheless raised a range of issues, and these have been considered and addressed in this report.

A total of 10,180 submissions were received by DP&E from 8,029 submission authors. Eight submissions were from government agencies and seven from local councils. Of the submissions received around 8,810 were standardised form letters. Each submission was read carefully and issues extracted for detailed consideration. **Chapter 4** (Response to key stakeholder submissions) and **Chapter 5** (Response to community submissions) of this report present the issues raised in submissions and corresponding responses.

The subjects most commonly raised related to:

- Traffic and transport
- Strategic justification and project need
- Socio-economic impacts
- Biodiversity
- Air quality
- Project development and alternatives
- Noise and vibration
- Human health
- Planning and statutory approval process.

Clarifications in response to submissions

Chapter 6 (Clarifications) of this report describes clarifications to the EIS and refinements to project components that have been made to reflect further design development since preparation and exhibition of the EIS. In all cases these are minor refinements that do not alter the outcomes of the assessments as presented in the EIS.

The clarifications detailed in **Chapter 6** relate to:

- Local road upgrades
- Construction vehicle routes and car parking
- The traffic, air and noise impact assessments
- Property acquisition
- Environmental management measures.

Changes to the project since exhibition of the EIS

Section 5.1 of the EIS identified that the project description was based on the preferred design and that this would be refined during detailed design. Accordingly, **Chapter 7** of this report explains changes or refinements that are intended to minimise environmental impacts, to deal with issues raised during exhibition, or which result from detailed design undertaken as contemplated by the EIS.

Among the design changes are several intersection refinements, as well as further details on mitigation measures proposed in the EIS to protect the Green and Golden Bell Frog population within the project area.

Intersection design refinements

In response to submissions received, changes have been made to the design of three intersections to improve pedestrian accessibility and amenity, and to align these locations more closely with the broader active transport strategy for the project.

A slip lane at the intersection of Euston Road, Sydney Park Road and Huntley Street has been removed in response to feedback from Councils and the community in relation to active transport amenity and connectivity at this location. This change rationalises the road space, increases space for landscaping adjacent to the roadway, and improves pedestrian connectivity, amenity, crossing distances, times and safety.

The temporary signalised intersection at Campbell Road and Albert Street has been converted to a permanent intersection with a dedicated pedestrian crossing on two legs of the intersection to provide:

- Enhanced at-grade connection with nearby residential areas, Sydney Park and the new public active transport links, and public open space in and around the St Peters interchange
- An alternative mid-block crossing of Campbell Road for pedestrians not wishing to cross over the proposed pedestrian and cycle bridge further east on Campbell Road, to minimise jaywalking and improve pedestrian safety
- An alternative crossing to that provided at the intersection of Campbell Street and Princes Highway. This would benefit nearby residents heading south, as well as pedestrians accessing Sydney Park from the south side of the Princes Highway.

A mid-block signalised intersection has been added on Campbell Road east, between Burrows Road and Bourke Road, with a pedestrian crossing on two legs of the intersection (one with dedicated cycle signals) to provide:

- Improved at-grade pedestrian crossing opportunities across Campbell Road
- A safer crossing of the commercial driveway, which forms the third leg of the intersection, for pedestrian and cyclists using the dedicated east–west active transport route.

Green and Golden Bell Frog Habitat Creation and Captive Breeding Plan

The Marsh Street ponds at Arncliffe were identified in the Green and Golden Bell Frog Plan of Management (Appendix K of the Biodiversity Assessment Report, in Appendix S of the EIS) as part of a broader package of mitigation and management measures to support the long term survival of the local population by expanding and enhancing the habitats available for the species.

At the time of preparing the EIS, no design detail was available; this has now been progressed as part of the project and a review of the potential impacts associated with the construction and operation of the ponds has been undertaken. A Habitat Creation and Captive Breeding Plan has also been prepared and is provided as **Appendix B** to this report.

Commitments to further investigations

Euston Road

During detailed design, Roads and Maritime would investigate an option to further reduce the width of the upgraded Euston Road. This may be achieved through a reduction in lane width and/or through the removal or reduction of the central turning lane. Options would be considered in the context of road safety, network performance and implications on property access.

A reduction in lane width in this location would address concerns raised in submissions by providing:

- Reduced impacts on Sydney Park, including retention of more park space and vegetation
- Improvements to pedestrian crossing distances and times, which would improve amenity and safety and enhance pedestrian connectivity across Euston Road
- The potential to shift the proposed shared path on the western side of Euston Road away from the kerb, improving safety and amenity for active transport users

- The potential for additional landscape treatments to increased verge spaces as a result of reduction in road space.

The possibility of removing the centre turning lane within Euston Road would also be investigated during detailed design. Removal of this centre lane would provide an increased area of open space adjacent to Sydney Park, enabling more of the existing vegetation to be retained and increasing the distance between pedestrians and cyclists and vehicular lanes, improving amenity and safety. A final determination on this option would require an investigation of impacts on property access and network performance.

King Street Gateway

Roads and Maritime is committed to working with the Marrickville and City of Sydney councils to develop and implement the concept for the King Street Gateway in consultation with stakeholders and the community. This may include refining treatments to and rationalisation of road space at the intersection of Princes Highway, King Street and Sydney Park Road, to limit through-traffic, improve pedestrian safety and access to Sydney Park, and protect the amenity of King Street.

When finalised the King Street Gateway concept could deliver improvements along the Princes Highway, and may also include potential amendments to restrict some turning movements at the intersection of May Street and Mitchell Road, to prevent 'rat running' and further protect the amenity of King Street.

Ongoing consultation with community and stakeholders

Consultation has been central to informing the development of the New M5 EIS and this submissions and preferred infrastructure report. During development of the EIS, Roads and Maritime undertook extensive consultation with the community and stakeholders, including councils. A number of elements of the design as presented in the EIS reflect suggestions and comments from these consultations, including the local road design, active transport connectivity and landscape concept.

During exhibition of the EIS a number of community consultation sessions and council workshops were undertaken to further explain the design and encourage feedback. These interactions highlighted a number of issues that have been addressed in this report, including through design changes.

Roads and Maritime has committed to ongoing consultation as the design develops, to ensure the project's evolution and refinement is in line with community and stakeholder expectations. These activities would include:

- Consultation on the Urban Design and Landscape Plan with Councils, the community and the Heritage Council of NSW
- Ongoing consultation with City of Botany Bay, City of Sydney and Marrickville Council during detailed design of the Campbell Street/Road cycleway
- Consultation with the Heritage Council of NSW on development of the Heritage Management Plan.

Conclusions from this report

The project, as outlined in the EIS, has been refined in response to consultation, submissions and further work conducted since the preparation of the EIS. These refinements would deliver an extensive range of benefits to multiple user groups, as described earlier in this executive summary.

These benefits and the commitments made by Roads and Maritime and NSW Government in relation to the project's ongoing development, provide a strong case for proceeding with the New M5 project.

This report outlines the basis on which these conclusions have been drawn and provides further details where greater benefits were able to be realised.

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Glossary of terms and abbreviations

Term	Definition
A	
AAQ NEPM	National Environment Protection (Ambient Air Quality) Measure
Acute exposure	Contact with a substance that occurs once or for only a short time (up to 14 days).
Air Toxics NEPM	National Environment Protection (Air Toxics) Measure
Aboriginal cultural heritage	The tangible (objects) and intangible (dreaming stories, song lines and places) cultural practices and traditions associated with past and present day Aboriginal communities.
Aboriginal object	Any deposit, object or material evidence (not being a handicraft made for sale), including Aboriginal remains, relating to the Aboriginal habitation of NSW.
Aboriginal place	Any place declared to be an Aboriginal place under section 94 of the <i>National SEIFAParks and Wildlife Act 1974</i> .
ABS	Australian Bureau of Statistics
ACM	Asbestos containing material(s)
ADT	Average daily traffic
ADWG	<i>Australian Drinking Water Guidelines</i> (National Health and Medical Research Council 2013)
AHD	Australian height datum. A common national surface level datum approximately corresponding to mean sea level
Alignment	The geometric layout (eg of a road) in plan (horizontal) and elevation (vertical).
AM peak period	6:30am to 9:30am
Ancillary	A subordinate part of an element.
ANZECC	Australian and New Zealand Environment Conservation Council
Aquifer	A groundwater bearing formation sufficiently permeable to transmit and yield groundwater
AR5	Fifth Assessment Report of the Intergovernmental Panel on Climate Change (IPCC)
ARI	Average recurrence interval The average period in years between the occurrence of a flood of a particular magnitude or greater. In a long period of say 1,000 years, a flood equivalent to or greater than a 100 year ARI event would occur 10 times. The 100 year ARI flood has a 1 per cent chance (i.e. a one-in-100 chance) of occurrence in any one year The frequency of floods is generally referred to in terms of their AEP or ARI. In this report the frequency of floods generated by runoff from the study catchments is referred to in terms of their ARI, for example the 100 year ARI flood.
ARMCANZ	Agriculture and Resources Management Council of Australia and New Zealand
Arncliffe construction compound (C7)	Located within the Kogarah Golf Course. The site would be used for civil construction activities and for tunnelling support.
Arncliffe motorway operations complex (MOC2)	Located near the south western corner of the Kogarah Golf Course. Contains operational ancillary infrastructure that is required for operation of the project.
ARTC	Australian Rail Track Corporation
Arterial roads	The main or trunk roads of the State road network.
AS	Australian Standard
ASC NEPM	National Environment Protection (Assessment of Site Contamination) Measure 1999 (Commonwealth)

Term	Definition
Asphalt or asphaltic concrete	A dense, continuously graded mixture of coarse and fine aggregates, mineral filler and bitumen usually produced hot in a mixing plant.
ASS	Acid sulfate soils Naturally occurring soils, sediments or organic substrates (eg peat) that are formed under waterlogged conditions. These soils contain iron sulfide minerals (predominantly as the mineral pyrite) or their oxidation products. In an undisturbed state below the water table, acid sulfate soils are benign. However if the soils are drained, excavated or exposed to air by a lowering of the water table, the sulfides react with oxygen to form sulfuric acid.
ASSMP	Acid Sulfate Soil Management Plan
ASTER	Advanced Spaceborne Thermal Emission and Reflection Radiometer
At-grade	A road at ground level, not on an embankment or in a cutting.
Aquifer	Water bearing rock
Average recurrence interval (ARI)	An indicator used to describe the frequency of floods. For example for a flood having a 5 year ARI, there would be floods of equal or greater magnitude once in 5 years on average.
AWT	Average weekday traffic
B	
Background concentration (air quality)	Describes all contributing sources of a pollutant concentration other than road traffic. It includes, for example, contributions from natural sources, industry and domestic activity.
Background noise level	The ambient sound-pressure noise level in the absence of the sound under investigation exceeded for 90 per cent of the measurement period. Normally equated to the average minimum A-weighted sound pressure level.
Bank cubic metres	A measure of volume representing a cubic metre of unexcavated material. Once material is excavated, it expands to varying degrees depending on its constituents.
Bexley Road East construction compound (C6)	Located on the eastern side of Bexley Road, south of the intersection with Wolli Avenue. This site would be used mainly for car parking and administrative support activities.
Bexley Road North construction compound (C4)	Located on the western side of Bexley Road and north of the M5 East Motorway. The compound would be mainly used as a tunnelling support site.
Bexley Road South construction compound (C5)	Located within Kingsgrove Avenue Reserve on the western side of Bexley Road to the south of the M5 East Motorway tunnel portals. The compound would be mainly used as a tunnelling support site.
Bexley Road South motorway operations complex (MOC3)	Located to the south of the M5 East Motorway western portals, adjacent to Bexley Road. Contains operational ancillary infrastructure that is required for operation of the project.
bgl	Below ground level
BH	Borehole
Blasting	Rock blasting is the controlled use of explosives and other methods such as gas pressure blasting pyrotechnics or plasma processes, to excavate, break down or remove rock
BoM	Bureau of Meteorology
Bore	Constructed connection between the surface and a groundwater source that enables groundwater to be transferred to the surface either naturally or through artificial means.
BS	British standard
BTEX	Benzene, toluene, ethylbenzene and xylenes
BTS	Bureau of Transport Statistics
(the) Business Case	WestConnex Business Case Executive Summary (Sydney Motorways Project Office, 2013a)

Term	Definition
Burrows Road motorway operations complex (MOC5)	Located at the corner of Burrows Road and Campbell Road, St Peters. Contains operational ancillary infrastructure that is required for operation of the project.
Burrows Road construction compound (C11)	Located on the south-western corner of Campbell Road and Burrows Road. The site would mainly be used to support civil infrastructure construction activities, including construction of the St Peters interchange and the local road upgrades.
Bus lane	A traffic lane dedicated to buses, but which can also be used by taxis, bicycles and motorcycles.
C	
CAMBA	China-Australia Migratory Bird Agreement
Campbell Road bridge construction compound (C12)	Located on the south-eastern side of Burrows Road, opposite Campbell Road. The site would be mainly used for the construction of a new bridge across the Alexandra Canal as part of the Campbell Road extension.
Campbell Road construction compound (C9)	Located on the southern side of Campbell Road between Woodley Street and Harber Street, St Peters. The site would be mainly used to support construction of the St Peters interchange and local road upgrades.
Canal Road construction compound (C8)	Located within the St Peters interchange site at St Peters. The site would be mainly used to support tunnelling and civil infrastructure construction activities
Canterbury LEP 2012	Canterbury Local Environmental Plan 2012.
Carriageway	The portion of a roadway used by vehicles including shoulders and ancillary lanes.
Catchment	The land area draining through the main stream, as well as tributary streams, to a particular site. It always relates to an area above a specific location.
CASA	Civil Aviation Safety Authority
CBD	Central business district
CCTV	Closed circuit television
CEMP	Construction Environmental Management Plan A site specific plan developed for the construction phase of the project to ensure that all contractors and sub-contractors comply with the environmental conditions of approval for the project and that the environmental risks are properly managed.
CETU	Cente d'Etudes des Tunnels
City Centre Access Strategy	Sydney City Centre Access Strategy (Transport for NSW, 2013d)
Climate change	A change in the state of the climate that can be identified (eg by statistical tests) by changes in the mean and/or variability of its properties, and that persists for an extended period of time, typically decades or longer (CSIRO and BoM 2015a).
Climate projection	A climate projection is the simulated response of the climate system to a scenario of future emission or concentration of greenhouse gases and aerosols, generally derived using climate models. Climate projections are distinguished from climate predictions by their dependence on the emission/concentration/radiative forcing scenario used, which in turn is based on assumptions concerning, for example, future socioeconomic and technological developments that may or may not be realised (CSIRO and BoM 2015a).
CLM Act	Contaminated Land Management Act 1997 (NSW)
CNVMP	Construction Noise and Vibration Management Plan
CO	Carbon monoxide.

Term	Definition
CO ₂	Carbon dioxide. A naturally occurring gas, also a by-product of burning fossil fuels from fossil carbon deposits, such as oil, gas and coal, of burning biomass, of land use changes and of industrial processes (eg cement production). It is the principle anthropogenic greenhouse gas that affects the Earth's radiative balance (CSIRO and BoM 2015a).
COHb	Carboxyhaemoglobin
Commercial Road construction compound (C3)	Located on the southern side of the existing M5 East Motorway, within a private property used for commercial business purposes between Tallawalla Street and Commercial Road, Kingsgrove. The compound would be mainly used as a tunnelling support site.
Concept design	Initial functional layout of a road/road system or other infrastructure. Used to facilitate understanding of a project, establish feasibility and provide basis for estimating and to determine further investigations needed for detailed design.
Construction compound	Facilities used to support the operation of a construction site including (but not limited to) tunnelling support, site offices, workshops, delivery areas, storage areas, staff vehicle parking, materials, plant and equipment.
Construction footprint	Area required for the construction of the project. This includes the operational footprint and additional temporary land for construction.
Contributory item	Place within a Heritage Conservation Area that contributes to its heritage significance.
CoPC	Contaminants of Potential Concern
CPAH	Carcinogenic Polycyclic Aromatic Hydrocarbons
CPTED	Crime Prevention Through Environmental Design
CSIRO	Commonwealth Scientific and Industrial Research Organisation
CTSMP	Construction Traffic and Safety Management Plan
Cumulative impacts	Impacts that, when considered together, have different and/or more substantial impacts than a single impact considered alone.
Cut-and-cover	A method of tunnel construction whereby the structure is built in an open excavation and subsequently covered.
Cutting	Formation resulting from the construction of the road below existing ground level, the material is cut out or excavated.
D	
dB(A)	A-weighted decibels A-weighting is applied to instrument-measured sound levels in effort to account for the relative loudness perceived by the human ear, as the ear is less sensitive to low audio frequencies.
DCP	Development Control Plan
DECC	Former Department of Environment and Climate Change (now OEH).
DECCW	Department of Environment, Climate Change and Water (formerly DECC, but now OEH).
Design speed	A nominal speed which determines the geometric design features of a road.
Detailed design	The stage of design where project elements are designed in detail, suitable for construction.
Deviation	An alteration to the alignment of a portion of a road.
Discharge	The rate of flow of water measured in terms of volume per unit time, for example, cubic metres per second (m ³ /s). Discharge is different from the speed or velocity of flow, which is a measure of how fast the water is moving (eg metres per second [m/s]).
DIT	Department of Infrastructure and Transport
Divided road	A road with a separate carriageway for each direction of travel created by placing a physical separation (eg median) between the opposing traffic directions.
DMP	Dust Management Plan
'Do minimum'	A model that does not incorporate the proposed project infrastructure

Term	Definition
'Do something'	A model that incorporates the proposed project infrastructure
DP&E	NSW Department of Planning and Environment
DPI	NSW Department of Primary Industries
DPI – Water	Department of Primary Industries – Water
Drainage	Natural or artificial means for the interception and removal of surface or subsurface water.
Drawdown	Reduction in the height of the water table caused by changes in the local environment.
E	
Earthworks	All operations involved in loosening, excavating, placing, shaping and compacting soil or rock.
EC	Electrical conductivity The measure of a material's ability to accommodate the transport of an electric charge.
EEC	Endangered ecological community
Egress	Exit
EIS	Environmental impact statement
Embankment	An earthen structure where the road (or other infrastructure) subgrade level is about the natural surface.
Emergency management	A range of measures to manage risks to communities and the environment. In the flood context it may include measures to prevent, prepare for, respond to and recover from flooding.
Emissions scenario	A plausible representation of the future development of emissions of substances that are potentially radiatively active (eg greenhouse gases, aerosols) based on a coherent and internally consistent set of assumptions about driving forces (such as demographic and socioeconomic development, technological change) and their key relationships (CSIRO and BoM 2015a).
Enabling works	Works which are required to enable the commencement of the main construction works.
ENMM	Environmental Noise Management Manual (Roads and Traffic Authority 2001)
EP&A Act	Environmental Planning and Assessment Act 1979 (NSW)
EPA	NSW Environment Protection Authority
EPBC Act	Environment Protection and Biodiversity Act 1999 (Commonwealth)
EPL	Environment protection licence
Erosion	A natural process where wind or water detaches a soil particle and provides energy to move the particle.
ESA	Environmental site assessment
ESD	Ecologically sustainable development.
ESP	Electrostatic precipitator
EU	European Union
Extreme rainfall	There is no consistent global definition for extreme rainfall. It can be defined by either relative rainfall at a location (amount relative to averages), or absolute rainfall amounts (eg over 100 millimetres in a single day). In this Chapter, an extreme rainfall event is defined as the wettest day in 20 years.
Extreme temperature	Definitions vary, however this Chapter refers to extreme temperature as hot days (days above 35°C) and very hot days (days above 40°C).
F	
FBA	<i>Framework for Biodiversity Assessment</i>

Term	Definition
Feasible and reasonable	Consideration of best practice taking into account the benefit of proposed measures and their technological and associated operational application in the NSW and Australian context. Feasible relates to engineering considerations and what is practical to build. Reasonable relates to the application of judgement in arriving at a decision, taking into account mitigation benefits and cost of mitigation versus benefits provided, community expectations and nature and extent of potential improvements.
FFDI	Forest fire danger index
Fire weather	Weather conditions conducive to triggering and sustaining wild fires, usually based on a set of indicators and combinations of indicators including temperature, soil moisture, humidity, and wind. Fire weather does not include the presence or absence of fuel load (CSIRO and BoM 2015a).
Flash flooding	Flooding which is sudden and unexpected. It is often caused by sudden local or nearby heavy rainfall. It is often defined as flooding which peaks within six hours of the rain event.
Flood	Relatively high stream flow which overtops the natural or artificial banks in any part of a stream, river, estuary, lake or dam, and/or local overland flooding associated with major drainage before entering a watercourse, and/or coastal inundation resulting from super-elevated sea levels and/or waves overtopping coastline defences excluding tsunamis.
Flood prone land	Land susceptible to flooding by the probable maximum flood. Note that the flood prone land is also known as flood liable land.
Flood storage area	Those parts of the floodplain that are important for the temporary storage of floodwaters during the passage of a flood. The extent and behaviour of flood storage areas may change with flood severity, and loss of flood storage can increase the severity of flood impacts by reducing natural flood attenuation. It is necessary to investigate a range of flood sizes before defining flood storage areas.
Floodplain	Area of land which is inundated by floods up to and including the probable maximum flood event (ie flood prone land).
Floodplain Risk Management Plan	A management plan developed in accordance with the principles and guidelines in the NSW <i>Floodplain development manual</i> (DIPNR 2005). Usually includes both written and diagrammatic information describing how particular areas of flood prone land are to be used and managed to achieve defined objectives.
Footprint	The extent of impact that a development makes on the land.
Fracture	Cracks within the strata that develop naturally or as a result of underground works
Freeboard	A factor of safety typically used in relation to the setting of floor levels, levee crest levels, etc. It is usually expressed as the difference in height between the adopted flood planning level and the peak height of the flood used to determine the flood planning level. Freeboard provides a factor of safety to compensate for uncertainties in the estimation of flood levels across the floodplain, such as wave action, localised hydraulic behaviour and impacts that are specific event related, such as levee and embankment settlement, and other effects such as “greenhouse” and climate change. Freeboard is included in the Flood Planning Level.
FTE	Full-time equivalent
G	
Gardeners Road Bridge construction compound (C13)	Located on the southern side of Burrows Road, St Peters. The site would be used to service the construction of a bridge over the Alexandra Canal, which would connect the St Peters interchange directly with Gardeners Road, Mascot.
GCCSA	Greater capital city statistical area
GCL	Geosynthetic clay liner

Term	Definition
GDE	Groundwater dependent ecosystem. Refers to communities of plants, animals and other organisms whose extent and life process are dependent on groundwater, such as wetlands and vegetation on coastal sand dunes.
GHG	Greenhouse gas
GIS	Geographic information systems
Global Sydney	As defined in <i>A Plan for Growing Sydney</i> (NSW Government 2014). Global Sydney includes the Sydney CBD, North Sydney CBD, Barangaroo, Darling Harbour, the Bays Precinct, Pyrmont-Ultimo, Broadway and Camperdown Education and Health Precinct, Central to Eveleigh, Surry Hills and City East.
Grade	The rate of longitudinal rise (or fall) with respect to the horizontal expressed as a percentage or ratio.
Grade separation	The separation of road, rail or other traffic so that crossing movements at intersections are at different levels.
GRAL	Graz Lagrangian (dispersion model). Air quality modelling package.
GRAMM	Graz Mesoscale Model
Greenhouse gas	Greenhouse gases are those gaseous constituents of the atmosphere, both natural and anthropogenic, that absorb and emit radiation at specific wavelengths within the spectrum of terrestrial radiation emitted by the Earth's surface, the atmosphere itself, and by clouds. Water vapour (H ₂ O), carbon dioxide (CO ₂), nitrous oxide (N ₂ O), methane (CH ₄) and ozone (O ₃) are the primary greenhouse gases in the Earth's atmosphere (CSIRO and BoM 2015a).
Groundwater	Water that is held in rocks and soil beneath the earth's surface.
Growing Sydney	<i>A Plan for Growing Sydney</i> (NSW Government, 2014)
GRP	Gross regional product
GSP	Gross state product
H	
Hazard	A source of potential harm or a situation with a potential to cause loss. In relation to the <i>NSW Floodplain development manual</i> (DIPNR 2005) the hazard is flooding which has the potential to cause damage to the community.
HC	Hydrocarbons
HCAs	Heritage Conservation Areas
Heavy vehicles	A heavy vehicle is classified as a Class 3 vehicle (a two axle truck) or larger, in accordance with the Ausroads Vehicle Classification System.
HEC_RAS	Hydraulic modelling software
Heritage Act	Heritage Act 1977 (NSW)
Heritage item	Place listed on a statutory heritage register
HF	Hydrogen fluoride
HHRA	Human Health Risk Assessment
HI	Hazard Index
HIA	Health Impact Assessment
Hurstville LEP 2012	Hurstville Local Environmental Plan 2012.
HV	Heavy vehicle
Hydraulic conductivity	A characteristic of soil that describes how easily water moves through it.
Hydrogeology	The area of geology that deals with the distribution and movement of groundwater in soils and rocks.
I	
IAQM	Institute of Air Quality Management
ICNG	<i>Interim Construction Noise Guideline</i> (Department of Environment and Climate Change, 2009a)
ICOMOS	International Council on Monuments and Sites

Term	Definition
Impact	Influence or effect exerted by a project or other activity on the natural, built and community environment.
Infiltration	The downward movement of water into soil and rock. It is largely governed by the structural condition of the soil, the nature of the soil surface (including presence of vegetation) and the antecedent moisture content of the soil
INP	Industrial Noise Policy
Interchange	A grade separation of two or more roads with one or more interconnecting carriageways.
Intrusive item	Place within a heritage conservation area that detracts from its heritage significance.
IPCC	Intergovernmental Panel on Climate Change
ISCA	Infrastructure Sustainability Council of Australia
IRSAD	Index of relative socio-economic advantage and disadvantage
ITS	Intelligent Transport Systems Systems in which information and communication technologies are applied in the field of road transport, including infrastructure, vehicles and users, and in traffic management and mobility management, as well as for interfaces with other modes of transport.
J	
JAMBA	Japan-Australia Migratory Bird Agreement
K	
King Georges Road interchange upgrade (KGRIU)	A component of the wider WestConnex program of works. Planning approval granted on 3 March 2015 and under construction.
Kh	Horizontal hydraulic conductivity
Kingsgrove motorway operations complex (MOC1)	Located to the south of the western project portals and the existing M5 East Motorway. Contains operational ancillary infrastructure that is required for operation of the project.
Kingsgrove North construction compound (C1)	Located on the northern side of the existing M5 East Motorway between Canterbury Golf Course and Garema Circuit, Kingsgrove. The compound would service the construction of the western surface works and would support tunnelling construction.
Kingsgrove South construction compound (C2)	Located to the south of M5 East Motorway within Beverley Grove Park. The compound would primarily be used to service the construction of the western surface works.
Kingsgrove surface works	Located between the western surface works and Bexley road surface works, around Kingsgrove Road. The works would be primary related to the construction and operation of toll infrastructure.
kL	Kilolitres
kL/day	Kilolitres per day
Kv	Vertical hydraulic conductivity
L	
L/s/km	Litres per second per kilometre
LA90	The noise level exceeded for 90 per cent of the sample period. This noise level is described as the average minimum background sound level (in the absence of the source under consideration), or simply the background level.
L _{Aeq}	The 'energy average noise level'. It is often expressed with a time period eg 1 hour, 9 hour (to represent the night-time period from 10.00 pm to 7.00 am) or 15 hour (to represent the daytime and evening periods from 7.00 am to 10.00 pm). The L _{Aeq} can be likened to a noise dose representing the cumulative effects of all the noise events occurring in the relevant time period.
LAF _{max}	Maximum fast time weighted noise level

Term	Definition
Landfill Closure construction compound (C10)	Located on the southern side of Campbell Road and would be used to support closure of the Alexandria Landfill site.
Landscape character	The aggregate of built, natural and cultural aspects that make up an area and provide a sense of place. Includes all aspects of a tract of land – built, planted and natural topographical and ecological features.
Lane	A portion of the carriageway allotted for the use of a single line of vehicles.
LCMP	Landfill Closure Management Plan
LCZ	Landscape Character Zone
Leachate	Liquid that 'leaches' (drains) from a landfill
LEP	Local environmental plan
LGA	Local government area
Licensed discharge point	A location where a licensed operation discharges water to the environment in accordance with conditions stipulated within the site environment protection licence (EPL).
Localised flooding	Localised flooding occurs when components of the drainage system are undersized or blocked and cannot accommodate the incoming overland surface flows, resulting in the flooding of a localised area
Local road upgrades	Refers to the local roads around the St Peters interchange and the intersection of Campbell Road and Euston Road
LoS	Level of service
LTP	Leachate treatment plant
LV	Light vehicle
M	
M	Metres
m/day	Metres per day
m ²	Square metres
m ³	Cubic metres
M4 East	A component of the wider WestConnex program of works. Located from Homebush Bay Drive, Homebush to Parramatta Road and City West Link (Wattle Street) at Haberfield (planning application lodged and subject to planning approval)
M4 Widening	A component of the wider WestConnex program of works. Located from Pitt Street, Parramatta to Homebush Bay Drive, Homebush (planning approval granted on 21 December 2014 and under construction)
M4-M5 Link	A component of the wider WestConnex program of works. Undergoing concept development and subject to planning approval.
M5 East Motorway	Part of the M5 Motorway corridor. Located between Beverly Hills and Sydney Airport (General Holmes Drive).
M5 Motorway corridor	The M5 East Motorway and the M5 South West Motorway
M5 South West Motorway	Part of the M5 Motorway corridor. Located between Prestons and Beverly Hills.
main alignment tunnels	The main two tunnels to be constructed as part of the project. About nine kilometres long, with the western tunnel portals located at Kingsgrove and the eastern ramp portals located at the St Peters interchange.
Mainstream flooding	Inundation of normally dry land occurring when water overflows the natural or artificial banks of a stream, river, estuary, lake or dam.
Marrickville LEP 2011	Marrickville Local Environmental Plan 2011.
Mean rainfall	The arithmetically averaged total amount of precipitation recorded during a calendar month or year.
Median	The central reservation which separates carriageways from traffic travelling in the opposite direction.
Methodology	The method for analysis and evaluation of the relevant subject matter.
mg/L	Milligrams per litre
MIC	Maximum instantaneous charge

Term	Definition
microSiemens per centimetre	A measure of electrical conductivity. Commonly used to measure the salinity of water.
Mid-block	Section of road between two intersections
ML	Megalitres
MLALC	Metropolitan Local Aboriginal Land Council
ML/day	Megalitres per day
MKVT	Million vehicle kilometres travelled (MVKT)
MOC	Motorway operations complex
Motorway	Fast, high volume controlled access roads. May be tolled or untolled.
MUSIC	Model for Urban Stormwater Improvement Conceptualisation
N	
NARCLiM	NSW/ACT Regional Climate Modelling
NATA	National Association of Testing Authorities
National Road Network	AusLink National Land Transport Network
NCA	Noise Catchment Area
NCG	Noise Criteria Guideline
NEPC	National Environmental Protection Council
New M5	The subject of this EIS. A component of the wider WestConnex program of works.
NGA	National Greenhouse Accounts
NGER	National Greenhouse and Energy Reporting
NGER Act	National Greenhouse and Energy Reporting Act 2007 (Commonwealth)
NL	Noise Logger
NMG	Noise Mitigation Guideline
NML	Noise management level
NO ₂	Nitrogen dioxide
NOW	(former) NSW Office of Water (now the Department of Primary Industries – Water)
NO _x	Nitrogen Oxide
NPI	National Pollutant Inventory
NRMA	National Roads and Motorist's Association
NSW	New South Wales
NSW 2021	<i>NSW 2021: A plan to make NSW number one</i> (NSW Department of Premier and Cabinet, 2011)
NWQMS	National Water Quality Management Strategy
O	
O ₃	Ozone
Obstruction Limitation Surface	An invisible level that defines the limits to which objects may project into the airspace around an aerodrome so that aircraft operations may be conducted safely.
OCP	Organochlorine Pesticides
OEH	NSW Office of Environment and Heritage (formerly DECCW)
Off-ramp	A ramp by which one exits a limited-access highway / tunnel.
On-ramp	A ramp by which one enters a limited-access highway / tunnel.
Operational footprint	Areas to be directly impacted by the operational components of the project such as roadways, tunnels and associated facilities (eg motorway operations complex and ventilation facilities).
OPP	Organophosphate Pesticides
OU	Odour Units
Outcrop	Bedrock exposed at the ground surface.
Outside shoulder	The area of pavement outside the traffic lanes that is closest to the 'slow' lane.
Overbridge	Bridge which conveys another road, rail or pedestrians over the described road.

Term	Definition
Overland flooding	Inundation by local runoff rather than overbank discharge from a stream, river, estuary, lake or dam.
P	
PACHCI	Procedure for Aboriginal Cultural Heritage Consultation and Investigation
PAD	Potential archaeological deposits
PAH	Polycyclic aromatic hydrocarbons
PANS-OPS	Procedures for air navigation systems – aircraft operations
Parcel of land	Refers to an individual lot number (lot) and deposited plan (DP)
PASS	Potentially acid sulfate soils
Pavement	The portion of a carriageway placed above the subgrade for the support of, and to form a running surface for, vehicular traffic.
PCB	Polychlorinated biphenyls
PEA Act	Protection of the Environment Administration Act 1999 (NSW)
Peak discharge	The maximum discharge occurring during a flood event.
Peak flood level	The maximum water level occurring during a flood event.
pH	Numeric scale ranging from zero to 14 used to specify the acidity or alkalinity of an aqueous solution. Solutions with a pH less than seven are acidic and solutions with a pH greater than seven are alkaline. Pure water has a pH of seven and is neutral.
Photo-ionisation detector measurements	A measurement of the concentration of volatile organic compounds and other gases within the soil.
PIARC	Permanent International Association of Road Congress
PM	Particulate matter
PM _{2.5}	Particulate matter of up to 2.5 micrometres
PM ₁₀	Particulate matter of up to 10 micrometres
PM Peak	3:30pm to 7:00pm
PMF	Probable maximum flood The flood that occurs as a result of the probable maximum precipitation on a study catchment. The PMF is the largest flood that could conceivably occur at a particular location, usually estimated from probable maximum precipitation coupled with the worst flood producing catchment conditions. Generally, it is not physically or economically possible to provide complete protection against this event. The PMF defines the extent of flood prone land (i.e. the floodplain).
POEO Act	Protection of the Environment Operations Act 1997 (NSW)
POEO Regulation 2005	Protection of the Environment Operations (Waste) Regulation 2005 (NSW)
Pollutant	Any measured concentration of solid or liquid matter that is not naturally present in the environment.
portals	The locations where a tunnel meets a surface road.
ppbv	Parts per billion by volume
PPFL	Preliminary peak flood level
PPM	Parts Per Million
ppmv	Parts per million by volume
Prescribed airspace	The airspace above any part of either an Obstruction Limitation Surface or a 'procedures for air navigation systems – aircraft operations' (PANS-OPS) surface for Sydney Airport. The obstacle limitation surface is an invisible level that defines the limits to which objects may project into the airspace around an aerodrome so that aircraft operations may be conducted safely
Probability	A statistical measure of the expected chance of flooding (see annual exceedance probability).
project	New M5 project
Property	Based on ownership, with the potential to contain more than one lot and DP.

Term	Definition
Proponent	The person or organisation that proposes to carry out the project or activity. For the purpose of the project, the proponent is the NSW Roads and Maritime Service.
Q	
R	
RAFTS and DRAINS	Rainfall – runoff modelling software packages
RBL	Rating background noise level
RCP	Representative concentration pathways. Scenarios that include time series of emissions and concentrations of the full suite of greenhouse gases and aerosols and chemically active gases, as well as land use/cover (CSIRO and BoM 2015a).
Residual land	Acquired land not required during operation of the project.
Risk	Chance of something happening that will have an impact. It is measured in terms of consequences and likelihood. In the context of the manual it is the likelihood of consequences arising from the interaction of floods, communities and the environment.
RMS	NSW Roads and Maritime Services
RNP	<i>Road Noise Policy</i> , Department of Environment, Climate Change and Water (DECCW) 2011.
Roads and Maritime	NSW Roads and Maritime Services
Road reserve	A legally defined area of land within which facilities such as roads, footpaths and associated features may be constructed for public travel.
Roadheader	A commonly used machine for excavation in sandstone using pics mounted on a rotary cutter head attached to a hydraulically operated boom.
Road Safety Strategy	National Road Safety Strategy for Australia 2011 – 2020
Roadside furniture	A general term covering all signs, street lights, protective devices for the control, guidance and safety of traffic and convenience of road users.
Rockdale LEP 2011	Rockdale Local Environmental Plan 2011.
ROKAMBA	Republic of Korea-Australia Migratory Bird Agreement
RTA	(Former) NSW Roads and Traffic Authority (now Roads and Maritime Services)
Runoff	The amount of rainfall that ends up as streamflow, also known as rainfall excess.
RWR	Residential, Workplace and Recreational
S	
SA2	Statistical Area 2
SCATS	Sydney Co-ordinated Adaptive Traffic System
SEARs	Secretary's Environmental Assessment Requirements Requirements and specifications for an environmental assessment prepared by the Secretary of the Department of Planning and Environment under section 115Y of the <i>Environmental Planning and Assessment Act 1979</i> (NSW).
Section 170 register	State Government agency section 170 Heritage and Conservation Register
SEIFA	Social-Economic Indexes for Areas
SEPP	State Environmental Planning Policy
SES	State Emergency Services
Settlement	Refers to how ground can move due to the construction of new infrastructure
Shotcrete	Concrete and mortar that is sprayed onto a surface at high velocity.
Shoulder	The portion of the carriageway beyond the traffic lanes adjacent to and flush with the surface of the pavement.
SMC	Sydney Motorway Corporation
SO ₂	Sulfur dioxide
Socio-economic	Involving combination of social and economic matters.

Term	Definition
Southern extension	Refers to a future motorway extension from Arncliffe to the bayside and southern suburbs of Sydney.
Span	The distance between the centres of adjacent supports of a bridge.
SPOCAS	Suspension Peroxide Oxidation – Combined Acidity and Sulfate
Spoil	Surplus excavated material
SREP 33	Sydney Regional Environmental Plan No.33 – Cooks Cove
SSI	State significant infrastructure
SSROC	Southern Sydney Region of Councils
State Infrastructure Strategy	State Infrastructure Strategy 2012–2032 (Infrastructure NSW, 2012)
State Infrastructure Strategy Update	State Infrastructure Strategy – the State Infrastructure Strategy Update 2014 (Infrastructure NSW, 2014)
St Peters interchange	Located at the former Alexandria Landfill site. In its ultimate configuration (ie in the event the entire WestConnex program of works is completed) it would connect the New M5, the future M4-M5 Link and the future Sydney Gateway with Euston Road, Gardeners Road and Sydney Airport / Port Botany area.
St Peters motorway operations complex (MOC4)	Located near the western corner of the St Peters interchange, adjacent to the Prince Highway / Canal Road intersection. Contains operational ancillary infrastructure that is required for operation of the project.
STM	Strategic Traffic Model
Stockpile	Temporarily stored materials such as soil, sand, gravel, spoil/waste.
Strata	Geological layers below the ground surface.
Stream order	A classification system which assigns an 'order' to waterways according to the number of additional tributaries associated with each waterway, to provide a measure of system complexity.
Structure (soil)	The way soil particles group together to form aggregates.
Stub tunnel	Driven tunnels constructed to connect to the future Southern extension or future M4–M5 Link.
Surface road concentration (air quality)	Describes the contribution of pollutants from the surface road network. It includes not only the contribution of the nearest road at the receptor, but also the net contribution of the modelled road network at the receptor.
Surface water	Water flowing or held in streams, rivers and other wetlands in the landscape.
SVOC	Semi Volatile Organic Hydrocarbons
Sydney Catchment REP	Sydney Regional Environmental Plan (Sydney Harbour Catchment) 2005
Sydney's Rail Future	Sydney's Rail Future: Modernising Sydney's Trains (Transport for NSW, 2012b)
Sydney's Bus Future	Sydney's Bus Future: Simpler, faster, better bus services (Transport for NSW, 2013a)
Sydney's Cycling Future	Sydney's Cycling Future: Cycling for everyday transport (Transport for NSW, 2013b)
Sydney's Walking Future	Sydney's Walking Future: Connecting people and places (Transport for NSW, 2013c)
Sydney Gateway	A component of the wider WestConnex program of works. Subject to further investigations by the NSW Government and would be subject to separate planning approval
Sydney LEP 2012	Sydney Local Environmental Plan 2012.
Sydney Park construction compound (C14)	Located on the northern side of Campbell Road in Sydney Park. The site would be used to service the construction of pedestrian and cycling facilities associated with the local road upgrades, including the Campbell Road pedestrian and cycle bridge over Campbell Road.
T	
TAGG	Transport Authorities Greenhouse Group

Term	Definition
TBM	Tunnel boring machine. An excavation machine that 'bores' through soil or rock to create a tunnel with a circular cross section (as opposed to drilling and blasting methods).
TDS	Total dissolved solids
TEC	Threatened ecological community
TEU	Twenty-foot equivalent unit
TfNSW	Transport for NSW
The Blue Book	Managing Urban Stormwater – Soils and Construction Volumes 1 and 2, NSW Government 2004 and 2006
TMC	Transport Management Centre
TMSP	Traffic Management and Safety Plan
Total concentration (air quality)	The sum of the background, surface road and ventilation outlet concentrations. It may relate to conditions with or without the project under assessment.
Toxicity	The degree of danger posed by a substance to human, animal or plant life.
TPH	Total Petroleum Hydrocarbon
TUFLOW	Hydraulic modelling software (flooding)
Transport Master Plan	NSW Long Term Transport Master Plan
TRH	Total recoverable hydrocarbons
TSC Act	Threatened Species Conservation Act 1995 (NSW)
TSP	Total suspended particulate
Tunnel portal	The entrance / exit to the tunnel.
Typical cross section	A cross section of a carriageway showing typical dimensional details, furniture locations and features of the pavement construction.
U	
UFP	Ultrafine Particle
µm	Micrometre
UNFCCC	United Nation Framework Convention on Climate Change
Urban design	The process and product of designing human settlements, and their supporting infrastructure, in urban and rural environments.
USEPA	United States Environmental Protection Agency
V	
VDV	Vibration dose value
VENM	Virgin excavated natural material
Ventilation facility	Facility for the mechanical removal of air from the mainline tunnels, or mechanical introduction of air into the tunnels
Ventilation outlet	The location that tunnel air is expelled
Ventilation outlet concentration (air quality)	Describes the contribution of pollutants from tunnel ventilation outlets.
VKT	Vehicle kilometres travelled
VMS	Variable message signs
VOC	Volatile Organic Compounds
W	
WARR Act	Waste Avoidance and Resource Recovery Act 2001 (NSW)
Waterway	Any flowing stream of water, whether natural or artificially regulated (not necessarily permanent).
WDA	WestConnex Delivery Authority
WestConnex program of works	Proposal to provide a 33 kilometre motorway linking Sydney's west and south-west with Sydney Airport and the Port Botany precinct.
Western surface works	Connects the New M5 and the existing M5 East Motorway to the M5 South West Motorway through works within and around the King Georges Road interchange.
WHO	World Health Organisation
WHS	Work Health and Safety Plan

Term	Definition
WHS Regulation 2011	Work Health and Safety Regulation 2011
WM Act	Water Management Act 2000 (NSW)
WRTM	WestConnex Road Traffic Model

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1 Introduction

1.1 Overview of WestConnex

WestConnex is a NSW Government initiative to provide a 33 kilometre motorway linking Sydney's west and south-west with the CBD, Sydney Airport and the Port Botany precinct. The component projects of the WestConnex program of works are:

- M4 Widening – Pitt Street, Parramatta to Homebush Bay Drive, Homebush (planning approval granted on 21 December 2014 and under construction)
- M4 East - Homebush Bay Drive, Homebush to Parramatta Road and City West Link (Wattle Street) at Haberfield (planning approval granted on 12 February 2016)
- New M5 – Beverly Hills to St Peters (the subject of this report)
- King Georges Road interchange Upgrade (planning approval granted on 3 March 2015 and under construction)
- M4–M5 Link – Haberfield to St Peters via Rozelle and Camperdown (undergoing concept development and would be subject to future assessment and planning approval)
- Sydney Gateway - St Peters to the airport and port precinct (is currently the subject of further investigations by the NSW Government and would be subject to future assessment and planning approval).

The components of WestConnex are shown on **Figure 1-1**.

Separate planning applications have or will be lodged for each component project. Each project will be assessed separately, but the impact of each project will also be considered in the context of the wider WestConnex program of works.

A proposed Southern Connector (previously known as the Southern extension) from Arncliffe to Kogarah is currently being investigated by the NSW Government, separately to the WestConnex program of works. The Southern Connector would connect the New M5 to the southern and bayside suburbs of Sydney, and the proposed Gateway to the South project.

Sydney Motorway Corporation Pty Limited (SMC) was established in August 2014 to finance and deliver major infrastructure solutions to support Sydney's long-term economic growth and high quality transport connections for anticipated population growth.

SMC is currently delivering WestConnex on behalf of the NSW Government. Core responsibilities of SMC include procuring and managing contracts relating to the development, construction, funding, operation and maintenance of WestConnex.

Roads and Maritime is the Government client agency for the WestConnex program of works. The design, construction and operation of the motorway will be undertaken pursuant to contractual arrangements between Roads and Maritime and SMC subsidiary entities which will design, build, own and operate the motorway on behalf of Roads and Maritime. Roads and Maritime and SMC are working together to manage the assessment and planning approval process for the project. Roads and Maritime is the proponent for the project.

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Figure 1-1 Regional context and the WestConnex program of works

1.2 The project

Roads and Maritime is seeking approval under Part 5.1 of the *Environmental Planning and Assessment Act 1979* (EP&A Act) to construct and operate the New M5 (the project), which would comprise a new, tolled multi-lane road link between the existing M5 East Motorway east of King Georges Road and St Peters. The project would also include an interchange at St Peters and connections to the existing road network. The location and key features of the project are shown in **Figure 1-2**.

The M5 Motorway corridor (the M5 East Motorway and the M5 South West Motorway) is the main passenger, commercial and freight corridor between Port Botany, Sydney Airport and south-west Sydney. Traffic demands on the M5 East Motorway currently exceed its design capacity and present a significant bottleneck to the M5 Motorway corridor with motorists experiencing heavy congestion and unreliable journey times.

The project is needed to provide additional capacity along the M5 Motorway corridor, allowing for a more robust and reliable transport network.

Key components of the project would include:

- Twin motorway tunnels between the existing M5 East Motorway (between King Georges Road and Bexley Road) and St Peters. Each tunnel would be around nine kilometres in length and would be configured as follows:
 - Between the western portals and Arncliffe, the tunnels would be built to be three lanes wide but marked for two lanes as part of the project. Any change from two lanes to three lanes would be subject to future assessment and planning approval
 - Between Arncliffe and St Peters, the tunnels would be built to be five lanes wide but marked for two lanes as part of the project. Any change from two lanes to any of three, four or five lanes would be subject to future assessment and planning approval
- Tunnel stubs to allow for a potential future connection to WestConnex M4-M5 Link and a potential future connection to southern Sydney (known as the Southern Connector)
- Surface road widening works along the M5 East Motorway between east of King Georges Road and the new tunnel portal at Kingsgrove
- A new road interchange at St Peters, which would initially provide road connections from the main alignment tunnels to Campbell Road and Euston Road, St Peters and to a new bridge crossing Alexandra Canal and joining to Gardeners Road
- A second new road bridge across Alexandra Canal, linking Campbell Road, St Peters with Gardeners Road and Bourke Road, Mascot
- Closure and remediation of the Alexandria Landfill site, to enable the construction and operation of the new St Peters interchange
- Works to enhance and upgrade local streets and intersections near the St Peters interchange
- Ancillary infrastructure and operational facilities for electronic tolling, signage (including electronic signage), ventilation structures and systems, fire and life safety systems, and emergency evacuation and smoke extraction infrastructure
- A motorway control centre that would include operation and maintenance facilities
- New service utilities and modifications to existing service utilities
- Temporary construction facilities and temporary works to facilitate the construction of the project
- Tolling infrastructure for electronic tolling on the existing M5 East Motorway
- Surface road upgrade works within the corridor of the M5 South West Motorway and M5 East Motorway.

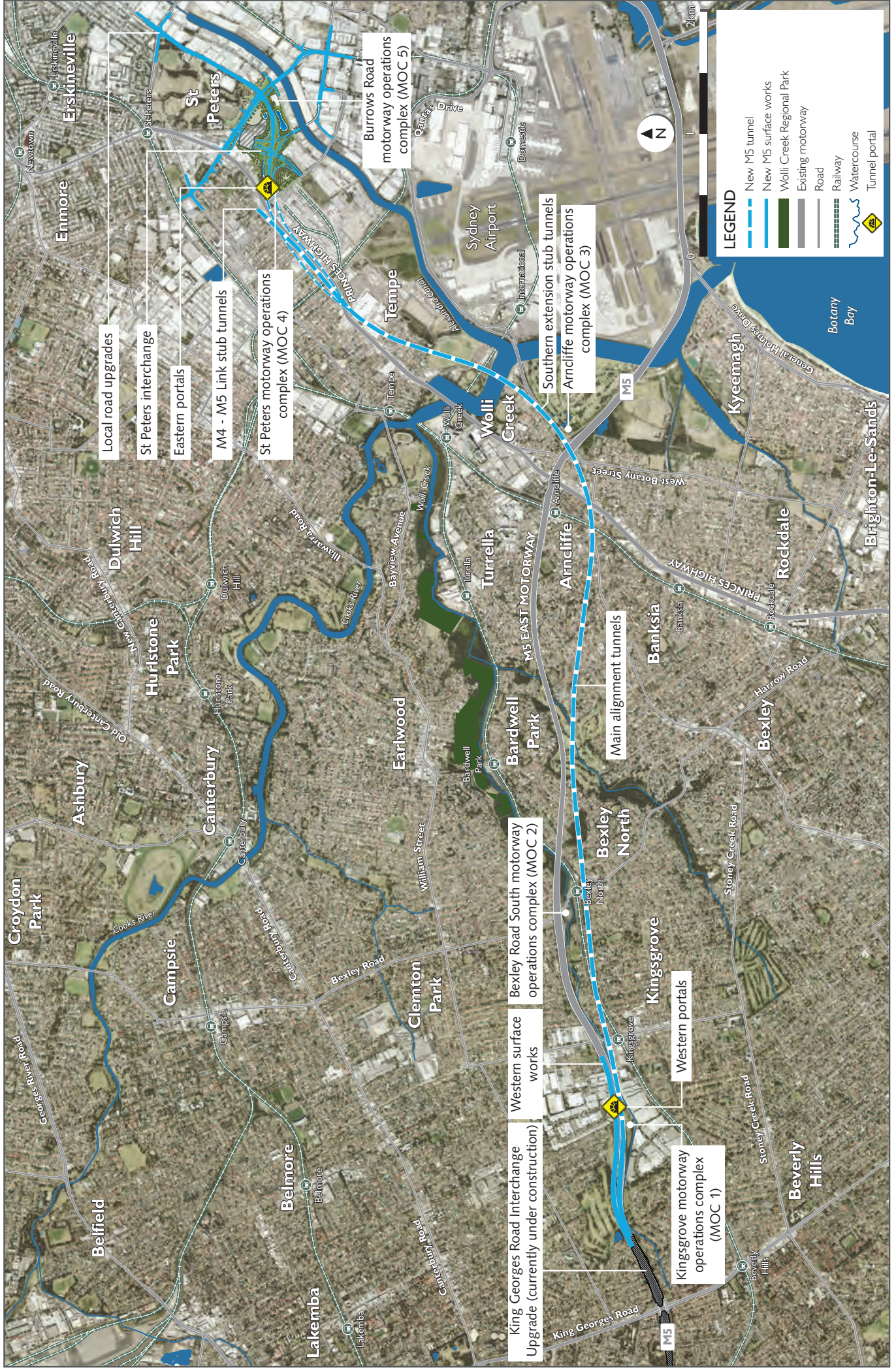


Figure 1-2 Key features of the project

1.3 Need for the project and WestConnex

The New M5 is part of the NSW Government's commitment to deliver WestConnex in response to the *State Infrastructure Strategy 2012–2032* (Infrastructure NSW, 2012), the *NSW Long Term Transport Master Plan* (Transport for NSW, 2012 and updated strategy released in 2014) and the State Priorities announced in September 2015.

In addition, *A Plan for Growing Sydney* (NSW Government, 2014) presents a vision for Sydney as a strong global city and the nation's economic and financial powerhouse. It emphasises the need to improve access to major employment hubs and global gateways.

The New M5 would deliver on these strategies and plans and would provide benefits including:

- Relieving congestion along the M5 East Motorway
- Reducing travel times and improving reliability
- Providing improvements in road safety.

The investment in the New M5 and other WestConnex projects would facilitate a step change in network performance, enabling delivery of major city shaping improvements and delivering economic growth. As part of the broader WestConnex program of works, the New M5 would support NSW's major sources of economic activity and would provide a strategic response to the currently inadequate, and highly congested, road network.

Critically, WestConnex would provide a targeted response to inadequacies in the motorway network that supports Sydney's Global Economic Corridor (which runs from Sydney's Port and Airport precinct through the CBD and North Sydney to Macquarie Park) and south-western Sydney.

Improvements to the transport network, including the New M5, would support these key economic growth areas by supporting domestic and international freight and trade, underpinning a sustainable NSW economy and Sydney's role as a global city.

Integrated land use and transport planning initiatives are a key factor in developing a future where Sydney's growing population can reliably access jobs and services. The New M5 complements a number of other transport and freight based infrastructure initiatives identified in the *Long Term Transport Master Plan*, a combination of which would best address Sydney's needs.

1.4 Assessment and approval process

Clause 94 of *State Environmental Planning Policy (Infrastructure) 2007* (Infrastructure SEPP) provides that development for the purpose of a road or road infrastructure facilities may be carried out by or on behalf of a public authority without consent on any land. The project is characterised as being for the purpose of a road and road infrastructure facilities, and is to be carried out on behalf of Roads and Maritime. As such, the project is permissible without development consent under the EP&A Act.

The project has been declared by Ministerial Order to be State significant infrastructure and critical State significant infrastructure under sections 115U(4) and 115V of the EP&A Act. The Ministerial Order also amended Schedule 5 of the SRD SEPP. The project remains subject to assessment under Part 5.1 of the EP&A Act and requires the approval of the Minister for Planning. An EIS was required for the project. This has been prepared and publicly exhibited.

The project is a controlled action under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act), and approval from the Commonwealth Minister for the Environment is required. Under the Bilateral Agreement relating to environmental assessment (February 2015) between the Commonwealth Government and the NSW Government, the EIS has been prepared for the purpose of meeting the assessment requirements of both the Commonwealth EPBC Act and the NSW EP&A Act.

1.5 New M5 EIS

An EIS was prepared for the project in accordance with the relevant provisions under the EP&A Act and the EPBC Act.

It addressed the environmental assessment requirements issued by the Secretary of the Department of Planning and Environment on 26 August 2015, the relevant provisions of Schedule 2 of the *Environmental Planning and Assessment Regulation 2000*, and the *Guidelines for preparing Assessment Documentation relevant to the Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act) – WestConnex New M5 Project* (EPBC 2015/7520). The Secretary's Environmental Assessment Requirements (SEARs) included the requirements of the Commonwealth Department of the Environment, under the EPBC Act.

In accordance with the EP&A Act, the EIS presented an assessment of environmental issues identified during the planning and assessment of the project. It also included assessment of potential impacts on the relevant matters of national environmental significance in accordance with the EPBC Act. The assessment considered the areas directly or indirectly affected by construction and operation of the project.

The EIS was publicly exhibited for 64 days from 27 November to 29 January 2016. Public exhibition of the EIS provided the community, government agencies and other interested parties an understanding of the project and provided the opportunity to comment on it.

1.6 Purpose and structure of this document

During the exhibition of the EIS for the project, 10,180 submissions were received by the Department of Planning and Environment. The Secretary of the Department of Planning and Environment provided copies of the submissions to Roads and Maritime.

In accordance with section 115Z of the EP&A Act, the Secretary required Roads and Maritime to respond to the issues raised in these submissions in a submissions report. The Secretary also advised that if there are any proposed changes to the project to minimise its environmental impact or to address issues raised in submissions, a preferred infrastructure report would be required. This New M5 Submissions and Preferred Infrastructure Report document has been prepared to fulfil both of these requirements.

The Submissions and Preferred Infrastructure Report has the following structure:

- Chapter 1 – provides background to WestConnex and the New M5, reiterates why the project is needed, outlines the assessment and planning approval process and outlines the purpose of the Submissions and Preferred Infrastructure Report
- Chapter 2 – outlines the consultation activities undertaken prior to, and during, the public exhibition of the EIS, as well as ongoing consultation proposed during the pre-construction, construction and commissioning phases
- Chapter 3 – provides an overview of the submissions received including a summary of the issues raised
- Chapter 4 – sets out the issues raised in key stakeholder submissions on the EIS and presents responses to those issues. Key stakeholders include government agencies, local councils, elected representatives and peak groups and advisory organisations
- Chapter 5 – sets out the issues raised in community submissions on the EIS and presents responses to those issues
- Chapter 6 – provides clarifications on aspects of the project as highlighted during the submissions process
- Chapter 7 – describes and assesses the refinements and changes to the project, which have occurred since the submission of the EIS. These refinements are proposed to minimise environmental impacts or in response to submissions

- Chapter 8 – presents a revised set of environmental management measures for the project, to address issues raised during public exhibition of the EIS or as a result of additional assessment or project refinement. This report refers in several locations to the environmental management measures contained in the EIS, and also in the technical papers that form appendices to the EIS. These environmental management measures have been revised to address submissions received on the EIS and also as a result of further refinement in the detailed design and construction planning. Accordingly, the revised environmental management measures in **Chapter 8** of this report represent the commitments to mitigate environmental impact of the project during construction and operation
- Chapter 9 – provides a conclusion for the Submissions and Preferred Infrastructure Report and outlines the next steps in the project.

2 Community and stakeholder involvement

2.1 Consultation overview

Consultation with the community, state and local government agencies, utilities, special interest groups and relevant industry stakeholders has been undertaken prior to and during the preparation of the environmental impact statement (EIS). Consultation has allowed for feedback to be considered throughout the development of the New M5 project and the broader WestConnex scheme. Details of these consultation activities are documented in Section 7.3 of the EIS.

The EIS was publicly exhibited for 64 days from 27 November 2015 to 29 January 2016. During this time, a range of consultation activities were undertaken to engage with stakeholders and local communities on information in the EIS. Submissions on the project were received by the NSW Department of Planning and Environment (DP&E) during the exhibition period. Responses to these comments are outlined in **Chapter 4** (Response to key stakeholder submissions) and **Chapter 5** (Response to community submissions) of this report.

2.2 Consultation activities

During the public exhibition of the EIS a variety of consultation activities were undertaken including community drop-in sessions, a series of briefings and meetings, and distributing a range of information materials. The following sections provide an outline of the consultation activities undertaken during the public exhibition of the EIS.

2.2.1 Static display of the environmental impact statement

The EIS and supporting materials were made available to view and download on DP&E's website, the project website (www.westconnex.com.au) and at the following locations:

- Arncliffe Library, 11 Firth Street, Arncliffe
- Bexley Library, 499 Forest Road, Bexley
- Bexley North Library, 24 Shaw Street, Bexley North
- Campsie Library, 14–28 Amy Street, Campsie
- City of Botany Bay Council, 141 Coward St, Mascot
- City of Canterbury, Administration Centre, 137 Beamish Street, Campsie
- City of Sydney CBD, One Stop Shop Town Hall House, 456 Kent Street, Sydney
- Department of Planning and Environment Information Centre, 23–33 Bridge Street, Sydney
- Green Square Library, 100 Joynton Avenue, Zetland
- Hurstville City Council Civic Centre, MacMahon Street, Hurstville
- Hurstville City Library, Corner Queens Road and Dora Street, Hurstville
- Marrickville Council Customer Service Centre, 2–14 Fisher Street, Petersham
- Marrickville Library, Corner Marrickville and Petersham Roads, Marrickville
- Mascot Library, 2 Hatfield Street, Mascot
- Natural Conservation Council of NSW, Level 2, 5 Wilson Street, Newtown
- Newtown Library, 8–10 Brown Street, Newtown
- Redfern Neighbourhood, Service Centre, 158 Redfern Street, Redfern
- Roads and Maritime Services, Head Office, Level 9, 101 Miller Street, North Sydney
- Rockdale City Council Customer, Service Centre, 2 Bryant Street, Rockdale
- St Peters Library and Town Hall, 39 Unwins Bridge Road, Sydenham.

2.2.2 Advertisements in local and regional publications

Advertisements were placed to announce the EIS public exhibition period and to promote the community information sessions for the project. Advertisements placed in local and metropolitan newspapers are outlined in **Table 2-1**.

Table 2-1 Advertisements for New M5 EIS public exhibition

Publication	Date of publication
Sydney Morning Herald	Saturday 28 November 2015
Daily Telegraph	Saturday 28 November 2015
Inner West Courier	Tuesday 1 December 2015
Southern Courier	Tuesday 1 December 2015
Canterbury Bankstown Express	Tuesday 1 December 2015
Bankstown Canterbury Torch	Wednesday 2 December 2015
St George and Sutherland Shire Leader	Thursday 3 December 2015
City Hub	Thursday 3 December 2015

2.2.3 Community drop-in sessions

Seven community drop-in sessions were held during the EIS public exhibition period to provide opportunities for the community and stakeholders to discuss the EIS with technical specialists and members of the New M5 project team. More than 225 people attended the sessions. The community were informed of the drop-in sessions through the community update distributed along the project corridor, advertising in local and metropolitan newspapers, email notifications to registered stakeholders and information on the project website. The locations, times and number of attendees at each of the sessions are outlined in **Table 2-2**.

Table 2-2 Community drop-in sessions during EIS exhibition period

Location	Date	Time	Number of attendees
Rowers on Cooks River, Wolli Creek	Wednesday 2 December 2015	4.00pm to 7.30pm	27
Kingsgrove RSL, Kingsgrove	Saturday 5 December 2015	10.00am to 1.00pm	51
WestConnex pop-up shop, St Peters	Saturday 12 December 2015	10.00am to 1.00pm	48
Mascot Town Hall, Mascot	Tuesday 15 December 2015	4.00pm to 7.30pm	17
Bexley RSL, Bexley	Saturday 16 January 2016	10.00am to 1.00pm	29
WestConnex pop-up shop, St Peters	Monday 18 January 2016	4.00pm to 7.30pm	37
Rowers on Cooks River, Wolli Creek	Thursday 21 January 2016	4.00pm to 7.30pm	19

2.2.4 1300 number and project email

The project phone number (1300 660 248) and email (info@westconnex.com.au) were available prior to and during the EIS exhibition period as channels for the community and stakeholders to find out more and ask questions. The project phone number and email address were promoted in the project advertisements placed, community update, project overview and via the project website.

Over 3500 members of the community registered to receive ongoing community updates by the close of the exhibition period. The project phone number and email were monitored throughout the EIS public exhibition period. **Table 2-3** provides an outline of the contacts during the EIS public exhibition period.

Table 2-3 Summary of the number of 1300 calls and project emails during the EIS exhibition period

Activity	Total number
Project phone calls received	205
Phone call made by project team to community members	76
Project emails received	107
Emails sent by the project team to community members	40

2.2.5 Notifications to email subscribers

During the EIS exhibition period, two email notifications were sent to stakeholders that had subscribed to receive WestConnex New M5 updates via email. The notifications included information on the EIS exhibition period, links to the EIS documents and how to make a submission on the NSW Planning and Environment website, details of community drop-in sessions and links to fact sheets other supporting materials.

The email notifications were sent to approximately 3500 subscribed stakeholders on 27 November 2015 and 13 January 2016.

2.2.6 Project overview document

A project overview document was made available to coincide with the public exhibition period. The document presents an overview of the project and the environmental and community considerations that were taken into account during the preparation of the EIS. Details of how to view the full EIS were provided and readers were encouraged to make a submission.

The project overview document was made available on the project website and at the community drop-in sessions.

2.2.7 Project fact sheets and brochures

Project fact sheets were prepared to support the EIS exhibition period including location based information for Kingsgrove, Bexley North, Arncliffe and St Peters on the potential construction and operational impacts of the project and the mitigation measures proposed to minimise these impacts. A tunnelling fact sheet was also prepared. All fact sheets were made available at the community drop-in sessions and were accessible on the project website.

2.2.8 Community updates

In early November 2015, a community update was distributed to around 60,000 residences and businesses along the project corridor providing notification that the New M5 EIS was due to come out in the coming weeks and encouraging stakeholders to register for email updates on the project.

In late November 2015, a community update (New M5 EIS) was distributed to around 60,000 residences and businesses along the project corridor to notify community members and stakeholders of the public exhibition of the EIS. This community update included details of the submissions period, how to make a submission, where hard copies of the EIS were available and details of the community drop-in sessions. The community update was also made available on the project website.

2.2.9 Website updates

The WestConnex project website (www.westconnex.com.au) was updated throughout the public exhibition period including with the New M5 Project Overview (November 2015), project fact sheets, the EIS community update and the New M5 tunnelling tool which provides details on the alignment and the depth of the tunnel. Website links to the full EIS were also posted on the website and the locations for where the EIS could be read in hard copy were also identified. Information was also made available regarding the timing and location of the seven community drop-in sessions held.

2.2.10 Council workshops

Two day workshops were held with each of the councils within the footprint of the project (City of Sydney, Marrickville Council, City of Botany Bay, Hurstville City Council, City of Canterbury and Rockdale City Council).

The workshops were hosted by key project team members and specialists involved in preparation of the New M5 EIS. The purpose of the workshops was to provide council representatives with detailed information to inform their submissions to the EIS and to provide direct access to the EIS specialists. During the workshops, council representatives were able to pose questions to the EIS specialists. Questions that required further investigation or analysis were responded to in the days following the workshops.

Following the workshops, council representatives were provided with notes that included a summary of the issues raised, responses and actions undertaken.

At the request of Marrickville and City of Sydney Councils, further traffic modelling was undertaken and data was provided to these councils.

Subsequent meetings were held with representatives from Marrickville Council and City of Sydney to further discuss and clarify questions raised during the workshops.

2.2.11 Meetings and briefings with stakeholders

Just prior to and during the exhibition period, 13 meetings and briefings were held to provide stakeholders with an overview of the EIS and discuss any issues of interest. Details of the meetings held just prior to and during the EIS period are outlined in **Table 2-4** and **Table 2-5** outlines the additional briefings offered during this period.

Table 2-4 Stakeholders consulted just prior to and during the EIS public exhibition period

Stakeholder	Date of briefing / meeting
Monica Barone, CEO, City of Sydney	11 November 2015
Bike South West	13 November 2015
St Peters Anglican Church	16 November 2015
St Peters Community Preschool	18 November 2015
St Peters Public School	8 December 2015
A New M5 EIS workshop was held over two days with council officers from City of Sydney, Marrickville Council and City of Botany Bay	7 and 8 December 2015
A New M5 EIS workshop was held over two days with council officers from Hurstville City Council, City of Canterbury and Rockdale City Council	9 and 10 December 2015
Marrickville Council	16 December 2015
City of Sydney and Marrickville Council	6 and 20 January 2016
Department of Infrastructure and Regional Development hosted a meeting with the New M5 project team and Sydney Airport Corporation Limited, Civil Aviation Safety Authority, Airservices and the Australian Airline Pilots' Association	15 January 2016
City of Sydney councillors and senior representatives	21 January 2016
Marrickville councillors and senior representatives	27 January 2016

Table 2-5 New M5 EIS stakeholder briefings offered

Stakeholder	Date briefing offer sent
St Peters Community Preschool	4 December 2015
McCallums Hill Public School	14 December 2015
TransGrid	19 January 2016
Port Authority of NSW	26 January 2016
NRMA	26 January 2016
Committee for Sydney	27 January 2016
Ron Hoenig, Member for Heffron	28 January 2016
Steve Kamper, Member for Rockdale	28 January 2016
Chris Minns, Member for Kogarah	28 January 2016
Greater Sydney Commission	28 January 2016

2.2.12 WestConnex information kiosks

A network of WestConnex information kiosks was established in key shopping precincts throughout western and south-western Sydney to provide residents with up to date and accurate information about WestConnex and its component parts.

The WestConnex information kiosks at Marrickville Metro, Westfield Hurstville and Centro Roselands were established with a focus on the New M5 project due to its location in the vicinity of the project.

The kiosks were open seven days per week during the EIS public exhibition period and had supporting materials available for members of the public to pick up. Community members were able to find out more about the project here and were referred to other communication channels and consultation opportunities including the community information sessions for further information on the EIS.

A total of 9372 people visited the information kiosks at Marrickville Metro, Westfield Hurstville and Centro Roselands during the exhibition period.

2.3 Future consultation

Roads and Maritime would continue to provide opportunities for the community and stakeholders to participate during the ongoing refinement of the design with a view to further minimising project impacts.

During detailed design and construction, the project team would continue to work with the community and stakeholders to ensure they are informed about the project and have opportunities to provide feedback to the project team. Key involvement activities and tools would include but are not limited to:

- Development and implementation of a detailed construction communications plan
- Complaints management process
- Notification of works (including targeted letterbox drops)
- 24-hour project information phone line
- Transport Management Centre (TMC) communication channels: radio crosses and interviews,
- Variable Message Signs throughout the metropolitan network
- Live Traffic and Transport NSW Info websites and TMC 24-hour Traffic Information Line (132 701)
- Regular updates to the WestConnex website
- Newsletters, information brochures and fact sheets
- Community drop-in information sessions
- Clear signage at construction sites
- Media releases and project advertisements in local and metropolitan papers
- Construction updates (including for councils, emergency services and bus operators)
- Key stakeholder briefings and meetings
- Regular forums with local councils and agencies to engage on matters including urban design and landscape management, heritage management, active transport, traffic and transport planning, pedestrian and cyclist management during construction.

A more detailed description of the consultation activities and other consultation processes (such as complaints management) that would be undertaken during construction can be found in the draft Community Consultation Framework in Appendix E of the EIS.

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3 Submissions received

3.1 Respondents

Submissions in response to the Environment Impact Statement (EIS) were accepted by the NSW Department of Planning and Environment (DP&E) during the public exhibition period.

The period ran for 64 days between 27 November 2015 and 29 January 2016. Submissions were accepted via:

- Electronic submission (online) - www.majorprojects.planning.nsw.gov.au
- Email - plan_comment@planning.nsw.gov.au
- Post - Major Projects Assessment, NSW Department of Planning and Environment, GPO Box 39, Sydney, NSW, 2001.

A total of 10,180 community submissions were received in response to the EIS. The submissions were received from 8,029 submission authors. The submissions received have been summarised in **Table 3-1**.

Table 3-1 Summary of submissions received

Submission group type	Number of submissions
Community and other key stakeholders	10,180 from 8,029 submission authors
State government agencies	8
Local councils	7
Total	10,195 from 8,044 submission authors

3.2 Overview of submissions and issues raised

Submissions were received from government agencies and corporations, local councils, community groups, individual community members and other stakeholders.

Issues raised in submissions by government agencies and corporations and local councils have been individually addressed in **Chapter 4** (Response to key stakeholders) of the report.

Issues raised in submissions from community groups, individual community members and other stakeholders have been grouped into common issues, which are described in **Appendix A** of the report. Responses to the issues raised are addressed in **Chapter 5** (Response to community submissions) of the report.

3.2.1 Government agencies and corporations

There were a total of eight government agencies and corporations that made submissions during the public exhibition of the EIS. The government agencies and corporations that made submissions were:

Office of the NSW Chief Scientist and Engineer

The NSW Chief Scientist and Engineer endorsed the EIS, stating that it constitutes a thorough review of high quality, covering all the major issues and areas that an EIS for a project of this scale should.

The NSW Chief Scientist also raised a number of queries regarding the air quality impact assessment including model selection and methods.

Office of Environment and Heritage

The Office of Environment and Heritage raised queries and recommendations relating to flood risk management, sustainability and biodiversity. The Office of Environment and Heritage noted that the Framework for Biodiversity Assessment had been correctly applied and agreed with the major conclusions of the assessment.

NSW Health

NSW Health reviewed the EIS with emphasis on the technical adequacy of the Human Health Risk Assessment (HHRA), the Air Quality assessment and the Noise and Vibration impact assessment. NSW Health was satisfied that the project HHRA used an appropriate approach for the assessment of human health. Queries and recommendations primarily related to external air quality, in-tunnel air quality, noise and vibration and groundwater.

NSW Department of Primary Industries – Water

The NSW Department of Primary Industries – Water raised queries and recommendations in relation to groundwater, water licencing, waterways and riparian land.

Sydney Water Corporation (Sydney Water)

Sydney Water raised queries and recommendations across their wastewater and water assets as well as their stormwater assets.

NSW Environment Protection Authority

The NSW Environment Protection Authority raised queries and recommendations in relation to groundwater pollutants, water quality objectives and water treatment plants. Queries were also raised in relation to air quality in terms of model inputs and assumptions, and noise and vibration in terms of monitoring and mitigation.

Fire and Rescue NSW

Fire and Rescue NSW requested consultation regarding conditions of approval.

Heritage Council of NSW

The Heritage Council of NSW raised recommendations relating to Alexandra Canal, impacts to places of local heritage value, and general historical archaeological impacts.

The submissions are responded to in **Chapter 4** (Response to key stakeholders) of this report.

3.2.2 Local councils

The project is located in the local government areas of Canterbury, Hurstville, Rockdale, Marrickville, Botany Bay and Sydney. Each of the councils for these local government areas made a submission, as well as Leichhardt Council. A detailed list of issues raised in the submissions received from local councils and respective responses are found in **Chapter 4** (Response to key stakeholders) of this report.

3.2.3 Community and other stakeholders

A total of 10,180 submissions were received from 8,029 submission authors from community groups, individual community members and other stakeholders. The issues raised by each submission vary, largely based on their location and also their particular interests in the project. Community groups are included in the list of community submissions.

Other stakeholders who made a submission include the following:

- Peak groups and advisory organisations, including NRMA
- Interest groups, including Action for Public Transport (ATP NSW) Inc, Australian Association for the Study of Peak Oil and Gas (ASPO Australia), Bicycle NSW, BIKEast Inc., Bike Marrickville, Bike South West, Bikes Botany Bay, BIKESydney, Cooks River Valley Association (CRVA), Cyclists Against WestCONNex, Friends of Erskineville, The Glebe Society, Newtown Precinct business association, Residents against polluting stacks, Save Sydney Park, WestConnex Action Group, Wolli Creek Preservation Society
- Educational facilities, including Arncliffe Public School, Erskineville Public School P&C Association and St Peters Public School P&C Association

- Elected representatives (State), including Jenny Leong Member for Newtown, Jamie Parker Member for Balmain and Ron Hoenig, Member for Heffron.

Common issues

Each submission was examined in detail to identify and understand the issues raised in the submission. The content of each community submission was reviewed and categorised according to the key issues (eg traffic and transport) and sub-issues (eg traffic congestion) raised. The issues raised in each submission have been extracted and collated and have been presented as a summary of the specific issues raised by individual submissions. This means that while the exact wording of a particular submission may not be presented in the summary of the issue, the intent of each individual issue raised has been captured and corresponding responses to the issues have been provided. Where similar issues have been raised in different submissions, only one response has been provided. The community issues raised and SMC's response to these issues on behalf of Roads and Maritime, form the basis of **Chapter 5** (Response to community submissions).

Submission author identification number

Submission authors can locate the issues raised in their submission and the relevant section of this report where these have been addressed. Each submission author has been assigned an identification number based on their submission form number assigned by DP&E on receipt of the submission. In those instances where more than one submission was submitted by the same author, generally only one submission form number was assigned as the identification number. However, where a submission was not identified as originating from the same author, that submission author will have more than one identification number. A submission author can access their submission form number by locating their submission on the DP&E website.

The following issues were most commonly raised in the submissions received:

- Traffic and transport
- Strategic justification and project need
- Socio-economic impacts
- Biodiversity
- Air quality
- Project development and alternatives
- Noise and vibration
- Human Health
- Planning and statutory approval process

Detailed discussion of the issues raised by the community and responses to these issues are located in **Chapter 5** (Response to community submissions). Stakeholder identification numbers and the relevant section of the report where each stakeholder's issues are addressed are provided in **Appendix A** of this report.

Petitions

One petition was received in response to the EIS:

- Petition 1 – containing 108 signatures from residents of Glamis Street, Kingsgrove.

Form letters

A proportion of the community provided submissions during the public exhibition of the EIS in the form of a standardised letter. In total 8,810 individual form letters were received in 89 versions. The issues raised in each form letter have been examined in detail and included in the summary of the specific issues raised by individual submissions. These form letters have been assigned an identification number so that submission authors can locate the issues raised in their submission and the relevant section of this report where these have been addressed.

Community members whose submission author identification numbers are located in **Table 3-2** against a particular form letter number may use this form letter number to navigate **Appendix A**.

Where a submitter has provided additional comments within a form letter, those additional comments are represented by the submission author identification number (as opposed to the form letter number) and cross referenced against the relevant responses in **Appendix A**.

Table 3-2 Form letter submissions

Form letter	Submission Author Identification Number
1	56 638 1604 1605 3311 3312 3314 3350 3351
2	6 24 40 41 42 43 44 45 46 47 48 49 50 51 52 76 134 136 137 138 180 202 203 204 205 209 216 228 230 233 234 235 239 240 241 243 244 245 246 247 248 249 251 252 253 254 255 256 257 258 259 280 281 282 283 303 304 305 309 314 315 317 318 319 321 322 323 324 326 327 328 329 330 331 332 333 334 335 336 337 338 339 340 341 342 343 344 345 346 347 348 349 350 351 352 353 354 355 356 357 358 359 360 361 362 363 364 365 366 367 368 369 370 371 372 373 374 375 376 377 378 379 380 381 382 383 384 385 386 387 388 389 390 391 392 393 394 395 396 397 398 399 400 401 402 403 404 405 406 407 408 409 410 416 417 418 419 420 421 422 423 424 425 453 454 454 455 463 464 465 466 467 468 469 470 471 473 474 475 476 477 478 479 480 481 482 483 484 485 486 487 488 489 490 491 502 503 504 505 506 539 540 594 609 611 612 625 819 852 927 988 1000 1063 1074 1110 1144 1170 1334 1347 1440 1569 1610 1611 2058 2108 2177 2237 2267 2389 2417 2448 2450 2452 2455 2457 2459 3517 3914 3931 3932 3935 3937 3939 3949 3953 6557 7931 7932 7933 7934 7935 7936 7937 7938 7958 7959 7968 7969 7970 8018 8070 8071 8072 8073 8074 8075 8106 8112 8113 8212 8214 8215 8216 8248 8251 8701 8715 8716 8762 8850 9041 9044 9045 9047 9048 9049 9050 9053 9054 9055 9056 9057 9058 9059 9060 9061 9062 9063 9064 9065 9066 9090 9288 9388 9389 9390 9391 9404 9479 9758 9808 9835 9942 9947
3	377 569 570 571 572 573 574 575 576 577 578 579 580 581 582 590 591 593 595 598 601 602 603 607 608 610 613 614 615 616 617 618 619 620 621 622 623 625 626 627 628 655 656 657 658 659 1202 1568 2195 2197 2198 2199 2224 2225 2226 2227 2228 2229 2230 2231 2232 2233 2234 2235 2236 2238 2239 2240 2241 2242 2243 2244 2245 2246 2247 2248 2249 2250 2251 2252 2253 2254 2255 2256 2257 8901
4	131 3912 3913 3915 3916 3917 3918 3919 3920 3921 3922 3923 3924 3925 3926 3927 3928 3929 3930 3933 3934 3936 3938 3940 3941 3942 3943 3944 3945 3946 3947 3948 3950 3951 3952 3954 12899
5	120 128 177
6	6 250 305 369 508 510 511 512 513 514 515 516 517 518 519 521 522 523 524 525 526 527 528 529 531 532 533 534 535 536 537 538 541 542 543 547 548 549 551 552 553 554 555 556 557 558 559 561 562 564 565 566 567 583 584 585 586 587 588 600 1184
7	18 135 1471

Form letter	Submission Author Identification Number
8	6 8 74 99 129 144 250 257 283 314 314 315 316 409 426 447 490 497 540 544 611 738 885 902 903 904 905 906 907 908 909 910 911 912 913 913 914 915 916 917 918 919 920 920 921 921 922 923 924 925 927 928 929 930 931 932 933 934 935 936 938 939 940 941 942 943 944 962 963 964 965 966 967 968 969 970 971 1063 1184 1203 1204 1205 1206 1207 1208 1209 1210 1212 1213 1214 1215 1216 1223 1265 1330 1338 1443 1444 1447 1450 1454 1455 1457 1460 1466 1468 1469 1470 1471 1472 1473 1476 1478 1484 1485 1489 1494 1497 1498 1500 1508 1509 1530 1536 1537 1540 1541 1543 1544 1549 1551 1553 1555 1559 1560 1562 1565 1567 1568 1570 1573 1574 1575 1589 1591 1592 1594 1595 1598 1602 1606 1609 1610 1611 1612 1613 1621 1622 1623 1624 1626 1627 1652 1657 1658 1660 1661 1666 1674 1675 1676 1677 1678 1687 1688 1690 1691 1704 1708 1710 1713 1714 1715 1716 1721 1724 1727 1732 1735 1736 1738 1778 1790 1792 1794 1798 1802 1805 1807 1812 1825 1826 1828 1829 1845 1855 1866 1869 1869 1874 1879 1882 1883 1884 1886 1887 1889 1891 1923 1924 1952 1959 1960 1961 2015 2016 2018 2019 2043 2071 2072 3337 3552 4216 4218 4221 4228 4243 4249 4277 4286 6559 7015 7317 7318 7319 7321 7323 7326 7328 7330 7337 7339 7340 7343 7344 7347 7350 7352 7353 7357 7358 8417 8418 8419 8420 8424 8425 8426 8427 8428 8429 8430 8431 8432 8433 8434 8435 8436 8437 8438 8439 8440 8441 8442 8443 8444 8445 8446 8447 8448 8449 8450 8454 8455 8456 8457 8458 8459 8460 8461 8462 8463 8464 8465 8466 8467 8468 8470 8471 8472 8473 8474 8475 8476 8477 8478 8479 8480 8481 8482 8483 8484 8486 8487 8488 8489 8490 8491 8492 8493 8494 8495 8496 8497 8498 8499 8500 8501 8502 8503 8504 8505 8506 8507 8508 8509 8510 8511 8512 8513 8514 8516 8517 8518 8519 8520 8521 8522 8523 8524 8526 8527 8528 8529 8530 8531 8532 8534 8536 8537 8538 8539 8540 8541 8542 8543 8544 8545 8546 8547 8548 8549 8550 8551 8552 8553 8554 8555 8556 8557 8558 8559 8560 8562 8563 8564 8565 8566 8567 8568 8569 8570 8571 8572 9249 9254 9607 12815
9	167 168 169 170 5640 5674
10	5 6 69 136 140 145 145 164 180 191 201 202 205 237 241 252 304 309 315 318 342 368 403 429 477 485 486 492 506 513 516 521 526 529 539 547 552 557 557 567 612 615 635 638 650 692 760 777 783 820 839 839 859 862 930 949 1009 1101 1127 1186 1196 1200 1217 1264 1302 1312 1315 1325 1339 1352 1363 1393 1432 1511 1511 1526 1529 1529 1542 1542 1547 1547 1552 1554 1557 1564 1630 1657 1662 1662 1706 1719 1742 1775 1876 1880 1916 1939 1950 2003 2027 2049 2127 2177 2219 2250 2250 2264 2319 2378 2423 2457 2572 2660 2725 2913 2935 2949 3071 3170 3283 3285 3316 3325 3342 3406 3502 3703 3748 3763 4260 4879 4921 4968 5345 5520 5521 5522 5523 5524 5525 5526 5527 5528 5529 5530 5531 5532 5533 5534 5535 5536 5537 5538 5539 5540 5541 5542 5543 5544 5545 5546 5547 5548 5549 5550 5551 5552 5553 5554 5555 5556 5557 5558 5559 5560 5561 5562 5563 5564 5565 5566 5567 5568 5569 5570 5571 5572 5573 5574 5575 5576 5577 5578 5579 5580 5581 5582 5583 5584 5585 5586 5587 5588 5589 5590 5591 5592 5593 5594 5595 5596 5597 5598 5599 5602 5605 5610 5611 5612 5613 5614 5615 5617 5618 5619 5620 5623 5624 5625 5626 5628 5629 5630 5631 5632 5635 5636 5637 5638 5639 5642 5643 5644 5646 5647 5648 5652 5653 5654 5655 5656 5657 5658 5659 5660 5661 5662 5663 5665 5666 5669 5670 5670 5671 5672 5673 5676 5677 5678 5679 5680 5682 5683 5684 5685 5687 5688 5689 5690 5691 5692 5693 5694 5695 5696 5699 5700 5701 5702 5703 5705 5706 5707 5708 5709 5710 5711 5712 5713 5714 5715 5716 5717 5718 5719 5720 5721 5722 5724 5725 5726 5727 5728 5729 5731 5732 5733 5734 5735 5736 5738 5739 5741 5742 5743 5744 5745 5747 5748 5750 5752 5753 5754 5755 5756 5757 5759 5760 5761 5762 5763 5764 5765 5766 5767 5768 5769 5770 5771 5772 5773 5774 5775 5776 5777 5778 5779 5780 5781 5782 5783 5784 5785 5786 5787 5788 5789 5790 5791 5792 5793 5794 5795 5796 5797 5798 5799 5800 5801 5802 5803 5804 5805 5806 5808 5810 5811 5812 5813 5814 5815 5816 5817 5818 5819 5820 5821 5822 5823 5826 5827 5828 5829 5830 5832 5834 5835 5836 5838 5839 5841 5842 5843 5843 5846 5848 5849 5850 5851 5854 5855 5856 5858 5859 5861 5862 5863 5864 5866 5869 5871 5872 5873

Form letter	Submission Author Identification Number
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11	227 229 232 260 261 262 263 264 265 266 267 268 269 270 271 272 273 274 275 276 277 278 279 284 285 286 287 288 289 290 291 292 293 294 295 296 297 299 300 301 306 307 308 411 413 492 493 494 496 1811 5519 10088 12800
12	563 1284 7912
13	629 630 631 632 633 634 635 637 638 639 640 641 642 643 644 645 646 647 648 649 650 651 652 653 654 674 675 676 677 678 679 680 681 682 683 684 685 686 687 688 689 720 10568 11022 12781
14	250 638 690 691 692 693 694 721 722 723 724 726 727 728 729 730 731 732 733 734 735 737 738 739 740 741 742 743 745 752 757 758 759 760 761 762 763 764 765 766 767 769 770 771 772 773 774 775 856 2258 2259 2261
15	32 35 354 660 661 662 663 664 665 666 667 668 670 671 672 673 691 695 696 697 698 699 701 702 704 705 706 707 708 709 710 711 712 713 714 715 716 717 725 1939 1939 2260 2262 2263 2264 2266 2268 2270 2271 2272 2273 2274 2275 2276 2277 2278 2279 2280 2282 2286 2287 2288 2289 2290 2291 2292 2294 2295 2296 2297 2298 2299 2300 2301 2302 2303 2304 2305 2306 2308 2309 2310 2311 2312 2313 2314 2315 10382
16	454 638 654 719 746 747 748 749 750 751 753 754 755 756 776 777 778 779 780 781 782 783 784 785 786 787 789 790 791 792 794 795 796 797 798 799 800 801 802 803 804 805 835 836 837 846 1142 1143 1145 1146 1147 1148 1149 1150 1151 1152 1153 1154 1155 1156 1158 1159 1200 1711 2375 10429 10430
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18	6 859 860 861 862 948 949 950 951 952 953 954 955 956 957 958 976 977 978 979 980 981 982 983 984 985 986 987 989 990 991 992 993 994 995 996 998 999 1001 1002 1003 1004 1005 1006 1007 1008 1009 1010 1011 1012 1014 1015 1016 1017 1018 1019 1020 1022 1023 1024 1025 1042 2386 2387 2388 2390 2391 2392 2393 2394 2395 2396 2397 2398 2399 10449 10457
19	314 887 894 900 957 960 961 1201 1202 1218 1220 1266 1461 1464 1471 1581 1692 1694 1696 1698 1718 1820 1835 1934 2000 2100 4622 4623 4624 4625 4626 4627 4628 4629 4630 4631 4632 4633 4634 4635 4636 4637 4638 4639 4640 4641 4642 4643 4644 4645 4646 4647 4648 4649 4650 4651 4652 4653 4654 4655 4656 4657 4658 4659 4660 4661 4662 4663 4664 4665 4666 4667 4668 4669 4670 4671 4672 4673 4674 4675 4676 4677 4678 4679 4680 4681 4682 4683 4684 4685 4686 4687 4688 4689 4690 4691 4692 4693 4694 4695 4696 4697 4698 4700 4701 4702 4703 4704 4705 4706 4707 4708 4709 4710 4711 4712 4713 4714 4715 4716 4717 4718 4719 4720 4721 4722 4723 4724 4725 4726 4727 4728 4729 4730 4731 5648 8576

Form letter	Submission Author Identification Number
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23	6 250 638 638 654 1174 1175 1176 1178 1179 1180 1182 1183 1184 1186 1187 1188 1189 1190 1191 1192 1193 1195 1196 1198 1239 1241 1243 1244 1245 1246 1247 1248 1249 1250 1251 1252 1253 1254 1255 1256 1257 1259 1260
24	1123 1364 7424
25	1224 1226
26	250 1129 1157 1184 1229 1230 1231 1232 1233 1236 1237 1264 1267 1268 1269 1270 1271 1272 1274 1275 1276 1277 1278 1280 1281 1282 1283 1285 1286 1287 1288 1289 1300 1311 1312 1313 1314 1315 1328 1337
27	250 638 654 1184 1296 1297 1299 1301 1302 1303 1304 1305 1306 1307 1308 1310 1325 1326 1327 1329 1330 1331 1332 1333 1335 1336 1439 4046
28	209 250 483 485 512 551 602 691 738 909 1184 1360 1361 1362 1363 1365 1366 1367 1368 1369 1370 1371 1373 1374 1375 1376 1377 1378 1379 1380 1381 1382 1383 1384 1385 1386 1387 1388 1390 1391 1392 1394 1405 1413 1717 1926 2500 2501 2502 2503 2504 2505 2506 2507 2508 2509 2510 2511 2512 2728 2880 2927 2928 2930 2931 2933 2941 2942 2945 2948 2963 2967 2968 2969 2970 2979 3107 3141 3244 3249 3252 3259 3260 3264 3269 3273 3274 3281 3282 3287 3292 3299 3300 3304 3306 3311 3316 3317 3319 3320 3321 3322 3326 3328 3330 3333 3335 3336 3337 3338 3339 3340 3375 3529 3532 3533 3534 3535 3537 3541 3542 3543 3545 3546 3549 3552 3553 3555 3556 3558 4014 4015 4016 4025 4046 4047 4049 4056 4058 4059 4069 4073 4077 4112 4131 4133 4143 4150 4303 4304 4305 4306 4307 4308 4309 4310 4311 4312 4313 4314 4315 4316 4317 4318 4319 4320 4321 4322 4323 4324 4325 4326 4327 4328 4329 4330 4331 4332 4333 4334 4335 4336 4337 4338 4339 4340 4341 4342 4343 4344 4345 4346 4347 4348 4349 4350 4351 4352 4353 4354 4355 4356 4357 4358 4359 4360 4361 4362 4363 4364 4365 4366 4367 4368 4369 4370 4371 4372 4373 4374 4375 4376 4377 4378 4379 4380 4381 4382 4383 4384 4385 4386 4387 4388 4389 4390 4391 4392 4393 4394 4395 4396 4397 4398 4442 4469 4470 5016 5107 5200 5441 5442 5443 5449 5457 5465 5481 5482 5495 6438 6600 6601 6602 6603 6605 6607 6608 6609 6610 6611 6612 6613 6614 6615 6616 6617 6618 6619 6620 6621 6622 6623 6624 6624 6625 6626 6627 6628 6629 6630 6631 6632 6633 6634 6635 6636 6637 6638 6639 6640 6641 6644 6645 6647 6648 6649 6651 6652 6653 6654 6655 6656 6657 6658 6659 6660 6662 6663 6664 6665 6666 6667 6668 6669 6670 6671 6672 6673 6674 6675 6676 6677 6678 6679 6680 6681 6682 6683 6684 6685 6686 6687 6688 6693 6694 6696 6698 6701 6708 6709 6727 6739 6742 6743 6746 6750 6756 6757 6759 6793 6805 6878 7378 7389 7670 7676 7677 7679 7685 7690 7691 7696 7698 7796 7797 7798 7799 7801 7803 7810 7816 7817 7820 7821 7827 7828 7831 7835
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31	529 1321 1324
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33	1322

Form letter	Submission Author Identification Number
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37	204 223 250 250 250 527 630 691 691 691 782 782 859 877 993 1180 1184 1460 1679 1965 1966 1967 1968 1969 1970 1971 1972 1973 1974 1975 1975 1977 1978 1980 1981 1982 1983 1984 1985 1986 1987 1988 1989 1990 1991 1992 1993 2937 2938 2938 2940 2946 2947 2954 2955 2956 2957 2958 2959 2960 2961 2980 2981 2982 2990 2991 3000 3001 3002 3003 3004 3005 3006 3007 3008 3009 3010 3011 3012 3013 3014 3015 3016 3017 3018 3019 3020 3021 3022 3023 3024 3025 3026 3027 3028 3029 3030 3031 3032 3033 3036 3037 3038 3039 3040 3041 3042 3043 3043 3044 3045 3046 3047 3049 3051 3052 3053 3054 3055 3056 3057 3058 3059 3061 3107 3337 3340 3379 3569 3574 3578 3580 3583 3588 4005 4007 4044 4079 4237 4937 5020 5035 5057 5061 5064 5072 5386 5393 5423 5635 6163 6198 6198 6200 6515 6530 6531 6535 6542 6544 6548 6548 6559 6560 6562 6563 6563 6563 6564 6565 6566 6567 6568 6569 6570 6571 6571 6572 6573 6573 6575 6576 6577 6578 6579 6581 6582 6583 6584 6585 6586 6587 6589 6590 6591 6592 6593 6594 6595 6596 6597 6599 6675 6675 6900 6901 6902 6903 6904 6905 6906 6907 6908 6909 6911 6912 6913 6914 6915 6916 7242 7250 7255 7255 7269 7269 7400 7404 7412 7417 7418 7426 7430 7435 7438 7439 7444 7446 7452 7455 7458 7459 7460 7463 7464 7469 7470 7473 7475 7487 7489 7491 7494 7496 7498 7501 7502 7528 7605 7629 7636 9670 9689 9690 9817
38	250 1975 2161 2162 2163 2164 2165 2166 2167 2168 2169 2170 2171 2172 2173 2174 2175 2176 2177 2178 2179 2180 2181 2182 2183 2184 2185 2186 2187 2188 2189 2190 2192 2193 2208 2209 2210 2211 2212 2213 2214 2215 2216 2217 2218 2219 2220 2221 2222 2223 4975 7478
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Form letter	Submission Author Identification Number
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4 Response to key stakeholder submissions

4.1 NSW Chief Scientist and Engineer

4.1.1 Traffic and transport

Issue description – sensitivity of findings to traffic modelling

A key feature of this project is that limited adverse effects on local air quality are predicted at locations some distance from the project itself, particularly alongside Stoney Creek Road, Bexley Road, Forest Road and Harrow Road. This appears to be the reason why the project as a whole is predicted to offer a small net disbenefit to air quality (albeit negligible to tolerable in terms of health impacts), in contrast to the M4 East. In the EIS this effect is attributed to increases in traffic on these roads, particularly in off-peak periods. The introduction of tolling to the existing M5 East (in addition to tolls on the New M5) is cited as being a major contributor to the additional traffic on alternative untolled surface routes, i.e. toll-avoidance behaviour.

This makes the major outcomes of the assessment, and especially the quantification of localised adverse outcomes, quite sensitive to the modelling of behavioural responses to tolling, and (presumably) to the level of tolling. A critique of the strength and limitations of this modelling is beyond our expertise. We do, however, expect it to be associated with significant uncertainty. Tolls can also be adjusted which may give rise to different traffic and hence air quality outcomes.

We find that this was not communicated in the EIS. It is reasonable for affected residents in Bexley to ask what would happen if there was more toll-avoidance than has been predicted for this EIS. We recommend that a worst-case scenario is developed describing the maximum likely degree of transfer of traffic from the M5 to the surface road network and the impact on local surface receptors, or a convincing argument presented as to why such additional modelling is not required. A sensitivity study of the relationship between tolling and air quality impacts in Bexley, if practical and credible, may be appropriate before the project can be considered to be satisfactorily assessed.

Response

The project would have an impact on alternate un-tolled surface routes (or parallel routes) as part of the project, and the EIS considers these potential impacts. As noted, changes to traffic, including behavioural aspects due to tolling, have consequential air quality and health impacts. Development of the traffic model included a number of activities, including behavioural studies for toll-related behaviour, and peer review. Efforts were focused on reducing the uncertainty associated with the traffic modelling, as detailed below.

As discussed in Section 9.2 of the Technical working paper: Traffic and transport (Appendix G of the EIS), traffic is forecast to divert off the motorway network to other routes outside the peak traffic periods to avoid the motorway toll. This shift in traffic distribution is not anticipated to have a significant impact from a traffic perspective (in terms of congestion) as there is generally network capacity to accommodate the additional, redistributed traffic in these off-peak periods. The project does not seek to augment the existing road as a result of this redistribution of traffic.

The EIS assesses the changes in air quality as a result of redistribution of traffic from the motorway network to the surrounding surface road network, and concludes that “For much of the community this would result in no change or a small improvement (i.e. decreased concentrations and health impacts). However for some areas located near key surface roads, a small increase in pollutant concentration may occur. Potential health impacts associated with changes in air quality (specifically nitrogen dioxide and particulates) within the local community have been assessed and are considered to be acceptable (Section 15.3.2 of the EIS).

The WestConnex Road Traffic Model (WRTM) uses current best practice methods for representing drivers' behaviour with respect to their willingness to pay tolls for road travel time savings for multiple toll roads and routes through the Sydney metropolitan network. The toll choice model was developed for the WestConnex project as an augmentation of standard traffic route modelling procedures that are normally used in planning and assessment of untolled roads. The toll choice model addresses private vehicle and commercial (truck) traffic behaviour, representing the different willingness of these vehicle users to pay for travel time savings in the context of total journey costs including tolls, travel times and distances available on competing routes.

To assess the values that differing vehicle users place on travel time savings, a project specific survey was designed and conducted in Sydney in 2013 asking road users questions about their willingness to pay tolls. Independent specialist peer reviewers provided oversight throughout the design and analysis of the survey. The survey yielded a distribution of estimates of the value that Sydney drivers are willing to pay in terms of tolls to reduce their travel time. These values were benchmarked against values from other studies in Australia and internationally. The survey results are used within WRTM's route choice algorithm to represent the influence of a toll.

The current tolls on all tolled roads in the Sydney metropolitan area are incorporated into the model. The model also considers future changes in perceived value of tolls taking into account escalation of tolls, effects of inflation and average weekly earning projections. The traffic modelling was independently peer reviewed by a committee including David Johnston of Johnston Services Pty Ltd and Professor David Hensher of University of Sydney Institute of Transport and Logistics Studies who are recognised experts in the field of toll road patronage forecasting and transport behavioural choice modelling.

The traffic forecasts produced by WRTM are dependent on a number of input assumptions, such as Sydney's future population and its distribution across the city. WRTM uses the current NSW state government population forecasts. Therefore, given these input assumptions and given the robust approach in developing the toll choice model, the most practical way to manage the risk of estimation of the traffic impacts is through the use of observed data.

To do this it is proposed that on select routes deemed likely to be subject to toll avoidance (i.e. alternative untolled parallel routes to the New M5), a number of locations along the length of the routes would have additional traffic data collected both prior to opening, 12 months after opening of the New M5. This observed traffic flow data would reflect actual driver route choice associated with the New M5 and tolls. The collected data would identify both light and heavy vehicles and enable comparison with forecast traffic flows. The new observed data would be used to monitor the impacts on the parallel routes relative to that predicted in the EIS.

Should this data reveal changes associated with actual driver route choice to be sufficient to explore mitigation measures, Roads and Maritime would develop such interventions as are necessary and that these measures would themselves be subject to the necessary approvals processes.

4.1.2 Air quality

Issue description – future projections of background air quality

The background concentration is assumed to be constant across all future scenarios. Although there is no evidence to support this assumption, a more reasonable assumption is not readily available. This introduces an extra degree of uncertainty into the projected scenarios, but this is non-critical given the degree of current compliance with the *NEPM* in this part of Sydney.

Response

Noted. In the absence of a reasonable, agreed approach to predicting background air quality in the future, continued air quality around existing levels has been assumed. This is in accordance with the principles in the *NSW Approved Methods for the Modelling and Assessment of Air Pollutants in New South Wales* (DEC, 2005).

As noted, current compliance with the ambient air quality goals in the *National Environment Protection (Ambient Air Quality) Measure* (NEPM) in this part of Sydney provides an additional level of assurance of acceptable ambient air quality outcomes despite uncertainty around future background air quality.

Issue description – level of construction impact assessment and management

Although the SEARs apparently do not explicitly require that the EIS should contain a quantitative impact assessment of the air pollutant emissions during the construction phase, it cannot be ruled out that these emissions may be associated with high risks of significant health impacts. Thus, one conclusion in the previous M4 East EIS review was that 'an attempt to quantify the emissions of some critical air pollutants, e.g. NO₂/NO_x, PM₁₀ and PM_{2.5}, during the construction of the M4 East, along with some dispersion modelling to assess the construction works' impact on local air quality, would have been justified.'

Hence, it was gratifying --- but at the same time somewhat puzzling --- to read through Chapter 8 (Appendix H) in the New M5 EIS on the dust and odour assessment of the Alexandria Landfill closure and remediation.

This chapter describes namely the development of an emissions inventory for TSP, PM₁₀ and PM_{2.5} for the activities to prepare the landfill to form a major component of the St Peters interchange and the remainder to be converted to a public park. The emissions inventory applied emission factors for dust generation (i.e. TSP, PM₁₀ and PM_{2.5}) from the handling and hauling of landfill waste material and new material by bulldozers, excavators, etc., provided by the US EPA. The emissions inventory data were used as inputs into the US EPA AERMOD dispersion model to calculate ambient air concentrations (annual and maximum 24-hour averages) of PM_{2.5}, PM₁₀ and TSP as well as annual average dust deposition around the landfill due to the landfill closure works. The results show that the contribution from the landfill closure works is not critical for the exceedance of existing PM_{2.5} and PM₁₀ ambient air standards in the surroundings of the landfill. However, it should be noted that exhaust PM from the machinery and vehicles operating on the landfill was not included in the emission inventory.

Consequently it's a bit contradictory that the proponent states in the EIS that 'it is very difficult to quantify dust emissions from construction activities' and that 'exhaust emissions from on-site plant and site traffic are unlikely to have a significant impact on local air quality, and in the majority of cases they would not need to be quantitatively assessed', and in the comments to my review of the M4 East EIS that "A quantitative assessment would not provide any additional benefit (i.e. in addition to the semi---qualitative assessment) given the comprehensive management measures already recommended.", and then is just doing exactly this for the Alexandria Landfill closure and remediation, including a dispersion modelling exercise (which was what we called for the construction phase in the M4 East review). Obviously this cannot be that difficult as the proponent claims.

The emissions estimates and predicted impacts on air quality appear reasonable. Two exceedances are predicted and are explained as being unlikely in reality, which again, is reasonable. It should be noted however, that these results are dependent on continual good implementation of mitigation measures that have been incorporated into the modelling and are set out in the Landfill Closure Management Plan. Failure to continually implement these measures would make an exceedance more likely.

Response

The air quality impact assessment presented in Chapter 10 and Appendix H (Technical working paper: Air quality) of the EIS was prepared in accordance with the SEARs issued for the project. The SEARs do not require a quantitative assessment of air quality impacts during construction. Consistent with the SEARS, the EIS used a risk-based approach, identifying specific activities or locations that had the potential for unacceptable impacts, and ensuring these are well-managed.

Section 5.5.1 of Appendix H (Technical working paper: Air quality) of the EIS details the rationale and justification for the type of assessment applied to the various construction activities. Further details of the assessment methods are then provided in Chapters 7 and 8 of Appendix H. This can be summarised as:

- Tunnelling activities - this work is underground, and therefore would have negligible impact on surrounding receivers

- Surface activities - comprising demolition, earthworks, construction and track-out. This would occur intermittently across multiple sites in accordance with a yet-to-be-developed detailed construction schedule. Therefore, a semi-quantitative approach was used to determine the types of activities that could potentially have unacceptable impacts (Chapter 7 of the Technical working paper: Air quality), and to identify management measures to reduce the potential for these impacts to occur (e.g. avoid generators and use mains power or batteries to reduce emissions). Management measures are detailed in Section 11.1 of the Technical working paper: Air quality (amended in **Chapter 8** (Revised environmental management measures) of this report)
- Closure of Alexandria landfill - this potentially could have higher risk of impacts, due to its history, potential for odour, and the degree of work required on a single site. It was therefore assessed using modelling assessment. Details are provided in Chapter 8 of the Technical working paper: Air quality.

A more detailed assessment for construction activities would not have been appropriate given the uncertainty around the construction schedule and intermittent nature of the works. The screening carried out in Section 7.6.2 of the Technical working paper: Air quality showed the areas around construction sites to be highly sensitive. The risk assessment in Section 7.8 of the Technical working paper: Air quality identified that construction impacts can be reduced through good management. The challenge in assessing construction air quality impacts relates to the combination of variable construction activities and features such as stockpiles, with variable meteorology. Therefore best practice is to construct to minimise impacts, particularly by taking account of meteorological conditions when planning each activity.

The emissions inventory included emissions of exhaust particulate matter from the machinery and vehicles operating on the landfill closure site – although not explicitly. The emissions inventory identified plant and equipment, and applied factors that included both exhaust and non-exhaust emissions. This is based on the US EPA AP-42 emissions factors, which include particulate matter emissions from both mechanical processes (e.g. material handling) and diesel exhaust (combustion). These emission factors do not distinguish between these two sources, since the sampling method used to derive the original emission factors captured both mechanical and combustion particulate matter sources. The National Pollutant Inventory for Mining (Version 2) supports this, and states:

"It should be noted that the emission factors for mining activities in Tables 1 and 2 have been derived from measurements that cover all PM₁₀ emissions associated with a unit operation, including exhaust emissions. To add the exhaust PM₁₀ emissions to the fugitive emissions would involve some measure of double counting for those activities."

Issue description – emission modelling and in-tunnel air quality

The criteria air pollutant emission modelling part of the New M5 EIS (Chapter 9.2 in Appendix H) is comprehensive and clearly described. Emissions from the traffic in the New M5 tunnel were calculated using the most recent (2012 update) emission factors provided by PIARC. For calculations of emissions from traffic on surface roads the model developed by NSW EPA for the emissions inventory covering the Greater Metropolitan Region, also from 2012, was used. The rationale for choosing these two models is clear and well described in the EIS. For both the tunnel and surface roads the WestConnex Road Traffic Model, the version assuming the NSW Department of Planning and Environment's 2014 land use projections, was used to derive data on traffic volume, composition and speed for various traffic scenarios for a base year (2014), 2021 and 2031. Several other sources and models were used to model the demand for e.g. road trips, trip distances and modes of operation on surface roads in the Sydney metropolitan region. Other parameters included in the emission modelling were road type, road gradient, traffic mix by road type, fuel split and the primary NO₂/NOX--fraction in the exhaust by vehicle type.

As for the emission modelling for surface roads, the results show large reductions in emissions between the base year and 2021 and 2031 (between -10% and -60% depending on pollutant, with the highest numbers for gases and the lowest numbers for PM, in particular PM₁₀). For a given future year (2021 or 2031) the differences in emissions between the scenarios without the new M5 and with the new M5 were in the order of one or a few percent. The figures refer to the WestConnex GRAL domain.

The two emission models used for the EIS were evaluated by direct comparison of their predicted emission rates, both for individual vehicle types and weighted for traffic composition, as well as through validation against real world air pollution emission measurements in the Lane Cove Tunnel. The evaluation exercise showed that the two models were broadly comparable for NO_x, whereas for PM_{2.5} the PIARC emission factors were considerably higher than the NSW EPA model emission factors, due to the built-in conservatism in the former. In most cases both models overestimated the concentrations of all pollutants compared to the real world air pollution emission measurements in the Lane Cove Tunnel, which means that both models are conservative with regard to the assessment of air pollution impacts.

The modelled in-tunnel concentrations in the New M5 tunnel were well below the in-tunnel concentration limits for all pollutants and all scenarios.

To summarise, there seems to be no or few weak points in the emission modelling part of the New M5 EIS.

Response

The endorsement of the emission modelling by the Chief Scientist's review is noted.

Issue description – evaluation of dispersion model (GRAL)

GRAL has not been used in a project of this nature in Australia before, except for the M4 East. A partial evaluation of the use of GRAL was included in the EIS for the M4 East. In our review of that EIS we commented that the evaluation had several weaknesses. Subsequent to our review, additional model sensitivity test results and additional data was conducted and presented in the Submissions Report (December 2015). Furthermore the point was made in response our review that a full evaluation or validation of the model was beyond the scope of an EIS, which is a point we accept. We concluded then that we found GRAL to be an appropriate model to use for the assessment, and that the model had been used in an appropriate manner. We do not believe that the use of GRAL had introduced any significant errors into the assessment.

In the New M5 EIS the same evaluation is presented (Appendix J - Dispersion model evaluation). That this is identical to the material in the M4 East EIS is understandable given that the New M5 EIS was completed before the responses to submissions on the M4 East had been completed. Furthermore we understand that there was no new measurement data available.

Consequently, our views on the evaluation remain unchanged since the M4 East Submissions Report, and apply equally to the New M5. To reiterate, we find that GRAL to be an appropriate model to use for the assessment of the New M5, and that the model had been used in an appropriate manner. We do not believe that the use of GRAL has introduced any significant errors into the assessment.

However, it remains the case in our view that GRAL has not yet been validated in Australia for this kind of project, in particular near-field impacts (within ~400 m) of changes to road traffic in a complex urban environment. This also includes the validity of estimates of background air quality used in the assessment.

Some of the issues raised would have been easier to address had project-specific air monitoring data been available at an earlier stage (i.e. 6 - 12 months earlier). This should be borne in mind for future projects of this nature. Furthermore for WestConnex projects beyond the New M5 East it should be noted that a substantially greater air quality monitoring dataset would be available which should be used to better quantify background air quality and verify dispersion modelling, reducing uncertainties relative to this project.

Response

Noted. It is relevant to add that model validation in Australia has been limited by data availability, especially for roadside and kerbside sites, so the issue is not unique to only the GRAL model. Similar comments would also apply to other models.

Background air quality has been defined using measurements from monitoring stations at sites which are, by definition, urban background locations. The data from such sites have been used, for many years, to represent background air quality at locations closer to roads, and this approach is documented extensively in the scientific and technical literature. In the WestConnex assessments (both the M4 East and the New M5), a much larger number of monitoring sites (and a much larger dataset) has been used compared with previous air quality assessments in Australia.

Issue description – assessment of elevated receptors

Potential impacts on multi-storey residential and commercial buildings have been addressed in the assessment through including dispersion modelling receptors at 30 m height above ground. This provides a screening approach without the need to quantify and model the height of every building in the large modelling domain. We find this approach to be appropriate.

Results were presented for changes in annual mean $PM_{2.5}$ only. We find the restriction to changes (rather than absolute concentrations) to be appropriate. However whereas the first limitation is justified in the text, the decision to restrict to $PM_{2.5}$ does not appear to be explained. The restriction to modelling of only annual means is more questionable. It is quite plausible that an elevated receptor could be subjected to significantly elevated short-term concentrations without it impacting annual means (a 'plume strike' scenario). This is particularly a risk for short-term (1-hour average) NO_2 impacts. We accept that the modelling of such risks is difficult and may involve substantial uncertainties. However do not believe that this justifies its exclusion from the assessment. The risk of such impacts should be commented upon.

The implications of the results are presented in Section 9.6 of Appendix H:

"For all existing receptor locations, the largest increases in concentration at a height of 30 metres are clustered around the Southern extension outlets. Given that the Southern extension is not formally part of WestConnex, and the precise locations of the outlets are not known at this stage, this does not constitute a problem. The contour maps do not seem to impose any significant restrictions on future developments to 30 metres height, except in the immediate vicinity of ventilation outlet."

The phrase 'does not constitute a problem' is an odd one to use and seems to contradict the following statement. The results clearly show that there is strong potential for a problem were this outlet to be located near multi-storey buildings, or were such buildings to be proposed in the future. Furthermore 'immediate vicinity' is quite vague. A qualitative impression of what this means is given by Figure 9-101 but this contains neither any scale for distance, nor does the scale for $PM_{2.5}$ explicitly match the scale used in previous figures. We accept that the Southern extension is not being formally assessed in this EIS, but we consider this particular result to be important as even the EIS text indicates it may require careful management. This section of the assessment should be more specific.

Response

The intent of the elevated receiver analysis was twofold:

- To determine potential adverse air quality impacts on existing elevated receivers
- To identify if there are potential constraints that should be taken into account for potential future developments, and which should be addressed through planning controls.

The methodology for the elevated receiver analysis is described and the results are presented in Sections 9.4.6 and Section 9.6 of the Technical working paper: Air quality (Appendix H of the EIS).

Annual mean $PM_{2.5}$ was assessed because the change in annual $PM_{2.5}$ concentration is the most important metric from a human health perspective. The assessment of ground-level impacts in the EIS demonstrates that if annual mean $PM_{2.5}$ concentrations result in health risks in the tolerable/acceptable range, the air quality and health outcomes for other pollutants and averaging periods are also acceptable.

Nevertheless, additional modelling with GRAL was undertaken to determine the 24-hour mean PM_{2.5} concentrations (excluding background) at the elevated receiver heights (10 metres and 30 metres) for the 2031-DSC scenario. For both heights a full modelling run was conducted across the New M5 domain. The GRAL model was used to predict 24-hour PM_{2.5} concentrations associated with both surface roads and tunnel ventilation outlets.

Figure 4-1 and **Figure 4-2** present contour maps showing the changes in maximum 24-hour mean PM_{2.5} concentrations in the 2031-DSC scenario at heights of 10 metres and 30 metres respectively. These can be compared with the changes in ground-level concentrations for the same scenario (Figure K-167 in Appendix K of the EIS). **Figure 4-3** presents a contour map showing the changes in maximum 24-hour mean PM_{2.5} concentrations in the 2031-DSC scenario at a height of 30 metres in the vicinity of the St Peters interchange and M4-M5 Link ventilation facilities.

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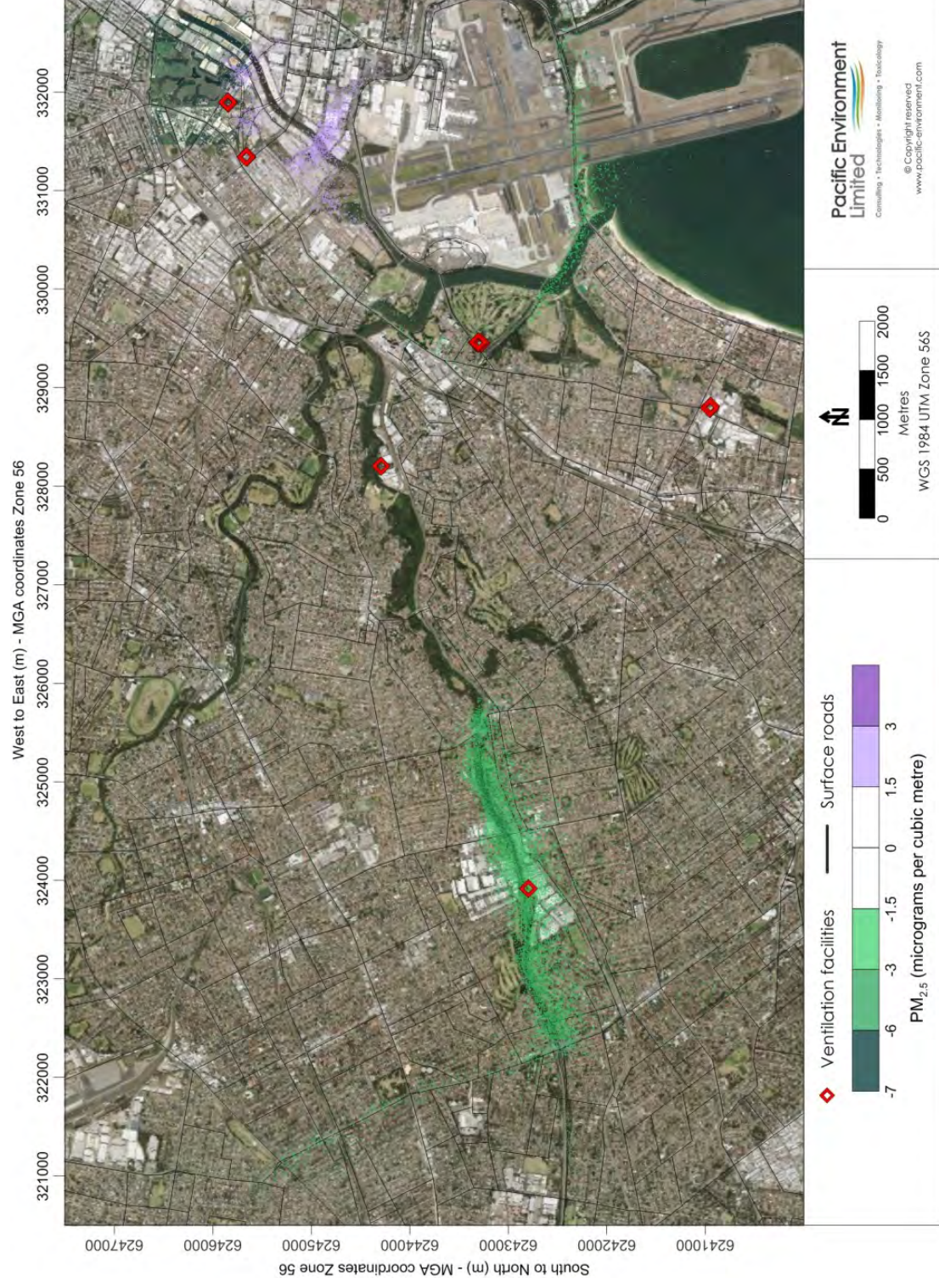


Figure 4-1 Contour map for change in maximum 24-hour average PM_{2.5} (2031-DSC minus 2031-DM, 10m)

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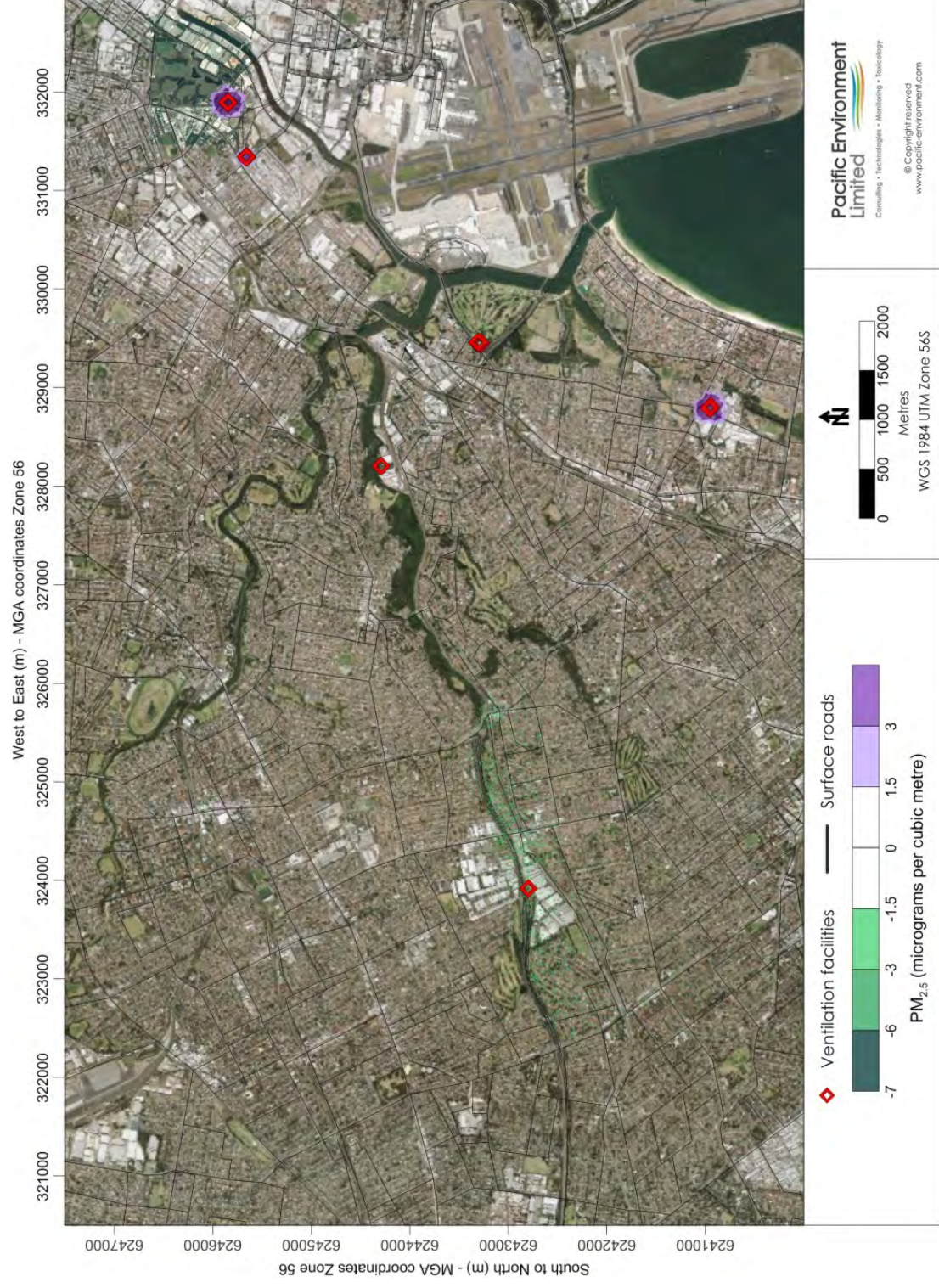


Figure 4-2 Contour map for change in maximum 24-hour average PM_{2.5} (2031-DSC minus 2031-DM, 30m)

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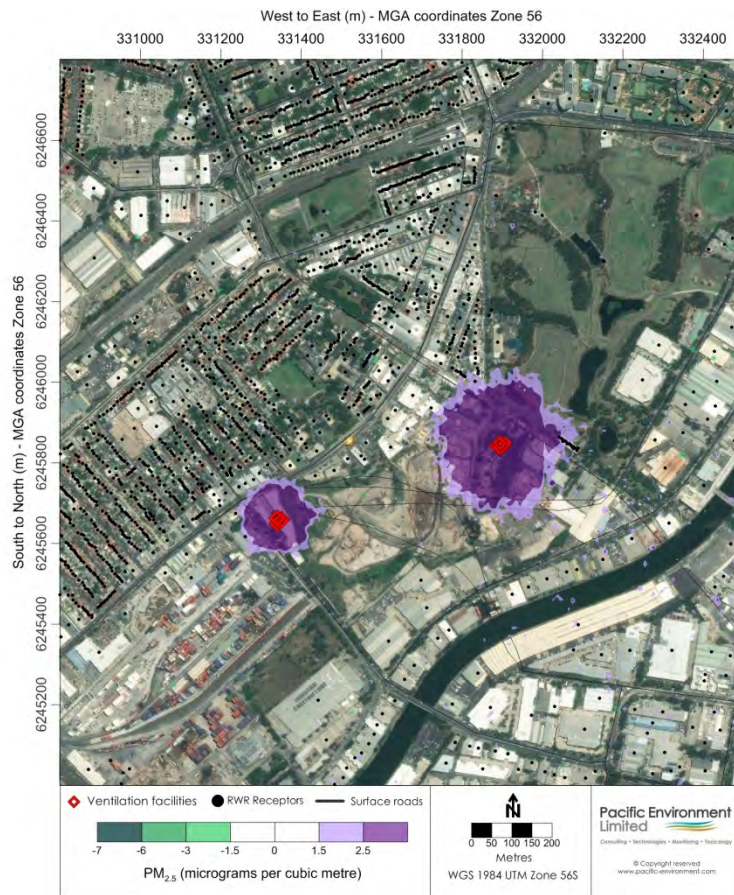


Figure 4-3 Contour map for change in maximum 24-hour average PM_{2.5} (2031-DSC minus 2031-DM, 30m), M4-M5 Link

The results of the 24-hour mean and annual analysis are consistent and can be summarised as follows:

- At a height of 10 metres, the maximum changes in concentration are lower than ground level:
 - At a height of 10 metres no receivers were predicted to experience a change in annual average PM_{2.5} of more than 0.8 µg/m³ (10 per cent of the assessment criterion). The largest increase was 0.8 µg/m³
 - At a height of 10 metres only three receivers were predicted to experience a change in maximum 24-hour PM_{2.5} of more than 2.5 µg/m³ (10 per cent of the assessment criterion). The largest increase was 2.7 µg/m³.
- At a height of 30 metres, the maximum changes in concentration were predicted to be larger than at 10 metres or at ground level, but these were localised around the Southern Connector and the M4-M5 Link ventilation outlets:
 - At a height of 30 metres, 38 receivers were predicted to experience a change in annual average PM_{2.5} of more than 0.8 µg/m³ (10 per cent of the assessment criterion). There were 17 receivers that were predicted to have a change in annual average PM_{2.5} of more than 1.6 µg/m³ and these were all very close to the assumed location of the Southern Connector ventilation facility
 - At a height of 30 metres, 54 receivers were predicted to experience a change in maximum 24-hour PM_{2.5} of more than 2.5 µg/m³ (10 per cent of the assessment criterion). All of these receiver locations were very close to the assumed location of the Southern Connector and M4-M5 Link ventilation facilities

- As the location for the Southern Connector (formerly Southern extension) has yet to reach concept design and consultation stage, results in this location should be considered indicative of potential cumulative impacts to be addressed in future development rather than an assessable impact of the New M5 project.

The implications of these results can be summarised as follows:

- At a height of 10 metres, the maximum changes in concentration are lower than ground level
 - No adverse air quality impacts were predicted at any existing receptors to a height of 10 metres
 - Future developments to a height of 10 metres were not predicted be constrained by the ventilation outlets at any locations.
- At a height of 30 metres, the maximum changes in concentration were predicted to be larger than at 10 metres or at ground level, but increases were predicted to be localised around the Southern Connector and M4-M5 Link ventilation outlets
 - The ventilation outlets were predicted not to result in adverse air quality impacts at any existing receptors as there are no existing buildings 30 metres or higher located close to the proposed ventilation facilities at St Peters or the Southern Connector
 - Planning controls should be developed in the vicinity of the St Peters interchange to ensure future developments at heights 30 metres or higher are not adversely impacted by the ventilation outlets. Development of planning controls would be supported by detailed modelling addressing all relevant pollutants and averaging periods.
 - The future Southern Connector project should undergo appropriate impact assessment reflecting the chosen location and development in that area at the time of the project.

The intention of the Technical working paper: Air quality in this respect is to point out that the impacts of the Southern Connector are potentially significant, and therefore the location and management of the ventilation outlet(s) would need to be considered in depth.

Issue description – method to estimate NO₂ concentration

We find the empirical approach of estimating NO₂ concentrations using observational NO₂ and NO_x data to be sound, appropriate and preferable to the alternatives presented.

Response

The endorsement of the approach for estimating NO₂ concentrations by the Chief Scientist's review is noted.

Issue description – presentation and visualisation of cumulative air quality impacts

For the most part the tables, distributions and plots appear adequate. An exception may be the plots in EIS Air Quality Assessment Report's Appendix K (Figure K-54 for example) which map show the change in concentration of pollutants between modelling scenarios. Whereas improvements in air quality, represented in green, are easy to pick out, worsening of air quality, represented in purple, is not always clear, often blending into the background. This may be interpreted by the public as misleading and hiding negative impacts. Again, as in the M4 East EIS, the minimal changes are uncoloured and thus not illustrated on these maps. While this is reasonable in light of the modelling uncertainties upon which the results are predicated, it serves to make invisible potential concentration increases across the area. This may be interpreted by the public as misleading and hiding negative impacts.

Response

Noted. The aim of using this approach was to make it easier for complex plots to be interpreted. A number of different options were considered, and the final approach was considered to be the most suitable.

4.2 NSW Department of Primary Industries

4.2.1 Groundwater

Issue description – assessment of EIS

DPI considers that while there are a number of matters that require addressing and further work, the matters of interest to DPI are relatively low risk and should not be an impediment to determination of this project.

Response

DPI's position in relation to the determination of the project is noted.

Issue description – groundwater data

There are indications that reported standing water levels (SWL) data from monitoring bores do not represent the water table in all cases. A further examination suggests that they might lie in three classes (a) representing the water table (the majority), (b) representing some other piezometric head and (c) representing combination of deeper pressure head reflecting variations often seen in the water table.

As a result, some representations of groundwater value in the EIS could be a little misleading in that it might be widely viewed as representing the water table. The use of the data for that purpose in the modelling may have introduced unintended errors. DPI Water recommends that the SWL be re-interpreted and any corrections made as necessary.

Response

It is acknowledged that not all SWL data was representative of the water table (piezometric surface) as the deeper measured water levels were likely to represent partially confined or confined conditions. Hence, these data represented a potentiometric surface. However, the potentiometric surface was considered to be adequate for calibration purposes due to the minor differences between the measured potentiometric surface and the piezometric surface.

The shallow SWL measured in the alluvium, Botany Sands, Ashfield Shale and Hawkesbury Sandstone where the aquifers are unconfined are representative of the water table. However, it is acknowledged that where the measured groundwater levels are deeper, generally where the well screens are located in excess of 20 metres below ground level (mbgl), there may be partially confining layers present that cause the piezometric heads to be partially confined or confined and thus differ from the water table. At Tempe Railway Station two separate monitoring wells have been constructed intersecting the alluvium (screened at 18-21 m) and the Hawkesbury sandstone screened at a depth of 48-51 m. The shallow well within the alluvium is considered to be representative of the water table whereas the deeper Hawkesbury Sandstone is likely to be confined or partially confined. Reduced groundwater levels measured in April 2015 were 0.63 m AHD (alluvium) and 1.36 m AHD (Hawkesbury Sandstone) suggesting a piezometric head difference of 0.73m at this location.

In this case the pressure head difference of 0.73 m is known and the head difference is considered within the uncertainties of the model. Elsewhere across the model the head difference between the water table and measured piezometric heads could be larger or smaller. It was not feasible to install additional shallow monitoring bores at all locations and without shallow monitoring wells at each location this head difference remains unknown. However, the head differences would be within the uncertainty limits of the model and recalibration of the model is not considered to be warranted.

It is noted that in the modelling report (Section 5.2) the depressed groundwater level measured around the Alexandria Landfill is referred to as the water table whereas more correctly it should be referred to as the piezometric head.

Note that Figure 3-5 in the Technical working paper: Groundwater representing a geological cross section has been amended (refer **Figure 4-4**). The representation of groundwater levels has been altered to reflect the water table in unconfined conditions and the potentiometric head in partially confined and confined conditions.

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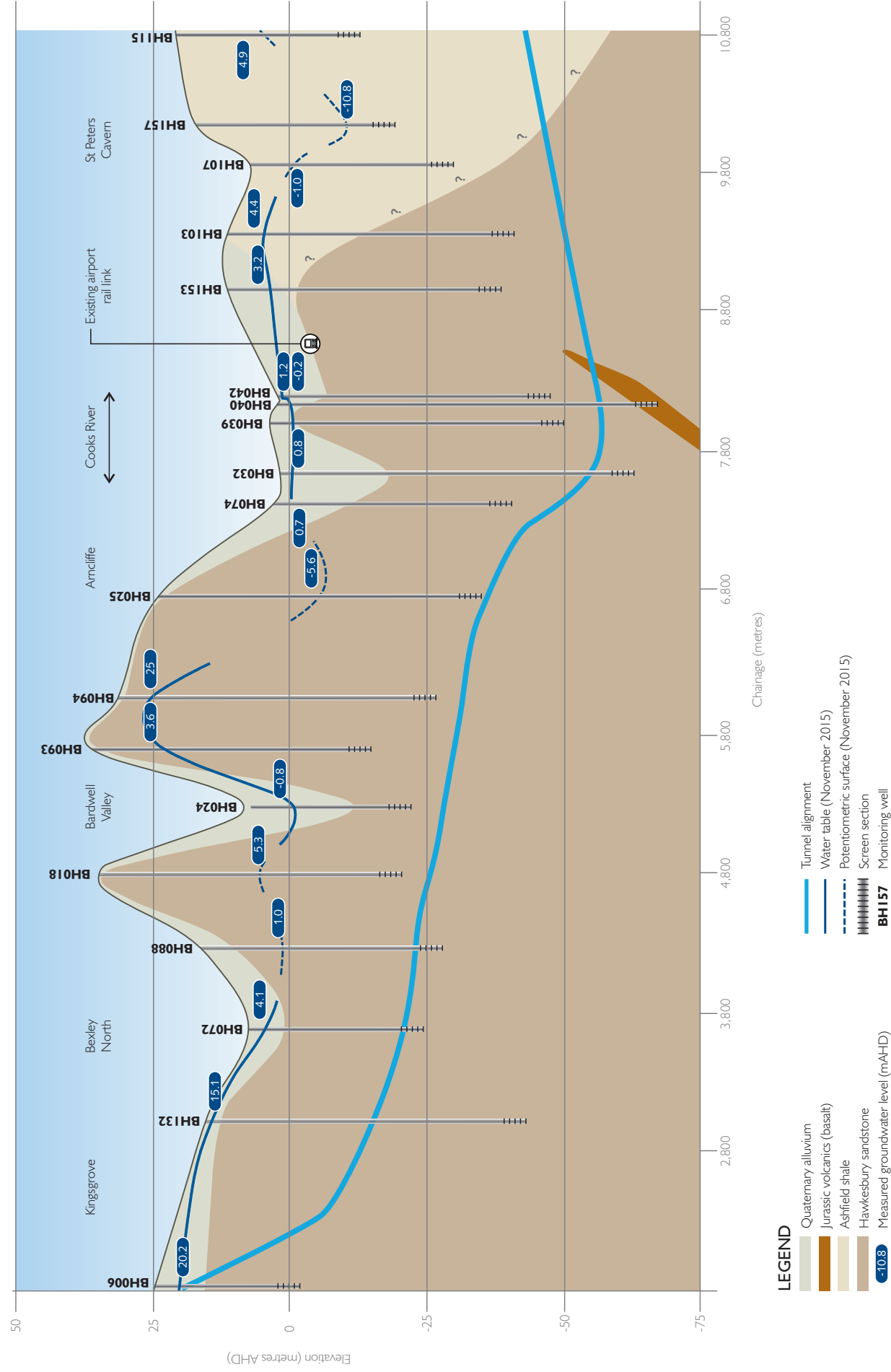


Figure 4-4 Geological cross section

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Issue description – groundwater modelling – methodology

DPI Water considers that the in-tunnel drainage system to separate groundwater inflows from other inflows is a satisfactory response to the potential for intercepting polluted groundwater. DPI Water recommends that information on measured groundwater flows be reported at least annually and additional monitoring of groundwater levels in the western edge of the Cooks River alluvia be undertaken to assist with management of the water resource.

Response

DPI's recommendation is noted.

Groundwater inflow would be measured during the construction of the project tunnels as part of the tunnelling procedure. Measure groundwater inflow rates would be used to inform the installation of waterproofing to satisfy the design criterion for groundwater inflow into the tunnels and would provide a basis for the groundwater monitoring program during construction and operation. Environmental management measures GW13 and OpGW03 (construction and operational groundwater monitoring respectively) have been amended to include this requirement. The monitoring programs would be finalised in consultation with DPI Water, during which agreement on an appropriate method of reporting these results to DPI Water would be determined.

Issue description – groundwater modelling – methodology

A Confidence Level 2 groundwater model for the project was developed by CDM Smith, dated 28 Sept 2015, and included in Appendix Q. The modelling report provides a comprehensive overview of the topographic setting, stratigraphy, hydrostratigraphic and geological features of the project. Figures 1 to 5 (Appendix C) indicate that the approximate first 2700 m of tunnels would be less than 40 mbsl, whereas the remainder (about 70%) would mostly be between 55 and 80 mbsl except for about 600 m near Bardwell Valley (at about 40 mbsl). The discussion in Appendix Q, page 56, Section 5.3 regarding depths of features does not exactly match the Indicative geological long section presented as Appendix C.

The potential effects around the cut-off wall to the Alexandria Landfill and the narrow strip of Botany Sands adjacent to the Alexandra Canal are not fully predictable, suffice to say that flows in this area would be significantly restored as a consequence of the construction of the cut-off wall. Flows and levels in other parts of the Botany Sands would need to be monitored for potential dewatering effects.

Response

Noted. Environmental management measures GW13 and OpGW03 provide for construction and operational groundwater monitoring programs, which would include monitoring of the Botany Sands aquifer. As stated earlier in this section, the monitoring programs would be finalised in consultation with DPI Water.

Issue description – groundwater modelling – methodology

The focus of the modelling was to predict indicative steady state conditions and impacts. The approach taken, including model domain conceptualisation and operable processes and constraints present in the model domain, seems reasonable as an overarching approach.

However, the methodology as presented is predicated on bulk all-layer values for recharge, hydraulic values and homogeneity. Given that some recognisable differences are readily apparent in the 3-dimensional real world represented by the model domain, it is questioned why some greater degree of natural variability has not been investigated.

The model has been developed using a blanket recharge estimate of 40 millimetres of annual rainfall (about four per cent). In section 5.4 of the groundwater modelling report (found in the Technical working paper: Groundwater), it is argued that the model is sensitive to the recharge/hydraulic conductivity ratio. A more zoned approach to recharge might be beneficial in developing the initial calibration. The model domain represents a highly urbanised area with significant open spaces, and saturated alluvium and free water and the reason for choosing 40 millimetres recharge and not developing recharge zones should be clarified and justified.

The values of hydraulic parameters used (Table 5-3 of the groundwater modelling report, found in the Technical working paper: Groundwater) are consistent with the wide range of values available for the various hydro stratigraphic units utilised. It is not clear why parameters were not applied in zones in relation to tunnel inverts. The model report presents a large amount of packer data obtained during the tunnel geotechnical investigations as Figure 3-9. An included analysis of the geometric mean indicates a subtle shift – decrease - in hydraulic conductivity at about 40 metres depth. As noted above, about 70 per cent of the tunnels are at depths between 55 and 80 meters below surface level; at these depths hydraulic conductivity would appear to be typically slightly less than the overlying.

In addition, as also noted previously, the model is sensitive to the recharge/hydraulic conductivity ratio. This is again sufficient reason for the variation as noted here to be investigated in the modelling.

Response

Groundwater modelling is based on well-established scientific principles but has limitations because of the difficulty of inferring the properties of an extensive aquifer system based on a relatively small number of measurements. In developing the numerical model and achieving an acceptable calibration there is a trade-off in simplifying the natural system or adding too much detail. The disadvantage in adding too much detail is that the run time of the model increases significantly and the model can become unstable. In this case, the less detailed approach was adopted to simulate the relationship between hydraulic conductivity and recharge which have a reciprocal relationship.

The Water Sharing Plan for the Greater Metropolitan Region Groundwater Sources recommends the recharge rate to be used across the Sydney Basin Central should be six per cent, based on rainfall data between 1921 and 1995. The percentage recharge has been refined during the calibration process by optimising specific yield and hydraulic conductivity to four per cent or 40 millimetres of rainfall. While the model surface area could have been divided into different recharge areas with higher recharge over the Botany Sands and lower recharge in urban areas, the overall water into the system via recharge would have been approximately the same as the bulk recharge value.

Different values of vertical and horizontal hydraulic conductivity were applied to the numerical model for the major hydrostratigraphic units based on the packer test data and literature values. While it is acknowledged that the hydraulic conductivity slightly decreases with depth, the average values are spread out across the depth. Since the majority of the tunnels are within the depth range of between 55 mbgl to 80 mbgl, the average hydraulic conductivity values may be lower than the average values applied in the model. In these cases, the predicted results of groundwater inflow and induced groundwater drawdown may be slightly elevated and thus are considered conservative.

Issue description – Standing Water Level data

The model uses SWL data supplied for calibration purposes. These data e.g. as presented in Table 5-2 (Appendix A) and which are also represented in Figure 3-5 (p25, Appendix Q) are discussed previously. The data should be re-examined and any consequential amendments or adjustments made throughout the modelling report as necessary.

Response

As outlined above (response to Issue description – Groundwater data), it is acknowledged that not all SWL data was representative of the water table (piezometric surface) as the deeper measured water levels were likely to represent partially confined or confined conditions. Hence, these data represented a potentiometric surface. However, the potentiometric surface was considered to be adequate for calibration purposes due to the minor differences between the measured potentiometric surface and the piezometric surface as monitored at Tempe railway station where a difference of 0.73 metres was recorded.

Note that Figure 3-5 in the Groundwater Technical Report representing a geological cross section has been amended (refer **Figure 4-4**). The representation of groundwater levels has been altered to reflect the water table in unconfined conditions and the potentiometric head in partially confined and confined conditions.

Issue description – reformatting of figures and impacts to groundwater dependent ecosystems

The groundwater modelling does not sufficiently predict impacts to groundwater dependent ecosystems. The wetlands should be specifically considered, even if predicted impacts are minimal. One of the modelling objectives was to “Predict the impacts to nearby registered groundwater users and groundwater dependent ecosystems.” (Appendix Q, Section 2.3.3, p 12 and Section 1.5 of the modelling report).

This objective has not been satisfactorily met. The modelling report in Sec 6.2.5 “Predicted impacts on groundwater dependent ecosystems” (p6-4) should better consider the notified wetlands and specifically discuss the potential water table impacts for each; in fact these areas are not shown in the model output diagrams. Impacts on these ecosystems should be specifically considered, even if predicted impacts be minimal.

The modelling outputs and associated analysis are further discussed in Sec 7.0 (Appendix Q) but they generally suffer from the same matters as described for the Modelling Report: they lack clarity.

Response

Figure 7-1 in the Technical working paper: Groundwater shows predicted groundwater level elevations at steady state conditions and Figure 7-2 in the Technical working paper: Groundwater shows predicted drawdown contours under steady state conditions. These figures have been re-drafted to provide more clarity. Instead of representing the drawdown and water table contours as coloured lines, the contour intervals are now represented as coloured intervals at 10 metre intervals (refer to **Figure 4-5** and **Figure 4-6** of this report).

Discussion of the assessment of impacts on notified wetlands is presented in **Section 4.2.2** below.

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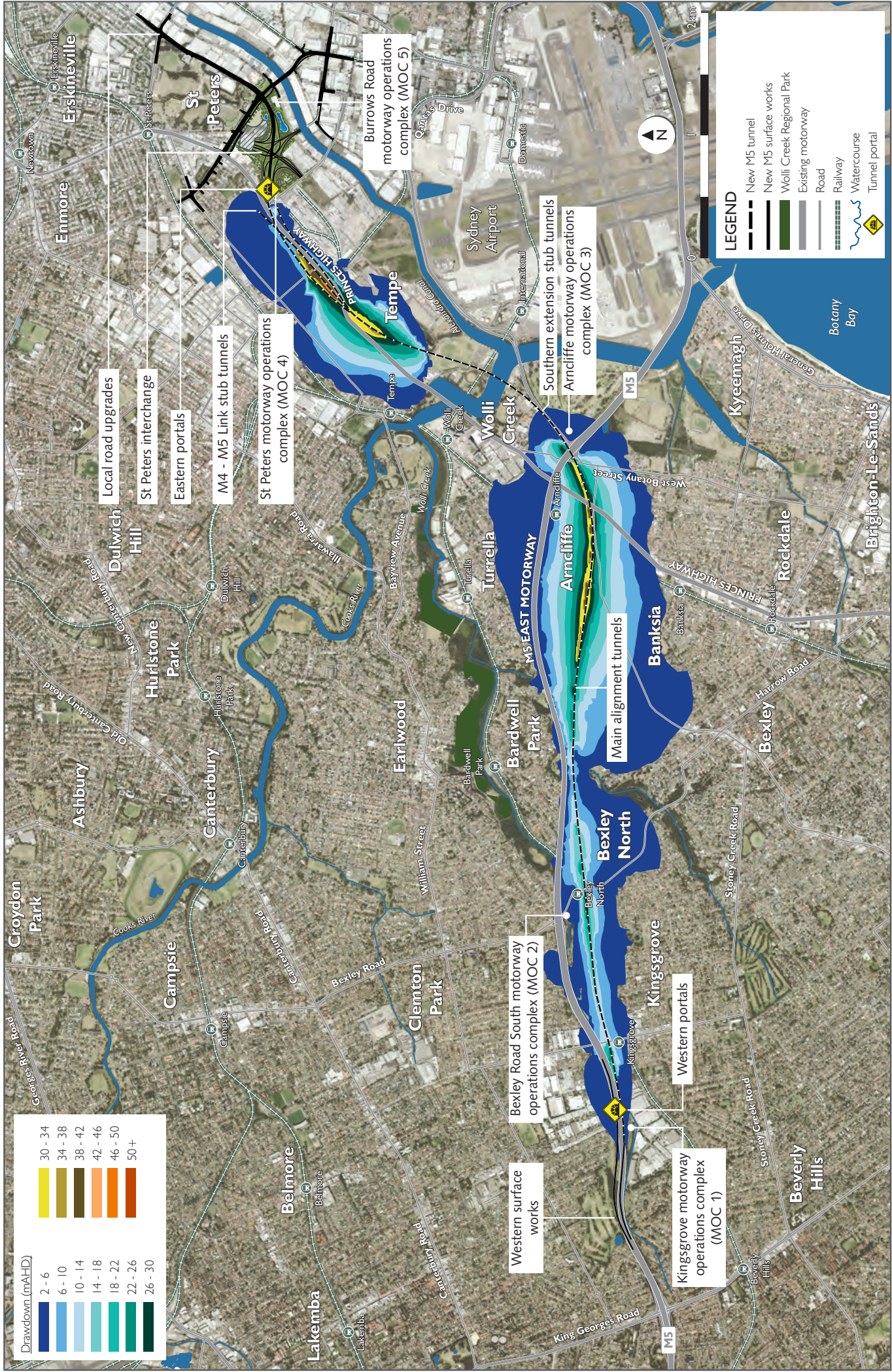


Figure 4-5 Predicted drawdown caused by the project

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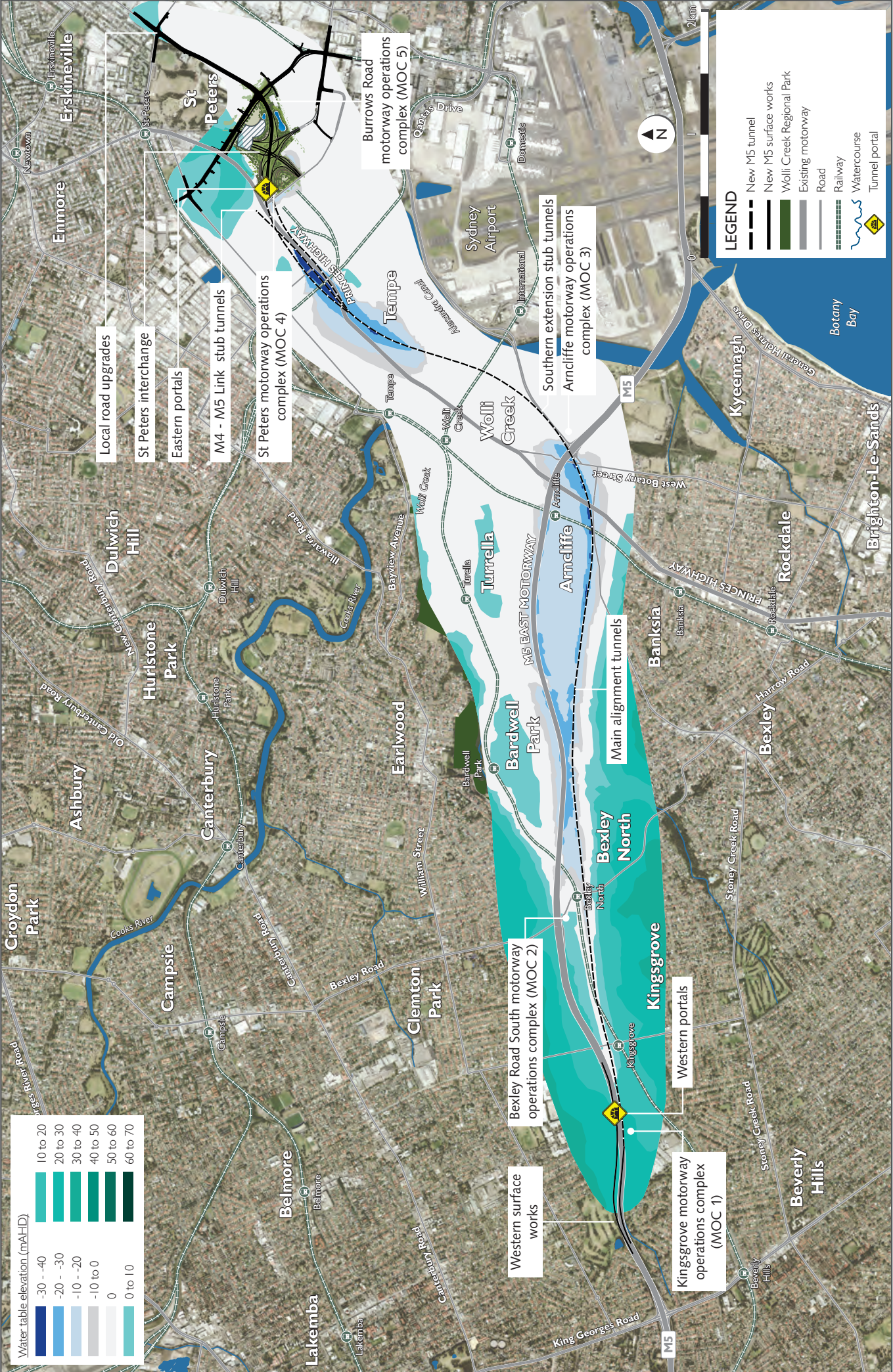


Figure 4-6 Predicted water table elevations after completion of the project

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Issue description – impacts to groundwater users

The groundwater modelling does not sufficiently predict impacts to nearby registered groundwater users. A full assessment of the project against the Aquifer Interference Policy (AIP) is required. The relevant documentations, *Assessing a Proposal against the NSW Aquifer Interference Policy*, can be found at <http://www.water.nsw.gov.au/water-management/law-and-policy/key-policies/aquifer-interference>.

It is clear from the modelling outputs (Table 6-1, p6-5, Appendix A of the Technical Working Paper: Groundwater) that at least four bores registered for water supply, and located within one kilometre of the project tunnels would be impacted by a drawdown in excess of two metres. The proponent needs to revisit the impact analyses and develop contingency plans including make-good provisions in respect of affected bores in accordance with the AIP.

Response

An assessment of the project against the Aquifer Interference Policy (AIP) is provided in Chapter 9 (Groundwater) of the EIS, which tabulates the minimal impact considerations and responses for the “less productive fractured rock aquifer” and for the “highly productive coastal aquifer”.

Predicted drawdown in registered bores in excess of two metres as predicted in the modelling report is tabulated in the Technical working paper: Groundwater in Table 9 and discussed in Section 7.5. Contingency plans including make-good provisions are discussed in Sections 6.4, 7.2, 7.5 and 8.1 of the Technical working paper: Groundwater. The measures taken would be dependent upon the location of the impacted bore and would be determined in consultation with the affected licence holder but could include, deepening the bore, providing a new bore or providing an alternative water supply.

Issue description – impacts to alluvia and groundwater monitoring

A groundwater monitoring program has been proposed in draft format (Appendix E of Appendix Q) and is briefly discussed in Appendix Q in Sec 8.0 “Mitigation and management measures”. Further work is required, in consultation with DPI Water, in order to develop a comprehensive Groundwater Monitoring and Management Plan (GMMP).

What is clear is that monitoring of alluvia in the vicinity of the western portal and the Bardwell Valley has not been included and need to be. These areas have some significant vegetation and many community amenities associated and need to be protected for any adverse impacts. The Bardwell Valley part of the Project traverses a significant palaeochannel and is associated with the potential for significant amounts of on-going drawdown. The outer edge of the Cooks River alluvium (Botany Sands) near Arncliffe may also be impacted with important implications for infrastructure and buildings and should also be monitored. The remainder of this setting is likely to be influenced by tidal recharge from the Cooks River.

At the Alexandria landfill a cut-off wall is to be constructed to isolate the Botany Sands from the landfill (Fig 7-3 from Appendix Q) with a hydraulic conductivity of 10-8 m/s. The effects of this would be to limit leachate production in the former landfill and to restore the groundwater flow in the narrow strip between the landfill and the Alexandria Canal. Future groundwater levels in this area, however, are difficult to predict and should be better monitored. The area is still subject to loss of permeable surface due to infrastructure and building. Appropriate groundwater level monitoring should be associated down hydraulic gradient of the wall to assist in management of this feature as well as the proposed water quality basin.

Response

Noted. Environmental management measures GW13 and OpGW03 provide for construction and operational groundwater monitoring programs, which would include monitoring of the alluvia at Bardwell Valley and the Botany Sands aquifer. As stated earlier in this section, the monitoring programs would be finalised in consultation with DPI Water.

4.2.2 Groundwater dependent ecosystems

Issue description – impacts to groundwater dependent ecosystems

The Technical Working Paper: Biodiversity (Appendix S) and elsewhere in the EIS has strongly suggested that flora assemblages identified as groundwater dependent may in fact not be so. Many seem to be associated with tidal and saltmarsh areas where they are dependent more on saltwater flooding and infiltration to alluvium rather than any supply of groundwater.

Even though groundwater is likely to enter most alluvial areas, it is likely that its contribution to any groundwater dependent ecosystems is low. An exception is the groundwater dependent ecosystem in Bardwell Valley which is near the edge of the estimated drawdown area.

However, forest areas associated with alluvium and/or vegetation close to the tunnel centreline (eg. along Bardwell Creek and at Stotts Reserve) may be impacted by on-going drawdown and would certainly be stressed by groundwater drawdown associated with construction.

The groundwater modelling and associated analysis should better consider effects on vegetation, listed GDEs and other surficial landscapes. Impacts on these ecosystems should be specifically considered, even if predicted impacts be minimal. It is recommended that this aspect be further considered when the groundwater modelling is re-visited.

Response

It is agreed that the impact to flora associated with tidal and saltmarsh areas is likely to be minimal due to these assemblages being more dependent on saltwater flooding rather than groundwater inflows. Higher up in the catchment, such as along Bardwell Creek at Stotts Reserve within the deeply incised Hawkesbury Sandstone, drawdown would have the potential to stress vegetation with a moderate to high potential for groundwater dependence.

In the vicinity of Bardwell Creek at Stotts Reserve, near where the existing M5 tunnel passes beneath Bardwell Creek, the groundwater level was measured as -4.93 m AHD (BH084). Thus the local hydrogeological regime appears to be already impacted by the existing M5 tunnel and vegetation in that area may already be relying on perched groundwater and rainfall recharge. The Technical working paper: Biodiversity notes that although the groundwater could be drawn down by up to 10 metres and trees could show signs of stress in prolonged dry periods, however the community should recover with sufficient rainfall. Similarly, the biodiversity report indicates that drawdown beneath the Bardwell Valley Parkland could be beneath the roots of dependent trees. However, since the forest has access to surface water in Bardwell Creek the impact is unlikely to be substantial.

It is not proposed to re-calibrate the model or alter the zonation within the model with respect to recharge and hydraulic conductivity since there is insufficient data to upgrade the model outside the model uncertainty limits.

During construction these impacts are expected to be low because the short term tunnel inflows are influenced by local fracturing and storage within the fracture networks. Initial tunnel inflows during construction can be large because of large hydraulic gradients that develop near the walls. However, these gradients dissipate in time as inflows approach steady state conditions. Although initial groundwater inflows could be high for a short duration during construction, drawdown is expected to be minimal as it would take time for the fracture storage to be depleted before the water table begins to decline.

4.2.3 Waterways and riparian land

Issue description – riparian impacts (construction)

The EIS does not provide details on the riparian corridor widths along the waterways which are potentially impacted at the project's surface sites. DPI recommends the riparian widths are in accordance with the DPI Water's Guidelines for Controlled Activities on Waterfront Land, and that the project generally be undertaken in accordance with those guidelines. The guidelines are available at <http://www.water.nsw.gov.au/water-licensing/approvals/controlled-activity>.

DPI Water supports the inclusion of environmental management measure (EMM) – SW16 (Table 30.1, page 30.16) that vegetation on waterfront land would be managed in accordance with the controlled activities guidelines.

Response

Impacts to riparian corridors would be minimised as far as practical through detailed design and reconfirm that works in the riparian corridor would be undertaken in accordance with the controlled activities guidelines wherever possible.

Issue description – riparian impacts (Kingsgrove motorway operations complex)

It is noted the Kingsgrove motorway operations complex (MOC 1) is to be constructed at a similar location to the temporary construction compound C2 site (see Figures 5.11, 5.12, 5.38 and 6.6). Figures 5.11, 5.12 and 5.38 show a grey vehicular access way to MOC 1 and a brown access path north of Wolli Creek. DPI Water recommends consideration is given to move the access ways further north away from the creek to assist improvement of the riparian vegetation.

Response

The alignment of the path shown on the drawings is generally consistent with the existing path prior to construction. The path diverts away from the existing path where the permanent operations complex MOC 1 is built. The operations complex has been set back as far as possible from the creek.

Issue description – watercourse crossings

The EIS confirms the watercourse crossings would be designed and constructed in accordance with the DPI Water Guidelines for Controlled Activities on Waterfront Land (Section 16.3.1, page 16.41). It is recommended this is included as an environmental management measure.

Response

Noted. The following mitigation measure has been included in **Chapter 8** of this report:

“New watercourse crossings and drainage and discharge outlet infrastructure should be designed and constructed in accordance with the Guidelines for Controlled Activities on Waterfront Land.”

Issue description – drainage and discharge outlet infrastructure

The EIS notes new discharge outlets during operation would include energy dissipation and erosion scour protection. It is recommended that the drainage and discharge outlet infrastructure are designed and constructed in accordance with the controlled activities guidelines and the environmental management measures in Table 30.1 are amended to include this.

Response

Noted. The following mitigation measure has been included in **Chapter 8** of this report:

“New watercourse crossings and drainage and discharge outlet infrastructure should be designed and constructed in accordance with the Guidelines for Controlled Activities on Waterfront Land.”

4.2.4 Soil and water quality

Issue description – surface water quality data sets

The EIS notes that due to the availability of several existing surface water quality data sets within the study area no further surface water quality sampling was considered necessary (Section 16.1.2, page 16.3). It is unclear if these data sets target the potential impacts of road construction and operation.

Response

The compiled Water Quality Reference Criteria listed in Appendix A of the Technical working paper: Surface water (Appendix N of the EIS) and the baseline Surface Water Quality Monitoring that is currently being undertaken are for the purposes of providing a reference data set that can be used to set criteria for discharges from the groundwater treatment plants, and for the purposes of determining water quality compliance, both during construction and operation.

Existing surface water quality data sets that have been relied upon include characterisation of water quality constituents that are of relevance for understanding potential impacts of road construction and operation. Refer to environmental management measure OpSW03 in Section 16.4 of the EIS for details on potential water quality constituents of concern.

Issue description – mitigation relating to the decommissioning of the existing water quality wetland

Appendix N confirms the decommissioning of the existing water quality wetland during construction in the Wolli Creek catchment would not occur until replacement water quality devices are in operation (Section 6.3.2, page 85). It is recommended an environmental management measure is included in relation to this.

Response

Noted. Environmental management measure OpSW02 has been amended in **Chapter 8** of this report to include the following:

“Replacement water quality devices would be installed and operational prior to decommissioning of the existing water quality pond (WQP-2) in Wolli Creek catchment.”

Issue description – water quality monitoring

Section 16.3.2 of the EIS indicates “the operational water quality monitoring would be conducted for 12 months post-construction or as otherwise required by the conditions of approval” (see page 16.54). The proposed water quality monitoring period for the WestConnex M4 East project is for “a *minimum period of three years following the completion of construction or until the affected waterways and/or groundwater resources are certified by an independent expert as being rehabilitated to an acceptable condition*” (see Table 2, R10 page 18 of draft SWQMP, Rev 7 December 2015). It is unclear why the New M5 project only proposes to undertake 12 months of surface water quality monitoring post construction. It is recommended the operational water quality monitoring period for the New M5 is amended to be consistent with the WestConnex M4 East project.

Response

A groundwater monitoring program has been prepared for pre-construction, construction and post construction (GW13 and OpGW-3). The program includes three years of groundwater monitoring post construction, after which the requirement for further monitoring would be assessed. The environmental management measures in **Chapter 8** of this report have been updated to reflect the revised monitoring program.

Issue description – geomorphology impacts and mitigation measures

Section 6.4 of Appendix N notes other potential construction impacts on the geomorphology include tunnelling activities causing bedrock fracturing and/or subsidence with the watercourse bed (page 87). Sections 6.4.1 and 6.4.2 of Appendix N indicate tunnelling would occur beneath Wolli Creek and the Cooks River and it states the construction methodology would minimise potential impacts to surface geology, such as fracturing and subsidence but no further details are provided (pages 87 and 88). DPI Water recommends this potential impact be assessed in more detail and mitigation measures be identified where required.

Response

Tunnelling activities can cause settlement or subsidence of creek beds as a result of groundwater drawdown. The tunnel cover varies between about 12 and 33 metres at the various watercourses and surface settlements due to groundwater drawdown are estimated at around 17 to 20 millimetres at these locations. Grouting or an impermeable membrane would be used at the tunnel lining where inflows are elevated beneath the watercourses to minimise these impacts. Bed settlement of this magnitude would not have a measureable impact on the creeks.

Further assessment on the potential impacts of ground settlement would be undertaken during detailed design.

4.2.5 Water licence requirements

Issue description – licencing

During the operation of the project, the modelling predicts inflows of 1115 cubic metres per day of groundwater into the project tunnels. A licence would be required for long term/ongoing take of groundwater. DPI Water requests that the RMS liaise with it to discuss options for licensing this take of water.

Response

Roads and Maritime would continue liaising with DPI Water to ensure that any licensing requirements are met.

4.2.6 Environmental management measures

Issue description – environmental management measures in the EIS

SW13 – DPI Water supports the amendment to EMM (SW13) (previously SW10 in the draft EIS) to minimise disturbance to waterfront land and thereby minimises disturbance to riparian land (Table 30.1, page 30.16)

SW16 – DPI Water supports the inclusion of EMM (SW16) that vegetation on waterfront land would be managed in accordance with the Guidelines for controlled activities on waterfront land (Table 30.1, page 30.16).

OpSW03 – This EMM indicates “water quality monitoring would be conducted for 12 months post construction or as otherwise required by the conditions of approval” (Table 30.1, page 30.17). DPI recommends the operational water quality monitoring period is for a minimum period of three years, consistent with the Westconnex M4 East project.

GW02 – This EMM indicates “a groundwater and soil salinity plan would be prepared prior to the commencement of earthworks” (Table 30.1, page 30.24). DPI Water requests that this EMM is amended to require this report to be prepared in consultation with DPI Water

GW13 – Indicates a groundwater monitoring program would be prepared and implemented to monitor groundwater impacts during construction and that the program would be developed in consultation with DPI Water and other relevant agencies (Table 30.1, page 30.26). It is important that the monitoring program is developed in consultation with DPI Water and as noted above, it recommended that a Groundwater Monitoring and Management Plan (GMMP) is developed to assist DPI Water in the management of groundwater impacts of the project.

OpGW03 – Indicates a groundwater quality monitoring program would be prepared and implemented to monitor groundwater impacts during tunnel operations and that the program would be developed in consultation with DPI Water and other relevant agencies (Table 30.1, page 30.28). As the tunnel would result in groundwater inflows, a comprehensive Groundwater Monitoring and Management Plan (GMMP), should be developed that includes monitoring of tunnel water inflow rates and groundwater levels. The GMMP should include mitigation, including make-good measures for if adverse events are identified and provide for the measurement of into-tunnel groundwater flows, provision of data and interpretative reporting of on a regular basis.

B12 – EMM (B12) states “works within or near aquatic habitats and riparian areas would be managed in accordance with Roads and Maritime’s Guide 10 Aquatic habitats and riparian zones” but no details are provided on this Guide (see Table 30.1, page 30.35). DPI Water recommends that this EMM also refer to DPI Water’s Guidelines for controlled activities on waterfront land.

B13 – This EMM notes “works within aquatic habitats or riparian zones would be undertaken to limit impacts on aquatic flora and fauna, and their habitats and impacts on riparian areas”. It indicates this would be undertaken in accordance with Guide 10 of the Biodiversity Guidelines (Table 30.1, page 30.35). DPI Water recommends that this EMM also refer to DPI Water’s Guidelines for controlled activities on waterfront land.

B14 – DPI Water recommends the following amendment is made to EMM B14 (see Table 30.1, page 30.35): Where possible construction activities would minimise disturbance to waterways and riparian land and permanent infrastructure is to be located outside riparian land, where possible.

B15 – DPI Water supports the inclusion of EMM (B15) to locate stockpiles outside the riparian corridors (Table 30.1, page 30.55).

OpB01 – DPI Water supports the inclusion of EMM (OpB01) for the preparation and implementation of a management plan which is to include procedures for the management, maintenance and rehabilitation of riparian land disturbed by the project (see Table 30.1, page 30.36).

Response

DPI Water’s support of environmental mitigation measures SW13, SW16, B15, and OpB01 is noted.

Environmental management measures B12 and B13 have been updated to include reference to DPI Water’s Guidelines for controlled activities on waterfront land.

There are no objections to the amendments to OpSW03, B14, GW02, GW13 and OpGW03.

Amended environmental management measures are provided in **Chapter 8** (Revised environmental management measures) of this report.

Issue description – recommended environmental management measures

It is recommended the following environmental management measures are incorporated into the project:

- Riparian land temporarily disturbed by the project would be rehabilitated with native species from the relevant local vegetation community.
- Where riparian land /vegetation is permanently removed by the project the riparian area would be offset either at the work site or elsewhere along the relevant watercourse.
- New watercourse crossings and drainage and discharge outlet infrastructure should be designed and constructed in accordance with the Guidelines for Controlled Activities on Waterfront Land
- Decommissioning of the existing water quality pond (WQP-2) in Wolli Creek catchment would not occur until replacement water quality devices are in operation.

Response

In general the additional recommended environmental management measures can be adopted; however, the need for riparian offsets has not been identified as part of the Technical working paper: Biodiversity Assessment Report (Appendix S of the EIS).

Issue description – recommended conditions of approval

1. The project must be carried out consistently with the Guidelines for Controlled Activities on Waterfront Land (DPI 2012).
2. Groundwater inflow volumes must be recorded and reported annually.
3. Decommissioning of the existing water quality pond (WQP-2) in Wolli Creek catchment shall not occur until replacement water quality devices are in operation.

4. The proponent must provide compensatory water supply or alternative financial compensation to the owner of any private water supply work whose water supply is directly and adversely impacted by the project (other than an impact that is minor or negligible), to the satisfaction of the Secretary.

Response

Noted. Conditions of approval are a matter for the Department of Planning and Environment to consider during its assessment of the critical State significant infrastructure application.

However, as detailed in earlier responses to this submission, the recommended conditions of approval are generally reflected in existing or amended environmental management measures as detailed in **Chapter 8** (Revised environmental management measures) of this report. This includes B12 (waterfront land), B13 (waterfront land), SW16 (waterfront land), OpSW02 (pond decommissioning), GW13 (construction groundwater monitoring), GW15 ('make good' provisions), OpGW03 (operational groundwater monitoring).

4.3 NSW Environment Protection Authority

4.3.1 Environmental protection licence

Issue description - Environment Protection Licence requirement

In accordance with Schedule 1 of the *Protection of the Environment Operations Act 1997* (POEO Act), this project would require an environment protection licence (EPL) for construction. The proponent would need to make a separate application to the EPA for this licence if project approval is granted.

Response

The requirement to make a separate application to the EPA for an EPL is noted.

4.3.2 Water quality

Issue description – Groundwater pollutants

While a number of pollutants have been identified and concentrations estimated for their discharge to the Cooks River, Wolli Creek and Alexandra Canal, it appears that some potential non-trivial pollutants have not been considered.

The EIS details how groundwater at Arncliffe has been impacted by contaminants associated with market gardens and dredged sediments from the Cooks River. However, pesticides and other associated organic toxicants are not listed in the water quality reference criteria (Appendix A) despite groundwater samples being analysed for these constituents. In addition, loads have been estimated for total petroleum hydrocarbons (TPH), phenols and iron within groundwater influent; however these pollutants are not included in the discharge criteria. Ammonia has been listed in the discharge criteria as a toxicant however ammonium should also be listed as a stressor considering that the average load of ammonia in contaminated groundwater influent has been estimated at 19.8kg/day.

The EPA recommends clarification is provided regarding an absence of these pollutants from the proposed discharge criteria, and consideration given to expanding the list of pollutants to include iron, ammonium and the constituents listed in the draft groundwater monitoring program. Specifically these constituents are total hydrocarbons (TRH (C6-C40), benzene, toluene, ethylbenzene and xylenes (BTEX), polycyclic aromatic hydrocarbons (PAHs), phenols, organochlorine pesticides, organophosphorus pesticides and polychlorinated biphenyls (PCBs).

Response

The discharge criteria developed and presented in the EIS were based on existing available data for the receiving environments of the Cooks River, Wolli Creek and Alexandra Canal.

These data were collected for the purpose of understanding ecological indicators of waterway health. The available data was limited and it was acknowledged in the EIS that a more comprehensive data set would be needed to set criteria for discharges.

Therefore, baseline surface water quality monitoring is currently being undertaken to provide a reference data set that can be used to set criteria for discharges from the groundwater treatment plants, and to determine water quality compliance during construction and operation. The analytes assessed as part of this monitoring program include a broader range of pollutants than those listed in the discharge criteria presented in the EIS.

Of the pollutants requested to be included by the EPA, only the following are not currently part of the baseline monitoring program to determine discharge criteria:

- Ammonium
- Phenols
- Organophosphorus pesticides
- Polychlorinated biphenyls (PCBs).

These analytes would be added to the groundwater baseline monitoring program for the project in order to inform the discharge water quality criteria. Discharge water quality criteria would be developed in consultation with the EPA.

Issue description – NSW water quality objectives

The EIS acknowledges most of the NSW Water Quality Objectives (WQO) of the Cooks River catchment (aquatic ecosystem health, visual amenity, primary and secondary contact recreation) however the WQO "aquatic foods (cooked)" has been omitted. The EIS does not provide a statement of the indicators and trigger values for the relevant environmental values or the practical measures that could be taken to restore or maintain those values. It should also be noted that following section 45(f1) of the POEO Act, the EPA is required to take the environmental values of receiving waters into consideration in its licensing decisions.

It is recommended that the EIS provide:

- A statement of all relevant WQO and environmental values for the receiving waters relevant to the proposal
- A statement of the indicators and associated trigger values or criteria for the identified environmental values
- Demonstration of how the proposal would be designed and operated to:
 - Protect the WQOs for receiving waters where they are currently being achieved
 - Contribute towards achievement of the WQOs over time where they are not currently being achieved.

Response

The relevant water quality objectives and environmental values for each of the receiving waters are presented in Technical working paper: Surface water (Appendix N of the EIS), which has an Appendix A Water Quality Reference Criteria. The following water quality objectives (WQOs) are also applicable to the project:

- Primary contact recreation: assess opportunities to achieve as a longer term objective, 10 years or more
- Aquatic foods (cooked): assess opportunities to achieve as a longer term objective, 10 years or more

All of the WQOs or environmental values rely upon restoring or maintaining environmental values, which is reflected in the selection of trigger values for water discharges, and the provision of treatment for stormwater runoff.

Many of the WQOs are not currently being achieved. The project would contribute to the achievement of these WQOs in the following way:

- Discharges from water treatment plants would meet the criteria of the water quality trigger values that have been developed for the project. These criteria were selected to accord with management goals of improving the condition of the waterways.
- For stormwater runoff, the treatment provided by the project is expected to provide a net reduction in pollutants that would be discharged to the lower Cooks River, and hence an overall improvement to the ecosystem health of this environment (refer Table 40 in Appendix N Technical working paper: Surface water).

Details regarding how the proposal project would be designed and operated to protect or achieve water quality objectives are described in Technical working paper: Surface water. Section 8 describes the mitigation measures that would be employed to prevent or minimise environmental impacts.

Issue description – Clarification regarding reference criteria for the Cooks River and Wolli Creek

The water quality reference criteria for the Cooks River and Wolli Creek include values for a range of ecosystem types as well as position within the catchment. From this it is unclear which of the trigger values tabulated in Appendix A (if any) are to be applied to each discharge point.

The EPA recommends that the EIS provide clarification on this issue by clearly defining the discharge criteria for each discharge point during construction and operation.

Response

Water quality trigger values have been developed based on existing data for specific reaches where construction works and discharges would occur. Within each reach, catchment and environmental conditions would be sufficiently homogenous such that the water quality data set for each reach would be representative. Section 16.2.7 of the EIS provides the trigger values that have been developed for the following reaches:

- Cooks River: Lower catchment
- Cooks River: Lower-middle catchment
- Cooks River: Upper-middle catchment
- Wolli Creek: Upstream
- Wolli Creek: Downstream
- Alexandra Canal.

These trigger values would be updated with new water quality data as it becomes available, and are applicable for the construction and operation phases of the project.

Issue description – Water treatment plants

The EIS states that the water treatment plants would be designed to a minimum standard that would meet the water quality reference criteria provided in Appendix A.

It is recommended that the EIS provides a commitment to treat and discharge polluted groundwater for the operation phase of the project equivalent to or better than the discharge criteria used for the construction phase.

Response

Roads and Maritime would treat and discharge groundwater for the operation phase of the project to a standard equivalent or better to the discharge criteria used for the construction phase.

4.3.3 Air dispersion modelling

Issue description – 1 hour average conversion of NO_x to NO₂

An empirical method was used to convert one-hour average NO_x to NO₂ concentrations rather than one of the methods listed in the *Approved Methods for the Modelling and Assessment of Air Pollutants in NSW* (the Approved Methods). The empirical method is based on data collected at OEH background monitoring sites and Roads and Maritime roadside sites.

Two different methods were used for community and other receivers:

- At the 'community receivers' (these were particularly sensitive locations within a zone (600 metres either side) along the project corridor, such as schools, child care centres and hospitals), predicted one-hour NO_x concentrations from the ventilation outlets and surface roads were added to a contemporaneous synthetic one-hour NO_x background file. An upper bound function was then used to give the maximum likely one-hour average NO₂ concentration for a given one-hour average NO_x concentration. The upper bound function for 2014 was determined from monitoring data. For 2021 and 2031, an NO₂/NO_x ratio of 0.16 was assumed and a corresponding function was determined

- At the 'residential, workplace and recreational (RWR) receivers' (these were all discrete receiver locations along the project corridor, and mainly covered residential and commercial land uses) the 98th percentile background was combined with the maximum predicted concentration. The conversion of NO_x to NO_2 was then based on the upper bound functions used for the community receivers.

The data from all Sydney monitoring sites between 2004 and April 2015 were used to define the upper bound function. Approximately 16 per cent of the data points were for roadside monitoring sites.

A comparison of the results of the one-hour NO_2 impact assessment with other methods to convert NO_x to NO_2 concentrations was included in the air quality impact assessment in the EIS. The results of the comparison concluded:

- The ambient ration method (ARM) and ozone limiting method (OLM) showed similar annual average impacts
- The ARM and OLM predicted exceedances of the NO_2 criteria whilst the project specific method predicted no exceedances.

Background NO_x and NO_2 concentrations are important factors to determine the conversion of NO_x to NO_2 . The comparison between the statistical and contemporaneous approach to evaluate the use of 98th percentile background in the statistical method shown in Figure 9-19 is exactly the same as for the M4 East project. The predicted impacts should be project specific and therefore it is expected that the results for M4 East and the New M5 would look different.

It is also noted that the statistical and contemporaneous comparison for 24-hour average PM_{10} (Figure 9-20) and 24-hour average $\text{PM}_{2.5}$ (Figure 9-21) are also exactly the same as the ones presented for the M4 East.

The EPA recommends that the justification for the use of 98th percentile background data used in the conversion methodology for NO_2 is updated to be specific to the New M5 project. Additionally, all evaluation of methodology and modelling shown in the figures (e.g. Figures 9-20 and 9-21) and the report should be specific to the New M5 project.

Response

In relation to the statistical (98th percentile) method, the figures presented in the Technical working paper: Air quality (Appendix H of the EIS) includes data points for three groups of receivers:

- M4 East community receivers
- New M5 community receivers
- The locations of the M4 East air quality monitoring stations (the locations of the New M5 monitoring stations were not known at the time of the analysis).

The data for the New M5 are therefore already included in Figures 9-19, 9-20 and 9-21 of the Technical working paper: Air quality (Appendix H of the EIS).

The figures were unable to be updated before the publication of the EIS. For the New M5 assessment the synthetic background profiles for NO_x and PM_{10} were modified compared with the M4 East assessment, meaning that the 98th percentile background concentrations used in the assessment were not reflected in the original EIS figures. In addition, the original figures contained GRAL predictions for the New M5 which were different from those in the final assessment. The figures have therefore been updated to reflect these changes, and the plots with the original and updated data for the New M5 are shown in **Figure 4-7**. It can be seen that updating the New M5 data had very little effect on the relationships between the contemporaneous and statistical concentrations. It should be noted that the actual air quality assessment for the New M5 was not affected by this change, as the correct values were used for the synthetic background profile and the GRAL predictions.

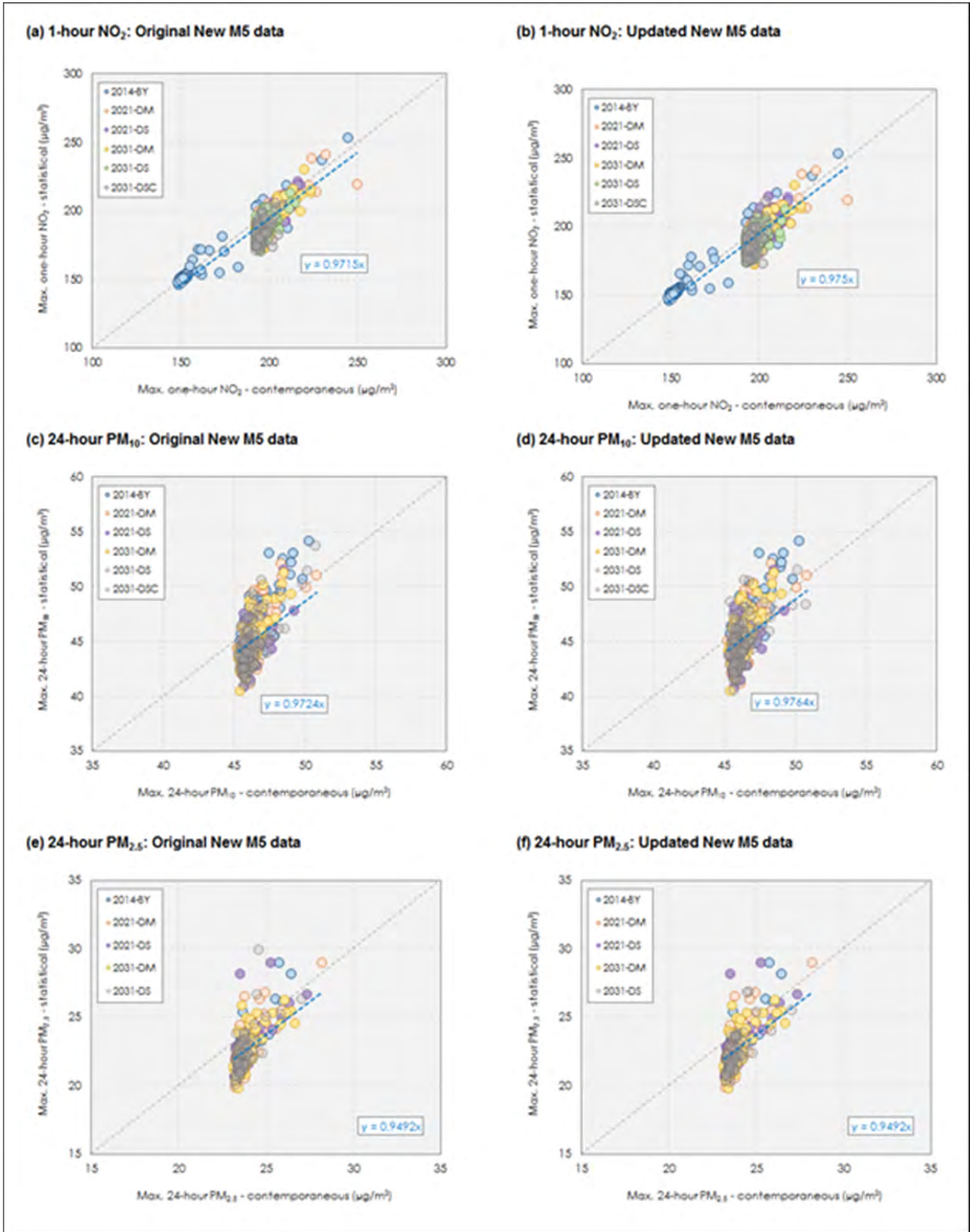


Figure 4-7 Effect of updating data for New M5 in the relationships between 'contemporaneous' and 'statistical' concentrations

Issue description – discrepancy between the modelled NO_x emission rate for regulatory worst case scenario and the proposed emission limit

The proposed NO_x limit for the regulatory worst case scenario is 20 mg/m³ which is the same as the limit for the NorthConnex project. The modelled emission rate for the regulatory worst case scenario at St Peters and Arncliffe is 0.72 kg/h (0.2 g/s) at a flow rate of 100 m³/s from each ventilation outlet. This equates to a concentration of 2 mg/m³ which is well below the proposed emission limit of 20 mg/m³. The EPA recommends the proponent verify the modelled NO_x emission rate in the regulatory worst case scenario is the same as the proposed emission limit.

Response

The NO_x discharge concentration limit of 20 mg/m³ was used in the regulatory worst case modelling. Table 9-22 of Appendix H in the EIS contains typographical errors. The NO_x emission rates given in Table 9-22 of Appendix H are incorrect, and should be multiplied by a factor of 10.

Issue description – total NO₂ impacts are not presented for the regulatory worst case scenario

The results for all pollutants for the regulatory worst case scenario are presented as contribution from the ventilation outlets alone. The total impact for all pollutants must be presented so that it can be assessed against the EPA's impact assessment criteria.

It is understood there is difficulty in estimating total NO₂ impacts due to time series information not being available for all receivers. In the M4 East assessment, the total NO₂ impacts were estimated at the top 10 receivers around the ventilation stacks. A similar methodology may be adopted for the new M5 assessment

For the regulatory worst case scenario, the EPA recommends the proponent provide the total impact (ventilation outlet, surface road and background) at receivers for all pollutants except air toxics.

Response

A revised regulatory worst-case assessment was provided in the *M4 East Submissions Report* (RMS, December 2015) which addressed a similar comment made by the EPA in relation the M4 East project. This revised approach was also taken for the New M5 regulatory worst-case assessment and is detailed below along with accompanying results.

Calculation of total concentrations

The assessment presented in the EIS focused on the contributions from tunnel outlets alone. Total concentrations can be determined for the 'residential, workplace and recreational' (RWR) receivers using the same methods that were used for the expected traffic scenarios. This would require the combination of the results for the separate sources (background, surface roads and ventilation outlets). In addition, for short-term metrics the 98th percentile background concentration approach would be used.

Conversion of NO_x to NO₂

The ventilation outlet increment alone for NO₂ cannot be presented for RWR receivers, which relates to the NO_x to NO₂ conversion issue discussed above and noted in the Technical working paper: Air Quality (Appendix H of the EIS). As NO₂ is calculated from total NO_x, it cannot be determined definitively from the outlet NO_x contribution only as the surface road and background NO_x concentrations also need to be known. Moreover, these need to be known for the same one-hour period when the maximum ventilation outlet contribution occurs, and this is only possible for receivers for which a time series has been determined (i.e. the community receivers and not all RWR receivers).

It should also be noted that:

- The highest total one-hour NO_x (and NO₂) concentrations during a year are driven by the background contribution
- The largest ventilation outlet contribution to NO_x would be very unlikely to occur at the same time as the largest background and surface road contributions.

To address this concern, the following method, which extends the spatial coverage of points assessed, was applied. In the regulatory worst-case scenario the aim was to determine the area affected by the ventilation outlet, which typically involves considering all receivers to determine which are likely to be affected. However, it is only possible to calculate the various contributions to NO₂ concentrations where a full time series of one-hour values is available. Given that the community receivers presented in the EIS were not all close to ventilation outlets; this additional set of calculations provided more robust information on the effects of the regulatory worst-case scenario. The method involved the following steps:

- Define a two kilometre by two kilometre domain around each ventilation outlet (refer to **Figure 4-8**)
- Identify the top 10 receivers with the largest ventilation outlet contributions
- Run the GRAL model for these receivers to obtain a time series
- Conduct a contemporaneous assessment to combine the background contributions and GRAL predictions
- Present NO₂ results as both the maximum total (background and ventilation outlet contributions) and maximum ventilation outlet increment.

The locations of the 'top 10' receivers from step 2 are shown in **Figure 4-9** to **Figure 4-14**. Note that the Southern Connector is a separate future project. The ventilation outlet shown on **Figure 4-8** is indicative only.

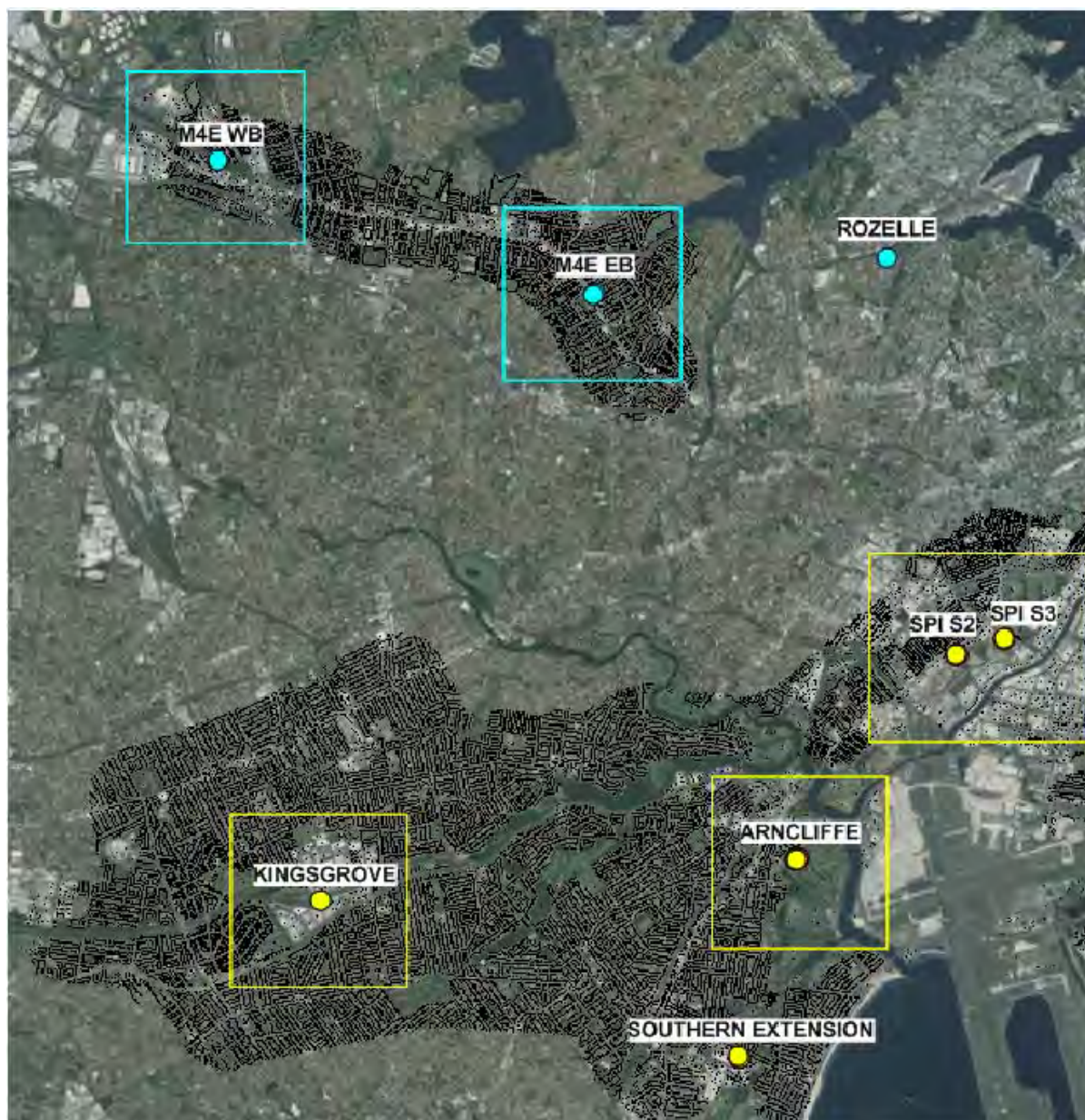


Figure 4-8 Domains around ventilation outlets



Figure 4-9 Top 10 RWC ventilation outlet increment RWR receivers for one-hour NO_x (2021-DS and 2031-DS, St Peters interchange (Stage 2) ventilation outlet)



Figure 4-10 Top 10 RWC ventilation outlet increment RWR receivers for one-hour NO_x (2031-DSC, St Peters interchange (Stage 2 and Stage 3) ventilation outlets)

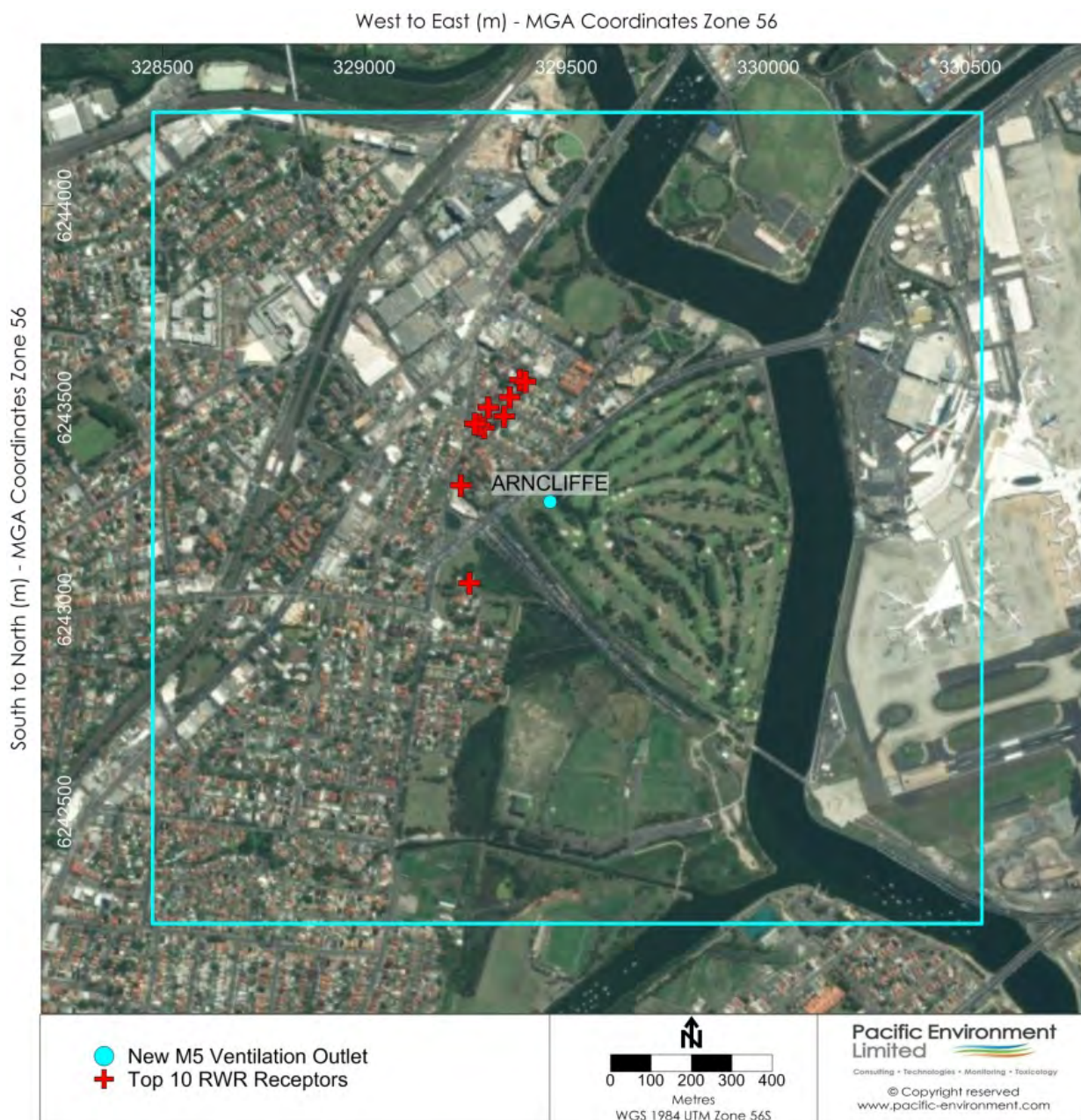


Figure 4-11 Top 10 RWC ventilation outlet increment RWR receivers for one-hour NO_x (2021-DS and 2031-DS, Arncliffe ventilation outlet)



Figure 4-12 Top 10 RWC ventilation outlet increment RWR receivers for one-hour NO_x (2031-DSC, Arncliffe ventilation outlet)



Figure 4-13 Top 10 RWC ventilation outlet increment RWR receivers for one-hour NO_x (2021-DS and 2031-DS, Kingsgrove ventilation outlet)

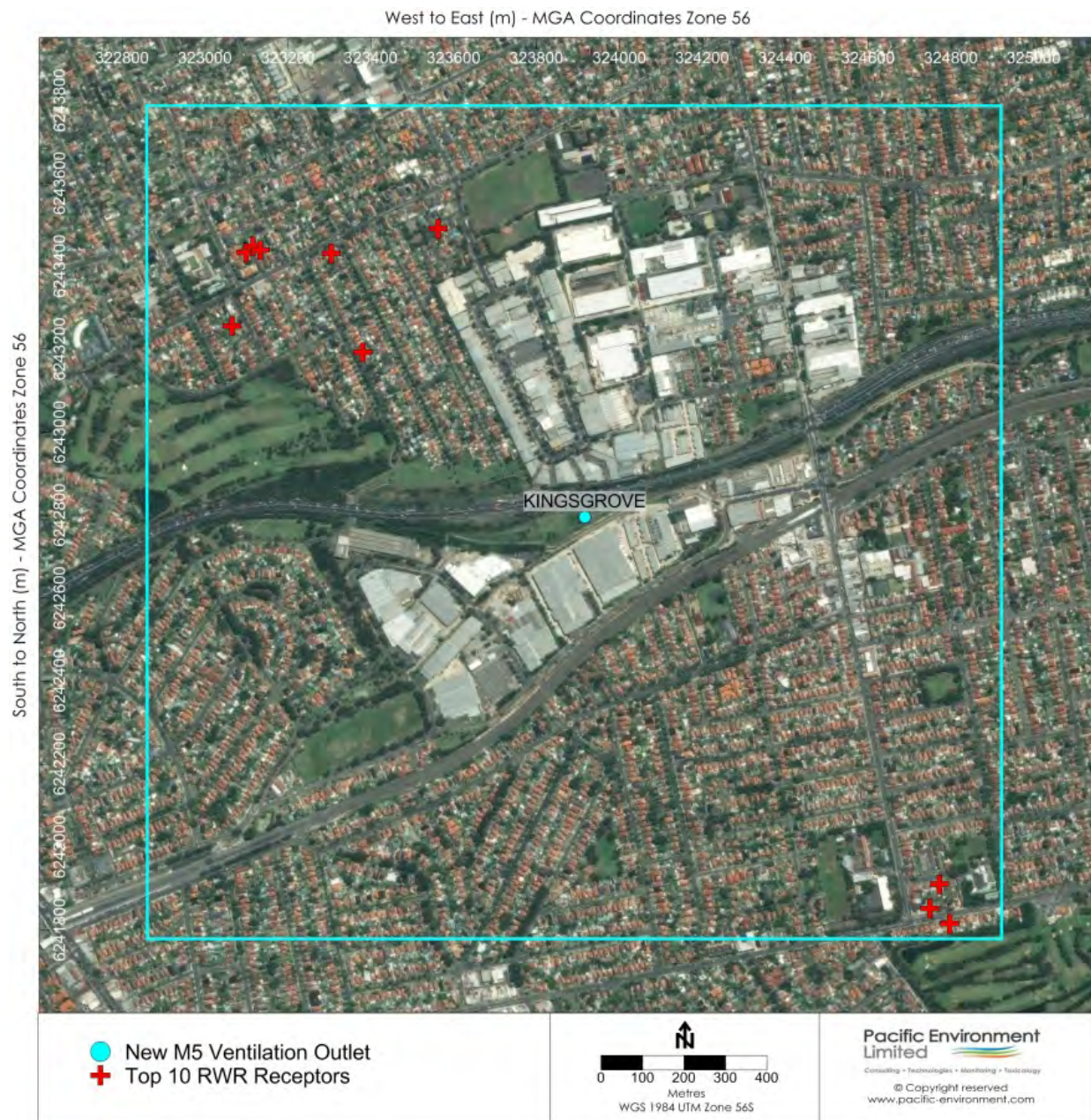


Figure 4-14 Top 10 RWC ventilation outlet increment RWR receivers for one-hour NO_x (2031-DSC, Kingsgrove ventilation outlet)

Results

The results are shown in **Figure 4-15** to **Figure 4-23**. In each figure:

- The first plot (a) shows the different source contributions when the maximum one-hour NO₂ concentration occurs during the year. During these periods the ventilation outlet contributions are zero or close to zero
- The second plot (b) shows the NO₂ concentrations when the maximum ventilation outlet concentrations occur; under these circumstances the background and surface road concentrations tend to be lower than in plot (a), and therefore the total NO₂ concentrations are well below the applicable air quality criterion.

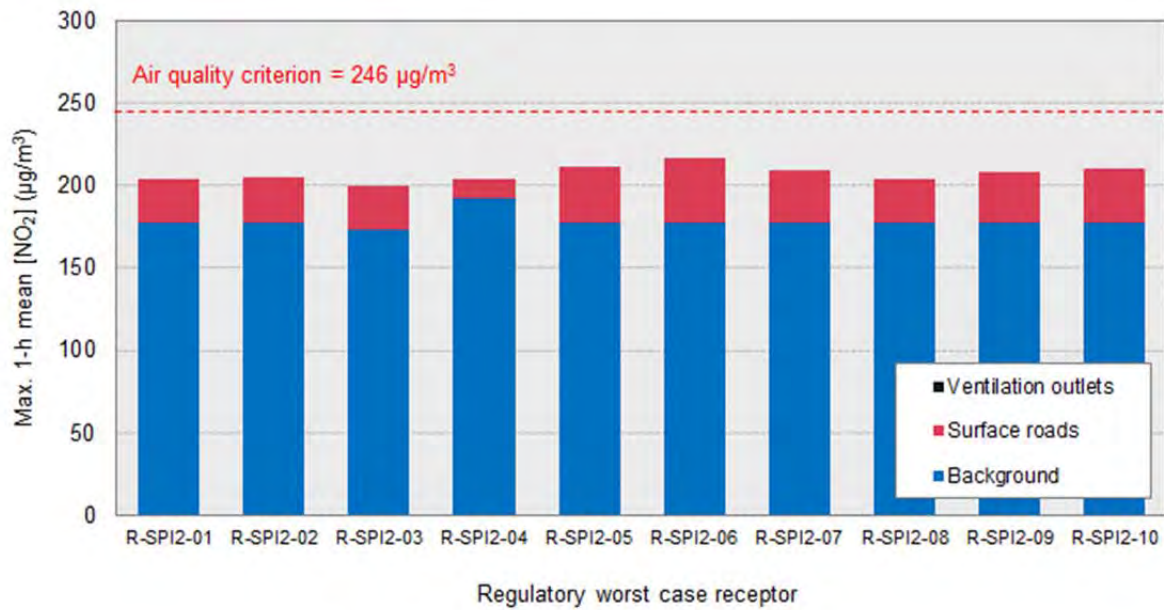
For some receivers the same maximum ventilation outlet concentration occurred in more than one hour of the year. Where this was the case, the hour having the largest total concentration has been presented.

Although in some cases the ventilation outlet contributions appear to be substantial, this is deceptive. As the background and surface road contributions (and hence total NO_x) increase, there is a pronounced reduction in the contribution of the ventilation outlets to NO₂. In other words, as the total NO₂ concentration tends towards the 'maximum' situation in plot (a) of each figure, the ventilation outlet contribution to NO₂ decreases dramatically, indicated by the black 'ventilation outlet' contribution being imperceptible in the plots. Plot (b) of each figure shows that the maximum ventilation outlet contribution occurs when other contributions are low, such that overall NO₂ concentrations are well below the applicable air quality criterion or even the current maximum concentration.

The results for the receivers with the largest ventilation outlet contributions to NO₂ were also examined in more detail. For each hour of the year the separate contributions of background, surface roads and ventilation outlets were determined, and the hourly periods were ranked by the ventilation outlet contribution. The results are shown in **Figure 4-24** to **Figure 4-32**.

Only the one-hour periods with a ventilation outlet contribution greater than zero are shown in each figure (typically around 3,000 hours of the year). It can be seen that for all non-zero ventilation outlet contributions the total one-hour NO₂ concentration is no greater than 200 µg/m³; the highest total concentrations tend to occur when the ventilation outlet contribution is zero or close to zero. This is also clear from **Figure 4-33** to **Figure 4-35** which show, for each scenario, the contributions at the receivers with the largest ventilation outlet contributions. These are ranked by the total NO₂ concentration (in this case all hours of the year are shown).

(a) Maximum total NO₂ concentrations



(b) NO₂ concentrations for maximum outlet contributions

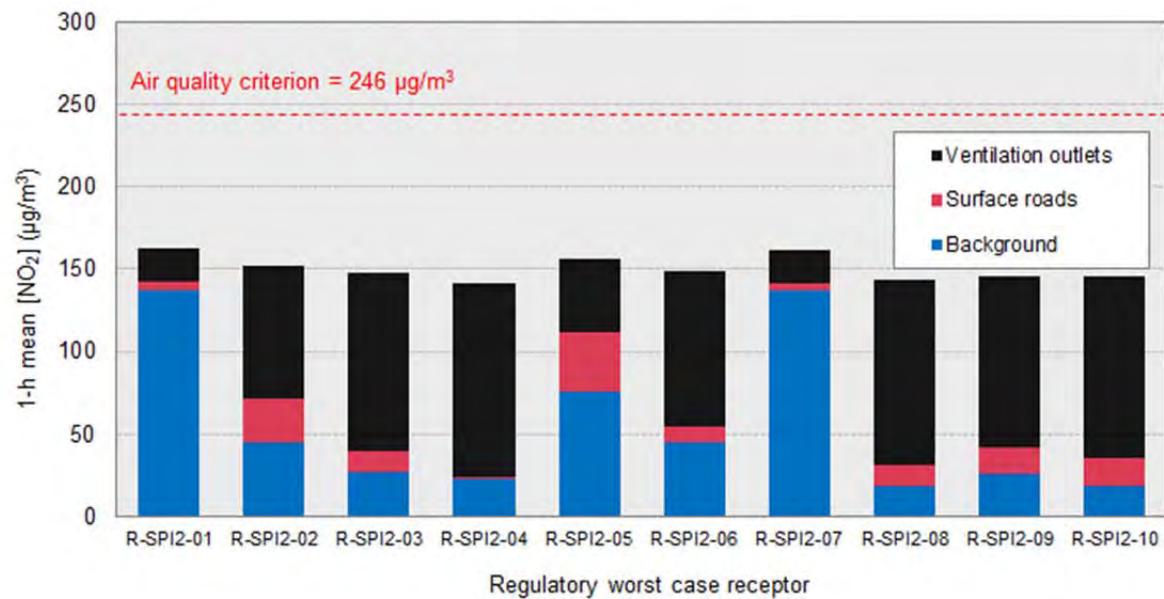
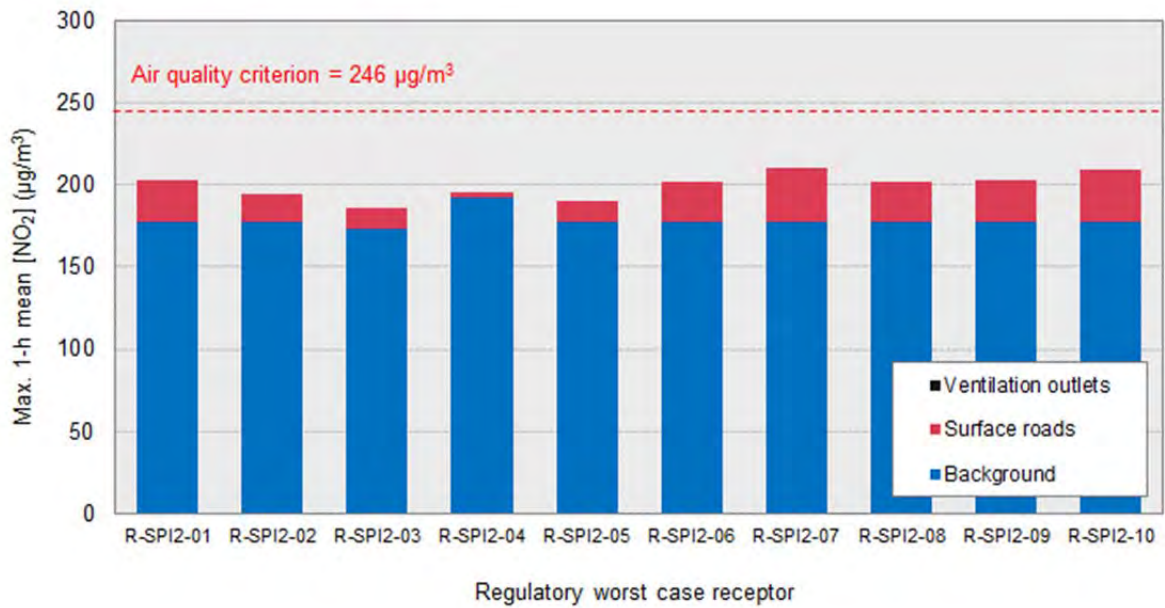


Figure 4-15 One-hour mean NO₂ concentrations (2021-DS, St Peters Interchange (Stage 2) ventilation outlet)

(a) Maximum total NO₂ concentrations



(b) NO₂ concentrations for maximum outlet contributions

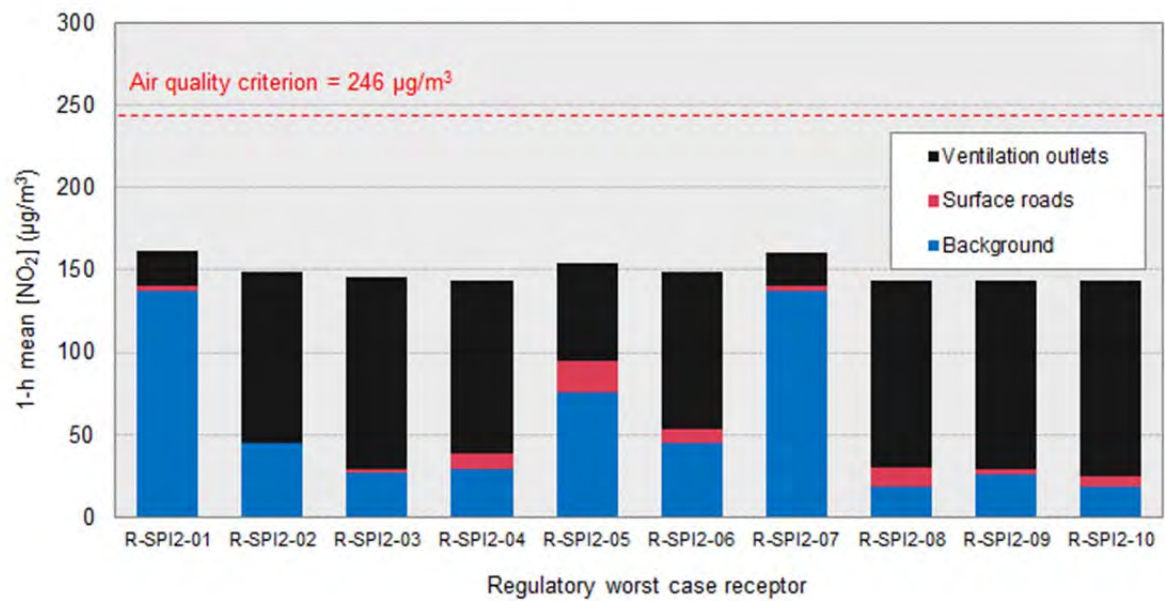
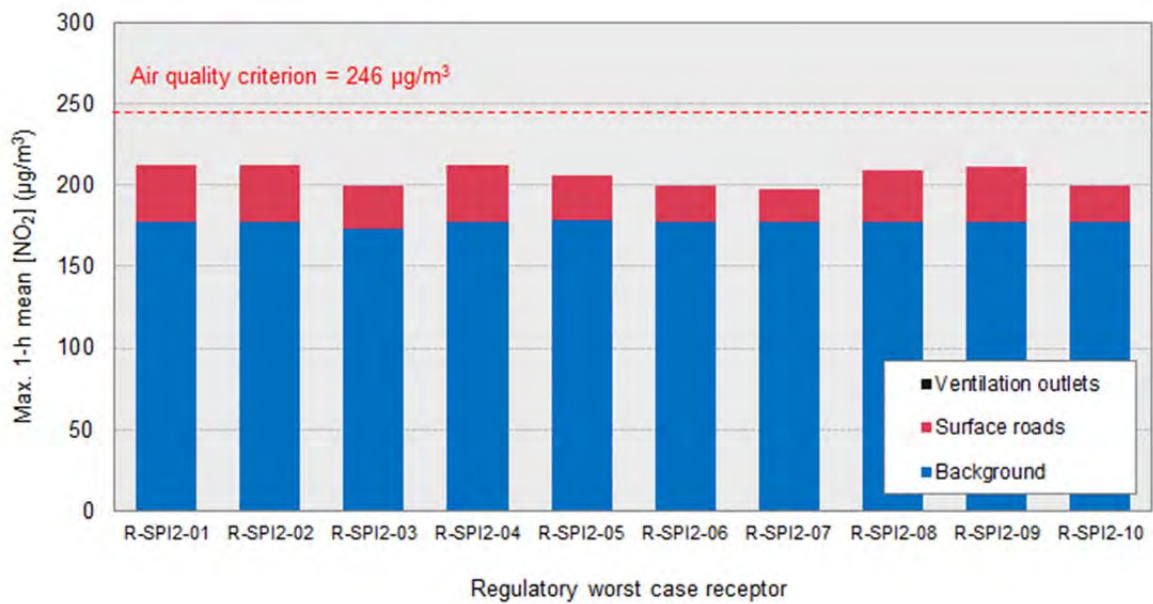


Figure 4-16 One-hour mean NO₂ concentrations (2031-DS, St Peters Interchange (Stage 2) ventilation outlet)

(a) Maximum total NO₂ concentrations



(b) NO₂ concentrations for maximum outlet contributions

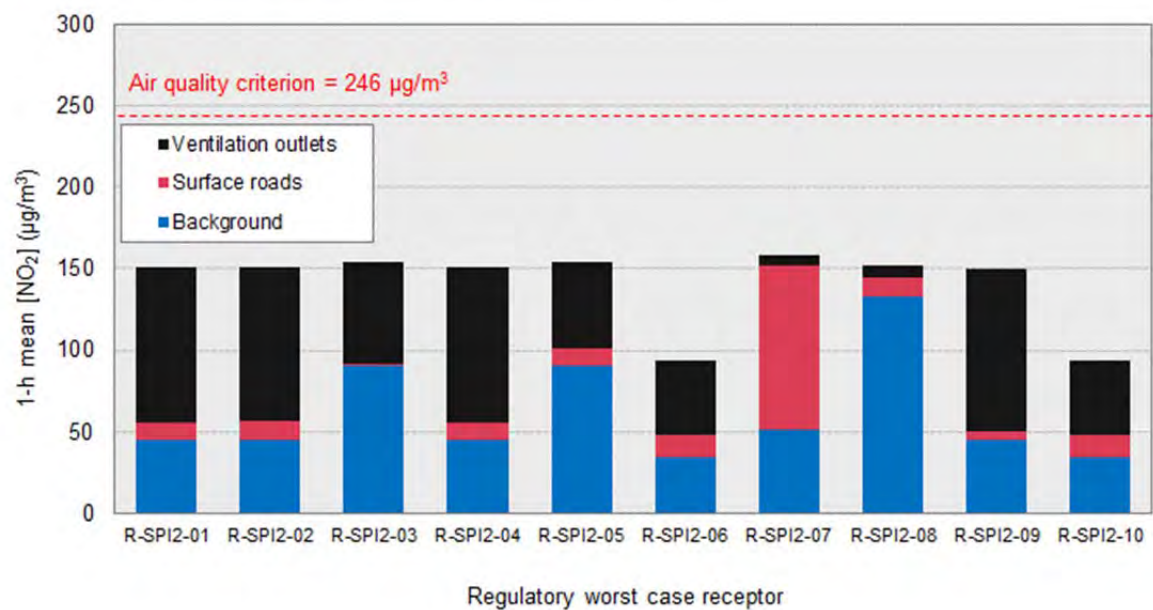
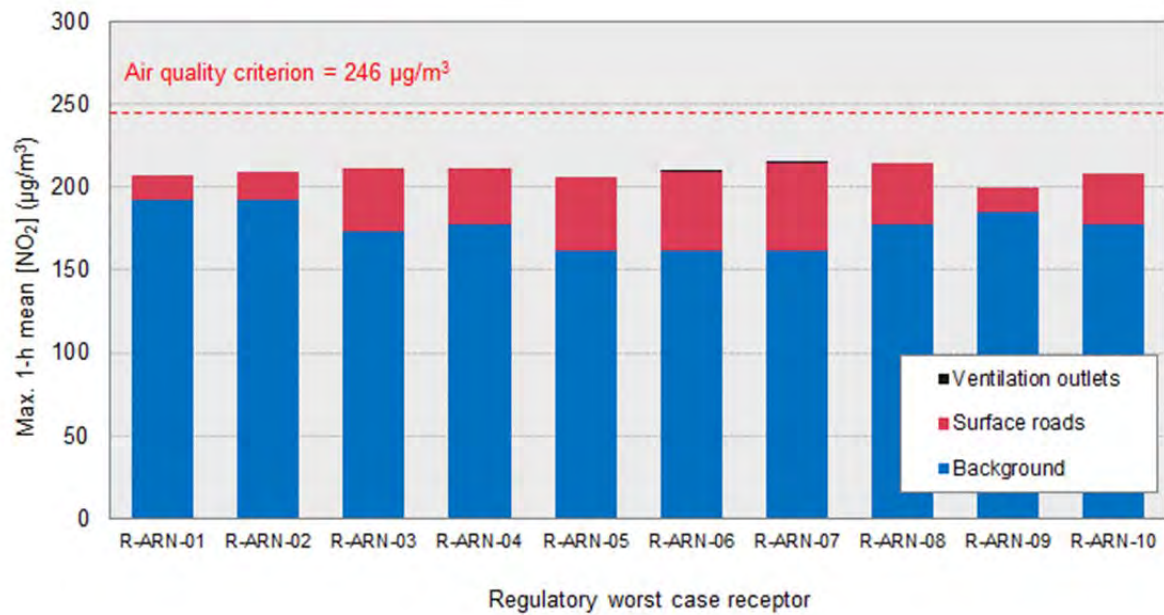


Figure 4-17 One-hour mean NO₂ concentrations (2031-DSC, St Peters Interchange (Stage 2) ventilation outlet)

(a) Maximum total NO₂ concentrations



(b) NO₂ concentrations for maximum outlet contributions

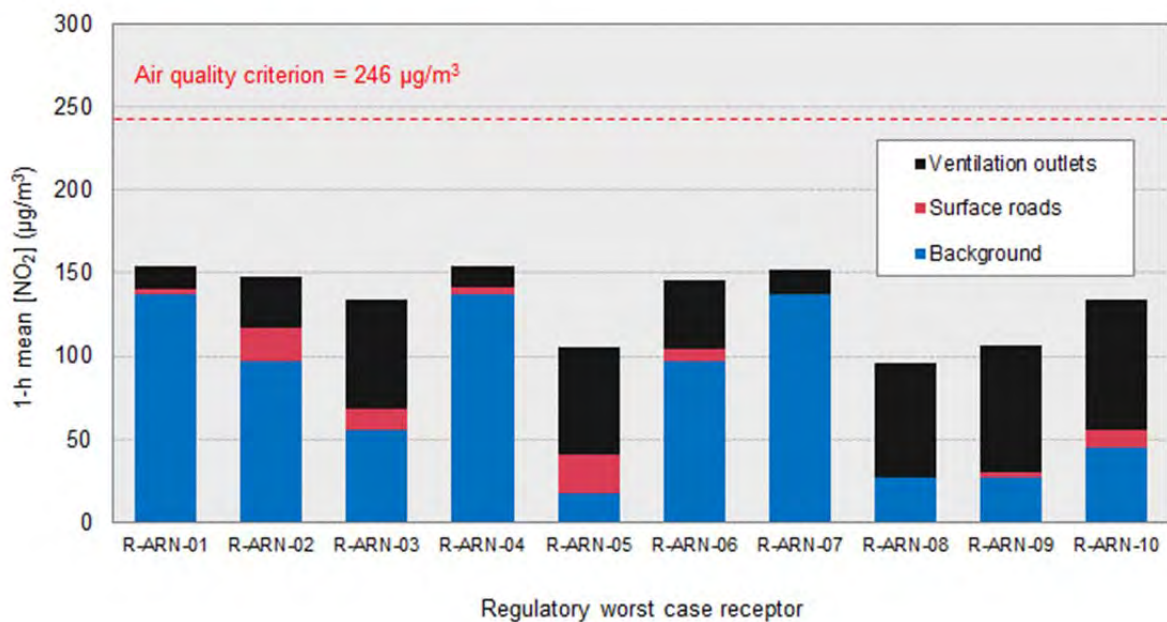
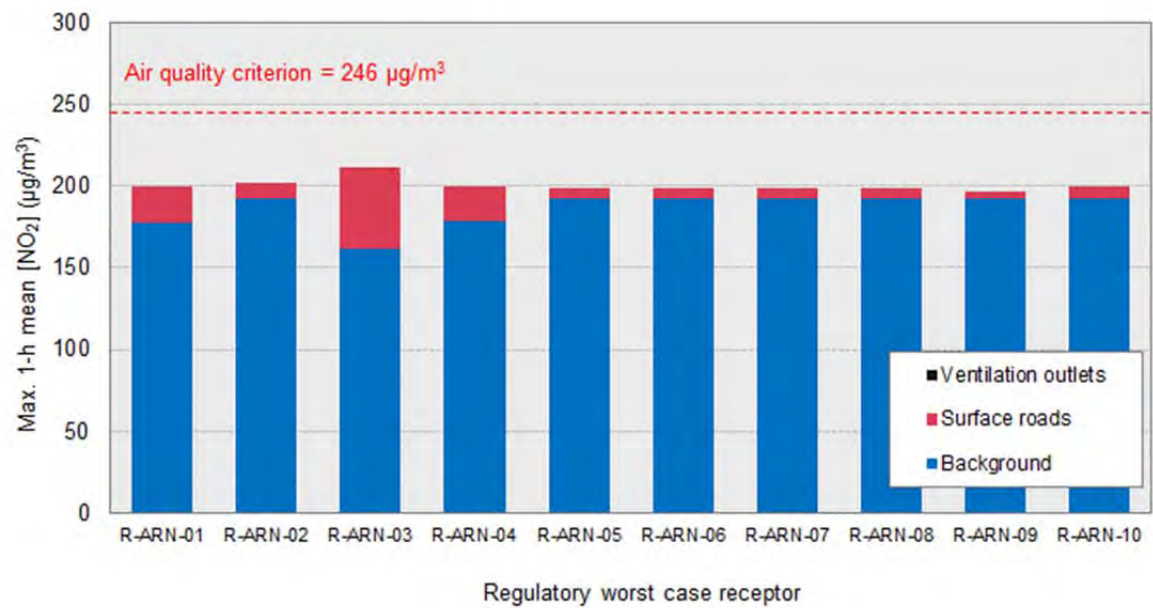


Figure 4-18 One-hour mean NO₂ concentrations (2021-DS, Arncliffe ventilation outlet)

(a) Maximum total NO₂ concentrations



(b) NO₂ concentrations for maximum outlet contributions

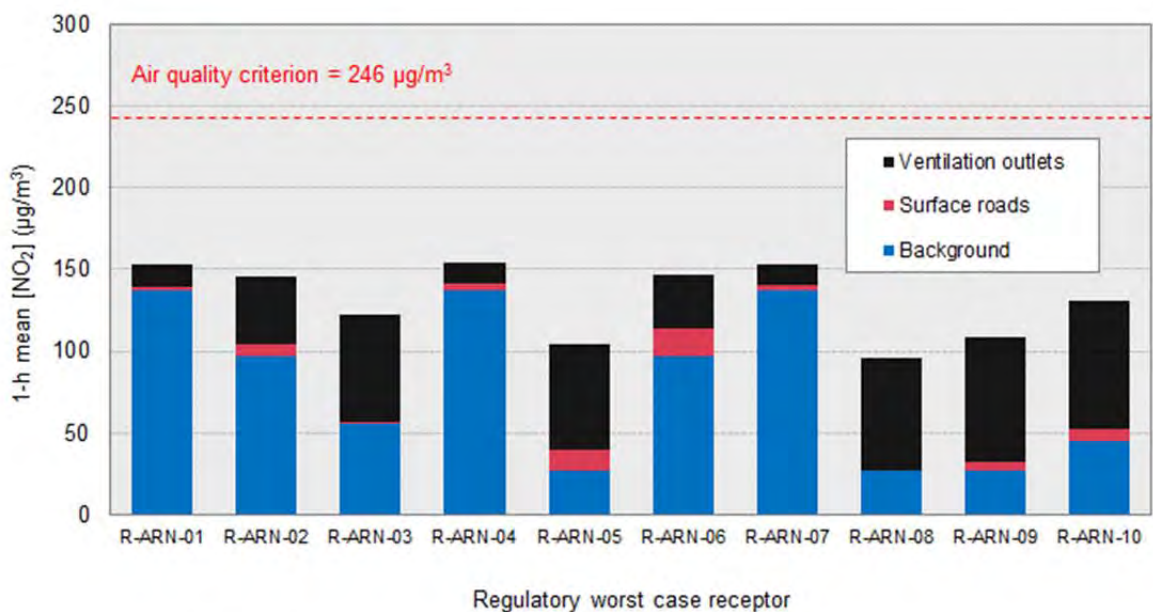
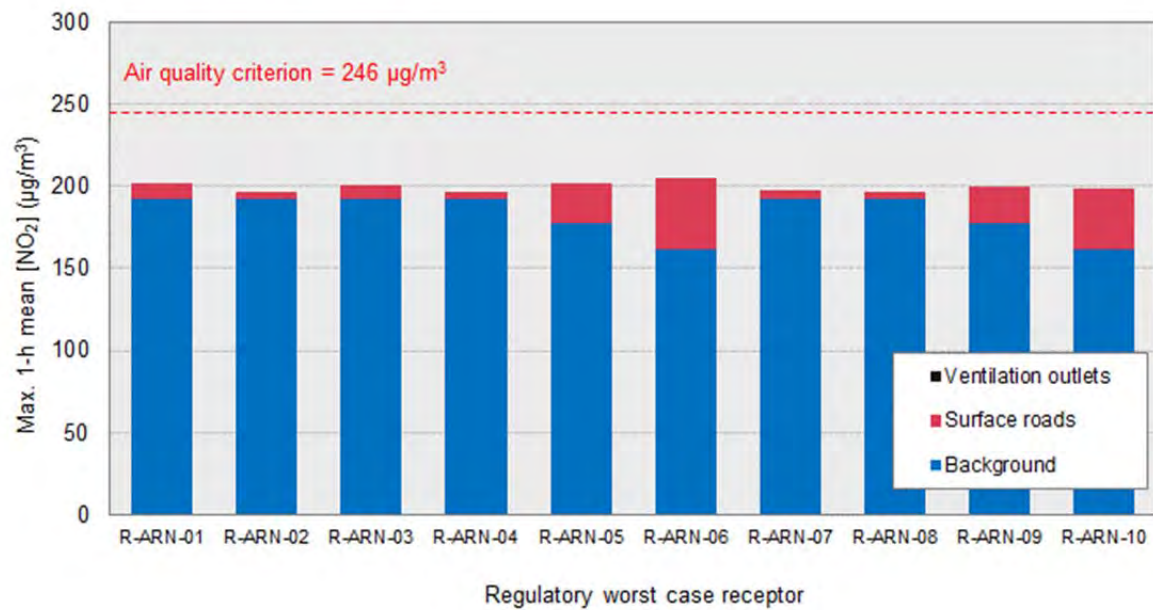


Figure 4-19 One-hour mean NO₂ concentrations (2031-DS, Arncliffe ventilation outlet)

(a) Maximum total NO₂ concentrations



(b) NO₂ concentrations for maximum outlet contributions

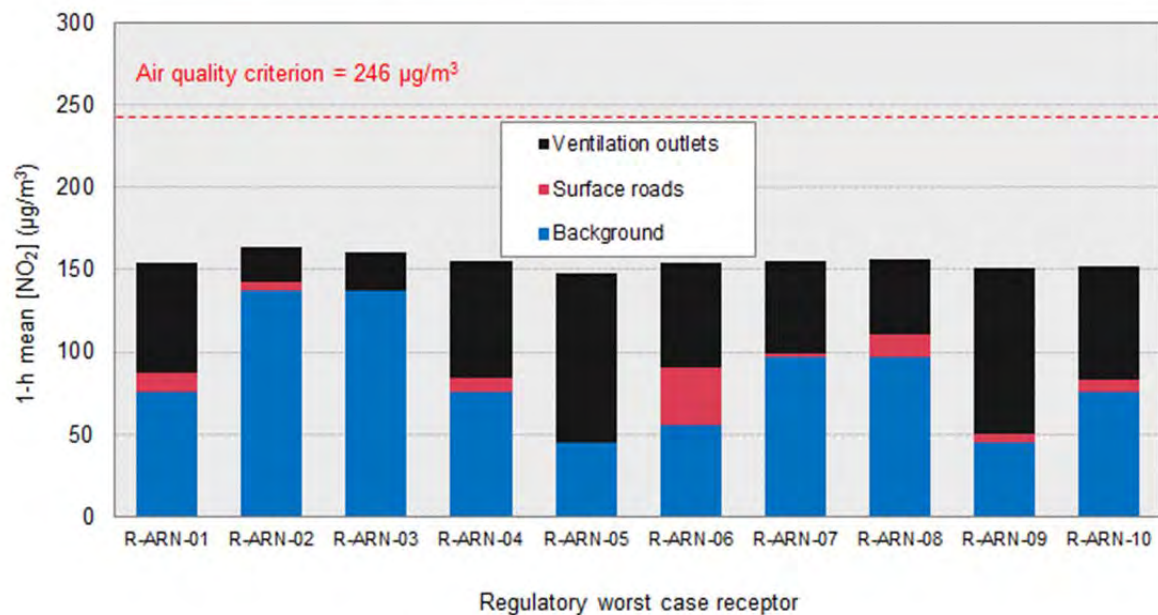
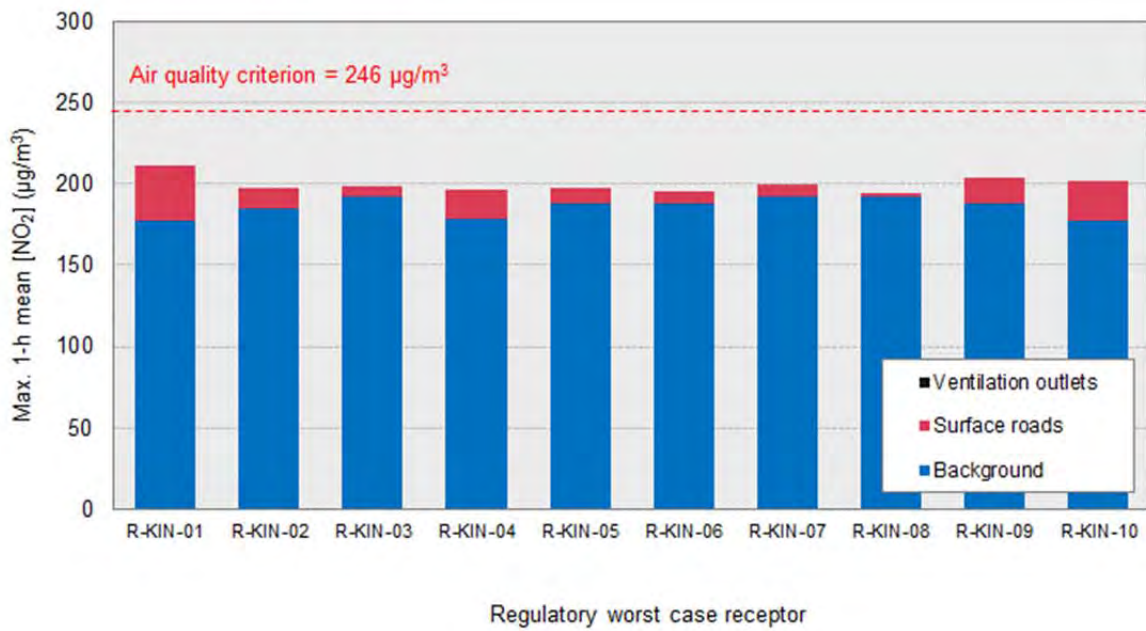


Figure 4-20 One-hour mean NO₂ concentrations (2031-DSC, Arncliffe ventilation outlet)

(a) Maximum total NO₂ concentrations



(b) NO₂ concentrations for maximum outlet contributions

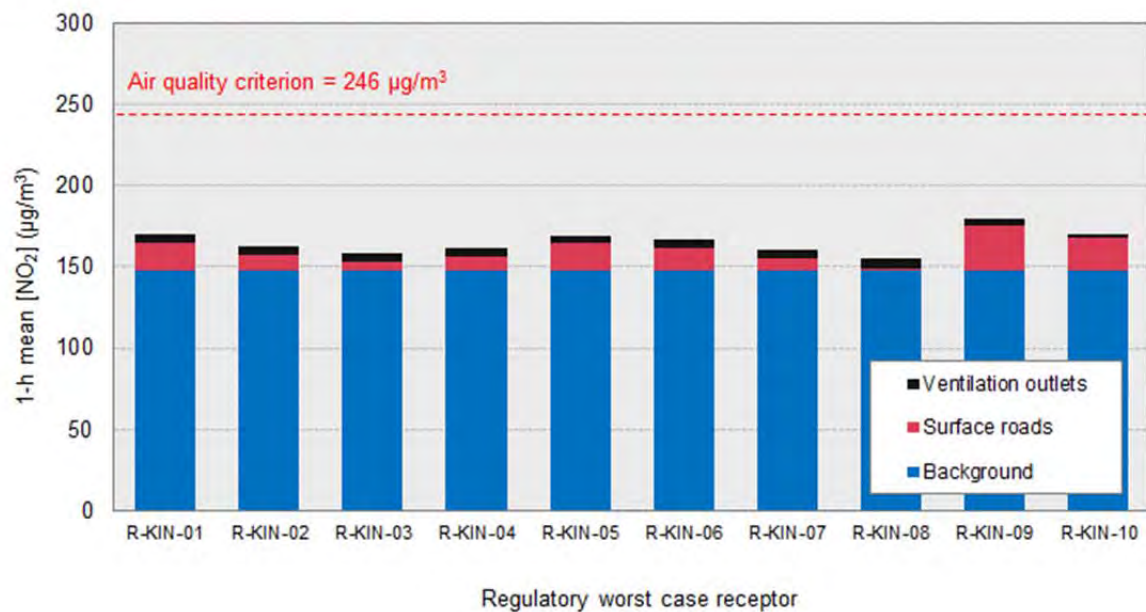
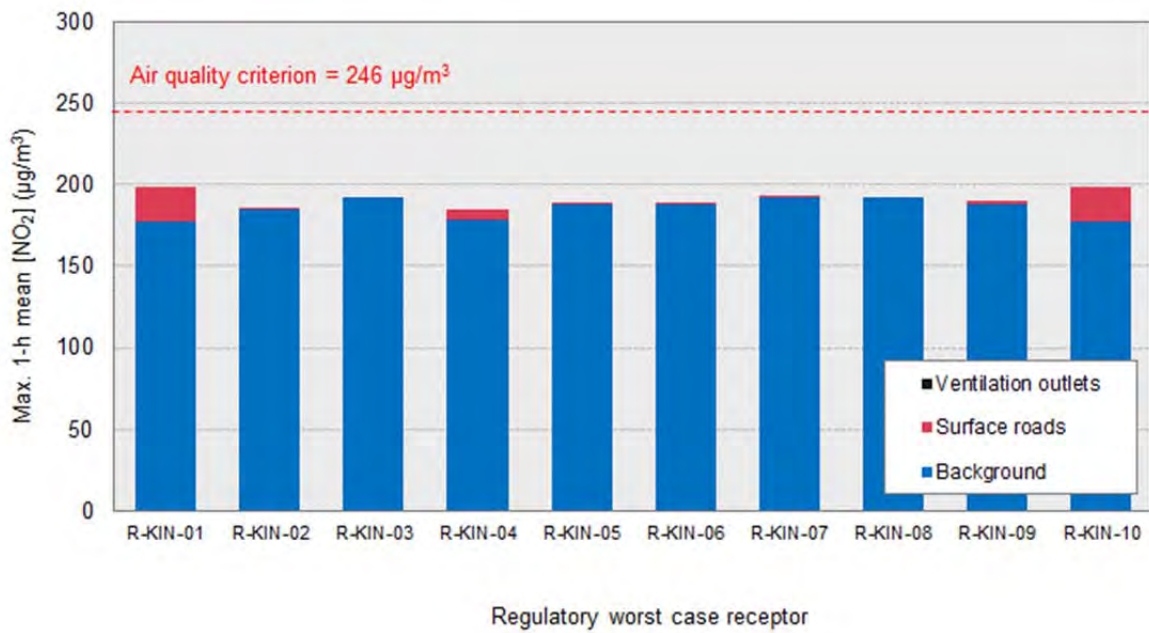


Figure 4-21 One-hour mean NO₂ concentrations (2021-DS, Kingsgrove ventilation outlet)

(a) Maximum total NO₂ concentrations



(b) NO₂ concentrations for maximum outlet contributions

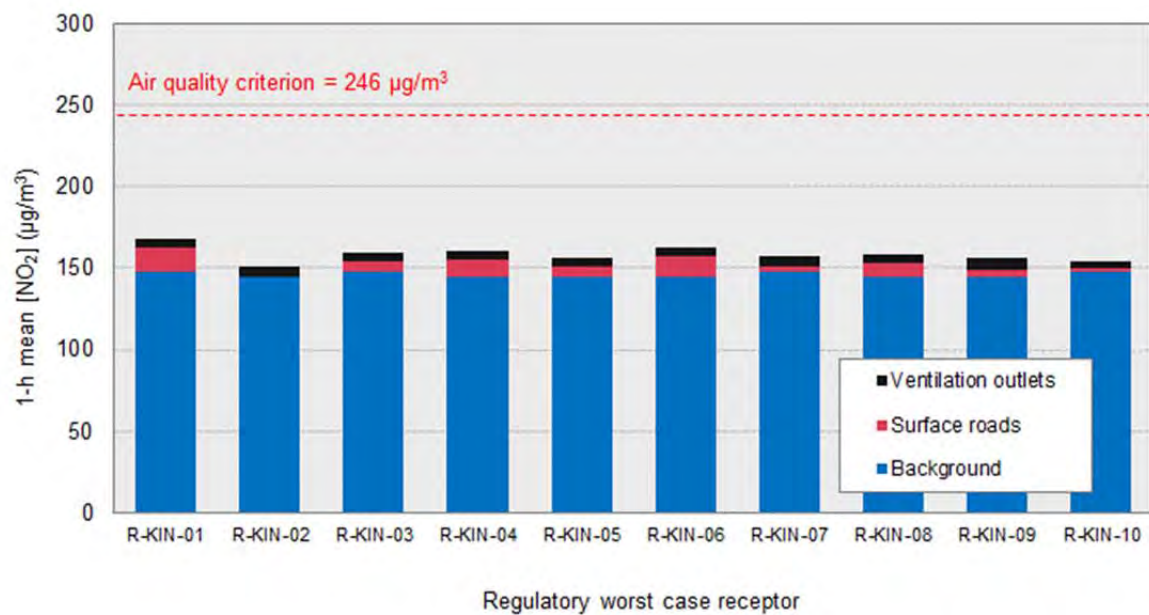
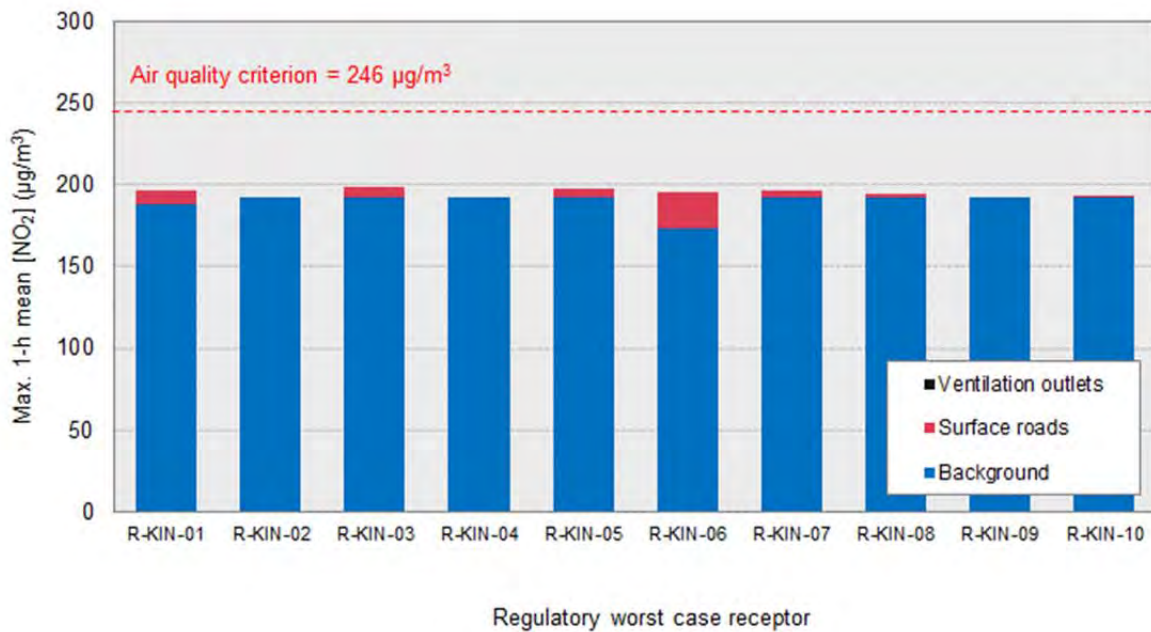


Figure 4-22 One-hour mean NO₂ concentrations (2031-DS, Kingsgrove ventilation outlet)

(a) Maximum total NO₂ concentrations



(b) NO₂ concentrations for maximum outlet contributions

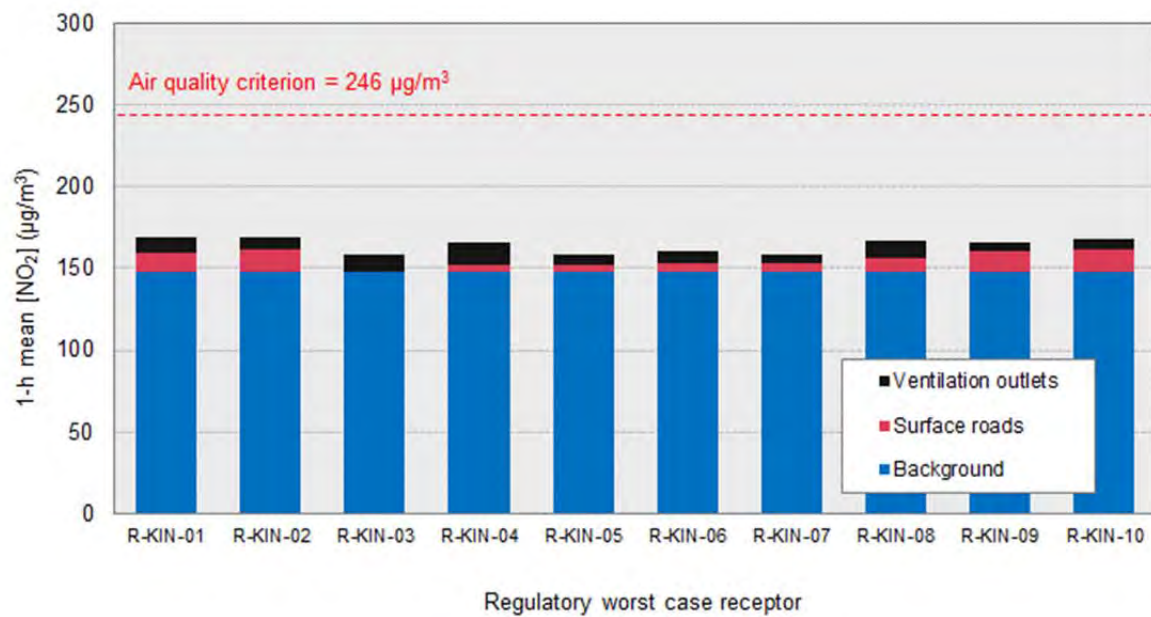


Figure 4-23 One-hour mean NO₂ concentrations (2031-DSC, Kingsgrove ventilation outlet)

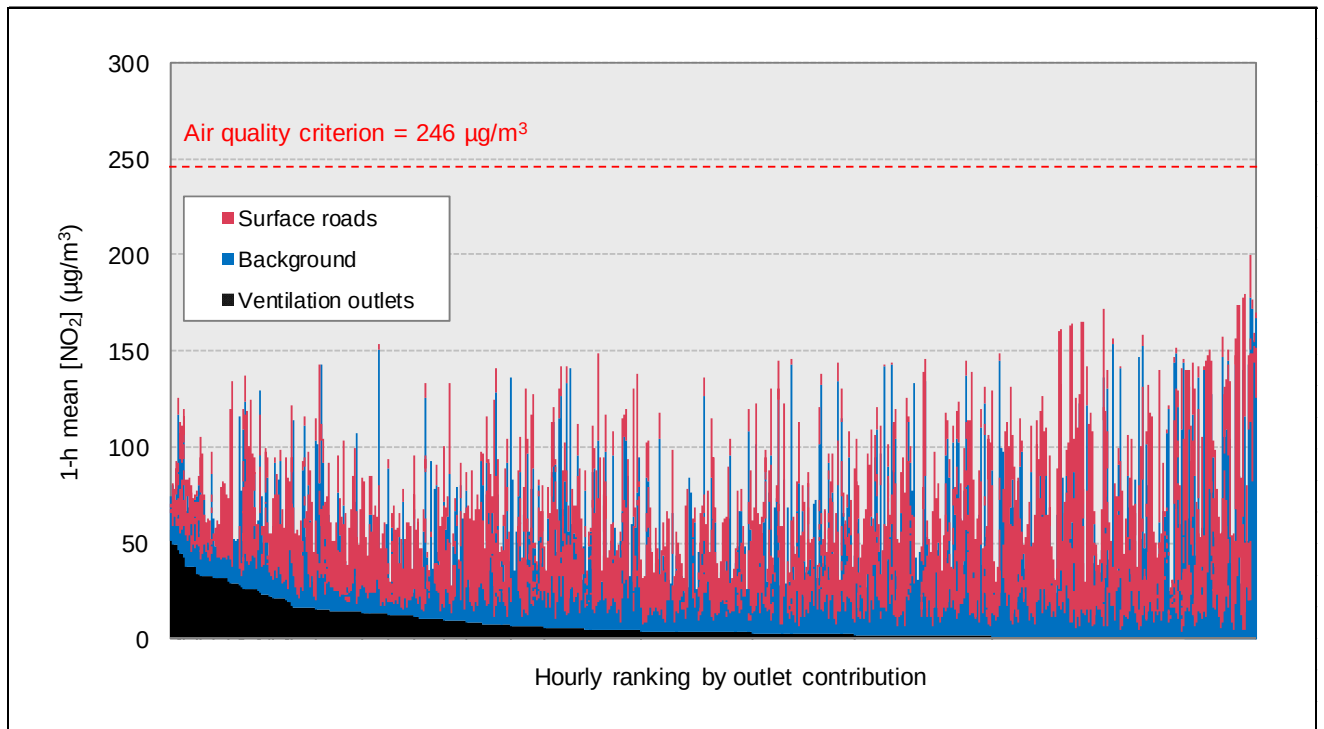


Figure 4-24 Hourly contributions to one-hour mean NO₂, ranked by outlet contribution, for receiver with largest ventilation outlet contribution (2021-DS (Arncliffe) – receiver R-ARN-01)

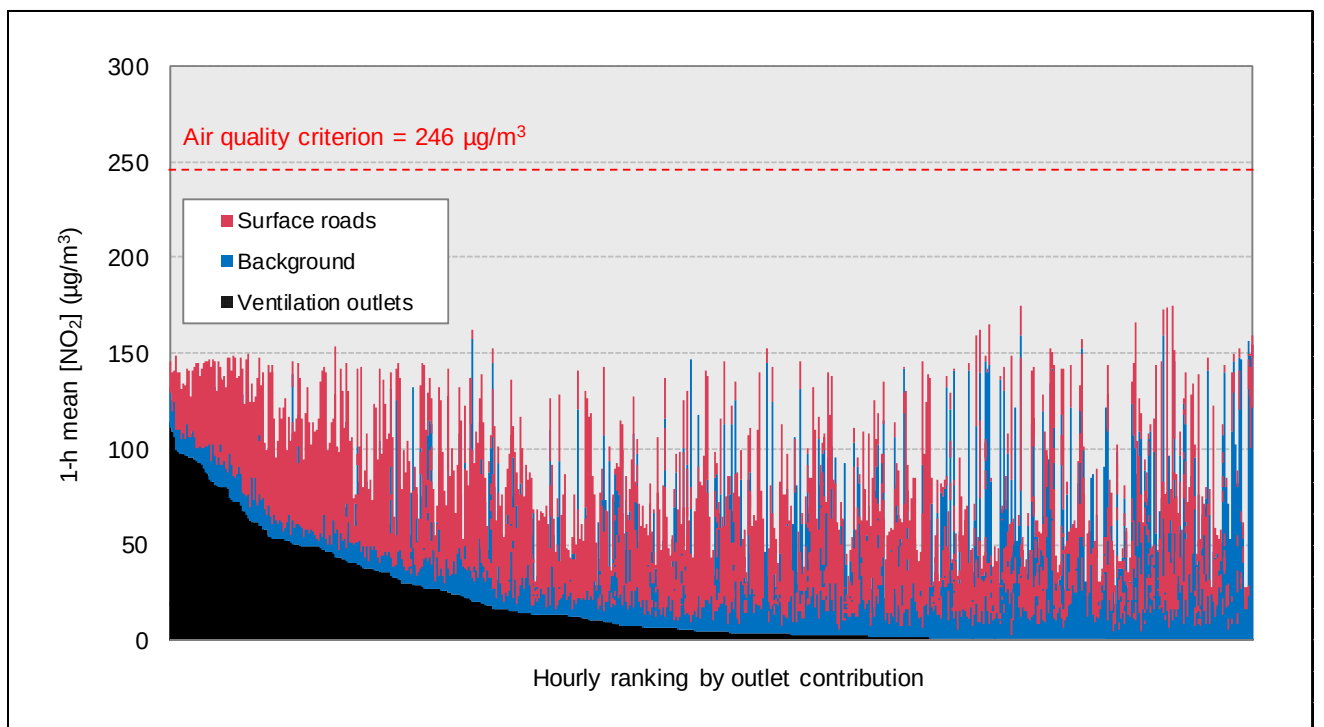


Figure 4-25 Hourly contributions to one-hour mean NO₂, ranked by outlet contribution, for receiver with largest ventilation outlet contribution 2021-DS (SPI Stage 2) – receiver R-SPI2-01

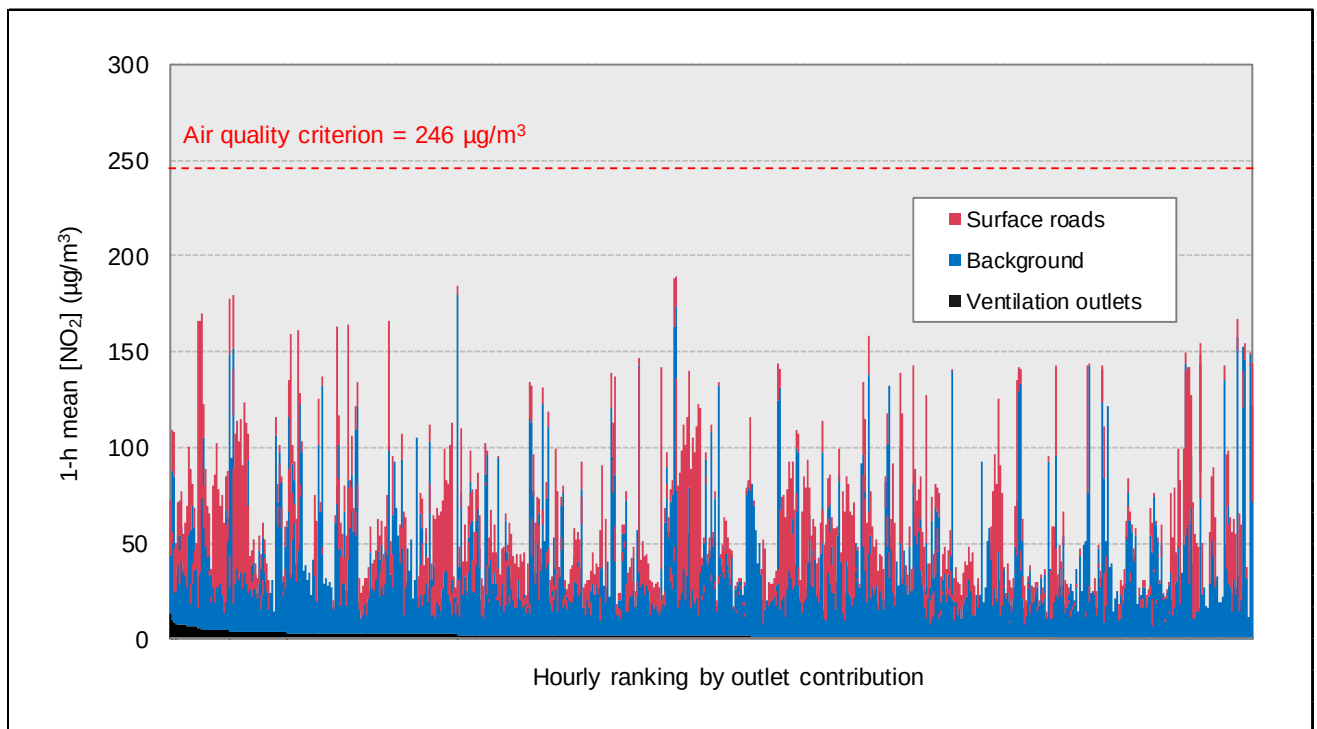


Figure 4-26 Hourly contributions to one-hour mean NO₂, ranked by outlet contribution, for receiver with largest ventilation outlet contribution 2021-DS (Kingsgrove) – receiver R-KIN-09

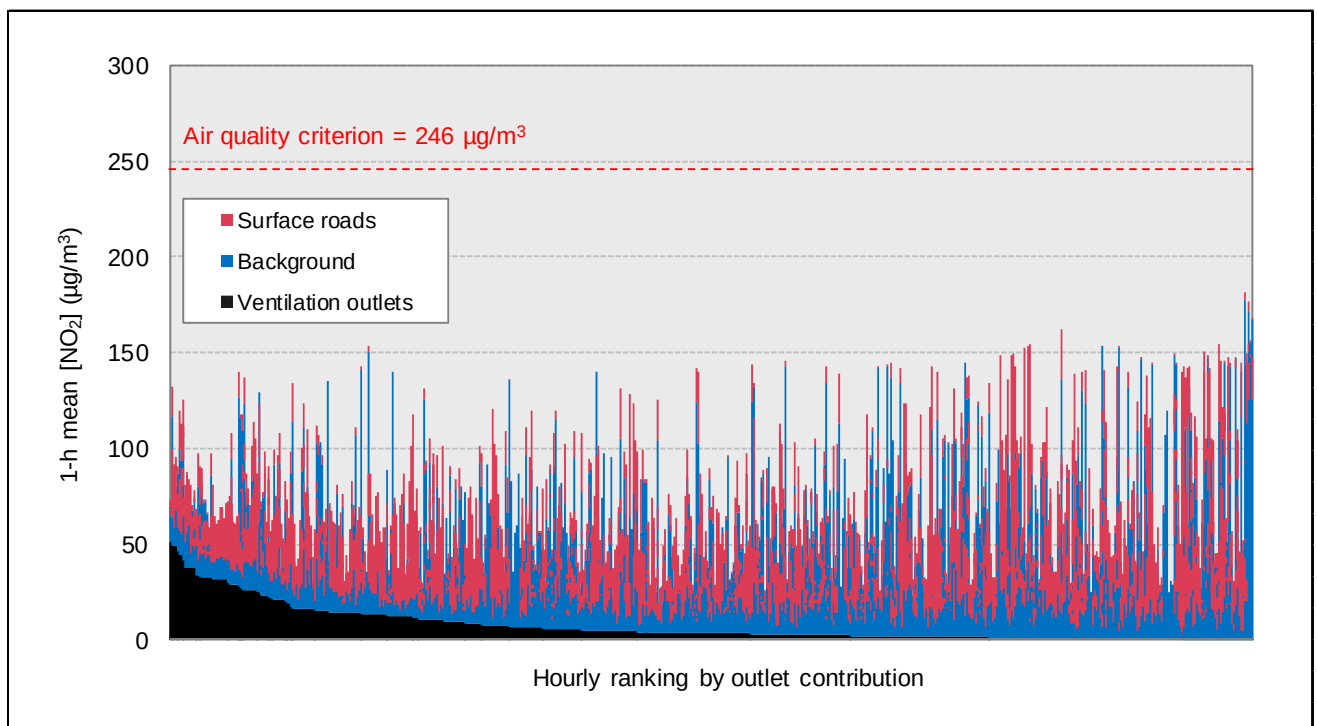


Figure 4-27 Hourly contributions to one-hour mean NO₂, ranked by outlet contribution, for receiver with largest ventilation outlet contribution 2031-DS (Arncliffe) – receiver R-ARN-01

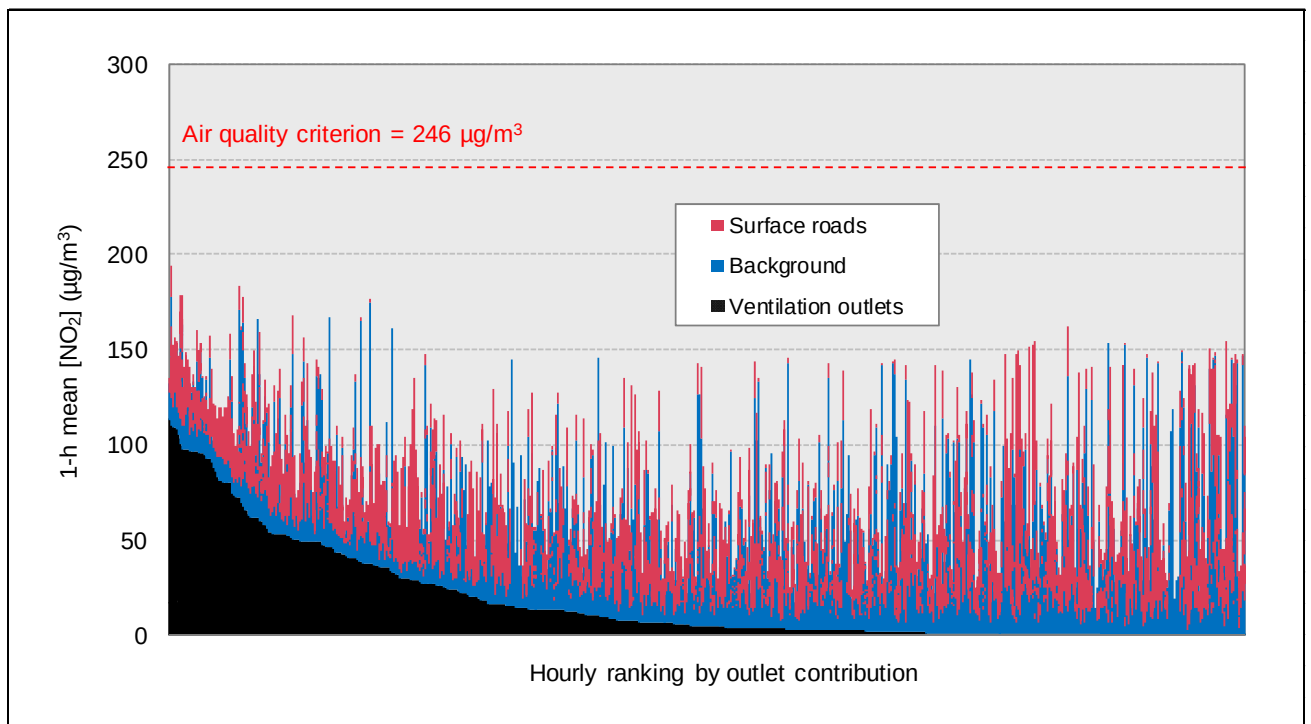


Figure 4-28 Hourly contributions to one-hour mean NO₂, ranked by outlet contribution, for receiver with largest ventilation outlet contribution 2031-DS (St Peters Interchange Stage 2) – receiver R-SPI2-01

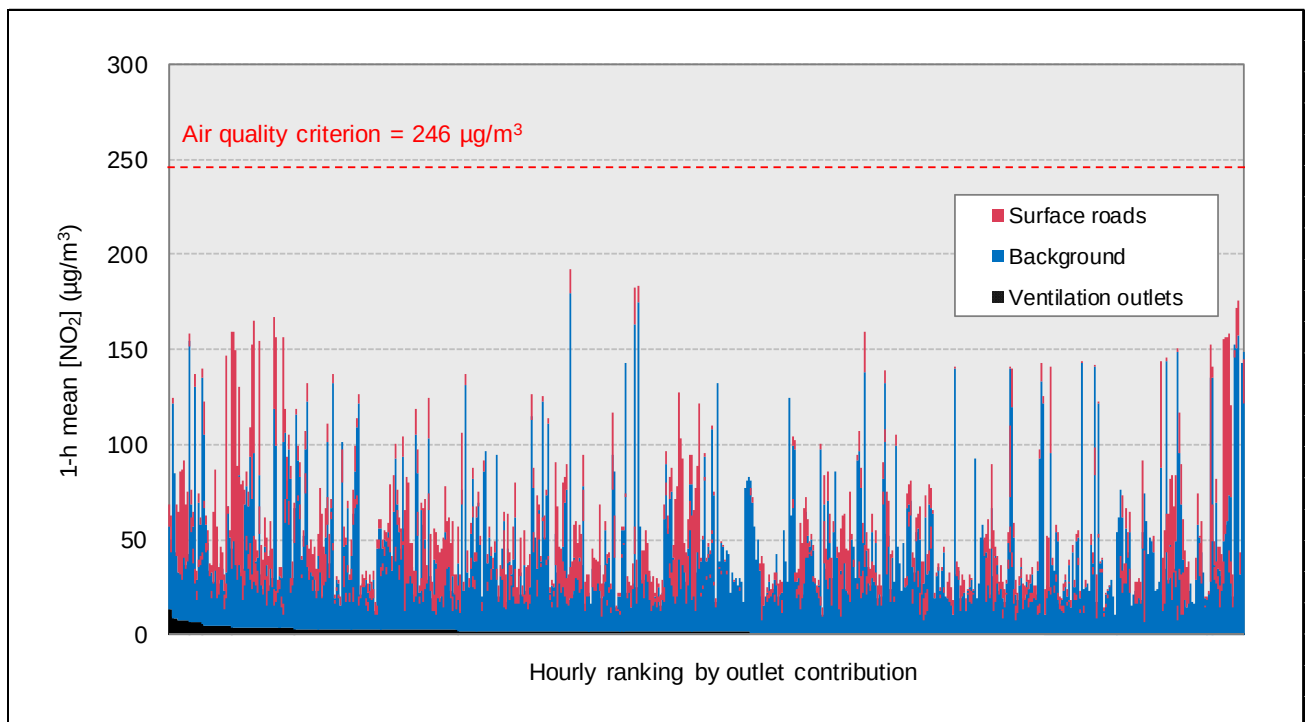


Figure 4-29 Hourly contributions to one-hour mean NO₂, ranked by outlet contribution, for receiver with largest ventilation outlet contribution 2031-DS (Kingsgrove) – receiver R-KIN-09

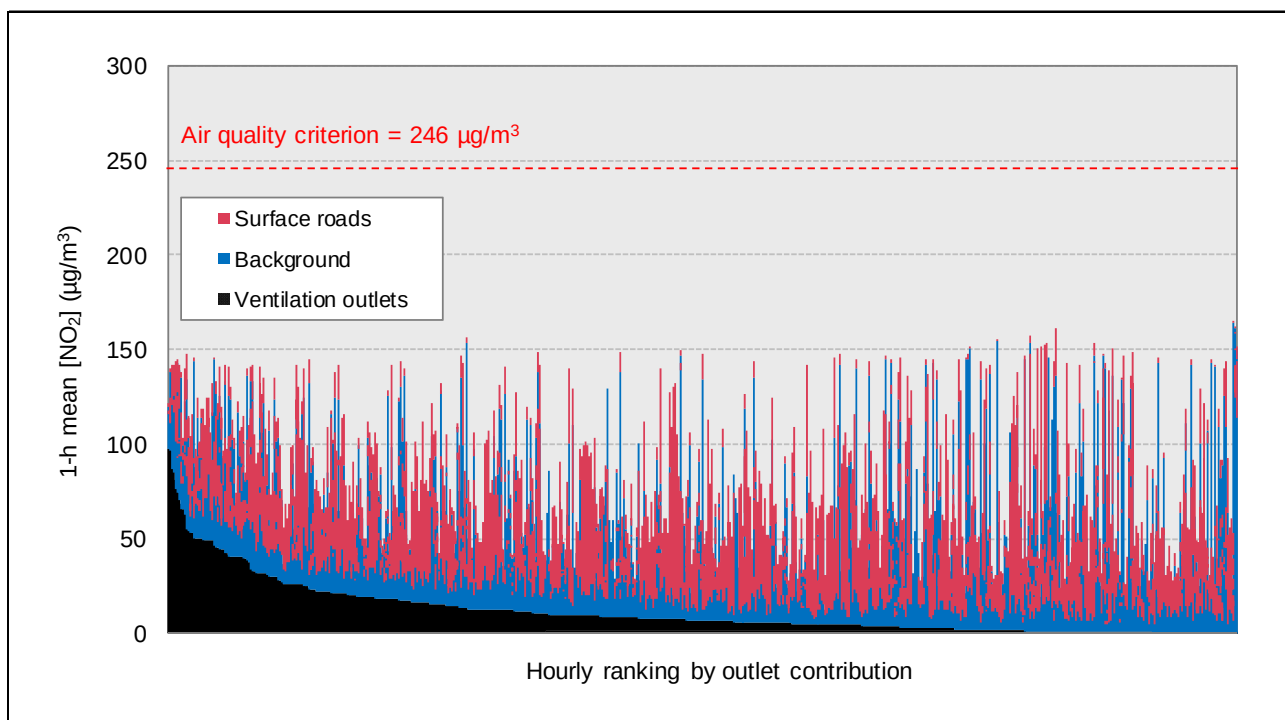


Figure 4-30 Hourly contributions to one-hour mean NO₂, ranked by outlet contribution, for receiver with largest outlet contribution 2031-DSC (Arncliffe) – Receiver R-ARN-09

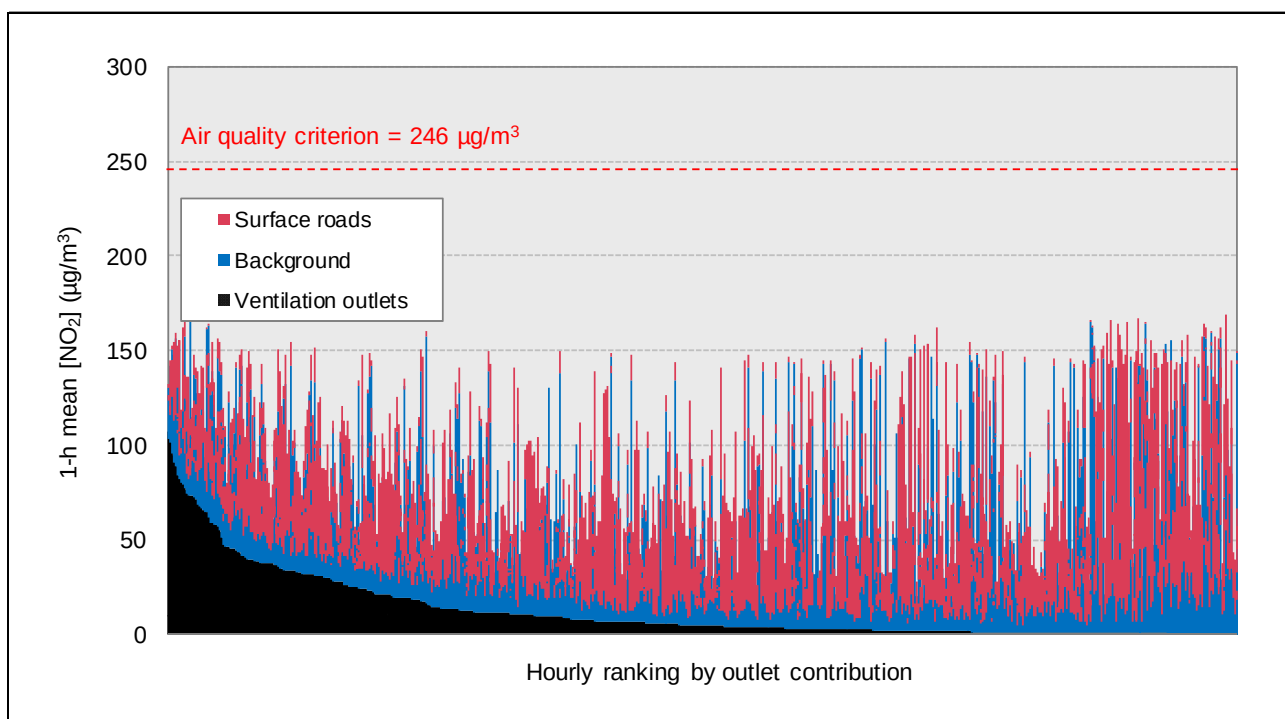


Figure 4-31 Hourly contributions to one-hour mean NO₂, ranked by outlet contribution, for receiver with largest ventilation outlet contribution 2031-DSC (St Peters Interchange Stage 2/3) – receiver R-SPI2/3-01

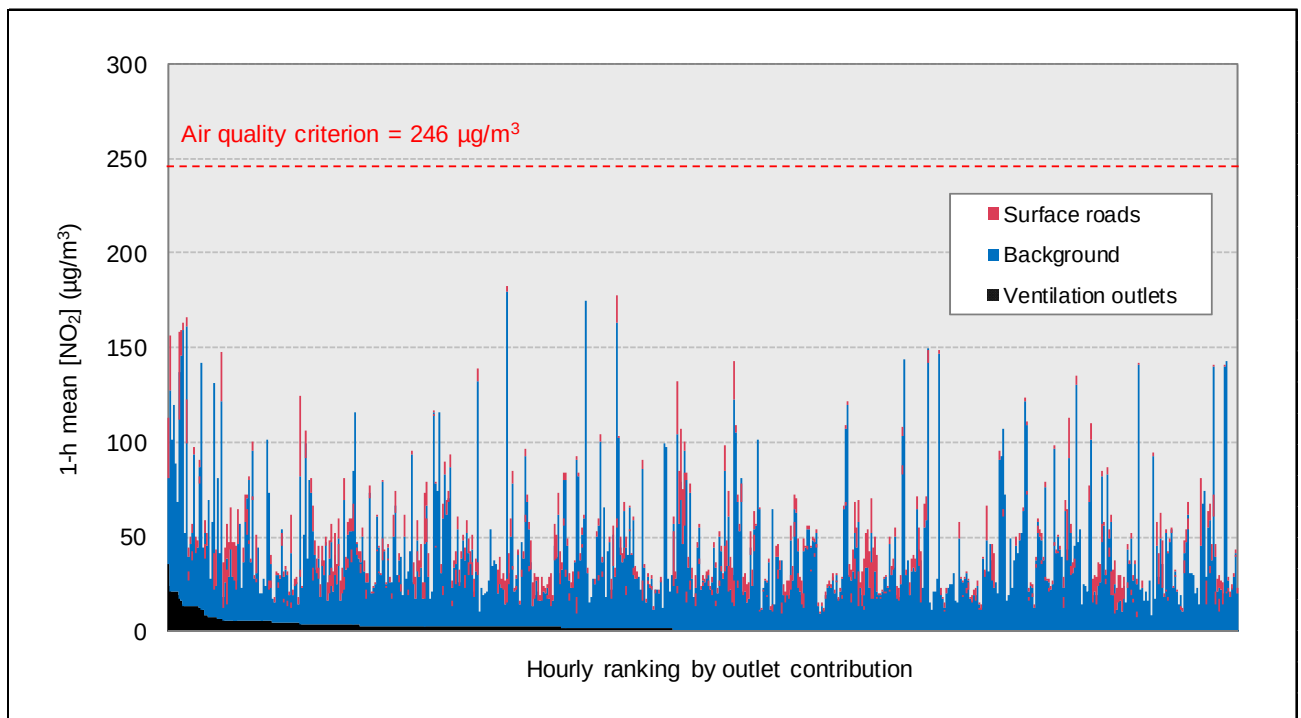


Figure 4-32 Hourly contributions to one-hour mean NO₂, ranked by outlet contribution, for receiver with largest ventilation outlet contribution 2031-DSC (Kingsgrove) – receiver R-KIN-04

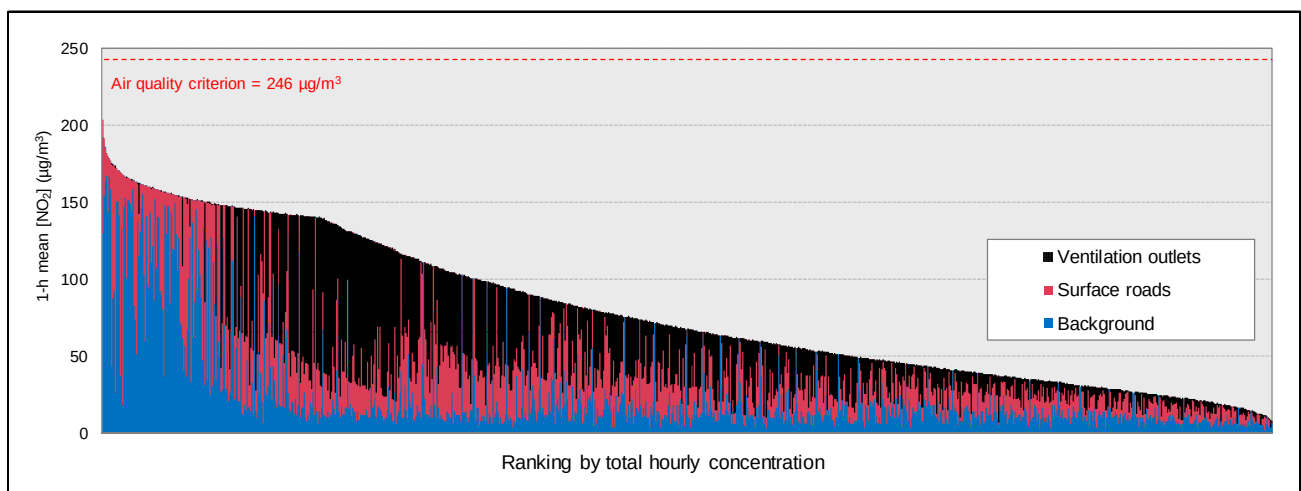


Figure 4-33 Hourly contributions to one-hour mean NO₂, ranked by total concentration, for receiver with largest ventilation outlet contribution 2021-DS – receiver R-SPI2-01

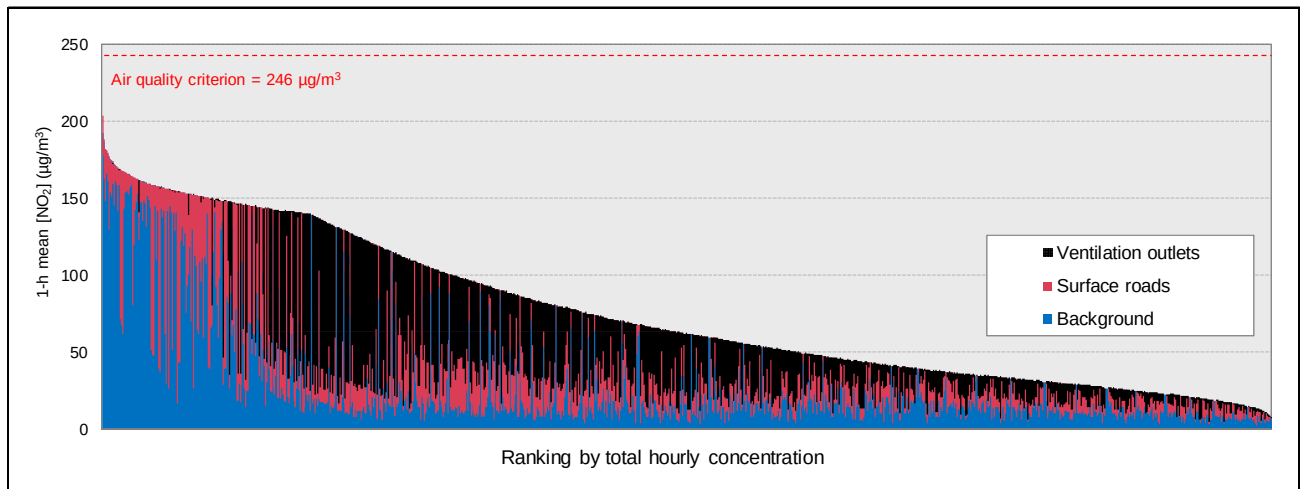


Figure 4-34 Hourly contributions to one-hour mean NO₂, ranked by total concentration, for receiver with largest ventilation outlet contribution 2031-DS – receiver R-SPI2-01

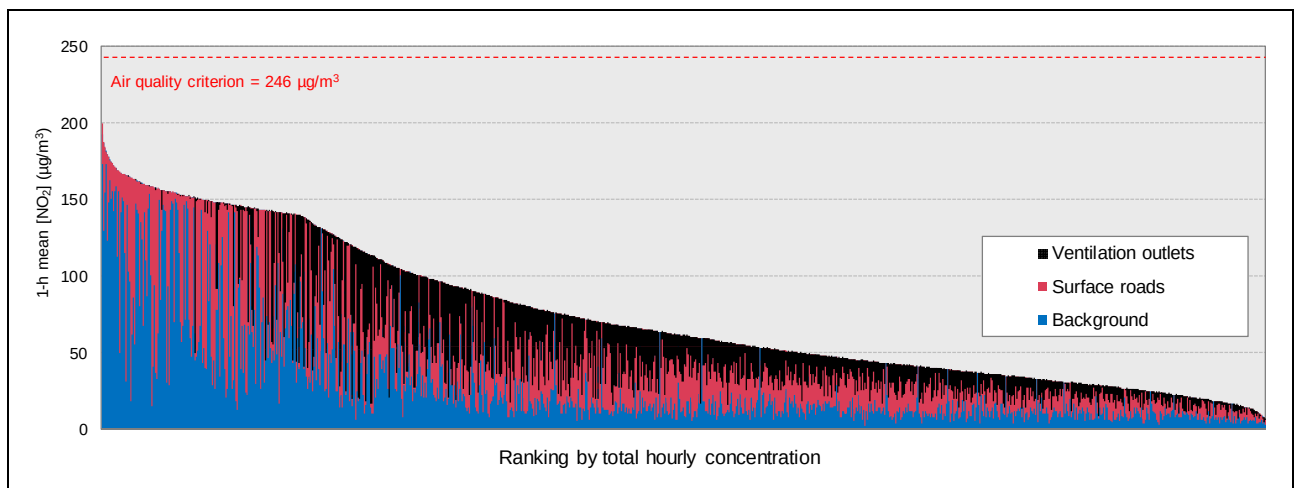


Figure 4-35 Hourly contributions to one-hour mean NO₂, ranked by total concentration, for receiver with largest ventilation outlet contribution 2021-DSC –receiver R-ARN-09

Other pollutants

EPA also recommended that the total impact (ventilation outlet, surface road and background) at receivers for all pollutants (except air toxics) are presented. This would require a similar analysis to that presented above for CO, PM₁₀ and PM_{2.5}. However, it was demonstrated in the EIS that the impacts for these pollutant would not be significant. For example:

- For CO the maximum one-hour outlet contribution (0.33 mg/m³) is a very small fraction of the criterion (30 mg/m³). The maximum background CO concentration is also low (2.87 mg/m³) and well below the applicable air quality criterion. Hence, maximum total impact of CO cannot be greater than 3.2 mg/m³, or approximately 10 per cent of the criterion
- For PM₁₀ and PM_{2.5} the maximum 24-hour average outlet contributions are low (4.29 µg/m³) and a fraction of applicable air quality criteria (50 and 25 µg/m³, respectively). There are also no predicted exceedances when using the 98th percentile background concentrations (40.0 µg/m³ and 18.9 µg/m³, respectively). Any exceedances of the criteria would be dominated by background concentrations.

Issue description – results for the regulatory worst case scenario are not presented for air toxics

Regulatory worst case modelling was completed to assess constant ventilation outlet concentrations (at the proposed discharge concentration limits) over a 24-hour period. Two scenarios were included in the regulatory worst case modelling:

- Project only
- Project and the M4-M5 link.

The results of the regulatory worst case modelling were only presented at the RWR receivers.

The predicted concentration for speciated air toxics (benzene, polycyclic aromatic hydrocarbons, formaldehyde and 1,3-butadiene) are provided in Appendix K of the Technical working paper: Air quality for scenarios not including the regulatory worst case scenario. For the regulatory worst case scenario, the only air toxic results presented were for total hydrocarbon without speciation.

It is not appropriate to compare the change in speciated air toxics to the assessment criteria. The EPA impact assessment criteria for air toxics are incremental; however, this is in recognition of the generally very low levels in 'background' air quality. For this project it is appropriate to compare predicted ventilation outlet plus surface road speciated air toxic concentrations to the assessment criteria.

The EPA recommends the predicted impact (ventilation outlet and surface road) at receivers be provided for speciated air toxics.

Response

The maximum ventilation outlet concentrations for the four specific air toxics considered in the assessment were determined using the speciation profiles provided in the Technical working paper: Air quality (Appendix H of the EIS). The results are presented in **Table 4-1**. The ventilation outlet contributions to the specific air toxics are well below the impact assessment criteria in the *Approved Methods for the Modelling and Assessment of Air Pollutants in New South Wales* (DEC, 2005).

Table 4-1 Results of regulatory worst case assessment (RWR receivers) - ventilation outlets only

Pollutant and period	Units	Maximum ventilation outlet contribution at any receiver			Impact assessment criterion (µg/m ³)
		RWC-A		RWC-B	
		2021	2031	2031	
THC (1 hour)	(µg/m ³)	30.25	30.25	31.64	-
Benzene (1 hour)	(µg/m ³)	1.31	1.20	1.26	29
PAH (BaP) (1 hour)	(µg/m ³)	0.009	0.009	0.010	0.4
Formaldehyde (1 hour)	(µg/m ³)	0.77	1.00	1.05	20
1,3-butadiene (1 hour)	(µg/m ³)	0.34	0.13	0.34	40

The *Approved Methods for the Modelling and Assessment of Air Pollutants in New South Wales* (DEC, 2005) requires the incremental impacts of a project to be calculated, and these are shown in the Technical working paper: Air quality (Appendix H of the EIS) prepared for the New M5 (expected traffic scenarios). The incremental impacts for the expected traffic scenarios include both ventilation outlets and surface road contributions. At some receivers, the project increment is an increase, at others a decrease.

Table 4-2 shows that, even if the maximum ventilation outlet contribution is added to the maximum increase in concentration with the project (which implies some double counting), the results are still comfortably below the impact assessment criteria.

**Table 4-2 Results of regulatory worst case assessment (RWR receivers, RCB-B scenario).
Ventilation outlets plus traffic.**

Pollutant and period	Units	Maximum outlet contribution at any receiver	Maximum increase due to project (ventilation outlet + expected traffic)	Sum	Impact assessment criteria
THC (1 hour)	(µg/m3)	31.64	-	-	-
Benzene (1 hour)	(µg/m3)	1.26	5.80	7.06	29
PAH (BaP) (1 hour)	(µg/m3)	0.01	0.04	0.05	0.4
Formaldehyde (1 hour)	(µg/m3)	1.05	4.85	5.90	20
1,3-butadiene (1 hour)	(µg/m3)	0.34	1.55	1.89	40

Issue description – Analysis of monitoring data and model evaluation are not specific to the New M5

Seven new monitoring sites were established in the New M5 area including three monitoring stations at urban background locations and four monitoring stations to characterise roadside air quality. The monitoring stations were established in July/August 2015.

Monitoring data presented in the report was from 2004 to 2014 for OEH monitoring stations and existing M5 monitoring stations. Contemporary monitoring from the newly established monitoring stations for the M4 East and New M5 projects were not included in the background analysis.

Similarly, the assessment states that due to only two months of project-specific monitoring data being available, model evaluation based on the new M5 was not completed. The model evaluation in the M4 East assessment was discussed instead. The roadside data used in the M4 East evaluation was from existing M5 East Motorway tunnel monitors (F1 and M1). These sites were established to characterise air quality in the vicinity of the M5 East Motorway tunnel portals.

The analysis of background monitoring data is important in characterising and evaluating the New M5 area being assessed. Despite less than a complete year of data collected at the newly established monitoring stations for the M4 East and New M5 projects, the data should be included for discussion as they are most representative of the existing project site.

The EPA recommends that a discussion on the contemporary monitoring data from the newly established sites be included for completeness and to evaluate model performance based on project specific data.

Response

The monitoring data from the newly established monitoring stations for the M4 East and New M5 projects were deliberately excluded from the development of background concentrations. The reason for this was that the base year for the assessment was 2014. Therefore, both background concentrations and meteorological data for 2014 were used in the analysis. It is important in such an analysis that the background concentrations and meteorology are contemporaneous, as the former depend strongly upon the latter. For each background monitoring station included in the analysis a full year's worth of data for 2014 was used. The monitoring for the M4 East background site at St Lukes Park only began in November 2014, and the New M5 monitoring stations became operational well into 2015. This meant that neither the data from the M4 East monitoring stations nor the New M5 monitoring stations was sufficient for the purpose of establishing background air quality for the air quality impact assessment.

An analysis of the data from the New M5 monitoring stations is presented below. The locations and types of the monitoring stations (which are at a mixture of background and roadside locations) are given in Appendix F of the Technical working paper: Air quality (Appendix H of the EIS). The data covered the period between July 2015 and October 2015, and the pollutants CO (rolling eight-hour mean), NO_x (one-hour mean), NO₂ (one-hour mean), PM₁₀ (24-hour mean) and PM_{2.5} (24-hour mean). It should be noted that the data have not yet been fully ratified, and analysis should therefore be viewed as provisional.

Time series of concentrations

The time series of measured concentrations for the pollutants with short-term air quality criteria (CO, NO₂, PM₁₀ and PM_{2.5}) are shown in **Figure 4-36**. The corresponding air quality criteria are also shown.

All measured concentrations of CO (rolling eight-hour) and NO₂ (1-hour) were well below the respective criteria (10 mg/m³ and 246 µg/m³).

The 24-hour mean PM₁₀ and PM_{2.5} concentrations were close to the respective criteria (50 µg/m³ and 25 µg/m³) on several occasions, and there were some significant exceedances of the criteria in August and October. The August peak in PM_{2.5} was also observed in the data from the OEH monitoring stations, and therefore appears to be a regional event. The PM₁₀ data for several sites were unavailable during this period. Large peaks in PM₁₀ and PM_{2.5} were observed at the Bexley Road site on 13 October 2015. These were not observed at any of the other sites, and it was therefore concluded that an (unknown) local event was responsible. At some sites there was also an exceedance of the PM₁₀ criterion on 7 October 2015. This was attributed to a regional spike in PM₁₀ through a comparison with the OEH monitoring sites.

Summary statistics

Summary statistics are presented for the New M5 monitoring stations are provided in **Table 4-3** to **Table 4-7** and shown in **Figure 4-37** to **Figure 4-41**. The figures show the average values for the whole of the monitoring period.

There was some overlap in the background and roadside concentrations across monitoring sites. For example, the average CO concentration at one of the background sites (04) was higher than that at three of the roadside sites.

The overall average CO concentrations at the roadside sites were slightly higher (around 13 percent) than those at the background sites but, as noted earlier, the concentrations at all sites were low relative to the applicable ambient air quality criterion.

The overall average NO_x concentrations at the roadside monitoring sites were 74 per cent higher than those at the background monitoring sites. Average maximum NO_x concentrations at the roadside sites were 64 per cent higher than those at the background sites. For NO₂ the differences between roadside and background were smaller, with the overall average concentration being 29 per cent higher at the roadside sites and the average maximum being 23 per cent higher.

For both PM₁₀ and PM_{2.5} the overall average concentrations at roadside and background sites were similar.

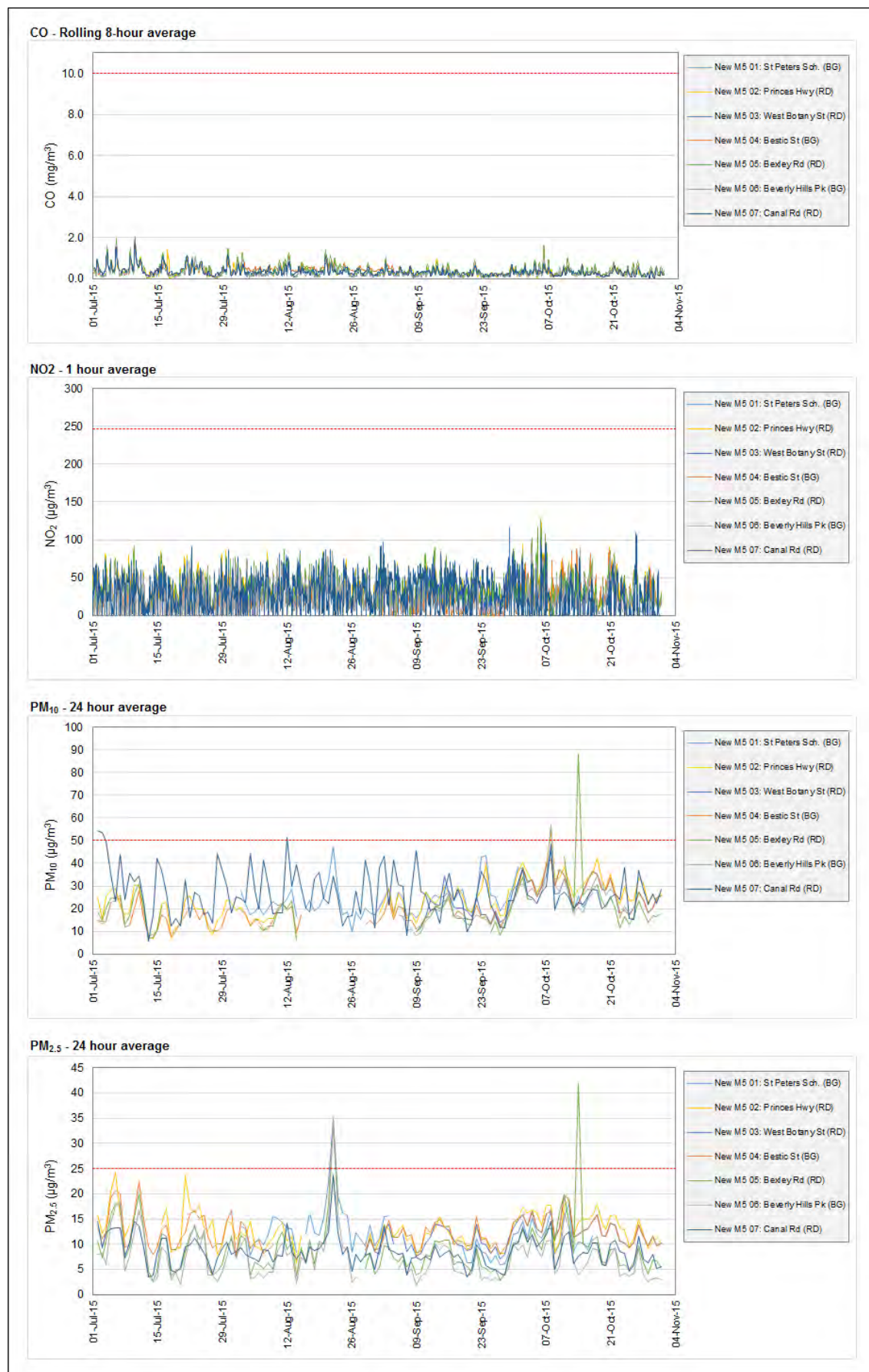


Figure 4-36 Time series for CO, NO₂, PM₁₀ and PM_{2.5}

Table 4-3 Summary statistics for CO - rolling eight-hour

Site code	Name	Type	Value by month (µg/m³)				Overall value
			Jul 2015	Aug 2015	Sep 2015	Oct 2015	
Average							
New M5: 01	St Peters School	Background		0.26	0.21	0.26	0.24
New M5: 04	Bestic Street	Background	0.38	0.53	0.30	0.28	0.37
New M5: 06	Beverly Hills Park	Background	0.38	0.31	0.21	0.27	0.29
New M5: 02	Princes Highway	Roadside	0.43	0.31	0.29	0.28	0.33
New M5: 03	West Botany Street	Roadside		0.29	0.24	0.28	0.27
New M5: 05	Bexley Road	Roadside	0.49	0.41	0.32	0.40	0.41
New M5: 07	Canal Road	Roadside	0.48	0.37	0.30	0.28	0.35
Maximum							
New M5: 01	St Peters School	Background		0.97	0.67	0.59	0.97
New M5: 04	Bestic St	Background	1.47	1.11	0.80	1.08	1.47
New M5: 06	Beverly Hills Park	Background	1.65	1.10	0.66	0.92	1.65
New M5: 02	Princes Highway	Roadside	1.59	1.02	1.01	0.71	1.59
New M5: 03	West Botany Street	Roadside		0.85	0.61	1.08	1.08
New M5: 05	Bexley Road	Roadside	2.07	1.40	1.06	1.65	2.07
New M5: 07	Canal Road	Roadside	1.74	1.13	0.77	0.77	1.74
98th percentile							
New M5: 01	St Peters School	Background		0.66	0.54	0.53	0.59
New M5: 04	Bestic Street	Background	1.02	0.91	0.66	0.60	0.89
New M5: 06	Beverly Hills Park	Background	1.12	0.85	0.50	0.64	0.90
New M5: 02	Princes Highway	Roadside	1.28	0.74	0.66	0.57	0.99
New M5: 03	West Botany Street	Roadside		0.69	0.52	0.60	0.61
New M5: 05	Bexley Road	Roadside	1.50	1.15	0.80	0.90	1.19
New M5: 07	Canal Road	Roadside	1.26	0.77	0.61	0.63	0.97

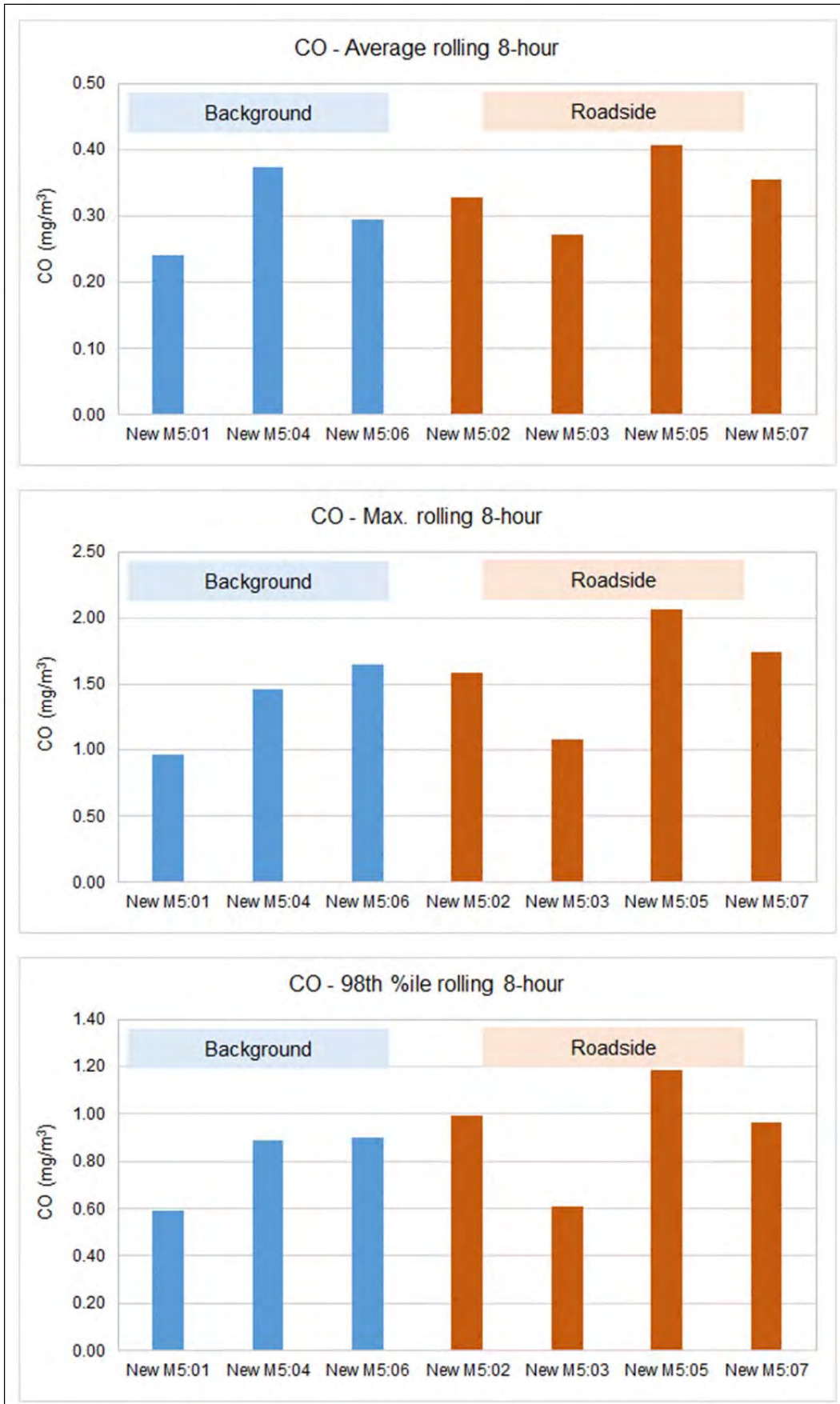


Figure 4-37 Summary statistics for CO - rolling eight-hour (full monitoring period)

Table 4-4 Summary statistics for NO_x - one hour

Site code	Name	Type	Value by month (µg/m³)				Overall value
			Jul 2015	Aug 2015	Sep 2015	Oct 2015	
Average							
New M5: 01	St Peters School	Background		51.1	41.9	40.1	45.1
New M5: 04	Bestic St	Background	68.8	50.7	27.0	67.0	53.6
New M5: 06	Beverly Hills Park	Background	91.0	65.9	45.8	47.2	62.0
New M5: 02	Princes Highway	Roadside	104.7	73.4	69.5	66.0	78.1
New M5: 03	West Botany St	Roadside		71.3	66.9	67.0	68.4
New M5: 05	Bexley Road	Roadside	125.0	98.5	81.1	88.0	98.3
New M5: 07	Canal Road	Roadside	163.4	125.3	111.4	105.6	128.7
Maximum							
New M5: 01	St Peters School	Background		270.9	178.6	191.8	270.9
New M5: 04	Bestic Street	Background	348.9	309.9	168.3	403.1	403.1
New M5: 06	Beverly Hills Park	Background	525.4	470.0	396.1	322.4	525.4
New M5: 02	Princes Highway	Roadside	521.3	389.9	299.6	304.7	521.3
New M5: 03	West Botany Street	Roadside		348.9	326.3	403.1	403.1
New M5: 05	Bexley Road	Roadside	720.4	888.7	476.1	543.9	888.7
New M5: 07	Canal Road	Roadside	801.8	701.2	587.3	443.1	801.8
98th percentile							
New M5: 01	St Peters School	Background		194.4	137.5	127.3	149.8
New M5: 04	Bestic St	Background	233.6	197.5	127.8	214.4	209.3
New M5: 06	Beverly Hills Park	Background	345.1	279.0	209.9	196.5	287.7
New M5: 02	Princes Highway	Roadside	401.5	227.8	186.8	200.7	291.4
New M5: 03	West Botany Street	Roadside		222.6	187.4	214.4	211.1
New M5: 05	Bexley Road	Roadside	455.2	383.1	274.8	318.6	379.7
New M5: 07	Canal Road	Roadside	505.3	391.5	320.9	343.6	417.6

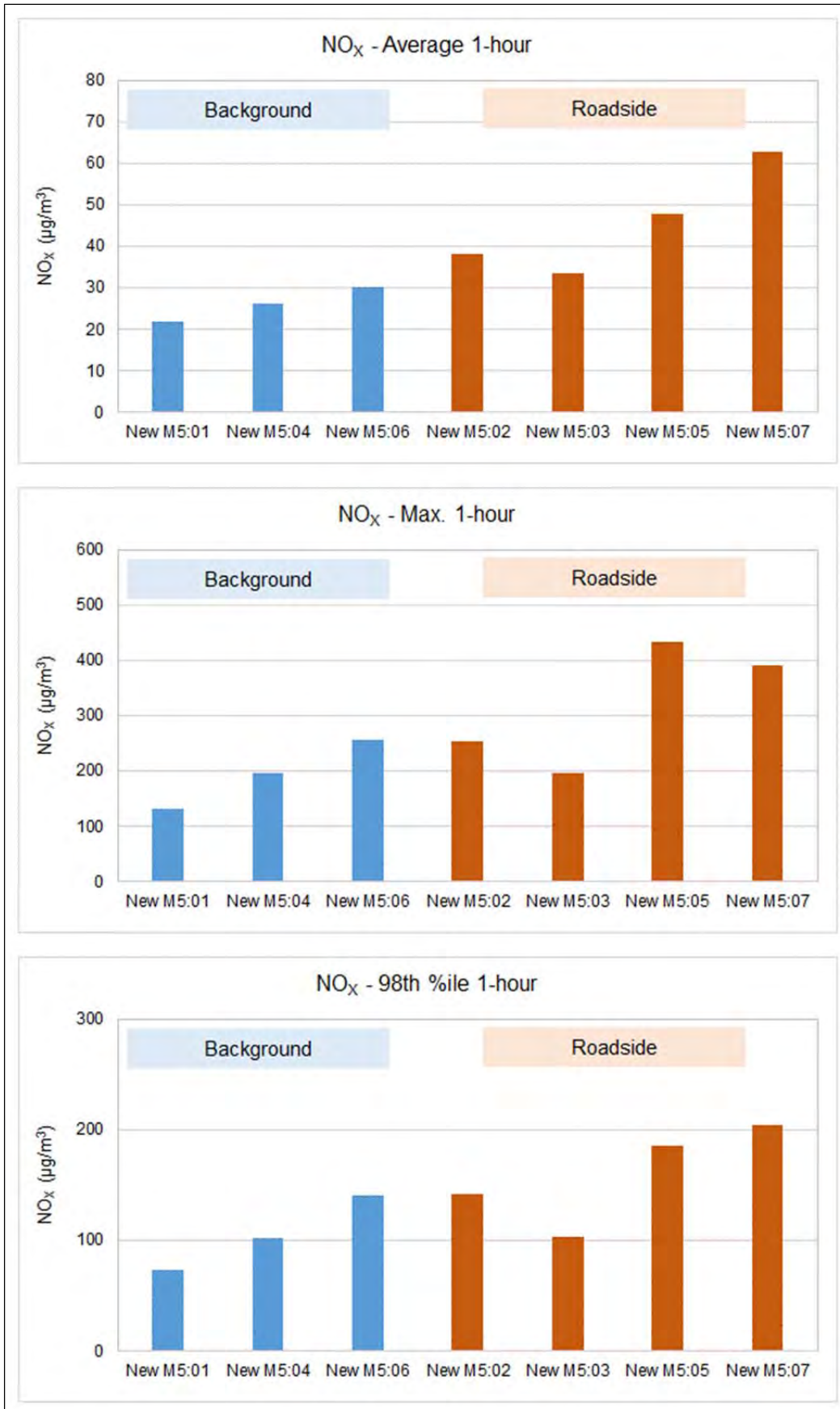


Figure 4-38 Summary statistics for NO_x - one-hour (full monitoring period)

Table 4-5 Summary statistics for NO₂ - one hour

Site code	Name	Type	Value by month (µg/m³)				Overall value
			Jul 2015	Aug 2015	Sep 2015	Oct 2015	
Average							
New M5: 01	St Peters School	Background		30.5	27.2	28.6	28.8
New M5: 04	Bestic Street	Background	25.9	25.9	13.5	36.3	25.5
New M5: 06	Beverly Hills Park	Background	32.4	32.2	23.6	27.2	28.8
New M5: 02	Princes Highway	Roadside	39.1	37.9	36.5	36.6	37.5
New M5: 03	West Botany Street	Roadside		35.7	33.5	36.3	35.2
New M5: 05	Bexley Road	Roadside	38.7	38.0	35.4	38.2	37.6
New M5: 07	Canal Road	Roadside	30.7	32.7	36.7	28.1	32.4
Maximum							
New M5: 01	St Peters School	Background		63.6	57.5	79.1	79.1
New M5: 04	Bestic Street	Background	73.9	57.5	43.1	111.5	111.5
New M5: 06	Beverly Hills Park	Background	73.9	82.1	71.8	197.9	197.9
New M5: 02	Princes Highway	Roadside	86.2	84.1	88.3	123.6	123.6
New M5: 03	West Botany Street	Roadside		86.2	117.0	111.5	117.0
New M5: 05	Bexley Road	Roadside	92.4	88.3	90.3	127.2	127.2
New M5: 07	Canal Road	Roadside	90.6	87.5	92.0	109.2	109.2
98th percentile							
New M5: 01	St Peters School	Background		49.7	49.3	64.2	53.4
New M5: 04	Bestic Street	Background	45.2	47.2	34.9	83.5	65.7
New M5: 06	Beverly Hills Park	Background	63.6	71.8	61.6	80.6	68.2
New M5: 02	Princes Highway	Roadside	80.0	71.8	72.4	88.4	78.0
New M5: 03	West Botany Street	Roadside		73.6	69.8	83.5	76.4
New M5: 05	Bexley Road	Roadside	75.9	75.5	78.0	92.1	80.0
New M5: 07	Canal Road	Roadside	68.0	71.1	73.1	80.9	73.1

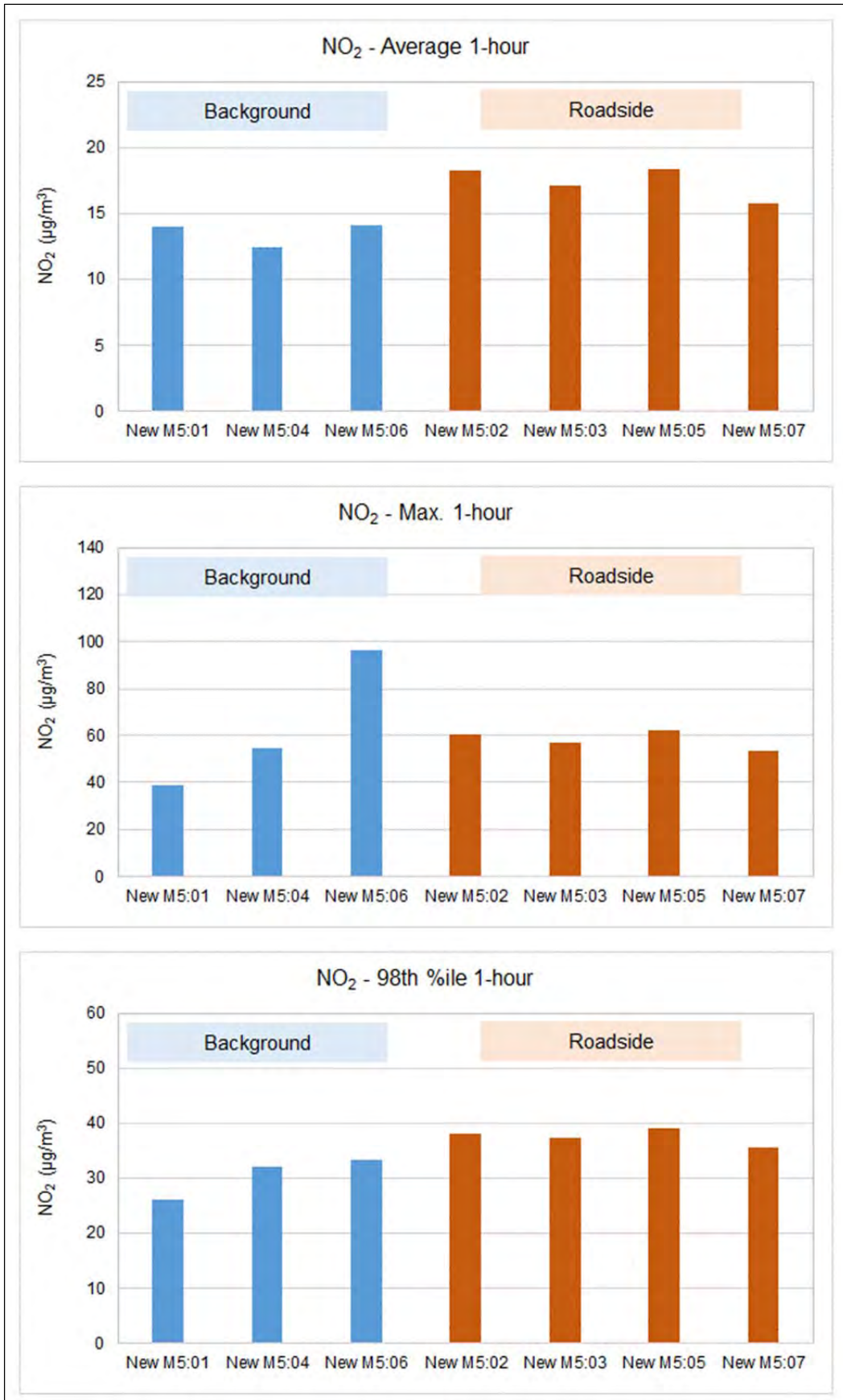


Figure 4-39 Summary statistics for NO₂ - one-hour (full monitoring period)

Table 4-6 Summary statistics for PM₁₀ – 24-hour

Site code	Name	Type	Value by month (µg/m³)				Overall value
			Jul 2015	Aug 2015	Sep 2015	Oct 2015	
Average							
New M5: 01	St Peters School	Background		21.8	25.3	29.4	24.8
New M5: 04	Bestic St	Background	15.7	15.6	18.2	28.3	19.9
New M5: 06	Beverly Hills Park	Background	16.5		16.6	27.4	21.4
New M5: 02	Princes Highway	Roadside	19.0	16.3	24.0	31.5	24.0
New M5: 03	West Botany St	Roadside			20.2	28.3	24.8
New M5: 05	Bexley Road	Roadside	18.8	15.3	16.6	25.0	19.9
New M5: 07	Canal Road	Roadside	28.5	27.2	25.1	26.1	26.7
Maximum							
New M5: 01	St Peters School	Background		47.3	43.6	46.0	47.3
New M5: 04	Bestic St	Background	27.8	22.7	28.0	41.9	41.9
New M5: 06	Beverly Hills Park	Background	22.6		29.9	57.2	57.2
New M5: 02	Princes Highway	Roadside	30.5	20.8	39.2	54.1	54.1
New M5: 03	West Botany St	Roadside			34.4	41.9	41.9
New M5: 05	Bexley Road	Roadside	31.1	23.5	28.4	88.0	88.0
New M5: 07	Canal Road	Roadside	54.5	51.3	45.8	48.7	54.5
98th percentile							
New M5: 01	St Peters School	Background		38.9	43.1	43.6	44.8
New M5: 04	Bestic St	Background	26.0	22.2	25.9	40.4	38.0
New M5: 06	Beverly Hills Park	Background	22.1		28.3	46.4	34.7
New M5: 02	Princes Highway	Roadside	30.1	20.3	37.7	46.9	40.2
New M5: 03	West Botany St	Roadside			32.8	40.4	39.3
New M5: 05	Bexley Road	Roadside	29.8	23.2	27.3	66.4	39.5
New M5: 07	Canal Road	Roadside	53.9	47.2	44.2	42.5	50.6

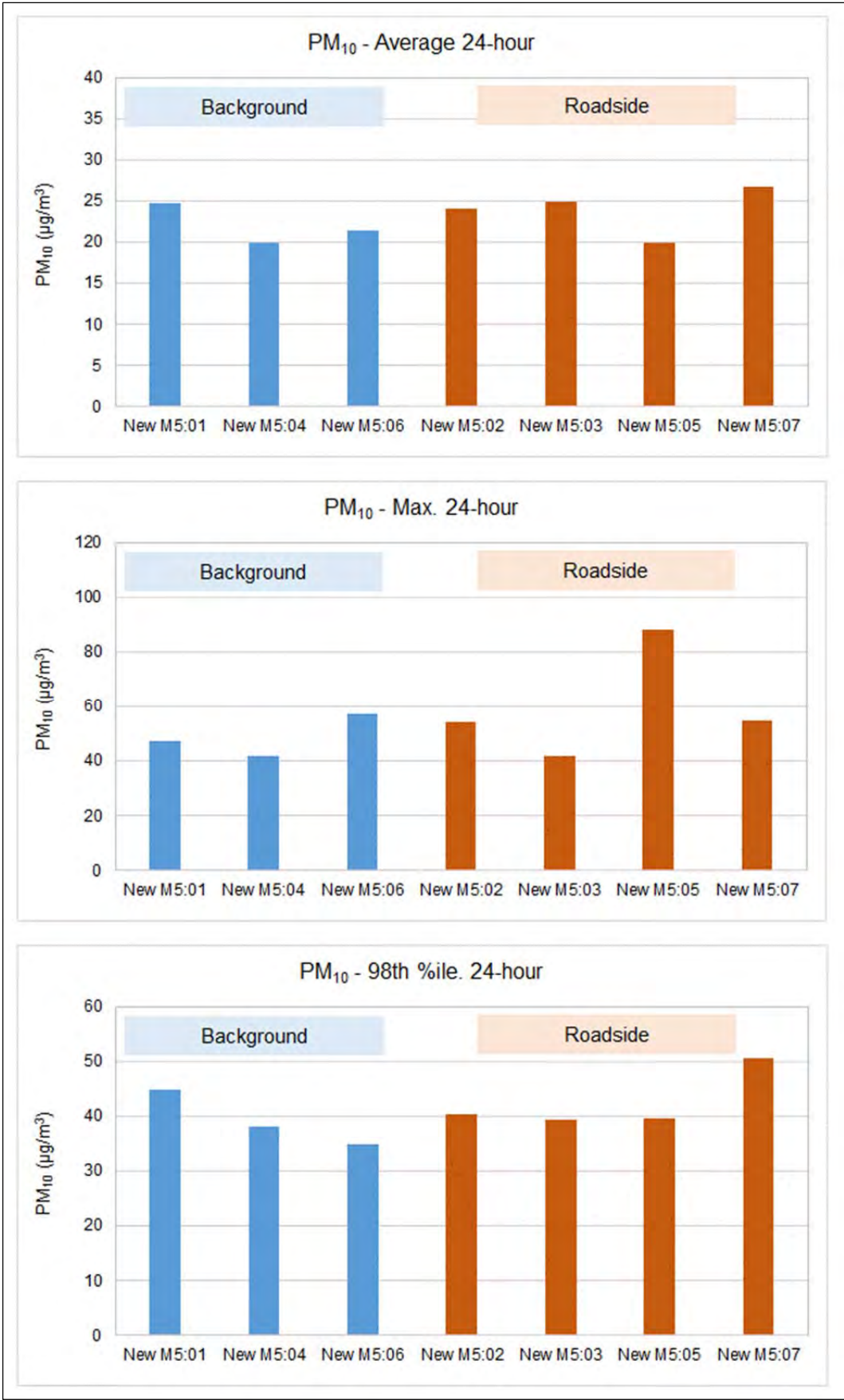


Figure 4-40 Summary statistics for PM₁₀ - 24-hour (full monitoring period)

Table 4-7 Summary statistics for PM_{2.5} – 24-hour

Site code	Name	Type	Value by month (µg/m³)				Overall value
			Jul 2015	Aug 2015	Sep 2015	Oct 2015	
Average							
New M5: 01	St Peters School	Background		13.6	9.3	12.2	12.2
New M5: 04	Bestic Street	Background	13.1	10.3	11.6	13.0	12.3
New M5: 06	Beverly Hills Park	Background	8.3	8.5	5.5	7.0	7.3
New M5: 02	Princes Highway	Roadside	14.3	10.8	11.5	14.0	12.8
New M5: 03	West Botany Street	Roadside		8.9	10.8	13.0	11.7
New M5: 05	Bexley Road	Roadside	9.6	9.5	7.0	10.6	9.2
New M5: 07	Canal Road	Roadside	9.2	8.9	7.4	8.8	8.6
Maximum							
New M5: 01	St Peters School	Background		34.5	15.6	18.1	34.5
New M5: 04	Bestic St	Background	22.5	14.5	15.4	19.8	22.5
New M5: 06	Beverly Hills Park	Background	18.5	35.1	10.1	16.3	35.1
New M5: 02	Princes Highway	Roadside	24.2	14.6	15.4	18.9	24.2
New M5: 03	West Botany Street	Roadside		11.1	14.7	19.8	19.8
New M5: 05	Bexley Road	Roadside	19.9	33.6	10.8	41.8	41.8
New M5: 07	Canal Road	Roadside	14.6	23.7	13.6	14.5	23.7
98th percentile							
New M5: 01	St Peters School	Background		27.4	15.6	17.7	21.8
New M5: 04	Bestic Street	Background	21.4	14.3	15.3	19.2	19.9
New M5: 06	Beverly Hills Park	Background	17.9	25.4	10.1	14.5	17.3
New M5: 02	Princes Highway	Roadside	23.9	14.4	15.1	18.3	20.2
New M5: 03	West Botany Street	Roadside		11.0	14.3	19.2	18.2
New M5: 05	Bexley Road	Roadside	18.8	25.9	10.8	28.6	19.9
New M5: 07	Canal Road	Roadside	14.5	18.0	11.6	13.8	14.5

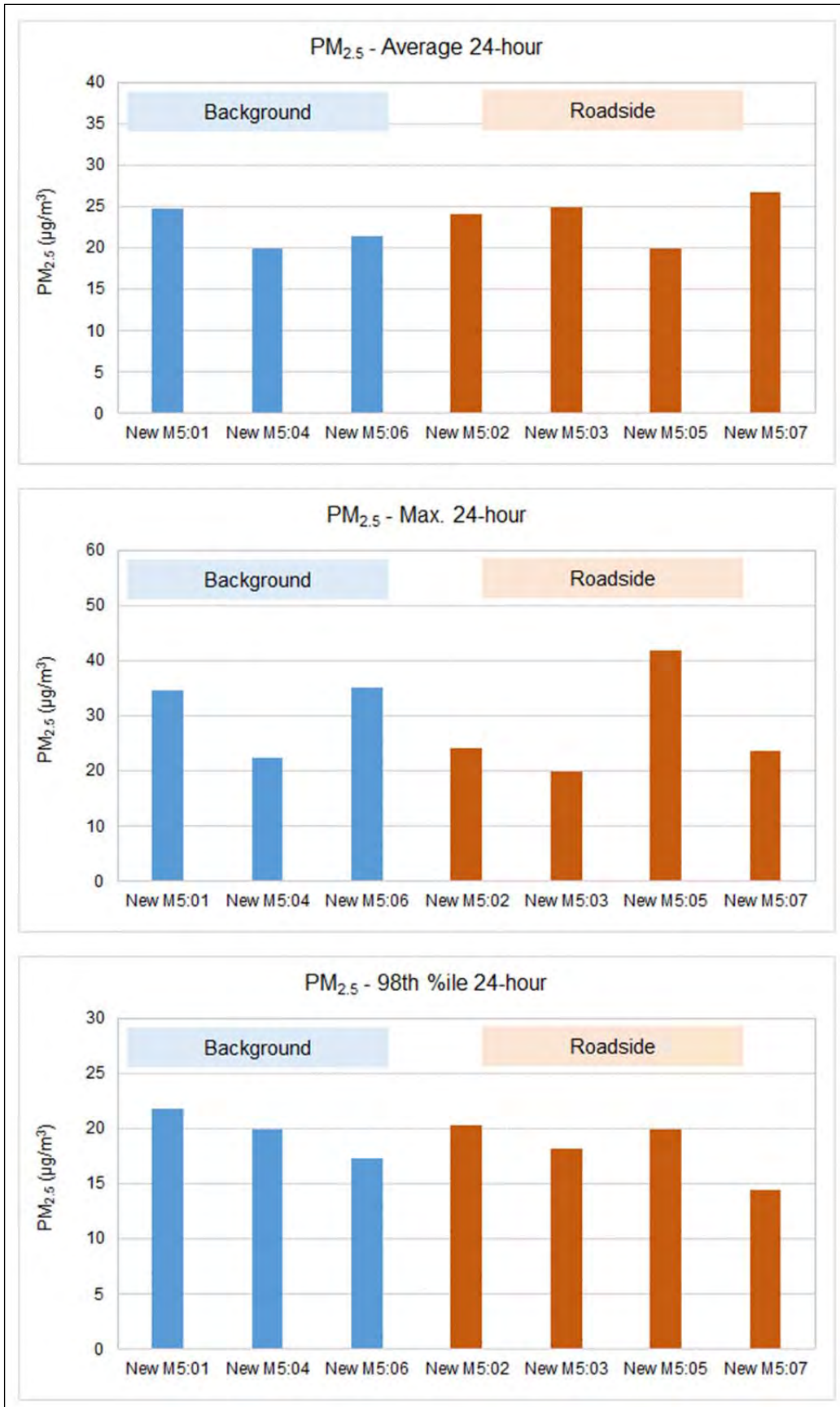


Figure 4-41 Summary statistics for PM_{2.5} - 24-hour (full monitoring period)

Comparison with OEH monitoring sites

The measurements from the New M5 monitoring sites were compared with those from the OEH monitoring sites at Chullora, Earlwood and Rozelle. The 24-hour average concentrations of CO, NO₂, PM₁₀ and PM_{2.5} were obtained from the OEH web site, and the equivalent values were calculated as averages for New M5 background (BG) and roadside (RD) sites. The results are shown in Figure 4-42.

The 24-hour average CO concentrations at the New M5 sites showed a good agreement with those at the OEH sites. Again, the background and roadside concentrations for the New M5 sites were similar. This suggests that all monitoring sites (New M5 and OEH) are measuring a regional background concentration.

The 24-hour average NO₂ concentrations at the New M5 background sites also showed a generally good agreement with the average concentrations across the three OEH sites. The concentrations at the New M5 roadside sites were higher than those at the OEH sites, reflecting the traffic influence.

For PM₁₀ and PM_{2.5} the concentrations at the New M5 background and roadside sites were systematically higher than those at the OEH sites, although the profiles followed broadly the same patterns at all site types.

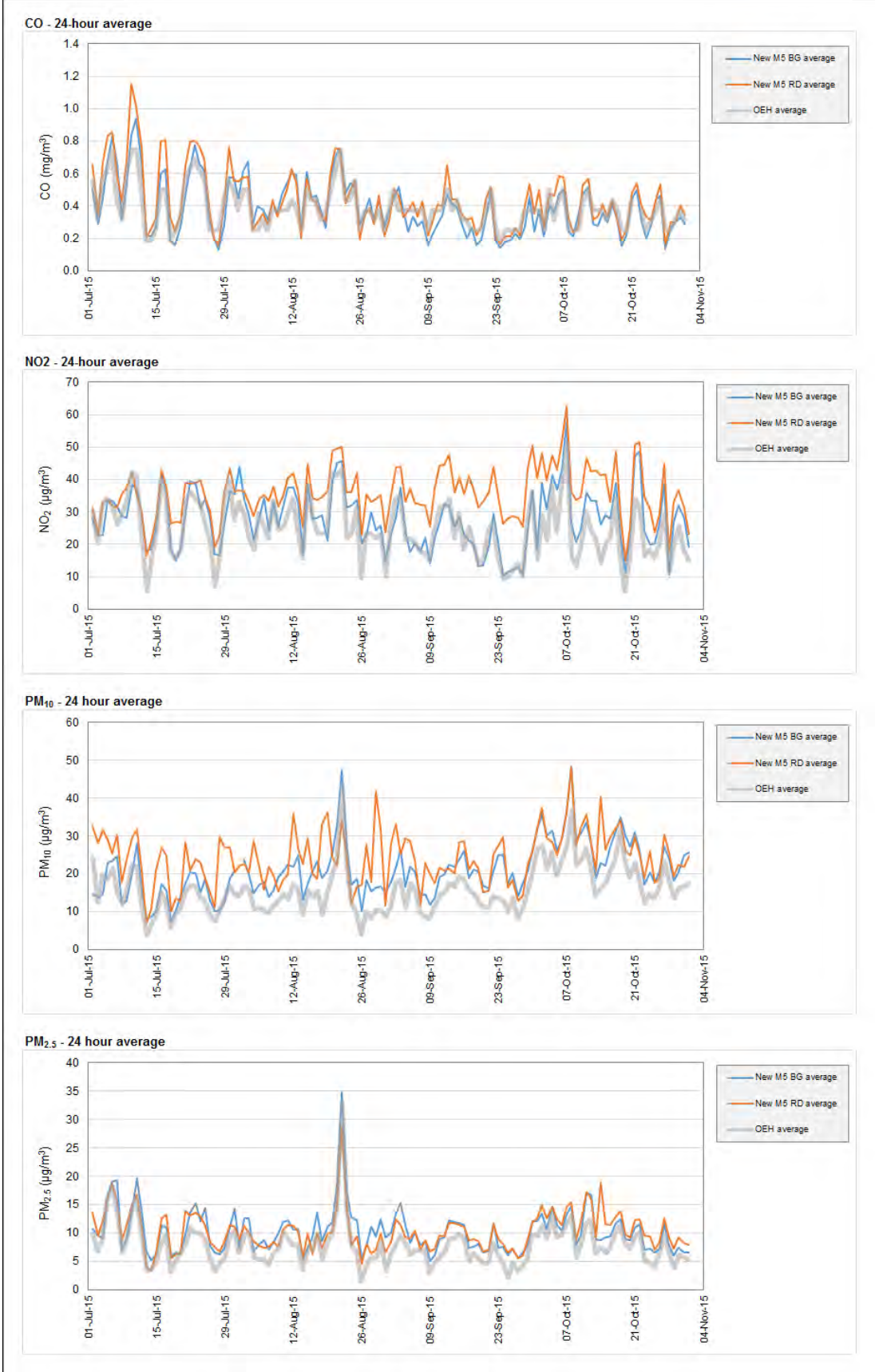


Figure 4-42 Comparison between New M5 measurements and OEH measurements (24-hour mean concentrations only)

Comparison with synthetic background profile

The concentrations measured at the New M5 background sites (in 2015) were also compared with those in the synthetic background profiles (for 2014) that were used for short-term pollutant metrics in the air quality assessment. The results are shown in **Figure 4-43**.

Although the years are different, the plots show that the synthetic profiles provided a good representation of background air quality in the New M5 area, with the ranges of values for the period (1 July 2015 to 31 October 2015) being similar.

The synthetic profiles for PM₁₀ and PM_{2.5} do not reflect the peak concentrations in the New M5 data, but this is mainly because regional/natural events and unusual local events have not been removed from the New M5 datasets.

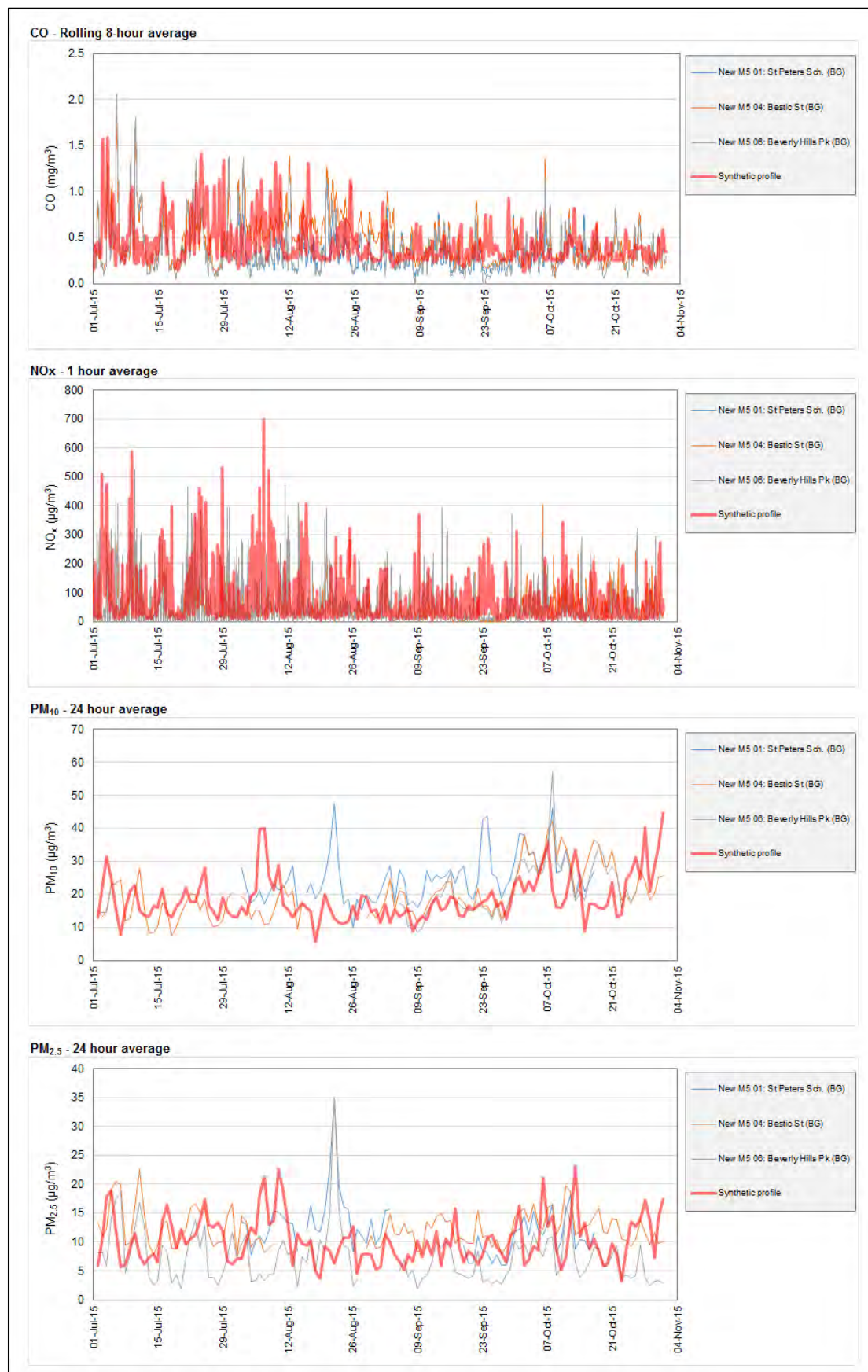


Figure 4-43 Comparison between measurements at New M5 background sites and synthetic background profiles used in the New M5 air quality impact assessment

NO_x-to-NO₂ conversion

The validity of the method used for converting one-hour NO_x concentrations into one-hour NO₂ concentrations for the New M5 monitoring sites was also investigated. The hourly mean NO_x concentrations and NO₂/NO_x ratios for the New M5 monitoring sites are shown, along with the conversion functions used in the air quality assessment, in Figure 4-44. The data points from the monitoring sites were well within the upper bound functions used in the assessment. It can therefore be concluded that the functions are valid for the assessment.

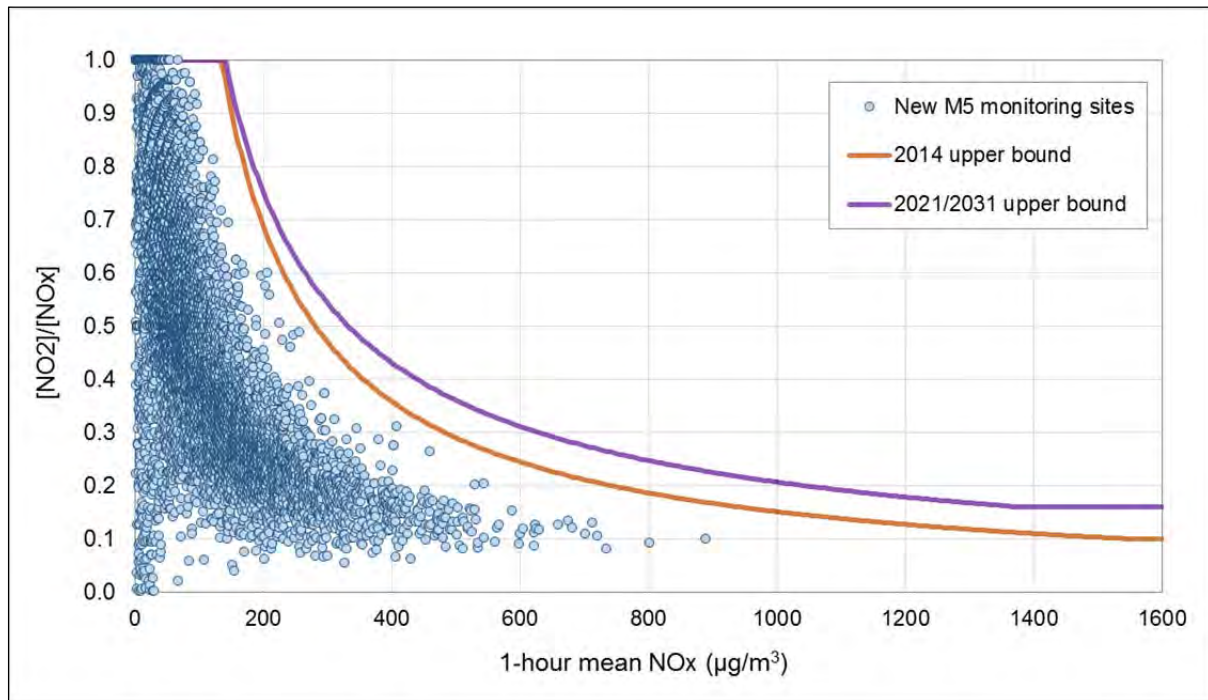


Figure 4-44 Hourly mean NO_x and NO₂/NO_x ratios for New M5 monitoring sites

GRAL validation

Validation of the GRAL dispersion model against 2015 monitoring data for the New M5 monitoring sites would require complete remodelling, and was beyond the scope of the EIS.

Issue description – emissions for assessment of Alexandria Landfill are smeared over the whole year

Potential impacts from the closure of the existing Alexandria Landfill are assessed as part of the New M5 project. The results indicate there is potential for exceedances of the criteria for annual average PM_{2.5}, 24-hour average PM₁₀ and odour. Proposed dust mitigation measures include haul road watering, stockpile watering and keeping travel routes of dozers moist.

Emissions were estimated based on annual capacity based on the inventories provided in Tables 8-5 to 8-7. The assessment states that estimated contribution from closure works is based on activities occurring across the entire site continuously 24-hours per day every day of the year. It is noted from the landfill closure management plan (Appendix F of Appendix H to the EIS) that landfill closure operations do not occur 24-hours per day.

If emissions were assumed to be operating 24-hours a day based on an annual inventory then there is potential for emissions to have been smeared across the year and underestimated compared to emissions from normal operations or potential worst case.

The EPA recommends the proponent verify the emissions used in the modelling for Alexandria landfill is representative of normal and/or worst case emissions and has not been smeared throughout the year.

Response

The standard procedure in the development of emission inventories for extractive industries, landfills and materials handling is to take operations occurring at a site over the full year and divide the estimated emissions over that year. This is the approach taken for emissions estimation for the majority of air quality assessments produced in accordance with the NSW Approved Methods. Whilst it is true that emissions are 'smeared' over the course of a year, activities included in the emissions inventory represent all possible activities to occur in that year and over all meteorological conditions included in the modelling. In this sense, activities represented over the course of a year may be considered conservative or not depending on when and for how long the activity actually takes place (i.e. in reality, hauling may only take place for one month where wind speeds are low). Therefore, the emissions inventory is considered as a 'snapshot in time' of all activities to occur over the modelled year and modelled against all available meteorological conditions.

It is correct that all activities have been assumed to occur 24 hours per day, all year. It should also be noted, however, that many of the emission estimates are dependent on wind speed which is generally lower at night. In other words, the majority of emissions are likely to occur during the day, even though the activities are evenly distributed. It is also the case that with higher winds speeds, although emissions may be higher, dispersion would be more efficient. The reverse would often be the case at night. That is, emissions may be low but dispersion would be poor. It is unlikely that the outcomes of the assessment would change if activities are modelled to occur only during the day.

Issue description – Meteorological data used is not fully justified

There is insufficient justification and validation regarding the selection of meteorological station for Graz Mesoscale Model (GRAMM) meteorological modelling. Canterbury Racecourse was used as it was close to the centre of the WestConnex domain. This was stated to be beneficial for the modelling of the later stages of the project.

The validation of Canterbury Racecourse station influenced GRAMM showed poor correlation with the Sydney Olympic Park, Chullora and Rozelle stations. The rationale for not including Chullora and Rozelle stations in GRAMM is the stations are not compliant with Australian Standards. It is inappropriate to use Canterbury Racecourse in the statistical analysis as this is the data that was used to drive GRAMM. Earlwood station is located close to Canterbury Racecourse and has 100% data recovery in 2014 compared to 90% at Canterbury Racecourse. However, Earlwood station was excluded from the validation with no justification provided for the exclusion.

The EPA recommends that justification be provided for the choice of meteorological data used in the meteorological modelling. Similar justification was provided for the M4 East project and the same level of detail is expected for the new M5 as it is a standalone assessment.

Response

The selection of the meteorological station was based on multiple criteria, including:

- Location relative to the project
- Adjacent land use and therefore representativeness of the wider study area, taking into account surface roughness factors
- Compliance with Australian Standards for siting
- Advice from data holders; analysis of consistency of changes in wind speeds and wind directions that would indicate whether the data provided a reliable trend
- Reliability and completeness of the data set.

Based on this assessment, the Canterbury Racecourse meteorological station was selected as providing the best available data.

The Technical working paper: Air quality (Appendix H of the EIS) provides significant detail on the chosen meteorological dataset, as well as the other datasets that were analysed to support the site selection. Appendix H details all meteorological data included in the initial analysis (data from three OEH stations and five Bureau of Meteorology (BoM) stations) and provides reasons why these were not chosen for dispersion modelling.

The OEH Chullora and Rozelle sites showed inconsistencies in dominant wind direction through six years of data, and non-compliance with the Australian Standards for siting. Additional information regarding these sites was provided by OEH. An investigation of the data by OEH showed that differences in the dominant wind patterns at these sites were probably due to a variety of factors, including change in surroundings (i.e. new buildings and trees in the area surrounding the stations), sensor alignment issues and instrument replacements which occurred around the same time that the data analysis showed a shift in the dominant wind patterns (i.e. 2011/2012).

The data from the OEH monitoring station at Earlwood were not selected for modelling as they were not considered to be representative of the wider study area, showing low annual average wind speeds and high percentages of calms. Further analysis of the stability class data from this site showed an unusually high percentage of G stability class (very stable) and a low percentage of D class (neutral) conditions (see **Figure 4-45**). The Earlwood monitoring station is located in a valley surrounded by a densely populated residential area, which may explain the data from this site.

The BoM Sydney Airport and Fort Denison data were also analysed but not selected for modelling. The annual average wind speeds recorded at these sites were very high (monthly averages over the year are shown in **Figure 4-46**) and the percentage of calms was very low due to the topography surrounding these sites (e.g. large fetch, open water). Although the data at these sites may be reliable, they were considered to only be representative of the specific locations, and not suitable for representing the wider New M5 study area.

The only other data potentially suitable for modelling were from the BoM Sydney Olympic Park (Archery Centre) site. However, data were only available for four years, as the site was commissioned in 2010. Due to this, and the fact that the BoM Canterbury Racecourse station is located more centrally to the full WestConnex program of works, the Canterbury Racecourse site was considered to be more appropriate. As shown in **Figure 4-46**, the general wind patterns that are seen over the course of a year at other stations are also reflected in the Canterbury Racecourse data.

The previous response explains why the BoM Canterbury Racecourse data were chosen in preference to the meteorological data from the other sites. The fact that the OEH Chullora and Rozelle sites do not comply with Australian Standards is a valid point given the comments provided by the OEH about these sites and the shift in wind patterns seen in the data.



Figure 4-45 Stability class distributions for the BoM Canterbury Racecourse and OEH Earwood sites

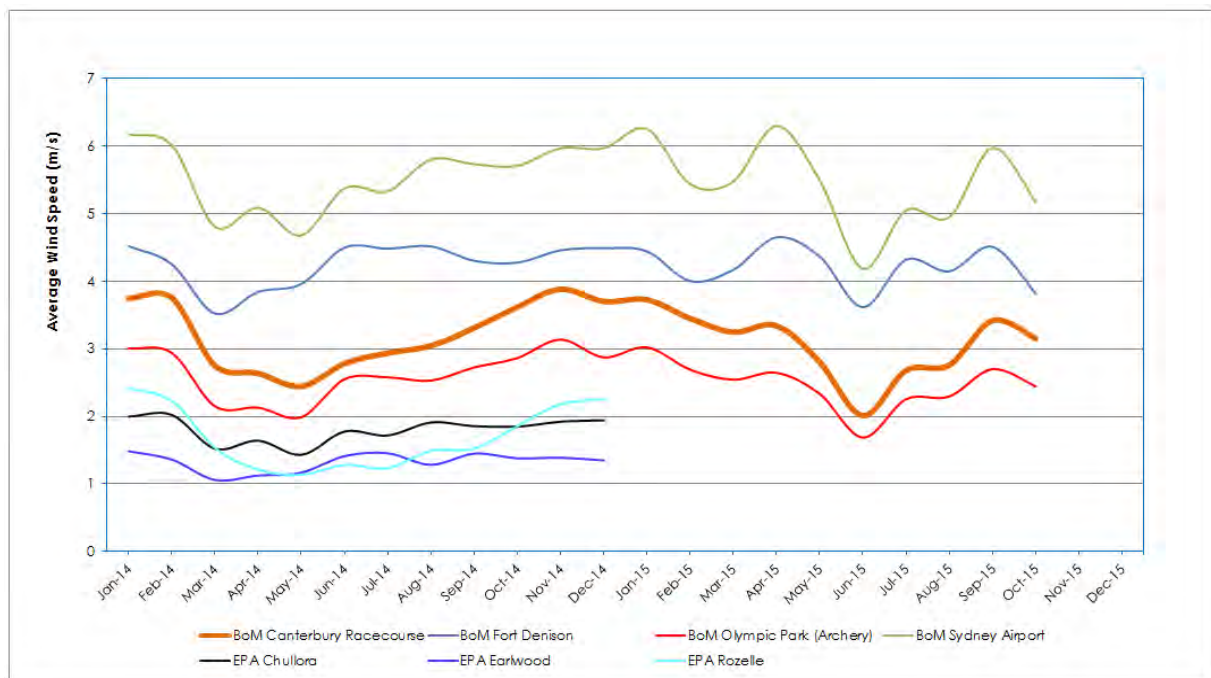


Figure 4-46 Monthly average wind speeds at BoM and OEH sites

Whilst it is true that the model shows a good agreement at the BoM Canterbury Racecourse site and a poorer agreement at other locations, this is not unusual as the GRAMM model (like other models such as CAL3CHQR) uses meteorological data from one location to represent the study area. The use of a single meteorological dataset is not uncommon in studies with domains the size of that applied to the WestConnex program of works, and with predominantly uniform land use and terrain. The regression analysis shows a fair agreement (R^2 of ~0.5 and 0.6 at BoM Sydney Olympic Park), given that the data were not included in the model. Furthermore, as discussed previously, the validity of the Rozelle and Chullora meteorological data is uncertain, and therefore it is not possible to provide a definitive test of the GRAMM performance at these locations.

Ultimately, the most important consideration is how well the results (predicted concentrations) from the overall model chain compare with measurements. Section 9.4.9 and Appendix J of the Technical working paper: Air quality (Appendix H of the EIS) describes an evaluation of the GRAL concentration predictions against measured data. The analysis shows a good agreement between predictions and measurements, and shows that the model is slightly over predicting at all locations. This is as expected, and is considered to be desirable in an assessment of this nature, so that absolute concentrations and impacts are not underestimated. The evaluation shows that the overall model chain is predicting concentrations at an appropriate level at various locations in the study area.

To test the sensitivity of the GRAL predictions to meteorology, a GRAMM run using the Earlwood 2014 dataset was completed. These datasets were selected due to the contrast with the BoM Canterbury Racecourse data (i.e. much lower annual average wind speed and much higher percentage of calms). The re-run GRAMM was run through to the 2031-DM and 2031-DSC GRAL scenarios for annual mean $PM_{2.5}$.

Figure 4-47 shows the ranked annual mean $PM_{2.5}$ concentrations at the RWR receivers in the 2031-DSC scenario. The figure shows the results for both the test run using the Earlwood and the original run using the BoM Canterbury Racecourse data. The results obtained using the Earlwood meteorological data were, on average, $0.6 \mu\text{g}/\text{m}^3$ higher than those obtained using the Canterbury Racecourse data.

Figure 4-48 shows a comparison of the changes in $PM_{2.5}$ (2031-DSC minus 2031-DM) for the two datasets. When using the Canterbury Racecourse data, 19 RWR receivers were predicted to have an increase in annual mean $PM_{2.5}$ above $0.8 \mu\text{g}/\text{m}^3$. When using the Earlwood data, 192 receivers were predicted to have an increase in annual mean $PM_{2.5}$ above $0.8 \mu\text{g}/\text{m}^3$. When using the Canterbury Racecourse data, one RWR receiver was predicted to have an increase in annual mean $PM_{2.5}$ above $1.6 \mu\text{g}/\text{m}^3$. When using the Earlwood data, seven receivers were predicted to have an increase in annual mean $PM_{2.5}$ above $1.6 \mu\text{g}/\text{m}^3$. It is important to note that although the use of the Earlwood data shows an increase in absolute concentrations at RWR receivers, there is actually a higher percentage of receivers for which there is predicted to be a benefit due to the project (i.e. more receivers would have a decrease in concentration due to the project if the Earlwood data are assumed to be representative of the study area). This is a particularly important metric when assessing the potential risks to human health.

It should be noted that the Earlwood data are not more representative of the study area than the Canterbury Racecourse data. As discussed previously, the Earlwood data were used as a contrasting dataset to test the sensitivity of the GRAL results. The results of the test have shown that when using a dataset with much lower wind speeds and much higher calms, the absolute concentrations would increase but the benefits due to the project also increase.

The corresponding results for the maximum one-hour NO_2 concentrations and the changes in concentration, at the RWR receivers are shown in **Figure 4-49** and **Table 4-1**. For most receivers the change in the meteorology has little effect on the maximum NO_2 concentration.

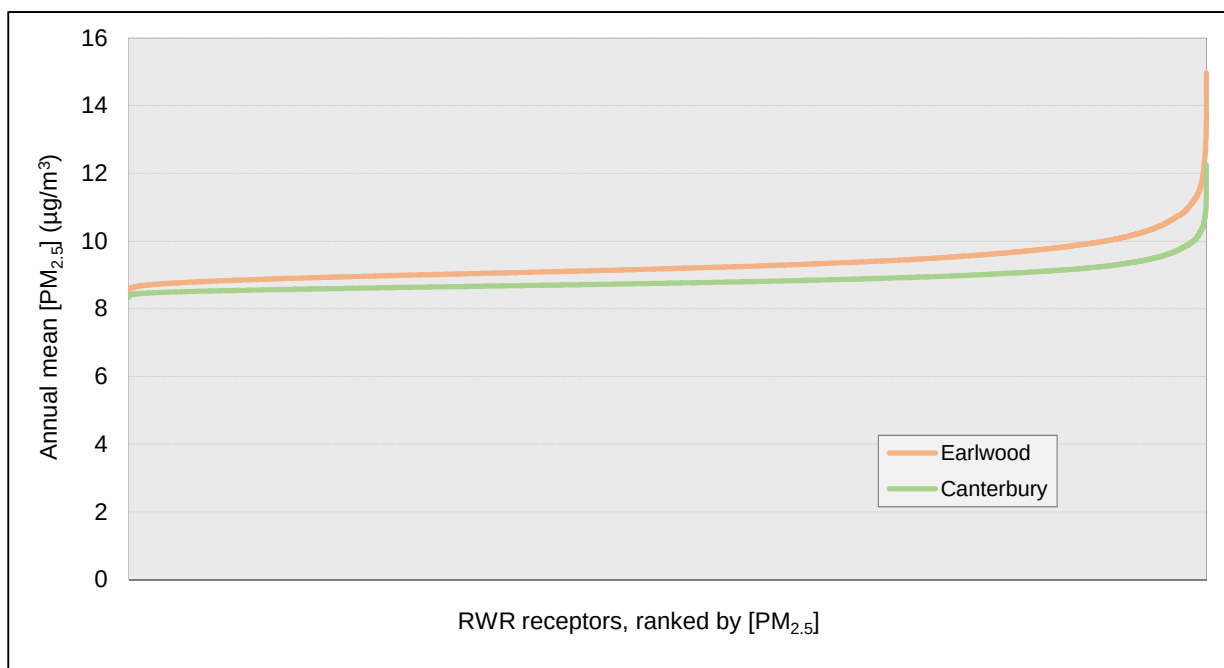


Figure 4-47 Sensitivity of GRAL predictions to meteorological data input: absolute annual mean $PM_{2.5}$, 2031-DSC

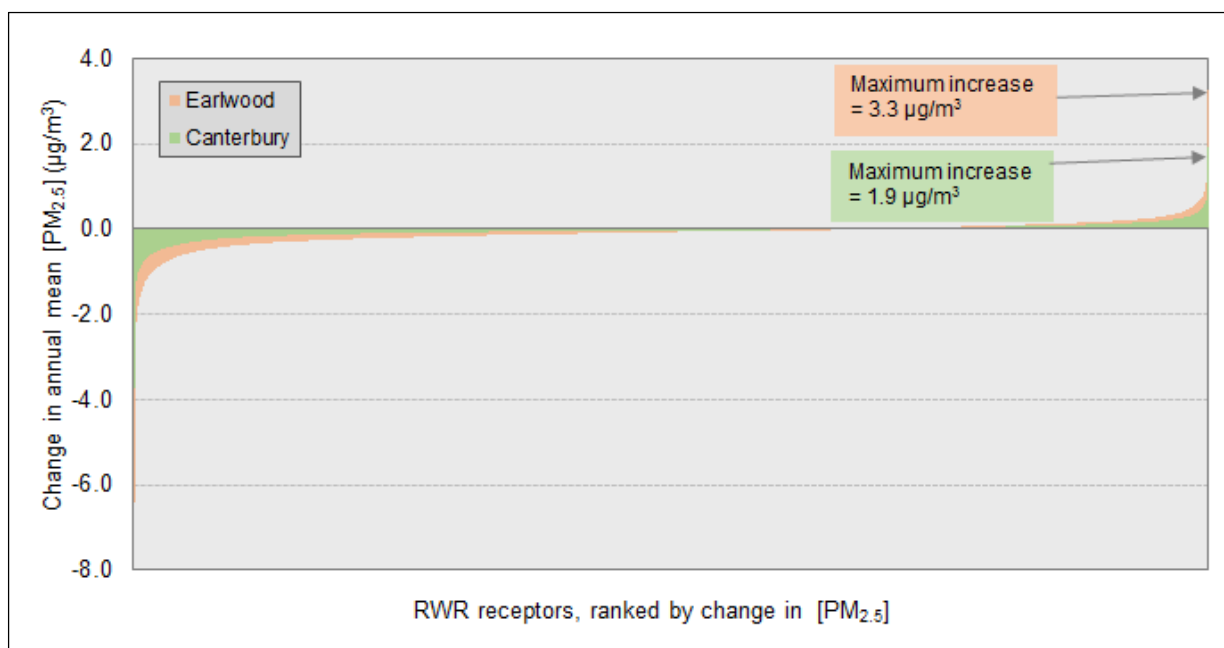


Figure 4-48 Sensitivity of GRAL predictions to meteorological data input: change in annual mean $PM_{2.5}$ with the project (2031-DSC minus 2031-DM)

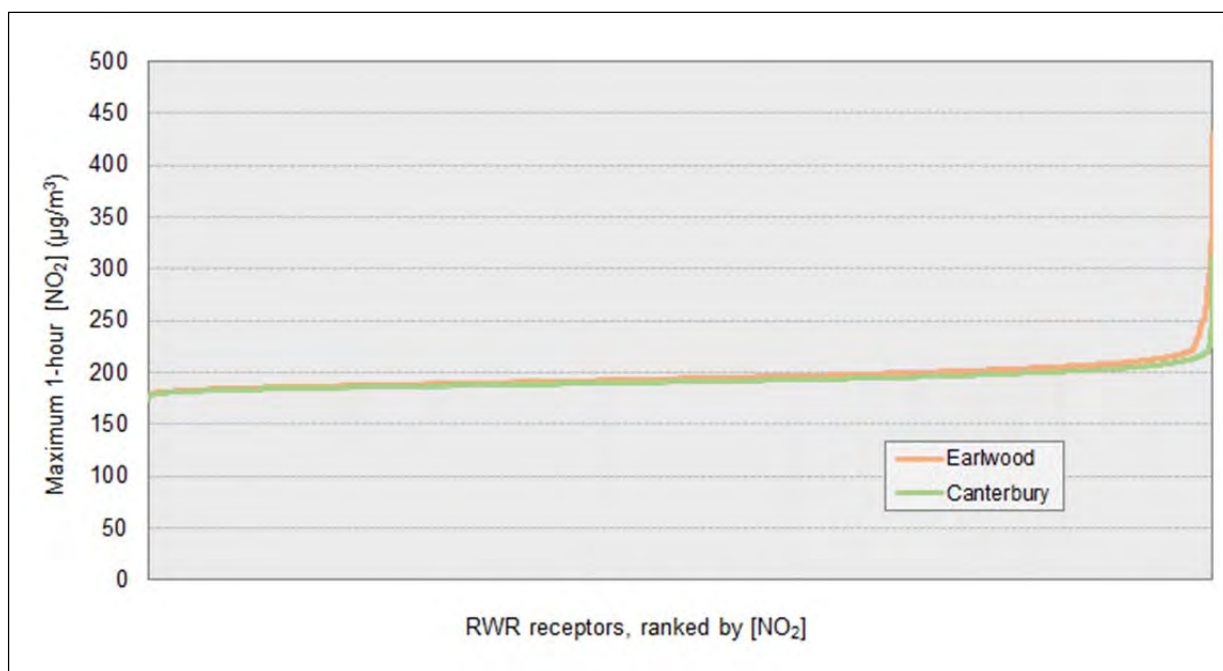


Figure 4-49 Sensitivity of GRAL predictions to meteorological data input: maximum one-hour NO₂, 2031-DSC

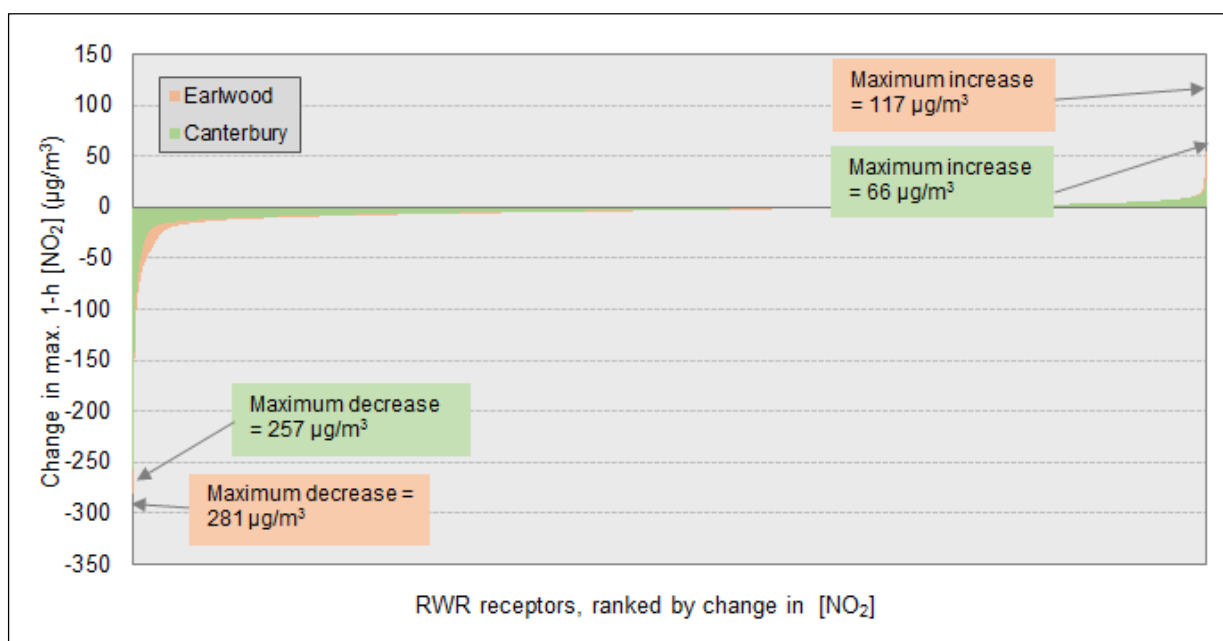


Figure 4-50 Sensitivity of GRAL predictions to meteorological data input: change in maximum one-hour NO₂ with the project (2031-DSC minus 2031-DM)

The implications in terms of exceedances of the one-hour NO₂ criterion of 246 µg/m³ are shown in **Table 4-8**. The table demonstrates that the number of predicted exceedances is sensitive to the meteorology. There would be more predicted exceedances based on the Earlwood meteorological data, both in the 'Do Minimum' and 'Do Something' scenarios. However, in both cases there would be a reduction in the number of exceedances with the project.

Table 4-8 Exceedances of 1-hour NO₂ criterion based on Canterbury and Earlwood meteorological data

Meteorological input	Scenario	Number of exceedances of criterion (246 µg/m ³)
Canterbury	2031-DM	438 (0.95% of receivers)
	2031-DSC	43 (0.09% of receivers)
Earlwood	2031-DM	1,187 (2.57% of receivers)
	2031-DSC	473 (1.02% of receivers)

Issue description – only annual average PM_{2.5} is assessed at the elevated receivers

Potential impacts at elevated receivers are assessed at 10 metres and 30 metres. The focus is on annual average PM_{2.5} concentrations in the 2031-DSC scenario. The assessment of elevated receivers did not include short term averages or other pollutants. To ensure adequate protection of human health the assessment of elevated receivers should include other pollutants and shorter averaging periods.

The EPA recommends that the assessment at elevated receivers should include other pollutants and shorter averaging periods.

Response

The intent of the elevated receiver analysis was twofold:

- To determine potential adverse air quality impacts on existing elevated receivers
- To identify if there are potential constraints that should be taken into account for potential future developments, and which should be addressed through planning controls.

The methodology for the elevated receiver analysis is described and the results are presented in Sections 9.4.6 and Section 9.6 of the Technical working paper: Air quality (Appendix H of the EIS).

Annual mean PM_{2.5} was assessed because the change in annual PM_{2.5} concentration is the most important metric from a human health perspective. The assessment of ground-level impacts in the EIS demonstrates that if annual mean PM_{2.5} concentrations result in health risks in the tolerable/acceptable range, the air quality and health outcomes for other pollutants and averaging periods are also acceptable.

Nevertheless, additional modelling with GRAL was undertaken to determine the 24-hour mean PM_{2.5} concentrations (excluding background) at the elevated receiver heights (10 metres and 30 metres) for the 2031-DSC scenario. For both heights a full modelling run was conducted across the New M5 domain. The GRAL model was used to predict 24-hour PM_{2.5} concentrations associated with both surface roads and tunnel ventilation outlets.

Figure 4-51 and **Figure 4-52** present contour maps showing the changes in maximum 24-hour mean PM_{2.5} concentrations in the 2031-DSC scenario at heights of 10 metres and 30 metres respectively. These can be compared with the changes in ground-level concentrations for the same scenario (Figure K-167 in Appendix K of the Technical working paper: Air quality). **Figure 4-53** presents a contour map showing the changes in maximum 24-hour mean PM_{2.5} concentrations in the 2031-DSC scenario at a height of 30 metres in the vicinity of the St Peters interchange and M4-M5 Link ventilation facilities.

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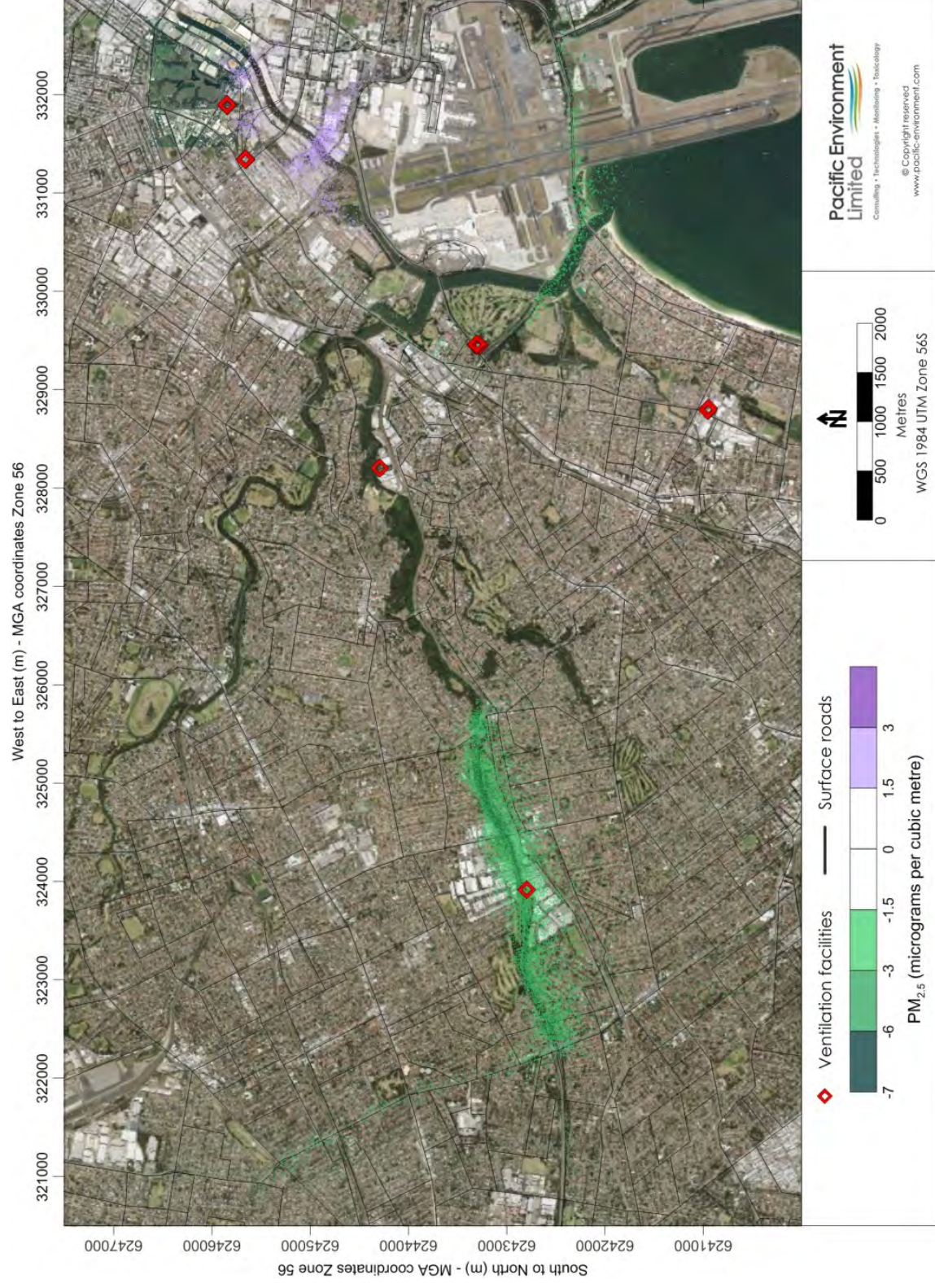


Figure 4-51 Contour map for change in maximum 24-hour average PM_{2.5} (2031-DSC minus 2031-DM, 10 metres)

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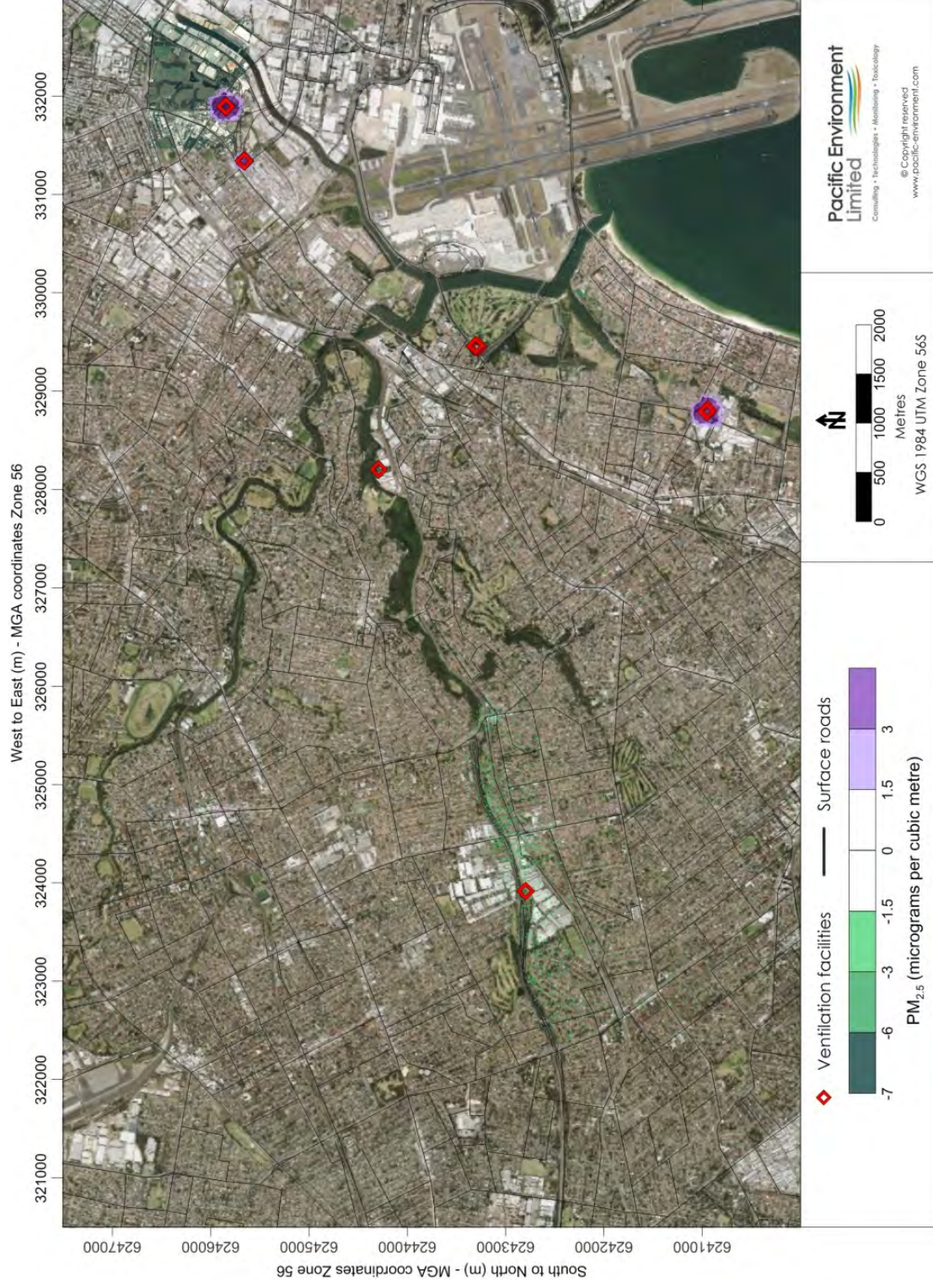


Figure 4-52 Contour map for change in maximum 24-hour average PM_{2.5} (2031-DSC minus 2031-DM, 30 metres)

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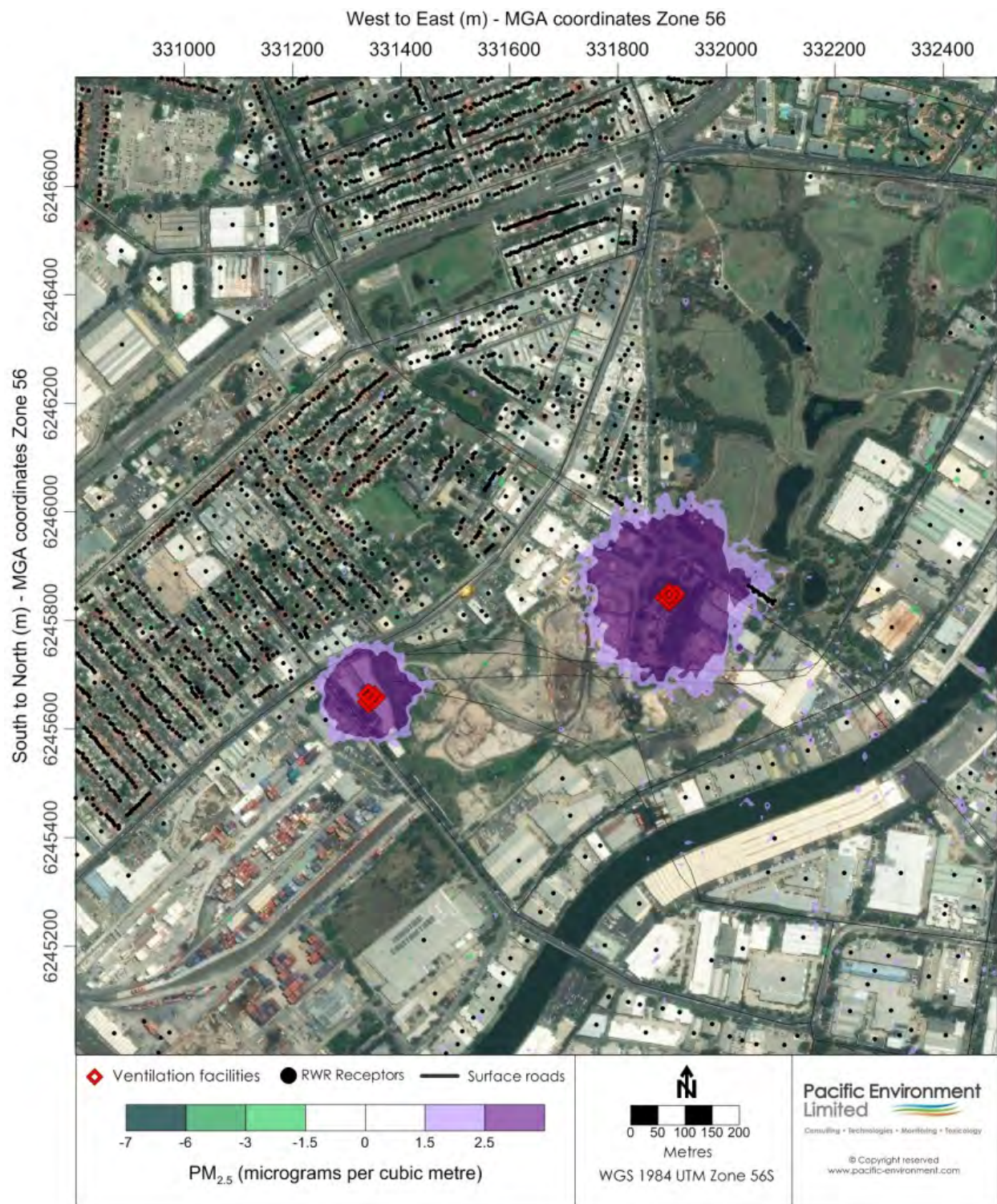


Figure 4-53 Contour map for change in maximum 24-hour average PM_{2.5} (2031-DSC minus 2031-DM, 30 metres), M4-M5 Link

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The results of the 24-hour mean and annual analysis are consistent and can be summarised as follows:

- At a height of 10 metres, the maximum changes in concentration are lower than ground level:
 - At a height of 10 m no receivers were predicted to experience a change in annual average $\text{PM}_{2.5}$ of more than $0.8 \mu\text{g}/\text{m}^3$ (10 per cent of the assessment criterion). The largest increase was $0.8 \mu\text{g}/\text{m}^3$
 - At a height of 10 metres only three receivers were predicted to experience a change in maximum 24-hour $\text{PM}_{2.5}$ of more than $2.5 \mu\text{g}/\text{m}^3$ (10 per cent of the assessment criterion). The largest increase was $2.7 \mu\text{g}/\text{m}^3$.
- At a height of 30 metres, the maximum changes in concentration were predicted to be larger than at 10 m or at ground level, but these were localised around the Southern Connector and the future M4-M5 Link ventilation outlets:
 - At a height of 30 metres, 38 receivers were predicted to experience a change in annual average $\text{PM}_{2.5}$ of more than $0.8 \mu\text{g}/\text{m}^3$ (10 per cent of the assessment criterion). There were 17 receivers that were predicted to have a change in annual average $\text{PM}_{2.5}$ of more than $1.6 \mu\text{g}/\text{m}^3$ and these were all very close to the assumed location of the Southern Connector ventilation facility
 - At a height of 30 metres, 54 receivers were predicted to experience a change in maximum 24-hour $\text{PM}_{2.5}$ of more than $2.5 \mu\text{g}/\text{m}^3$ (10 per cent of the assessment criterion). All of these receiver locations were very close to the assumed location of the Southern Connector and future M4-M5 Link ventilation facilities
 - As the location for the Southern Connector (formerly Southern extension) has yet to reach concept design and consultation stage, results in this location should be considered indicative of potential cumulative impacts to be addressed in future development rather than an assessable impact of the New M5 project.

The implications of these results can be summarised as follows:

- At a height of 10 metres, the maximum changes in concentration are lower than ground level:
 - No adverse air quality impacts were predicted at any existing receivers to a height of 10 metres
 - Future developments to a height of 10 metres were not predicted be constrained by the ventilation outlets at any locations.
- At a height of 30 metres, the maximum changes in concentration were predicted to be larger than at 10 m or at ground level, but increases were predicted to be localised around the Southern Connector and future M4–M5 Link ventilation outlets:
 - The ventilation outlets were predicted not to result in adverse air quality impacts at any existing receivers as there are no existing buildings 30 metres or higher located close to the proposed ventilation facilities at St Peters or the Southern Connector
 - Planning controls should be developed in the vicinity of the St Peters interchange to ensure future developments at heights 30 metres or higher are not adversely impacted by the ventilation outlets. Development of planning controls would be supported by detailed modelling addressing all relevant pollutants and averaging periods
 - The future Southern Connector project should undergo appropriate impact assessment reflecting the chosen location and development in that area at the time of the project.

The intention of the Technical working paper: Air quality in this respect is to point out that the impacts of the Southern Connector are potentially significant, and therefore the location and management of the ventilation outlet(s) would need to be considered in depth.

4.3.4 Vehicle estimation techniques

Issue description – fleet fuel type mix

The fleet fuel type mix for passenger vehicles for both the 2021 and 2031 assessment is not stated. The EPA's calculations show that a fixed petrol/diesel fuel mix is used for passenger vehicles for 2021 and 2031. This does not account for the strong growth in diesel vehicle sales that could reasonably be expected to continue and particularly for SUV vehicles where the diesel share is growing strongly, together with SUV's strong growth in the proportion of new passenger vehicle sales. Light duty diesel vehicles have both a much higher total NO_x emission rate, and the fraction of the NO_x that is NO₂ is also very much higher.

The combination of these may result in NO₂ emissions from diesel light duty vehicles up to two orders of magnitude higher than comparable petrol light duty vehicles. Hence it is imperative to base emission calculations on the best possible estimation of the fleet fuel mix.

The proponent should present the disaggregated trends in fuel mix (i.e. passenger cars and SUV separately), the trend in SUV proportion and projections from these to 2031, and verify the in-tunnel NO₂ emissions arising from this fleet mix via a transparently documented sensitivity analysis for both 2021 and 2031.

Response

The EPA's calculations are correct. The same fleet fuel mix from 2020 was used for all time periods. The fleet fuel type mix used for passenger vehicles is 15.6 per cent diesel.

Vehicle registration data shows that diesel vehicle sales, particularly for passenger vehicles, have been slower than predicted. Analysis of the consequences of increased share of diesel vehicles shows that uptake of new, cleaner vehicles drives fleet average NO₂ emissions down. As the PIARC methodology does not include this beyond 2020, the EIS results for 2031 are therefore conservative. A sensitivity analysis was undertaken as requested. The analysis illustrated that varying the inputs gives predicted NO₂ levels that can be adequately managed by the project. The following sections discuss this further.

Predicted uptake of diesel vehicles

While strong growth in diesel sales was predicted in the EPA's Air Emissions Inventory, registration statistics show that diesel uptake for passenger vehicles may have peaked, rather than strong and continuing growth.

Recent data (2014) for NSW new vehicle registrations suggest the diesel fraction of new LDVs might plateau around 91% and the fraction of new diesel passenger vehicles peaked in 2013 at 20%. Data from the Roads and Maritime registrations database are shown in **Figure 4-54** below.

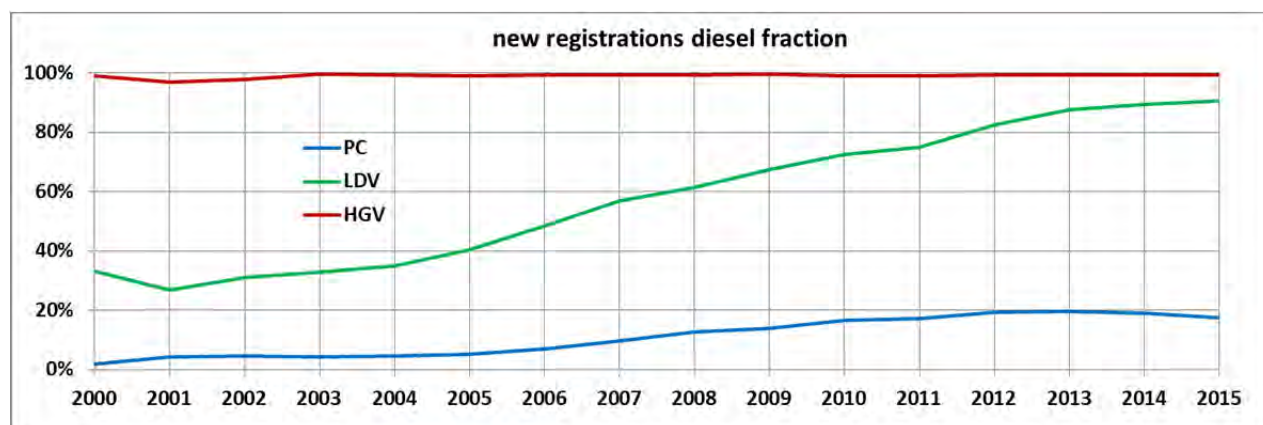


Figure 4-54 Percentage of new vehicles which are diesel-fuelled

For this proportion of new registrations, the change to the vehicle fleet would be slower than that predicted in the Air Emissions Inventory. A detailed analysis of uptake of diesel vehicles, and comparison to the EPA's emissions inventory, is provided in Section E.2.3 of the Technical working paper: Air quality (Appendix H to the EIS).

Fleet turnover that takes up cleaner technology is key to future emissions

The contribution of diesel vehicles, while important, does not change the overall trend of lower emissions due to improved vehicle standards. Should the entire passenger fleet become diesel by 2030, the average emissions would still be lower than today's fleet.

This assessment was undertaken by the Advisory Committee on In-Tunnel Air Quality in developing the *In-Tunnel Air Quality (Nitrogen Dioxide) Policy*. The figure illustrating this point is reproduced below as **Figure 4-55**.

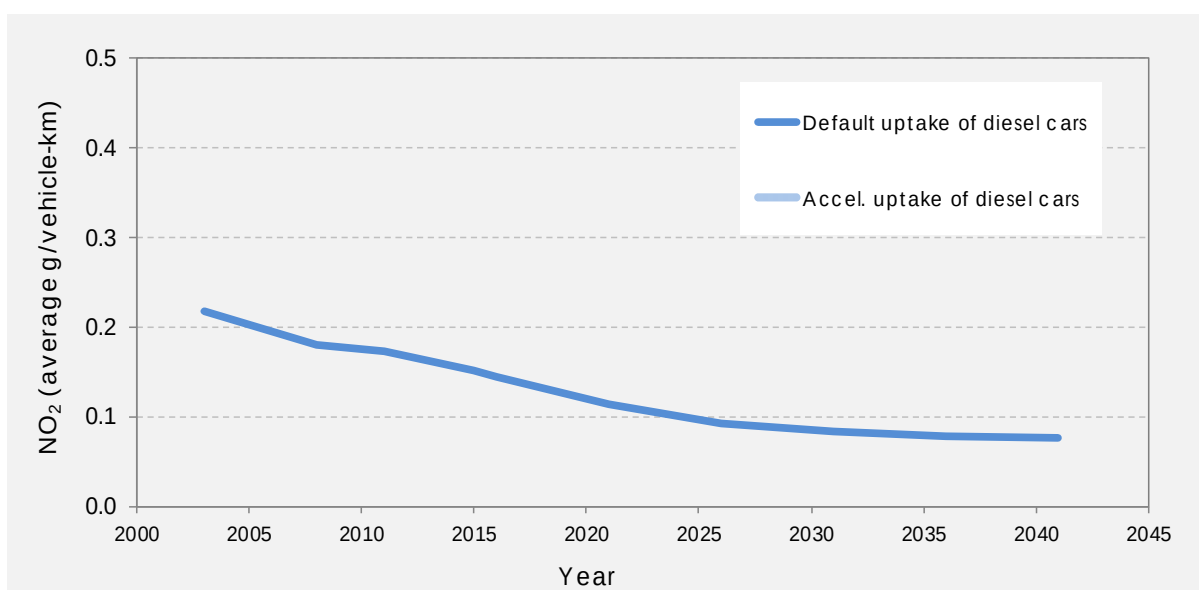


Figure 4-55 Average nitrogen dioxide emissions for NSW fleet (In-Tunnel Air Quality (Nitrogen Dioxide) Policy, ACTAQ). The accelerated uptake of diesel cars is a hypothetical scenario where 100 per cent of passenger cars are diesel by 2030

The PIARC methodology does not provide for any reductions in emissions after 2020, therefore the 2031 ventilation assessment is conservative. The results presented in the EIS for 2021 are the key issue in assessing air quality, as pollutant levels are predicted to decline beyond this point.

Sensitivity to assumed proportion of diesel vehicles

As requested, a sensitivity analysis was undertaken to assess the consequences of accelerated diesel vehicle uptake. The sensitivity analysis used the EIS as a baseline against which to compare two options:

- EIS: PIARC simple methodology (Euro classification); registration data to 2015 used to develop predicted fleet diesel share
- Scenario 1: the PIARC detailed methodology (Euro classification), with diesel proportions based on the EIS ventilation report (Figure 7.8 from that report). This approach allowed increasing LDV diesel fractions with time instead of the fixed 50/50 split in the simple approach, showing an increase as requested

- Scenario 2: inputs from the In-Tunnel Air Quality (Nitrogen Dioxide) Policy (Advisory Committee on Tunnel Air Quality, February 2016), which uses vehicle data from Air Emissions Inventory for the Greater Metropolitan Region in NSW: 2008 Calendar Year (NSW EPA, August 2012) specifically those for diesel proportions, Euro characterisation (Figure 7) and NO₂:NO_x ratios (Table 1).

The sensitivity analysis is reported by comparison with the EIS. The results are shown in **Table 4-9** below.

Table 4-9 Sensitivity analysis: effects of varying diesel share of fleet on NO₂ emissions

	Scenario 1: PIARC detailed methodology		Scenario 2: PIARC methodology, inputs from <i>Air Emissions Inventory for GMR</i>	
Year	2021	2031	2021	2031
Assumed diesel share of fleet	PC: 15.6% LDV: 79.1% HGV: 100%	PC: 17.6% LDV: 91% HGV: 100%	PC: 19.7% LDV: 54.1% HGV: 100%	PC: 28.1% LDV: 65.8% HGV: 100%
Free-flowing (80 km/hr)	-1% compared to EIS	-52% compared to EIS	+2% compared to EIS	-31% compared to EIS
Varying speeds (20 km/hr)	+10% compared to EIS	-50% compared to EIS	+36% compared to EIS	+9% compared to EIS

The sensitivity analysis can be interpreted as follows:

- The EIS air quality impact assessment is either not particularly sensitive to the changes in inputs, or provides higher predictions than the scenarios examined
- The exception is the 2021 congested case, which predicts higher NO₂ emissions for the EPA fleet projections
- The predicted increases in 2021 relative to the EIS should be considered in the context that they are based on 2021 fleet projections made from 2008 data, whereas the EIS projections were made from 2015 registration data (i.e. the EPA projections are likely to be overly conservative)
- Were the fleet to develop as projected in the *Air Emissions Inventory for the Greater Metropolitan Region*, and in the unlikely event that the project tunnels achieved full congested traffic flow in the first few years of operation, this level of emissions could still meet air quality criteria with extra jet fans operating
- The ambient air quality expected traffic cases and regulatory (free flowing) cases are not sensitive to the scenarios examined. The expected traffic cases are based on free flowing traffic, and emissions are within 2% of the sensitivity scenarios for 2021. For 2031 free flowing traffic the EIS predictions are significantly higher than the EPA-based predictions (a consequence of the EIS assuming no improvement in emissions post 2020).

Issue description – trends of new light diesel vehicle (LDV) sales

The petrol/diesel mix for LDV adopts the PIARC default assumption of 50%/50% for both the 2021 and 2031 assessments. This is very likely to underestimate the proportion of light diesel vehicles in 2031, which the EPA estimates to be greater than 80 per cent diesel in 2031, as compared to the base PIARC assumption of 50 per cent. Given the higher NO_x and higher fNO₂ of light duty diesel vehicles relative to petrol vehicles, this may cause an underestimation of LDV NO₂ emissions.

Present the trends in fuel type of new LDV sales should be provided and a projection of this to 2031 and verify the in-tunnel NO₂ emissions arising from this fleet mix via a transparently documented sensitivity analysis for both 2021 and 2031.

Response

Scenario 1 in the sensitivity analysis above represents the expected uptake of diesel vehicles, based on 2015 registration data. It assesses a 79 per cent share of diesel for light duty vehicles in 2021, rising to 90 per cent in 2031. Scenario 2 represents a higher uptake of diesel for passenger vehicles, to 28 per cent in 2031, following the EPA documents. The results are discussed above.

The uptake of cleaner vehicles is the driving factor. This has not been accounted for in the 2031 EIS case, hence the EIS case would still be conservative should diesel uptake rise dramatically.

Issue description – fleet fuel profile

The documentation of the NO₂ fraction (fNO₂) in Section 9.3 of Appendix L of the Technical working paper: Air quality (Appendix H of the EIS) indicates a fixed NO₂ fraction (fNO₂) is applied to the PIARC NO_x estimates for 2021 and 2031, based on a single reference. This approach is not considered best practice as it would not respond to changing fleet technology into the future, or to changing fuel mixes.

Some clarification presented in the submission report for the WestConnex M4 East EIS has confirmed that a fleet age profile was used to determine age specific fNO₂ based on the assumed emission certification of each model year vehicle. This information is also expected to be presented for the new M5 as it is a standalone assessment. However it is not clear what year the age profile was applied to in order to derive the fleet average fNO₂ presented in Table 9.2.

The proponent should reassess the fNO₂ based on the reassessment of the fleet fuel profile per Fleet fuel type mix and Trends of new light diesel vehicle sales above for both 2021 and 2031, taking into account the age profile and consequent emission certification, noting that the diesel age profile is likely to be different to the petrol due to the rapid increase in the diesel vehicle sales.

Further the rigour of using one reference to source fNO₂ is debateable. The reference used draws its data from a remote sensing study that measured an instantaneous snapshot of vehicle emissions under a limited range of conditions. Other European data sources provide fNO₂ based on representative real world drive cycles and these should be referred to for comparison to the remote sensing data in order to ensure the most robust fNO₂ is applied.

It is noted that a more appropriate approach was taken for the surface road modelling which could have been adopted for the in-tunnel emission estimation.

Response

As in the M4 East EIS, a fleet age profile was used, incorporating variable NO₂:NO_x ratio. This drew on the vehicle age profile from the 2014 vehicle census by the ABS, presented in Figure 7.7 of the Tunnel Ventilation Report (Appendix L to Appendix H of the EIS). For 2020 the same age profile was used, which implies uptake of vehicles meeting more stringent emissions standards corresponding to their age. The NO₂:NO_x ratios presented in Table 9.2 consolidate these calculations and present the fleet average results for 2020.

The fleet averaged NO₂:NO_x ratio for 2020 in Table 9.3 of the Tunnel Ventilation Report and in Figure 10 of *In-Tunnel Air Quality (Nitrogen Dioxide) Policy* show good agreement.

Figure 4-54 shows that, even with accelerated uptake of diesel passenger vehicles, primary NO₂ emissions continue to decrease. The sensitivity analysis outlined above confirmed that, whatever common basis is used for both 2021 and 2031 estimation, the 2021 fleet emissions (and hence 2020 emissions) are conservative for 2031. Changing fleet technology and fuel mix in the future is most likely to reduce emissions including NO₂ and hence this approach is considered conservative.

Issue description – heavy goods vehicle exhaust emission factors

The heavy goods vehicle (HGV) exhaust emission factors used in the in-tunnel emissions estimation are 80 per cent below that provided by PIARC for NO₂ and PM, and varying amounts below the PIARC figures for CO. No mention is made of an adjustment to the base PIARC emission factors in the text.

The EPA recommends that the reason for this variation should be provided and justified, along with a detailed description and reference to the methodology used.

Response

The HGV exhaust PM factors are 80 per cent of those in the PIARC tables (i.e. 20 per cent below the PIARC table values not 80 per cent).

The PIARC exhaust emission factors provide a general methodology, which was adapted using data specific to Sydney:

- The HGV splits were assessed using data from the existing M4 motorway, to provide a guide for expected fleet composition in motorways. This is detailed in Section 7.2.1 of the Ventilation Report (refer Appendix L to Appendix H of the EIS)
- Within the HGV data, the average weight of the fleet was considered, as a proxy for vehicle size, and hence pollution generation. M5 East weigh-in-motion data were used to develop a weight-distribution assessment for HGVs, and this is illustrated in Figure 7.3 of the Ventilation Report in Appendix L to Appendix H of the EIS. The resulting average weight of HGVs is shown in Table 7.4 of the Ventilation Report and with the proportion in medium and long detailed in Figure 7.6.

Applying the PIARC methodology with average HGV mass determined results in a 20 per cent reduction of the PIARC base emission factors which are based on 23 tonne mass.

Issue description – off road diesel emissions

The environmental impacts associated with off road diesel equipment can be a major source of fine particles.

The EPA recommends that the proponent assess the environmental impacts associated with heavy vehicles including off road diesel equipment and plant used in the construction of the project. This should include but is not limited to:

- Compliance with relevant and current emission standards as prescribed in Australian design Rules for heavy duty engines and vehicles
- Strategies for minimising air emissions from off road diesel equipment including but not limited to graders, bulldozers, loaders etc.
- Confirmation that all off road diesel equipment would meet best available diesel emissions standards or be fitted with an appropriate diesel exhaust treatment device where possible.

Response

A Construction Air Quality Management Plan (CAQMP) would be prepared for the project as part of the Construction Environmental Management Plan (CEMP) which would include management measures, and procedures to guide their implementation during construction to minimise diesel emissions. These measures would include:

- All construction plant and equipment must be maintained and operated to minimise emissions. Visible smoke should not be emitted for any period greater than 15 seconds for plant not registered for use on public roads and 10 seconds for plant registered for use on public roads. The Environmental Representative would be notified of any defective emission controls
- Ensure all on-road vehicles comply with relevant emissions standards
- Ensure that, where practicable, engine idling is minimised when stationary
- Avoid the use of diesel or petrol powered generators and use mains electricity or battery powered equipment where practicable.

4.3.5 Noise and vibration

Issue description – Construction Noise and Vibration Management Plan

The noise and vibration impact assessment predicts noise and vibration impacts from construction works that are typical for this type of significant infrastructure project. An appreciable portion of the surrounding community is expected to be significantly impacted from time to time by many of the project's construction activities including demolition, clearing, earthworks, tunnelling, etc. Worst case exceedances of the construction noise management levels of greater than 25 decibels are flagged for some activities, with many receivers being highly noise affected, particularly when works are in close proximity. Impacts are also predicted from ground borne noise, vibration affecting human comfort, and disturbance to sleep.

To address these impacts, the Technical Working Paper proposes mitigation and management measures in general terms, outlined in Section 7.2 and 7.3. The noise and vibration impact assessment states in Section 7.1 that a Construction Noise and Vibration Management Plan (CNVMP) is to be developed, which would provide further detail on how a range of noise and vibration issues would be addressed in terms of impacts, mitigation and management. These issues include (but are not limited to):

- Ground-borne noise from tunnelling
- Cumulative construction noise
- Out-of-hours works
- Sleep disturbance
- General construction works.

As the predicted impacts are significant, additional information on the impacts and mitigation measures should be provided at the EIS stage, and prior to any approval, rather than deferred to a post-approval management plan to enable appropriate consent conditions to be developed. The information to be provided should include, at a minimum, specific noise and vibration mitigation and management measures to be implemented for each activity and location together with an assessment of their mitigation performance at sensitive receivers. Details are required for an appropriate level of assessment of the likely impacts of the project to be made, the feasibility and reasonableness of any proposed mitigation and management measures, and their effectiveness in reducing impacts.

Notwithstanding the above, the EPA has provided recommended conditions of approval as below, which are consistent with conditions on project approvals for other similar transport infrastructure projects.

The EPA recommends that the Department of Planning and Environment includes in any approval given for the project:

- The recommended conditions provided as part of the EPA submission
- Compliance assessment conditions which require additional noise mitigation measures to be implemented if predicted noise or vibration levels are exceeded.

Response

The noise and vibration impacts of the project have been assessed in accordance with the requirements of the SEARs issued for the project. The information requested in the EPA's submission would be included within the Construction Noise and Vibration Management Plan and associated procedures. The Construction Noise and Vibration Management Plan would be prepared in consultation with the EPA. It would be provided to the EPA for comment, together with other agency referrals.

The Construction Noise and Vibration Management Plan would include the following:

- Identification of nearby residences and other sensitive land uses
- Description of approved hours of work

- Description and identification of all construction activities, including work areas, equipment and duration
- Description of what work practices (generic and specific) would be applied to minimise noise and vibration
- A complaints handling process
- Noise and vibration monitoring procedures
- Overview of community consultation required for identified high impact works.
- Cumulative construction noise impacts.

Issue description – Recommended conditions of approval

The EPA recommends that the Department of Planning and Environment includes in any approval given for the project the recommended conditions provided as part of the EPA submission

Response

Noted. We note that conditions of approval are a matter for the Department of Planning and Environment to consider during its assessment of the project.

4.4 Fire and Rescue NSW

Issue description – consultation with Fire and Rescue NSW

Fire and Rescue NSW considers that consultation should occur between the project team and Fire and Rescue NSW throughout the life of the project. In order to facilitate this effectively, Fire and Rescue NSW recommends that the conditions of approval attached to its submission be included in the Minister for Planning's approval of the project.

Response

Roads and Maritime would continue to consult with key stakeholders throughout detailed design and during operation of the project. This would include consultation with Fire and Rescue NSW in relation to fire safety and emergency planning and management for the project. Roads and Maritime would comply with all consultation requirements.

4.5 NSW Health

4.5.1 General

Issue description – technical adequacy

NSW Health has reviewed the EIS with emphasis on the technical adequacy of the Human Health Risk Assessment (HHRA), the Air Quality assessment and the Noise and Vibration impact assessment. NSW Health is satisfied that for this particular project the HHRA has used an appropriate approach for the assessment of human health.

Response

Noted.

4.5.2 External air quality

Issue description – validation of air quality model

Information provided within the EIS does not demonstrate that the model used to estimate air pollution has been adequately validated. However, it is noted that the model used in the EIS is the same model that was used to assess the external air quality for the proposed M4 East and that subsequently substantial additional work (mainly sensitivity studies) has been undertaken to validate the modelling work for the proposed M4 East development. As such, NSW Health is happy to accept that the model is appropriate for this EIS.

Response

NSW Health's acceptance that the model is appropriate for this EIS is noted.

Issue description – inconsistency between input variables of air quality modelling and human health risk assessment

Many of the input variables presented in the Human Health Risk Assessment section of the EIS (Chapter 11 and Appendix I) are inconsistent with the variables reported in the Air Quality assessment section of the EIS. For some of the input variables into the Human Health Risk Assessment, no results are presented in the Air Quality assessment. It would be useful to assure that these data align.

Further, the HHRA calculates the risk from threshold chemicals (such as air toxics) without consideration of background concentrations. Concentrations considered for the assessment should be the maximum predicted total concentrations, and not the difference in concentrations between scenarios, as would be used for non-threshold chemical.

Response

Inputs used in the Technical working paper: Human health (Appendix I of the EIS) were obtained from the air quality assessment/model, and based on all the inputs and assumptions outlined in the air quality assessment (refer Section 9.8 of Appendix H of the EIS). The specific air pollutant concentrations, related to maximum impacts and individual receptor locations used in the Human Health Risk Assessment are presented in the relevant tables and calculations in the Human Health Risk Assessment.

The assessment of air toxics has used modelled data on vehicle emissions from roads and ventilation facilities. In the areas evaluated, no current background data is available for air toxics, specifically total volatile organic compounds (or speciated compounds) or polycyclic aromatic hydrocarbons and hence both background and project related changes have been modelled. The only background data that is available for Sydney and Rozelle relates to data collected and reported by the NSW Environment Protection Authority (EPA) for the period 1996 to 2001. The NSW EPA data is dated, however the levels of individual compounds derived from combustion sources such as toluene, xylenes and 1,3-butadiene are modelled from all sources (background and the project) to be in the same range as measured in 1996 to 2001. It is noted that vehicle emissions control equipment and the composition of fuel has changed since the 1996 to 2001 data was collected and as a result the 1996 to 2001 data is expected to provide a conservative view of air toxics in the current urban environment.

While the change in air toxics concentrations was evaluated in the Technical working paper: Human health (Appendix I of the EIS), it is more correct that the calculation of threshold effects includes both background and the contribution from the project. On this basis the calculated Hazard Indices (HI) presented in Table 6.6 and Table 6.7 of the Technical working paper: Human health have been updated (refer to **Table 4-10** and **Table 4-11**). The update is based on the maximum predicted total concentration in air (background plus project contribution) in the surrounding area (regardless of location and land use).

The calculated total HI is less than or equal to 1 for 2021, 2031 and the 2031 cumulative scenario. This indicates risks that are considered to be acceptable. It is noted that the maximum HI is calculated for emissions in 2021, which are dominated by potential exposures to formaldehyde (for acute exposures) and 1,3-butadiene (for chronic exposures). These impacts are dominated by changes in surface road emissions. Impacts associated with background plus the project contributions are predicted to improve over time to 2031 and for the 2031 cumulative scenario.

Table 4-10 Assessment of acute exposures to VOCs – maximum impacts in community associated with project

Key VOC	Maximum predicted 1-hour average concentration associated with project and calculated HI					
	2021		2031		Cumulative - 2031	
	Maximum concentration (µg/m ³)	HI	Maximum concentration (µg/m ³)	HI	Maximum concentration (µg/m ³)	HI
Total VOCs	614		354		341	
Toluene	49	0.011	26	0.0057	27	0.0061
Xylenes	41	0.018	21	0.0096	23	0.010
1,3-Butadiene	7.0	0.011	3.8	0.0057	3.9	0.0059
Formaldehyde	15	1.0	12	0.78	8.4	0.56
Acetaldehyde	8.0	0.017	5.3	0.011	4.4	0.0094
Total HI		1		0.8		0.6

Table 4-11 Assessment of chronic exposures to VOCs and PAHs – maximum impacts in community associated with project

Key VOCs and PAHs	Maximum predicted annual average concentration associated with project and calculated HI					
	2021		2031		Cumulative - 2031	
	Max concentration (µg/m ³)	HI	Max concentration (µg/m ³)	HI	Max concentration (µg/m ³)	HI
Total VOCs	23.2		13.9		13.2	
Toluene	1.9	0.00037	1.0	0.00020	1.1	0.00021
Xylenes	1.5	0.0070	0.83	0.0038	0.87	0.0040
1,3-Butadiene	0.26	0.88	0.15	0.49	0.15	0.50
Formaldehyde	0.57	0.17	0.46	0.14	0.32	0.098
Acetaldehyde	0.30	0.034	0.21	0.023	0.17	0.019
Total PAHs	0.15		0.092		0.087	
Naphthalene	0.10	3.4 x10 ⁻²	0.060	2.0 x10 ⁻²	0.057	1.9 x10 ⁻²
Acenaphthylene	0.0083	4.1 x10 ⁻⁵	0.0050	2.5 x10 ⁻⁵	0.0047	2.4 x10 ⁻⁵
Acenaphthene	0.0021	1.1 x10 ⁻⁵	0.0013	6.4 x10 ⁻⁶	0.0012	6.1 x10 ⁻⁶
Fluorene	0.011	7.5 x10 ⁻⁵	0.0063	4.5 x10 ⁻⁵	0.0060	4.3 x10 ⁻⁵
Phenanthrene	0.021	1.5 x10 ⁻⁴	0.013	9.0 x10 ⁻⁵	0.012	8.5 x10 ⁻⁵
Anthracene	0.0017	1.7 x10 ⁻⁶	0.0010	1.0 x10 ⁻⁶	0.0010	9.6 x10 ⁻⁷
Fluoranthene	0.0012	8.7 x10 ⁻⁶	0.00073	5.2 x10 ⁻⁶	0.00070	5.0 x10 ⁻⁶
Pyrene	0.0021	2.1 x10 ⁻⁵	0.0013	1.3 x10 ⁻⁵	0.0012	1.2 x10 ⁻⁵
Total HI		1		0.7		0.6

Issue description – portal emissions

NSW Health notes that portal emissions are not included in the proposal. This is in keeping with good design and consistent with the NHMRC (2008) observation that 'In urban locations, it is often felt that portal emissions are not acceptable because of the localised effect of such a powerful point source of air pollutants'.

Response

Noted.

Issue description – human health risks associated with ground level concentrations of PM_{2.5} and nitrogen dioxide emissions

The EIS predicts reductions in PM_{2.5} and nitrogen dioxide exposure in a number of the areas surrounding the proposed development in 2021 and 2031. There are, however, limited areas of increased PM_{2.5} and nitrogen dioxide exposure that appear to align with areas of surface traffic congestion. The HHRA predicts a non-negligible increased risk of hospitalisation and mortality (to a maximum increased risk of 6 per 100,000 per annum) for residents who experience an increase in PM_{2.5} and /or nitrogen dioxide exposure. Based on this assessment, it is recommended that there is further exploration of all feasible and reasonable measures to reduce ground level concentrations in those areas currently predicted to experience an increase. Further, some workplace areas and some locations at 30 m elevation are predicted to have an increased risk of morbidity and mortality ranging from 1 per 10,000 per annum to 2 per 1000 per annum. In these areas it is important to consider the impacts of pollutants and their dispersion in any future land use change. Future approval of elevated residences may expose people to unacceptable levels of pollutants as well as change the stack dispersion patterns.

Response

The project would result in changes to how traffic travels through the road network, which is reflected in the spatial changes in air quality as presented in the Technical working paper: Air quality. This includes substantial reductions in pollutant concentrations along certain roads, and increases on a number of other roads, such as Campbell Street. Where increases in pollutant concentrations at receivers have been predicted, these were mostly small and along existing road corridors. The potential health impacts associated with changes in air quality on surface roads (specifically nitrogen dioxide and particulates) within the local community have been assessed and are considered to be acceptable. The feasibility of refinements to reduce pollutant concentrations, such as the use of landscaping or the optimisation of signals, would be considered during detailed design.

The NSW Government is committed to reducing emissions from motor vehicles and continues to work with the Commonwealth to implement cleaner fuels and cleaner vehicles. Total emissions from the Sydney vehicle fleet have reduced over the last 20 years, and are projected to continue to reduce into the future.

The project has the potential to influence development patterns for existing and future elevated receiver locations (for example, those receivers within multi-storey residential buildings) as a consequence of operation of the project's ventilation outlets. Elevated receivers have the potential to experience higher air quality impacts because emissions from the ventilation outlets have less time to disperse compared with potential impacts at ground level. Section 10.8 of the EIS includes an assessment of potential air quality impacts for both ground level and elevated receiver locations. This issue is discussed further in this section in response to NSW Heath's submission.

Issue description – air quality and odour impacts near Alexandria Landfill

Potential exceedances for PM₁₀ could occur in the industrial area on the southern boundary of the Alexandria Landfill zone. Dispersion modelling for odour has also predicted the chance of some industrial receptors at the southern boundary experiencing levels up to seven odour units, and therefore some occupants (workers) would experience odour annoyance. It is recommended that comment is sought from SafeWork NSW on this issue.

Response

The predicted particulate matter levels attributed to the landfill closure works are low, and even when added to existing concentrations would remain below their relevant air quality criteria.

An exception to this is the predicted cumulative 24-hour PM₁₀ in the industrial area on the southern boundary, although this is unlikely to be an exceedance in practice. The maximum predicted 24-hour PM₁₀ concentration due to landfill closure works is approximately 10-20 µg/m³ in that area (as shown in Figure 8-6 of Appendix H of the EIS). To exceed the criterion this modelled maximum would need to occur on the same day as the conservative background of 40 µg/m³. This is conservative as the maximum prediction is based on all activities occurring at the maximum rate on all days of the year.

Regarding odour impacts, predicted 99th percentile odour concentrations at most of the nearest receptors were below 1 OU, the theoretical level of detection. For all but one of the off-site receptors the odour criterion of 2 OU (99th percentile) was not predicted to be exceeded.

There is the potential for some industrial receptors at the southern boundary experience levels of up to 7 OU, and therefore some occupants to experience odour annoyance. However, it should be noted that the modelling has assumed that large areas of the whole site would be exposed continuously which would not be the case. In practice, covers would be applied to exposed areas on a daily basis as part of an odour management plan, which would significantly reduce odour impacts, particularly close to the site.

Notwithstanding, Roads and Maritime would consult with SafeWork NSW regarding management of impacts on industrial workers adjacent to the landfill site.

Issue description – future developments

Future development proposals and rezoning could result in new multi-storey residential buildings being built in close proximity to the stacks. In addition, there are a number of existing receptors which are currently deemed not to be at risk of unacceptable exposures due to the project as they are non-residential. There needs to be special consideration around these receptors if there is a proposed change to land use, such as from industrial to residential. We support the approach outlined in the EIS, namely that any future developments would have to consider the air dispersion performance of the stacks along with how the future development may affect this performance, and that Roads and Maritime Services would work with the Department of Planning and Environment and local governments in determining the suitability of any relevant development proposals.

Response

The future development of land (including re-zonings) in the vicinity of the ventilation facilities that may involve multi-story buildings would need to consider the air dispersion performance of the Arncliffe ventilation facility. Roads and Maritime would assist local councils, or the Department of Planning and Environment, in determining any relevant land use considerations applicable to future development for inclusion in local environmental plans or development control plans, where required (refer to Section 13.3.2 of the EIS for further information).

NSW Health support of the approach outlined in the EIS is noted.

Issue description – elevated receivers

It is noted that the New M5 EIS includes air pollution modelling at 10 m and 30 m in addition to ground level with classified "unacceptable" health impacts close to the stacks. This must be taken into account in any rezoning plans. Specifically, it is noted that the increased risk for some health outcomes for potential future elevated receptors (30 m) would be within the "unacceptable" range (Table 6.24). The EIS states that Roads and Maritime would ensure that it works closely with Department of Planning and Environment and local governments to ensure no inappropriate developments adjacent to proposed stacks occur. It is strongly recommended that the proponent ensures during joint regional planning that consideration of a height exclusion zone is created around the Southern Ventilation Facility, which prohibits unsafe building around the stack.

Response

The Southern Ventilation Facility is a reference to the ventilation facility that would be required for the future Southern Connector (referred to in the EIS as the Southern extension) as detailed in Section 9.6 of Appendix H (Technical working paper: Air quality) of the EIS. As stated in the assessment, this ventilation facility does not form part of the project and would be subject to design development and separate environmental planning approval.

As stated in Section 6.9.5 of Appendix I (Technical working paper: Human health risk) of the EIS, the impacts identified at 30 metres height are localised around ventilation outlets with the maximum increases more specifically located adjacent to the proposed Southern Connector facility. There are no multi-storey buildings located close to the New M5 ventilation facilities or the Southern Connector facility; hence the maximum risks calculated are hypothetical at this stage.

Additional analysis on this issue has been provided in **Section 4.1.2** of this report. The implications of these results can be summarised as follows:

- At a height of 10 metres, the maximum changes in concentration are lower than ground level
 - No adverse air quality impacts were predicted at any existing receptors to a height of 10 metres
 - Future developments to a height of 10 metres were not predicted be constrained by the ventilation outlets at any locations.
- At a height of 30 metres, the maximum changes in concentration were predicted to be larger than at 10 metres or at ground level, but increases were predicted to be localised around the Southern Connector and M4-M5 Link ventilation outlets:
 - The ventilation outlets were predicted not to result in adverse air quality impacts at any existing receptors as there are no existing buildings 30 metres or higher located close to the proposed ventilation facilities at St Peters or the Southern Connector
 - Planning controls should be developed in the vicinity of the St Peters interchange to ensure future developments at heights 30 metres or higher are not adversely impacted by the ventilation outlets. Development of planning controls would be supported by detailed modelling addressing all relevant pollutants and averaging periods.
 - The future Southern Connector project should undergo appropriate impact assessment reflecting the chosen location and development in that area at the time of the project.

Roads and Maritime would consult with Department of Planning and Environment and local governments in determining any land use considerations applicable to future development for inclusion in local environmental plans or development control plans, where required.

Issue description – potential for additional lanes

It is noted that approval is being sought for two lanes to be used in each of the tunnels. However it is understood that the tunnel construction would allow for additional lanes to be built in both directions. Should additional lanes be proposed, the impact of these should be assessed on in tunnel and external air quality.

Response

A cumulative air quality and human health risk assessment has been completed as part of the 2031 full WestConnex program of works and Southern Connector. This accounts for the change in traffic demand within the New M5 once these future projects are operational. Nonetheless, any increase from two lanes would be subject to further impact assessments and planning approval, which would consider changes in air quality and human health risk.

4.5.3 In-tunnel air quality

Issue description – nitrogen dioxide exposure

The EIS proposes an in-tunnel limit of 0.5 ppm of nitrogen dioxide as a rolling 15 minute average. It is noted that this would likely result in the usual exposure levels of nitrogen dioxide being significantly lower. In addition, the significant protective effect of a vehicles ventilation system when set to recirculate would be expected to appropriately reduce exposure to nitrogen dioxide. The degree of reduction in exposure is dependent on air conditioning recirculation being actively promoted to tunnel users, which should be considered in the conditions placed on this project, if approved. Consideration of travel through multiple tunnels has not been comprehensively undertaken, for example providing scenarios of travel times and exposure.

Response

NSW Health's position is noted.

The focus has been on designing the tunnels to minimise in-tunnel exposures. Details on the tunnel design relevant to minimising and managing in-tunnel exposure are presented in Appendix H (Technical working paper: Air quality) of the EIS. This includes mitigation measures to reduce the generation of emissions through design (refer to Section 11.2.3 of the technical working paper).

The tunnel has been designed to comply with an in-tunnel nitrogen dioxide standard of 0.5 parts per million (ppm) (as a 15-minute rolling average across the whole tunnel). This compares favourably to the international standard in-tunnel nitrogen dioxide design guidelines which range between 0.4ppm and 1.0ppm.

Designing a tunnel ventilation system for a compliance of 0.5 ppm would result in normal operational levels lower than 0.5 ppm.

Modern cars with air vents set to recirculate can result in significantly lower in-cabin NO₂ levels than in-tunnel levels. A study conducted in Sydney motorway tunnels found that switching vehicle ventilation systems to recirculate results in in-cabin levels at least 70 per cent less than in-tunnel levels. Levels in newer vehicles were typically 90 per cent less than in-tunnel levels.

As discussed later in this section of the report, a communication strategy to reduce nitrogen exposure would be implemented.

Issue description – communication strategy to reduce nitrogen dioxide exposure

Available evidence indicates that setting a car's ventilation system to recirculate can significantly reduce exposure to nitrogen dioxide. A clear communication strategy is required to ensure that tunnel users are informed of the need to switch the car's ventilation system to recirculate when using the tunnel.

Response

In order to clearly communicate to drivers in relation to the benefits of switching the vehicles ventilation system to recirculate on entering the tunnel, a number of in-tunnel communication systems would be investigated during detailed design which would include but not be limited to:

- Physical warning signs on approach to and at tunnel portals
- Use of variable message sign (VMS) within the tunnels
- Use of the in-tunnel communication systems.

Further information for motorists would be made available on the Roads and Maritime website.

Issue description – operational monitoring

The modelling indicates that PM levels in the tunnel may be similar or higher than what has been measured in the current M5 tunnel.

To ensure that the tunnel's performance is monitored accurately when operational, it is important that adequate monitoring data regarding in-tunnel levels of air pollutants is recorded. This would include appropriate positioning of monitoring equipment (such as entry and exit portal, at the base of any ventilation or emergency extraction outlets, ramp junctions and at midpoints between portals, ramps and ventilation outlets), redundancy for potential mechanical failure, and that the data produced are made available in a timely manner.

Response

As outlined in Section 5.8 of the EIS, an in tunnel air quality monitoring and management system would be implemented for the project.

Continuous emission monitoring and ambient air quality monitoring would be undertaken during operation of the project to monitor:

- In-tunnel air quality
- Air quality within ventilation outlets
- Ambient air quality at representative locations for a defined period of project operation.

Continuous emission monitoring equipment for key contaminants (particulate matter (PM_{2.5} and PM₁₀), nitrogen dioxide (NO₂) and carbon monoxide (CO) and potentially other pollutants) would be installed at appropriate locations in the tunnel and at ventilation outlets to ensure the project is operating within the prescribed emission limits for the project as set by the conditions of approval. Periodic manual monitoring of ventilation outlet emissions would also be undertaken to validate the accuracy of the continuous emission monitoring equipment.

Single point air quality monitors would be installed within the main alignment tunnels. The monitors would be located:

- Inside entry and exit portals
- Ahead of tunnel exhaust points
- Along the main alignment tunnel on- and off-ramps
- Where airflows are combined or divided at tunnel junctions (for example, the junction of the main alignment tunnels and the New M5 ramps).

An Operational Air Quality Management Plan would be prepared to manage air quality within the main alignment tunnels. This would include strategies for the management of tunnel ventilation during periods of congestion and during an incident or emergency. Data from the air quality monitoring would be produced in a timely manner in accordance with the conditions of approval.

During detailed design, a reliability analysis would be completed to ensure that the project can continue to operate under credible equipment failure scenarios. For critical equipment, redundancy has been included in the design (e.g. ventilation stations would have redundancy in the event of equipment failure).

Ambient air quality monitoring would also be undertaken at specific locations to confirm EIS predictions.

4.5.4 Noise and vibration

Issue description – Noise and vibration levels during construction

Noise and vibration impacts during construction are estimated to exceed acceptable noise levels in several areas affecting a substantial number of receptors. Appropriate mitigation measures are required to minimise potential adverse health impacts. However, a comprehensive plan for mitigation measures would only be developed in the specific construction noise and vibration management plans (CNVMP's) during the detailed construction planning phase; hence it is currently not possible to comment on the adequacy of mitigation measures. It is strongly recommended that all feasible and reasonable mitigation strategies be applied in order to prevent adverse health effects for all sensitive receptors, and where necessary, tailoring interventions for the most vulnerable residents.

Response

Specific construction noise and vibration management plans would be prepared as part of detailed construction planning, which would occur during detailed design. All feasible and reasonable mitigation identified within these plans would be implemented. The measures identified would be specific to the construction activity and the site, and would be tailored to respond to sensitive receivers. The Technical working paper: Noise and Vibration identifies the types of strategies that would be explored further as part of this process.

During construction of the project the community engagement professionals representing the project would establish the specific needs of the community. These project representatives would ensure that the needs of specific at-risk individuals are considered when developing and/or modifying construction management plans.

Issue description – sensitivity analysis of road traffic noise model

NSW Health assumes the validation of the traffic noise model used for this EIS was appropriate and the model is using adequate inputs for the proposed scenarios. It is noted this EIS does not present a sensitivity analysis discussing the uncertainties of the prediction.

Response

Noise prediction modelling has some accuracy limitations and would commonly produce acceptable errors of around $\pm 2\text{dB(A)}$. Variation in noise levels can also occur due to potentially increased speeds/traffic flow etc. For example, an increase in the percentage of heavy vehicles from 10 per cent to 15 per cent at 60 km/h traffic speed or an increase of 25 per cent in annual average daily traffic (AADT) corresponds to an increase in noise levels of around 1 dB(A). Compliance checks would be conducted post-construction to verify whether implemented mitigation measures are adequate to minimise noise impacts associated with the project.

Issue description – operational noise and vibration impacts

Significant noise exceedances are predicted during operation of the project, especially around the St Peters area. NSW Health has concerns for the substantial number of impacted receptors including the two school buildings of St Peters Public School. Potential mitigation strategies are outlined; however, it is noted that final feasible and reasonable noise mitigation strategies would only be determined during the detailed design phase. The mitigation measures described are based on having external windows and doors shut and having minimal use of outdoor areas. For many residential receptors and the St Peters Public School community this would result in an impact on their use of outdoor areas. NSW Health recommends that all feasible and reasonable mitigation strategies are applied in order to prevent adverse health effects for all sensitive receptors. Particular emphasis should be placed on tailoring interventions for the St Peters Public School buildings reducing noise levels by as much as possible to promote best learning conditions for all students.

Response

As detailed in the Technical working paper: Noise and vibration, noise controls such as road design, quiet road surfaces and barriers are the first consideration where road traffic noise criteria are exceeded at noise sensitive receivers. Where this is not feasible or reasonable then additional noise mitigation measures such as at-property treatments are considered.

Where consideration of additional noise mitigation measures has been triggered, as with St Peters Public School and St Peters Community Preschool, then this would include a detailed assessment of the property and the recommendation of specific noise mitigation measures to reduce internal noise levels appropriately.

With respect to the St Peter Public School Section 8.2 of the Technical Working Paper stated:

“St Peters Public School has been identified as potentially exceeding the applicable noise criteria. Internal noise measurements and insertion loss investigations would need to be undertaken at the detailed design phase to determine the likely internal noise impact and determine if the school is eligible for architectural noise treatment. If the school is found to be eligible for the consideration of additional noise mitigation, suitable noise mitigation would be recommended to comply with the applicable noise criterion.”

It is noted that road traffic noise levels for the St Peters Public School playground areas comply with the active outdoor space (active) noise criterion, which is an $LA_{eq(15\text{hour})}$ noise criterion of 60 dB(A). Therefore these spaces are not eligible for consideration of additional noise mitigation measures.

The St Peters Community Preschool was erroneously identified in the EIS as forming part of the St Peters Public School campus. Under the *NSW Road Noise Policy* (Department of Environment, Climate Change and Water, 2011), this sensitive receiver would be classified as a child care centre which has external and internal noise level criteria. The pre-school remains eligible for consideration of at-property acoustic treatments as it has been identified as potentially exceeding the applicable noise criteria for internal and external areas. Similar to the St Peters Public School, noise measurements at these specific locations would be undertaken during detailed design. If the preschool is confirmed to be eligible for the consideration of at-property acoustic treatments, appropriate measures would be developed in consultation with the preschool.

Issue description - noise mitigation

The noise and vibration assessment should provide greater clarity and more details in the following areas:

- **Reduction around open windows:** There is a question about the noise level reduction from outside to inside. This is commonly accepted as being 10 dBA for an open window. It is likely that in many cases, this assumption is correct but there are also cases where this assumption is too optimistic. There is data to suggest that for some house constructions, it may be as low as maybe 5 dBA. NSW Health would like to see a discussion about what that might mean in practice in relation to the numbers and types of houses impacted and in terms of noise mitigation for those affected.
- **Noise mitigation strategies:** NSW Health understands that it can be difficult to determine exact noise mitigation strategies during the current stage of the project. NSW Health would like to emphasise the importance on developing detailed mitigation strategies outlining the specific amount in decibels for which each measure would be used to reduce noise below guideline levels.
- **Protecting vulnerable individuals:** For the construction phase it is noted that normal practice is to mitigate noise by undertaking most works during daytime hours. However, this may not be sufficient for those who are at home during the day including the elderly, young children and their carers, those who are unwell and those who are unemployed, who are likely to be more susceptible to adverse health effects of noise. Tailored mitigation strategies for these vulnerable individuals may need to be developed.
- **Communication plan:** NSW Health notes that a communication plan would be part of developing CNVMs. It is important that such a plan includes ways in which two-way communication would occur with individuals who may find it difficult to advocate for themselves, especially those who are elderly, who do not speak English, are housebound, or who may be unwell.
- **Cumulative noise and vibration impacts:** The EIS states it is possible construction of the M4-M5 Link and the Sydney Gateway may occur concurrently with the New M5 project. NSW Health requests a detailed description of potential exceedances resulting from concurrent major projects including detailed mitigation strategies at the earliest possible opportunity.

Response

- **Reduction around open windows:** Construction noise management levels and road traffic noise criteria for residential receivers are applied externally to those properties. Therefore the reduction loss through an open window is of no consequence in determining if additional noise mitigation measures should be considered. For all other noise sensitive receivers such as schools, further assessment, including a detailed survey, would be undertaken during the detailed design phase to determine the actual noise levels within the properties rather than relying on predictions.

- **Noise mitigation strategies:** The Construction Noise and Vibration Management Plan would detail all feasible and reasonable noise mitigation measures, taking into account detailed construction planning. A construction noise and vibration monitoring program would also be implemented. Options to mitigate road traffic noise include the following (in order of priority):
 - At-source mitigation, including choice of road pavement
 - Noise attenuation using noise barriers
 - At-receiver noise mitigation, including at-property acoustic treatments
- **Protecting vulnerable individuals:** During construction of the project the community engagement professionals representing the project would establish the specific needs of the community. These project representatives would ensure that the needs of specific at-risk individuals are considered when developing and/or modifying construction staging and/or management plans.
- **Communication plan:** A community involvement plan would be prepared for the New M5 project to ensure appropriate communication with affected members of the community throughout construction of the project.
- **Cumulative noise and vibration impacts:** Cumulative impacts are discussed in Chapter 27 of the EIS. As discussed in that chapter, concurrent noise activities may give rise to an increase in noise levels. A construction environmental management plan would address cumulative noise issues, should they arise. Further, the future environmental impact statements for the Sydney Gateway and future M4-M5 Link would need to address cumulative impacts.

4.5.5 Groundwater and surface water quality monitoring

Issue description – consultation during development of monitoring programs

It is noted that contaminated groundwater is to be collected, treated and discharged into the Cooks River and Alexandra Canal. The EIS refers to a groundwater and surface water quality monitoring program which would be implemented to monitor groundwater and surface water impacts during tunnel operations on groundwater quality and wetlands. The program would be developed in consultation with the Environment Protection Authority, Department of Primary Industry and relevant local governments; however we recommend that Southern Sydney Region of Councils (SSROC) also be consulted during the planning stage.

Response

Noted. Roads and Maritime would consult with the EPA, DPI (Water) and local councils within the project footprint concerning the surface water and groundwater monitoring programs, which are already underway.

4.5.6 Other health impacts

Issue description – impacts to human health as a result of property acquisition

The EIS does not provide detail regarding the health effects of property acquisition, its effects on specific vulnerable populations, or mitigation measures such as support services for affected residents. It is noted that relocation may have significant mental and physical health impacts on those affected, particularly on the elderly or those with a disability, so further detail on health effects and mitigation strategies is warranted.

Response

Section 9.6.2 of Appendix I (Technical working paper: Human Health) of the EIS covers the assessment of the potential health effects and social impacts relating to property acquisitions and access. This section includes a discussion of the programs that Roads and Maritime has in place to help manage the stress involved in these acquisitions, with two services provided – WestConnex Assist for all those whose properties are being acquired, and an additional service for other vulnerable households. A revised environmental management measure has been included in **Chapter 8** (Revised environmental management measures) of this report.

4.6 Heritage Council of NSW

4.6.1 Impacts to Alexandra Canal

Issue description – impacts to Alexandra Canal

Alexandra Canal is of high historic, aesthetic and technical/ research significance as a rare surviving 19th century navigational canal, being one of only two purpose built canals in New South Wales. It played a seminal role in the changing pattern and evolution of the occupation and industrial uses of the local area.

The New M5 involves two new crossings across Alexandra Canal to connect the St Peters interchange with Gardeners Road and Bourke Road, Mascot, and new construction compounds located near each bridge. Stormwater discharge points, requiring the removal of sections of highly significant Broken Range Ashlar, would be constructed in the embankment walls of Alexandra Canal. Further impacts to fabric may occur as a result of vibration due to intensive construction activities occurring in close proximity to the embankments.

It is noted that plans of the two new crossings are provided in the EIS as indicative only. It is understood that further detail would be provided as part of the Urban Design and Landscape Plan, however this plan would be prepared following approval of the project. The Heritage Council has raised concerns that design options have not been fully explored as quality urban design, including consideration of heritage impacts, should be a key consideration from an early phase of the project. The Heritage Council also raised concern regarding the impacts from the removal of significant fabric, particularly considering that conservation works are not proposed to mitigate these impacts as part of this project.

If approved, the following conditions are recommended:

- The proposed management measures outlined in Chapter 8 of the Technical Working Paper: Non-Aboriginal heritage must be implemented
- The crossings over Alexandra Canal and construction compounds must be of a high quality and as recessive as possible, and designed in accordance with the endorsed Conservation Management Plan. The detailed design must be undertaken in consultation with heritage specialists
- Stabilisation and conservation works must be undertaken in the vicinity of the proposed crossings and stormwater discharge points
- All works to Alexandra Canal must be undertaken by skilled tradespeople with experience working on heritage sites, under the supervision of a heritage specialist
- Detailed drawings showing the proposed design of the bridges, including stabilisation and conservation works, must be provided to the Heritage Council for comment prior to finalisation of the Urban Design and Landscape Plan. Relevant local councils should also be invited to comment where local heritage items are affected.

Response

The concept design of the bridge crossings is minimalist and simple in form, in order to not detract from the surroundings. The bridges would provide additional public access and greater appreciation of the Alexandra Canal heritage item relative to the limited access currently possible due to the current built form adjacent to the canal. The bridge designs include adequate clearances on both sides of the bridge structures to facilitate the future Alexandra Canal cycleway. This increased accessibility would provide opportunities for greater heritage interpretation for this State significant heritage item.

Roads and Maritime has committed to preparing the final Urban Design and Landscape Plan in consultation with the New M5 Design Review Panel, local councils and the community (environmental management measure OpV06). This would include the detailed design and integration of the bridges over the Alexandra Canal, which would consider the heritage sensitivity of the setting as set out in the Alexandra Canal Heritage Conservation Plan. Roads and Maritime would consult with the Heritage Council as part of the detailed design process as it relates to the bridges over the Alexandra Canal.

As recognised in the Heritage Council's submission, Roads and Maritime would also prepare an interpretation plan for the Alexandra Canal and the industrial heritage of the area. This would include installation of heritage interpretation signage regarding the canal (environmental management measure NAH16).

Construction compounds would not be a long term feature of the project. They would be located within an active industrial area, and would primarily consist of active construction areas and laydown storage. As such, the Gardeners Road bridge construction compound (C13) and Campbell Road bridge construction compound (C12) would be managed in accordance with the Construction Heritage Management Plan, which would include measures to avoid and manage works within the vicinity of heritage items.

With respect to the Heritage Council's concerns with the removal of significant fabric, direct impacts would also be associated with the installation of additional stormwater outlets at the new bridge crossings. This would require the removal of two sections of the Broken Range Ashlar embankment walls. However, the impact and extent of these works would be reduced through the reinstatement of the sandstone blocks and their re-use to finish the discharge points. Further, as committed within the EIS:

- A Construction Heritage Management Plan would be prepared prior to the commencement of construction in consultation with the NSW Heritage Division of NSW Office of Environment and Heritage (OEH) (environmental management measure NAH04)
- Training and induction processes would be conducted for construction personnel. Inductions would cover built heritage, landscape and historical archaeological sites and their management, and would provide heritage guidance on how to avoid/ manage impacts. The inductions would be developed in consultation with a suitably qualified heritage specialist and historical archaeologist (environmental management measure NAH04)
- An archival recording of the affect part of the Alexandria Canal would be prepared, involving scale drawings and photography, prior to the removal of any sandstone blocks required for the construction of the project. A condition report for areas surrounding the construction areas in the vicinity of the canal would also be prepared. Measures to manage the reinstatement or re-use of any sandstone blocks would also be implemented (environmental management measure NAH16).

As indicated in Appendix R (Technical working paper: Non-Aboriginal heritage) of the EIS, stabilisation of the canal walls in the vicinity of the crossings and stormwater outlets would be required. Any rehabilitation or conservation works in the vicinity of these areas would be determined in consultation with Sydney Water, as the asset owner. Environmental management measure NAH16 has been amended to reflect the requirement for this consultation.

As stated in Table 63 of Appendix R (Technical working paper: Non-Aboriginal heritage) of the EIS, skilled trades people would be used for the works along Alexandra Canal that involve direct interaction with the heritage item, who would take advice from heritage professionals as and when necessary. This is outlined in the amended environmental management measures (**Chapter 8** of this report).

4.6.2 Impacts to places of local heritage value

Issue description – Rudders Bonds Store

The Rudders Bonds Store is listed as local heritage item on the Sydney Local Environmental Plan. The heritage impact assessment in the EIS identifies that the Rudders Bond Store is of State historical, associative, aesthetic, technical and rarity significance for its rare use of glued laminated timber, with only two other known surviving examples in New South Wales. The project could therefore have a major adverse impact through removal of a place of state significance. The rarity of this building has not been sufficiently confirmed in the non-Aboriginal heritage assessment, as such, a thorough comparative analysis is required to confirm the building's level of significance, and the level of heritage impact resulting from its proposed demolition. This level of assessment should comprise part of the EIS documentation.

To minimise these impacts, it is recommended that the management measures for in Chapter 8 of the Technical Working Paper: Non-Aboriginal heritage are implemented.

If approved, the following conditions are recommended:

- The proposed management measures outlined in Chapter 8 of the Technical Working Paper: Non-Aboriginal heritage must be implemented
- A detailed comparative analysis of the Rudders Bond Stores should be prepared against other laminated truss Symonds buildings in New South Wales and Australia to confirm its level of rarity and heritage significance. The detailed comparative analysis should be provided as part of the EIS documentation prior to approval of the project
- If the comparative analysis concludes that Rudders Bond Store is rare at a state level, the proponent must explore alternative design solutions to retain the building
- Interpretation measures should be expanded to include interpretation of the Rudders Bond Store (if removed)
- If Rudders Bond Store is removed, sections of laminated timber from Rudders Bond Store must be salvaged and displayed as part of the Interpretation Plan.

Response

The Rudders Bond Store is located in the path of the St Peters interchange connection to the Campbell Road and Euston Road intersection. The location of the St Peters interchange has been identified to limit the footprint and impacts of the project. The location of the New M5 ramps and connection to the Campbell Road and Euston Road intersection has been positioned to satisfy road geometry requirements and network integration. It is not possible to achieve the desired traffic and public amenity outcomes if the Rudders Bond Store is retained. Therefore it is not possible to retain the store and office in situ.

Based on the aesthetic significance and rarity of the store, consideration would be given to the salvage of selected laminated timber columns, subject to a structural assessment, for use elsewhere within the St Peters interchange or the local area (to be determined during detailed design). The bricks and corrugated iron cladding are not considered to be significant fabric and do not warrant salvage and reconstruction. Salvage of these elements and adaptive reuse through either structural frameworks for public amenities or interpretative items would enable the public to gain a better appreciation of Ralph Symonds and his important contribution to Australian architecture. It is acknowledged that some of the significance would be lost by relocating the features of the item from its current context, however, it is preferable to losing these values altogether.

As concluded in the EIS, the store has already been deemed to hold State historical, aesthetic, technical and rarity significance. As such, Roads and Maritime would complete a comparative analysis of the Rudders Bond Store against other laminated truss Symonds buildings in New South Wales and Australia during detailed design. The comparative analysis would form part of the archival recording of the structure and interpretation plan of the Rudders Bond Store, as outlined in amended environmental management measure NAH07 (refer to **Chapter 8** of this report).

Further, as committed to in the EIS, Roads and Maritime would investigate options for documenting the history of the Ralph Symonds Company and presenting it to a national audience, in partnership with stakeholders such as the City of Sydney and the Powerhouse Museum (environmental management measure NAH07).

In consultation with the Heritage Council and the NSW Heritage Division of the Office of Environment and Heritage, and with advice from a suitably qualified heritage specialist, Roads and Maritime would identify the level of fabric salvage required, identify an appropriate methodology for salvage and investigate appropriate adaptive reuse and locations for reuse of these elements. This would be undertaken during detailed design and prior to the demolition of the item. This is outlined in the amended environmental management measures (refer to **Chapter 8** of this report).

Issue description – houses at 28-44 and 82 Campbell Street at St Peters

The houses at 28-44 and 82 Campbell Street, St Peters, are listed on the Roads and Maritime Services Section 170 Heritage and Conservation Register as items of local significance. The non-Aboriginal heritage assessment presented in the EIS identifies that these houses are adequately represented elsewhere in the area and hold no particular historical, aesthetic, associative or other significance that warrants their retention. Whilst these buildings may not be rare, it should be noted that the cumulative impact of their loss and their replacement with modern road infrastructure would alter the urban landscape and remove evidence of the historic fabric of this area.

If approved, the following conditions are recommended:

- The proposed management measures outlined in Chapter 8 of the Technical Working Paper: Non-Aboriginal heritage must be implemented
- Interpretation measures should be expanded to include interpretation of the houses along Campbell Street, St Peters.

Response

In accordance with environmental management measure NAH06, the house at 82 Campbell Street and terrace group at 28-44 Campbell Street would be subject to a full archival recording following the NSW Heritage Division archival recording guidelines.

4.6.3 Historical archaeological impacts

Issue description – historical archaeological impacts

The non-Aboriginal heritage assessment states that most of the proposed New M5 alignment, including subsurface works, has limited potential to impact historical archaeological sites and relics. However it should be noted that the St Peters end of the former brickworks site (the current location of Sydney Park) may be impacted by the local road adjustments proposed as part of the project.

The following comments and conditions are therefore recommended to assess the significance of these items and to ameliorate the impact of the development to these areas, if appropriate:

- A detailed historical archaeological assessment report, in accordance with Heritage Council of NSW Guidelines, should be prepared for the following two sites to assess the significance of any relics that may be present in these areas, prior to the commencement of works. The assessment should also include appropriate research designs and excavation methodologies if appropriate, based on the level of significance and impact proposed. Comparative analysis should be undertaken in the assessment to establish the significance of these sites. The research design and excavation methodology should supplement the information present in Appendix C of the Technical Working Paper: Non-Aboriginal heritage to be more appropriate to historical archaeological sites. The assessment, excavation methodology and research design should be provided to the Department of Planning and Environment for approval prior to works commencing in these areas:
 - The affected section of the former Brickworks Pty Ltd City Yard located along Euston Road/ Campbell Road
 - The affected section of the NSW Brick Company Ltd (intersection of Euston Road and former Huntley Street).
- At the completion of the archaeological works, a report should be provided within one year of the completion of the fieldwork to an appropriate standard for the information of the Department of Planning and Environment, the Heritage Council of NSW and the relevant council local studies library in which the sites are located.

Response

As part of the Construction Heritage Management Plan for the project, an overarching historical archaeological research design would be prepared prior to commencement of construction in consultation with the NSW Heritage Division of OEH (refer to environmental management measure NAH03). The overarching historical archaeological research design would describe clear significance thresholds for possible archaeological items that may be uncovered during works and would designate when monitoring, testing and/ or salvage and excavation should occur relative to the project program. Post-excavation reporting, including artefact analysis and additional historical research (where necessary), would be required for any historical archaeological investigations undertaken.

4.6.4 Urban design considerations

Issue description – heritage and urban design consideration

The Heritage Council would like to reiterate its concern that urban design options have not been fully explored in the EIS documentation. Whilst an urban design is included in the EIS, the design has not responded to the scale of the current urban setting and existing patterns of development.

It is recommended that the proponent further reduces the heritage impacts of the project by seeking:

- Involvement and advice from an independent urban design team prior to approval to ensure there are sympathetic urban design and engineering solutions that would minimise heritage impacts and improve urban design outcomes
- Better consideration of the integration of sympathetic urban design and engineering outcomes around places of heritage value. More fine-grain engineering solutions are to be explored for interchanges and tunnel entry/ exit points that better consider urban design outcomes
- Early collaboration with local councils on urban design and landscape treatments and use of residual land
- Providing further involvement of the Heritage Council in the design of the project and willing to establish a subcommittee to provide further guidance to reduce heritage impacts.

Response

The Alexandria Landfill site has been chosen as the preferred site for the New M5 St Peters interchange as it provides the best balance of engineering, road network performance, environmental and land use outcomes. The interchange contains locational attributes that provide for vehicular connectivity required to ensure the New M5 achieves its stated objectives. It also reduces the need for extensive acquisition of residential properties. The site is constrained in relation to potential future development opportunities owing to aviation hazard regulations around Sydney Airport and the historical use of the site as a landfill.

The design of the St Peters interchange achieves the project objectives whilst minimising impacts on the environment and surrounding communities. The topographical features of the site allow the infrastructure to sit within the landscape, ensuring it is not visible from most surrounding areas. Furthermore there is no singular urban setting or development pattern within the area. The area features a mix of residential, industrial, commercial and open space and does not exhibit a consistent pattern.

As described in Appendix L (Urban design report) of the EIS, an independent Urban Design Review Panel chaired by the NSW Government Architect would have an ongoing role in reviewing the urban design components of the project.

Roads and Maritime has committed to preparing the final Urban Design and Landscape Plan in consultation with the New M5 Design Review Panel, local councils and the community (environmental management measure OpV06). Roads and Maritime would also consult with the Heritage Council during this process in relation to items of heritage significance.

4.7 NSW Office of Environment and Heritage

4.7.1 Flood Risk Management

In its submission, the Office of Environment and Heritage (OEH) noted that it had provided comments on 6 November 2015 on flood risk management matters as part of the consistency review process for the New M5 EIS. OEH considers that these comments remain relevant to this stage of the assessment. The flood risk management issues raised by OEH as part of the consistency review are provided below.

Issue description – flooding in the existing M5 tunnel

The current M5 East Motorway tunnels seem to flood in fairly minor rainfall events and it is not clear if drainage of the tunnels has been considered. On 14 October 2014, the M5 East Motorway tunnels near Arncliffe flooded, presumably from overland flood water entering the tunnel portals. OEH requests clarification of the diversion of rainwater into the tunnels and the need for drainage being considered in the design of the project.

Response

The tunnel portals for the New M5 and associated flood protection barriers would be located above the Probable Maximum Flood (PMF) level or the 100 year ARI flood level plus 0.5 metres (whichever is greater).

The tunnel portals and tunnel drainage system for the New M5 has also been designed to:

- Capture pavement runoff at the tunnel portals for storms up to the 100 year ARI event
- Limit the volume of direct rainfall runoff that enters the tunnel drainage system.

The project is not seeking to modify infrastructure associated with the main tunnel alignments for the M5 East motorway, including drainage.

Issue description – detailed design for flood mitigation

Specific measures that would need to be incorporated into the detailed design in order to mitigate residual flood related impacts also need to be identified.

Response

The EIS identified changes in mainstream flood levels as a result of the project. This included potential impacts at Kingsgrove, Arncliffe and St Peters. The assessment identified the need to undertake further investigation into the potential impacts, including the need for further modelling using surveyed floor levels for potentially impacted buildings. Suggested mitigation measures were identified, such as the provision of compensatory flood storage at Arncliffe. These measures are discussed in Section 18.3.2 of the EIS.

Flood and drainage modelling data has been provided to Roads and Maritime by local councils. Roads and Maritime is currently using this information to undertake additional flood modelling as part of the detailed design for the project. Refer to **Chapter 8** (Revised environmental management measures).

Issue description –long term sea level rise

The potential impacts from climate change on flooding behaviour due to sea level rise (0.4 metres for 2050 and 0.9 metres for 2100) and increased rainfall intensities have been documented. However, the design life of project infrastructure has been deemed to be 2070 at this stage, with a corresponding assumption of 0.4 metres sea level rise at that time. The impact of sea level rise in relation to the 'long term' particularly in the vicinity of the Arncliffe, St Peters and Burrows Road should be considered to be well beyond 2070.

It is recommended that this consideration be undertaken during detailed design to determine the climate change related flood risks to the project and to scope requirements for any management measures.

Response

Chapter 25 (Climate change risk and adaptation) of the EIS presents the outcomes of the risk assessment completed for the project in accordance with the climate change risk assessment framework. This identified a medium risk to the project as a result of increased intensity and frequency of extreme rainfall events, the impacts of sea level rise and increased extreme sea levels during storm surges.

OEH's submission is noted. During detailed design consideration would be given to opportunities to minimise the climate change related flood risks to the project and to scope requirements for any management measures. Refer to **Chapter 8** (Revised environmental management measures).

A more detailed climate change risk assessment would be undertaken during detailed design. The more detailed assessment would build on the EIS outcomes and would be prepared in accordance with the AS 5334-2013 *Climate change adaptation for settlements and infrastructure – A risk based approach*. The more detailed assessment would be used to identify and inform implementation of adaptation measures to address high and extreme risks. The decision to implement adaptation measures for medium risks would also be considered during detailed design. An adaptation measure as recommended in Table 25-6 of the EIS includes the consideration of an option to apply a minimum of 10 per cent sensitivity testing (as required by the draft *Technical Guide: Climate Change Adaptation for the State Road Network* (RMS, 2015)) to hydrological / hydraulic modelling on detailed design, combined with extreme sea level scenario incorporating projected sea level rise by 2090.

4.7.2 Sustainability

Issue description – Infrastructure Sustainability Rating Scheme (ISCA)

It is noted that it is proposed to apply the Infrastructure Sustainability Council of Australia's Infrastructure Sustainability Rating Scheme. This is strongly supported by OEH.

Response

Support noted.

4.7.3 Biodiversity

OEH indicated that the Framework for Biodiversity Assessment (FBA) had been correctly applied and agreed with the major conclusions of the assessment, namely that

- No "impacts requiring for further consideration" are likely. The Framework for Biodiversity Assessment requires special consideration of certain serious and potentially irreversible impacts on biodiversity. No such impacts are expected as a result of the project
- Significant impacts on threatened species are confined to the Green and Golden Bell Frog and are not expected in relation to any other threatened species including the Grey Headed Flying Fox
- Measures proposed for avoiding indirect impacts during construction on Green and Golden Bell Frogs are, in general, appropriate and are based on previous projects that impact the same species
- Direct impacts to Cooks River Castlereagh Ironbark Forest endangered ecological community at Beverly Grove are considered acceptable noting proposals to actively manage for conservation other areas of this community through Biobanking agreements.

The submission presented two issues (listed below) to be addressed.

Issue description – arrangements for biodiversity offset delivery

The OEH submission noted that:

- The exhibited Biodiversity Offset Strategy (Appendix T of the EIS) did not confirm the location or quantity of the offsets
- The Biodiversity Offset Strategy did not provide the credit calculator output.

It is important that the timing for delivery and the security of the proposed offsets be specified in the conditions of approval. To facilitate this, it is recommended that Department of Planning and Environment (DP&E), OEH and the Sydney Motorway Corporation discuss the most appropriate requirements prior to approval being issued.

Response

The Biodiversity Offset Strategy (Appendix T of the EIS) identifies the quantity of credits required, the efforts undertaken to date to secure the required offsets prior to the exhibition of the EIS, and the approximate quantity of credits the landowners have (if known).

Appendix L of the Biodiversity Assessment Report (Appendix S of the EIS) provided a copy of the Biodiversity credit report for the credits required.

Roads and Maritime considers that the conditions of approval for the project would provide an adequate legal framework to ensure compliance with the offsetting requirement but is willing to explore additional mechanisms in consultation with DP&E.

Investigation and identification of potential sources of credits has been undertaken. Roads and Maritime has agreed to provide OEH with a copy of the contracts once the credits are purchased and the contracts are finalised.

Issue description – response to unforeseen impacts on RTA ponds on Kogarah Golf Course

OEH notes that while the risk to the Green and Golden Bell Frogs living in the RTA ponds arising from indirect impacts including dust, noise, vibration, lighting, pathogens and chemical spills is low, the consequences for the population is high. OEH recommends that any approval be conditioned so that in the event of the population being lost during construction, further offsets would be required to be provided. These offsets should be calculated using the Framework for Biodiversity Assessment (FBA).

Response

The EIS for the project has demonstrated that reasonable measures have been taken to avoid and minimise the direct and indirect impacts of the project on biodiversity values. This has resulted in:

- Avoidance of the RTA breeding ponds
- Mitigation including minimising the footprint of foraging land affected by minimising the footprint of the construction compound, frog proof fencing of the compound, construction management measures to minimise risk of construction stage impacts to Green and Golden Bell Frog population, enhancing the corridor between the ponds and the remaining foraging land on the golf course and construction and providing additional habitat by constructing purpose-designed frog ponds at Marsh Street
- Committing to purchasing offsets for the lost foraging area. The Green and Golden Bell Frog Plan of Management documents the mitigation measures, including the creation of enhanced and additional habitat and the proposal to establish a captive breeding colony.

In relation to further offsets, Road and Maritime notes that the Biodiversity Offset Strategy (Appendix T of the EIS) includes a commitment to consider a BioBanking agreement or other similar mechanism for new habitat at Marsh Street. This would resolve the long-term management for the land.

It is agreed to offset any future unforeseen loss of habitat values at the RTA ponds using the FBA.

4.8 Sydney Water Corporation

4.8.1 Sydney Water assets

Issue description – water and wastewater assets

Sydney Water Corporation (Sydney Water) has trunk and reticulation assets located within and outside of the project footprint which are used to supply services to customers as per the Sydney Water Operating Licence and regulatory requirements. Sydney Water raises the following issues relating to its assets:

- Sydney Water reserves the right to assess the impacts of the project on Sydney Water assets and to identify adjustments to assets which are required to maintain access and function of the assets (to be completed through the Sydney Water Asset Adjustment process). Any adjustment works outside the project boundary would require an environmental approval
- Access must be maintained to all assets for the life of the project
- Staging and timing requirements need to be considered to ensure adjustments to assets do not impact on the operation of the network
- Any trade waste licence request, in particular with respect to the disposal of leachate, would need to meet Sydney Water's requirements before approval
- The environmental approval would need to consider the discharge protocols for chlorinated water due to the shut down and reconnection of live assets requiring adjustment
- The availability and volume of potable water for use within and for the project would depend on system capability and would be confirmed during detailed design
- Amplification of mains may be required to facilitate future growth along the project corridor, and this would be assessed during the adjustment process.

Response

The items raised by Sydney Water are noted. Consultation on these matters has commenced with Sydney Water and would be ongoing during the detailed design and construction phases, as required.

Utilities requiring adjustment or relocation within the construction footprint would be confirmed during detailed design and would be adjusted according to utility provider requirements. Changes to utilities outside of the project footprint would be subject to separate environmental assessment and approval processes.

A trade waste agreement has been entered into for treated leachate currently being generated at the Alexandria landfill. Any modifications or additional trade waste agreements, if required, would be entered into with Sydney Water and would meet the requirements of Sydney Water.

However, in relation to the potential need for amplification of mains, it should be noted that the project does not seek approval for future urban development along the project corridor. Any such future urban development, and the utilities required to service it, would be the responsibility of the relevant developer. Future urban development and associated utility works would be subject to separate assessment and approval as appropriate, and matters related to mains capacity would be addressed as part of that process.

Issue description – consultation in relation to stormwater assets

Consultation with Sydney Water during detailed design, construction and operation would be required to ensure that its objectives are met and that the impacts to stormwater assets are minimised, or improvements to the receiving environment can be achieved.

Response

Consultation has commenced with Sydney Water on these matters and would be ongoing during the detailed design and construction phases, as required.

4.8.2 Water quality

Issue description – pollution reduction targets

Sydney Water supports the aim to achieve best practice outcomes for the project and supports the adoption of the Botany Bay water runoff quality targets.

Response

As detailed in Section 16.3.2 of the EIS, stormwater from new impervious surfaces created by the project would be treated by new stormwater treatment devices where practical and where space is available. These new stormwater treatment devices would be designed with a target of meeting the pollutant load reductions set out in the Botany Bay and Catchment Water Quality Improvement Plan (SMCMA, 2011).

The current provisions are sufficient to meet the treatment targets for some catchments, and stormwater treatment in other catchments could exceed the treatment requirements, such that the project overall may result in less pollutants being delivered to Botany Bay. The final design of the stormwater treatment measures would be confirmed during detailed design.

4.8.3 Alexandra Canal

Issue description – Alexandra Canal

Works around Alexandra Canal would require heritage and environmental safeguards, which are site specific and may not be currently covered by the conservation management plan for the canal. Consultation with Sydney Water, Sydney Motorway Corporation and the Environment Protection Authority is ongoing.

Response

Noted.

As detailed in Chapter 20 of the EIS and Technical working paper: Non-Aboriginal heritage (AECOM, 2015), specific mitigation measures for Alexandra Canal, a State heritage item, would be detailed in a Construction Heritage Management Plan. As detailed in the technical working paper, any rehabilitation and conservation requirements for sections of the canal impacted by the project works would be determined in consultation with Sydney Water.

Mitigation and management measures NAH04 (Construction heritage management plan) and NAH16 (Alexandra Canal) have been amended to include a requirement for consultation with Sydney Water during the preparation of the management plan and to determine rehabilitation and conservation requirements.

The potential risks associated with the disturbance of contaminated sediments within the canal are assessed in Chapter 17 of the EIS. As detailed in Section 17.3.3, Roads and Maritime would:

- Detail appropriate mitigation measures to minimise sediment mobilisation as a result of construction activities at the location of the new stormwater infrastructure at Alexandra Canal in the Construction Environmental Management Plan with consideration of the requirements of the Remediation Order and in consultation with NSW EPA and Sydney Water (environmental management measure CM11). The measures would be detailed in the Alexandra Canal Contamination Management Plan, which has been included in the amended environmental management measure CM11 (refer to **Chapter 8** of this report). The relevant conditions of approval would also be met (should the project be approved)
- Consult with the NSW EPA and obtain approval from Sydney Water (as the asset owner) concerning the final design of the discharge outlets, including scour protection measures, to minimise sediment mobilisation during operation of the project (OpCM3).

4.8.4 Flooding

Issue description – flood impacts

Ongoing consultation with Sydney Water regarding the detailed design and flood assessment would be required. Any worsening of the potential impacts would be critically examined by Sydney Water.

Response

Noted. Management measure FD01 has been amended to include Sydney Water as a relevant stakeholder during the preparation of the Flood Management Strategy, refer to **Chapter 8** (Revised environmental management measures) of this report.

4.9 Canterbury Council

The City of Canterbury partnered with Hurstville and Rockdale Councils to engage a consultant (Molino Stewart) to review components of the EIS on behalf of the Councils. The following sections provide a response to the summary of concerns raised by Canterbury Council. Responses to issues identified in the Molino Stewart review, but not specifically raised by Canterbury Council, are located in Section 4.16 of this document.

4.9.1 Air quality

Issue description – proposed tunnel ventilation system

The proposed tunnel ventilation system may be inadequate to ensure safe and compliant air quality in-tunnel and in the immediate vicinity of the ventilation outlets at all times.

It is recommended that alternative approaches to the ventilation and management of in-tunnel air and ventilation outlet discharges, as proposed in the Molino Stewart report, are included in the project proposal, and modelled and assessed in the working paper and EIS.

Response

This issue has been raised within the Molino Stewart report jointly commissioned by Rockdale City, Hurstville and Canterbury Councils, and has been addressed in **Section 4.16.1** of this report.

4.9.2 Hydrology and water quality

Issue description – management of surface water

Minimal detail in the EIS on how surface water would be managed.

No assessment of surface water movement and impacts during the construction phase.

Response

This issue has been raised within the Molino Stewart report jointly commissioned by Rockdale City, Hurstville and Canterbury Councils, and has been addressed in **Section 4.16.2** of this report.

Issue description – contamination

Mitigation measures for spill containment on the motorway are not mandatory and therefore seem an inappropriate environmental risk.

No information has been provided of what water contaminants there may be and how they would be treated during construction.

Response

This issue has been raised within the Molino Stewart report jointly commissioned by Rockdale City, Hurstville and Canterbury Councils, and has been addressed in **Section 4.16.2** of this report.

Issue description – Wolli Creek

There is little discussion of the impacts on the Wolli Creek riparian corridor, no consideration of the Wolli Creek Riparian Corridor Management Plan and no detail provided on what rehabilitation there would be subsequent to the works being undertaken.

Response

This issue has been raised within the Molino Stewart report jointly commissioned by Rockdale City, Hurstville and Canterbury Councils, and has been addressed in **Section 4.16.2** of this report.

Issue description – cumulative Impacts

The cumulative impacts of clearing of riparian vegetation, and increase in discharges to waterways have not been considered.

Response

This issue has been raised within the Molino Stewart report jointly commissioned by Rockdale City, Hurstville and Canterbury Councils, and has been addressed in **Section 4.16.2** of this report.

Issue description – inadequate understanding and data

Inadequate understanding and data on the effects of the construction and tunnel on groundwater, surface water and water quality.

Response

The Groundwater, surface water and flooding assessments have been prepared in accordance with the SEARs for the project, and relevant guidelines and policies relating to the assessment of surface water, flooding and groundwater impacts.

The EIS includes detailed assessments of the potential impacts of the project on groundwater, surface water and water quality, as follows:

- Chapter 19 and Appendix Q (Technical working paper: Groundwater) include a detailed assessment of potential groundwater impacts, including groundwater modelling to demonstrate the potential extent of aquifer drawdown as a result of the project. The assessment presents existing groundwater quality data, and includes consideration of potentially affected groundwater users
- Chapter 18 and Appendix P (Technical working paper: Flooding) assess the implications of the project on flooding and drainage at a local and catchment scale
- Chapter 16 and Appendix N (Technical working paper: Surface water) provide a detailed assessment of the potential surface water impacts of the project during construction and operation. The assessment includes consideration of the volume and quality of anticipated surface water discharges, and evaluates the surface water performance of the project against the water quality and volume objectives for affected catchments and watercourses.

4.9.3 Biodiversity

Issue description – mitigation measures

It is unclear from the Biodiversity Assessment Report whether the mitigation measures are adequate to address the direct and indirect impacts of the proposal.

Response

This issue has been raised within the Molino Stewart report jointly commissioned by Rockdale City, Hurstville and Canterbury Councils, and has been addressed in **Section 4.16.3** of this report.

Issue description – species and vegetation communities

There are a number of species and vegetation communities that were not considered in the BAR including the Powerful Owl, micro-bats and indirect impacts to Swamp Oak, Freshwater Wetlands and Coastal Saltmarsh vegetation.

Response

This issue has been raised within the Molino Stewart report jointly commissioned by Rockdale City, Hurstville and Canterbury Councils, and has been addressed in **Section 4.16.3** of this report.

Issue description – Cooks River Castlereagh Ironbark Forest EEC

The removal of part of Cooks River Castlereagh Ironbark Forest EEC vegetation would result in the local extinction of this entire patch of vegetation and therefore the proponent must provide biodiversity offsets for removal of the 1.82 ha.

Response

This issue has been raised within the Molino Stewart report jointly commissioned by Rockdale City, Hurstville and Canterbury Councils, and has been addressed in **Section 4.16.3** of this report.

Issue description – further surveys

Undertake surveys to assess whether threatened fauna utilise this patch of vegetation, in combination with other areas of similar vegetation within the Canterbury Golf Course and Beverley Park to the south as part of a large range study to include the Powerful Owl, micro-bats.

Response

This issue has been raised within the Molino Stewart report jointly commissioned by Rockdale City, Hurstville and Canterbury Councils, and has been addressed in **Section 4.16.3** of this report.

Issue description – Grey-headed Flying-fox

Determine impacts on the Turrella Camp of Grey-headed Flying-fox to assess population dynamics, potential outward flight paths and foraging resources.

Response

This issue has been raised within the Molino Stewart report jointly commissioned by Rockdale City, Hurstville and Canterbury Councils, and has been addressed in **Section 4.16.3** of this report.

Issue description – land use

Degradation and loss of recreational green space at Kingsgrove and Bexley North in an area that already has below Sydney average green space.

Increase to Urban Heat Island effect with the loss of vegetation and green space.

Response

Measures are in place to ensure a net increase in green/open space for the community across the project corridor. The worst case disturbance footprint for the project would require the removal of 10.76 hectares of vegetation, comprising a mixture of native vegetation communities (3.31 hectares) and urban native and exotic vegetation (7.45 hectares). A summary of vegetation to be cleared for the project is included in Table 21-9 in Chapter 21 of the EIS.

Landscaping and revegetation as part of the project would include planting of around 2,800 mature trees and about 4,000 juvenile trees (as part of massed planting areas). The total area to be landscaped and replanted would be around 17.5 hectares. This would result in a net gain of around 6.7 hectares of vegetated open space as a result of the project.

The project would not result in a significant impact on formal green space in Kingsgrove and Bexley North for the following reasons:

- The majority of the western surface works associated with upgrades to the existing M5 East Motorway would be contained within the road reserve (currently zoned SP2 Infrastructure) with only minor encroachment into adjacent natural and planted landscapes. This minor loss of existing natural and planted landscapes would not affect the current use of Beverly Grove Park and the broader M5 Linear Park for recreational purposes. Notwithstanding this, the project would result in a net gain of green open space.
- Although the Kingsgrove Avenue Reserve may currently be a planted and natural landscape, the land on which the Bexley Road South motorway operations complex (MOC2) would be permanently located is zoned SP2 Infrastructure. The site is intended for longer-term development for infrastructure (particularly road infrastructure) and planted and natural landscapes have been accommodated as an interim use. This interim potential use for planted and natural landscapes would be lost. However, use of the site for road infrastructure is consistent with the well-established land use zoning outcome for the land.

The majority of the area within which permanent changes due to the western surface works area (including the Kingsgrove motorway operations complex (MOC1)) and the Bexley Road surface works (including the Bexley Road South motorway operations complex (MOC2)) are proposed to occur is zoned SP2 Infrastructure under both the Hurstville LEP 2012 and the Canterbury LEP 2012, which reflects the desire to maintain accessibility, supporting economic activity and efficient freight movement. Although, some changes would occur on land zoned RE1 Public Recreation, the overall character of 'a suburban setting with pockets of bushland' would not be significantly affected.

The urban heat island effect results from the replacement of natural surfaces, including the vegetation canopy, with hard surfaces and the narrow arrangement of buildings in urban areas which absorbs radiation and inhibits atmospheric cooling. It can have negative effects on human health, plants, and animals in particular with regard to increased temperatures.

The majority of the project is underground in tunnels or involves replacing existing hard surfaces with new hard surfaces. While the project would remove 10.76 hectares of vegetation, this is the total removal across the entire project footprint, and is not concentrated in a single area. The vegetation to be removed is predominantly urban native and exotic vegetation (7.45 hectares) and would provide only a very localised benefit to residents directly adjacent to the vegetation (in terms of urban island effect). Proposed landscaping would replace some of the planted vegetation that would be lost, which would help to offset potential impacts.

While the project would remove 10.76 hectares of vegetation, this is the total removal across the entire project footprint, and is not concentrated in a single area. The vegetation to be removed is predominantly urban native and exotic vegetation (7.45 hectares). Loss of vegetation as a result of the project would be compensated by:

- Formal biodiversity offsets for impacts on threatened species and communities
- Large scale landscaping and rehabilitation of areas disturbed during construction, but not required to accommodate permanent surface infrastructure
- Landscaping and rehabilitation of residual land on the former Alexandria Landfill site that is not required for the St Peters interchange to form a new urban forest and public open space.

4.9.4 Traffic

Issue description – toll avoidance

Canterbury Council would like to raise concerns regarding toll avoidance behaviours and the impacts on our local and regional roads as a result of the New M5.

Response

The project would have an impact on parallel routes as part of the project, and the EIS considers these potential impacts on existing roads. As discussed in Section 9.2 of the Technical working paper: Traffic and transport, traffic is forecast to divert off the motorway network to other routes outside the peak traffic periods to avoid the motorway toll. This shift in traffic distribution is not anticipated to have a significant impact from a traffic perspective (in terms of congestion) as there is generally network capacity to accommodate the additional, redistributed traffic in these off-peak periods.

Traffic forecasting data from the WestConnex Road Traffic Model (WRTM) was used to examine how traffic patterns may change between alternative parallel corridors through the study area and was reported in the screenline analysis in Chapter 9 of Technical working paper: Traffic and transport (Appendix G) of the EIS.

The WRTM uses current best practice methods for representing drivers' behaviour with respect to their willingness to pay tolls for road travel time savings for multiple toll roads and routes through the Sydney metropolitan network. The toll choice model was developed for the WestConnex project as an augmentation of standard traffic route modelling procedures that are normally used in planning and assessment of untolled roads. The toll choice model addresses private vehicle and commercial (truck) traffic behaviour, representing the different willingness of these vehicle users to pay for travel time savings in the context of total journey costs including tolls, travel times and distances available on competing routes.

To assess the values that differing vehicle users place on travel time savings, a project specific survey was designed and conducted in Sydney in 2013 asking road users questions about their willingness to pay tolls. Independent specialist peer reviewers provided oversight throughout the design and analysis of the survey. The survey yielded a distribution of estimates of the value that Sydney drivers are willing to pay in terms of tolls to reduce their travel time. These values were benchmarked against values from other studies in Australia and internationally. The survey results are used within WRTM's route choice algorithm to represent the influence of a toll.

A reference tolling regime was developed for WestConnex and is explained in the Updated Strategic Business Case, released in November 2015. The reference tolling regime has been used in the traffic demand modelling, revenue figures and the economic and financial analysis within the business case.

The reference tolling regime for WestConnex is consistent with the NSW Government's tolling principles and includes:

- A distance-based tolling successfully adopted on the M7 since its opening
- Higher tolls for heavy vehicles
- A minimum charge (or flagfall)
- A maximum charge (or toll cap).

The tolling regime that would be applied to the New M5 was developed giving consideration to:

- Affordability and equity principles by providing:
 - tolling proposition tailored to usage
 - mechanisms to limit the total cost of a trip.
- Wider road impacts, by:
 - minimising diversion (for example, by setting toll levels at appropriate levels)
 - discouraging shorter trips at certain times which has a disproportionate impact on congestion.
- Contribution of WestConnex to wider transport planning objectives:
 - supporting public transport use
 - ensuring freight efficiency outcomes.
- A tolling proposition which is efficient to administer and straightforward to understand
- Alignment with the WestConnex financing and procurement strategy to provide a basis for private sector involvement for the relevant WestConnex stages
- Alignment with NSW and Australian government policy frameworks.

The current tolls on all tolled roads in the Sydney metropolitan area are incorporated into the model. The model also considers future changes in perceived value of tolls taking into account escalation of tolls, effects of inflation and average weekly earning projections. The traffic modelling was independently peer reviewed by a committee including David Johnston of Johnston Services Pty Ltd and Professor David Hensher of University of Sydney Institute of Transport and Logistics Studies who are recognised experts in the field of toll road patronage forecasting and transport behavioural choice modelling.

Additional traffic data would be collected at a number of locations along the length of the parallel routes prior to the project opening and again 12 months after opening. This observed traffic flow data would reflect actual driver route choice associated with the New M5 and tolls. The collected data would identify both light and heavy vehicles and enable comparison with forecast traffic flows. The new observed data would then be used to monitor the impacts on the parallel routes relative to that predicted in the EIS.

If this data indicates that the difference between predicted and actual driver route choices is sufficient to warrant an exploration of mitigation measures, Roads and Maritime would develop such interventions as necessary and these measures would themselves be subject to the relevant approvals processes.

4.9.5 Road Pavement

Issue description – pavement deterioration

City of Canterbury would like notification of how this project is going to address the accelerated pavement deterioration issues on local and regional roads as a result of the increased heavy and light construction vehicles in addition to the usual traffic volumes. Compensation relating to the increased pavement deterioration must be considered.

The proposed construction traffic routes are mainly on regional roads for which Council receives funding from the State Government for condition based pavement repair. It should be noted that over the years significant works have been carried out rehabilitating the pavement of Kingsgrove Road.

Please note that Council's aim is to document and record the current condition of our road pavements as listed in the EIS. Council has engaged ARRB to assess the structural integrity of these pavements and the effects of the additional loading throughout construction of the project.

Current condition of the pavements on these roads, as identified, are attached for your reference.

A review of the structural integrity of these pavements would be completed in 3-4 weeks and a copy of this report would be forwarded to you or the proponent as soon as possible.

Response

A road dilapidation report(s) would be prepared by Roads and Maritime that would identify the existing conditions of local roads which would be used during construction and would identify the mechanisms to repair damage to the road network caused by heavy vehicle movements associated with the construction of the project (refer to environmental management measure TT12, (amended in **Chapter 8** (Revised environmental management measures) in this report)). Relevant councils would be consulted as part of this process.

Any damage caused by the project during construction on these roads would be repaired by Roads and Maritime.

4.10 Hurstville Council

Hurstville Council partnered with the City of Canterbury and Rockdale Councils to engage a consultant (Molino Stewart) to review components of the EIS on their behalf. The following sections provide a response to the summary of issues raised. Responses to issues identified in the Molino Stewart review, but not specifically raised by Hurstville Council, are located in Section 4.16 of this document.

4.10.1 Air quality

Issue description – assessment of general construction impacts

It is recommended that appropriate and specific Construction Phase Air Quality Management Plans (or sub-plans) are developed and implemented for individual components of the overall construction task. Council requests a copy of the Construction Management Plan (CEMP) and sub-plans to ensure that air quality mitigation measures are applied in accordance to relevant guidelines and levels adopted in the plans.

Response

This issue has been raised within the Molino Stewart report jointly commissioned by Rockdale City, Hurstville and Canterbury Councils, and has been addressed in **Section 4.16.1** of this report.

Issue description – assessment of operational impacts (in-tunnel air quality)

For reasons fully detailed within the attached Molino Stewart EIS Assessment Report, it is considered that the longitudinal ventilation system currently proposed for the New M5 may not be adequate or appropriate to ensure safe and compliant air quality at all times, especially on longer tunnels, such as the New M5 and tunnels that carry a very significant traffic load with commensurate pollution burdens.

It is recommended that a contingency strategy based on alternative tunnel ventilation approaches and the management of in-tunnel air, such as transverse ventilation be fully incorporated into the project proposal and modelled in the working paper and EIS.

Response

This issue has been raised within the Molino Stewart report jointly commissioned by Rockdale City, Hurstville and Canterbury Councils, and has been addressed in **Section 4.16.1** of this report.

Issue description – assessment of operational impacts (ventilation facilities)

Any inadequacy in the control of air pollutant levels within the tunnels would have an impact on the quality of discharges from the associated ventilation facilities, and any assumptions made regarding surface air quality near those stacks.

It is recommended that an alternative approach to the management of air quality in the immediate vicinity of the proposal tunnel ventilation facilities is included in the project proposal and modelled in the working paper and EIS, to complement the inclusion of an alternative tunnel ventilation strategy as recommended above. This should also include any air quality management limitations available through stack height and discharge velocity and the inclusion of air cleaning and filtration technologies at the ventilation facilities.

Council seeks a commitment on the continuous monthly monitoring of the air quality around the Kingsgrove area and for the report to be made available on the website.

Response

This issue has been raised within the Molino Stewart report jointly commissioned by Rockdale City, Hurstville and Canterbury Councils, and has been addressed in **Section 4.16.1** of this report.

4.10.2 Hydrology and water quality

Issue description – impacts to drainage network

Council notes that the New M5 project location is also likely to impact flow to Hurstville Council's drainage network. The impact of altered flow into Council's drainage network needs to be considered at every stage of the New M5 works

Response

Roads and Maritime would continue to consult with Hurstville Council concerning any required alteration or modification to its drainage network as a result of the project during detailed design.

Issue description – proposed construction and operational mitigation measures (groundwater and surface water data and monitoring)

All surface water and ground water monitoring proposed for monitoring water quality and contamination of groundwater and the impacts of the proposed project should be sufficient in both extent and duration to allow full monitoring and interpretation of the project impacts both before the project commences (minimum 12 month base monitoring) and after the project commences.

Groundwater monitoring would continue post the completion of construction and that six monthly groundwater monitoring is proposed to occur for three years after the tunnel becomes operational, after which the requirement for on-going monitoring would be assessed. This is considered to be entirely inadequate, given that the point has been made consistently in the EIS that it takes some time for groundwater to reach a steady state. As such, after three years the full extent of the impact of the project on the groundwater table could not possibly be known.

It is recommended that further groundwater baseline data, including soil salinity data, of a minimum 12 months duration, which is representative of the entire project site should be obtained as a priority and the assessment revisited once this information is available. The monitoring program should also be developed in consultation with all relevant government agencies.

Response

This issue has been raised within the Molino Stewart report jointly commissioned by Rockdale City, Hurstville and Canterbury Councils, and has been addressed in **Section 4.16.2** of this report.

Issue description – groundwater modelling

The groundwater model has not been developed to predict the interaction with surface water nor is it able to model any changes to surface water bodies that may arise from the project. The EIS does not assess or predict what would happen to the connected surface water systems of the Cooks River, Wolli Creek or Bardwell Creek. This represents a deficiency in the assessment. The groundwater model should be altered to include the interaction between groundwater and surface water, and the impacts that the drawdown on groundwater would have on surface water systems.

Data on the full extent of the impacts on the water table from the M5 East Motorway needs to be collected from across the actual site alignment to inform the groundwater modelling (not data from other roadways and tunnels which is 'expected' to be an accurate representation of what would occur on the New M5).

Response

This issue has been raised within the Molino Stewart report jointly commissioned by Rockdale City, Hurstville and Canterbury Councils, and has been addressed in **Section 4.16.2** of this report.

Issue description – groundwater inflows

There is no firm commitment made within the EIS that any part of the system would be lined (only that it would be applied as required if inflows are too high). As such, it is possible that the inflows may be higher than those modelled for the EIS.

The EIS also notes that there is potential for the palaeochannels to extend deeper than expected (based on current information) and consequently there is a risk that the alignment could intersect a paleochannel. This could potentially result in much higher inflows and the management of such an event is only addressed with a cursory statement in the EIS.

A preferable mitigation measure for groundwater would have been confirmation that any part of the works would be lined to prevent any inflows. The EIS commits to using appropriate waterproofing measures to permanently reduce the inflow to an acceptable quantity where the project alignment passes close to watercourses and/or where higher than expected inflows are experienced. As there has been no investigation into the inflow rates that may be experienced nor any criteria or limits established for when waterproofing measures need to be adopted during construction, this mitigation measure does not provide any imperative for action to be taken.

As potential impacts should be assessed and understood as part of the EIS, it is recommended that the potential impacts of groundwater inflow, groundwater drawdown and the impacts of salt water intrusion into the groundwater be understood now before the project commences.

Response

This issue has been raised within the Molino Stewart report jointly commissioned by Rockdale City, Hurstville and Canterbury Councils, and has been addressed in **Section 4.16.2** of this report.

Issue description – surface water interactions with groundwater

Working on the reported inflows during the construction of the M5 East Motorway, the proposed New M5 project could produce between 40 litres per second and 50 litres per second over the full length of the tunnels towards the end of construction. Surface water is then in addition to this. This would indicate that the stated daily discharge flow allowance of 32 litres per second would be a significant underestimation of the potential combined surface and groundwater discharges from the project.

As this is a constant discharge throughout the duration of construction, it is not appropriate to compare this flow to the one year ARI event to assess of the significance of this discharge, and hence the potential impact/s. The one year ARI event is a minor flood event, not a constant flow. It is not considered valid to use this as justification for dismissing this constant discharge into creek systems above the tidal zone.

Response

At the time of the assessment, no flow data was available to characterise the normal flow variability within Wolli Creek. Flood studies have been done for Wolli Creek that estimate the two year flow. In order to compare the proposed rates of discharge from the water treatment plants against more frequent flows, the one year flow was calculated. This comparison is considered reasonable for the following reasons:

- The Wolli Creek catchment is highly modified, with the upper catchment (upstream of Bexley Road) almost completely urbanised, and most of the catchment runoff is conveyed to the creek by direct connection via the stormwater drainage network.
- During the construction phase within the Wolli Creek catchment it is proposed that the treated water is discharged at three locations, all of which discharge into the armoured (concrete) stormwater drainage network.
- The stormwater drainage network is sized to convey events up to the (typically) five year return interval, meaning that runoff from events up to this size has a very short catchment response time as there is little roughness or infiltration to attenuate flows. Consequently, in comparison to less urbanised catchments, the hydrology of Wolli Creek is very 'flashy' i.e. peak flows are very high relative to less-urbanised catchments of similar size, and flows in non-tidal reaches would abate quickly after rain.
- The form of Wolli Creek has been shaped by this hydrology, which is characterised by short durations of high shear-stress flows. This is evident through considerable armouring of the bed and banks in the non-tidal reaches to make these areas stable and the disturbed channel form currently present downstream of Bexley Road.

To determine if discharge from the water treatment plants was likely to have an impact on the form of the stream, it is therefore appropriate to compare the magnitude of these treated water discharges to the size of the flows that have shaped the stream form. Treated water discharges to Wolli Creek during construction would contribute an increase in flow of 0.02 per cent for the one year return interval flow event. This is a relatively insignificant increase in flow that would likely have minimal impact on stream levels and velocities in the creek hence it is not expected to impact the geomorphology of the creek. Furthermore, any new discharge outlets into Wolli Creek would be designed and constructed with energy dissipaters and/or scour protection measures to further minimise the potential risk of erosion and sediment disturbance caused by the operation of new outlets. The design of the outlets, including discharge velocities and energy dissipaters / scour protection measures, would be confirmed during detailed design and informed by appropriate drainage modelling.

Issue description – surface water data

One of the datasets data used to present comparisons of the Cooks River indicators against the ANZECC guidelines was data that was over 14 years old. There is no explanation as to why more recent water quality data is not used.

Response

The water quality data used to develop the water quality reference criteria was the best data available at the time of the assessment. It has been recognised that there are gaps in the dataset that require more comprehensive and more recent water quality sampling. The Water Quality Monitoring Program (see Technical working paper: Surface water) describes the ongoing monitoring of sites relevant to the project that is currently being undertaken. Monitoring started in June 2015 and would continue to be undertaken monthly until post-construction.

Issue description – surface water (sensitive receiving environments)

The EIS states that the project has the potential to interact with a number of sensitive receiving environments. However, there are other creeks, marshes and wetlands within the vicinity of the project area which are not mentioned.

It is recommended that the EIS should also acknowledge Wolli Creek and Bardwell Creek as sensitive receiving environments.

Response

The list of sensitive receiving environments was a list of environments that are known to have high ecological values that could be highly sensitive to surface water impacts resulting from the project. The Wolli Creek and Bardwell Valley catchments have been significantly altered due to urbanisation. However, it is acknowledged that conservation works have been underway in sections of Wolli Creek, located downstream from the project.

The Technical working paper: Surface water does assess the potential impacts on Wolli Creek during the construction and operation of the project, including surface water discharges and potential geomorphology impacts as a result of increased discharges (refer to Section 6.3.2, 6.4.1, Section 7.3.1 and Section 7.4.1 of the technical working paper).

The project does not propose any activities within the catchment of Bardwell Creek and it is not expected that there would be any direct impacts to Bardwell Creek as a result of at-surface activities or discharges. Indirect impacts due to groundwater drawdown and subsequent ecology impacts for Bardwell Creek valley are considered in the EIS.

Issue description – surface water (riparian land)

It would be expected that further detail should be provided on what the project would involve with respect to activities adjacent to waterways and mitigation measures, given that there are significant disturbances of creek lines and riparian areas.

Council recommends that a vegetation management plan be developed with the input from Councils and other relevant stakeholders. The Wolli Creek Riparian Corridor Management Plan should be fully considered as part of the EIS assessment process and the impacts assessed in relation to the objectives the plan.

Response

Waterways that would be directly or indirectly impacted by the project are:

- Wolli Creek. The sections of Wolli Creek that run immediately adjacent to the construction footprint of the project consist of either a semi-natural water course channel or a constructed concrete-lined channel. Works associated with the project would include the construction of discharge points for construction water treatment plants, and/or new or modified drainage infrastructure to accommodate the project. Construction activities would also occur immediately adjacent to the channel. Impacts to Wolli Creek downstream of Bexley Road could occur due to discharges during construction or operation. There would be no direct impacts to any riparian vegetation along the Wolli Creek corridor, downstream of Bexley Road
- Cooks River. No construction works are proposed within areas that would be defined as waterfront or riparian areas of the Cooks River. However, construction works would impact drainage lines within the golf course that drain towards the Cooks River. Discharges from water treatment plants would also occur during construction and operation, via existing Council stormwater outlets
- Alexandra Canal and Munni Street stormwater channel. Both are constructed canals, and construction works would occur adjacent and above these channels due to the construction of permanent bridge structures, and the construction of new drainage discharge points.

Section 4.2 of the Technical working paper: Surface water (Appendix N of the EIS) provides a description of the waterways and catchments that have the potential to be impacted by the project.

The watercourses within the project area are highly disturbed, with concrete channelisation and reconstructed rock banks which limit the significance of potential riparian impacts associated with the project.

There would be no direct impacts on any riparian vegetation along the Wolli Creek corridor, downstream of Bexley Road.

The Technical working paper: Biodiversity assessment report (Appendix S of the EIS) described the aquatic and riparian values present and likely to be impacted. The use of the Wolli Creek Riparian Corridor Management Plan is noted. However, the Technical working paper: Biodiversity assessment report concluded that there was no riparian vegetation that would be impacted and therefore no requirement to rehabilitate any area.

Nonetheless, all works within the riparian areas would be managed in accordance with Guide 10 – Aquatic habitats and riparian zones of Roads and Maritime's Biodiversity Guidelines (RTA, 2011) and would be undertaken to minimise impacts.

Works adjacent to these watercourses would also be managed in accordance with the *Guidelines for Controlled Activities on Waterfront Land* (DPI, 2012) to mitigate and manage any impacts on water quality.

Issue description – surface water (increase in flows)

The EIS should provide quantification of the increased area of impermeable surfaces and details of where flow paths would be altered in order that a full analysis be undertaken to determine the impacts. This information is required in order to accurately assess increases in flows entering the waterways and the extent of increased erosion and pollution inputs that are likely to occur.

Additionally, in relation to pollution influx via run off, the mitigation measures do not require spill containment for spills on the motorway as a matter of course. Rather, it is to be provided only 'if warranted'. This would not seem an appropriate mitigation of environmental risk.

Response

The increased area of impermeable surfaces is quantified for each catchment in the Technical working paper: Surface water: Wolli Creek (Section 7.3.1), Alexandra Canal (Section 7.3.2), Eastern Channel (Section 7.3.3) and Cooks River (Section 7.3.4).

The pollutant reduction target for total suspended solids (TSS) is 85 per cent. Where the indicative treatment performance indicates that operational stormwater runoff discharges would not meet this target, opportunities for improving treatment may be explored. Note that treatment performances are indicative and would be updated based on the detailed design of treatment devices. There may be opportunities to increase the stormwater treatment provided in this catchment.

Surface water during the construction of the project would be managed by the CEMP. Details of the construction process would be developed during detailed design, at which time the water quality mitigation measures of the CEMP would also be developed.

For spill containment, an assessment of the risk of spills on the motorway would be undertaken. If warranted, spill containment would be provided. This would be determined during detailed design.

Issue description – fracturing or cracking of creek beds

There is little discussion within the EIS of the risks relating to the fracturing or cracking of creek beds, beyond the EIS noting that appropriate waterproofing measures would be used if inflows are elevated. This is not considered to be a sufficient assessment of potential impacts.

Council calls for a more thorough investigation into the risks of fracturing or cracking creek beds and the development of mitigation measures required preventing this from occurring.

Response

This issue has been raised within the Molino Stewart report jointly commissioned by Rockdale City, Hurstville and Canterbury Councils, and has been addressed in **Section 4.16.2** of this report.

Issue description – geomorphology impacts

Within the assessment of construction impacts, the statement is made that the discharge of treated ground / construction water would have a minor increase in flow rates of receiving water courses.

Discharge to Wolli Creek would be to the concrete lined section upstream of Bexley Road. Between Bexley Road and the fish weir at Turrella the discharge would contribute up to 13.1 litres per second to a highly altered reach of creek, affected by both upstream lining and downstream hydraulic controls. Further, it states that this small amount of discharge would not have the potential to impact what was the natural flow variability in the creek. However, while there are controls at these two points within Wolli Creek, there is nevertheless a natural creek bed between these two points and it is inferred that this is to be a continuous flow; as such it may actually be discharging at this rate all day, every day. Based on a predicted flow of 13.1 litres per second this would result in a continuous flow of 1.3 mega litres per day into Wolli Creek.

A constant flow like this has the ability to contribute to channel incision or headcutting, altering the geomorphology of this natural section of river. While this may only be localised, there is no information presented on what the normal flow variability is within Wolli Creek. As such, the discharge of a continuous flow should not be dismissed as a potential impact.

The total discharge of both surface flows and groundwater flows provided for the project are 32 litres per second (Table 23 in the EIS). There is no information on how this was derived, or what contribution is from groundwater and surface water respectively.

Council requests that information be provided on how the discharge rates for surface flows and groundwater flows were determined within the Technical working paper: Groundwater.

Response

Groundwater and construction water inflows have been estimated for the purpose of sizing and locating the groundwater treatment plants. The inflow scenarios are values that would typically be expected in the Sydney Basin for projects of a similar size and nature as the New M5. The estimated inflow and discharge rates from each treatment plant during the construction phase are provided in Table 23 of the Technical working paper: Surface water (Appendix N of the EIS). Total project discharges during construction, across all water treatment plants is estimated to be about 32 litres per second, as noted in Table 23 of Appendix N of the EIS. This comprised of about 26 L/sec (81%) derived from tunnel inflow and the remaining 6 L/sec (19%) derived from generated construction water. The basis of the groundwater tunnel inflow is described in detail in the Technical working paper: Groundwater.

As noted in Section 6.4.1 of the Technical working paper: Groundwater (Appendix N of the EIS), treated water would be discharged at two locations associated with the western surface works, each with a discharge rate of up to 2.8 litres per second. This treated water would likely be composed of groundwater inflow and construction water.

An additional 7.6 litres per second of treated water would be discharged at Bexley Road. The total discharge volume expected to enter Wolli Creek during construction, across the three discharge locations, is equal to about 13.2 litres per second.

A detailed response to the potential for constant flow to alter the geomorphology of the river is provided in Issue description – surface water (riparian land) later in this section.

When compared to the one year ARI flow of 58.9 cubic metres (58,900 litres) per second at Bexley Road (PB-MWH, 2009), this discharge would contribute an increase of 0.02 per cent. This is considered to be a relatively insignificant increase in flow that would be unlikely to have any meaningful impact on stream levels and velocities in the creek. A significant impact to the geomorphology of the creek is therefore not considered to be likely.

The basis of the groundwater tunnel inflow and the environmental management measures proposed to reduce inflow are described in detail in Technical working paper: Groundwater (Appendix Q of the EIS) and **Chapter 8** of this report.

Issue description – impacts of clearing of riparian zones for construction

The Technical working paper: Surface water states that direct construction activities within or adjacent to the watercourse and/or riparian zone are likely to involve the clearing of vegetation and excavation of channel bed and bank areas, including installation of bridge abutments. These direct activities are likely to disturb the existing floodplain and/or in-channel geomorphic units, exposing them to scour erosion, altering the trajectory of the channel planform. The proposed project includes works proposed within the watercourses or other riparian areas, including the construction water treatment plants. As such, there would be clearing of vegetation and excavation of channel bed and bank areas. The extent of this clearing is not quantified within the working paper.

Council request more analysis be given to impacts of clearing vegetation on water quality and more detail be provided on the extent of clearing.

Response

Works within watercourses would be associated with the installation of additional drainage discharge points into existing waters. Construction works would also occur directly adjacent to modified watercourses (for example at Bexley Road).

These works occur within or adjacent to highly disturbed watercourses that consist of concrete channelisation, semi-natural channel and/or reconstructed rock banks. New or modified drainage discharge points that may require works within the sections of waterways are located at Wolli Creek and Alexandra Canal during construction. Construction and operational water discharges at Arncliffe would occur via existing council stormwater system. The construction of bridge abutments would occur adjacent to Alexandra Canal, and would not require excavation of the channel bed.

The extent of clearing would be confirmed following detailed design of the project and any potential impacts on water quality would be controlled using standard mitigation measures as outlined in

Section 16.4 of the EIS. The design of stabilisation and revegetation works for disturbed areas would be site specific and dependent on site context. Stabilisation and revegetation works within riparian corridors would be documented in the CEMP.

During construction, all works within the riparian areas would be managed in accordance with Guide 10 – Aquatic habitats and riparian zones of Roads and Maritime's Biodiversity Guidelines (RTA, 2011).

A Soil and Water Management Plan would be prepared by the contractor to incorporate controls and measures in accordance with The Blue Books¹. The plan would be continually updated to suit the changing needs as the project works progress. The plan would be developed in consultation with the Environment Protection Authority and DPI (Water) and document the types of measures that would be put in place to minimise the risk of soil erosion or polluted discharges reaching the receiving environments.

A project specific water quality monitoring program would continue to collect data for at least 12 months or to the commencement of construction (whichever is sooner) to represent pre-construction conditions for the project. Monitoring would continue during construction of the project as identified in Appendix A of the Technical working paper: Surface water (Appendix N). The details of this monitoring program would be contained in the Soil and Water Management Plan.

Issue description – treatment of water during construction.

The groundwater and surface water technical working papers are not clear on what criteria is adopted for treating water during construction. Council notes that construction water treatment plants would be used during construction at five locations.

Given that the five treatment plants would be spread out across the alignment and each would be receiving water of varying quality the EIS needs to gather sufficient data on the water quality at each location and specify the pollution reduction criteria that would be used for each plant.

Response

The water treatment plants used during the construction and operation of the project would be designed to ensure that discharge water quality would meet the Water Quality Reference Criteria (refer Appendix A of the Technical working paper: Surface Water). Further, monitoring of the Cooks River would be undertaken in accordance with the water quality program for 12 months post-construction or as otherwise required by the conditions of approval to ensure that discharge is meeting these criteria.

Water quality trigger values have been developed based on existing data for specific reaches where construction works and discharges would occur. Within each reach, catchment and environmental conditions are considered to be sufficiently homogenous such that the water quality data set for each reach would be representative. Trigger values have been developed for the following reaches:

- Cooks River: Lower catchment
- Cooks River: Lower-middle catchment
- Cooks River: Upper-middle catchment
- Wolli Creek: Upstream
- Wolli Creek: Downstream
- Alexandra Canal.

These trigger values would be updated with new water quality data as it becomes available, and are applicable during the construction and operation of the project.

¹ These documents provide guidance for local councils and practitioners on the design, construction and implementation of measures to improve stormwater management, primarily erosion and sediment control, during the construction-phase of urban development.

Issue description –bore water users

It is recommended that the impact on existing and future bore water users from reduced water quality should also be assessed along with reduced drawdown. Further, the impact on bore water users should be assessed across the whole project area (not just the one kilometre buffer zone).

An overarching alternative recommendation which would address many of the concerns presented above is for the precautionary principle to be applied and for a commitment to be given for the New M5 tunnels to be constructed as lined tunnels for their full length.

Response

This issue has been raised within the Molino Stewart report jointly commissioned by Rockdale City, Hurstville and Canterbury Councils, and has been addressed in **Section 4.16.3** of this report.

Issue description – flooding

The EIS should give full consideration to the draft Hurstville Overland Flood Study to be able to determine the potential impact on overland flow as a result of disturbance to surface water and groundwater systems during the New M5 project construction and operational phases.

Response

During construction, the control of overland flows within construction areas would require temporary drainage works to capture runoff and direct flows around and/or through work sites as appropriate. The design of these works would be developed during detailed design in coordination with detailed site and construction planning. However, all temporary works would be designed in consideration of the potential for adverse flooding impacts to occur, and would seek to minimise flow diversions and associated increases in peak flood levels as far as possible.

During operation, runoff generated on the project's new road pavements would be discharged directly into Wolli Creek. Therefore there would be no potential for these surfaces to impact overland flows. Overland flows approaching the motorway would be controlled by new and upgraded drainage systems designed to minimise off-site flooding impacts as far as possible.

In terms of the Hurstville Overland Flood Study, flooding impacts have been assessed in Technical working paper: Flooding (Appendix P of the EIS). As identified in Section B4.7 a new model was developed to respond to:

- Different catchment flooding-storm tide combinations; two dimensional effects associated with bends in the Cooks River
- Higher peak water levels
- Higher peak flows at the Botany Bay outfall.

This resulted in a more conservative model that was built specifically for the purpose of informing the design of the New M5, and as such the measures of conservatism built into the assumptions help to minimise the risk that the project may impact surrounding environments. The draft Hurstville Overland Flood Study model would be built for a different purpose, and the assumptions made reflect the priorities of that modelling.

Modelling done for the PMF was done for the purpose of designing the levels at the tunnel portals, and the assumptions made for these scenarios reflect that purpose

4.10.3 Biodiversity

Issue description – limitations in determining species impacted by the project

There has not been a thorough review of information obtained for the local areas as held by the local government authorities. In particular, there was inadequate consideration of any:

- Additional information obtained by Hurstville, Rockdale and Canterbury on local threatened fauna/flora species as part of the development application process or

- Species hotspots or known areas of significant habitat that may not be recorded in threatened species databases but identified in biodiversity studies, such as the important Wolli Creek Regional Park
- Management plans and strategies prepared for local government authorities that document the particular aspects of local biodiversity such as the Grey-headed Flying-fox management plan for Turella.

There are provisions within the Framework for Biodiversity Assessment (FBA) to consider local information where it can be demonstrated that this information provides a more comprehensive summary of the existing biodiversity compared to government databases. The desktop review conducted for the Technical working paper: Biodiversity assessment report could have considered additional sources of information to obtain a more comprehensive species list potentially impacted by the proposal. This includes previous studies for M5 East such as the detailed surveys of the Beverly Grove bushland by Cumberland Flora and Fauna Interpretive Services and local government studies.

Response

The Technical working paper: Biodiversity assessment report (Appendix S of the EIS) prepared for the project included a review of a number of previous reports to understand the context of the project footprint in relation to previous biodiversity studies, including:

- *Beverly Grove Bushland Flora Survey – M5 East Motorway Corridor Beverly Grove* (Cumberland Flora and Fauna Interpretive Services 1997)
- *Management Plan for Green and Golden Bell Frog at Arncliffe* (White 1998)
- *Draft Recovery Plan for the Green and Golden Bell Frog* (NSW DEC 2005)
- *Green and Golden Bell Frog Management Plan for Cooks Cove* (Cumberland Ecology 2006)
- *Plan of Management: Green and Golden Bell Frog Key Population of the Lower Cooks River* (NSW DECC 2008a)
- *Biodiversity assessment proposed widening of Marsh Street Wolli Creek* (AMCS 2014).

These previous reports were considered to provide relevant context of biodiversity values within and near the project footprint.

Use of local data, including Council data sets, generally refers to the use of vegetation mapping as per Section 5.2.1.3 of the FBA. For threatened species, the use of more appropriate local data may be considered. The use of this local data is only to provide background information described at Section 6.1.1.1 of the FBA, not whether the species is present or otherwise.

The Cumberland Flora and Fauna Interpretive Services study was considered and reviewed as part of the Technical working paper: Biodiversity Assessment Report.

Data was sought from community based environmental organisations for access to survey data and information related to the biodiversity along the Wolli Creek valley and for threatened migratory birds. Unfortunately, this data was not provided.

Issue description – likelihood of occurrence assessment

Based on the project design for tunnels rather than a surface expression, the Technical working paper: Biodiversity assessment report, discounted the likely presence of many of the species predicted to occur within the area.

Whilst Office of Environment and Heritage (OEH) have provided additional species for consideration, in addition to those outlined in the SEARs, the process has truncated the potential threatened species lists and focussed on only a number of key species and communities. This number is further reduced following the likelihood of occurrence assessment that only focuses on the immediate environment within the project alignment and does not include the range of surrounding vegetation types.

This process fails to fully consider the potential for stepping stone habitat or occasional use of local patches of vegetation within the project alignment as part of a regional biodiversity corridor, passing through Bardwell Valley, then towards either Stotts Reserve to Wolli Regional Park; or via Coolibah Reserve and continuing towards Wolli Regional Park. These reserves are included Priority Natural Areas with moderate conservation significance in the Rockdale City Council Biodiversity Strategy.

Response

The biodiversity impacts of the project have been assessed in accordance with the requirements of the FBA, Biodiversity Offsets Policy for Major Projects and the SEARs issued for the project.

The FBA specifies that there may be matters where impacts require further consideration, which are considered to be complicated or severe. OEH listed a number of matters that require further consideration as part of the biodiversity assessment of the project, which are detailed in Section 7.6 of the Technical working paper: Biodiversity assessment report.

The list of matters for further consideration provides the species and ecological communities present within five kilometres of the development boundary as produced from OEH advice as input to the SEARs. Many of the listed matters for further consideration are highly unlikely to be impacted project given the absence of suitable habitats. As part of the preparation of the Technical working paper: Biodiversity assessment report for the project, a rationale for the exclusion of matters for further consideration was undertaken and provided in Table 25 of that technical working paper.

Of the matters listed, only three were identified as occurring within the project footprint: Cooks River Castlereagh Ironbark Forest, Swamp Sclerophyll Forest and the Green and Golden Bell Frog. Refer to Section 21.3.1 of the EIS for details of the assessment of likely impacts.

The value of 'stepping stone' patches of vegetation is considered as part of the Technical working paper: Biodiversity assessment report using the landscape value score of the FBA. The landscape value score is derived from the percentage of native vegetation cover in the landscape, the connectivity value, patch size and area to perimeter ratio. It is from this base information that some of the threatened species are 'filtered in' to the assessment process.

Issue description – adequacy of the survey method

The Technical working paper: Biodiversity assessment report was prepared using the FBA. Section 2.1.1.4 of the FBA indicates that where a proponent is proposing to establish an offset site as part of the Biodiversity Offset Strategy (BOS) for the Major Project, the Biobanking Assessment Methodology (BBAM) must be used to assess the biodiversity values of the offset site and to identify the number and type of biodiversity credits that may be created on the offset site.

This relies on the FBA credit calculator tool in determining the potential species impacted by a project and does not consider additional species identified during the background review.

Response

The assessment, use of the tool and preparation of the Technical working paper: Biodiversity assessment report and Technical working paper: Biodiversity offset strategy (Appendix T of the EIS) were completed in accordance with the FBA.

'Ecosystem credit' species cannot be added to the credit calculator tool, but 'species credit' species can be. No 'species credit' species identified in the background review were considered to be present within the project footprint.

Issue description – landscape assessment of threatened species

The species list interrogated to assess the requirements for further targeted species survey did not include the additional species provided in the supplementary SEARs, or those provided by OEH as supplementary species. Consequently no targeted surveys for threatened species were undertaken in the BAR. Therefore the assessment of potential impacts from the proposal cannot be fully assessed where threatened species could occur within the project alignment.

Response

The biodiversity impacts of the project have been assessed in accordance with the requirements of the FBA, Biodiversity Offsets Policy for Major Projects and the SEARs issued for the project.

The FBA specifies that there may be matters where impacts require further consideration when it is considered to be complicated or severe. OEH listed a number of matters that require further consideration as part of the biodiversity assessment of the project, which are detailed in Section 7.6 of the Technical working paper: Biodiversity Assessment Report.

The list of matters for further consideration outlined by OEH contains the species and ecological communities present within five kilometres of the development boundary. The list was produced from OEH advice to the SEARs. Many of the listed matters for further consideration are highly unlikely to be impacted by the project given the absence of suitable habitats. As part of the preparation of the Technical working paper: Biodiversity assessment report for the project, a rationale for the exclusion of matters for further consideration was undertaken and provided in Table 25 of that report.

Of the matters listed, only three were identified as occurring within the project footprint; Cooks River Castlereagh Ironbark Forest, Swamp Sclerophyll Forest and the Green and Golden Bell Frog. Refer to Section 21.3.1 of the EIS for details of the assessment of likely impacts.

Issue description – survey methodology

The survey effort and coverage was restricted to the immediate project alignment with many of the areas of investigation having restricted or no access. The EIS acknowledges that the survey effort did not cover the optimal season for detection for many of the species likely to occur and hence the information is inconclusive. Whilst this is a function of the political and financial constraints for major infrastructure projects, in the absence of a thorough field assessment, the precautionary principle should have been adopted. Under this principle, if suitable habitat exists within the project alignment, however degraded or modified, then a species should be considered likely to utilise this habitat, either permanently or as part of a wider range. It is not clear from the Technical working paper: Biodiversity assessment report to what extent the assessment and therefore conclusions are based on this position.

Examples are provided in the Molino Stewart report for particular species as outlined in the Technical working paper: Biodiversity assessment report which demonstrates the limitations in the survey. These include the Green and Golden Bell Frog, the Grey Headed Flying-fox, micro-bats, birds and hollow-bearing tree surveys.

Response

Surveys were conducted in November, December, April, May and June. The June survey was for aquatic and riparian habitats. **Table 4-12** shows the months for survey for the species returned from the online tool. The season of survey for the project does correspond with the correct season for all of these species, with the exception of *Caladenia tessellata*. That species should be surveyed in September and October. That species is not known from sites within or in close proximity to the project footprint. The closest known population is located at Braidwood.

Green and Golden Bell Frog have been surveyed every year since 2001, near and within the project footprint. These survey results were considered as part of the Technical working paper: Biodiversity Assessment Report. The survey for this species was conducted by a specialist with particular knowledge of this population, its dynamics and responses to management actions.

Recent guidelines for Grey-headed Flying-fox suggest that survey for the species is not informative, especially since many sightings are recorded in urban habitats. Rather, the guideline suggests that survey for feed species is the preferred method. The presence of feed trees would have been captured in the vegetation surveys. Grey-headed Flying-fox for the purposes of this project have been considered as ecosystem credit species; this is because only foraging habitat would be impacted.

The hollow-bearing tree survey was conducted to assess the presence of hollows in trees that were accessible (some trees occurred on private land where access was not available). The hollow-bearing tree survey is the first step in attempting to quantify roosting habitat for threatened microbats. Following the survey, it was considered that no such habitat existed within the project footprint where roosting habitat may have been directly impacted. This survey is in accordance with the scope provided in the SEARs and the advice from OEH.

Table 4-12: List of species credit species and the survey months returned from the online credit calculator

Species for survey	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
<i>Acacia prominens</i> - endangered population	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
<i>Hoplocephalus bungaroides</i>			Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	
<i>Acacia bynoeana</i>	Yes	Yes	Yes						Yes	Yes	Yes	Yes
<i>Meridolum corneovirens</i>	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
<i>Darwinia biflora</i>	Yes	Yes							Yes	Yes	Yes	Yes
<i>Melaleuca deanei</i>	Yes	Yes										Yes
<i>Dillwynia tenuifolia</i>	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
<i>Acacia pubescens</i>	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
<i>Cercartetus nanus</i>												
<i>Epacris purpurascens</i> subsp. <i>purpurascens</i>	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
<i>Callocephalon fimbriatum</i> population in the Hornsby and Ku-ring-gai Local Government Areas	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
<i>Litoria aurea</i>	Yes	Yes	Yes									
<i>Gyrostemon thesioides</i>	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
<i>Haloragodendron lucasii</i>	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
<i>Hibbertia puberula</i>	Yes	Yes							Yes	Yes	Yes	Yes
<i>Hibbertia</i> sp. <i>Bankstown</i>									Yes	Yes	Yes	Yes
<i>Hibbertia superans</i>							Yes	Yes	Yes	Yes	Yes	Yes
<i>Phascolarctos cinereus</i>	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
<i>Chalinobius dwyeri</i>	Yes	Yes	Yes	Yes					Yes	Yes	Yes	Yes
<i>Syzygium paniculatum</i>	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
<i>Maunderia triglochinos</i>	Yes	Yes	Yes								Yes	Yes
<i>Grammitis stenophylla</i>	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
<i>Callistemon linearifolius</i>	Yes	Yes	Yes						Yes	Yes	Yes	Yes
<i>Persoonia nutans</i>	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
<i>Pimelea curviflora</i> subsp. <i>curviflora</i>	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
<i>Pomaderris prunifolia</i> - endangered population	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
<i>Pseudophryne australis</i>	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
<i>Anthochaera phrygia</i>	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
<i>Varanus rosenbergi</i>	Yes	Yes									Yes	Yes
<i>Grevillea parviflora</i> subsp. <i>parviflora</i>	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
<i>Petaurus norfolcensis</i>	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Species for survey	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
<i>Pterostylis saxicola</i>									Yes	Yes	Yes	
<i>Tetratheca glandulosa</i>							Yes	Yes	Yes	Yes	Yes	
<i>Caladenia tessellata</i>									Yes	Yes		
<i>Wahlenbergia multicaulis</i> - endangered population	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
<i>Leucopogon exolasius</i>	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Issue description – vegetation communities assessments

Based on Molino Stewart's assessment of the OEH vegetation mapping, a patch of vegetation within the Marsh Street / Eve Street wetlands includes Swamp Oak and could be representative of Swamp Oak Swamp Forest Endangered Ecological Community (EEC). Similarly, the freshwater wetlands may also be consistent with the Sydney Freshwater Wetlands EEC. There are also vegetation communities located outside of the survey buffer for the project alignment that could be impacted by indirect effects of the construction works and should also be considered in the Technical working paper: Biodiversity assessment report and these are also detailed in the attached Molino Stewart report.

Response

Survey of the area mentioned above was conducted and mapped vegetation was validated. None of these areas would be directly impacted by the project (as exhibited). These vegetation types were considered as part of the Groundwater Dependent Ecosystem (GDE) assessment and none of these communities were considered to be groundwater dependent.

Issue description – groundwater dependant ecosystems

The dewatering of the tunnelling works during the construction phase would continue throughout the life of the project. For the lower topographic areas, the drawdown of the water table is predicted to be balanced by tidal flushing. This would progressively increase the salinity of groundwater within the deepest root zone for canopy species and may lead to floristic changes in the vegetation communities. For instance, there would be a likely replacement of *Melaleuca* species by *Casuarina* species lining the waterways (Cooks River, palaeochannels, back swamps and depressions) resulting in potential reduction on foraging habitat for the Grey-headed flying-fox. This may also alter the assemblage of communities that occur on top of the Botany Sands sand sheet.

The draw down and groundwater salinity changes would also have the potential to impact the Marsh Street / Eve Street wetlands next to Kogarah Golf Course. This area overlies the Botany Sands and would be subjected to an inflow of saline water to replace the ongoing drawdown of the groundwater table for the project. The extent of this drawdown in relation to natural recharge and tidal flushing is not quantified in the Technical working paper: Biodiversity Assessment Report, hence impacts can only be inferred. There is the probability that this may be a significant impact to these wetlands, resulting in a shift in floristic composition from permanently inundated aquatic species to ephemeral, more salt-tolerant species. A flow on effect of altering the groundwater conditions and floristic diversity on the Green and Golden Bell Frog is not known or considered in the Technical working paper: Biodiversity Assessment Report.

For the upper reaches of the Cooks River and tributaries, including Bardwell Creek and Wolli Creek, there is the potential for changes in groundwater to affect existing vegetation. The Wolli Creek Riparian Corridor Management Plan lists five EEC along the section from Kingsgrove to the confluence with Cooks River including Freshwater Wetlands and Swamp Sclerophyll Forest on Coastal Floodplains. These two EEC are susceptible to any adjustment to the groundwater levels due to the extent of the drawdown of the groundwater table or salinity changes from seawater recharge.

The patch of Sydney Turpentine-Ironbark Forest EEC vegetation at Beverley Park (Tallawalla Road), in close proximity to the project alignment, may be affected by drawdown of groundwater and that this impact has not been fully quantified in the Technical working paper: Biodiversity Assessment Report. This patch of vegetation was included in the list of GDE likely to be affected by indirect impacts. The extent of the drawdown is significant and long-term and is likely to have a significant impact that should be considered in the biodiversity assessment.

The Bardwell Valley biodiversity corridor is locally significant, linking vegetated areas from Bardwell Park to Stotts Reserve and Wolli Regional Park; and towards Coolibah Reserve and Wolli Regional Park. This native vegetation occurs along drainage lines. Any disruptions to the groundwater levels, discharge zones or subsurface flows due to the New M5 proposal would have an impact on this biodiversity corridor. The extent of this impact is unable to be assessed based on the available information provided in the Technical working paper: Biodiversity Assessment Report, but would potentially affect natural regeneration of existing vegetation communities, placing mature vegetation under water stress. It would also provide opportunities for colonisation of the area by extra-local or exotic species more suited to a changed groundwater regime.

Response

The Eve Street wetland is located in the tidal area of the Cooks River. The water that would flood into this wetland from the river is therefore saline. If there were any drawdown impacts on this wetland, they are unlikely to result in considerable or significant composition changes.

The Green and Golden Bell Frog is not recently known to exist at the Eve Street wetland, with the RTA ponds being the key source of adults for this population. Therefore, if there were changes to the species composition at Eve Street, they would be unlikely to have an adverse effect on this threatened species. Moreover, the RTA ponds are watertight and are not connected to any groundwater systems. These ponds are highly managed, occasionally drained and salt flushed to restrict the impacts of Plague Minnow predation and infection by chytridiomycosis.

Assessments of the impacts on vegetation in the upper reaches of Wolli and Bardwell Creeks due to groundwater drawdown were undertaken as part of the Technical working paper: Biodiversity assessment report and assessed the significance of the impacts as low.

In the lower reaches of the Cooks River, groundwater is in hydraulic connection with the Cooks River via the alluvium. Therefore any changes in groundwater levels would be minimal as the groundwater would be recharged from river water.

With respect to the potential impacts of salinity changes, saline water would be drawn into the tunnel from the tidal Cooks River. However, this salinity increase would be in part balanced by on-going fresh water rainfall recharge. It is expected that a fresh water lens, as part of a Ghyben-Hertzberg system, would remain over a saline groundwater and provide fresh water for the floral assemblages that may be partially dependent on groundwater.

The patch of the Sydney Turpentine Ironbark Forest EEC near Tallawalla Road was not listed as a groundwater dependant ecosystem in the Technical working paper: Biodiversity assessment report – see Tables 6 and 7 as well as Section 6.5.1 of that report. The Technical working paper: Biodiversity assessment report also considered the impacts to Stotts Reserve and other areas of native vegetation in the predicted drawdown extent and concluded any impacts would be minor.

Issue description – Framework for Biodiversity Assessment Species Credits

The Technical working paper: Biodiversity assessment report provided as part of the EIS has not fully considered a range of species and communities that may potentially be affected directly or indirectly by the New M5 project. Therefore, the Biodiversity Offset Strategy is potentially not considering all relevant impacts and as such, the Biodiversity Offset Strategy may not adequately mitigate all project impacts.

Response

The Technical working paper: Biodiversity assessment report for the project has been undertaken in accordance with the FBA. To inform the list of species and communities that could potentially be affected by the project, the FBA credit calculator was used to identify ecosystem credit and species credit species. The Credit Calculator is a decision support system provided by OEH. The accredited assessor used the Credit Calculator to undertake the New M5 biodiversity assessment and prepare the Technical working paper: Biodiversity assessment report (BAR) and then a Biodiversity Offset Strategy (BOS) based on the required credits identified in the BAR. This is a standard approach for major projects. The Credit Calculator is informed by a number of databases which are periodically updated to reflect updated information relevant to biodiversity values and data. Databases considered in the Credit Calculator include:

- NSW Vegetation Information System Classification Database (VIS Classification Database)
- Threatened Species Profile Database
- Vegetation Benchmarks Database
- Over-cleared landscapes database (Mitchell landscapes).

In addition to these databases, the Technical working paper: Biodiversity assessment report has used the following databases to inform the assessment of the project:

- Sydney Metropolitan Catchment Management Authority Vegetation Mapping (OEH 2013)
- Native Vegetation Maps of the Cumberland Plain, Western Sydney (NPWS 2002)
- OEH Atlas of NSW Wildlife (10 kilometre radius search), accessed 13 Nov 2014
- EPBC Act Protected Matters Search Tool (10 kilometre radius search), accessed 1 Dec 2014
- NSW DPI Fisheries threatened and protected species records viewer (FM Act), accessed 4 June 2015
- NSW DPI Fisheries Key Fish Habitat Map, accessed 4 June 2015
- NSW Fisheries Marine Vegetation Map (Botany Bay and Cooks River)
- Bureau of Meteorology Groundwater Dependent Ecosystems Atlas, accessed 3 June 2015.

The use of the abovementioned databases meets the requirements of the FBA and is considered appropriate to identify threatened species and / or communities that could potentially be impacted by the project. Given this, the calculated offsets are also deemed appropriate.

Issue description – Cooks River Castlereagh Ironbark Forest EEC

The removal of 1.40 ha of a patch of 1.82 hectares of Cooks River Castlereagh Ironbark Forest between the existing M5 East Motorway and Canterbury Park Golf Course requires the acquisition of 31 ecosystem credits as determined by the FBA credit calculator. However, the loss of 78 per cent of the patch of existing native vegetation is significant and likely to place the residual 0.42 hectares at risk of long-term extinction. In determining the appropriate species credits to mitigate this loss, the calculation should consider:

- Firstly, the entire patch size as being removed, i.e. using the full 1.82 hectares rather than the minimum necessary for the construction footprint; and
- Secondly, the loss of this patch of vegetation, when considered as part of the wider Cooks River Castlereagh Ironbark Forest EEC / Sydney Turpentine-Ironbark Forest EEC community surrounding the golf course, would impact on a range of threatened fauna that also need to be considered in the credit calculation.

Response

This issue has been raised within the Molino Stewart report jointly commissioned by Rockdale City, Hurstville and Canterbury Councils, and has been addressed in **Section 4.16.3** of this report.

Issue description – Swamp Sclerophyll Forest EEC

Part of the Swamp Sclerophyll Forest EEC occurring on Kogarah Golf Course would be removed for the Arncliffe motorway operations complex (MOC3) compound. This would be mitigated by the acquisition of 27 ecosystem credits. No consideration was made on the potential loss of winter foraging resources for the Grey-headed Flying-fox in this calculation. The biodiversity offset requirements are therefore unlikely to fully mitigate the loss of habitat due to the project and therefore should be reviewed in light of potential impacts to a range of other fauna species dependent upon the Swamp Sclerophyll Forest EEC.

Response

The Draft National Recovery Plan for the Grey-headed Flying-fox (DECC, 2009) identifies foraging habitat within a 50 kilometre radius of a roost site with more than 30,000 individuals as being critical to survival. The Grey-headed Flying-fox camp at Gordon about 20 kilometres north of the project extent varies in the number of individuals between zero and 80,000 (Ku-ring-gai Council, 2013) and data for this camp suggests that between 20,000 and 40,000 individuals use this camp during the breeding seasons (summer). As a result, there is some critical foraging habitat located within the biodiversity study area for the project. The Grey-headed Flying-fox camp at Turrella, about 500 metres north of the biodiversity study area does not meet this definition due to the smaller number of individuals present.

Analysis of available native vegetation mapping (OEH, 2013), as part of the preparation of the Technical Working Paper: Biodiversity Assessment Report, identified more than 77,000 hectares of native vegetation as being present within 50 kilometres of the Gordon camp site. The OEH mapping analysed is limited to vegetation within the Sydney Metropolitan Catchment Management Authority area, and is considered to include only about 50 per cent of native vegetation within 50 kilometres of the Gordon camp site. Further, this analysis also only included native foraging habitat and does not include non-native street trees or urban vegetation that may be used for foraging by this species.

Around 10 hectares of potential foraging habitat would be removed or modified as part of the project and this is estimated to be around 0.012 per cent of the available foraging habitat for the Gordon camp. This kind of foraging habitat is critical for survival, but a significant portion of it would not be removed and the impacts are not expected to be significant in the context of the area of habitat available.

The Grey-headed Flying-fox was not filtered into the credit calculator by the background calculations. If it had been filtered in, it would have been as an ecosystem credit species as only foraging habitat would have been impacted. Given this, any impacts to native vegetation (ecosystem credits) account for impacts to ecosystem credit species. So while the Grey-headed Flying-fox was not filtered in, its foraging habitat is actually accounted for in the credit calculations.

Issue description – Green and Golden Bell Frog

The clearing of vegetation for the MOC 3 compound on Kogarah Golf Course would impact on 7.82 hectares (20 per cent) of known habitat for the Green and Golden Bell Frog in the Arncliffe area. It is calculated that 203 species credits would be the required offset for this impact. In addition, land shall be acquired near the existing Marsh Street / Eve Street wetlands for construction of artificial habitat, similar to the RTA ponds constructed adjacent to the Kogarah Golf Course in compensation for impacts from the M5 East Motorway construction works.

This offset is inadequate to fully mitigate the habitat loss and potential for the nationally-significant Arncliffe population of Green and Golden Bell Frog to be placed at risk of extinction. The extent to which this offset is inadequate is demonstrated in the following points:

- The calculation of the species credits only considers the amount of clearing for the construction footprint of the MOC3 compound and does not consider adjoining areas of potential habitat.
- The review of the Green and Golden Bell Frog in the Technical working paper: Biodiversity assessment report outlines that key breeding was occurring within the RTA ponds with limited episodic breeding within some of the ponds on the golf course. No recent breeding was observed within the Marsh Street / Eve Street wetlands
- Furthermore, the Technical working paper: Biodiversity assessment report also indicates the edges of a couple of the golf course fairways provide sheltering habitat with movement observed between a number of the ponds towards the RTA wetlands, but also via a cycle underpass towards the Marsh Street / Eve Street wetlands. The arrangement of the MOC3 compound would place a barrier to these movement patterns and therefore would have an area of impact greater than the construction footprint of the MOC3 compound.

The assessment of the RTA ponds as key breeding habitat does not consider the importance of the Marsh Street / Eve Street wetlands as potential habitat for this species. This is despite evidence that movement of these frogs did occur via the bicycle underpass between the golf course and the wetlands, and presumably between the RTA ponds and the Marsh Street / Eve Street wetlands. At the very least these wetlands provide sheltering habitat and hence any impacts through changes in groundwater associated with the construction of the New M5 would affect this area. The extent of this potential impact was not quantified in the Technical working paper: Biodiversity assessment report and also not included in the species credit calculation for the Green and Golden Bell Frog.

In addition to the required biodiversity offset, additional mitigation measures proposed for this population include the preparation of a Green and Golden Bell Frog Plan of Management as part of the Flora and Fauna Management Plan for the New M5. This document shall only be prepared after the close of public comments for the New M5 EIS and therefore is not available for public scrutiny. Any management plans must:

- Adopt lessons learned from other infrastructure projects
- Be available to local government for comment and input during the process of developing these management plans.

Response

The Green and golden Bell Frog Plan of Management was provided in Appendix K of the Technical working paper: Biodiversity assessment report and was therefore available for comment as part of the EIS submissions process. It takes into consideration the development of the Green and Golden Bell Frog Plan of Management, provided in Appendix K of the Technical working paper: Biodiversity assessment report, takes into consideration lessons learnt from other projects and has been independently reviewed by a Green and Golden Bell Frog specialist. In addition, the habitat creation and captive breeding plan would be independently reviewed by two experts. This plan is provided in **Appendix B** of this report.

All offset calculations were conducted in accordance with the credit calculator and policy and are considered reasonable. The location of the construction compound has also been sited so as not to restrict movement of frogs from the RTA ponds to Eve Street or Marsh Street habitat areas.

It should also be noted that the Eve Street wetland is hypersaline and does not generally support frogs. The Marsh Street wetland is generally too overgrown and frogs have not been observed there for many years. Refer to Section 7.1.6 of this report for further details on additional habitat at Marsh Street.

The cycle underpass is considered to be a hostile environment for this species and while frogs were observed in a stormwater basin, they do not generally move from the RTA ponds and golf course.

Issue description – Grey-headed Flying-fox

No species offset credits are proposed for the potential impact on the Grey-headed Flying-fox. The Grey-headed Flying-fox was not listed within those species potentially impacted by the project using the FBA credit calculator. Additionally, the Technical working paper: Biodiversity assessment report concludes that due to the large range of foraging for this species, patches of vegetation to be removed within the project alignment would not result in a significant loss of resources and hence would not significantly impact the bats residing within the Turrella colony. However, it is not clear from the Technical working paper: Biodiversity assessment report what is the extent of winter flowering trees within the potential foraging range of this species, or whether the patch of Swamp Sclerophyll Forest EEC to be removed from Kogarah Golf Course for the MOC3 compound is significant in providing a seasonal resource for this species.

There is also the potential for other patches of vegetation within the Marsh Street / Eve Street wetlands to be affected by changes in the groundwater due to the construction works and may result in a loss of foraging habitat.

The loss of foraging sites, particularly seasonally-available resources should be reassessed to consider the impact on the Grey-headed Flying-fox colony at Turrella and biodiversity offsets considered to mitigate these impacts.

Response

Offset credits for potential impacts on the Grey-headed Flying-fox

An assessment of the impacts of the project on the Grey-headed Flying-fox against the EPBC significant impact criteria was undertaken as part of the Technical working paper: Biodiversity assessment report (refer to Appendix F of that Technical working paper). The assessment against the significant impact criteria concluded that the project would not affect known breeding habitat and would only impact on a relatively small area of potential foraging habitat for this highly mobile species. No important populations would be isolated or fragmented and the life cycle of this species is not likely to be adversely affected. Therefore, the proposal is not likely to have a significant impact on this species and no offset credits are required.

Impacts to the Grey-headed Flying-fox from winter flowering trees and Swamp Sclerophyll Forest EEC

The Grey-headed Flying-fox was not filtered in to the credit calculator by the background calculations. If it had been filtered in, it would have been as an ecosystem credit species only as foraging habitat only would have been impacted. Given this, any impacts to native vegetation (ecosystem credits) account for impacts to ecosystem credit species. So while the Grey-headed Flying-fox was not filtered in, its foraging habitat is actually accounted for in the credit calculations.

Loss of foraging habitat from impacts to GDEs

Vegetation within Marsh and Eve Street wetlands are generally dominated by Casuarina species, which are not favoured by Grey-headed Flying-fox. Some Melaleuca species were present; however they would not be directly impacted by the project.

These two wetlands were considered more likely to be influenced by surface water flows from stormwater than by ground water dependence.

Issue description – Cooks River/Castlereagh Ironbark Forest

The removal of 1.40 hectares of a total patch size of 1.82 hectares at Beverley Grove would have a significant and long-term impact on this vegetation. It is unlikely that the residual vegetation would continue as a patch of native vegetation without future vegetation management. This patch of vegetation was previously identified during the assessment for the M5 East realignment works as being at the easternmost extent of the distribution range, of high conservation significance and should be rehabilitated. There are no similar patches in the area for which to obtain an appropriate biodiversity offset.

The habitat value of the existing Cooks River Castlereagh Ironbark Forest would be degraded due to this loss of canopy vegetation. Moreover, when considered in association with other patches of STIF EEC occurring within the golf course, the loss of such vegetation would disrupt the connectivity and impact on a range of species not considered in the Technical working paper: Biodiversity Assessment Report.

Response

The Technical working paper: Biodiversity assessment report notes that the long term viability of the remaining 0.4 hectares of this patch of this vegetation community is questionable and the removal of the 1.4 hectares would inhibit the recovery of the community. However, the Cooks River Castlereagh Ironbark Forest within the project footprint is not considered important to the recovery of the EEC across its entire extent given that it is highly modified in structure and composition, has a high perimeter to area ratio and has no prospect of expanding into adjacent areas.

Without substantial effort and continuing management, this patch is unlikely to be viable in the long term. An offset package has been developed for the project, in accordance with the requirements of the FBA. This would include measures to compensate for the loss of Cooks River Castlereagh Ironbark Forest from construction of the project. This would require that all identified significant residual impacts on Cooks River Castlereagh Ironbark Forest are offset in accordance with the principles of the NSW Offset Policy for Major Projects.

The *Plan of Management for Beverly Grove* (ngn environmental 2014) states that fauna species observed were common urban tolerant and wide ranging species. While the loss of canopy would have some impact to these species, none of them would solely rely on this patch for foraging resources. In addition, common species of fauna do not require an offset in accordance with the NSW Offset Policy for Major Projects.

Issue description – Sydney Turpentine Ironbark Forest

This vegetation community occurs adjacent to Cooks River Castlereagh Ironbark Forest in retained vegetation along the fairways of Canterbury Golf Course and in a public reserve to the south of the existing M5 East Motorway. Whilst outside of the project alignment there is the potential that groundwater changes due to construction may affect natural regeneration of this community.

Fauna surveys were not undertaken within patches of Sydney Turpentine Ironbark Forest EEC and hence no assessment of the potential for these patches of vegetation when considered as a whole to provide temporary habitat for a range of species. In particular these areas are within a regionally important biodiversity corridor along Wolli Creek that is known to include habitat for the Powerful Owl.

Response

Sydney Turpentine Ironbark Forest in the Sydney Basin Bioregion was mapped as occurring at two locations near the western surface works outside of the project footprint. The stands of this vegetation community identified near the project did not meet the EPBC Act criteria for the threatened community due to their small size. These two stands of vegetation did however meet the TSC Act definition of this community and was considered as being in moderate-good condition as defined in the FBA methodology.

The areas mapped as containing Sydney Turpentine Ironbark Forest are located near the western surface works and would be outside the area potentially impacted from groundwater drawdown associated with tunnelling activities.

Issue description – Coastal Saltmarsh

The groundwater changes during construction are likely to affect coastal saltmarsh vegetation within the drawdown area. The extent of this impact was not quantified in the Technical working paper: Biodiversity assessment report and further information should be provided to assess the long-term implications to this EEC.

Response

Coastal saltmarsh is not a groundwater dependant ecosystem. Its presence is influenced by tidal reach and salinity levels in water. Therefore, its presence would be more influenced by tidal flushing rather than by groundwater drawdown.

Issue description – Sydney Freshwater Wetlands

This vegetation is likely to exist in a degraded condition within the Marsh Street / Eve Street wetlands adjacent to the MOC3 compound. Any groundwater changes due to construction works would affect these wetlands. The extent of this impact was not quantified in the Technical working paper: Biodiversity assessment report and further information should be provided to assess the long-term implications to this EEC. A vegetation management plan should be developed as part of the mitigation measures for this wetland to enhance the available habitat for a range of migratory birds and frog species.

Response

The Marsh Street and Eve Street wetlands are located in alluvium and would not be affected by groundwater drawdown. Also, neither wetland was identified as being freshwater. The Eve Street wetland is considered to be hypersaline according to a local specialist familiar with this area. The Marsh Street wetland is overgrown with a range of noxious weeds including *Lantana camara* and *Cestrum parqui*. It is highly unlikely that any freshwater wetland remains in this location.

Issue description – Swamp Oak Floodplain Forest

This vegetation was recorded within the Marsh Street / Eve Street wetlands but outside of the project alignment. Interruptions to groundwater levels due to the project may impact on this community although details of potential impacts were not quantified in the Technical working paper: Biodiversity Assessment Report. A vegetation management plan for the Marsh Street / Eve Street wetlands should be developed to enhance the habitat value of the communities in this area to support migratory birds and frog species

Response

Marsh Street and Eve Street wetlands were not considered to be groundwater dependent. These wetlands are located in alluvium and would not be affected by drawdown.

There would be no requirement to develop a vegetation management plan for these areas.

Issue description – Bangalay Sand Forest

This community was not recorded within the project alignment but may occur on the sand sheets surrounding Botany Bay. The potential for groundwater changes due to the project to affect this community was not quantified in the Technical working paper: Biodiversity assessment report. In the absence of available information, a precautionary principle should be adopted and measures developed to mitigate any potential adverse effects from the New M5 proposal.

Response

This vegetation community (Bangalay Sand Forest) is not identified as a groundwater dependent ecosystem; therefore it was not identified in the Technical working paper: Biodiversity assessment report as being affected by drawdown.

Issue description – River Flat Eucalypt Forest

This community was not recorded within the project alignment but may possibly be extant along the non-tidal sections of Wolli Creek. Changes to the hydrological regime, groundwater discharge areas and subsurface flows may affect any River Flat Eucalypt Forest EEC. Further investigation of the degree of hydrological changes along this waterway should be prepared before any assessment of the long-term effects to this EEC can be determined.

Response

This EEC was not identified along Wolli Creek, including the non-tidal sections. No further assessment is therefore required.

Issue description – Cooks River Clay Plain Scrub Forest

This community is included as part of the Cooks River Castlereagh Ironbark Forest and is likely to occur in the vicinity of Canterbury Golf Course. Changes in groundwater levels due to the construction works, or due to clearing of existing vegetation, may affect this community and should be considered in any biodiversity offsets for the Cooks River EEC.

Response

An offset package has been developed for the project, in accordance with the requirements of the FBA. This includes measures to compensate for the loss of Cooks River Castlereagh Ironbark Forest from construction of the project. This requires that all identified significant residual impacts on Cooks River Castlereagh Ironbark Forest are offset in accordance with the principles of the NSW Offset Policy for Major Projects.

Issue description – Swamp Sclerophyll / Forest on Coastal Floodplains

The clearing of 1.82 hectares of moderate to good quality Swamp Sclerophyll Forest EEC would be required for the current arrangement for the MOC3 compound. The impact of this clearing would be compensated through the acquisition of biodiversity offsets determined in accordance with the FBA credit calculator. This vegetation community is not listed as a threatened ecological community under the EPBC Act and hence no assessment of the significance of the clearing of this vegetation was provided in the Technical working paper: Biodiversity Assessment Report. Without this information, it is difficult to know the extent of the Swamp Sclerophyll Forest retained on the Kogarah Golf Course and whether the removal of the 1.82 hectares for the MOC3 compound would affect the long-term survival of the residual vegetation.

The habitat value of this patch of vegetation was also not fully considered within the Technical working paper: Biodiversity Assessment Report. In particular, winter flowering *Melaleuca quinquenervia* is an important food resource for the Grey-headed Flying-fox. Given the proximity of the Turrella colony, the removal of the Swamp Sclerophyll Forest may have a significant impact on the availability of seasonal foraging resources within the local area.

The fairways near the RTA ponds were also identified as habitat for the Green and Golden Bell Frog, either for sheltering, occasional breeding; or a corridors for movement between the waterways on the golf course and either the RTA ponds or the Marsh Street / Eve Street wetlands .

There has been no consideration of the potential impacts the removal of the Swamp Sclerophyll Forest EEC vegetation may have on these threatened species.

Response

The Swamp Sclerophyll Forest on the Kogarah Golf Course is highly modified and only meets the moderate to good condition score due to canopy cover. It is highly likely that the vegetation present on the golf course is reconstructed. However, the species present most likely fit the plant community type aligned with this EEC.

The habitat value is considered as part of the Technical working paper: Biodiversity assessment report and the offsets package for the project. The removal of 1.82 hectares of this vegetation type is unlikely to result in the local extinction of the local occurrence.

The removal of this vegetation type forms part of the basis for the offset credit calculations for Green and Golden Bell Frog. The vegetation is included as part of the frog habitat (203 credits) and as a separate credit requirement.

Issue description – birds

The migratory bird survey was limited to the immediate impact area of the project alignment and focused on the Eve Street wetlands. No consideration was presented for the potential for occasional use of the waterways within the Kogarah Golf Course or the Wolli Creek / Alexandra Canal. These areas are likely to provide occasional habitat although further surveys are required.

Response

There were no records for JAMBA, CAMBA or ROKAMBA listed species being present in the Kogarah Golf Course, Wolli Creek or Alexandra Canal.

These threatened migratory birds generally require tidal mudflats or coastal lagoons. These habitat types were not present within the areas mentioned above.

Issue description – Grey-headed Flying-fox

The proximity of the Turrella colony to the project alignment should indicate that the New M5 proposal may impact on the Grey-headed Flying-fox. The initial species lists for further consideration under the bilateral agreement as determined using the FBA credit calculator did not include the Grey-headed Flying-fox. OEH recommended additional investigation of this species.

Rockdale City Council commissioned a Management Plan for the Grey-headed Flying-fox camp at Turrella. This plan indicates that this camp was a significant permanent colony in southern Sydney. Winter food resources include Sydney Red Gum (*Angophora costata*) and other flowering Eucalypts common in southern Sydney. However it is unclear to what extent, if any, the Grey-headed Flying-fox colony management plan was considered in the Technical working paper: Biodiversity Assessment Report. There was no detailed investigation into the importance of *Melaleuca quinquenervia* and *M. ericifolia* vegetation in providing winter food resources for this species. Without this information, an assessment of the potential impact to this species cannot be established. The reliance on a large foraging range of up to 20 kilometres from any colony should not be justification for excluding local food resources where these may provide a scarce seasonal supply.

Response

OEH recommended that targeted survey should be carried out if camps were to be directly affected by the project. As the project does not directly affect camps, no further survey was carried out as per the OEH recommendation.

According to the OEH Threatened Species Profile Database, foraging vegetation within 200 metres of a camp should not be impacted so as to avoid impacts to a colony or camp. As the project is more than 200 metres from the Turrella camp, no impacts are likely to occur.

As stated in the Technical working paper: Biodiversity Assessment Report, there is a requirement to provide for foraging species in any landscaping as part of the project.

Grey-headed Flying-fox camps are dynamic, with colonies moving across the landscape in response to flowering events. There was no requirement to evaluate the foraging resources to the extent suggested.

Grey-headed Flying-fox is an ecosystem credit species and the vegetation types that would be impacted by the project that may provide foraging resources are considered to be fully offset.

Issue description – groundwater dependent ecosystems

The New M5 proposal would have lasting impacts on the hydrology due to dewatering and discharge of groundwater during construction and Operation of the New M5. These changes would have a significant impact on existing vegetation communities within the potential groundwater drawdown area. In addition, changes to surface runoff from impervious surfaces and flow regimes through installation of detention basins and stormwater management systems would have localised impacts.

The FBA does not address the direct impacts that are not associated with vegetation clearing and hence does not quantify those indirect impacts from changes to groundwater changes.

It is likely that the proposal would affect existing natural environments such as the Marsh Street / Eve Street wetlands, Stotts Reserve and Coolibah Reserve as well as local open spaces within the local government area. The impact of existing vegetation communities in these areas was not quantified.

Response

The Bureau of Meteorology Groundwater Dependent Ecosystems Atlas was examined for presence of GDEs in the project corridor and within the extent of predicted drawdown.

The assessment process followed the steps outlined in the risk assessment guidelines for groundwater dependent ecosystems (NSW DPI 2012). A search of the National GDE Atlas was conducted for all project areas, and potential GDEs were assessed by a GDE specialist for their type and level of groundwater dependence, as well as their ecological value (where this was known). Potential impacts from construction and dewatering were determined for each of the GDEs identified, and threats these pose to each GDE was assessed. The Australian Groundwater Explorer database was also used to get an indication of groundwater levels expected in the area.

Table 7 of the Technical working paper: Biodiversity assessment report identifies areas outside the footprint, but within the predicted drawdown cone, which includes the vegetation mentioned above. The Technical working paper: Biodiversity assessment report also identifies areas of native vegetation within the predicted drawdown extent which are not considered to be groundwater dependant ecosystems. This includes the Marsh Street and Eve Street wetlands.

The risk assessment was applied and these results are reported in the Technical working paper: Biodiversity Assessment Report. Section 6.5.1 of the Technical working paper: Biodiversity assessment report not only quantifies the predicted drawdown for these areas, but also provides an assessment of the impacts.

Issue description – species not considered in the Technical working paper: Biodiversity assessment report

The reliance on the FBA credit calculator, SEARs and OEH guidance to derive a species list for further investigation of potential impact from the New M5 disregarded local knowledge of the biodiversity within the project area. A number of species that are likely to be impacted by the proposal that have not been considered in the Technical working paper: Biodiversity assessment report are included below.

The Powerful Owl is known to occur within the regionally-significant biodiversity corridor along Bardwell Valley towards Wolli Creek. The removal of native vegetation for the construction footprint has the potential to affect the foraging resources within the home range for this species.

A number of micro-bats were identified by OEH in its advice to the proponents as being worthy of further investigation, including the Eastern Freetail Bat and the Greater Broad-nosed Bat. In addition, a large number of recorded sightings of the Eastern Bentwing Bat have also been documented for the area. No echolocation detecting surveys were conducted in the Technical working paper: Biodiversity assessment report to provide information regarding the potential for these micro-bat species to occur within the project alignment.

The Technical working paper: Biodiversity assessment report identified areas of Swamp Sclerophyll Forest (Kogarah Golf Course) and Swamp Oak (Eve Street wetlands) including *Allocasuarina* and *Casuarina* species. These trees provide potential foraging resources for the Glossy Black Cockatoo but no assessment for the impact to this species was considered.

Response

This issue has been raised within the Molino Stewart report jointly commissioned by Rockdale City, Hurstville and Canterbury Councils, and has been addressed in **Section 4.16.3** of this report.

4.10.4 Cumulative impacts

Issue description – Cooks River Castlereagh Ironbark Forest

Cooks River Castlereagh Ironbark Forest near Canterbury Golf Course is managed for conservation by Roads and Maritime as a condition of approval for the construction of the M5 East Motorway in 1998. Any impact to this vegetation for the New M5 proposal is not consistent with the objectives stated in SEPP Infrastructure or the Biodiversity Offsets Policy for Major Projects. Removal of this vegetation would place the residual patch at risk of local extinction and may also affect nearby Sydney Turpentine Ironbark Forest EEC vegetation.

Response

The NSW Biodiversity Offsets Policy for Major Projects has three objectives:

- To provide clear, efficient and certain guidance for stakeholders
- To improve outcomes for the environment and communities
- To provide a practical and achievable offset scheme for proponents.

There is nothing in the policy that precludes the removal of this vegetation.

The policy states that one of the measures to achieve better environmental outcomes is to provide for management (in perpetuity, unlike the management at Beverly Grove). The policy also encourages broad, strategic and enduring outcomes.

The Technical working paper: Biodiversity assessment report notes that the long term viability of the remaining 0.42 hectares of this patch of this vegetation community is questionable and the removal of the 1.40 hectares would inhibit the recovery of the community. However, the Cooks River Castlereagh Ironbark Forest within the project footprint is not considered important to the recovery of the EEC across its entire extent given that it is highly modified in structure and composition, has a high perimeter to area ratio and has no prospect of expanding into adjacent areas.

Without substantial effort and continuing management, this patch is unlikely to be viable in the long term. An offset package has been developed for the project, in accordance with the requirements of the FBA. This would include measures to compensate for the loss of Cooks River Castlereagh Ironbark Forest from construction of the project. This would require that all identified significant residual impacts on Cooks River Castlereagh Ironbark Forest are offset in accordance with the principles of the NSW Offset Policy for Major Projects.

By providing a larger, more strategic offset that would be managed in perpetuity, the project is consistent with the NSW Biodiversity Offsets Policy for Major Projects.

Issue description – RTA ponds next to Kogarah Golf Course

The RTA ponds next to Kogarah Golf Course were also constructed as a condition for approval of M5 Motorway to provide breeding habitat for the Arncliffe population of Green and Golden Bell Frog. The clearing of 20 per cent of potential habitat for this species from the Kogarah Golf Course is required for the New M5. Regular monitoring of the RTA ponds and adjoining areas indicates that the Green and Golden Bell Frog in the Arncliffe locality is stable but is not expanding. Any subsequent impacts would have a significant effect on this species.

The Technical working paper: Biodiversity assessment report is inconclusive in demonstrating that the proposed mitigation measures for the Green and Golden Bell Frog are adequate to ensure that the long-term survival of this nationally-significant population is not placed at risk of extinction due to the New M5 proposal. The clearing of potential habitat from the golf course and installation of barrier fencing surrounding the MOC3 compound would have an immediate impact. The effectiveness of any proposed artificial wetlands to supplement existing habitat may not be achieved in the immediate timeframe. Mitigating these impacts through the biodiversity offset strategy can only support the Arncliffe population if the biodiversity offset credits are obtained within the local context.

Response

There was no condition for Roads and Maritime to manage the foraging land for the Green and Golden Bell Frog as part of the M5 East approval. Regardless, Roads and Maritime has made a commitment with respect to the local population. This is articulated in the Technical working paper: Biodiversity assessment report and Technical Working Paper: Biodiversity offset strategy.

Monitoring of the population has actually demonstrated that it is not stable and in the last two years there have been declines from the population high of 110 in 2012. This is most likely due to predation by foxes and changing vegetation management on the golf course.

The Technical working paper: Biodiversity assessment report provides an extensive and detailed table outlining an assessment of the effectiveness of the mitigation measures.

The Green and Golden Bell Frog Plan of Management has been independently reviewed and the reviewer is satisfied that the approach taken would indeed assist the population. Measures include providing supplementary feeding and additional stepping stone ponds near the RTA ponds as well as additional habitat at Marsh Street (refer to Section 7.1.6 of this report for further details).

The Technical Working Paper: Biodiversity Offset Strategy (Appendix T of the EIS) has been developed in accordance with the Policy and tool. As the policy and tool state, credits for this species could be obtained anywhere in NSW. The offset includes credits for temporary as well as permanent impacts to foraging, dispersal and sheltering habitat. These offsets would be managed in perpetuity.

Issue description – Species impact statements, Green and Golden Bell Frog

Without adequate population surveys, movement patterns and any assessment of the importance of the surrounding areas that are outside of the project alignment but provide habitat for this species; a species impact statement should be prepared as Stage 2 of the EIS process. It is unlikely that the biodiversity offset required for impact to this species in accordance with the FBA credit calculator would be obtained within the Arncliffe area and that the local population may be placed at risk of extinction. There is also no certainty that the proposed mitigation measures in addition to the biodiversity offset, including the creation of additional breeding habitat, would be successful or provide immediately viable habitat alternatives to clearing of a known habitat.

Response

The requirement to prepare a species impact statement does not apply for State Significant Infrastructure projects. The SEARs set out the requirements that the project must satisfy to assess the potential impacts on biodiversity.

The credits are unlikely to be obtained in the Arncliffe area. This is because there is limited habitat in this area for this species. This forms part of the rationale to create additional, purpose built habitat at Marsh Street as outlined in the Green and Golden Bell Frog Plan of Management (refer to Section 7.1.6 of this report for further details).

Issue description –Cooks River Castlereagh Ironbark Forest (species impact statement)

The impact to the patch of Cooks River Castlereagh Ironbark Forest vegetation at Beverley Grove would be significant and long term and may result in the loss of the entire patch of vegetation at this location. This is the most easterly extent of the known distribution of this community and the implications for this loss are not clearly outlined in the Technical working paper: Biodiversity Assessment Report. Further investigation of the importance of this vegetation should be considered.

Response

The requirement to prepare a species impact statement does not apply for State Significant Infrastructure projects. The SEARs set out the requirements that the project must satisfy to assess the potential impacts on biodiversity.

The implication of the loss of this patch would be a reduction in its range extent. The patch currently has no prospects of expanding and is subject to intense management due to its size, the dissection of the patch by a cycleway, its position adjacent to the M5 East Motorway and the Canterbury Golf Course.

There were no hollow bearing trees present in the patch, no threatened plants and it is unlikely to support threatened fauna which would solely rely on this patch.

4.10.5 Biodiversity recommendations

Issue description – Green and Golden Bell Frog

Council recommends the following actions are taken:

- Redesign the layout of the MOC3. At present, the southern extension of this compound creates a significant barrier to movement through Kogarah Golf Course towards the constructed RTA ponds and Marsh Street / Eve Street wetlands. Preference would be for a wider compound aligned along the northern boundary of the golf course next to Marsh Street to maintain connection between the waterways on the golf course and the cycleway under the M5 East motorway.
- Commence the establishment of any artificial wetland that is designed to supplement the existing RTA ponds at the earliest possible time to provide suitable habitat prior to removal of existing habitat from Kogarah golf course.
- Develop a fauna relocation plan to populate other potential breeding sites.
- Develop a management plan for the waterways on the golf course to provide additional breeding opportunities. This may involve the dewatering of these areas and removal of exotic fish.
- Include local government in review process of subsequent Flora and Fauna management plans for the New M5.

Response

Conditions of approval, including additional management plans are a matter for the Department of Planning and Environment (DP&E) to consider during its assessment of the critical State significant infrastructure application.

However, it is noted that:

- Roads and Maritime is proposing to establish additional breeding and foraging habitat at a vacant site adjacent to the Marsh Street wetland. It is also establishing a captive breeding program which would assist in the population of this habitat. Further detail on the Marsh Street ponds is provided in **Chapter 7** (Preferred infrastructure report) of this report.
- Roads and Maritime is not responsible for the management of foraging habitat outside its ownership or lease boundaries.

Issue description – Grey-headed Flying-fox

Council recommends the following actions are taken:

- Undertake survey of Turrella colony to assess population dynamics, potential outward flight paths, foraging resources.
- Determine the local abundance of seasonally-available foraging resources and assess significance of removal of Swamp Sclerophyll Forest EEC.
- Consider Rockdale Council's management plan for Grey-headed Flying-fox.

Response

As discussed in earlier responses, OEH recommended that targeted survey should be carried out if camps were to be directly affected by the project. As the project does not directly affect camps, no further survey was carried out as per the OEH recommendation.

According to the OEH Threatened Species Profile Database, foraging vegetation within 200 metres of a camp should not be impacted so as to avoid impacts to a colony or camp. As the project is more than 200 metres from the Turrella camp, no impacts are likely to occur.

As stated in the Technical working paper: Biodiversity Assessment Report, there is a requirement to provide for foraging species in any landscaping as part of the project.

Grey-headed Flying-fox camps are dynamic, with colonies moving across the landscape in response to flowering events. There was no requirement to evaluate the foraging resources to the extent suggested.

Grey-headed Flying-fox is an ecosystem credit species and the vegetation types that would be impacted by the project that may provide foraging resources are considered to be fully offset.

Conditions of approval, including additional management plans, are a matter for DP&E to consider during its assessment of the critical State significant infrastructure application.

Issue description – Cooks River Castlereagh Ironbark Forest EEC

Council recommends the following actions are taken:

- Consider that the removal of part of this vegetation would result in the local extinction of this entire patch of vegetation and therefore provide biodiversity offset for removal of the 1.82 hectares.
- Undertake surveys to assess whether threatened fauna utilise this patch of vegetation, in combination with other areas of similar vegetation within the Canterbury Golf Course and Beverley Park to the south as part of a large range such as the Powerful Owl, micro-bats

Response

As discussed in earlier responses, the Technical working paper: Biodiversity assessment report notes that the long term viability of the remaining 0.42 hectares of this patch of this vegetation community is questionable and the removal of the 1.40 hectares would inhibit the recovery of the community. However, the Cooks River Castlereagh Ironbark Forest within the project footprint is not considered important to the recovery of the EEC across its entire extent given that it is highly modified in structure and composition, has a high perimeter to area ratio and has no prospect of expanding into adjacent areas.

Without substantial effort and continuing management, this patch is unlikely to be viable in the long term. An offset package has been developed for the project, in accordance with the requirements of the FBA. This would include measures to compensate for the loss of Cooks River Castlereagh Ironbark Forest from construction of the project. This would require that all identified significant residual impacts on Cooks River Castlereagh Ironbark Forest are offset in accordance with the principles of the NSW Offset Policy for Major Projects.

The *Plan of Management for Beverly Grove* (nghi environmental 2014) states that fauna species observed were common urban tolerant and wide ranging species. While the loss of canopy would have some impact to these species, none of them would solely rely on this patch for foraging resources. In addition, common species of fauna do not require an offset in accordance with the NSW Offset Policy for Major Projects.

Conditions of approval, including additional management plans, are a matter for DP&E to consider during its assessment of the critical State significant infrastructure application.

Issue description – Marsh Street / Eve Street Wetlands

Council recommends the following actions are taken:

- Marsh Street / Eve Street Wetlands – develop a vegetation management plan to enhance the existing habitat of the Swamp Oak and Freshwater Wetlands EEC identified in this area, and potentially areas of Coastal Saltmarsh to support migratory birds and frog species.

Response

Conditions of approval, including additional management plans are a matter for DP&E to consider during its assessment of the critical State significant infrastructure application, noting the project would not directly impact the vegetation at the Marsh Street/ Eve Street wetlands.

4.10.6 Traffic and transport

Issue description – additional capacity

Council supports the proposed additional capacity (tunnels) along M5 East Motorway as it would reduce through traffic movements (rat-runs) along local/regional road networks, specifically Tooronga Street-Commercial Road, Morgan Street and King Georges Road-Stoney Creek Road routes improving amenity for local residents.

Response

Noted.

Issue description – construction traffic management plan

Council requests a copy of the construction traffic management plan (once developed) to provide comments before it is implemented on any local streets.

Response

If the project is approved, a Traffic Management and Safety Plan would be prepared in addition to the CEMP; in accordance with the relevant conditions of approval. The plan would be developed in consultation with relevant councils, emergency services, road user groups and pedestrian and cyclist user groups. The CEMP and all sub-plans would require approval by DP&E.

Issue description – haulage of excavated material

Council recommends the restriction of haulage of excavated material to off peak periods, preferably limited to night-time.

Response

Construction traffic volumes assessed in the EIS have been based on a proposed 24 hour haulage scenario and spoil haulage would be limited and managed during peak hours. It is proposed that C1, C3, C4, C5, C7 and C8 construction sites would generate spoil haulage trips during evening and night periods. All other construction trips generated by these and other compounds would occur between 7.00am and 6.00pm. Any changes to this methodology would be determined through discussions with Roads and Maritime and the Traffic Management Centre informing the CEMP.

Any conditions of approval, including restriction of haulage hours, are a matter for DP&E to consider during its assessment of the critical State significant infrastructure application.

Issue description – off-street parking facilities

Council request that WestConnex ensures adequate off-street parking facilities are provided for all the workers of the construction site.

Response

Construction workforce parking is discussed in Section 7.6 of the Technical working paper: Traffic and transport in Appendix G of the EIS. Parking provisions for light vehicles within construction compounds have been provided across the project. Off-site parking would be discouraged and it would be regularly reinforced through project inductions and toolbox talks. Construction personnel would be encouraged to use public transport, active transport or other options, such as car-pooling.

If the project is approved, a Traffic Management and Safety Plan would form a sub-plan of the CEMP and would be prepared in accordance with the relevant conditions of approval. A car parking strategy for all sites would be developed as part of the Traffic Management and Safety Plan to limit impacts on the surrounding communities, in consultation with local councils and stakeholders.

Issue description – toll avoidance

Council requests that the Department of Planning and Environment ensure that WestConnex work with Roads and Maritime to develop a strategy prior to operation of the New M5 to minimise the impact of toll avoidance on the Hurstville local road network and this strategy should be detailed in the revised EIS. Council requests that it be consulted during the development of this strategy. The proposed operational review to be conducted by Roads and Maritime 12 months after the opening of the New M5 infers that a band-aid approach would be adopted rather than strategically addressing the issue prior to commencement.

Response

The project would have an impact on alternate un-tolled surface routes (or parallel routes) as part of the project, and the EIS considers these potential impacts. Development of the traffic model included a number of activities, including behavioural studies for toll-related behaviour, and peer review. Efforts were focused on reducing the uncertainty associated with the traffic modelling, as detailed below.

As discussed in Section 9.2 of the Technical working paper: Traffic and transport (Appendix G of the EIS), traffic is forecast to divert off the motorway network to other routes outside the peak traffic periods to avoid the motorway toll. This shift in traffic distribution is not anticipated to have a significant impact from a traffic perspective (in terms of congestion) as there is generally network capacity to accommodate the additional, redistributed traffic in these off-peak periods. The project does not seek to augment the existing road as a result of this redistribution of traffic.

The WestConnex Road Traffic Model (WRTM) uses current best practice methods for representing drivers' behaviour with respect to their willingness to pay tolls for road travel time savings for multiple toll roads and routes through the Sydney metropolitan network. The toll choice model was developed for the WestConnex project as an augmentation of standard traffic route modelling procedures that are normally used in planning and assessment of untolled roads. The toll choice model addresses private vehicle and commercial (truck) traffic behaviour, representing the different willingness of these vehicle users to pay for travel time savings in the context of total journey costs including tolls, travel times and distances available on competing routes.

To assess the values that differing vehicle users place on travel time savings, a project specific survey was designed and conducted in Sydney in 2013 asking road users questions about their willingness to pay tolls. Independent specialist peer reviewers provided oversight throughout the design and analysis of the survey. The survey yielded a distribution of estimates of the value that Sydney drivers are willing to pay in terms of tolls to reduce their travel time. These values were benchmarked against values from other studies in Australia and internationally. The survey results are used within WRTM's route choice algorithm to represent the influence of a toll.

The current tolls on all tolled roads in the Sydney metropolitan area are incorporated into the model. The model also considers future changes in perceived value of tolls taking into account escalation of tolls, effects of inflation and average weekly earning projections. The traffic modelling was independently peer reviewed by a committee including David Johnston of Johnston Services Pty Ltd and Professor David Hensher of University of Sydney Institute of Transport and Logistics Studies who are recognised experts in the field of toll road patronage forecasting and transport behavioural choice modelling.

The traffic forecasts produced by WRTM are dependent on a number of input assumptions, such as Sydney's future population and its distribution across the city. WRTM uses the current NSW state government population forecasts. Therefore, given these input assumptions and given the robust approach in developing the toll choice model, the most practical way to manage the risk of estimation of the traffic impacts is through the use of observed data.

To do this it is proposed that on select routes deemed likely to be subject to toll avoidance (i.e. alternative untolled parallel routes to the New M5), a number of locations along the length of the routes would have additional traffic data collected both prior to opening, 12 months after opening of the New M5. This observed traffic flow data would reflect actual driver route choice associated with the New M5 and tolls. The collected data would identify both light and heavy vehicles and enable comparison with forecast traffic flows. The new observed data would be used to monitor the impacts on the parallel routes relative to that predicted in the EIS.

Should this data reveal changes associated with actual driver route choice to be sufficient to explore mitigation measures, Roads and Maritime would develop such interventions as are necessary and that these measures would themselves be subject to the necessary approvals processes.

Issue description – accident or break down

Council wishes to understand the process that would be applied in the event of an accident or break down inside the New M5 tunnel. How would the flow on effect of traffic queuing along the tunnel and consequently along local roads be managed keeping in mind that there are no exit ramps until St Peters.

Council should be provided details of accident / breakdown response plans and that these plans be developed in such a way that minimises the impact of traffic queuing on local road networks.

Response

The project has been designed to provide for efficient, free flowing traffic with physical capacity to accommodate predicted traffic volumes. The preferred design has incorporated all feasible and reasonable design measures including those relating to geometry, pavement, lighting and signage, and is consistent with current Australian Standards, road design guidelines and industry best practice. In doing so, the design of the project has been developed to minimise the likelihood of incidents and crashes.

As with the operation of all roads, there is an inherent risk of vehicle collision in the project tunnels and on surface roads. The New M5 tunnel would be well equipped to effectively manage a crash or incident. The tunnel would be continuously monitored, allowing for fast response times for emergency services. In the event of an accident on the road network, the New M5 would offer increased resilience to the road network by offering an alternative route.

Further, an Incident Response Plan would be developed and implemented in the event of an accident or incident (environmental management measure OpHR08, amended in **Chapter 8** (Revised environmental management measures) of this report). The response to incidents within the motorway would be managed in accordance with the memorandum of understanding between Roads and Maritime and the NSW Police Service, NSW Rural Fire Service, NSW Fire Brigade and other emergency services.

4.10.7 Urban design and visual impacts

Issue description – ventilation facilities

Council should be consulted in the future design of the ventilation facilities and the "landscape and urban design plan" and the recommendations of the New M5 Urban Design Review Panel.

Response

The final urban design and landscape plan would be prepared in consultation with the New M5 Urban Design Review Panel, local councils within the project corridor and the local community (environmental management measure OpV06 amended in **Chapter 8** (Revised environmental management measures) of this report). The plan would include (but not limited to):

- The architectural treatment of the ventilation facilities, which would be informed by the functional requirements and the design principles detailed in the New M5 Urban Design Report.
- Landscape plans and final plant species for the western surface works, Bexley Road motorway operations complex, Arncliffe motorway operations complex, the St Peters interchange and local road upgrades
- The artwork strategy for the Kindilan underpass
- Consideration of the outcomes of the Safety in Design review of the project.

Consultation would be ongoing with key stakeholders throughout detailed design and would also be in accordance with any Conditions of Approval imposed by DP&E.

Issue description – shared pedestrian/cycle paths

Council supports the retention of the existing shared pedestrian and cycle paths and the retention and extension of pedestrian and cycle access in the Kindilan Underpass. It is noted that the width of the underpass would be reduced to allow construction vehicle access between the Kingsgrove North construction compound and Kingsgrove South construction compound. It is also noted that the southern pathway is to be closed and users diverted under the Kindilan underpass and onto the northern pathway during construction; the need to investigate opportunities to provide an alternative southern cycle route for the length of the existing shared path impacted by the western surface works is supported.

Response

Council's support of the retention of the existing shared pedestrian and cycle paths and the retention and extension of pedestrian and cycle access in the Kindilan Underpass is noted.

Issue description – landscape design

Council supports the landscape design objectives of providing a clear landscaped zone and safe sight distance setbacks to avoid the creation of hidden public places whilst maximising passive surveillance opportunities. The landscape design objective of maintaining and enhancing the existing landscape character and vegetation patterns and the landscape intent to screen as much of the built form as possible is also supported.

Council should be consulted on the future proposed landscape treatment.

Response

Roads and Maritime would consult with Hurstville Council during the preparation of the final urban design and landscape plan (environmental management measure OpV06 amended in **Chapter 8** (Revised environmental management measures) of this report).

Issue description – lighting and signage

The lighting design for shared paths located with the M5 Linear Park impacted by the project or located adjacent to compounds should be designed to minimise light spill to adjoining residential properties while maintaining a safe night time environment for path users.

The proposed future signage strategy detailing the design for temporary wayfinding and safety is also supported and Council should be consulted on the signage details, specifically in relation to the location and design.

Response

The lighting design for shared paths located within the M5 Linear Park impacted by the project or located adjacent to compounds would be designed to minimise light spill to adjoining residential properties while maintaining a safe night time environment for path users (e.g. lighting position below the height of the fence line) (environmental management measure V10 amended in **Chapter 8** (Revised environmental management measures) of this report). Cut-off and/or directed lighting would also be used within and outside of construction compounds with lighting location and direction considered to ensure glare and light spill are minimised (environmental management measure V09 amended in **Chapter 8** (Revised environmental management measures) of this report).

A signage strategy would be developed during detailed design for temporary wayfinding and safety. Potentially affected receivers would be consulted on the final signage in relation to the location and associated impacts.

Consultation would be ongoing with key stakeholders throughout detailed design in accordance with any conditions of approval imposed by DP&E.

4.11 Rockdale City Council

Council has reviewed the Environmental Impact Statement (EIS), and its associated documentation, and has prepared a detailed submission to a number of issues raised in the EIS.

While Council supports, in principle, the planning and construction of the WestConnex New M5, Council's review raises a number of key issues related to possible social and environmental impacts on the City of Rockdale. The submission outlines these areas and offers some recommendations for further analysis and actions to ensure impacts are addressed or mitigated effectively.

Council's comments and recommendations are supported by detailed analyses and reports that were prepared for Council by independent specialists in environmental management (Molino Stewart), traffic and transport (Bitzios Consulting), as well as flooding and drainage (WMAwater Pty Ltd).

4.11.1 Traffic and transport

Issue description – impact of toll avoidance on local roads

Whilst the motorway alignment and interchange arrangements are designed in a way that is expected to have minimal impacts on the Rockdale local government area road network, the proposed toll costs appear to have been set too high, which is resulting in traffic avoiding the M5 corridor compared to the base case. The resultant effect is that many of the suburban arterial roads (most concerning through Bexley and Wolli Creek) would contain higher traffic volumes 'with' the project compared to 'without'.

Response

The project would have an impact on parallel routes as part of the project, and the EIS considers these potential impacts on existing roads. As discussed in Section 9.2 of the Technical working paper: Traffic and transport, traffic is forecast to divert off the motorway network to other routes outside the peak traffic periods to avoid the motorway toll. This shift in traffic distribution is not anticipated to have a significant impact from a traffic perspective (in terms of congestion) as there is generally network capacity to accommodate the additional, redistributed traffic in these off-peak periods.

Traffic forecasting data from the WestConnex Road Traffic Model (WRTM) was used to examine how traffic patterns may change between alternative parallel corridors through the study area and was reported in the screenline analysis in Chapter 9 of Technical working paper: Traffic and transport (Appendix G) of the EIS.

The WRTM uses current best practice methods for representing drivers' behaviour with respect to their willingness to pay tolls for road travel time savings for multiple toll roads and routes through the Sydney metropolitan network. The toll choice model was developed for the WestConnex project as an augmentation of standard traffic route modelling procedures that are normally used in planning and assessment of untolled roads. The toll choice model addresses private vehicle and commercial (truck) traffic behaviour, representing the different willingness of these vehicle users to pay for travel time savings in the context of total journey costs including tolls, travel times and distances available on competing routes.

To assess the values that differing vehicle users place on travel time savings, a project specific survey was designed and conducted in Sydney in 2013 asking road users questions about their willingness to pay tolls. Independent specialist peer reviewers provided oversight throughout the design and analysis of the survey. The survey yielded a distribution of estimates of the value that Sydney drivers are willing to pay in terms of tolls to reduce their travel time. These values were benchmarked against values from other studies in Australia and internationally. The survey results are used within WRTM's route choice algorithm to represent the influence of a toll.

A reference tolling regime was developed for WestConnex and is explained in the Updated Strategic Business Case, released in November 2015. The reference tolling regime has been used in the traffic demand modelling, revenue figures and the economic and financial analysis within the business case.

The reference tolling regime for WestConnex is consistent with the NSW Government's tolling principles and includes:

- Distance-based tolling successfully adopted on the M7 since its opening

- Higher tolls for heavy vehicles
- A minimum charge (or flagfall)
- A maximum charge (or toll cap).

The tolling regime that would be applied to the New M5 was developed giving consideration to:

- Affordability and equity principles by providing:
 - Tolling proposition tailored to usage
 - Mechanisms to limit the total cost of a trip.
- Wider road impacts, by:
 - Minimising diversion (for example, by setting toll levels at appropriate levels)
 - Discouraging shorter trips at certain times which has a disproportionate impact on congestion.
- Contribution of WestConnex to wider transport planning objectives:
 - Supporting public transport use
 - Ensuring freight efficiency outcomes.
- A tolling proposition which is efficient to administer and straightforward to understand
- Alignment with the WestConnex financing and procurement strategy to provide a basis for private sector involvement for the relevant WestConnex stages
- Alignment with NSW and Australian government policy frameworks.

The current tolls on all tolled roads in the Sydney metropolitan area are incorporated into the model. The model also considers future changes in perceived value of tolls taking into account escalation of tolls, effects of inflation and average weekly earning projections. The traffic modelling was independently peer reviewed by a committee including David Johnston of Johnston Services Pty Ltd and Professor David Hensher of University of Sydney Institute of Transport and Logistics Studies who are recognised experts in the field of toll road patronage forecasting and transport behavioural choice modelling.

Additional traffic data would be collected at a number of locations along the length of the parallel routes prior to the project opening and again 12 months after opening. This observed traffic flow data would reflect actual driver route choice associated with the New M5 and tolls. The collected data would identify both light and heavy vehicles and enable comparison with forecast traffic flows. The new observed data would then be used to monitor the impacts on the parallel routes relative to that predicted in the EIS.

If this data indicates that the difference between predicted and actual driver route choices is sufficient to warrant an exploration of mitigation measures, Roads and Maritime would develop such interventions as necessary and these measures would themselves be subject to the relevant approvals processes.

Issue description – public transport improvement opportunities

There is little opportunity for bus improvements, as the arterial network appears to worsen with the high tolls.

Response

The project offers a flexible design that does not preclude bus prioritisation measures being included in the future. In *Sydney's Bus Future* (Transport for NSW, 2013), a planned rapid bus route is identified between Hurstville and Macquarie Park via Burwood (current route M41), with bus priority along the corridor, including on Stoney Creek Road and Bexley Road. Roads and Maritime Services and Transport for NSW would continue to work together to deliver *Sydney's Bus Future* (Transport for NSW, 2013).

The tolls for WestConnex New M5 would be set in line with the reference tolling regime and NSW Government tolling principles (as outlined above).

Traffic forecasting data from the WRTM was used to examine how traffic patterns may change between alternative parallel corridors through the study area and was reported in the screenline analysis in Chapter 9 of the Technical Working Paper: Traffic and transport (Appendix G of the EIS).

On select routes deemed likely to be subject to toll avoidance (i.e. alternative untolled parallel routes to the New M5), additional traffic data would be collected both at a number of locations prior to the project opening and again 12 months after opening of the New M5. This observed traffic flow data would reflect actual driver route choice associated with the New M5 and tolls. The collected data would identify both light and heavy vehicles and enable comparison with forecast traffic flows. The new observed data would then be used to monitor the impacts on parallel routes relative to the impacts predicted in the EIS.

If this data indicates that the difference between predicted and actual driver route choices is sufficient to warrant an exploration of mitigation measures, Roads and Maritime would develop such interventions as necessary and these measures would themselves be subject to the relevant approvals processes.

Issue description – traffic and transport impact assessment

The interpretation of potential impacts and benefits is limited in this assessment due to a lack of data. More information is required such as difference plots, select link analysis, additional intersection analysis, local area modelling and traffic volume information on key corridors through centres such as Bexley, Bexley North, Rockdale, Wolli Creek, Brighton Le Sands as well as toll cost modelling sensitivities. The location of the current screen lines is also unclear (i.e. no descriptive figure).

Response

The Technical Working Paper: Traffic and transport (Appendix G of the EIS) was undertaken in accordance with the SEARs issued for the project by the Department of Environment (DP&E). The extent of the traffic and transport study area was limited to roads that would potentially be affected as a result of construction and / or operation of the project, including roads which:

- Would be used as part of construction compound vehicle routes
- Would provide the main connections between the M5 East Motorway and the arterial road network during construction and operation
- Would provide the main connections between the New M5 and the arterial road network during operation.

The modelled screenline locations are provided in Figure 66 of the technical working paper.

Further information concerning the tolling assumptions applied in the traffic and transport assessment is provided in response to the issue 'impact of toll avoidance on local roads' described earlier in this section.

Issue description – construction impacts on traffic

The modelling provided around the Arncliffe construction compound appears to have been modelled incorrectly as the base case results do not reflect current field conditions. The existing performance is much worse. Consideration should be given to merging the M5 (westbound) to one lane prior to the Marsh Street entry ramp merge to enable a lane gain from this location.

Response

Traffic count data was used to prepare average daily and weekly traffic profiles for the study area. Automatic 'mid-block' traffic counts were carried out at 13 locations in the study area during 2014 (refer to Figure 9-1 of the EIS). In addition, traffic counts were also conducted at 48 key intersections across the study area. Locations of mid-block and intersection traffic counts were selected to provide a good representation of existing traffic conditions on roads likely to be affected by the project.

As noted in the Technical working paper: Traffic and transport (Appendix G of the EIS), the performance of construction intersections' was calculated based on standalone intersections using SIDRA. While this does not reflect the true Level of Service for those intersections that are part of a co-ordinated system of signalised intersections, the comparative impact of the construction traffic can nonetheless be compared and reported. The intersection level of service generally remains the same with the same average delay in the 'without construction' and 'with construction' scenarios.

If the project is approved, a TMSP would form a sub-plan of the CEMP and would be prepared in accordance with the relevant conditions of approval. The congestion in this area is recognised and the plan would include more detailed modelling of the road network during the construction period. The plan would be developed in consultation with relevant councils, emergency services, road user groups and pedestrian and cyclist user groups. The CEMP and all sub-plans would require approval by DP&E.

A car parking strategy for all sites would be also developed as part of the TMSP to limit impacts on the surrounding communities, in consultation with local councils and stakeholders.

Issue description – validation of traffic modelling

In general, the base case intersection modelling does not appear to have been validated to back of queue survey data and this is not evidenced in the reporting.

Response

As noted in the Technical working paper: Traffic and transport (Appendix G of the EIS), the performance of construction intersections was calculated based on standalone intersections using SIDRA. While this does not reflect the true Level of Service for those intersections that are part of a coordinated system of signalised intersections, the comparative impact of the construction traffic can nonetheless be measured and reported.

The operational modelling around St Peters was undertaken using Paramics, a micro-simulation traffic modelling software. The Paramics base models were calibrated and validated to align with existing operating conditions.

Issue description – cycleway treatments around Rockdale

There appears to be no cycleway treatments proposed in the Rockdale area, apart from works in the Cooks Cove area.

Response

The Project does not propose to include cycleway treatments in the Rockdale area. However, Roads and Maritime would soon provide a dedicated cycleway and improve pedestrian access in the area as part of the Airport West Precinct project. Roads and Maritime is also investigating options for improved cycle and pedestrian facilities as part of the Sydney Gateway project to improve connectivity for active transport users in the Rockdale area to St Peters, Sydney Park, Alexandria, Mascot and the Domestic terminal at Sydney Airport.

Issue description – request for funding to offset increased traffic congestion

It is recommended that the proponent contributes funding to Rockdale City Council for the amenity improvement of public domain infrastructure at affected town centres at Bexley, Bexley North and Wolli Creek, as an offset to increased traffic congestion in these centres.

Response

Strategic modelling undertaken for the New M5 does not indicate that significant change to the amenity of the public domain infrastructure at Bexley, Bexley North and Wolli Creek town centres is likely to occur. However, an operational traffic review would be undertaken 12 months after the commencement of operations to confirm the impacts of the project on surrounding arterial roads and major intersections. The operational traffic review would include an assessment of the changes in traffic levels on parallel arterial roads, which would include Bexley Road, Forest Road and Princes Highway.

The provision of funding to Rockdale City Council is outside the scope of the EIS.

Issue description – cycleway adjacent to rail corridor

Rockdale City Council has requested that the proponent commit to the construction of a commuter cycleway adjacent to the rail corridor between Kingsgrove and Mascot, as promised as part of the M5 East Motorway project.

Response

The project would enhance cycling infrastructure and connectivity at the western and eastern ends of the project (refer **Section 5.5.2** of this report). The project would be in tunnel from the western tunnel portals in Kingsgrove to the eastern ramp portals located at the St Peters interchange, precluding cycling infrastructure along this section of the project.

The project does not propose to construct surface infrastructure between the western and eastern tunnel portals. Existing cycle links are provided along the local street network in this area. The provision of additional cycling infrastructure is not part of the project scope, and would not contribute to meeting the project objectives articulated in Chapter 3 of the EIS.

Extending the existing cycleway along Wolli Creek Valley to connect the western and eastern cycle infrastructure was investigated as part of the M5 East Motorway project. That investigation identified that a cycleway at this location would not be feasible as it would require additional land acquisition.

Issue description – tollway pricing

The proponent investigates and reports on a range of tollway pricing signals that genuinely reflects triggers for tollway avoidance behaviours by motorists, based on best available information.

The toll cost introduced appears to be set too high with many vehicles seen to divert to Stoney Creek Road to the west and General Holmes Drive to the east. It is apparent that this higher cost has been set as part of the financial modelling to optimise the return on investment for the operator. To assist with understanding the sensitivities associated with the toll value a series of sensitivity tests should have been undertaken and provided to show the traffic volume response to those varying toll scenarios.

Response

Information concerning the tolling assumptions applied in the traffic and transport assessment is provided earlier within this section.

Toll levels have been determined based on the NSW Government tolling principles as set out in the Updated WestConnex Strategic Business Case. Generally, the tolls are lower (per kilometre) than other inner urban toll roads in Sydney and would therefore encourage less diversion relative to other toll roads.

The Updated Business Case can be found on the WestConnex website site at www.westconnex.com.au/documents/updated_strategic_business_case.pdf

Issue description – optimisation of truck movements during construction

A detailed review of the local temporary fill sites should be considered with the goal of managing spoil handling in a way that minimises truck movement impacts to the surrounding network and surrounding community.

Response

Haulage routes to and from construction sites were developed with the aim of minimising impacts on local residential streets and maximising the use of state and regional routes. An assessment of the impact of construction traffic associated with the spoil management sites is discussed in Section 9.3 of the EIS.

Five potential spoil management sites have been identified to receive excess spoil from the project. The final destinations for excess spoil from the construction of the project would be confirmed during the construction planning phase.

The management of spoil haulage and spoil management sites would be detailed in a Spoil Management Strategy to be prepared and implemented before the start of tunnelling activities.

Issue description – future motorway projects

Discussions between Council and Sydney Motorway Corporation should commence to discuss the future planning of the F6 project and the Southern Gateway.

Response

Noted. These projects are in the early stages of design and are beyond the scope of this EIS. Roads and Maritime would consult with Rockdale City Council concerning future motorway projects in the local government area.

Issue description – construction workforce transport arrangements

Rockdale City Council requests that the proponent operates a shuttle bus service from Wolli Creek Station for its workers at the Arncliffe construction compound.

Response

As noted in table 64 of the Technical working paper: Traffic and transport (Appendix G of the EIS), the number of parking spaces at the Arncliffe construction compound is 220 to serve a likely employee peak of 300 at shift change over. Taking into account carpooling and active modes of transport, the number of personnel using public transport is anticipated to be low and therefore a shuttle service from Wolli Creek station is not warranted.

As noted in Section 7.6 of Appendix G (Technical working paper: Traffic and transport), construction personnel would be encouraged to use public transport where possible, and consider other modes of transport such as carpooling.

A number of public transport options are available for workers across the construction areas:

- Kingsgrove South and North: near the Beverly Hills train station and buses provide transportation to Wirega Avenue and a short walk into site
- Bexley Rd North, South and East: a six minute walk from Bexley North train station
- Canal Rd and Campbell St: fifteen minute walk from St Peters train station and several bus services travel along Princes Highway providing links to nearby train stations and the city
- Burrows Rd and Burrows Rd Bridge : fifteen minute walk from St Peters train station and several bus services travel along Princes Highway providing links to alternative train stations or the city
- Bourke Rd: nine minute walk from Mascot train station and several bus services travel along Gardeners Road providing links to alternative train stations or the city
- Euston St: a ten minute walk from St Peters train station and several bus services travel along Princes Highway providing links to alternative train stations or the city

As noted in Section 5.1.4.2 the Technical working paper: social and economic (Appendix M of the EIS), to accommodate the large labour force anticipated on the project a temporary bus service is proposed in the industrial area to the north of Kingsgrove construction compound and western surface works. This service is anticipated to be needed for the works at the western surface works, with large labour numbers required for both the tunnel and surface works. The shuttle bus would collect workers from the stations and transport them to the Kingsgrove North construction compound.

Issue description – impact of toll avoidance

Whilst it is unknown what the human response would be to the introduction of the tolls, a monitoring system should be in place within the contractual arrangements to ensure that the M5 East/New M5 corridors are effectively priced to ensure traffic volumes on the arterial network remain no worse than current levels. This may require toll reductions in the early years until the operational aspects of the new project is better understood. The monitoring of traffic volumes on the motorways and arterial networks should occur on a regular basis, with variable toll pricing mechanisms in place to ensure the financial viability of the toll road and also the appropriate amenity for the local centres (i.e. such as Kingsgrove, Bexley, Arncliffe, etc.).

Response

Information on toll aversion, toll pricing, the impacts on parallel routes and monitoring following the opening of the project is provided earlier within this section.

Issue description – inconsistency in traffic data

It should also be noted, the traffic volume information relating to the base year performance in Table 9-13 of the EIS seems to contradict with the base year traffic volumes in Table 9-7 and Table 9-11 of the EIS. This discrepancy requires clarification; however the outcome from the amendment (if required) is unlikely to have any significant impact on the outcome.

Response

The figures in Table 9-7 and Table 9-11 of the EIS were taken from a 24-hour, one-week, Automatic Number Plate Recognition (ANPR) system and provided a good indication of the daily profile for the M5 East Motorway. This was then supplemented by peak period surveys.

The figures in Table 9-9 and Table 9-13 of the EIS reflect an average of the ANPR and the peak period counts to more accurately reflect the peak hour situation for the purposes of undertaking a mid-block level of service assessment for the peak hours.

Issue description – existing congestion at Bexley or North Bexley centres

The traffic assessment does not detail the intersection performance forecast within the Bexley or North Bexley centres. This is required to be addressed.

Modelling of the Bexley Road / Kingsgrove Ave intersection appears to have a performance that is not reflective of its current poor operations. It is possible that the date of the counts that informed the assessments may not be reflective of the 85th percentile day or 100th highest hour across the year. In addition, the count may not have taken into consideration the volume of traffic that resides within the queuing areas and did not progress through the intersection within its signal phase time allocated. There is also no evidence that the base models were validated to a back of queue.

There are concerns that the level of traffic congestion within the Bexley and North Bexley areas has been understated. Whilst the access arrangements and associated construction traffic in this area is expected to be relatively low, the base case condition in the area is currently poor and this is not reflected in the EIS documentation.

Response

The traffic and transport assessment study area was identified based on the SEARs, informed by the project corridor and the forecast impact of traffic and transport changes and followed initial consultation with Roads and Maritime. Ultimately, the study area includes roadway and intersections that would be primarily impacted by the New M5 project. This excludes Bexley and North Bexley centres.

As noted in the Technical Working Paper: Traffic and transport (Appendix G of the EIS), the construction intersections' performances were calculated as standalone intersections using SIDRA. While this model has some limitations, the impact of the construction traffic can be measured and reported.

It is acknowledged that SIDRA only models intersection throughput, so may underestimate the impact of congestion from downstream intersections. While this may not reflect the true Level of Service for that section of Bexley Road as they are part of a co-ordinated system of signalised intersections, the impact of the construction traffic can be compared and reported. The intersection LoS remains at LoS A with the same average delay in the 'without construction' and 'with construction' scenarios. It is worth noting that while the overall intersection level of service is LoS A, the right turn movements at the intersection operate at LoS E/F.

If the project is approved, a TMSP would form a sub-plan of the CEMP and would be prepared in accordance with the relevant conditions of approval. The plan would include more detailed modelling of the road network during the construction period. The plan would be developed in consultation with relevant councils, emergency services, road user groups and pedestrian and cyclist user groups. The CEMP and all sub-plans would require approval by DP&E.

Issue description – traffic impacts on local roads

In general (considering the New M5 project in isolation), the relief provided at the West Botany Street / Marsh Street area is expected to free up capacity for local traffic desiring to enter onto the M5 East or access the Marsh Street area. The tolling level applied is suggesting that there is no net benefit provided to the arterial network, as the reduced traffic on the Princes Highway is simply diverted to the General Holmes corridor. In addition, it is clear that many motorists are exiting prior King Georges Road with a significant increase in traffic noticed on Stoney Creek Road and onward through Bexley. Bexley is already operating at Level of Service E/F during peak periods and has no ability to cater for any increase in traffic volumes.

The New M5 project appears to mostly be a relief valve for the M5 East, catering for longer distance travel demands from the south-west growth sector that would remain in congestion along the M5 East if the New M5 was not to be provided.

The modelling results are showing little benefit to Forrest Road, Princes Highway and General Holmes Drive. In fact the results from Table 9-47 of the EIS show that the traffic is simply shifting across from the Princes Highway to General Holmes Drive (around 4,000 vehicles per day). The 2021 results on the western screen lines appear to show that the introduction of tolls on the M5 East is a greater deterrent to the corridors use than the benefit the project provides. To the east (along the eastern screen-line) the results are showing some levels of increased use within the combined M5 East/New M5 corridor, however there is little difference in performance to Forrest Road/Princes Highway/ General Holmes Drive. Of particular concern, is that with additional traffic on suburban roads, there would be greater traffic pressures placed on Rockdale local government area centres such as Wolli Creek and Arncliffe, where the pedestrian/cycle amenity balance is already undermined by high volumes of "through traffic".

It is difficult to draw firm conclusions from the information provided in the EIS particularly when no maps of screenlines or figures showing on which sections the volumes represent. There is also no mapping of volumes, difference plots or select link analysis. As a minimum, West Botany Street and the Princes Highway around Cooks River should be provided in the reporting. Traffic volumes through Rockdale, Brighton Le Sands and Bexley should also be provided.

Response

As shown in Table 80 of the Technical working paper: Traffic and transport (Appendix G of the EIS), there is an increase in total two-way traffic across the eastern screenline in the 2031 'with project' scenario. The New M5 is forecast to carry more vehicles than are shifting from just the M5 East and Marsh Street corridors. This implies traffic is also shifting from the Princes Highway corridor and not just shifting across to the General Holmes corridor.

The assessment was based on strategic model outputs and consequently, may be affected by the limitations of the modelling process, as described in the EIS. An operational traffic review would be undertaken to confirm the operational traffic impacts of the project on surrounding arterial roads and major intersections about 12 months after the commencement of operation of the project. The changes in traffic levels on parallel arterial roads would form part of the traffic review.

As noted in Technical working paper: Traffic and transport (Appendix G of the EIS), the shift in the daily traffic movement mainly occurs in the off-peak periods as the peak hour spare capacity is limited.

The aim of the project is to provide additional capacity along the M5 Motorway corridor, allowing for a more robust and reliable transport network. The M5 Motorway corridor (the M5 East Motorway and the M5 South West Motorway) is the main passenger, commercial and freight corridor between Port Botany, Sydney Airport and south-west Sydney. Traffic demands on the M5 East Motorway currently exceed its design capacity and present a significant bottleneck to the M5 Motorway corridor with motorists experiencing heavy congestion and unreliable journey times.

As shown in Table 80 of the Technical working paper: Traffic and transport (Appendix G of the EIS), there is an increase in total two-way traffic across the eastern screenline in the 2031 'with project' scenario. The New M5 is forecast to carry more vehicles than are shifting from just the M5 East and Marsh Street corridors. This implies traffic is also shifting from the Princes Highway corridor and not just shifting across to the General Holmes corridor.

Traffic on the western screenline is forecast to shift to parallel arterial roads, mainly Stoney Creek Road and Canterbury Road, in this scenario. The increase in traffic on these parallel roads is less pronounced in the peak hours than over the course of the day as the peak hour spare capacity is limited. The M5 East Motorway corridor would continue to carry about 50 per cent of the total two-way traffic.

The assessment was based on strategic model outputs and consequently, may be affected by the limitations of the modelling process, as described in the EIS. An operational traffic review would be undertaken to confirm the operational traffic impacts of the project on surrounding arterial roads and major intersections about 12 months after the commencement of operation of the project. The changes in traffic levels on parallel arterial roads would form part of the traffic review.

Strategic modelling does not indicate that significant change to the amenity of Wolli Creek and Arncliffe is likely to occur. However, an operational traffic review would be undertaken 12 months after the commencement of operations to confirm the impacts of the project on surrounding arterial roads and major intersections. The operational traffic review would include an assessment of the changes in traffic levels on parallel arterial roads, which would include Marsh Street and Princes Highway.

The modelled screenline locations are shown on Figure 66 of the Technical working paper: Traffic and transport (Appendix G of the EIS), with the volume relating to the screen lines locations provided in Tables 79-81 and Figures 67-72.

The traffic and transport assessment study area was identified based on the SEARs, and following consultation with Roads and Maritime based on forecast wider traffic impacts. Ultimately, the study area includes roadway and intersections that would be primary impacted by the New M5 project.

Issue description – pedestrian and cycle connectivity

The majority of the pedestrian / cycle amenity improvements are provided in the St Peters area where the level of traffic impact is expected to be greatest. As the New M5 project contains no access points within the Rockdale local government area and is tunnelled for its entire length, there is little opportunity to introduce new pedestrian/cycle facilities as part of the project.

Agreements were in place as part of the M5 East project to construct a shared path along the railway corridor adjacent to the M5 East. This commitment was never fulfilled and Council has been left with an indirect and lower quality cycle network in this area. The issue of the M5 East project not undertaking the cycle project should now be addressed as part of this project as it currently is a significant missing link in the regional cycle network.

Council also should begin to liaise with the Sydney Motorway Corporation / Roads and Maritime to discuss required cycle facilities in the Southern Gateway Connection and the F6 Connection to President Avenue. There is a strong need for improved cycle networks parallel to this corridor as well as improvements to the east-west connections providing improved connections from the residential/business centres to the west to the residential/recreational areas to the east. The Cooks Cove foreshore areas are a major attractor for recreational cycling. As Wolli Creek, Cooks Cove,

Arncliffe and Banksia continue to grow as Priority Precincts it would be important to establish good regional cycle networks to provide this connectivity.

Response

The project would enhance cycling infrastructure and connectivity at the western and eastern ends of the project (refer **Section 5.5.2** of this report). The project would be in tunnel from the western tunnel portals in Kingsgrove to the eastern ramp portals located at the St Peters interchange, precluding cycling infrastructure along this section of the project.

The project does not propose to construct surface infrastructure between the western and eastern tunnel portals. Existing cycle links are provided along the local street network in this area.

Extending the existing cycleway along Wolli Creek Valley to connect the western and eastern cycle infrastructure was investigated as part of the M5 East Motorway project.

The investigation identified that a cycleway at this location would not be feasible, as it would require additional land acquisition.

Roads and Maritime Services would consult Rockdale City Council on the development of plans for future projects in the area.

Issue description – construction impacts around Arncliffe

The modelling provided around the Arncliffe construction compound appears to have been modelled incorrectly as the base case results do not reflect current field conditions. The existing performance is much worse. Consideration should be given to merging the M5 (westbound) to one lane prior to the Marsh Street entry ramp merge to enable a lane gain from this location.

The use of Sidra traffic modelling for the determination of network performance for this section is inappropriate. The report states that the LOS for the intersections along Marsh Street is typically LOS A/B. These performance levels have been overstated as it is known that both of the areas are known to fail during the peak periods and often through the middle of the day. The intersection of Princes Highway/ Forest Road was shown as LOS F/D. This is reflective of the base case condition.

The majority of the congestion along Marsh Street initiates from traffic wishing to enter into the M5 East tunnels. In addition, it is often noticed that queuing forms back from Marsh Street entry ramp and the M5 East through travel lanes (westbound). These queues often form back up into the Marsh Street / M5 East signalised intersection further exacerbating traffic congestion effects that occur along Marsh Street. These queues can extend for 2km in all directions and this is typically observed to occur during the peak AM and PM peak periods as well as through the middle of the day.

To assist with addressing the M5 East/ Marsh Street entry ramp merge issue, consideration should be given to reducing the M5 East to one travel lane east of the merge point (westbound), thus providing a dedicated 'lane gain' for the traffic entering from the Marsh Street entry ramp. This would assist with ensuring the Marsh Street section can operate unimpeded by traffic blocking back into the intersections. In addition, it would assist with the management of the 60 truck movements expected to be generated per hour.

With respect to staff parking, there is currently no ability for overflow parking in this area. There is resident permit parking in place to manage the issue of Airport staff parking in the residential streets in the area. Consideration should be given to providing shuttle buses from Wolli Creek train station. Alternatively, improvements to the footpath network should be provided for staff to walk from the Wolli Creek station to the compound. The International Terminal Station is unlikely to be used as it contains additional fees for use due to the Airport levy in place.

Response

As noted in the Technical Working Paper: Traffic and transport in Appendix G of the EIS, the performance of construction intersections' was calculated based on standalone intersections using SIDRA. While this does not reflect the true Level of Service for those that are part of a co-ordinated system of signalised intersections, the impact of the construction traffic can be measured and reported.

If the project is approved, a TMSP would form a sub-plan of the CEMP and would be prepared in accordance with the relevant conditions of approval. The plan would include more detailed modelling of the road network during the construction period. The plan would be developed in consultation with relevant councils, emergency services, road user groups and pedestrian and cyclist user groups. The CEMP and all sub-plans would require approval by DP&E.

Section 6.6.1 of the EIS stated that parking would not be allowed off-site. The construction compounds for the project would be designed to provide off-street car parking facilities to minimise impacts on access and parking for local residents (refer to Section 9.4 of the EIS). Parking by construction workers on local streets would be discouraged, and would be regularly reinforced through project inductions and toolbox talks. Construction personnel would be encouraged to use public transport where possible, and consider other modes of transport such as carpooling. These strategies would form part of the Traffic Management and Safety Management Plan, and environmental management measure TT01 has been amended to include this requirement (refer to **Chapter 8** (Revised summary of environmental management measures) of this report.

4.11.2 Flood and drainage

Rockdale City Council engaged WMAwater Pty Ltd (WMAwater) to review the flooding assessment within the EIS (Technical working paper: Flooding, Appendix P of the EIS). Rockdale City Council's covering submission identified key issues and recommendations. In doing so, Rockdale City Council noted that its key issues and recommendations are to be considered in conjunction with the findings and recommendations in the WMAwater report.

This section provides a summary and response to the key issues and recommendations provided in the covering submission from Rockdale City Council. Where relevant, the findings and recommendations of the WMAwater report have been combined with the key flooding issues and recommendations provided in the covering submission.

Issue description –flooding and drainage model

The main finding of the review found that the modelling approach taken for the EIS ignored existing flood studies and modelling for the area that are freely available, and chose to establish new flood models. All Councils along the Cooks River use the results from the 2009 Sydney Water Cooks River Flood Study for flood related development control purposes.

The differences in flood models produce significantly different results in peak flood levels, which may have an impact on the accuracy of results. The EIS indicates that previous flood modelling was incorrect, although this claim is not substantiated. The establishment of the Sydney Water Cooks River Flood Study underwent substantial calibration and peer review and is regarded a well-established model.

Without a clear understanding of what model constitutes a more effective option, confusion may arise, especially when landowners need to account for insurance matters.

The key Council recommendation is that further information is required that clarifies and substantiates the position taken in the EIS that conflicts with a widely recognised and robust existing flood model.

With respect to this issue, the WMAwater report made the following comments:

- Models established for the 2009 Sydney Water Cooks River Flood Study prepared by PB MWH Joint Venture are freely available from Sydney Water and could have been used for the investigation rather than establishing new ones
- The establishment of a new modelling approach by Lyall & Associates, albeit using the TUFLOW software and with the majority of the bathymetric and topographic data coming from the 2009 study, produces different inflow peaks and changed peak flood levels compared to the previous abovementioned modelling due to a different modelling approach being used. The differences in peak flood level, comparing the previous with the Lyall and Associates model are significant. Immediately upstream of the Princes Highway the 2009 study indicates a 100 year ARI peak level of 2.2 mAHD whilst Appendix P indicates a peak level of 2.9 mAHD. In the PMF the increase at this location is from 3.5 mAHD to 5.8 mAHD. There is no rigorous substantiation as to why previous modelling (as part of the Sydney Water Cooks River Flood Study) was wrong.

- A major concern with the modelling undertaken as part of Appendix P (Technical working paper: Flooding) is that no calibration of the TUFLOW model was undertaken yet an extensive calibration was undertaken as part of the 2009 Sydney Water Cooks River Flood Study.
- Such a significant difference in flood levels is unsatisfactory for both Council and residents without a more rigorous explanation which can unequivocally confirm which model most accurately predicts flood levels. Using the 2009 Sydney Water Cooks River Flood Study modelling approach would largely eliminate these concerns, however if warranted, changes can be made to these 2009 models if there is valid justification. Results from the 2009 Sydney Water Cooks River Flood Study appear more credible based on the model calibration work undertaken as part of that study.
- The tidal hydrographs in Botany Bay for the year 2050 and 2100 scenarios only indicate a raising of ocean level around the peak whereupon the entire hydrograph should be elevated by the nominated ocean level rise. This modification to the ocean hydrograph would make minimal difference to the peak flood levels but should be undertaken for completeness.
- The noise walls on the eastern bank of the Cooks River adjacent to the airport appear not to have been included in the TUFLOW model. Whilst the inclusion would make no difference in events other than the PMF, they should be included as they would represent a complete barrier to flow entering / exiting the airport from Marsh Street to near the Southern and Western Suburbs Ocean Outfall Sewer (SWSOOS).
- In the Upper (Wolli Creek) TUFLOW model it also appears that the noise walls on either side of the East Hills railway line between Kingsgrove Road and Bexley Road have not been included. This represents a significant omission. A more accurate representation of the flow path would make nil difference to the impacts of the proposed New M5 works but would ensure that readers obtain a more accurate representation of the flow paths and would correctly highlight the hydraulic impacts of the noise walls.
- The following recommendations are made:
 - Amend Figure B4.2 of the Technical working paper: Flooding (Appendix P) to ensure raising of the entire ocean hydrograph due to sea level rise
 - Include the noise walls on either side of the East Hills railway line between Kingsgrove Road and Bexley Road and on the eastern bank of the Cooks River adjacent to the airport
 - Re-run the models to include the above.

Response

The flooding and drainage assessment presented in Chapter 19 of the EIS was undertaken in accordance with the SEARs issued for the project by DP&E.

Details regarding the TUFLOW modelling approach are provided in Section A3.2 of the Technical working paper: Flooding (Appendix P to the EIS). Section A3.3 provides details for the model setup.

Appendix B, Section B4.7 of the Technical working paper: Flooding outlines the differences between the *Cooks River Flood Study* (Sydney Water Corporation (SWC), 2009) and the model presented in the EIS.

As identified in Section B4.7 of the technical working paper, a new model was developed to respond to:

- Different catchment flooding-storm tide combinations; two dimensional effects associated with bends in the Cooks River
- Higher peak water levels
- Higher peak flows at the Botany Bay outfall.

This resulted in a more conservative model, with peak flood levels in the 2015 model shown to be higher than the peak flood levels of the 2009 model. The 2015 model was built specifically for the purpose of informing the design of the New M5, and as such the measures of conservatism built into the assumptions help to minimise the risk that the project may impact surrounding environments. The 2009 model was built for a different purpose, and the assumptions made reflect the priorities of that modelling.

Modelling done for the probable mean flood was done for the purpose of designing the levels at the tunnel portals, and the assumptions made for these scenarios reflect that purpose.

Issue description – appropriateness of the proposed approaches to address flooding issues during design and construct phase

The issues identified in the WMAwater report concerning the suitability of the modelling approach and assessment of existing conditions need to be initially addressed and re-modelling of the design conditions undertaken.

Response

Information on the suitability of the modelling approach and assessment of existing conditions is provided above.

For the reasons provided earlier in this section, remodelling of the design conditions is not proposed to be undertaken at this time but would occur as part of the detailed design process.

Issue description – consideration of climate change

Sea level rise has been appropriately addressed by assuming estimates for Year 2050 (0.4 metre rise) and Year 2100 (0.9 metre rise).

Rainfall increase has been considered for a 10 per cent rainfall increase only. Further modelling at subsequent stages should consult the most recent updates to Australia Rainfall and Runoff which may provide alternative approaches.

Whilst the hydraulic impacts of the proposed New M5 works under existing (no sea level rise) conditions have been assessed, the hydraulic impacts under the year 2050 and 2100 sea level rise conditions and any rainfall increases should also be provided at the design stage.

Response

Climate change impacts have been considered as part of the Technical working paper: Flooding (Appendix P to the EIS). In particular Sections 3.9 and 5.5 of the technical working paper addresses the impact of climate change on flooding as a result of changes in sea level and rainfall.

Sea level rise for the years 2050 and 2100 were adopted for storm tide levels in Botany Bay.

Section 6.2 of the technical working paper identifies that a detailed assessment of climate change impacts as they relate to flooding would need to be undertaken during detailed design.

4.11.3 Air quality

Rockdale City Council jointly engaged Molino Stewart with Hurstville and Canterbury Councils to review the air quality assessments within the EIS. Rockdale City Council's covering submission identified key issues and recommendations. In doing so, Rockdale City Council noted that its key issues and recommendations are to be considered in conjunction with the findings and recommendations of the Molino Stewart report.

This section provides a summary and response to the key issues and recommendations provided in the covering submission. The air quality issues and the responses to the jointly commissioned Molino Stewart report have been provided in **Section 4.16.1** of this report. Where appropriate, a cross reference to that response has been provided below.

Issue description – general issues and approach

The general approach to the EIS, including the description of the project; the identification of relevant air quality issues; the identification of regulatory requirements; the definition of the existing environment, and the outline of methodology used in the working paper and the EIS are considered to be generally adequate and appropriate.

Response

Noted.

Issue description – construction impacts

The approach adopted to the assessment of the impacts of construction activities associated with the New M5 Project on local air quality appears to have been reasonable and appropriate.

Response

Noted.

Issue description – assessment of operational impacts (surface air quality)

The findings of both the working paper and the EIS in terms of general surface air quality impacts appear to be reasonable.

Response

Noted.

Issue description – assessment of operational impacts (in-tunnel air quality)

This is Council's major areas of concern. The longitudinal ventilation system currently proposed for the two New M5 tunnels may not be adequate or appropriate to ensure safe and compliant air quality within the tunnels at all times.

Possible alternatives are not assessed in this EIS. This inadequacy may have an impact on air emissions' quality which leads to cumulative air pollutant impacts.

Response

The project includes a well-designed tunnel ventilation system that would ensure that applicable in-tunnel, ventilation outlet and ambient air quality criteria are met.

Alternative ventilation schemes and the reasons for the selection of the longitudinal ventilation system and the location of the ventilation facilities are detailed in Section 4.6.1 of the EIS. A detailed description of the ventilation system and the in-tunnel air quality design criteria is provided in Section 5.8.2 of the EIS. A review of tunnel ventilation design and control approaches, and their effectiveness is provided in Technical working paper: Air quality (Appendix H of the EIS).

The tunnel ventilation system has been designed to achieve the in-tunnel, ventilation outlet and ambient air quality criteria described in Section 4.6 of the Technical working paper: Air quality. The tunnel ventilation design includes intermediate air exchange facilities at Arncliffe and Bexley in addition to the western and eastern ventilation outlets at Kingsgrove and at the St Peters Interchange. The reductions in in-tunnel pollutant levels as a result of the operation of these facilities are clearly demonstrated in Figures 11.36 to 11.38 in the Technical working paper: Air quality.

The Technical working paper: Air quality demonstrates that in-tunnel air quality would be within operational limits for all scenarios. The simulations of in-tunnel air quality performance take into account the carriageway grades within the project tunnels, anticipated vehicle and fuel mix and average traffic speeds between 20 and 80 kilometres per hour. The results of these simulations of in-tunnel air quality performance are shown in Figures 11.15 to 11.40 of the Technical working paper: Air quality.

The development of cleaner vehicles in response to cleaner fuels and more stringent emission standards means that a significant reduction in vehicle emissions has occurred over the past 20 years. A well-designed longitudinal ventilation system can now easily maintain acceptable air quality in long tunnels and is considered the most efficient and effective tunnel ventilation system (Roads and Maritime, 2014a).

Although all three broad types of ventilation systems (transverse, semi-transverse and longitudinal) could be designed to ensure that in-tunnel air quality criteria would be met, a longitudinal system has been selected for the project. Longitudinal ventilation was considered the most appropriate as it is more effective for the management of smoke in the main alignment tunnels, and is more affordable to construct and operate than transverse ventilation systems.

Ventilation and management of in-tunnel air quality would be considered further during the detailed design phase to ensure that the ventilation system is appropriately designed to meet the in-tunnel air quality criteria. Continuous monitoring of both in-tunnel and ambient air quality would be undertaken during operation of the project to demonstrate that acceptable air quality outcomes are being achieved.

The proposed tunnel cross sections for the New M5 are roughly double the existing tunnel cross-sections for the M5 East and hence the design flows are very much higher, and as such the new tunnel would perform to a higher standard than older tunnels. Further development of the ventilation system and management of in-tunnel air quality would be undertaken during the detailed design phase. Continuous monitoring of both in-tunnel and ambient air quality would be undertaken during operation of the project to demonstrate that acceptable air quality outcomes are being achieved.

Issue description – construction air quality impacts (management)

It is recommended that appropriate and specific Construction Phase Air Quality Management Plans are developed and implemented for individual components of the overall construction task. It is also recommended that Rockdale City Council be provided with an appropriate watching brief to the Construction Management Plan process, to ensure that the various plans are applied and work effectively, and that air quality outcomes are consistent with relevant guidelines levels adopted.

Response

Air quality impacts on site and from haulage are addressed in the Technical working paper: Air quality in Appendix H of the EIS and would be managed during construction in accordance with the Construction Air Quality Management Plan, prepared as part of the CEMP.

Roads and Maritime would comply with all consultation requirements that may be included in the conditions of approval for the project.

Issue description – assessment of ventilation alternatives

Alternative approaches to the ventilation and management of in-tunnel air are included in the project proposal, and modelled and assessed in the working paper and EIS.

Response

This issue has been raised within the Molino Stewart report jointly commissioned by Rockdale City, Hurstville and Canterbury Councils, and has been addressed in **Section 4.16.2** of this report.

Issue description – cumulative air quality impacts

It is recommended that the cumulative impacts applicable as a consequence of any increase in in-tunnel pollutant loads that might be considered, and any associated changes to air quality impacts near exhaust emission stacks that might follow as a consequence, are assessed and presented in both the working paper and the EIS.

Response

This issue has been raised within the Molino Stewart report jointly commissioned by Rockdale City, Hurstville and Canterbury Councils, and has been addressed in **Section 4.16.2** of this report.

4.11.4 Surface water and groundwater

Rockdale City Council jointly engaged Molino Stewart with Hurstville and Canterbury Councils to review the water quality, surface water and groundwater assessments within the EIS. Rockdale City Council's covering submission identified key issues and recommendations. In doing so, Rockdale City Council noted that its key issues and recommendations are to be considered in conjunction with the findings and recommendations Molino Stewart report.

This section provides a summary and response to the key issues and recommendations provided in the covering submission. The water quality, surface water and groundwater issues and the responses to the jointly commissioned Molino Stewart report have been provided in **Section 4.16.2** of this report. Where appropriate, a cross reference to that response has been provided below.

Issue description – management of surface water

There is little detail around how surface water would be managed.

Response

This issue has been raised within the Molino Stewart report jointly commissioned by Rockdale City, Hurstville and Canterbury Councils, and has been addressed in **Section 4.16.2** of this report.

Issue description – geomorphology impacts

There is a lack of proper assessment of the geomorphological impacts of water discharges from the works on sensitive receiving environments such as creeks and riparian zones.

Response

This issue has been raised within the Molino Stewart report jointly commissioned by Rockdale City, Hurstville and Canterbury Councils, and has been addressed in **Section 4.16.2** of this report.

Issue description – contaminated groundwater inflow

The EIS has assumed non-contaminated groundwater would be arriving from the western section of the project. There is insufficient investigation or monitoring to conclude this.

Response

This issue has been raised within the Molino Stewart report jointly commissioned by Rockdale City, Hurstville and Canterbury Councils, and has been addressed in **Section 4.16.2** of this report.

Issue description – spill containment

The mitigation measures do not require spill containment for spills on the Motorway as a matter of course. Rather, it is to be provided only 'if warranted'. This is not an appropriate mitigation of environmental risk.

Response

This issue has been raised within the Molino Stewart report jointly commissioned by Rockdale City, Hurstville and Canterbury Councils, and has been addressed in **Section 4.16.2** of this report.

Issue description – catchment water quality

The EIS seeks to paint a picture of poor water quality within highly disturbed ecosystems. This is not the case across all catchments within the project area. The data used to set the targets is in some cases old and there is no discussion of trends.

Response

This issue has been raised within the Molino Stewart report jointly commissioned by Rockdale City, Hurstville and Canterbury Councils, and has been addressed in **Section 4.16.2** of this report.

Issue description – Wolli Creek riparian corridor and rehabilitation

There is little discussion of the impacts on the Wolli Creek riparian corridor, no consideration of the Wolli Creek Riparian Corridor Management Plan, nor any detail provided on what rehabilitation there would be.

Response

This issue has been raised within the Molino Stewart report jointly commissioned by Rockdale City, Hurstville and Canterbury Councils, and has been addressed in **Section 4.16.2** of this report.

Issue description – operational water quality reduction targets

The operational water quality reduction targets have not been met on the western side for the suspended solids. This means that 36 percent or approximately 10 tonnes per year of the solids generated would be discharged into the Wolli Creek catchment. There is no mitigation measure compensating this.

Response

This issue has been raised within the Molino Stewart report jointly commissioned by Rockdale City, Hurstville and Canterbury Councils, and has been addressed in **Section 4.16.2** of this report.

Issue description – groundwater quality modelling

Groundwater quality has not been modelled nor have any predictions been made.

Response

Chapter 19 and Appendix Q (Technical working paper: Groundwater) include a detailed assessment of potential groundwater impacts, including groundwater modelling to demonstrate the potential extent of aquifer drawdown as a result of the project. The assessment presents existing groundwater quality data, and includes consideration of potentially affected groundwater users.

The assessment of groundwater impacts presented in the EIS were undertaken in accordance with the SEARs issued for the project by DP&E.

The Molino Stewart report provided further detailed comments on the groundwater modelling which relates to this issue raised by Rockdale City Council. Responses to these issues have been provided in **Section 4.16.2** of this report.

Issue description – impact of salt water intrusion on groundwater

The EIS needs to assess the impacts on salt water intrusion to the groundwater.

Response

This issue has been raised within the Molino Stewart report jointly commissioned by Rockdale City, Hurstville and Canterbury Councils, and has been addressed in **Section 4.16.2** of this report.

Issue description – groundwater water drawdown impacts on surface water systems

The EIS needs to assess the impacts on the surface water bodies that would arise due to the drawdown of the water table.

Response

This issue has been raised within the Molino Stewart report jointly commissioned by Rockdale City, Hurstville and Canterbury Councils, and has been addressed in **Section 4.16.2** of this report.

Issue description – groundwater modelling

Data on the full extent of the impacts on the water table from the M5 East needs to be collected and inform the groundwater modelling for the New M5.

Response

This issue has been raised within the Molino Stewart report jointly commissioned by Rockdale City, Hurstville and Canterbury Councils, and has been addressed in **Section 4.16.2** of this report.

Issue description – duration of baseline surface and groundwater water quality data

Up-to-date water quality data for both surface water and groundwater needs to be collected across the entire area of potential impact. This should be for a sufficient duration (longer than 12 months at a minimum) and used to inform the impact assessment.

Response

This issue has been raised within the Molino Stewart report jointly commissioned by Rockdale City, Hurstville and Canterbury Councils, and has been addressed in **Section 4.16.2** of this report.

Issue description – fracturing or cracking of creek beds

Further investigation is necessary to understand and minimise the risks relating to the fracturing or cracking of creek beds, especially as a result of dewatering.

Response

This issue has been raised within the Molino Stewart report jointly commissioned by Rockdale City, Hurstville and Canterbury Councils, and has been addressed in **Section 4.16.2** of this report.

Issue description – Wolli Creek riparian corridor management plan

The EIS needs to have full consideration to the Wolli Creek riparian corridor management plan.

Response

This issue has been raised within the Molino Stewart report jointly commissioned by Rockdale City, Hurstville and Canterbury Councils, and has been addressed in **Section 4.16.2** of this report.

4.11.5 Biodiversity

Rockdale City Council jointly engaged Molino Stewart with Hurstville and Canterbury Councils to review the biodiversity assessment within the EIS. Rockdale City Council's covering submission identified key issues and recommendations. In doing so, Rockdale City Council noted that its key issues and recommendations are to be considered in conjunction with the findings and recommendations of the Molino Stewart report.

This section provides a summary and response to the key issues and recommendations provided in the covering submission. The biodiversity issues and the responses to the jointly commissioned Molino Stewart report have been provided in **Section 4.16.3** of this report. Where appropriate, a cross reference to that response has been provided below.

Issue description – mitigation measures

Rockdale City Council wishes to work with the NSW Government and agencies to minimise the impacts on their natural environment. The range of impacts is significant. It is unclear from the Biodiversity Assessment Report whether the mitigation measures are adequate to address the direct and indirect impacts of the proposal.

Response

Chapter 6 of the Technical working paper: Biodiversity Assessment Report (Appendix S of the EIS) discusses avoidance and minimisation of direct and indirect impacts. Section 6.6.3 and Table 22 of that technical working paper provides an assessment of the expected or predicted effectiveness of the proposed avoidance and mitigation measures.

The measures proposed for avoiding indirect impacts during construction have been considered by OEH and found to be appropriate.

Issue description – species not considered in the Technical working paper: Biodiversity assessment report

There are a number of species and vegetation communities that were not considered in the assessment including the Powerful Owl, Micro-bats and indirect impacts to Swamp Oak, Freshwater Wetlands and Coastal Saltmarsh vegetation near the Marsh Street/Eve Street wetlands. There is also potential impact to sensitive habitats and potentially other vegetation due to temporary changes to groundwater levels during construction. These need further quantification to be fully assessed.

Response

This issue has been raised within the Molino Stewart report jointly commissioned by Rockdale City, Hurstville and Canterbury Councils, and has been addressed in **Section 4.16.3** of this report.

Issue description – impacts on the Green and Golden Bell Frog population

The identified impacts to the Green and Golden Bell Frog population on the Kogarah Golf Course are significant and permanent. The assessment does not fully consider these impacts on the potential extinction of a local population of this species.

In the absence of a detailed amphibian survey being conducted as part of the biodiversity assessment report, and if the required biodiversity offsets cannot be acquired within the Arncliffe area, a species impact statement (SIS) should be developed to provide further information. The SIS should guide the additional mitigation measures proposed for this species, and be developed in consultation with local councils.

Response

This issue has been raised within the Molino Stewart report jointly commissioned by Rockdale City, Hurstville and Canterbury Councils, and has been addressed in **Section 4.16.3** of this report.

Issue description –recommended mitigation for the Green and Golden Bell Frog population

The following actions are recommended:

- Redesign the layout of the MOC3. At present, the southern extension of this compound creates a significant barrier to movement through Kogarah Golf Course towards the constructed RTA ponds and Marsh Street / Eve Street wetlands. Preference would be for a wider compound aligned along the northern boundary of the golf course next to Marsh Street to maintain connection between the waterways on the golf course and the cycleway under the M5 East motorway.
- Commence the establishment of any artificial wetland that is designed to supplement the existing RTA ponds at the earliest possible time to provide suitable habitat prior to removal of existing habitat from Kogarah golf course (refer to **Section 7.1** of this report).
- Develop a fauna relocation plan to populate other potential breeding sites.
- Develop a management plan for the waterways on the golf course to provide additional breeding opportunities. This may involve the dewatering of these areas and removal of exotic fish.
- Include local government in review process of subsequent Flora and Fauna management plans for the New M5.

Response

This issue has been raised within the Molino Stewart report jointly commissioned by Rockdale City, Hurstville and Canterbury Councils, and has been addressed in **Section 4.16.3** of this report.

Issue description – assessment of impacts on Grey-headed Flying-fox

Consider Rockdale Council management plan for Grey-headed Flying-fox and undertake local assessments/surveys to gain an understanding of the likely impacts from removal of Swamp Sclerophyll Forest Endangered Ecological Community (EEC).

Response

This issue has been raised within the Molino Stewart report jointly commissioned by Rockdale City, Hurstville and Canterbury Councils, and has been addressed in **Section 4.16.3** of this report.

Issue description – management of Marsh Street / Eve Street wetlands

Develop a vegetation management plan to enhance the existing habitat of the Swamp Oak and Freshwater Wetlands EEC identified in the Marsh Street and Eve Street wetlands, and potentially areas of Coastal Saltmarsh to support migratory birds and frog species.

Response

This issue has been raised within the Molino Stewart report jointly commissioned by Rockdale City, Hurstville and Canterbury Councils, and has been addressed in **Section 4.16.3** of this report.

4.12 Marrickville Council

Issue description – general opposition

Marrickville Council has for many years opposed inner city motorways and has recently confirmed its absolute opposition to the WestConnex project. Council views WestConnex as an outdated solution to Sydney's transport needs that would entrench car dependency, divert funds from essential public transport and undermine liveability.

Council also has concerns about the WestConnex planning process, including a poor business case, announcement of contractors prior to release of EISs and exhibition of the New M5 EIS over the end-of-year holiday period.

Response

Council's position is noted.

WestConnex needs to be viewed as part of an extensive plan to meet Sydney's growing transport and infrastructure needs. It is fully integrated into the State's infrastructure transport and planning strategies, including the *State Infrastructure Strategy 2012-2032* (Infrastructure NSW, 2012a) (the State Infrastructure Strategy) and the *NSW Long Term Transport Master Plan* (Transport for NSW, 2012). While the WestConnex programme of works has a role to play in easing Sydney's congestion, it is not designed to solve all of Sydney's transport problems.

WestConnex is intended to be delivered as an integrated package of transport improvements across Sydney, with complementary enhancements to the existing road network (including associated surface street changes, bus priority measures, and heavy vehicle access improvements), redesign of bus services and facilities, improved access to rail stations and upgrades to cyclist and pedestrian facilities.

The need for the WestConnex project has been identified in a number of strategic planning documents including, *NSW 2021: A Plan to Make NSW Number One* (NSW Department of Premier and Cabinet 2011), *State Infrastructure Strategy* and the Transport Master Plan. The NSW Long Term Transport Master Plan in particular highlights WestConnex as a critical link in Sydney's motorway network and the immediate priority for the NSW Government.

A detailed explanation of the need for the project is presented in Chapter 3 of the EIS. Project benefits are presented Section 5.3.7 and in Chapter 31 of the EIS.

The New M5 is part of the second stage of WestConnex and would provide a full motorway connection between Kingsgrove and St Peters. Future stages of WestConnex would link this project with Sydney's south-west, Sydney Airport and the Port Botany precinct.

Once approved and constructed, the project would play a key role in supporting the financial delivery of proposed future stages of WestConnex by using toll revenue to raise private sector debt. Investment in the project and subsequent stages of WestConnex would facilitate a step change in network performance, enabling delivery of major city shaping improvements and delivering economic growth.

Integrated land use and transport planning initiatives are key factors in developing a future where Sydney's growing population can reliably access jobs and services. The project complements a number of other transport and freight based infrastructure initiatives identified in the Transport Master Plan. Ultimately, it is the combination of these initiatives that would best address global Sydney's needs.

Sydney's freight, service and business task requires distribution of goods and services across the Sydney region, which relies on more diverse and dispersed point-to-point transport connections. The project supports this task by improving access to, and reliability of, the motorway network. The project would also provide a high quality road connection between key centres in the global economic corridor, such as the Parramatta and Sydney CBDs.

Economic and financial appraisals for each stage of WestConnex were presented in the *WestConnex Updated Strategic Business Case* (NSW Government 2015), consolidating the work undertaken in the original business case, with the significant modelling, analysis and scope enhancements completed in the past 24 months.

The Updated Strategic Business Case includes:

- A strategic justification for WestConnex in the context of key strategies and plans
- An updated reference design, including details of the options development process that lead to key alignment changes
- Budget and cost estimates for the whole of WestConnex
- Details of the proposed tolling regime
- Traffic demand and operational traffic modelling results, including details of travel time savings and interchange performance
- An economic appraisal, including cost benefit analysis
- A financial appraisal, including project cash flows based on the reference tolling scenario
- Details of staging, procurement and financing
- A description of the project governance model
- Details of environmental and sustainability principles
- A communications and stakeholder strategy.

The Updated Strategic Business Case also includes technical papers that provide additional detail in relation to traffic modelling, economic appraisal, updated strategic environmental review and a timeline for consultation activities.

The Updated Strategic Business Case can be found on the WestConnex website site at www.westconnex.com.au/documents/updated_strategic_business_case.pdf

In developing the New M5 project, Roads and Maritime has endeavoured to identify and pursue reasonable opportunities to streamline project delivery in recognition of the project's strategic importance to the NSW economy and State productivity. These activities would allow timely implementation of the project if it is approved by the Minister for Planning and would support delivery of the project's benefits as soon as possible. These activities do not undermine the EIS process and it is a matter for the Minister for Planning to determine whether the project should be approved and, if approved, the conditions of any such approval.

As the approval authority for the project, the Minister for Planning has the discretion under the *Environmental Planning and Assessment Act 1979* (EP&A Act) to refuse or approve the project, and to impose such conditions on an approval, including requirements for design changes, as the Minister may consider appropriate. In making a decision on the project, the Minister is not bound or constrained in any way by separate activities carried out to date, including selection of a design and construct contractor.

If the project receives planning approval, design updates may be required to meet conditions of approval applied by the Minister for Planning. Any such updates would be carried out during the detailed design phase, which is the typical approach for major infrastructure projects of this scale and nature.

The EIS states that, 'subject to approval, the project would proceed in mid-2016' rather than that it 'will proceed'.

A competitive tender process for the design and construction of the New M5 was conducted to identify an innovative, cost effective and environmentally responsive design within the New M5 project corridor, as identified in the *New M5 State Significant Infrastructure Application Report* (AECOM, 2015a). Three separate tenders, including individual tender designs were received on Friday 27 March 2015. These tenders were subject to several stages of evaluation to arrive at the preferred tender design that has formed the basis of this EIS.

The tender evaluation was separated into categories, including engineering design, environmental and social performance and project cost (including upfront capital expenditure and ongoing operational expenditure). Each of these categories was further divided into a number of sub-categories to allow comparison between the three tender designs. Relevant technical specialists were involved in the tender evaluation.

Under the *Environmental Planning and Assessment Act 1979*, the Secretary of the Department of Planning and Environment is responsible for determining the timing and duration of public exhibition periods for Environmental Impact Statements. In the case of the New M5, the Secretary determined to extend the public exhibition period from the statutory minimum of 30 days to a total of 64 days (27 November 2015 to 29 January 2016) to account for the Christmas and New Year period.

The public exhibition period for the New M5 EIS is more than double the statutory minimum and longer than that for other recent comparable transport infrastructure projects, including NorthConnex (60 days) and the WestConnex M4 East (55 days). As described in Chapter 2 (Community involvement) of this report, consultation activities were ongoing throughout this period including community information sessions and stakeholder meetings. If the project is approved, further consultation would be undertaken with regard to construction activities and the management of impacts.

4.12.1 Strategic issues

Issue description – preferred option selection

The decision that a motorway is the preferred option appears to have been made prior to development of the EIS without a full and transparent business case that includes serious consideration of mixed-mode alternatives, which Council believes would be more effective means of meeting the objectives of *A Plan for Growing Sydney* (NSW Government, 2014) – particularly given the cost of the project and its importance to the future of Sydney.

Response

As described in Section 3.1 of the EIS, the need for the WestConnex project has been identified in a number of strategic planning documents including, *NSW 2021: A Plan to Make NSW Number One* (NSW Department of Premier and Cabinet 2011), *State Infrastructure Strategy 2012–2032* and the *NSW Long Term Transport Master Plan* (Transport for NSW, 2012). The need for the project in particular has been identified in the NSW Long Term Transport Master Plan as a critical link in Sydney's motorway network and the immediate priority for the NSW Government.

WestConnex Updated Strategic Business Case

Economic and financial appraisals for each stage of WestConnex were presented in the *WestConnex Updated Strategic Business Case* (NSW Government 2015) (Updated Business Case), consolidating the work undertaken in the original business case, with the significant modelling, analysis and scope enhancements completed in the past 24 months.

The Updated Strategic Business Case includes:

- A strategic justification for WestConnex in the context of key strategies and plans
- An updated reference design, including details of the options development process that lead to key alignment changes
- Budget and cost estimates for the whole of WestConnex
- Details of the proposed tolling regime
- Traffic demand and operational traffic modelling results, including details of travel time savings and interchange performance
- An economic appraisal, including cost benefit analysis
- A financial appraisal, including project cash flows based on the reference tolling scenario
- Details of staging, procurement and financing

- A description of the project governance model
- Details of environmental and sustainability principles
- A communications and stakeholder strategy.

The Updated Strategic Business Case also includes technical papers that provide additional detail in relation to traffic modelling, economic appraisal, updated strategic environmental review and a timeline for consultation activities.

The Updated Strategic Business Case can be found on the WestConnex website site at www.westconnex.com.au/documents/updated_strategic_business_case.pdf

Consideration of mixed mode transport

The Updated Strategic Business Case clearly defines the importance of road infrastructure in the broader Sydney transport strategy. As in other major cities, public transport is the best option for journeys to dense employment centres, such as the Sydney CBD. In these areas, public transport is already the preferred choice for many commuters and this would continue to be the case.

While public transport can provide for efficient travel between major centres, there would continue to be a need for travel by road to jobs that are dispersed across the metropolitan area and not easily accessed by public transport. In addition, public transport alone cannot provide sufficient point-to-point access to the diverse range of employment and educational hubs, shopping centres or recreational centres, nor can it provide for the safe and efficient delivery of goods and services to Sydney's growing population.

The New M5 would support the economic development of Sydney by providing a high quality and efficient road connection for business and freight vehicles between the 'Global Economic Corridor' including Port Botany and Sydney Airport to Global Sydney. This connectivity is identified in the priority actions to achieve the goals set in *A Plan for Growing Sydney*

Issue description – level and quality of assessment of the project against strategic alternatives

The project adopts a business-as-usual approach without mode-shift targets, and alternatives are assessed in isolation (not as integrated solutions) against motorway project objectives, not against broader planning objectives.

The EIS fails to address the strategic requirements of several of the Secretary's Environmental Assessment Requirements (SEARs):

- No serious assessment of the environmental costs and benefits of the proposal relative to the alternatives, or if the project is in the public interest
- Suggested alternatives only fleetingly considered, and the analysis is narrow and inconclusive, and no information is provided on how the alternatives were selected
- No detail, compared to the amount of detail on the project itself, on the alternative option of widening the existing M5 East
- No description of any public transport alternatives, although mention is made of the existing East Hills line operating over capacity.

No consideration in the EIS has been given to the possibility of implementing a mixed program of road, rail, light-rail, bus, active transport and demand management options. Instead, alternatives are considered only in isolation. This is not consistent with actual behaviour of the travelling public, where travel decisions are made on the speed, reliability and connectivity of various modes.

Council also concurs with the January 2016 SGS Economics & Planning report WestConnex Stage 2 EIS – Review of Strategic Alternatives & Socioeconomic Impacts, commissioned by the City of Sydney. This report shows there are a number of significant issues with the information presented in the New M5 EIS. There is no detail on how the alternatives were developed and a lack of sufficient detail on the scope, timing and cost of each alternative. No integrated solutions that combine road, public transport, land-use and demand management options have been considered.

There is no rigorous quantitative assessment of the pros and cons of alternative multi-modal and demand-management transport options, and how each of these options relates to the objectives of the *NSW State Plan*, *NSW Long-Term Transport Masterplan* (TMP) and *A Plan for Growing Sydney*. Instead the EIS rates alternatives against motorway-biased project objectives before dismissing alternatives and presenting WestConnex as the preferred option.

Response

An assessment of a number of strategic alternatives to the project was included in Section 4.2 of the EIS. The assessment did not extend to macro-economic modelling or comparative cost benefit analysis as these are not typically undertaken in the comparative assessment of alternatives in EISs for major infrastructure and other projects in NSW.

WestConnex is part of an extensive plan to meet Sydney's growing transport and infrastructure needs and is fully integrated into the State's Infrastructure transport and planning strategies, including the *State Infrastructure Strategy* and the *NSW Long Term Transport Master Plan*. While WestConnex plays a role in easing congestion, the WestConnex program of works is not designed to solve all of Sydney's transport problems.

The NSW Government is committed to investing in a range of public transport projects, as identified by the *Transport Master Plan*, the *State Infrastructure Strategy 2012–2032*, *A Plan for Growing Sydney* and the *NSW State Priorities*. The Transport Master Plan provides the framework for delivering an integrated, modern and multi-modal transport system by identifying NSW's transport actions and investment priorities for the next 20 years.

During the development of the *NSW Long Term Transport Master Plan*, all modes and their benefits were considered. The construction of new and upgraded roads in Sydney is necessary to meet the continued demand for the movement of people, goods and services across Sydney. As mentioned in section 4.2.3 of the EIS, investment in public transport and freight facilities is one of a number of options available to improve congestion on Sydney's roads. The NSW Government is already directing funding towards a number of public transport (eg buses, trains and ferries) and freight projects (eg Northern Sydney Freight Corridor projects), which, coupled with investment in roads would improve congestion on Sydney's roads.

Continued demand for the movement of people, goods and services across the Sydney metropolitan region requires that new roads be constructed and existing roads be upgraded. Section 4.2 of the EIS considered the strategic alternatives to the project based on the extent to which those alternatives could meet the objectives of the project and their comparative performance across transport, environmental, engineering, social and economic factors.

WestConnex was a recommendation of Infrastructure NSW in October 2012, with Government adopting the concept in the 2012 *State Infrastructure Strategy* and the *NSW Long Term Transport Master Plan*. This was followed by the development of a business case, which was approved by Government in August 2013. An Executive Summary of that business case was publicly released. In November 2015, the Updated Strategic Business Case was released, which consolidates the work undertaken in the original business case, with the significant modelling, analysis and scope enhancements completed in the past 24 months.

The Updated Strategic Business Case includes:

- A strategic justification for WestConnex in the context of key strategies and plans
- An updated reference design, including details of the options development process that lead to key alignment changes
- Budget and cost estimates for the whole of WestConnex
- Details of the proposed tolling regime
- Traffic demand and operational traffic modelling results, including details of travel time savings and interchange performance
- An economic appraisal, including cost benefit analysis
- A financial appraisal, including project cashflows based on the reference tolling scenario

- Details of staging, procurement and financing
- A description of the project governance model
- Details of environmental and sustainability principles
- A communications and stakeholder strategy.

The Updated Strategic Business Case includes technical papers providing additional detail in relation to traffic modelling, economic appraisal, updated strategic environmental review, and timeline of consultation activities.

The Updated Strategic Business Case can be found on the WestConnex website site at www.westconnex.com.au/documents/updated_strategic_business_case.pdf

Issues identified in the SGS Report commissioned by the City of Sydney have been addressed in **Section 4.14.4** of this report.

Issue description – negative local level impacts

The significant expenditure on this project would result in many negative impacts at the local level and few benefits to wider community, including toll-paying motorists.

Response

The project would deliver the following benefits at the local level:

- Cleaning up and closing the longstanding Alexandria Landfill and rehabilitating the site to include approximately 6 hectares of high quality new public open space which would ultimately become an extension of Sydney Park
- Provision of about 14 km of improved pedestrian and cycle path connections, through and around the St Peters interchange, between Alexandria and Sydney Park, and Between St Peters and Mascot, completing a regional cycle connection.
- Improved shared facilities in Kingsgrove.

More broadly, the project would deliver the following benefits:

- Between 2021 and 2031, average travel times on the M5 East Motorway would generally be halved and average travel speeds would double during the morning and afternoon peak, improving the efficiencies of intrastate and interstate freight movements through travel time saving and reduced operating costs.
- Providing new connections for the residential, commercial and industrial growth in Sydney's south-west, including along the M5 corridor
- Doubling the capacity of the M5 corridor

With the completion of the full WestConnex program of works, average travel times and speeds would improve further. The project would have an average travel time of between nine and 10 minutes, improving connectivity for residents and businesses throughout the corridor at a speed of 68 kilometres per hour in both directions during the morning and afternoon peak in 2021 and in 2031.

Tolling of a motorway applies a 'user-pays' principle to provide an alternative source of funding to government. This reduces the burden on the NSW taxpayers by allowing the project to better fit within the financial capacity of the government, facilitating the overall financing strategy for the motorway and providing opportunities for the funds which would have been used by government to construct the New M5 to be diverted to other areas of strategic benefit.

The environmental management measures presented in Chapter 30 of the EIS, as amended in **Chapter 8** (Revised environmental management measures) of this report, outline management actions during construction and operation of the project.

Issue description – consistency with Government plans

The project is not likely to meet many of its own objectives and the objectives of *A Plan for Growing Sydney* – such as improved access from western Sydney to jobs in the CBD and major centres and improved freight transport from Port Botany and Sydney Airport to western Sydney.

The EIS is incongruous with the Initial Need for the Project as set out in the EIS. It states that the overarching key driver for this project is the growth Sydney is expected to see in the coming decades. Specifically, employment growth is expected to be predominantly in the eastern half of Sydney within Global Economic Corridor, whilst population growth is expected to be stronger in the west. Council is of the view that multi-modal options that include quality public transport and demand management measures is a more economically efficient way of serving the commuter market than a motorway-only option.

Although the *NSW Long Term Transport Master Plan* is regularly referred to in the EIS, there are numerous sections of this masterplan that encourage transport projects that reduce car use, which is contrary to this project's outcomes.

Response

The Government's strategy for the delivery of an integrated transport network is presented in detail in the *NSW Long Term Transport Master Plan* (Transport for NSW, December 2012) and the integrated modal delivery plans that sit under it. The New M5 project and the broader WestConnex program of works form just one part of the strategy to deliver a truly integrated multi modal transport system for Sydney as well as rural and regional New South Wales. Commuting demand is only a proportion of the demand along the M5 East Motorway corridor. The key customer markets identified for the project include highly dispersed and long distance passenger movements, as well as heavy and light freight and commercial services and businesses whose travel patterns are also highly dispersed and diverse in nature. These customers have highly varied requirements when it comes to the transfer of goods and services. These requirements include the transport of containerised freight by rigid and articulated trucks, light trucks, vans, utility vehicles and cars. Public transport would only partially address these customer demands. No feasible strategic transport alternatives such as heavy or light rail options or bus corridor enhancements would meet the diverse range of customer needs for travel in this corridor and address the project objectives as effectively as the project and the broader WestConnex program of works.

The full WestConnex program of works would provide a high quality and efficient road network connection for commuters, businesses and the freight industry to and from, Sydney's west and south west. This would provide opportunities for new employment zones along the M4 and M5 corridor including in the outer western and south western suburbs.

As detailed in *A Plan for Growing Sydney*, Sydney is expected to have 689,000 additional jobs by 2031, many of which are expected to be located in Western Sydney in response to an expected population increase of 900,000 in the area. A large percentage of these jobs would be located in zoned employment areas or in areas still to be investigated, such as around the future Western Sydney Airport, which is expected to produce up to 19,900 jobs for Western Sydney (Western Sydney Airport Alliance, 2013).

A Plan for Growing Sydney and *The NSW Long Term Transport Master Plan* both identify the need to prioritise development of centres such as Parramatta, Penrith and Liverpool to bring jobs closer to homes and areas of increasing population. However, there will continue to be growth in jobs in eastern Sydney over the same time period, despite the higher rate of growth in population in Western Sydney during the next few decades, and the development of the employment hubs and the Western Sydney Airport. The Australian Government has indicated that the Western Sydney Airport at Badgerys Creek may be opened in the mid-2020s, but that Sydney Airport will continue to be the primary airport for both passengers and freight.

The *NSW Long Term Transport Master Plan* identified that Western Sydney is currently home to 47 per cent of Sydney's residents but only 37 per cent of Sydney's jobs (Transport for NSW, 2012a). Although jobs growth in Western Sydney is forecast to be strong, surpassing that of the eastern half of the city in the coming decades, it is not forecast to match the job numbers of the city's eastern half (Bureau of Transport Statistics, 2014). This disparity is due to a complex mix of factors including greater housing affordability in Sydney's west, and the existing employment zones and infrastructure that support stronger business investment and location decisions in the global economic corridor and in Sydney's eastern half more generally. As outlined in *A Plan for Growing Sydney*, 28 per cent of workers who live in Western Sydney, work in other areas of Sydney and therefore are required to travel to work by car or on public transport.

There is still a need to provide a link between Western Sydney and other centres in Sydney such as the Sydney CBD, Sydney Airport and Port Botany. These connections are required to allow not only for the flow of workers, but also for the effective flow of goods and freight which can only occur by road transport, as rail does not provide point-to-point access to individual homes, industrial warehouses or commercial premises. By improving connectivity and enhancing the flow of people and goods to Sydney's south west, the project would also encourage business and industry investment and, as a result, employment opportunities, in south west centres.

While rail and public transport do provide for efficient travel between major centres, there will continue to be a need for travel by road to jobs that are dispersed across the metropolitan area and not easily accessed by public transport. In addition, public transport alone cannot provide sufficient point-to-point access to the diverse range of employment and educational hubs, shopping centres or recreational centres, nor can it provide for the safe and efficient delivery of goods and services to Sydney's growing population.

The *WestConnex Updated Strategic Business Case* (NSW Government 2015) (Updated Strategic Business Case) clearly defines the importance of road infrastructure in the broader Sydney transport strategy. As in other major cities, public transport is the best option for journeys to dense employment centres, such as the Sydney CBD. In these areas, public transport is already the preferred choice for many employees and that will continue to be the case in future.

The New M5 would support the economic development of Sydney by providing a high quality and efficient road connection for business and freight vehicles in between the 'global economic corridor' including Port Botany and Sydney Airport to Global Sydney. This connectivity is identified in the priority actions to achieve the goals set out in *A Plan for Growing Sydney* (NSW Government 2014).

The Technical working paper: Traffic and transport (Appendix G of the EIS) provides a detailed assessment, based on traffic modelling, of the operational traffic impacts of the New M5 project as well as the full WestConnex program of works.

The assessment concluded that the project would significantly reduce vehicle travel time along the M5 East corridor between King Georges Road in the west and Foreshore Road in the east (refer to Section 10.4 of the Technical working paper: Traffic and transport in Appendix G of the EIS). This would ensure greater accessibility between Sydney's south western suburbs as well Sydney Airport and Port Botany. The New M5 would also operate at an improved Level of Service compared to the current road network and would ultimately provide connectivity to the M4–M5 Link, making it a desirable choice for motorists. As part of the full WestConnex project, the New M5 would help to complete Sydney's motorway network and therefore connectivity between the major centres.

Issue description – induced demand in relation to public transport

Induced traffic is incompletely and inflexibly assessed in the EIS, with impacts on public transport patronage and active transport volumes not fully examined.

Response

The Technical working paper: Traffic and transport (Appendix G to the EIS) is based on traffic modelling using the WestConnex Road Traffic Model (WRTM), which relies on forecasts of car driver demand sourced from the Sydney Strategic Travel Model (STM) operated by the Transport for NSW Bureau of Statistics and Analytics. The STM uses projections of population and employment for the Sydney and forecasts mode choice between car, rail, bus, light rail and ferry modes for future infrastructure scenarios. The modelling with STM for the EIS incorporated currently planned public transport schemes including Sydney Metro and CBD and South East Light Rail. The car driver demands forecast using STM after allowing for mode share due to these public transport projects under congested road conditions was subsequently used for forecasting WestConnex toll choice in WRTM. As such, the assessment incorporates the effects of future demands for public transport.

Secondary vehicle travel is usually generated from new transport infrastructure such as road projects. The Updated WestConnex Strategic Business Case acknowledges that the construction of new roads can induce more people to travel on the road network. This is predicted to increase 2031 future year traffic volumes using WestConnex by between two per cent and seven per cent. The predicted induced travel demand was incorporated into the WestConnex Road Traffic Model (see Section 9.1.4 of the EIS).

The traffic and transport assessment shows that in both 2021 and 2031, the forecast reduction in traffic along the M5 East would result in improved speed, journey reliability and safety in this corridor. In the St Peters area, reductions in average delay and congestion are anticipated during both future years (2021 and 2031) compared to the 'do minimum' scenarios. The operational performance of the network, including predicted traffic volumes under the 'with project' scenarios which have incorporated induced demand forecasts, is discussed in detail in Chapter 9 and Appendix G of the EIS.

On an average weekday in 2031, the combined number of new road trips and trips redeployed from public transport as a result of improved traffic conditions from the full WestConnex program of works is estimated to be around 0.4 per cent of the total number of daily car trips on the WRTM Sydney-wide network at that time.

The method used for the induced demand analysis for the WestConnex project was independently reviewed by Professor David Hensher, Director of the Institute of Transport and Logistics Studies at the University of Sydney. Through independent analysis, Professor Hensher verified that the method was sound and specifically calculated that the parameters proposed by the New Zealand Transport Agency Economic Evaluation Manual were appropriate for use in Sydney.

Issue description – level and quality of the economic impact assessment

The economic impact assessment in the EIS does not provide justification for the proposal as it lacks a comprehensive assessment of the impacts based on detailed modelling, cost/benefit analysis, inclusion of opportunity costs and a robust business case.

Response

The scope of the EIS was designed to address the SEARs, which focussed on the impacts to directly affected properties and land uses; businesses in the vicinity of the project; and the community. Detailed modelling, cost/benefit analysis, and the inclusion of opportunity costs is provided in the *WestConnex Updated Strategic Business Case* (NSW Government 2015) (Updated Business Case).

In November 2015, the NSW Government released the Updated Strategic Business Case which consolidated the work undertaken in the original business case with the significant modelling, analysis and scope enhancements completed in the past 24 months.

The Updated Strategic Business Case includes:

- a strategic justification for WestConnex in the context of key strategies and plans
- an updated reference design, including details of the options development process that led to key alignment changes
- budget and cost estimates for the whole of WestConnex

- details of the proposed tolling regime
- results of traffic demand and operational traffic modelling, including details of travel time savings and interchange performance
- an economic appraisal, including cost benefit analysis
- a financial appraisal, including project cash flows based on the reference tolling scenario
- details of staging, procurement and financing
- a description of the project governance model
- details of environmental and sustainability principles
- a communications and stakeholder strategy.

The Updated Strategic Business Case also includes technical papers that provide additional detail in relation to traffic modelling, economic appraisal, updated strategic environmental review and a timeline for consultation activities.

The Updated Strategic Business Case can be found on the WestConnex website site at www.westconnex.com.au/documents/updated_strategic_business_case.pdf

Issue description – assessment of socio-economic impact on city shaping

The economic impact assessment does not consider the negative 'cityshaping' (urban form and liveability) impacts of the project.

The EIS's assessment of socio - economic impacts is limited by methodological flaws, particularly the mismatch between the Study Areas used by the Social and Economic Impact Assessment and the Traffic and Transport assessment.

Response

The study area for the social and economic impact assessment in Appendix M of the EIS was focused on the six LGAs within which the New M5 project is located, as well as the wider catchment that relates to the use of the New M5 Motorway, including the Greater Sydney region and Sydney CBD.

As the majority of the project would be in tunnels, direct socio-economic impacts would be limited to areas close to the western (eg Kingsgrove and Beverly Hills) and eastern (eg St Peters) extents of the project and at other locations where temporary (construction) and permanent (operational) surface infrastructure facilities are proposed for the project.

While social impacts generally occur at a community level, business impacts such as changes to turnover or employment generally occur at the location of the business activity. Technical working paper: Social and economic (Appendix M of the EIS) recognises that economic impacts associated with the movement of freight and commercial vehicles, as well as the indirect social impacts that occur as a result of these, occur on a broader regional, state and national scale. Technical working paper: Social and economic (Appendix M of the EIS) assesses a wider area of influence than the Technical working paper: Traffic and transport Assessment and is based on geographical statistical areas in the context of the broader Greater Sydney area.

City-shaping as a result of major infrastructure is typically assessed on a strategic planning level prior to the proposed development and approval of a project. The NSW Long Term Transport Master Plan (2012) identifies that the WestConnex program of works would provide a change in Sydney's connectivity, as a step towards creating a connected motorway network, providing improvements in freight efficiency and productivity, as well as alleviating congestion and improving access to areas such as the Port Botany and Sydney Airport precinct.

City-shaping elements have been considered as part of Chapter 14 (Visual impacts and urban design). In particular, Table 14-13 of the EIS provides an assessment of the project elements against the WestConnex Urban Design Framework which includes objectives on place-making, urban renewal and liveability.

Chapter 15 (Social and economic) and Appendix M (Technical working paper: Social and economic) of the EIS assess the potential impacts of the project's construction and operation, including the socio-economic impacts of increased traffic on local roads. Forecast traffic volumes indicate that King Georges Road, Stoney Creek Road and the Princes Highway would experience increases in traffic after the opening of the project due to some drivers diverting through these roads to avoid motorway tolls on the M5 East Motorway and New M5. The increase in traffic on local roads, the indirect amenity impacts and the resultant impacts to socio-economics are assessed in Chapter 15 (Social and Economic) and Appendix M (Technical Working Paper: Social and Economic) of the EIS.

Issue description – lack of strategic justification

Council supports the *2015 Strategic Review & Transport Modelling* of WestConnex report prepared by SGS Economics & Planning and Veitch Lister Consulting prepared for the City of Sydney, which states that WestConnex:

- won't improve access to city centre jobs as 90 per cent of western Sydney workers commute to the city on overcrowded public transport;
- doesn't align with A Plan for Growing Sydney's objective of create job opportunities in Western Sydney and transport links to them;
- won't help transfer freight from Port Botany and Sydney Airport to Western Sydney as critical linking roads are not funded;
- doesn't take into account Badgerys Creek Airport;
- would funnel thousands more cars into Newtown, St Peters, Erskineville, Alexandria, Waterloo, Redfern and Green Square;
- would blight Sydney Park with fast moving traffic, tunnel portals, ramps and ventilation outlets; and
- won't assist the revitalisation of Parramatta Road.

Response

This issue has been referenced by the Marrickville Council from the SGS and VLC report commissioned by the City of Sydney and has been addressed in **Section 4.14.3** of this report.

The WestConnex program of works would provide a high quality and efficient road network connection for commuters, businesses and the freight industry to and from, Sydney's west and south west. This would provide opportunities for new employment zones along the M4 and M5 corridor including in the outer western and south western suburbs.

As detailed in A Plan for Growing Sydney, Sydney is expected to have 689,000 additional jobs by 2031, many of which are expected to be located in Western Sydney in response to an expected population increase of 900,000 in the area. A large percentage of these jobs will be located in zoned employment areas or in areas still to be investigated, such as around the future Western Sydney Airport, which is expected to produce up to 19,900 jobs for Western Sydney (Western Sydney Airport Alliance, 2013).

A Plan for Growing Sydney and The *NSW Long Term Transport Master Plan* both identify the need to prioritise development of centres such as Parramatta, Penrith and Liverpool to bring jobs closer to homes and areas of increasing population. However, there would continue to be growth in jobs in eastern Sydney over the same time period, despite the higher rate of growth in population in Western Sydney during the next few decades, and the development of the employment hubs and the Western Sydney Airport. The Australian Government has indicated that the Western Sydney Airport at Badgerys Creek may be opened in the mid-2020s, but that Sydney Airport will continue to be the primary airport for both passengers and freight.

The *NSW Long Term Transport Master Plan* identified that Western Sydney is currently home to 47 per cent of Sydney's residents but only 37 per cent of Sydney's jobs (Transport for NSW, 2012a). Although jobs growth in Western Sydney is forecast to be strong, surpassing that of the eastern half of the city in the coming decades, it is not forecast to match the job numbers of the city's eastern half (Bureau of Transport Statistics, 2014). This disparity is due to a complex mix of factors including greater housing affordability in Sydney's west, and the existing employment zones and infrastructure that support stronger business investment and location decisions in the global economic corridor and in Sydney's eastern half more generally. As outlined in *A Plan for Growing Sydney*, 28 per cent of workers who live in Western Sydney, work in other areas of Sydney and therefore are required to travel to work by car or on public transport.

There is still a need to provide a link between Western Sydney and other centres in Sydney such as the Sydney CBD, Sydney Airport and Port Botany. These connections are required to allow not only for the flow of workers, but also for the effective flow of goods and freight, much of which can only occur by road transport as rail does not provide point-to-point access to individual homes, industrial warehouses or commercial premises. By improving connectivity and enhancing the flow of people and goods to Sydney's south west, the project would also encourage business and industry investment and, as a result, employment opportunities, in south west centres.

While rail and public transport do provide for efficient travel between major centres, there will continue to be a need for travel by road to jobs that are dispersed across the metropolitan area and not easily accessed by public transport. In addition, public transport alone cannot provide sufficient point-to-point access to the diverse range of employment and educational hubs, shopping centres or recreational centres, nor can it provide for the safe and efficient delivery of goods and services to Sydney's growing population.

The *WestConnex Updated Strategic Business Case* (NSW Government 2015) (Updated Business Case) clearly defines the importance of road infrastructure in the broader Sydney transport strategy. As in other major cities, public transport is the best option for journeys to dense employment centres, such as the Sydney CBD. In these areas, public transport is already the preferred choice for many employees and that will continue to be the case in future.

The New M5 would support the economic development of Sydney by providing a high quality and efficient road connection for business and freight vehicles in between the 'global economic corridor' including Port Botany and Sydney Airport to Global Sydney. This connectivity is identified in the priority actions to achieve the goals set out in *A Plan for Growing Sydney* (NSW Government 2014).

The Technical working paper: Traffic and transport (Appendix G of the EIS) provides a detailed assessment, based on traffic modelling, of the operational traffic impacts of the New M5 project as well as the full WestConnex program of works.

The assessment concluded that the project would significantly reduce vehicle travel time along the M5 East corridor between King Georges Road in the west and Foreshore Road in the east (refer to Section 10.4 of the Technical working paper: Traffic and transport in Appendix G of the EIS). This would ensure greater accessibility between Sydney's south western suburbs as well Sydney Airport and Port Botany. The New M5 would also operate at an improved Level of Service compared to the current road network and would ultimately provide connectivity to the M4–M5 Link, making it a desirable choice for motorists. As part of the full WestConnex project, the New M5 would help to complete Sydney's motorway network and therefore connectivity between the major centres.

Section 9.3.2 and the Technical working paper: Traffic and transport at Appendix G of the EIS include a thorough assessment of the predicted operational traffic impacts of the project on the local and regional road network. The existing traffic and transport environment and the potential traffic and transport related impacts associated with the project, have been described in the context of the two key components of the project:

- The M5 East Motorway corridor (comprising the M5 East Motorway, the main alignment tunnels between the two ends of the project and the St Peters interchange)
- The local roads around St Peters interchange and Sydney Park (comprising the suburbs of Mascot, Eastlakes, Kensington, Kingsford, Erskineville, Alexandria, Newtown and Zetland).

Impacts to Sydney Park are addressed separately in **Section 4.12.2** of this report.

The revitalisation of Parramatta Road is beyond the scope of this EIS.

Issue description – the New M5 does not connect people to high value jobs

The New M5 does not connect people to areas with jobs growth and high value jobs in Global Sydney, a key priority for the Central Subregion in *A Plan for Growing Sydney*.

Response

The project has the ability to connect residential communities with locations of employment, including Macquarie Park, Norwest Business Park as well as at Port Botany and Sydney Airport due to reduced congestion and decreased travel times. The project provides greater accessibility for residents of south and southwest Sydney to access Sydney Airport and Sydney CBD.

Observations on regional traffic behaviour are provided in Appendix G (Technical working paper: Traffic and transport) of the EIS and an overview of travel patterns is provided in Appendix M (Technical working paper: Social and economic) of the EIS.

Chapter 15 (Social and economic) and Appendix M (Technical working paper: Social and economic) of the EIS assess the potential impacts of the project's construction and operation, including the socio-economic impacts of increased traffic on local roads. Forecast traffic volumes indicate that King Georges Road, Stoney Creek Road and the Princes Highway would experience increases in traffic after the opening of the project due to some drivers diverting through these roads to avoid motorway tolls on the M5 East Motorway and the New M5. The increase in traffic on local roads, the indirect amenity impacts and the resultant impacts to socio-economics are assessed in Chapter 15 (Social and economic) and Appendix M (Technical working paper: Social and economic) of the EIS.

In addition, local road upgrades proposed as part of the project would include provision of new and upgraded pedestrian and cycle infrastructure, which is valued by the local community in terms of connectivity and access and in supporting an active lifestyle. This infrastructure has been designed to maintain and enhance pedestrian and cyclist accessibility and connectivity, particularly around the St Peters interchange and Sydney Park.

Issue description – impact on urban renewal areas

The impacts on Urban Renewal in Ashmore and Green Square are not adequately addressed

Response

There are not expected to be any specific adverse impacts to Ashmore or Green Square as a result of the New M5.

An assessment of the impact of the project on residential and commercial property prices has not been included in the preparation of the EIS given the large number of factors that influence the value of a property. However, Appendix M (Technical Working Paper: Social and Economic) of the EIS recognises that impacts on property values prior to and during construction would be of a temporary nature, and are likely to include uncertainty amongst property owners about property acquisition and the magnitude of potential amenity, accessibility and construction traffic impacts, as well as potential impacts to the perceived value of properties during the construction period.

The long term impact of the project on property values would be influenced by the long term benefits of the project as perceived in the land and property markets, arising from general overall improvements in amenity, including improved air quality, reduced traffic noise and improved road safety on local surface roads as traffic is diverted from them to the new tunnel.

It is very difficult to anticipate market perceptions, particularly as these in turn are influenced by broader macroeconomic considerations (eg strength of the economy, outlook for economic growth, interest rate levels and availability of finance, unemployment levels). As such, a reliable assessment of the interaction between the project and the property market cannot be made with any certainty.

Issue description – congestion in King Street, Newtown

The impact on congestion in King Street, Newtown has not been adequately addressed.

Response

The NSW Government has made clear public statements that there is no intention to extend clearway hours through King Street. The NSW Government position remains unchanged. Modifications to King Street do not form part of the Project.

Roads and Maritime is committed to development and implementation of the King Street Gateway in consultation with Relevant Councils, including the Marrickville Council, which may include re-design of the intersection of King Street and Sydney Park Road.

Any future proposal to reduce the capacity of King Street would be a separate project which would need to be assessed on its own merits, including undertaking traffic modelling and a full analysis of access and parking implications, as well as liaison with all relevant stakeholders and a detailed cost benefit analysis.

Issue description – transport modelling does not consider the full WestConnex program of works

Inconsistent reporting of transport modelling with limited assessment of the New M5 section in 2031 as a singular piece of infrastructure rather than as part of the full WestConnex project.

Response

The Technical working paper: Traffic and transport (Appendix G of the EIS) provides a detailed assessment of the operational traffic impacts of the project, including an assessment of the New M5 project assuming that no other works are completed and for the full WestConnex program of works.

Operational traffic modelling undertaken for the project considered impacts to the local and regional network, including the M5 East Motorway. Modelling of the future road network with the project was undertaken for three future scenarios; 2021 and 2031 'with the project', and 2031 'with the full WestConnex program of works' and the future Southern Connector. The full WestConnex program of works includes the future M4-M5 Link.

The future case 'with project' assumes the New M5 is complete and open to traffic without the M4 East (WestConnex Stage 1) or the future M4-M5 Link (WestConnex Stage 3) components of the full WestConnex program of works.

Issue description – WestConnex does not address transport challenges

Information in the EIS [is] not allaying any of the concerns about adverse impacts previously raised in the abovementioned 2015 SGS & Veitch Lister report, ie WestConnex would not address the transport challenges being faced by Sydney in the future.

Response

This issue has been referenced by the Marrickville Council from the SGS and VLC report commissioned by the City of Sydney and has been addressed in **Section 4.14.13** of this report.

As described in Section 3.1 of the EIS, the need for the WestConnex project has been identified in a number of strategic planning documents including, NSW 2021: A Plan to Make NSW Number One (NSW Department of Premier and Cabinet 2011), State Infrastructure Strategy 2012–2032 (Infrastructure NSW 2012a) and the NSW Long Term Transport Master Plan (Transport for NSW, 2012a). The need for the project in particular has been identified in the NSW Long Term Transport Master Plan as a critical link in Sydney's motorway network and the immediate priority for the NSW Government.

The New M5 would provide operational benefits in relieving congestion along the M5 East Motorway, including a reduction in travel times and improvements in road safety in both eastbound and westbound directions. Investment in the project, and other WestConnex stages, would facilitate a step change in network performance, enabling delivery of major city shaping improvements and delivering economic growth. The project would improve accessibility to jobs in Sydney's CBD and east as well as facilitating the flow of goods and people, and as a result industry investment and employment, in Sydney's western and south western centres.

The State Infrastructure Strategy (Infrastructure NSW, 2012) found that private road transport is – and will remain – the only viable option for most journeys in Sydney most of the time, even with the targeted growth in public transport and rail freight sought by the Government, and the expected increase in the population density of the city. This pattern is the consequence of established land use patterns in Sydney and there is no indication in the available data that the patterns of demand will change in the future.

Continued demand for the movement of people, goods and services across the Sydney metropolitan region requires that new roads be constructed and existing roads be upgraded. Section 4.2 of the EIS considered the strategic alternatives to the project based on the extent to which the alternatives could meet the objectives of the project and their comparative performance across transport, environmental, engineering, social and economic factors.

The EIS acknowledges that other WestConnex projects are needed to deliver a number of project benefits. However, section 1.4 of the EIS also identifies a number of project benefits that would be delivered by the project. Together with the Southern connector, the project would support the economic development of Sydney by providing a high quality and efficient road connection for business and freight vehicles between the 'Global Economic Corridor' including Port Botany and Sydney Airport to Global Sydney. This connectivity is identified in the priority actions to achieve the goals set in A Plan for Growing Sydney (NSW Government 2014).

Issue description – assessment of freight options

A stated secondary driver for the project is demand for freight movements between the airport and port to the west. This market would also be better served by multi-modal options, including greater use of rail for long-haul freight and greater use rail-road freight terminals such as the Enfield Intermodal Terminal. As WestConnex proposes road-only infrastructure, freight traffic would be slowed by congestion created by commuter traffic between the west and inner-Sydney. Providing some freight-only routes, shifting a proportion of the freight task to rail and providing multi-modal options for commuters is a far more cost-effective means of improving freight operations than the proposed motorway-only option.

Response

During the development of the *Transport Master Plan*, all modes and their benefits were considered. The construction of new and upgrade of roads in Sydney is required due to the continued demand for the movement of people, goods and services across Sydney. As mentioned in Section 4.2.3 of the EIS, investment in public transport and freight facilities are only a number of options available to improve congestion on Sydney's Roads. The NSW Government is already directing funding towards a number of public transport (eg buses, trains and ferries) and freight projects (eg Northern Sydney Freight Corridor projects), which, coupled with investment in roads would improve congestion on Sydney's roads. Investment in public transport is the responsibility of Transport for NSW who is currently implementing a number of public transport projects in Sydney.

The 2013 *NSW Freight and Ports Strategy* examined whether the shift from road to rail freight would address this issue for the motorway network. Given the predicted population growth and increase in total freight volumes, even if a significant percentage mode shift from road to rail was achieved, there would still be increases in road freight volumes. Specifically, it found that: 'even with the targeted increase in rail mode share, early modelling results indicate the M4 and M5 will not be able to accommodate the additional container traffic when combined with background growth from employment and population by 2031'.

Continued demand for the movement of people, goods and services across the Sydney metropolitan region requires that new roads be constructed and existing roads be upgraded. Section 4.2 of the EIS considered the strategic alternatives to the project based on the extent to which the alternatives could meet the objectives of the project and their comparative performance across transport, environmental, engineering, social and economic factors.

Issue description – estimation of benefits

Although the EIS states that the project would generate more than \$20B worth of benefits to the economy, there is no explanation as to how figure has been derived.

Response

An economic analysis for the WestConnex projects is presented in Section 12.6 of the Updated Business Case. The cumulative cost and benefits is presented in Figure 12.2 of the Updated Strategic Business Case and includes quantification of the benefits associated with:

- Reliability benefits
- Vehicle operating cost savings
- Travel Time savings
- Crash cost savings
- Greenhouse gas emissions
- Environment externalities
- Residual value of assets

The Updated Strategic Business Case includes technical papers providing additional detail in relation to traffic modelling, economic appraisal, updated strategic environmental review, and timeline of consultation activities.

The Updated Strategic Business Case can be found on the WestConnex website site at www.westconnex.com.au/documents/updated_strategic_business_case.pdf.

Issue description – consideration of multi-modal alternatives

Council's submission concludes that the project should not proceed and recommends that multi-modal alternatives to WestConnex Stage 2 be evaluated, including:

- Expansion of the new Metro rail network;
- New road connection from Port Botany to M5 to enable better dispersal of freight from port and road upgrades for freight heading north;
- Increased services along the Western Rail Line;
- Freight rail upgrades;
- Improved connections to stations along Airport/Revesby line including park and ride options at major stations and an increase in frequency of services along this line;
- New stations on the Airport Line in the Green Square area; and
- Expansion of the existing light rail network.

Response

The Council's recommendation is noted.

The NSW Government is committed to investing in a range of public transport projects, as identified by the *Transport Master Plan*, the *State Infrastructure Strategy*, *A Plan for Growing Sydney* and the *NSW State Priorities* (<https://www.nsw.gov.au/making-it-happen>). The *Transport Master Plan* in particular provides the framework for delivering an integrated, modern and multi-modal transport system by identifying NSW's transport actions and investment priorities for the next 20 years.

The *Transport Master Plan* identifies the need for progressive delivery of the WestConnex program of works. It recognises the upgrade of the M5 Motorway corridor as a key component of the WestConnex program of works, as it would increase the corridor's capacity to accommodate commercial vehicles and freight demand. The project would help to deliver these benefits by improving the performance of the existing M5 Motorway corridor.

During the development of the *Transport Master Plan*, all modes and their benefits were considered. The construction of new and upgraded roads in Sydney is required due to the continued demand for the movement of people, goods and services across Sydney. As mentioned in Section 4.2.3 of the EIS, investment in public transport and freight facilities are only a number of options available to improve congestion on Sydney's Roads. The NSW Government is already directing funding towards a number of public transport (eg buses, trains and ferries) and freight projects (eg Northern Sydney Freight Corridor projects), which, coupled with investment in roads would improve congestion on Sydney's roads. Investment in public transport is the responsibility of Transport for NSW who is currently implementing a number of public transport projects in Sydney.

The 2013 *NSW Freight and Ports Strategy* (Transport for NSW, 2013) examined whether the shift from road to rail freight would address this issue for the motorway network. Given the predicted population growth and increase in total freight volumes, even if a significant percentage mode shift from road to rail was achieved, there would still be increases in road freight volumes. Specifically, it found that 'even with the targeted increase in rail mode share, early modelling results indicate the M4 and M5 Motorways will not be able to accommodate the additional container traffic when combined with background growth from employment and population by 2031'.

The WestConnex program of works has been developed to provide an integrated and comprehensive solution which recognises that the issues currently experienced along the M4 Motorway and the M5 East Motorway cannot be resolved in isolation. The holistic solution takes into account the lessons learnt from previous unsuccessful proposals for upgrade and / or expansion works along the M4 and M5 East Motorways, as well as the former Marrickville Tunnel concept while incorporating the feedback received from the community and stakeholders as part of the historic development of these schemes.

4.12.2 Traffic and transport

Issue description – completion of the full WestConnex program of works by 2031

The Council questions assumption that all sections of WestConnex would be completed by 2031.

There is at this stage no firm commitment to completion of all stages by 2031 – without Stage 3, there would be no relief from the on-going traffic impact on inner-Sydney.

Response

The EIS acknowledges that other WestConnex projects are needed to deliver a number of project benefits.

Stage 3 of WestConnex program of works is the future M4–M5 Link. The future M4–M5 Link is undergoing concept development and is subject to the planning approval process. An indicative concept for the future M4–M5 Link was included in the *WestConnex Updated Strategic Business Case* (November 2015) (Updated Strategic Business Case), which was publicly released on 19 November 2015. A State Significant Infrastructure (SSI) application, lodged with the NSW Department of Planning & Environment (DP&E) on 2 February 2016, provides further detail on the future project.

The future M4–M5 Link would also include works to enable connections to the potential Western Harbour Tunnel, in the vicinity of the Rozelle Rail Yard. This connection has previously been referred to as the 'northern extension' and the 'Western Harbour Tunnel'.

Key components of the future M4-M5 Link project include:

- Twin motorway tunnels between the M4 East at Haberfield and the New M5 at St Peters. Each tunnel would be around 9.2 kilometres in length and would be built to accommodate three lanes of traffic. Each tunnel would integrate with tunnel stubs constructed underground as part of the proposed M4 East at the Wattle Street interchange and proposed New M5.
- A new road interchange at Rozelle at the disused Rozelle Rail Yard, to provide connections to and from the M4-M5 Link with City West Link, Victoria Road and the Anzac Bridge intersection.

- Tunnel stubs to allow for a potential future connection to the Western Harbour Tunnel and BeachesLink (an additional Sydney Harbour Tunnel road crossing) in the vicinity of the Rozelle interchange.
- A new road interchange at Camperdown to provide north and south-bound on and off ramps connecting to Parramatta Road.
- Connections to the St Peters interchange (constructed as part of the proposed New M5), including the construction of the future M4-M5 Link southern portal and integration works within the interchange.
- Ancillary infrastructure and operational facilities for electronic tolling, signage (including electronic signage), ventilation structures and systems, fire and life safety systems, and emergency evacuation and smoke extraction infrastructure.
- A motorway control centre that would include operation and maintenance facilities.
- New service utilities and modifications to existing service utilities.
- Modifications to the surface road network to integrate the new interchanges, including but not limited to the City West Link, Victoria Road, and Parramatta Road.
- Temporary construction ancillary facilities and temporary works to facilitate the construction of the project
- Further details of the future M4-M5 Link project are publicly available in the State Significant Infrastructure application on the Department of Planning's public register (https://majorprojects.affinitylive.com/public/726566c16c9b970fe155a31fb0ab3501/20160120_WCX_M4-M5_Link_SSIA_FINAL.pdf)

Issue description – assessment of full WestConnex program of works

There is a need for an over-arching EIS for the entire project to consider all inter-related issues and impacts, ie Stages 1, 2, 3, the Southern Gateway, the Sydney Gateway and possibly also the Northern and Southern extensions.

Response

Environmental impacts of the whole of the WestConnex program of works were identified in the Strategic Environmental Review (Sydney Motorways Project Office, 2013).

As described in Chapter 1 of the EIS, the New M5 project is a component of the WestConnex program of works. The size and scale of WestConnex requires the program of work to be delivered in a series of projects.

Separate planning applications would be lodged for each individual component project of WestConnex. Each project would be assessed separately, but the impacts of each project would also be considered in the context of the wider WestConnex program of works. The EIS considered other WestConnex projects where relevant and in accordance with industry standards and guidelines.

Chapter 27 of the EIS assesses potential cumulative impacts associated with the construction and operation of all components of the WestConnex program of works, based on information about the component projects that was publicly available at the time the EIS was prepared. Cumulative impacts have also been assessed in the EISs prepared for the M4 Widening, M4 East and King Georges Road Interchange upgrade projects.

Any future motorway projects, including the future M4-M5 Link, Western Harbour Tunnel and BeachesLink and the Southern Connector (part of Gateway to the South) would be subject to separate planning approval and assessment.

Impacts associated with the full WestConnex program of works and Southern Connector for the year 2031 have been considered in relation to:

- Traffic and transport (Chapter 9 and Appendix G of the EIS)
- Air quality (Chapter 10 and Appendix H of the EIS)

- Human health (Chapter 11 and Appendix I of the EIS)
- Noise and vibration (Chapter 12 and Appendix J of the EIS)
- Social and economic (Chapter 15 and section 6.3 of Appendix M of the EIS)
- Cumulative impacts (Chapter 27, in particular section 27.3.1, of the EIS)

The EIS acknowledges that other WestConnex projects are needed to deliver a number of project benefits. However, Section 1.4 of the EIS also identifies several project benefits that would be delivered by the New M5 project alone, and in combination with the King Georges Road Interchange Upgrade, which is currently under construction.

The New M5 would:

- Provide additional motorway capacity along the main connection to Sydney Airport, Port Botany and south west Sydney which would provide reliability and savings in travel time for through traffic
- Provide improved access and connectivity between employment and population centres as well as for local vehicle trips and for active transport
- Enable improvements to public transport including more frequent cross-regional bus services connecting to Sydney Airport
- Facilitate local road upgrades in St Peters and Mascot.

Together with the Southern Connector, the project would:

- Support the economic development of Sydney by providing a high quality and efficient road connection for motorists and freight vehicles between the Global Economic Corridor and Global Sydney (as defined in *A Plan for Growing Sydney* (NSW Government 2014))
- Provide additional capacity to address existing traffic congestion on the M5 East Motorway and local roads by separating longer distance through traffic from local traffic. Current traffic congestion is causing poor amenity along the M5 corridor and constraining the operation of existing businesses and efficient movement of freight
- Provide better connectivity between local centres adjacent along the M5 Motorway corridor.
- Facilitate urban renewal in precincts adjoining the M5 Motorway corridor by improving local amenity with less traffic noise and vehicle emissions from congested traffic.

Section 4.1.2 of the EIS acknowledges the potential to enhance the scope of WestConnex through northern and southern extensions to the scheme. The Southern Connector is proposed as a connection between the New M5 tunnels and President Avenue at Rockdale. At the time of preparing the EIS, a business case was being developed for the northern and southern extensions. The northern and southern extensions are also shown in Figure 1-1 of the EIS.

Issue description – transport model does not consider public transport forecasts

The New M5 EIS transport model does not include public transport assignment or public transport demand forecasting – therefore, the competing effects of traffic congestion and rail crowding have not been tested.

Response

The Technical working paper: Traffic and transport (Appendix G to the EIS) is based on traffic modelling using the WestConnex Road Traffic Model (WRTM), which relies on forecasts of car driver demand sourced from the Sydney Strategic Travel Model (STM) operated by the Transport for NSW Bureau of Statistics and Analytics.

The STM uses projections of population and employment for the Sydney and forecasts mode choice between car, rail, bus, light rail and ferry modes for future infrastructure scenarios. The modelling with STM for the EIS incorporated currently planned public transport schemes including Sydney Metro and CBD and South East Light Rail. The car driver demands forecast using STM after allowing for mode share due to these public transport projects under congested road conditions was subsequently used for forecasting WestConnex toll choice in WRTM. As such, the assessment incorporates the effects of future demands for public transport.

As noted in section 5.2.1 of the EIS, the NSW Government is committed to investing in a range of public transport projects, as identified by the *NSW Long Term Transport Master Plan* (Transport for NSW, 2012), the *State Infrastructure Strategy 2012–2032* (Infrastructure NSW, 2012), *A Plan for Growing Sydney* (NSW Government, 2014) and the *NSW State Priorities* (NSW Government 2015).

The project offers a flexible design which does not preclude bus priority measures being included in the future. Roads and Maritime and Transport for NSW will continue to work together to deliver *Sydney's Bus Future* (Transport for NSW, 2013).

Issue description – absence of long term traffic modelling

The absence of long-term traffic modelling means that long-term traffic growth and associated socio-economic or sustainability impacts are not being identified, mitigated or monitored.

Response

As outlined in Section 9.1.4 of the EIS, traffic modelling for the project has relied on population and employment data from the Bureau of Transport Statistics, which is the best information currently available. The current WRTM is based on 2014 land use projections and includes induced traffic demands.

Issue description – operational traffic growth and parking demand

Council has concern about the project's contribution to traffic growth and increased parking demand across the LGA (local government area) – leading to pressures for new or expanded clearways, with consequent amenity and business impacts, particularly along King Street, Newtown.

The EIS shows permanent removal of 400 on-street car parking spaces in various locations and the installation of 34 on-street and 26 off-street parking spaces. The loss of a significant number of on-street parking spaces would adversely affect residential amenity and business activity. The EIS does not include any details on the kerbside parking spaces to be removed once the project is operation.

Council has concern that traffic growth would increase pressure for new and expanded clearways and removal of kerbside parking (in particular, along King Street, Newtown and Edgeware Road), which would have significant negative impacts on the amenity of streets for pedestrians, residents and businesses. Abovementioned pressures for clearways and parking would result in conflicts with Council's long-standing objectives of reducing traffic capacity and installing traffic calming devices, walk/cycle facilities, trees/gardens etc. within road reserves;

Traffic growth and increased parking demand also conflicts with Council's efforts to constrain road capacity through traffic calming and the introduction of trees/gardens into road reserves.

Response

The project would not remove the current on-street parking along King Street or modify the existing on-street parking arrangements in this location. As noted in Table 9-51 of the EIS, similar or slightly reduced peak hour volumes are forecast along King Street.

Section 5.7.2 of the EIS describes the provision of parking as part of the road widening design. Along Campbell Street all traffic lanes would be around three metres wide. A parallel parking lane of around 2.5 metres would be provided in both directions along Campbell Street between Hutchinson Street and St Peters Street. Additional on-street and off street car parking spaces would be provided between St Peters Street and Church Street. Parking in the kerbside lanes of Euston Road would be permitted during off-peak periods. Table 5.9 describes parking provisions for each motorway upgrade.

An operational traffic review would be undertaken to confirm the operational traffic impacts of the project on surrounding arterial roads and major intersections about 12 months after the commencement of operation of the project. The results and recommendations of the review would assist the development of the Roads and Maritime's network operations and infrastructure provision plans.

Issue description – management of impacts on local traffic during operation

The EIS should identify the likely impacts of increased traffic on residential streets in the (Marrickville) LGA (local government area) by means of an appropriate local area traffic management (LATM) study, which should also include post-implementation reviews to address any unforeseen impacts; and mitigate those impacts by LATM works funded by the NSW Government.

The abovementioned LATM study should:

- include post-implementation reviews to identify and address any unforeseen impacts, with works also to be funded by the NSW Government;
- be guided by a set of principles for planning and implementation of LATM works to ensure that the outcomes achieve a balance between the competing needs of pedestrians, cyclists and motorists;
- include works such as traffic calming devices and street gardens, with a focus on all local streets in St Peters and any other street experiencing increased traffic and 'rat-running';
- implementation of a 40kph speed limit on King Street, Princes Highway north of Campbell Street, Unwins Bridge Road, May street and the surrounding network of local streets;

Council acknowledges some design work has been recently initiated by Roads & Maritime Services to mitigate impacts on King Street, but as yet there is no agreed solution.

Measures are needed to reduce the traffic flow in King Street to protect this key shopping and entertainment precinct. The New M5 project has increased the traffic capacity of Euston Road as the alternative to using King Street.

Response

An operational traffic review would be conducted 12 months following the commencement of operation to confirm the operational traffic impacts of the project on surrounding arterial roads and major intersections. The operational traffic review would be undertaken by a suitably qualified traffic specialist that is independent of the design and traffic studies undertaken as part of the environmental impact statement. The operational traffic review would include (but would not be limited to) an assessment of the level of service at major intersections on local roads around the St Peters interchange, the King Georges Road interchange and changes in traffic levels on parallel arterial roads, such as Stoney Creek Road.

When complete, the upgrades to local roads around the St Peters interchange would create substantial new capacity along Campbell Street and Euston Road and direct through traffic along these routes and away from residential properties along other suburban streets in the area. . In 2019 when the New M5 is complete but WestConnex Stage 3 (M4–M5 Link) is not, motorists would have three routes to choose from at St Peters interchange to get to their destination. This includes Campbell Street / Road at St Peters, Euston Road at Alexandria and a new bridge over the canal to Bourke Road at Alexandria. With the completion of WestConnex Stage 3 (M4–M5 Link), additional through traffic would be diverted into the motorway network, further easing impacts on local road networks.

The diverting of through traffic from local roads onto these upgraded roads around the St Peters interchange, as well as onto the WestConnex tunnels, would be instrumental in improving pedestrian and cyclist safety.

Intersection upgrades as part of the local road upgrades would deliver safety improvements for pedestrians and cyclists. Signalised intersections provide a controlled environment under which pedestrians and cyclists can move between the existing and upgraded shared path network. The impact of pedestrian movements on signal phasing and intersection delays for vehicles has been assessed in the detailed operational modelling. In completing the modelling, pedestrians have been provided equivalent or better priority at signalised intersections throughout the study area.

Upgrading the intersection of Unwins Bridge Road / Campbell Street / Bedwin Road / May Street would deliver safe pedestrian and cyclist crossing of these roads, providing access to existing pedestrian and cyclist infrastructure along these roads outside of the project's area of impact.

This would improve safety for users of this intersection who access nearby schools, community facilities and the Marrickville Metro shopping centre. Improvements to the overall alignment of Bedwin Road associated with the realignment of this road between the railway bridge near Camdenville Park and the intersection with Unwins Bridge Road / May Street / Campbell Street would further support pedestrian and cyclist safety via the removal of two existing tight curves.

Further, in response to the exhibition of the EIS, and in response to submissions that raised concerns relating to pedestrian connectivity and safety, a number of changes have been made to the local road upgrades described in Chapter 5 of the EIS. Changes to the local upgrades affect:

- Euston Road / Sydney Park Road / Huntley Street intersection
- Albert Street and Campbell Road intersection
- Change to the shared path within Sydney Park
- New Campbell Road (extension) / Southend Distribution Centre intersection.

Changes to the local road upgrades in these locations are described further below and in **Section 7.2** of this report.

Consultation would be ongoing with key stakeholders, including the Marrickville Council throughout detailed design in accordance with any Conditions of Approval imposed by DP&E.

The NSW Government has made clear public statements that there is no intention to extend clearway hours through King Street. The NSW Government position remains unchanged. Modifications to King Street do not form part of the Project.

Roads and Maritime is committed to development and implementations of the King Street Gateway in consultation with Relevant Councils, including the Marrickville Council, which may include re-design of the intersection of King Street and Sydney Park Road.

Any future proposal to reduce the capacity of King Street would be a separate project which would need to be assessed on its own merits, including undertaking traffic modelling and a full analysis of access and parking implications, as well as liaison with all relevant stakeholders and a detailed cost benefit analysis.

To verify that this traffic redistribution does not lead to unintended or unacceptable outcomes for the surrounding road network, an independent operational traffic review would be commissioned and carried out 12 months after the commencement of operation of the project (refer to environmental management measure OpTT02 as amended by Chapter 8 (Revised environmental management measures)). This review would include an assessment of the level of service at major intersections on local roads around the St Peters interchange. In the event that unintended or unacceptable outcomes are identified from this review, consideration would be given to additional feasible and reasonable measures to address these outcomes.

Issue description – impact from toll avoidance

The tolling regime is not tested and there is no explanation of how toll levels (and people's perception of tolls) change into the future – given the impacts this can have on surface roads and recent toll-road failures, this is a significant omission.

Response

The primary intention of the project is to increase capacity and alleviate congestion along the M5 corridor, leading to a more efficient motorway connection between south west Sydney and Sydney Airport/ Port Botany for key user groups. By achieving this intent, the project would increase connectivity between south west Sydney and Sydney's global economic corridor. The Updated Strategic Business Case identified key user groups of the motorway network and key requirements for freight customers. Key user groups include:

- International gateway users, travelling to and from Sydney Airport and Port Botany
- Heavy and light freight industries
- Dispersed and longer distance travellers
- Commercial services and business users.

The project would include the installation of tolling points on both the New M5 and the M5 East Motorways. Vehicles from all user groups would be subject to tolling on the New M5 and the M5 East Motorway.

The effect of tolling on road traffic demand was considered in Chapter 9 (Traffic and transport) and Appendix G (Technical working paper: Traffic and transport). Some diversion of traffic onto arterial roads to avoid the toll is most likely to occur outside peak traffic periods, when there is generally spare capacity across the network. During peak periods these arterial roads are already at capacity and there is less incentive to divert from the motorway in order to avoid the toll. Heavy and light freight industries are unlikely to avoid using the motorway during peak periods due to the time savings provided by the motorway connection when compared to the local road network.

Roads and Maritime conducted preference surveys to understand the value people in Sydney place on travel time savings associated with major infrastructure improvements. The WRTM includes tolling and general cost parameters that reflect the findings from these surveys.

In addition, SMC liaised with Professor David Hensher (Professor of Management, and Founding Director of the University of Sydney Institute of Transport and Logistics Studies) to further enhance the parameters for induced demand estimation based on academic research. The WRTM also considers that different motorists place different values on paying tolls to make time savings, including heavy vehicle motorists.

Issue description – impacts on Sydney Park

Significant negative traffic and road widening impacts on Sydney Park are not adequately assessed.

Response

Road infrastructure along Campbell Road would not encroach into Sydney Park, except for a small parcel near the intersection of Euston Road to enable development of the intersection.

The network of paths from the end of Campbell Road pedestrian and cycle bridge connecting with the existing paths in Sydney Park and proposed pedestrian and cycle paths commencing at the corner of Barwon Park Road and Campbell Road would all be returned to Sydney Park at the end of construction.

Further, the temporary land used for construction purposes would be reinstated at completion to a standard at least equivalent to that existing at the time of access. The only area of land required for permanent acquisition is that necessary for active transport infrastructure, being land required for the northern bridge abutment and airspace for the Campbell Road pedestrian and cycle bridge.

During detailed design, Roads and Maritime would investigate an option to further reduce the width of the upgraded Euston Road. This may be achieved through a reduction in lane width and/or through the removal or reduction of the central turning lane. Options would be considered in the context of road safety, network performance and implications on property access.

A reduction in lane width in this location would address concerns raised in submissions by providing:

- reduced impacts on Sydney Park, including retention of more park space and vegetation
- improvements to pedestrian crossing distances and times, which would improve amenity and safety and enhance pedestrian connectivity across Euston Road
- the potential to shift the proposed shared path on the western side of Euston Road away from the kerb, improving safety and amenity for active transport users
- the potential for additional landscape treatments to increased verge spaces as a result of reduction in road space.

The possibility of removing the centre turning lane within Euston Road would also be investigated during detailed design. Removal of this centre lane would provide an increased area of open space adjacent to Sydney Park, enabling more of the existing vegetation to be retained and increasing the distance between pedestrians and cyclists and vehicular lanes, improving amenity and safety. A final determination on this option would require an investigation of impacts on property access and network performance.

Issue description – management of impacts on local traffic during construction

Level of service (LOS) for intersections in the vicinity of the St Peters interchange were modelled as standalone intersections, and the EIS notes that "... this does not reflect the true LOS for those that are part of a co-ordinated system of signalised intersections." The results show a worsening of the performance of the intersections and especially Princes Highway / Railway Road, Princes Highway / Canal Road and Canal Road / Burrows Road;

Response

The level of service along the majority of roads around the construction compounds would generally not reduce during both the AM and PM periods. The assessment of construction traffic impacts did identify some roads on which the level of service would decline slightly – this would be expected to result in a minor increase in delays along these roads during the peak periods. These roads are detailed below.

The construction traffic and transport impact assessment summarised in Section 9.3.1 of the EIS concluded that additional construction traffic would represent a relatively small percentage increase, having regard to background traffic and traffic growth on the surrounding strategic road network. Construction of the project would therefore have a minor, temporary impact on the performance of the road network around the surface works.

During construction, road performance is generally expected to operate at a similar level of performance to the road network without construction traffic. Road performance would generally operate a LOS D or better during the AM and PM peak, except at:

- Campbell Road (eastbound), east of the Princes Highway, which would continue to operate at a LOS of F during the AM peak
- The Princes Highway (northbound), south of Canal Road, which would operate at a LOS of F during the AM peak
- The Princes Highway (southbound), which would continue to operate at a LOS of E during the PM peak.
- Canal Road (westbound), between the Princes Highway and Burrows Road which would operate at a LOS of E during the PM peak. Construction traffic would comprise less than four per cent of traffic along Canal Road at this location; however, the additional traffic would reduce the operation of the road network at this location, reducing the road performance from a level of service D without construction traffic to a level of service E.

As described in Section 9.4 of the EIS (as revised in **Chapter 8** (Revised environmental management measures) of this report), a Construction Traffic Management and Safety Plan would be prepared as part of the Construction Environmental Management Plan, in consultation with the relevant road authority, local councils, emergency services, road user groups and pedestrian and bicycle groups.

The Construction Traffic Management and Safety Plan would include the guidelines, general requirements and principles of traffic management to be implemented during construction, including specific provisions to manage potential impacts of construction traffic on local roads around the construction compounds.

The Construction Traffic Management and Safety Plan would be prepared in accordance with the Austroads Guide to Road Design (with appropriate Roads and Maritime supplements), the RTA Traffic Control at Work Sites manual and AS1742.3: Manual of uniform traffic control devices – Part 3: Traffic control for works on roads, and any other relevant standard, guide or manual. It would seek to minimise delays and disruptions, and identify and respond to any changes in road safety as a result of construction works.

Issue description – impact on bus services during construction

Reduced travel times in Railway Road, Princes Highway and Canal Road would impact on bus services in particular and worsen the reliability of bus services using these roads.

It is recommended that the treatment of bus stops is reconsidered in the interests of maintaining at least the current level of service provided to the community. In particular, the southbound bus stop on the Princes Highway south of Campbell Street should remain open to public transport users during the construction phase. It is noted that this may require its relocation to a place south of Albert Street. Further, the southbound bus stop on Canal Road south of the Princes Highway should be retained in its current location.

Response

The temporary removal of the southbound bus stop on the Princes Highway south of Campbell Street during construction has been proposed following consultation with Transport for NSW and given:

- The close proximity of bus stops to complex construction activities needs to be managed through high levels of safety and safety systems
- Due to site boundary limits, people waiting at bus stops would flow into pedestrian and cyclist access paths
- The impact of construction activities on pedestrian and public transport user desire lines
- The close proximity of alternative bus stops operating in lieu of the affected bus stops.

The bus stop on Princes Highway south of Campbell Street must be removed or replaced due to the civil works associated with upgrades to Albert Street, Campbell Street and Princes Highway. Further consideration of the impacts on bus stop locations during construction would be undertaken during detailed design in consultation with key stakeholders including Transport for NSW. The bus stop on Canal Road can be retained in its existing position without change.

Issue description – parking impacts for residents and businesses

The impact on parking for residents and businesses on May Street, as the project removes approximately 38 on-street parking spaces on May Street, including the removal of a number of resident parking spaces. Dwellings in May Street typically do not have off-street parking and rely on kerb-side parking. Council's December Traffic Committee endorsed a proposal for 30 resident parking scheme spaces in May Street.

Response

During construction, parking spaces around some of the works areas for the project, including May Street, would be temporarily reduced to allow safe access to construction compounds and to accommodate construction of the local road upgrades. The indicative temporary changes to on-street parking availability is summarised in Table 9-37 of the EIS.

As described in Section 6.6.1 of the EIS, parking provisions for light vehicles within the construction compounds have been provided which would minimise the impacts on on-street parking. Parking restrictions for construction workers would be considered where feasible and reasonable and would be reinforced through project inductions and toolbox talks. Construction personnel would be encouraged to use public transport where possible and consider other modes of transport such as carpooling.

It is unlikely that construction workers would use the private road at the back of the terrace houses along Campbell Road (accessed via Harber Street at St Peters). Parking provisions for up to 260 light vehicles would be provided at the Campbell Road construction compound (C9) on the southern side of Campbell Road and a car park would also be provided at the Sydney Park construction compound (C14) for light vehicles also. It is expected that the use of these car parks would be preferred by construction workers traveling to the site via motor vehicle.

The final number of on-street parking spaces to be affected by the project would be finalised during detailed design. If the project is approved, a Construction Traffic Management and Safety Plan would form a sub-plan of the Construction Environmental Management Plan and would be prepared in accordance with the relevant conditions of approval. The plan would be developed in consultation with relevant councils, emergency services, road user groups and pedestrian and cyclist user groups.

A car parking strategy for all sites would be developed as part of the Construction Traffic Management and Safety Plan to limit impacts on the surrounding communities, in consultation with local councils and stakeholders.

Issue description – cumulative traffic impacts associated with other developments

The project should also consider traffic impacts from the proposed expanded Marrickville Metro shopping centre at Victoria Road, Marrickville and the proposed Masters Homemaker store at Edinburgh Road, Marrickville.

Response

Traffic modelling for the project has relied on population and employment data from the Bureau of Transport Statistics, which is the best information currently available. The current WestConnex Road Traffic Model (WRTM) version 2.1 is based on 2014 land use projections, but does not specifically model individual developments such as those provided in the Council's submission. Whilst the localised traffic movements around these two developments are likely to be altered as a result of these developments, it is unlikely that there would be significant increased demand at a regional level.

This traffic modelling was used to inform the assessment of Air Quality (Chapter 10), Chapter 11 (Human Health) and Chapter 12 (Noise and Vibration) of the EIS. The cumulative impacts from traffic and transport are discussed in Section 27.5.1 of the EIS. Amenity is also considered in the assessment of cumulative impacts (Section 27.5.2 of the EIS).

Issue description – need for Campbell Road bridge

Council doubts about the need for the proposed Campbell Road bridge over the Alexandria Canal, as it does not appear to service traffic that is related to the New M5 and raises concerns about it encouraging increased traffic the Marrickville local government area – this bridge should at the very least be restricted to one lane of traffic in each direction.

Response

Council's comment is noted.

As part of the EIS, the following scenarios for the provision of the Campbell Road Bridge has been investigated for 2021 and 2031 traffic:

- No bridge on Campbell Road
- A two lane bridge on Campbell Road (one lane each way)
- A four lane bridge on Campbell Road (two lane each way)

The investigation considered the impact to the local road network in terms of queueing, flow capacity and performance of the nearby intersections. It was found that with a two lane bridge:

- The traffic would reroute via Gardeners Road and causes the level of service of the intersections along this route (Campbell Rd/Bourke Rd and Gardeners Rd/Bourke Rd) to reduce below the acceptable level
- There would be an increase in queue lengths on the eastern and western approaches of Gardeners Rd/Bourke Rd and the northern and western arm of the Campbell Rd/Bourke Rd intersection

For “No Bridge” on Campbell, the following would result on top of the impact of a narrower bridge described above:

- All local traffic would need to use Ricketty Street Bridge as there would be no access via the Gardeners ramps. The traffic on the roads along this link (Burrows Rd, Kent Rd, Canal Road and Gardeners West) would be significantly increased.

The project therefore proposes a four lane bridge on Campbell Road. Traffic that would be using the new bridge (‘rat running’ and toll avoidance) has been estimated and their movement modelled. It was found that with the proposed widening of the local roads, the intersection performance and queueing on the related local roads are acceptable.

Issue description – impact on bus services during operation

The proposal would result in issues for public transport issue relates to impacts on bus services. It is noted in the EIS that “... there are clearly specific locations and routes likely to be impacted by increased travel times.”

Concern about increased bus travel times caused by the project – the project should be designed so that it has no impact (or a positive impact) on bus services.

Conditions of approval for the project should include a requirement that bus priority measures be considered for the 348 bus route adjacent to Sydney Park in Princes Highway north of Campbell Street and Sydney Park Road between Princes Highway and Euston Road as part of the King Street Gateway.

Response

Conditions of approval are a matter for DP&E to consider during its assessment of the critical State significant infrastructure application.

No regular bus services use the M5 East Motorway or the M5 South Western Motorway. Intercity coach services that use the M5 East Motorway or M5 South West Motorway, such as those operated by Murrays or Greyhound, would benefit from reduced traffic and increased travel speeds on the M5 Motorway corridor as a result of the New M5 project and, later, the full WestConnex program of works and the Southern Connector (formerly the Southern extension).

Section 10.3.4.2 of the Technical working paper: Traffic and transport (Appendix G) describes the forecast impacts on bus operations around the St Peters interchange. Specifically, Table 109 of the Technical working paper details a comparison between bus travel times through the St Peters network under the 2021 ‘with project’ vs 2021 ‘without project’ scenario.

The assessment concluded that in 2021 under the ‘with project’ scenario, many routes could benefit from increased travel times due to improved traffic management and changed traffic demand compared with the 2021 ‘without project’ scenario. Of the 22 services which cross the St Peters area, six PM peak services are forecast to experience a travel time improvement of 20 per cent or better for the sections of the route running through the modelled area, in comparison to the 2021 ‘without project’ scenario. In the AM peak period, the time travel savings for buses in the modelled network would be less pronounced, with two services expected to see time travel improvements of greater than ten per cent when compared to the 2021 ‘without project’ scenario.

There would also be some routes which would be likely to experience increased travel times. In the AM peak, three services are forecast to experience an increase in travel time through the area of 20 per cent or more. Two services are forecast to be similarly affected during the PM peak period.

The modelled changes described above and shown in Table 109 of the technical working paper – which would range from a saving of 9.6 minutes to an increase of around 3.3 minutes - need to be interpreted in the context of the longer journey times and distances that buses travel between their origins and destinations, of which only a portion would fall within the area of the St Peters network.

The project has been designed with sufficient flexibility to accommodate potential future bus priority measures. Roads and Maritime and Transport for NSW will continue to work together to deliver Sydney's Bus Future in the area around St Peters and other locations within Marrickville Council.

As noted in the submission, the NSW Government has made clear public statements that there is no intention to extend clearway hours through King Street. The NSW Government position remains unchanged. Modifications to King Street do not form part of the Project.

Roads and Maritime is committed to the development, and implementation, of the King Street Gateway in consultation with relevant Councils, which may include re-design of the intersection of King Street and Sydney Park Road. Bus priority measures would be considered during development in consultation with TfNSW.

Any future proposal to reduce the capacity of King Street would be a separate project which would need to be assessed on its own merits, including undertaking traffic modelling and a full analysis of access and parking implications, as well as liaison with all relevant stakeholders and a detailed cost benefit analysis.

.Issue description – traffic forecast does not support the need for the project

The traffic forecasts for the New M5 do not support completion of the project at this stage. Whilst the reasons are many, they can be summarised as:

- The proposed tolling regime results in traffic avoiding the motorway system and diverting to local roads; and
- The forecast traffic volumes for the New M5 are very low – by comparison, they are lower than for the Sydney Cross City Tunnel.

The implications of induced demand have not been adequately assessed and that the forecasts in turn are not reliable for economic or financial assessment. Should the project proceed in its current form there remains a number of construction and operational issues which need to be addressed.

At a strategic level, it difficult to see how the New M5 can be justified given the low traffic forecasts. The main traffic impact will be on Campbell Street/Road and Euston Road. The completion of the full WestConnex will have detrimental impacts on peak hour traffic on Edgeware Road and King Street resulting in likely diversions to other routes. The EIS does not address this issue, and it is recommended that the justification for WestConnex be questioned given the significant traffic diversions it proposes that would be best accommodated within the existing road network.

The longer term forecasts with completion of the full WestConnex project and the Southern extension show a major increase in peak period traffic flows on Edgeware Road and King Street. The implications of this have not been addressed in the EIS.

Response

A response to the issue of tolling has been provided in **Section 4.17.4** of this report.

A response to the issue of forecast traffic volumes has been provided in **Section 4.17.5** of this report.

Chapter 3 of the EIS for the New M5 provides detailed information about the need for the WestConnex program of works, and the New M5 as a component of those works.

The Updated Business Case includes a financial and economic appraisal of the WestConnex program of works as well as details of the proposed tolling regime and consideration of the traffic demand and operational traffic modelling results, including details of travel time savings and interchange performance

As described in the *Updated Business Case*, the reference tolling regime for the entire WestConnex was developed to facilitate traffic, financial and economic modelling. This reference tolling regime was based generally on the WestLink M7 Motorway and is comparable with other tolling regimes in Sydney.

Tolling of a motorway applies a 'user-pays' principle to provide an alternative source of funding to government. This reduces the burden on the NSW taxpayers by allowing the project to better fit within the financial capacity of the government, facilitating the overall financing strategy for the motorway.

Diversion of traffic onto arterial roads to avoid the toll is most likely to occur outside peak traffic periods, when there is generally spare capacity across the network. During peak periods these arterial roads are already at capacity and there is less incentive to divert from the motorway in order to avoid the toll.

The effect of tolling on road traffic demand was considered in the Technical working paper: traffic and transport impact (Appendix G of the EIS) and is discussed in Chapter 9 of the EIS. The method used for the induced demand analysis for the WestConnex project was independently reviewed by Professor David Hensher, Director of the Institute of Transport and Logistics Studies at the University of Sydney. Through independent analysis Professor Hensher verified that the method was sound and specifically calculated that the parameters proposed by the Zealand Transport Agency Economic Evaluation Manual were appropriate for use in Sydney.

The traffic and transport assessment shows that in both 2021 and 2031, the forecast reduction in traffic along the M5 East would result in improved speed, journey reliability and safety in this corridor. In the St Peters area, reductions in average delay and congestion are anticipated during both future years (2021 and 2031) compared to the 'do minimum' scenarios. The operational performance of the network, including predicted traffic volumes under the 'with project' scenarios which have incorporated induced demand forecasts, is discussed in detail in Chapter 9 and Appendix G of the EIS.

Further consideration of the impacts on local roads due to increases in peak period flows as a result of completion of the full WestConnex program and/or Southern connector would be made in the EIS(s) undertaken for future aspects of the WestConnex program of works, as appropriate.

Issue description – pedestrian and cycle impacts during construction

Council should be consulted in relation to significant changes proposed for existing pedestrian and cycling infrastructure during the construction phase. In particular, the Bourke Road cycleway diversion is not acceptable and in relation to pedestrian facilities, the proponent will need to follow all Marrickville and City of Sydney council policies including appropriate, accessible paths of travel during construction.

Response

Cyclists are recognised as an important group of stakeholders, and their specific needs will be considered during detailed design and implementation of the project. Particular attention would be given to areas where existing cycling facilities would be directly affected by construction works, such as along Bourke Road.

Any changes to existing cycling infrastructure, including mechanisms to communicate these changes to affected stakeholders would be documented in the Construction Traffic and Access Management Plan for the project.

Temporary diversions to active transport routes would be minimised wherever reasonable and feasible, however some diversions would be required over the course of the project to maintain the safety of all road users including motorists, cyclists and pedestrians.

Marrickville Council is a key stakeholder and would be consulted on all proposed temporary and permanent changes to active transport facilities and routes during planning and construction.

Issue description – active transport options for construction workers

A green travel plan be prepared for the project, which would encourage and facilitate travel to and from work by means other than car. Provision should be made on-site for workers who travel by bicycle.

There is a need for a shuttle service between compounds if parking is to be accessible for workers. There is also a need to provide adequate accessibility between the compounds and public transport services in general. In this regard, it is recommended that any shuttle service also link to the local railway stations.

Response

As noted in Section 7.6 of Appendix G (Technical working paper: Traffic and transport), construction personnel would be encouraged to use public or active transport where possible, and consider other modes of transport such as car pooling.

A number of public transport options are available for workers across the construction areas:

- Kingsgrove South and North: near the Beverly Hills station, bus connection to Wirega Avenue and a short walk into site
- Bexley Road North, South and East: a six minute walk from Bexley North station
- Canal Road and Campbell Street: a 15 minute walk from St Peters station. Several bus services travel along Princes Highway providing links to nearby train stations and the city
- Burrows Road and Burrows Road Bridge: a 15 minute walk from St Peters station. Several bus services travel along the Princes Highway providing links to alternative train stations or the city
- Bourke Road: a nine minute walk from Mascot station. Several bus services travel along Gardeners Road providing links to alternative train stations or the city
- Euston Road: a 10 minute walk from St Peters station. Several bus services travel along the Princes Highway providing links to alternative train stations or the city.

Issue description – traffic impacts of spoil movement

The construction of the Sydney Metro (rail) is planned to commence in 2017. A southern dive site is proposed for Marrickville and would be located north of Sydenham Station and south of Bedwin Road. This site would provide support for tunnelling operations and spoil removal. The impacts of truck movements associated with this activity in addition to the New M5 construction have not been assessed in the EIS. This additional truck traffic is most likely to remove spoil via Campbell Street east of the Princes Highway. It is thus essential that planned road upgrades for Campbell Street as well as the upgrade of the intersection of Campbell Street with the Princes Highway are completed prior to this additional traffic entering the system.

Response

Transport for NSW is currently preparing an EIS for the proposed Sydney Metro (Chatswood to Sydenham), which will provide its assessment of construction impacts on the road network during construction, which would need to consider the cumulative impacts of WestConnex. At present, there is no publicly available information to undertake cumulative assessment for the purposes of this report. However, it is acknowledged, should both projects be approved, that there would be a cumulative impact which would require coordination between Roads and Maritime, Transport for NSW and the contractors for each project (environmental management measure CI02), and consultation with the affected community (environmental management measure CI01).

Issue description – recommended conditions of approval (traffic management)

- It is recommended the conditions of approval for the project include the following requirements: Investigate in consultation with Council and the local community of a traffic management measures for King Street, the Princes Highway and Sydney Park Road to minimise the amount of traffic using King Street, May Street, Sydney Park Road and Princes Highway to the north of Campbell Street;

- Investigate and fund the development and implementation of a Local Area Traffic Management scheme for Sydenham, St Peters, Newtown, Camperdown and Petersham in consultation with Council and the local community to minimise the intrusion of through-traffic. Remedial measures to be installed at no cost to Council.
- Investigate, in consultation with RMS, a proposal to revert the one-way traffic flow of Buckley Street and Railway Parade to two-way traffic flow to improve access and discourage traffic including trucks being drawn along Sydenham Road from the M4 through the Marrickville Town Centre to Port Botany.

Response

The NSW Government has made clear public statements that there is no intention to extend clearway hours through King Street. The NSW Government position remains unchanged. Modifications to King Street do not form part of the Project. Roads and Maritime is committed to development and implementation of the King Street Gateway in consultation with Relevant Councils, which may include re-design of the intersection of King Street and Sydney Park Road.

Any future proposal to reduce the capacity of King Street would be a separate project which would need to be assessed on its own merits, including undertaking traffic modelling and a full analysis of access and parking implications, as well as liaison with all relevant stakeholders and a detailed cost benefit analysis.

The provision of funding to Marrickville Council is outside the scope of the EIS.

Marrickville would need to consult with Roads and Maritime about proposals for traffic flow changes which are outside the scope of this project.

Recommendations relating to conditions of approval are a matter for the NSW Department of Planning and Environment to consider during its assessment of the critical State significant infrastructure application.

Issue description – recommendations (car parking and construction traffic movements)

It is recommended the project include the following requirements:

- parking to be provided for residents of May Street to compensate for the loss of 38 Parking spaces during construction work, located as close as is practical to these residents;
- final parking arrangements in May Street to be returned to the pre-EIS parking supply including the reinstatement of the 30 resident parking spaces endorsed by Council's December Traffic Committee in May Street
- coordinate construction traffic movements with the Sydney Metro rail project to minimise the impact of spoil removal from both projects.

Response

The Council's recommendations are noted. Parking arrangements in May Street are discussed in response to the issue 'parking impacts for residents and businesses'.

Transport for NSW is currently preparing an EIS for the proposed Sydney Metro (Chatswood to Sydenham), which would provide its assessment of construction impacts on the road network during construction. This would need to consider the cumulative impacts of WestConnex. Should both projects be approved, it is acknowledged that there would be a cumulative impact which would require coordination between Roads and Maritime, Transport for NSW and the contractors for each project (environmental management measure CI02) and consultation with the affected community (environmental management measure CI01).

Issue description – recommended conditions of approval (intersection design)

It is recommended the project include the following requirements:

- Each leg of the intersection to be provided with a traffic light controlled pedestrian crossing to improve access and safety for pedestrians;

- Traffic light changes should remove any left-turn slip lanes as these adversely impact on pedestrian safety;
- Provide additional mid-block pedestrian crossings on Princes Highway between Canal Road and Railway Road to improve pedestrian access and safety.
- Amend the design of the intersection of Bellevue Street and Princes Highway to accommodate right-turn movements and pedestrian crossings to improve pedestrian access.

Response

The concept design has provided a pedestrian crossing to each leg of the intersection in most instances. At the intersection of the St Peters Interchange northern ramps and Campbell Road, grade separation for the cycleway and pedestrian path has been provided over the southern legs of the intersection. At-grade pedestrian crossings have been included for all other legs.

The Council's concern with regards to the slip lanes is noted.

Marrickville would need to consult with Roads and Maritime about specific intersections which are outside the scope of this project.

Issue description – recommended conditions of approval (car parking)

It is recommended the project include the following requirements:

- Minimise the loss of on-street parking spaces associated with the construction activity, and during construction replace on-street parking as close as is practicable to the location where the spaces were removed
- Minimise the permanent loss of on-street parking spaces associated with the operation of proposal and reinstate parking temporarily removed during work as close as soon as practicable.

Response

Recommendations relating to conditions of approval are a matter for the NSW Department of Planning and Environment to consider during its assessment of the critical State significant infrastructure application.

4.12.3 Visual impact and urban design

Issue description – productive use of interchange design

The expansive design of the St Peters interchange is not productive use of the land, resulting in inaccessible 'lost space' connected by over-designed walk/cycle paths that lack surveillance and are not fully connected to the surrounding street network.

Currently the layout of the interchange structures, infrastructure ponds and associated buildings consumes large areas of land and restricts access to other potentially productive uses – the latter necessary to ensure sustainability, liveability and a sense of community ownership of the area. The approach of bringing all road connections to the surface in one place is questioned, as the multitude of above-ground interconnections constrains walk/cycle access and restricts other productive uses of the land.

A much greater portion of the site could be devoted to productive uses if the following design changes were implemented:

- Interchange roads provided underground in tunnels;
- 'Airport gateway' road relocated to create a more direct connection to Airport Drive further to the south; and
- The building footprint of portals significantly reduced.

Accordingly, the layout of the interchange area and surrounding road works should be reconsidered within a broader urban design context.

Response

The Councils suggestions are noted.

Urban and landscape design is a key component of the project, as demonstrated through the detailed and well-developed urban design included in Urban design report (Appendix L of the EIS). The urban and landscape design for the project has been developed with the aim of integrating the project into the natural and built environments and providing a contemporary, considered and cohesive design outcome. The urban and landscape design responds to the key objectives detailed in the *WestConnex Urban Design Framework* (Sydney Motorway Project Office, 2015):

- Leading edge environmental responsiveness, including sustainability
- Connectivity and legibility
- Place making
- Urban renewal and liveability
- Memorable identity and a safe, enjoyable experience
- A new quality benchmark.

Surveillance is an important aspect of the memorable identity and a safe and enjoyable experience objective which includes provision of passive surveillance, clear sight lines and lighting.

The urban and landscape design for the project has also been developed in accordance with the guidance provided in *Beyond the Pavement* (Roads and Maritime, 2014) which places particular focus on the following principles:

- Integration with local setting – the design maintains and enhances existing landscape character and vegetation patterns
- Ecologically sound – the design uses local species from existing and adjoining plant communities and assists in protecting and recovering local biodiversity
- Add character and value – the design responds to and draws upon the existing landscape patterns of the area.

The design of the St Peters interchange as constructed would be consistent with the design presented in the EIS. The detailed design process would be used to further develop and refine the design of the St Peters interchange and other components of the project, within the broad design parameters shown in the EIS.

The design of the St Peters interchange infrastructure and the landscaping strategy for the site have been developed with the aim of minimising visual and landscape impacts where feasible and reasonable, and to provide screening and softening of impacts through effective landscape treatments. The project design and landscaping strategy would continue to be developed during the detailed design phase in consultation with the New M5 Urban Design Review Panel, local councils along the project corridor and affect local communities. The outcomes of this process would be included in a final urban design and landscape plan for the project.

To achieve a lasting and cohesive urban design strategy for the St Peters interchange, focus would be on unifying and shaping the different stages of the project, including the New M5, the future Sydney Gateway, and the future WestConnex M4-M5 Link. The following objectives would allow design strategy to be implemented at the St Peters interchange:

- Close the former Alexandria Landfill site
- Return surplus lands to the community as public open space, and to allow separate future redevelopment and other permissible land uses
- Provide an extensive green volume of vegetation to compete with and soften the scale of the proposed multi-level interchange

- Promote the use of a tall, established tree canopy cover to not only soften the scale of the proposed infrastructure, but also provide a counterpoint and extension of the green open space from Sydney Park
- Design the St Peters motorway operations complex to enhance the existing street character whilst treated as a cohesive set of architectural buildings.

Such a design would allow for future stages of the St Peters interchange to adopt similar approaches to materials and detailing to achieve overall project cohesion and an integrated 'whole of project outcome'. The landscape approach in this area would focus on the creation of green volume and remediation of the former Alexandria landfill by creating an urban forest capable of competing with the scale of the St Peters interchange.

Issue description – pedestrian / cycle connectivity during operation

No pedestrian/cycling study has been undertaken for the EIS, and it is expected that the EIS would go further than it has to identify opportunities for walk/cycle network improvements and how these can be integrated with the surrounding network.

Council note that the project involves the upgrade of a number of intersections with traffic lights. These upgrades should be undertaken in a way that maximises pedestrian access and safety through minimising the spatial area of intersections, minimising crossing lengths, giving pedestrians priority in traffic light phasing and minimising provision of left-turn slip lanes for traffic.

Provision is made for a bridge connecting the raised cyclist and pedestrian bridge from the southern of Campbell Road and Sydney Park. An at-grade solution on the northern side of Campbell Street would be a more logical solution in developing the regional cycle network.

The project proposes the installation of exclusive on-road cycling facilities along Campbell Street, which is supported in principle. Concern is raised at the provision of an above- ground cycleway and pedestrian path/bridge on the south side of Campbell Street, as it does not include emergency access, rest spaces, shade or adequate connections to local streets. It is recommended that conditions of approval for the project include options for an at-grade cycle way instead of the proposed elevated structure to address the above concerns about the elevated path.

Council supports the proposed two-way cycleway along northern side of Campbell Street, but notes it stops at the intersection of Campbell and May Streets, St Peters. Council requests links to all existing cycleway be provided, including a link across the Bedwin Road bridge. One of the four traffic lanes on the Bedwin Street bridge should be removed to provide a suitable walk/cycle connection over the bridge.

Response

Pedestrian and cycle connectivity has also been raised by TTM Consulting, who were engaged by Marrickville to prepare a report commenting on the traffic related components of the EIS. Further discussion of pedestrian and cyclist impacts is presented in Section 4.17 of this report.

The New M5 Main Works Contract proposes a St Peters Interchange (the "Project"). The concept plan proposes various cycleways, shared paths and footpaths as part of the Project.

Throughout the Project development, Active Transport has been a key consideration in the development of the concept plan and Scope of Works and Technical Criteria (SWTC) requirements. However, as part of the submission a further review has been undertaken.

In summary, the review has included:

- A review of the municipal and state active transport strategies and show the initiatives in Saint Peter's Interchange region (including a brief review of current and future projects).
- A review of:
 - The current Active Transport network (highlighting current deficiencies/areas for network improvement);

- The proposed Active Transport network (resulting from the Project) noting the improvements; and
- Future opportunities resulting from the project.
- Comment on the consistency in Strategy of the Project with surrounding strategies outlined in Section 1.
- Compare the standard of Active Transport (in terms of bicycle and shared path dimensions) as required under the Project (SWTC) to the paths already constructed in the surrounding municipalities.
- Other risks associated with Active Transport Projects.

The active transport infrastructure to be implemented as part of the project would improve connectivity for cyclists and pedestrians via provision of a more integrated network. Pedestrian and/ or cyclist connectivity outcomes resulting from the project and includes:

- At the western end of the project, the existing M5 Linear Park shared path would be upgraded to provide a three metre wide surface for the majority of its length (around two kilometres in total)
- Providing a pedestrian and cycle friendly east / west connection to Bourke Road from Campbell Road through an additional crossing of the Alexandra Canal (currently an approximately 3.5km gap in connectivity)
- Providing a further connection along Bourke Street near Church Avenue at Mascot, integrating into the Alexandra Canal cycleway and improving the north to south connection on separated paths
- Improved connections to bike friendly paths (north of Sydney Park) at Mitchell Road through shared paths along Euston Road and Sydney Park Road at St Peters
- Improved connections from Campbell Road to Simpson Park and Camdenville Park at St Peters with new separated paths
- Improved pedestrian permeability to Sydney Park and the open space created by the New M5.
- Providing a connection to Canal Road from Sydney Park / Campbell Road through a shared path
- Improved connections into King Street at Newtown from the improvements to the network to the south
- A change to one-way traffic on Barwon Park Road (left turn from Campbell Road) resulting in reduced traffic flow and increasing the potential cycle use of the road.

A key benefit for cyclists and pedestrians stems from the separation of motor vehicles and cyclists/pedestrians via provision of a dedicated network of paths.

Pedestrian and cyclist connectivity is discussed further in **Section 5.5.2** of this report.

4.12.4 Consultation, social, economic and heritage

Issue description – consultation during development of business case

Council's main issue regarding consultation is absence of community or other stakeholder consultation in the development of the business case. No scoping of (or consultation with) population groups who will potentially be affected has been undertaken – apart from the people whose land will be acquired and users of social infrastructure.

Response

As discussed in Section 7.1 of the EIS, consultation on the project was part of the early consultation on the wider WestConnex program of works during the development of the WestConnex Strategic Environmental Review (Sydney Motorways Project Office, 2013b) and the WestConnex Business Case (Sydney Motorways Project Office 2013a), which were published in September 2013.

Following submission of the State significant infrastructure application for the project on 4 November 2014, more detailed project specific consultation commenced. Figure 7-1 of the EIS provided an overview of the timeline of consultation activities held in association with the project.

- Specific communication and consultation activities undertaken include: Early consultation activities undertaken for the wider WestConnex program of works, prior to the announcement of the project (discussed in Section 7.3.1 of the EIS); and
- Consultation activities undertaken following the announcement of the project in November 2014, during the preparation of the EIS and selection of the preferred design (discussed in Section 7.3.2 of the EIS).

Consultation activities have also occurred in association with the public exhibition of the EIS.

Issue description – consultation with Marrickville Council

In January 2015 the WestConnex Delivery Authority (WDA) (now Sydney Motorway Corporation) invited Council to participate in a Council Reference Group (CRG) together with representatives of Botany Council and the City of Sydney.

Council dedicated significant time and resources to analyse available information and provide balanced feedback and input, recognising the broader project requirements and objectives. Together with the City of Sydney staff made considered suggestions to optimise the project for a better balance between the project impacts, the existing compact network of inner-city streets and the needs of the community.

Many of the suggestions and opportunities identified and discussed were acknowledged throughout this process. Although they are clearly linked to the project scope, they have been excluded from the proposal in the EIS.

Sydney Motorway Corporation and Roads and Maritime are continuing to work with Council on a parallel process to determine design outcomes for Princes Highway (north of Campbell Street), King Street and Sydney Park Road, including the intersection of King/May Streets and King St and Sydney Park Road. However, as these opportunities are directly linked to the project, they should be part of the proposal the subject of this EIS or at the very least enforced as requirement of any approval to proceed.

Council requests that if the project proceeds to approval, conditions must be imposed to ensure these outcomes are delivered before the New M5 is operational.

Response

The Council's concerns are noted.

Consultation would be ongoing with key stakeholders, including the Marrickville Council throughout detailed design in accordance with any Conditions of Approval imposed by DP&E.

Conditions of approval are a matter for DP&E to consider during its assessment of the critical State significant infrastructure application.

The NSW Government has made clear public statements that there is no intention to extend clearway hours through King Street. The NSW Government position remains unchanged. Modifications to King Street do not form part of the Project.

Roads and Maritime is committed to development and implementations of the King Street Gateway in consultation with Relevant Councils, including the Marrickville Council, which may include re-design of the intersection of King Street and Sydney Park Road.

Any future proposal to reduce the capacity of King Street would be a separate project which would need to be assessed on its own merits, including undertaking traffic modelling and a full analysis of access and parking implications, as well as liaison with all relevant stakeholders and a detailed cost benefit analysis.

Issue description – timing of exhibition

Council is concerned about exhibition of the EIS over the end-of-year holiday period.

Response

Under the *Environmental Planning and Assessment Act 1979*, the Secretary of the Department of Planning and Environment is responsible for determining the timing and duration of public exhibition periods for Environmental Impact Statements. In the case of the New M5, the Secretary determined to extend the public exhibition period from the statutory minimum of 30 days to a total of 64 days (27 November 2015 to 29 January 2016) to account for the Christmas and New Year period.

The public exhibition period for the New M5 EIS is more than double the statutory minimum and longer than that for other recent comparable transport infrastructure projects, including NorthConnex (60 days) and the WestConnex M4 East (55 days). As described in Chapter 2 (Community involvement) of this report, consultation activities continued during this times including community information sessions and stakeholder meetings. If the project is approved, future consultation would be undertaken with regard to construction activities and the management of impacts.

Issue description – social and amenity impact of property acquisition

Council is concerned that the significant social and amenity impact of property acquisition, particularly those involving the demolition of dwellings along Campbell Street, St Peters.

Council sites are also directly affected, including Camdenville Park, St Peters. Council has concerns about the need to delay the planned upgrade of this park (including a planned BMX bicycle track) to provide for a construction compound for the project.

Response

The preferred design for the project has been designed to minimise the need for property acquisition. Nevertheless, some properties would be partially or wholly acquired.

Section 15.3.1 of the EIS and Section 6.2 of Technical working paper: Social and economic (Appendix M of the EIS) discusses the various social impacts associated with the property acquisition and household relocation process. This section acknowledges the social risks involved in relocating to other areas such as affecting access to social services, family, and local social networks (including sporting, social and recreation groups), and the dislocation of social networks generally.

As noted Section 13.3 of the EIS, compulsory acquisition of properties required for the project would be undertaken in accordance with the *Land Acquisition (Just Terms Compensation) Act 1991* (NSW). Relocation and some other categories of expenses would be claimable under this Act.

A section of Camdenville Park that is currently not open for public use is required to support flooding improvement works to local roads, including upgrades to the Camdenville Park detention basin. The remainder of the park is not required for the project.

Upon completion of these works, the Project will design and construct in consultation with council two BMX tracks and landscape treatments to the basin and surrounds to integrate into the surrounding park upgrades currently proposed by council in their masterplan.

Issue description – social impact and consultation

The social impact assessment should include a comprehensive assessment of the social impacts in consultation with affected people and communities, to identify positive impacts (if any) and improved mitigation measures for negative impacts.

The EIS's social and economic assessments are not adequate. There appears to be little background to the figures claimed in economic benefits, and the social assessment is lacking because it:

- has not involved profiling or direct consultation with affected people and communities to assist with identification of impacts and mitigation measures;
- does not consider how the project will improve people's lives by creating healthy built environments that facilitate recreation and active transport;

- does not explain how it improves equity – although the project will improve private vehicle access in the short-term for some, this is at the expense of others – particularly poor and vulnerable population in the area who have no choice but to live with the impacts;
- does not improve sustainability – as discussed elsewhere in this submission, WestConnex will entrench car dependency, divert funds from more sustainable options and in the long-term, congestion improvements are likely to fall away as induced traffic fills the additional road space; and
- does not commit to helping people to manage the changes in their lives that will occur because of the project.

Response

The EIS, including the Social Impact Assessment, has been prepared in accordance with the SEARs, prepared by the Secretary of DP&E and the relevant provisions of Schedule 2 of the *Environmental Planning and Assessment Regulation 2000* (NSW).

The SEARs for the project included a requirement to consult with the public, including community grounds, as well as adjoining and affected landowners. Chapter 7 of the EIS provides details of the objectives, process and activities to support the consultation program. Section 7.3.2 details the community consultation activities during the preparation of the EIS and associated with key project milestones.

Sections 6 and 7 of the Social Impact Assessment in Appendix M of the EIS provide a robust assessment of the range of social impacts associated with the construction and operational phases of the project.

The WestConnex Sustainability Strategy (the Sustainability Strategy) (WestConnex Delivery Authority, 2015) describes how sustainability initiatives will be integrated into the design, construction and operation of projects across the WestConnex program of works. The Sustainability Strategy outlines a sustainability vision, commitments, guiding principles, objectives and overarching targets across a range of sustainability themes, and was prepared to align with the Transport for NSW Sustainability Framework as well as other relevant Government sustainability instruments.

Chapter 3 of the EIS for the New M5 provides detailed information about the need for the WestConnex program of works and the New M5 as a component of those works. The strategic importance of WestConnex as just one part of a broad suite of transport infrastructure projects, including public transport measures, is also detailed in that chapter. Importantly, the EIS outlines the Government's plan to pursue this suite of transport infrastructure projects to tackle current and future congestion issues, recognising that no single project in isolation would provide a complete solution.

Chapter 4 of the EIS outlines the development of the project and alternatives to the New M5 that have been considered. Alternatives to the New M5, including optimising existing infrastructure, demand management, additional public transport and the 'do nothing' option are assessed in the chapter against the key project objectives. Alternative 3 (Section 4.2.2 of the EIS) assessed the alternative of investing only in public transport, active transport and rail freight improvements.

This assessment of the alternatives demonstrated that the New M5 provides the best complete response to the project objectives, relative to alternatives, and within the broad suite of transport infrastructure projects proposed to address congestion across Sydney.

Concurrent with the WestConnex program of works the NSW Government is delivering significant new public transport projects which would ease the demand for private vehicle journeys across Sydney and contribute to lowering the use of fossil fuels.

Further, the project would:

- include an Energy Efficiency and Greenhouse Gas Emissions Strategy detailing processes and methods to improve energy efficiency and reduce greenhouse gas emissions
- ensure a percentage of energy is sourced from renewable energy generated onsite and/or accredited GreenPower. The current target is to source a minimum of six per cent of energy from renewable energy generated onsite and / or accredited GreenPower

- optimise the design and operation of the motorway to minimise energy used by vehicles using the motorway.

Issue description – consultation with potentially affected population groups

No scoping of (or consultation with) population groups who will potentially be affected has been undertaken – apart from the people whose land will be acquired and users of social infrastructure.

Response

Chapter 7 of the EIS provides detailed information regarding the extensive consultation activities undertaken and the issues raised before and during preparation of the EIS. This covered the period through to August 2015, immediately prior to the EIS going on public exhibition.

During September, October and November 2015 SMC undertook a large number of additional consultation activities with government agencies, local Councils, community groups, businesses and residential property owners directly affected by the project. A summary of these additional consultation activities and the issues raised are documented in Chapter 2 of this report.

Consultation activities would continue as the project progresses through the assessment/approval and design development phase and into the construction phase.

Issue description – heritage and conservation

Council has concerns about the direct and indirect impact of the project on heritage items and conservation areas.

The New M5 will not have a positive effect on the heritage values of the Marrickville local government area – In fact, there will be significant negative impacts through demolition of heritage fabric, loss of cultural heritage and loss of amenity in the historic suburbs of St Peters and Newtown.

The main direct heritage impacts on specific properties are:

- demolition of 8 heritage buildings listed on the Roads and Maritime Services Section 170 register: 28-44 Campbell Street St Peters;
- demolition of 65 period dwellings, protected by Part 4.1.11 Marrickville Development Control Plan 2011 on Campbell Street, Brown Street and Albert Street St Peters; and
- reduction in the size of Camdenville Park and the Goodsell Estate Heritage Conservation Area.

Added to this are indirect impacts of reduced amenity through increased noise, traffic and air pollution affecting the following heritage properties and historic precincts.

- 105-119 May Street St Peters (Heritage Item I273 Marrickville Local Environment Plan 2011 (MLEP 2011)) has not been identified in the M5 East documentation. It may require protection from road works related to the realignment of the Campbell Street/Unwins Bridge Road intersection. Additionally, widening the road, increasing the lanes and reducing parking would negatively affect the value of these properties and therefore their significance is threatened.
- Brick Road and Footpath with stone kerbing, Victoria Street St Peters (Heritage Item I283 MLEP 2011) has not been identified in the M5 East documentation. A fabric survey should be undertaken prior to commencement of works, protective measures implemented to ensure the brick road and stone kerbing and guttering is not damaged by vehicles during construction, and regular monitoring of the site undertaken throughout the works, to ensure it is not damaged.

- C2 – King Street and Enmore Road Heritage Conservation Area - the heritage significance of the King Street Enmore Road Heritage Conservation Area (HCA2, Schedule 5, MLEP 2011 – assessed with State significance) lies in its continuous use as an active retail strip since the 1830s. In order to protect the retail use traffic volume should be retained at, or below, current levels, and no clearways should be located along the street. Without these two measures the resulting negative impacts to the amenity of the street would be felt by: pedestrians, residents of shop top housing, and most significantly retailers, many of whom trade with their shopfronts open conducting outdoor dining and footpath trade. The noise, dust, volume of traffic, and its proximity to the footpath if clearways are introduced, will reduce the patronage and liveability of the precinct, this in turn will negatively impact its vibrancy and economy, jeopardising the street's heritage significance as an historic retail street.
- Heritage items within King Street and Enmore Road Newtown HCA 2:
 - I272 – St Peter's Railway Station;
 - I159 – St Peters Hotel - 631 King Street Newtown;
 - I158 - Botany View Hotel, 597 King Street;
 - I154 - Former ANZ Bank, 327 King Street;
 - I153 - Former CBC Bank, 325 King Street;
 - I156 - Former Molloy's Shop 539 King Street;
 - I157 - Former Doumany's Shop 555 King Street; and
 - I155 - Terraces with Shops 415-419A King Street.
- I275 – St Peter's, Cooks River Church of England, 187 & 211 Princes Highway - this State Significant church is the oldest extant building in the Local Government Area. It may be susceptible to damage from vibration due to its age and fragility. A fabric survey should be undertaken prior to commencement of works, and regular monitoring of the site undertaken throughout the works, to ensure its current condition is maintained.
- I312 – Dynamo Auto Electrical Garage - the retention of the Dynamo Auto Electrical Garage at the corner of Princes Highway and Canal Road St Peters, and its incorporation into the design, is suitable. A Conservation Management Plan should be procured before commencement of the works. A fabric survey should be undertaken prior to commencement of works, and regular monitoring of the site undertaken throughout the works, to ensure it is not damaged.
- I277 – Southern Cross Hotel - this building is very close to the works and will be susceptible to damage from vibration, adequate protective measures should be taken prior to construction. A fabric survey should be undertaken prior to commencement of works, and regular monitoring of the site undertaken throughout the works, to ensure it is not damaged.
- C16 – Goodsell Estate HCA - standards of remediation of Camdenville Park post construction should be negotiated with Council.
- Draft Lackey Street HCA, incorporating Simpson Park – provide higher resolution details of landscape design proposals for public consultation prior to the works affecting Simpson Park. Take into consideration the feedback received from consultation.
- I281 - Town and Country Hotel - provide higher resolution details of landscape design proposals for public consultation prior to the works affecting Campbell Street. Take into consideration the feedback received from consultation.
- I280 – Waugh and Josephson Industrial Buildings, 1-7 Unwins Bridge Road - provide higher resolution details of landscape design proposals for public consultation prior to the works affecting Campbell Street. Take into consideration the feedback received from consultation.
- I270 - Alexandra Canal – a fabric survey should be undertaken prior to commencement of works, and regular monitoring of the item, in the vicinity of the site, undertaken throughout the works, to ensure it is not damaged.

- I271 - St Peter's Public School, 93A Church Street – a fabric survey should be undertaken prior to commencement of works, and regular monitoring of the site undertaken throughout the works, to ensure it is not damaged.
- I278 – 'Claraville' Victorian Filigree Mansion 21-23 Silver Street - a fabric survey should be undertaken prior to commencement of works, and regular monitoring of the site undertaken throughout the works, to ensure it is not damaged.

Response

During the development of the project design, one of the key objectives was to minimise impacts on listed heritage items. Impacts to built heritage, heritage landscapes and historical archaeological sites would, to the greatest extent practicable, be avoided and minimised. This has been achieved in several locations where the preferred design was amended to avoid impacts to heritage features.

Construction of a transport infrastructure project of this scale in an established urban area would inevitably generate a range of localised impacts. For this project one of the impacts that cannot be avoided is the demolition of housing, including listed and contributory heritage items, within Heritage Conservation Areas. Ultimately the benefits of the project must be balanced against these impacts, and the project must be able to demonstrate an overall net community benefit. The benefits and impacts of the project are comprehensively assessed in the EIS and associated technical reports and management measures are recommended to minimise impacts where possible.

Section 20.3 of the EIS provides an impact assessment of non-Aboriginal heritage. The assessment identifies direct, potentially direct and indirect impacts on non-Aboriginal heritage items. Fifty seven non-Aboriginal heritage items are expected to be directly or indirectly impacted by the project. Table 20-6 of the EIS provides a summary of the impact assessment and lists all 57 heritage items and the degree of impact.

Vibration is not expected to significantly affect buildings. Section 5.5 of the Technical working paper: Noise and vibration (Appendix J of the EIS) provides an assessment of potential construction vibration impacts as a result of works at surface and below ground (tunnelling). It concludes that, for tunnelling activities, the predicted vibration levels at heritage items are estimated to be around two millimetres per second or less, which is below the recommended maximum level of vibration that would be applicable to heritage structures set within the German Standard DIN 4150 - Part 3 - Structural Vibration in Buildings – Effects on Structures.

The potential impacts on heritage structures as a result of ground settlement would be dependent on the geotechnical conditions, the depth of the tunnelling activity, the number of storeys of the building, and the position, condition and masonry of the structure itself. The calculated settlement for the project is generally less than 20 millimetres for the majority of the tunnel alignment. Locations of peak settlement are at the portals and at the Y-junction caverns. It is expected that settlement would stabilise within two months of the roadheader passing under a structure. Section 19.3.9 of the EIS provides an assessment of the potential impacts of ground settlement on structures.

The potential impacts of vibration and settlement on heritage items as a result of tunnelling works are preliminary and do not take into account the specifics of properties themselves. Further assessments would be undertaken during detailed design to determine the level of potential impact on structures and to identify appropriate management measures to minimise these impacts. For some properties, this may involve undertaking an existing condition survey and a program of monitoring.

Consultation would be ongoing with key stakeholders throughout detailed design in accordance with any Conditions of Approval imposed by DP&E.

With respect to specific items noted in the submission:

- 28-44 Campbell Street St Peters, identified for demolition, was considered in the Technical working paper: Non-Aboriginal heritage (Appendix R of the EIS). The buildings would be subject to a full archival recording following the NSW Heritage Division guidelines How to Prepare an Archival Recording (NSW Heritage Office, 2003) and Photographic recording of heritage items using film or digital capture (NSW Heritage Office, 2006). Consideration should be given as to whether elements of the houses could be salvaged and used to maintain or restore other properties managed by Roads and Maritime (somewhat effective). This is reflected in NAH06 in Section 20.4 of EIS (and amended in Chapter 8 (Revised environmental management measures) of this report.
- A construction heritage management plan would be prepared prior to construction in consultation with the NSW Heritage Division of OEH, local councils, including Marrickville and Sydney Water. The plan would detail how construction impacts on heritage would be minimised and managed including training and induction processes for construction personnel. Inductions are to cover built heritage, landscape and historical archaeological sites and their management, and provide heritage guidance on how to avoid / manage impacts. The induction would be prepared in consultation with a suitably qualified heritage specialist and historical archaeologist. As a minimum, the plan would include the following:
 - Induction protocols for staff and project personnel to undertake a cultural heritage induction, to assist them in understanding and complying with their legal obligations under the Heritage Act 1977
 - A list, plan and GIS layer showing the location of identified heritage items
 - A significance assessment and statement of significance for each item
 - Detail the management measures identified and when the measures are to be implemented
 - Provide protocols and procedures to be enacted during construction to ensure the protection of items of heritage significance
 - An unexpected finds procedure in the event that further sites are identified during works
 - The separate procedure for the discovery of skeletal remains (highly effective). Impacts to built heritage, heritage landscapes and historical archaeological sites, will to the greatest extent practicable, be avoided and minimised. Where impacts are unavoidable, works shall be undertaken in accordance with the strategy outlined in the construction heritage management plan (moderately effective).
- Management measures for the Goodsell Estate Heritage Conservation Area would include:
 - Landscaping, to mitigate the impacts of realigning and widening roads, as well as alterations to the existing stormwater detention basin
 - Surface works would adhere to safe working distances
 - An existing condition survey report and program of monitoring would be undertaken to identify early potential risks to relevant structures within the conservation area and within 50 metres of the main alignment tunnels (highly effective).
- Terrace housing, including interiors, 105-119 May Street St Peters (Heritage Item I273) was considered in the Technical working paper: Non-Aboriginal heritage (Appendix R of the EIS), including visual impacts and impacts from vibration intensive activities.
- Brick Road and Footpath with stone kerbing, Victoria Street St Peters (Heritage Item I283 MLEP 2011) was considered in the Technical working paper: Non-Aboriginal heritage. This item is 30 to 40 metres from the construction footprint and the project is expected to have a negligible impact. This was incorrectly labelled as I273 on Figure 31 of the technical working paper.
- C2 – King Street and Enmore Road Heritage Conservation Area has been considered in Section 5.3 in the Technical working paper: Non-Aboriginal heritage. The project does not propose to change current car parking arrangements along King Street. Various items that are located along King Street as nominated in Council's submission are not within the defined assessment study area.

- Draft Lackey Street HCA, incorporating Simpson Park, Town and Country Hotel and Waugh and Josephson Industrial Buildings – landscaping designs would be developed and refined with the input of the Urban Design Review Panel. Public consultation on these more detailed designs would be appropriate.

Issue description – council requirements for heritage and historical management

Council requires the proponent to follow the recommendations of the Office of Environment and Heritage on all archaeological practice and monitoring, and to ensure archaeology is included in the interpretation strategy and design. Archaeological management plans should be prepared where necessary.

Regarding archival recording, Council requires (prior to the work) a photographic archival record should be undertaken in accordance with the Office of Environment and Heritage policy, and a copy provided to Marrickville Council of all areas affected by the works, in particular the streetscapes of Campbell Street, Brown Street and Albert Street St Peters.

Council requires the proponent to engage an interpretation specialist and complete interpretation design in conjunction with public art process and detailed landscape design in consultation with staff and St Peter's community.

All heritage items to be retained (within the construction site and/or directly impacted by the works) require an up to date Conservation Management Plan, to ensure appropriate works to/around each item.

All buildings proposed to be demolished should require salvaging of demolished heritage fabric or relocation of entire buildings where appropriate as a condition of approval/contract. Salvaged fabric should be disposed of at local retailer/s of second hand building materials. Salvageable materials include bricks, windows, doors, verandah posts, stone, tiles, timber flooring, timber joists, beams, rafters, battens, and framing, chimney pots, roof tiles and sheeting, fireplaces, mantle pieces, skirtings and architraves, light fittings, fences, gates, balustrades staircases, door and window hardware, bathroom, laundry and kitchen fittings.

Response

The detailed design, documentation and construction of the New M5 project would be managed to ensure that, as far as possible, the identified potential for heritage and archaeological impacts is avoided or minimised. Where impacts are unavoidable, works would be undertaken in accordance with the strategy outlined in the construction heritage management plan and the management measures outlined in Section 20.4 of EIS (and amended in **Chapter 8** (Revised environmental management measures) of this report) and include:

- The removal or change of heritage listed structures would be subject to specific management measures (refer to Section 20.4 of the EIS for details). All of these would include a full archival recording following the NSW Heritage Division guidelines How to Prepare an Archival Recording (NSW Heritage Office, 2003) and Photographic recording of heritage items using film or digital capture (NSW Heritage Office, 2006). Consideration would be given as to whether elements of the heritage items could be salvaged and used to maintain or restore other properties managed by Roads and Maritime.
- The implementation of a construction heritage management plan
- Depending upon the nature and extent of impact, potentially affected heritage conservation areas and heritage buildings that will be retained may require the preparation of a conservation management policy to assist in making informed decisions about their further management and conservation during the works.
- Safe working distances for surface works, and would include existing condition survey reports and program of monitoring to identify early potential risks at a number of non-Aboriginal heritage items
- Consideration would be given as to whether elements of the houses that are being demolished could be salvaged and used to maintain or restore other properties in the area.

4.12.5 Air quality

Issue description – technical issues with EIS emissions data

Although Council's independent assessment of air quality section of the EIS (by Air Noise Environment) concludes the assessment is "reasonable" and the project is "not likely to significantly worsen local and regional air quality", it raises a number of technical issues with the EIS's emissions data.

Response

Council's position is noted and specific responses to the technical issues raised in the independent review are discussed in this section.

Issue description – future changes to air quality standards

Council also notes that air quality in inner-Sydney is currently generally poor and changes to Federal air quality standards may affect the projects ability to comply – in any event, Council prefers transport alternatives that improve air quality.

Response

The Council's position is noted.

Issue description – adequacy of the air quality assessment methodology

Attempts to develop improved methodologies are an important step in developing an understanding of the impacts of complex infrastructure projects, there are inherent risks in the application of methodologies that have had limited application to tunnel projects in the past. This has resulted in some specific issues that have not been satisfactorily addressed in the EIS.

These issues relate primarily to the limitations of the dispersion modelling methodology (GRAM/GRAL model) with respect to:

- building downwash effects;
- data from multiple meteorological stations;
- hourly time varying emission rates;
- time varying emission temperatures; and
- the number of receptors where predicted impacts can be considered in detail.

The EIS has sought to address these limitations through sensitivity analysis and verification of the datasets used. However, these factors combine to introduce significant uncertainty to the predicted air quality outcomes, particularly for the predicted short term nitrogen dioxide concentrations.

These effects are likely to be most apparent for the dispersion of emissions from the ventilation stations. The estimates for variability presented in the assessment confirm +/-50 per cent variability for building downwash and +/-30 per cent variability for emission temperature for 24-hour average predicted concentrations. Additional uncertainty would be added to the predicted impacts of the ventilation stations as a result of the smoothing of hourly emission rates, as these uncertainties relate to 24-hour average data. This could result in predicted non-compliances at a number of additional receptors in close proximity to the ventilation outlets. There is also variability introduced due to the use of a single meteorological station that is located in the centre of the overall WestConnex modelling domain for the prediction of the meteorological data used in the GRAL modelling. This is opposed to use of data from the Earlwood monitoring station that is in closer proximity to the New M5.

Response

It is noted that councils independent technical assessment stated that the Air Quality Assessment has sought to address uncertainty "...in a thorough, scientifically sound manner". The EIS has addressed these uncertainties through sensitivity analysis and verification of the datasets used.

Matters relating to the meteorological data, hourly emissions rates and building wake effects are provided later in this section.

With respect to the receptors considered in the assessment, two categories of receptors were defined for use in the air quality impact assessment. Community receptors were considered in greater detail, as these were the particularly sensitive locations such as schools, child care centres and hospitals located in the project study area. For these receptors a more detailed approach was used to calculate the total concentration of each pollutant. Thirty five community receptors were identified in the project area for detailed assessment of air quality impacts. Another 46,219 receptors, known as RWR (residential or workplace receptors) were assessed as discrete point, classified according to land use. Further detail of the assessment of receptors is provided in section 9.4.6 in Technical working paper: Air quality (Appendix H of the EIS).

Issue description – alignment with Approved Methods for the Modelling and Assessment of Air Pollutants in NSW

The adopted methodology does not satisfy all of the requirements of Approved Methods for the Modelling and Assessment of Air Pollutants in NSW, and the EIS does not confirm that the NSW EPA has approved the modelling methodology that has been adopted. Confirmation should be sought from NSW EPA to confirm that the GRAM/GRAL modelling methodology is acceptable.

Response

The Approved Methods document states that it is to be used for 'assessing emissions of air pollutants from stationary sources'. While the assessment methodology adopted for the EIS applied the Approved Methods wherever possible, for some components of the assessment it was not clearly applicable. For example, the surface road network is 'an area-wide network of mobile sources, with complex patterns of operation'. In these cases, the assessment methodology adhered to the stated principles contained in the Approved Methods document, in conjunction with contemporary best practice.

The NSW EPA was consulted during the development and preparation of the assessment methodology and the air quality assessment for the project.

Issue description – construction air quality assessment

Further consideration should be given to:

- The completion of a quantitative construction air quality assessment, focusing on the risk of particulate impacts and including the potential for release of crystalline silica.
- Appropriate monitoring programmes to adopt during the remediation of the Alexandria landfill site to confirm that appropriate health and amenity criteria are achieved

Response

The risk of particulate impacts is addressed in the Technical working paper: Air quality (Appendix H of the EIS) and will be managed through implementation of a Construction Air Quality Management Plan for the project, (environmental management measure AQ01). A site specific management plan would be prepared for the Alexandria Landfill to manage landfill closure activities and will detail the management measures to manage odours generated by this activity (environmental management measure CM02 (as amended by **Chapter 8** (Revised environmental management measures) of this report).

It is acknowledged there is potential for crystalline silica emissions to occur during tunnel excavation due to the high temperatures caused at the excavation face. The potential for crystalline silica to be released is primarily relevant to occupational exposure, and would be managed in accordance with relevant NSW and Australian guidelines. The controls would effectively eliminate its discharge into the atmosphere. Safe work method statements would be developed as part of the project safety management system.

Dust control on site and from haulage is addressed in the Technical Working Paper: Air Quality in Appendix H of the EIS and would be managed during construction in accordance with the Construction Air Quality Management Plan. This would include implementing wheel washes as relevant at exit points and ensuring that truck loads are covered.

Issue description – portal emissions

Further consideration should be given to necessity of incorporating portal emission monitoring if a condition requiring no portal emissions is imposed.

Response

As detailed in Section 5.8.1 of the EIS, single point air quality monitors would be installed within the main alignment tunnels, including inside the entry and exit portals. Ambient air quality monitoring would also be undertaken at specific locations to assess compliance with the EPA's ambient air quality criteria.

Issue description – verification of meteorological dataset

Further consideration should be given concerning the verification and justification of the meteorological dataset relative to the Earlwood meteorological dataset that is in closer proximity to the project area.

Response

The selection of the meteorological station was based on multiple criteria, including:

- Location relative to the project
- Adjacent land use and therefore representativeness of the wider study area, taking into account surface roughness factors
- Compliance with Australian Standards for siting
- Advice from data holders; analysis of consistency of changes in wind speeds and wind directions that would indicate whether the data provided a reliable trend
- Reliability and completeness of the data set.

Based on this assessment, the Canterbury Racecourse meteorological station was selected as providing the best available data.

The Technical working paper: Air quality (Appendix H of the EIS) provides significant detail on the chosen meteorological dataset, as well as the other datasets that were analysed to support the site selection. Appendix H details the meteorological data included in the initial analysis (data from three OEH stations and five Bureau of Meteorology (BoM) stations) and provides reasons why these were not chosen for dispersion modelling.

The OEH Chullora and Rozelle sites showed inconsistencies in dominant wind direction through six years of data, and non-compliance with the Australian Standards for siting. Additional information regarding these sites was provided by OEH. An investigation of the data by OEH showed that differences in the dominant wind patterns at these sites were probably due to a variety of factors, including change in surroundings (i.e. new buildings and trees in the area surrounding the stations), sensor alignment issues and instrument replacements which occurred around the same time that the data analysis showed a shift in the dominant wind patterns (i.e. 2011/2012).

The data from the OEH monitoring station at Earlwood were not selected for modelling as they were not considered to be representative of the wider study area, showing low annual average wind speeds and high percentages of calms. Further analysis of the stability class data from this site showed an unusually high percentage of G stability class (very stable) and a low percentage of D class (neutral) conditions (see **Figure 4-56**). The Earlwood monitoring station is located in a valley surrounded by a densely populated residential area, which may explain the data from this site.

The BoM Sydney Airport and Fort Denison data were also analysed but not selected for modelling. The annual average wind speeds recorded at these sites were very high (monthly averages over the year are shown in **Figure 4-57**) and the percentage of calms was very low due to the topography surrounding these sites (e.g. large fetch, open water). Although the data at these sites may be reliable, they were considered to only be representative of the specific locations, and not suitable for representing the wider New M5 study area.

The only other data potentially suitable for modelling were from the BoM Sydney Olympic Park (Archery Centre) site. However, data were only available for four years, as the site was commissioned in 2010. Due to this, and the fact that the BoM Canterbury Racecourse station is located more centrally to the full WestConnex program of works, the Canterbury Racecourse site was considered to be more appropriate. As shown in **Figure 4-57**, the general wind patterns that are seen over the course of a year at other stations are also reflected in the Canterbury Racecourse data.

The previous response explains why the BoM Canterbury Racecourse data were chosen in preference to the meteorological data from the other sites. The fact that the OEH Chullora and Rozelle sites do not comply with Australian Standards is a valid point given the comments provided by the OEH about these sites and the shift in wind patterns seen in the data.



Figure 4-56 Stability class distributions for the BoM Canterbury Racecourse and OEH Earlwood sites

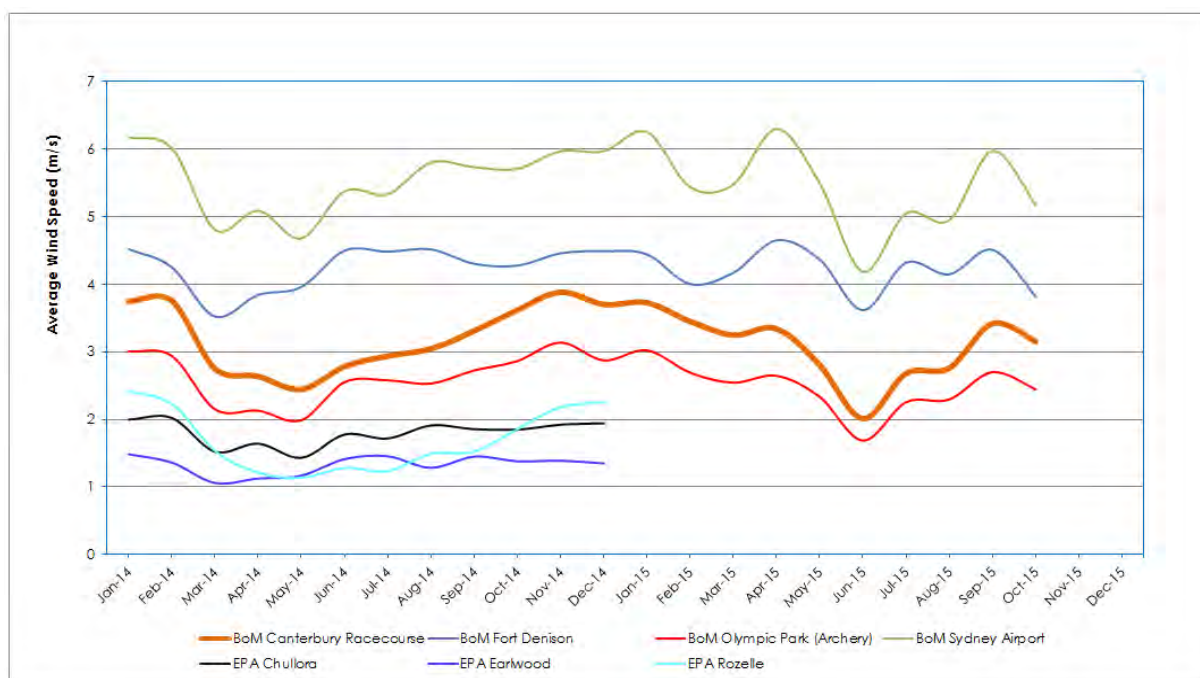


Figure 4-57 Monthly average wind speeds at BoM and OEH sites

Whilst it is true that the model shows a good agreement at the BoM Canterbury Racecourse site and a poorer agreement at other locations, this is not unusual as the GRAMM model (like other models such as CAL3CHQR) uses meteorological data from one location to represent the study area. The use of a single meteorological dataset is not uncommon in studies with domains the size of that applied to the WestConnex program of works, and with predominantly uniform land use and terrain. The regression analysis shows a fair agreement (R^2 of ~0.5 and 0.6 at BoM Sydney Olympic Park), given that the data were not included in the model. Furthermore, as discussed previously, the validity of the Rozelle and Chullora meteorological data is uncertain, and therefore it is not possible to provide a definitive test of the GRAMM performance at these locations.

Ultimately, the most important consideration is how well the results (predicted concentrations) from the overall model chain compare with measurements. Section 9.4.9 and Appendix J of the Technical working paper: Air quality (Appendix H of the EIS) describes an evaluation of the GRAL concentration predictions against measured data. The analysis shows a good agreement between predictions and measurements, and shows that the model is slightly over predicting at all locations. This is as expected, and is considered to be desirable in an assessment of this nature, so that absolute concentrations and impacts are not underestimated. The evaluation shows that the overall model chain is predicting concentrations at an appropriate level at various locations in the study area.

To test the sensitivity of the GRAL predictions to meteorology, a GRAMM run using the Earwood 2014 dataset was completed. These datasets were selected due to the contrast with the BoM Canterbury Racecourse data (i.e. much lower annual average wind speed and much higher percentage of calms). The re-run GRAMM was run through to the 2031-DM and 2031-DSC GRAL scenarios for annual mean $PM_{2.5}$.

Figure 4-58 shows the ranked annual mean $PM_{2.5}$ concentrations at the RWR receivers in the 2031-DSC scenario. The figure shows the results for both the test run using the Earwood and the original run using the BoM Canterbury Racecourse data. The results obtained using the Earwood meteorological data were, on average, $0.6 \mu g/m^3$ higher than those obtained using the Canterbury Racecourse data.

Figure 4-59 shows a comparison of the changes in $PM_{2.5}$ (2031-DSC minus 2031-DM) for the two datasets. When using the Canterbury Racecourse data, 19 RWR receivers were predicted to have an increase in annual mean $PM_{2.5}$ above $0.8 \mu g/m^3$. When using the Earwood data, 192 receivers were predicted to have an increase in annual mean $PM_{2.5}$ above $0.8 \mu g/m^3$. When using the Canterbury

Racecourse data, one RWR receiver was predicted to have an increase in annual mean $\text{PM}_{2.5}$ above $1.6 \mu\text{g}/\text{m}^3$. When using the Earlwood data, seven receivers were predicted to have an increase in annual mean $\text{PM}_{2.5}$ above $1.6 \mu\text{g}/\text{m}^3$. It is important to note that although the use of the Earlwood data shows an increase in absolute concentrations at RWR receivers, there is actually a higher percentage of receivers for which there is predicted to be a benefit due to the project (i.e. more receivers would have a decrease in concentration due to the project if the Earlwood data are assumed to be representative of the study area). This is a particularly important metric when assessing the potential risks to human health.

It should be noted that the Earlwood data are not more representative of the study area than the Canterbury Racecourse data. As discussed previously, the Earlwood data were used as a contrasting dataset to test the sensitivity of the GRAL results. The results of the test have shown that when using a dataset with much lower wind speeds and much higher calms, the absolute concentrations would increase but the benefits due to the project also increase.

The corresponding results for the maximum one-hour NO_2 concentrations, and the changes in concentration, at the RWR receivers are shown in **Figure 4-60**Figure 4-49 and **Table 4-1**. For most receivers the change in the meteorology has little effect on the maximum NO_2 concentration.

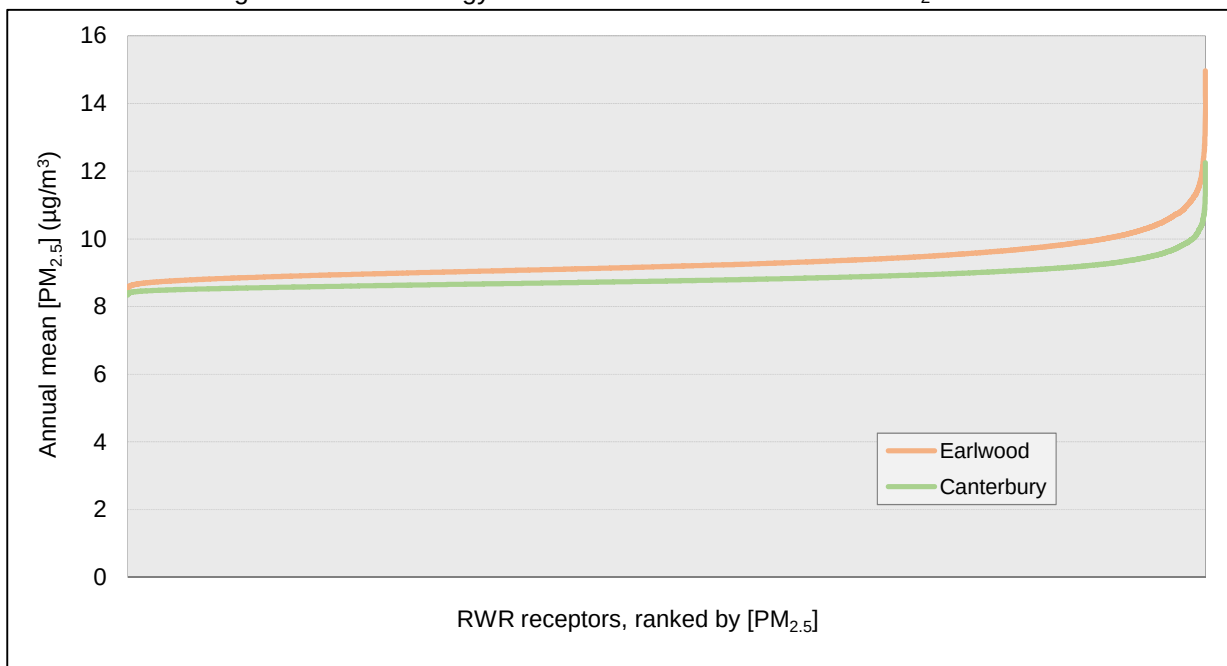


Figure 4-58 Sensitivity of GRAL predictions to meteorological data input: absolute annual mean $\text{PM}_{2.5}$, 2031-DSC

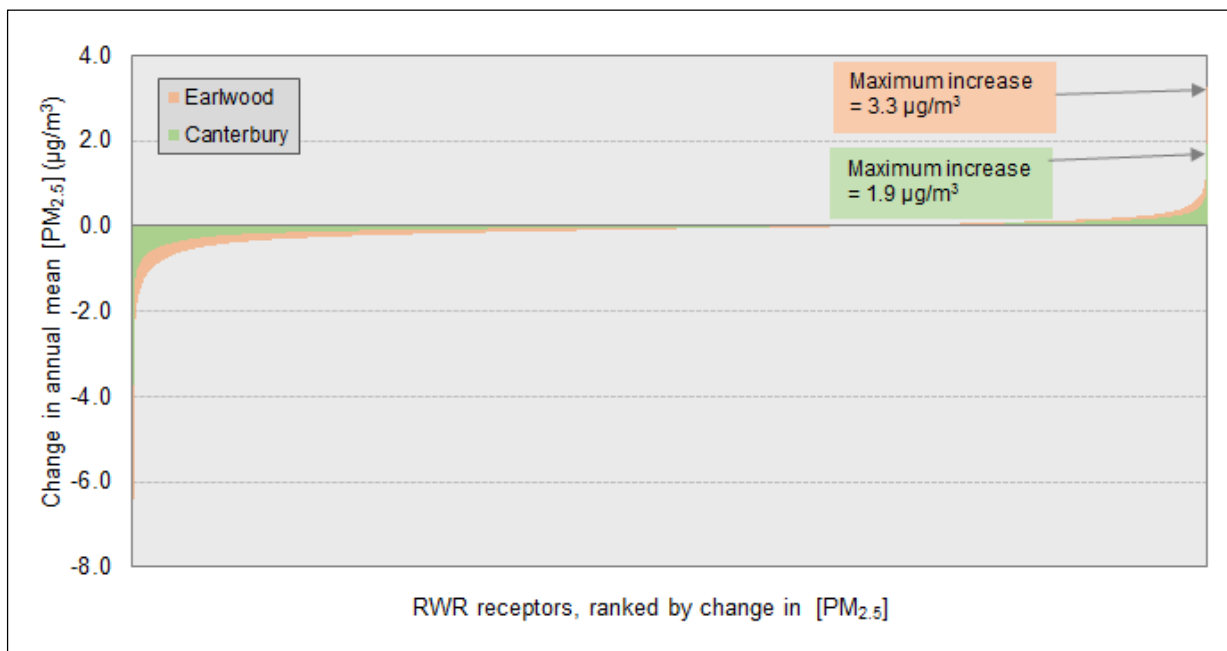


Figure 4-59 Sensitivity of GRAL predictions to meteorological data input: change in annual mean $PM_{2.5}$ with the project (2031-DSC minus 2031-DM)

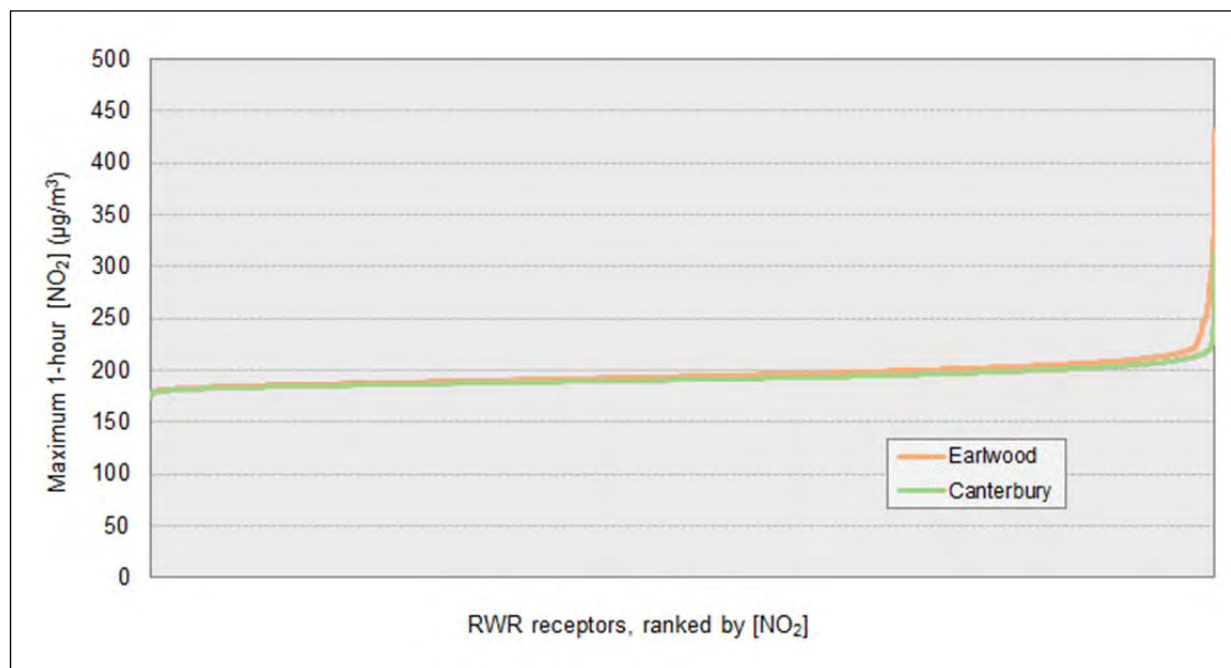


Figure 4-60 Sensitivity of GRAL predictions to meteorological data input: maximum one-hour NO_2 , 2031-DSC

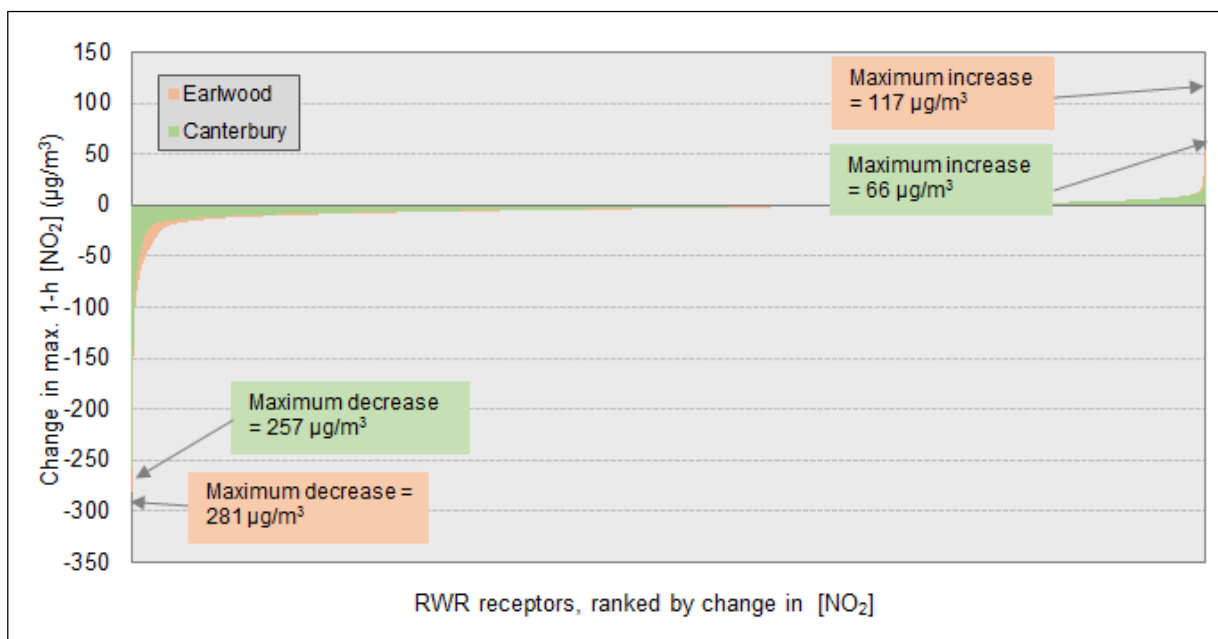


Figure 4-61 Sensitivity of GRAL predictions to meteorological data input: change in maximum one-hour NO₂ with the project (2031-DSC minus 2031-DM)

The implications in terms of exceedances of the one-hour NO₂ criterion of 246 µg/m³ are shown in **Table 4-8**. The table demonstrates that the number of predicted exceedances is sensitive to the meteorology. There would be more predicted exceedances based on the Earlwood meteorological data, both in the 'Do Minimum' and 'Do Something' scenarios. However, in both cases there would be a reduction in the number of exceedances with the project.

Table 4-13 Exceedances of 1-hour NO₂ criterion based on Canterbury and Earlwood meteorological data

Meteorological input	Scenario	Number of exceedances of criterion (246 µg/m ³)
Canterbury	2031-DM	438 (0.95% of receivers)
	2031-DSC	43 (0.09% of receivers)
Earlwood	2031-DM	1,187 (2.57% of receivers)
	2031-DSC	473 (1.02% of receivers)

Issue description – building downwash effects

Further consideration should be given to building downwash effects for the modelling of the ventilation station outlets; consideration of hourly varying emission rates (as required by the NSW EPA methodology) and hourly varying emission temperatures.

Response

Section 9.9.3 of the Technical working paper: Air quality (appendix H of the EIS) included results of a sensitivity test which addressed the use of buildings in the dispersion model. Results showed that, when buildings were included, there was an average increase in concentrations associated with the ventilation outlet by a factor of approximately 1.3. The testing concluded that the overall conclusions of the assessment would not change significantly with the inclusion of buildings particularly given that ventilation outlet emissions make up a minor component of the total predicted concentrations (i.e. surface roads, ventilation outlets and background).

Issue description – hourly varying emission rates and emission temperatures

Further consideration should be given to hourly varying emission rates (as required by the NSW EPA methodology) and hourly varying emission temperatures.

Response

Hourly varying emission rates were used for the ventilation outlets in the air quality assessment.

Section 9.5 of Appendix L to the Technical working paper: Air quality (Appendix H of the EIS) describes the consideration of temperature on in-tunnel emissions. The ground temperatures, 10 metres from the tunnel wall in Sydney tunnels are relatively constant between 16 degrees Celsius and 20 degrees Celsius. Figure 11.9, Appendix L of the Technical working paper: Air quality also shows the winter and summer ventilation outlet temperatures per hour as applied for the regulatory traffic case in 2031.

Table 9-35 of the Technical working paper: Air quality shows the results of the sensitivity test for the effect of ventilation outlet temperature. The results show that the predicted concentrations for the ventilation outlet were higher (by a factor of, on average, around 1.5). However the predicted concentrations remained well below the advisory reporting standards for PM_{2.5} and were a very small proportion of the total combined results for surface roads and ventilation outlets. Even with a significant change in ventilation outlet temperature the total predicted concentration is unlikely to be significantly impacted. The assumption of a single annual average temperature for GRAL was therefore considered unlikely to represent a large source of uncertainty in the overall predictions.

Issue description – ventilation design

Further consideration should be given to the demonstration of how the ventilation design will provide for varying outlet diameters.

Response

Individual dampers would be provided on all ventilation outlet fans for the purpose of variable control.

4.12.6 Contamination, flooding and water management

Issue description – contamination

For most of the project footprint, particularly in 'Project Area 5', the EIS presents ad hoc and limited primary and secondary data on contamination and as such fails to address the contamination assessment requirements of the SEARs. The EIS states that that on many parts of the project site, contamination (hence suitability for the proposed development) is unknown due to lack of investigation.

The EIS fails to address the SEARs and relevant Agency requirements for contamination. The SEARs state that the "assessment must include details of proposed remediation measures and justification for the proposed measures in terms of the proposed final use of that land". For every one of these requirements related to contamination, the EIS has provided an inadequate assessment or has deferred the assessment.

The contamination assessment could only be considered a Preliminary Site Investigation as per the Guidelines for Consultants Reporting on Contaminated Sites (NSW EPA 2011). The scale of the proposal, lack of information about past activities, and known presence of contamination and contaminating processes over the entire project site warrant a Detailed Site Investigation prior to approval, not deferred to a later stage.

Response

Detailed investigation reports were undertaken for the Alexandria Landfill and for the Roads and Maritime owned land at Canal Road. The findings of the landfill investigation have informed the Landfill Closure Plan.

The Technical working paper: Contamination (Appendix O of the EIS) included a Phase 1 Environmental Site Assessment (ESA), which was completed in accordance with the Contaminated Sites: Guidelines for Consultants Reporting on Contaminated Sites (OEHL, 2011). The purpose of this assessment was to evaluate the potential likelihood of contamination occurring along the alignment of the project.

Based on the findings of the Phase 1 ESA, further detailed site investigation works are required to be undertaken at a number of locations that were assessed to pose a potential risk of encountering contamination. All site investigation works will be undertaken in accordance with the NSW EPA contaminated land framework and guidelines, particularly the NEPC (2003) National Environmental Protection (Assessment of Site Contamination) Measure 1999 (Revised 2013) and the Contaminated Sites: Guidelines for Consultants Reporting on Contaminated Sites (OEHL, 2011).

Where the site investigations identify contamination that is assessed to require remedial action, a NSW EPA-accredited Site Auditor will audit the remediation works and certify that the site has been remediated to a condition suitable for the proposed land.

Issue description – water quality impacts on receiving waterways

The assessment of groundwater and water quality impacts is not adequate and there are further opportunities to reduce potable water consumption in the construction and operation of the project.

It is unacceptable that the EIS considers the receiving waters of the local river system to be degraded rather than a resource that can be improved over time with the implementation of water sensitive urban design. The EIS should have included options to treat the road runoff using bio-filters or other appropriate treatment measures prior to discharge.

Response

The groundwater and surface water impact assessments presented in Chapter 9 and Chapter 16 of the EIS were undertaken in accordance with the SEARs for the project.

The operational water quality impacts from the above ground permanent infrastructure associated with the project are assessed in Section 16.3.2 of the EIS. These impacts would be predominantly due to an increase in runoff from the increase of impervious area and the related mobilisation of pollutants from the carriageway. Although the project would result in an increase in impervious surface areas, current provisions are sufficient to meet the treatment targets for most catchments, and stormwater treatment in some catchments exceeds the treatment requirements, such that the project overall would result in fewer pollutants being delivered to local watercourses and to Botany Bay.

Additional pollutant loads generated by surface runoff would be managed through a range of stormwater treatment measures such as gross pollutant traps, constructed wetlands, bioretention systems, water quality basins and proprietary treatment devices. These would be designed with consideration of the pollutant reduction targets of the Botany Bay and Catchment Water Quality Improvement Plan (SMCMA, 2011).

Section 16.4 of the EIS (as amended by **Chapter 8** (Revised environmental management measures) of this report) outlines the measures to mitigate potential water quality risks to waterways during operation. The interchanges and connections to existing roads and the local road upgrades around the St Peters interchange would require management of additional runoff from the widened carriageways in these areas. The following management measures would be implemented:

- Suitable stormwater treatment devices would be identified during detailed design, and would include an operational water treatment plant which would collect, manage and pump groundwater seepage from the main alignment tunnels to a collection tank for treatment and discharge, with the aim of meeting the targets of the Botany Bay and Catchment Water Quality Improvement Plan (SMCMA, 2011). Where space is available, water quality basins would be installed. Where space is unavailable, treatment would include the use of proprietary stormwater treatment devices. The design of treatment trains would be informed by an assessment of the sensitivity of the receiving environments and supported by MUSIC modelling.

- New discharge outlets into Alexandra Canal would be designed with sufficient energy dissipation or scour protection to limit the impact on contaminated sediments and reduce the possibilities of contaminated sediments being subject to scour or resuspension.
- Where existing drainage lines would be subject to increased inflow, an assessment of their discharge characteristics would be made. If necessary, energy dissipation or scour protection would be added to prevent contaminated sediments from being subject to scour or resuspended. This would be undertaken during detailed design.
- The operational water treatment plant would be designed to meet the Water Quality Reference Criteria outlined in Appendix A of the Technical working paper: Surface water (Appendix N). Monitoring of the Cooks River would be undertaken during initial operation of the project to ensure discharge meets these criteria.

Where space is available, drainage and discharge infrastructure would incorporate measures, as appropriate, to trap and remove sediments having regard to stormwater pollution reduction targets from the Botany Bay and Catchment Water Quality Improvement Plan (SMCMA, 2011). This would reduce the risk of any impacts on the geomorphic condition of receiving waters.

Operational water quality monitoring would be conducted for 12 months post-construction or as otherwise required by the conditions of approval. This would include upstream (control) and downstream monitoring locations. The details of this monitoring program would be contained in the Soil and Water Management Plan, and would include the following:

- Sampling locations to include upstream (control) and downstream measurement locations
- Samples taken twice a month, once in dry conditions and once in wet conditions where possible
- In-situ monitoring of:
 - pH
 - Reduction Oxidation Potential
 - Dissolved Oxygen
 - Temperature
 - Conductivity
 - Turbidity
 - Colour
 - Odour
- Analytical sampling of the following potential constituents of concern:
 - Total Recoverable Hydrocarbons
 - Benzene, Toluene, Ethylbenzene, Xylene and Naphthalene
 - Nutrients including: Total Nitrogen, Total Kjeldahl Nitrogen, Nitrogen Oxide, Nitrite, Nitrate, Total Phosphorous and Reactive Phosphorous
 - Heavy metals (Arsenic, Cadmium, Copper, Chromium, Lead, Mercury, Nickel, Zinc)
 - Manganese
 - Ferrous Iron and Total Iron.

Issue description – flooding impacts and detention basin / wetland capacity

It is noted from the EIS that the project will increased flooding impacts in a number of locations, but these impacts are not expected to be significant. Notwithstanding, Council remains concerned about local flooding in the area around the Campbell/May Street intersection at St Peters.

It is noted in the EIS that proposed flood management works include the upgrading of the following facilities to a 100 year ARI standard:

- Drainage pipes at the intersection of Campbell and May Streets, St Peters;
- Wetland at Camdenville Park – from 6 mega litres capacity currently to 17 mega litres proposed; and
- Supplementary detention basin with an outlet structure discharging to the downstream trunk drain (box culvert) at the south west corner of Bedwin Street, hydraulically connected to the wetland and acting as a controlled outlet structure.

Council has initial concerns about the water detention basin/wetland capacity required for the project in Camdenville Park and is keen to ensure this facility is effective in addressing the abovementioned local flooding issues and in enhancing the recreational and biodiversity value of the park.

The scope and configuration of these facilities would be finalised in the detailed design stage. It is expected that WDA would consult Marrickville Council during that finalisation stage of these assets.

Council expects the wetland proposed in the EIS to be considered a matter of priority, as it does not have any dependencies with other proposed works. Early construction would allow Council to meet its timelines for works guided by the Camdenville Park masterplan and avoid constructing interim stormwater harvesting works.

Response

The intersection of Campbell Street / May Street / Bedwin Road / Unwins Bridge Road is frequently flooded as a result of both limited local inlet capacity in the piped drainage network, and limited hydraulic capacity in the downstream trunk drainage system.

The project includes upgrades to the existing detention basin in Camdenville Park to ensure downstream peak flow rates are not increased for events up to and including 100 year ARI flood. The required increase in storage capacity would be confirmed during detailed design and detailed in a drainage strategy.

Council's concerns with regards to the water detention basin capacity for the project are noted. A drainage strategy would be prepared during detailed design and would identify the storage capacity needed in the detention basin to ensure that peak flow rates downstream are not increased for the 100 year ARI flood.

Roads and Maritime would consult with Marrickville Council during detailed design concerning any modifications or connections to its stormwater management assets, and integration (where feasible and reasonable) with the Camdenville Park master plan.

The drainage strategy would be completed before the start of construction in this area.

Environmental management measure FD17 (as revised in **Chapter 8** (Revised environmental management measures) of this report) has been modified to include a requirement to consult with Marrickville Council concerning the drainage strategy at this location.

Issue description – timing of wetland construction

Council expects the wetland proposed in the EIS to be considered a matter of priority, as it does not have any dependencies with other proposed works. Early construction would allow Council to meet its timelines for works guided by the Camdenville Park masterplan and avoid constructing interim stormwater harvesting works.

Response

The Council's position is noted.

Issue description – impacts on tree health

The EIS states that alterations to groundwater flow paths and tables are anticipated following construction of WestConnex tunnels, but the impact of these new tunnels on the health of large trees (dependent on groundwater) has not been adequately considered. There may also be future impacts on groundwater dependent ecosystems when sections of existing concrete stormwater channels are rehabilitated into natural creek lines.

Response

Section 7.6 Appendix Q (Technical working paper: Groundwater) of the EIS considered the impacts on vegetation within the project area. It noted that for wetlands in the alluvium, where there may be water table decline once the steady state has been reached, the predicted drawdown may be less than calculated due to the presence of a low permeability organic layer preventing groundwater leakage, localised recharge rates higher than the 40 millimetre per year set in the regional model and as a result of induced recharge.

For the remaining vegetation within the Cooks River / Castlereagh Ironbark Forest at Kingsgrove, the vegetation community would be unlikely to be stressed as the groundwater drawdown would be less than two metres, within the natural seasonal variation. Vegetation in Stotts Reserve includes trees which are partially groundwater dependent and these could show signs of stress during drought conditions, but should recover following sufficient rainfall.

Drawdown of less than one metre is predicted beneath the estuarine fringe forest and mangrove forest between Wolli Creek and the Wolli Creek Railway Station as well as in the upper reaches of Wolli Creek and Bardwell Creek. A drawdown of this size is unlikely to impact on groundwater dependent species which may be present. There is also limited potential for groundwater drawdown to impact trees near watercourses and the majority of the alignment has a water table below the growth zone of trees.

The potential impacts to ecological values of GDEs is addressed in Appendix S (Biodiversity Assessment Report) of the EIS.

Issue description – riparian corridors

The existing riparian corridors of creeks crossing the new works are likely to be damaged. These adverse impacts should be addressed through the development of offset schemes for biodiversity corridors within these catchments.

Response

The project has been designed to avoid direct impacts on natural riparian areas.

The Biodiversity Assessment Report (BAR, Appendix S of the EIS) described the aquatic and riparian values present and likely to be impacted. The BAR concluded that there was no riparian vegetation that would be impacted and there would therefore be no requirement for rehabilitation. Much of the focus of the Technical working paper: Surface water (Appendix N of the EIS) is on the condition and potential for impacts to Wolli Creek, which would also be applicable to impacts on Bardwell Creek. Potential impacts to riparian corridors and surrounding vegetation is addressed in Section 7.6 of the Technical working paper: Groundwater. Drawdown beneath sensitive wetlands is considered negligible due to hydraulic connectivity with the Cooks River and lower Wolli Creek and continual recharge or tidal flushing.

During construction, works within the riparian areas will be managed in accordance with Guide 10 – Aquatic habitats and riparian zones of Roads and Maritime's *Biodiversity Guidelines* (RTA, 2011) and would be undertaken to limit impacts on riparian areas.

Stabilisation and revegetation works within riparian corridors would be documented in a Vegetation Management Plan as part of the CEMP.

Issue description – reuse of seepage water during operation

The EIS states that the approximate volume of seepage water will be 1.7 mega litres per day (or around 20 litres per second), which will be disposed of after treatment to the Cooks River. The proposed water treatment plant will be located adjacent to Giovanni Brunetti Bridge (Marsh Street, Kyeemah). There are opportunities to reuse the treated water for residential and commercial purposes. This should be investigated through consultation with Council and other relevant stakeholders. This kind of re-use would contribute to Council's initiatives to replace potable water for non-potable purposes. It is understood from the EIS that treated seepage water could be used to the meet water demands for tunnel and operational purposes such as cleaning, fire testing and landscaping.

Response

The suitability of the treated water for reuse would be considered as part of the detailed design (refer to environmental management measure SW08 in **Chapter 8** (Revised environmental management measures) of this report).

Issue Description – leachate water use

The EIS states that the existing leachate treatment plant at the Alexandria Landfill site will be upgraded and the treated water disposed to adjacent sewers as trade waste. There may be opportunities for using the treated water at the St Peters interchange for cleaning and maintenance activities at the proposed operations control centre and ventilation facility, as well as in adjacent industrial premises. In all these instances, low grade water quality would be suitable. This should be investigated further as part of resource recovery and management. An estimation of the likely volume of leachate should be made to determine the opportunities for reuse, especially at the St Peters interchange site.

Response

The existing leachate management system across the Alexandria Landfill site would be retained and augmented where required to suit the final landform of the site. Upgrades to the existing leachate management system are occurring under existing consents.

Augmentation of the existing leachate system as part of the project would include the installation of a new leachate barrier underneath the containment mound, upgrades to the leachate collection and transfer system and the construction of a new leachate treatment plant. The leachate collection, management and treatment system is summarised in Section 5.9.3 and detailed in Section 17.3.4 of Chapter 17 (Contamination).

The suitability of the treated leachate water for reuse would be considered as part of the detailed design.

4.12.7 Biodiversity

Issue description – quality of the biodiversity assessment

There are inadequacies in the EIS's methodology and assessment of biodiversity impacts, existing biodiversity is under-valued and there is little discussion of how biodiversity can be improved.

- The biodiversity assessment report (BAR) focuses on threatened species, populations and ecological communities, as does the FBA. However, the introductory SEARs statement and Threatened Species Conservation Act 1995 definition of biodiversity values suggests more consideration should have been given to biodiversity generally. This includes species and sites of local conservation significance within the City of Sydney and Marrickville LGAs, as well as the numerous initiatives that have been implemented to conserve and enhance habitat for/at these sites.
- No consideration was given to ecological reports and data held by the City of Sydney or Marrickville Council in the preparation of the BAR. This includes each Council's respective biodiversity strategies and recent records of threatened and migratory species. This is despite sections of the FBA stating that such information can or should be considered.
- The initiatives that have been implemented by the City of Sydney and Marrickville Councils and their respective community members to conserve and enhance habitats to promote biodiversity were not identified or otherwise considered in preparation of the BAR. The BAR does not recognise or discuss any of the opportunities presented by the development to create new habitats through site landscaping.
- Important habitat features, including local wetlands and native vegetation in Sydney Park, Tempe Reserve, and Tempe Lands were not mapped or otherwise identified in the BAR. It is not clear whether some of the abovementioned native vegetation should have been identified as Plant Community Types (PCTs) in accordance with the FBA. It appears to have been dismissed in the EIS as 'urban exotic and native' without being carefully considered.

- The dense weeds, mature trees, rock crevices, sandstone boulders, piles of debris and other ground level features at the Alexandria Landfill site are also of habitat value for priority species. The landfill contributes to local habitat connectivity between Sydney Park and Tempe Reserve and other sites on the Cooks River. The banks of Alexandria Canal are also important with regard to local habitat connectivity, with the UESAP, BS and BAP all recognising their potential for future habitat enhancement.
- The list of candidate 'credit species' in the BAR does not include several such species that have recently been recorded in the vicinity, and/or for which suitable habitat (as described on the OEH Threatened Species Profile Database) is present within the development footprint. This is particularly at the Alexandria Landfill site, where clearing has already commenced and where there is adjoining industrial and vacant land. These species include the Eastern Bent-wing Bat, possibly the Southern Myotis and the endangered inner-west population of the Long-nosed Bandicoot.
- The threatened Eastern Bent-wing Bat and (possibly) the Southern Myotis, the endangered Long-nosed Bandicoot population, the endangered Coastal Saltmarsh community and migratory species (including the Great Egret, Cattle Egret, Sharp-tailed Sandpiper, Latham's Snipe and Rufous Fantail) have all recently been recorded in the City of Sydney and/or Marrickville local government areas. However, as noted above, these species were not identified or adequately considered in the BAR despite potential for the project affect them.
- There appears to be a lack of understanding of the importance of urban biodiversity throughout the EIS and cumulative impacts on all fauna, including threatened species, have not been adequately considered.
- The project is likely to exacerbate reductions in biodiversity values that have resulted from past development in the City of Sydney, Marrickville and surrounding local government areas, and further cumulative impacts from current and proposed future developments in the area.
- A more comprehensive discussion of all impacts, including site-specific details, should be provided in the BAR.
- Further assessment is necessary in relation to:
 - Threatened species, populations and communities, in accordance with Sections 6 to 12 of the FBA
 - Priority/target species and priority sites in both the City of Sydney and Marrickville LGAs;
 - Similar species/sites that may be impacted in other local government areas; and
 - Any changes to the project that may arise during the detailed design phase.
- The mitigation measures outlined in the BAR are not considered adequate in terms of ensuring the minimisation of impacts on biodiversity values in the City of Sydney and Marrickville local government areas. More detailed measures are therefore recommended in addition to the BAR and Flora and Fauna Management Plan along with (or instead of) others already specified. This is in addition to new mitigation measures identified through the recommended further assessment and measure identified for similar species/sites in other LGAs.
- The BAR does not recognise or discuss any of the opportunities presented by the development to create new habitats through site landscaping. These should be explored with reference to City of Sydney's Urban Ecology Strategic Action Plan and Marrickville Council's Biodiversity Strategy 2011-2021 and Biodiversity Action Plan 2011-2015 in consultation with council staff.

Response

The Technical working paper: Biodiversity Assessment Report for the project has been prepared in accordance with the Framework for Biodiversity Assessment (FBA) and in accordance with the SEARs.

The following items respond to the issues raised by Council:

- To inform the list of species and communities that could potentially be affected by the project, the FBA credit calculator was used to identify ecosystem credit and species credit species. The credit calculator is a decision support tool provided by NSW OEH. In accordance with the FBA, an accredited assessor has used the credit calculator to undertake the assessment on biodiversity values by the project and has prepared the Technical working paper: Biodiversity Assessment Report.

The credit calculator is informed by a number of databases which are periodically updated to reflect updated information relevant to biodiversity values and data. Databases considered in the credit calculator include:

- NSW Vegetation Information System Classification Database (VIS Classification Database)
- Threatened Species Profile Database
- Vegetation Benchmarks Database
- Over-cleared landscapes database (Mitchell landscapes).
- In addition to these databases, the Technical working paper: Biodiversity Assessment Report has used the following databases to inform the assessment of the project:
 - Sydney Metropolitan Catchment Management Authority Vegetation Mapping (OEH 2013).
 - Native Vegetation Maps of the Cumberland Plain, Western Sydney (NPWS 2002).
 - OEH Atlas of NSW Wildlife (10 kilometre radius search), accessed 13 Nov 2014.
 - EPBC Act Protected Matters Search Tool (10 kilometre radius search), accessed 1 Dec 2014.
 - NSW DPI Fisheries threatened and protected species records viewer (FM Act), accessed 4 June 2015.
 - NSW DPI Fisheries Key Fish Habitat Map, accessed 4 June 2015.
 - NSW Fisheries Marine Vegetation Map (Botany Bay and Cooks River).
 - Bureau of Meteorology Groundwater Dependent Ecosystems Atlas, accessed 3 June 2015.

The use of the abovementioned databases meets the requirements of the FBA and is considered appropriate and sufficient to identify threatened species and / or communities that could potentially be impacted by the project. Given this, the calculated offsets are also deemed appropriate.

There is no requirement to utilise threatened species records held by local councils.

The biodiversity values of non-threatened species and ecological communities was addressed in the Technical working paper: Biodiversity Assessment Report by identifying the amount of urban and native vegetation present, the distribution and number of hollow bearing trees within the development footprint, the likely impacts on groundwater dependant ecosystems along with aquatic and riparian habitats and by reporting survey results for all bird species surveyed in Eve Wetlands. The Technical working paper: Biodiversity Assessment Report represents a comprehensive assessment of likely biodiversity impacts that has been endorsed by OEH as meeting the requirements of the FBA.

Section 7.6.2 of the Technical working paper: Biodiversity Assessment Report identifies the management of native vegetation and states that landscaping should reflect native vegetation in the local area as well as providing for foraging habitat for native fauna.

- Mapping at the scale of scattered plants is not practical. Under the FBA, local wetlands within the development area must be mapped. All such wetlands have been mapped within the development area, noting that mapping at the scale of scattered plants which may be of a species associated with wetlands is not practical. Groundwater dependent ecosystems were considered in the Technical working paper: Biodiversity Assessment Report and Technical working paper: Groundwater. As detailed in Section 7.6 of Technical working paper: Groundwater, groundwater modelling predicted that drawdown at Tempe Wetlands would be negligible.

- The initiatives implemented by the City of Sydney and Marrickville Council have typically been guided by, the City of Sydney's Urban Ecology Strategic Action Plan and Marrickville Council's Biodiversity Strategy 2011-2021 or Biodiversity Action Plan 2011-2015. These strategies provide general information on ecological matters in the relevant local government area. The City of Sydney's Urban Ecology Strategic Action Plan, for example, provides lists of threatened fauna in the local government area, none of which occur in the project area. The information contained in these documents would not be able to satisfy 'more appropriate local data' given the general nature of the data and the lack of records that relate to the project corridor. To consider local data for vegetation benchmarks, the vegetation to which the local data applies must be derived from measurements taken on reference sites that measure the same PCT in a relatively unmodified condition or from published sources
- The assessment was completed in accordance with the FBA, which specifies which matters are to be addressed. There is no requirement to utilise threatened species records held by local councils as they are assumed to be part of the curated and managed state datasets such as the Atlas of NSW Wildlife, or if the consent authority, in consultation with OEH, is of the opinion that it more accurately reflects local environmental conditions than the data held within the databases. In the case of the latter, DP&E has not provided this direction. The list of candidate credit species is generated by the credit calculator. The exclusion of some species would be on the basis of the habitat attributes associated with those species compared with the attributes present at the site.
- Only native vegetation affected by the development is required to be mapped and identified in the Technical working paper: Biodiversity Assessment Report.
- Field validation of vegetation was carried out and used to inform the preparation of the Technical working paper: Biodiversity Assessment Report. Where remnant native vegetation was encountered, it was mapped and ascribed to a PCT. This is shown in the Technical working paper: Biodiversity Assessment Report.
- A likelihood of occurrence assessment was undertaken for a number of listed micro-bat species as part of the Technical working paper: Biodiversity Assessment Report, including the Large-eared Pied Bat (*Chalinolobus dwyeri*), Little Bent-wing Bat (*Miniopterus australis*), Eastern Bent-wing Bat (*Miniopterus schreibersii oceanensis*) and the Eastern Freetail Bat (*Mormopterus norfolkensis*). With the exception of the Large-eared Pied Bat, there are records of the listed micro-bat species being present within 10 kilometres of the project, but not within the project footprint. In addition, no suitable habitat for these four micro-bat species was recorded as being present within the project footprint. As such, no further assessment of the impacts on these micro-bats was required as part of the Technical working paper: Biodiversity Assessment Report.
- The Eastern Bentwing Bat, the Southern Myotis and Long-nosed Bandicoot were not filtered into the calculator. This is likely because of the habitat attributes present. Species are filtered in based on their habitat requirements.
- The migratory birds listed are matters of national significance and are therefore not filtered into the tool, which considers State matters. Any relevant EPBC Act listed species were assessed and considered as part of the Technical working paper: Biodiversity Assessment Report. Not all threatened species in the local government area would be filtered into the assessment tool. Cumulative impacts are discussed in Table 16 of the BAR.
- The BAR does assess impacts on all relevant threatened species and communities, even if they are not filtered into the assessment tool, and outlines the management measures for these impacts. These are provided in Section 7.6 of the BAR.
- The BAR does identify (in Section 6.6.2) the management of native vegetation and that landscaping should reflect native vegetation in the local area as well as providing foraging habitat for native fauna. This is reflected in environmental management measure B07 (refer to Chapter 8 (Revised summary of environmental management measures) of this report). Consultation would be ongoing with key stakeholders throughout detailed design in accordance with any conditions of approval.

Issue description – reuse of removed trees

A significant quantity (15.9 hectares) of vegetation is proposed to be removed, including 12.9 hectares of trees, but the biodiversity impacts of this have not been adequately considered. Removed trees should be reused in revegetation works to create habitat/bank stabilisation, but there is no consideration of this in the EIS.

Council requests that the removal of trees required to implement the project be minimised, and that consideration be given to replanting large trees where possible.

Response

For the purpose of this assessment, a worst case construction footprint has been assumed (which is larger in area than the subsequent operational footprint for the project). Under this scenario the project would require the clearance of around 10.76 hectares of vegetation, including 3.31 hectares of native vegetation and 7.45 hectares of urban native and exotic vegetation. Opportunities to minimise clearing required for the construction and operation of the project would be explored during detailed design.

Where reasonable and feasible, mature and hollow-bearing trees would be retained. Where this is not possible, nest boxes would be installed to mitigate the impacts of removing hollow bearing trees in accordance with Table 8.1 of *Guide 8 – Nest boxes of Roads and Maritime's Biodiversity Guidelines* (RTA, 2011) at least one month before the start of construction (refer to environmental management measure B06 in **Chapter 8** (Revised summary of environmental management measures) of this report).

Consideration would be given to the moving of large trees and the use of logs in rehabilitation and landscaping. This is outlined in Table 21 and Section 6.6.1 of the Technical working paper: Biodiversity Assessment Report. This would be detailed in the Flora and Fauna Management Plan, which would be developed in accordance with the Roads and Maritime's *Biodiversity Guidelines* (RTA, 2011).

4.12.8 Greenhouse emissions, climate change and cumulative impacts

Issue description – climate change

The EIS does not adequately address the impact of the project on climate change, and should consider Australia's commitment to emissions reduction and Ecologically Sustainable Development as outlined in the Protection of the Environment Administration Act 1991 (NSW) and the Environment Protection and Biodiversity Conservation Act 1999.

Response

Chapter 25 of the EIS identified and considered impacts associated with potential future changes to rainfall intensity and/or frequency in line with climate change projections.

The EIS also acknowledged the need for a detailed Climate Change Risk Assessment, undertaken in accordance with the Australian Standard AS 5334-2013 *Climate change adaptation for settlements and infrastructure – A risk based approach* and Roads and Maritime's draft Technical Guide for Climate Change Adaptation for the State Road Network (unpublished, 2015), would be conducted during the detailed design.

An explanation of how sustainability has been considered in the design, construction and operation of the project is discussed in Chapter 28 of the EIS. Ecologically sustainable development as defined in the *Protection of the Environment Administration Act* in relation to the integrated consideration of:

- The precautionary principle, discussed in Section 28.4.1 of the EIS
- Inter-generational equity, discussed in Section 28.4.2 of the EIS
- Conservation of biological diversity and ecological integrity, discussed in Section 28.4.3 of the EIS
- Improved valuation, pricing and incentive mechanisms, discussed in Section 28.4.14 of the EIS

Opportunities to reduce consumption of fuels and electricity would be actively pursued during the detailed design and construction phases of the project. Reductions in operational phase emissions are noted in Section U.5 of Appendix U to the EIS, which notes that improvements to traffic flow and congestion, achieved through increased speeds, reduced travel distances and reduced frequency of stopping, would result in improved fuel efficiency by vehicles using the New M5. This will subsequently reduce the greenhouse gas emissions associated with road use.

Issue description – greenhouse gas emissions

The EIS should compare car and public transport greenhouse emissions and explain how the NSW Long Term NSW Long Term Transport Master Plan objective to grow the proportion of travel by sustainable modes (predominantly walking, cycling and public transport) is being addressed.

Response

Sydney's population is expected to increase by more than 1.6 million people by 2031 and without major investment in road network infrastructure this growth would result in worsening road congestion. This congestion would in turn affect Sydney's economic competitiveness as a global city.

The New M5 would deliver additional capacity for the M5 Motorway corridor, resulting in:

- A reduction of up to 60,000 vehicles on the M5 East on an average weekday, relieving congestion and improving travel reliability
- Between 2021 and 2031, average travel times on the M5 East Motorway would generally be halved and average travel speeds would double during the morning and afternoon peak, improving the efficiencies of intrastate and interstate freight movements through travel time saving and reduced operating costs
- An alternative to the M5 East, providing network resilience in the event of incidents or planned maintenance.

Without the New M5, conditions on the M5 East would continue to deteriorate.

WestConnex is part of an extensive plan to meet Sydney's growing transport and infrastructure needs and is fully integrated into the State's Infrastructure transport and planning strategies, including the *State Infrastructure Strategy* and the Transport Master Plan. While WestConnex plays a role in easing congestion, the WestConnex program of works is not designed to solve all of Sydney's transport problems.

The NSW Government is committed to investing in a range of public transport projects, as identified by the *Transport Master Plan*, the *State Infrastructure Strategy 2012–2032*, *A Plan for Growing Sydney* and the *NSW State Priorities*. The NSW Long Term Transport Master Plan provides the framework for delivering an integrated, modern and multi-modal transport system by identifying NSW's transport actions and investment priorities for the next 20 years.

The NSW Government is investing \$68 billion in infrastructure, including:

- Sydney Metro City and Southwest, which would extend the Sydney Metro Northwest via St Leonards and North Sydney, across the Harbour and into the Sydney CBD. From Sydney CBD, the Metro would connect to an upgraded Bankstown Rail Line
- Sydney Light Rail, including construction of a new CBD and South East Light Rail Line along the corridor between Sydney CBD and Randwick / Kingsford
- Upgrades and enhancements to the suburban rail network.

Although investment is being made in public transport infrastructure, the construction of new roads and the upgrade of existing roads in Sydney would continue to be required due to the continued demand for the diverse movements of people, goods and services across Sydney. Specifically, within the M5 Motorway corridor (comprising the M5 East Motorway and the M5 South West Motorway) public transport initiatives alone would not considerably enhance the productivity of commercial and freight generating land uses or resolve the current congestion issues along the M5 East Motorway.

For these reasons, a purely public transport alternative would not achieve the objectives of the project. The GHG assessment therefore does not compare car and public transport GHG emissions, since these modes are intended to be complementary, rather than exclusive.

Issue description – tracking of operational fuel use

EIS Figure 22.4 should be verified each year in the annual sustainability report to confirm the assumption that total fuel use will be lower because of the reduction in stop-start traffic resulting in smooth flowing vehicle movement. There is no evidence provided to confirm the assumption that free flowing vehicles travelling at higher speeds consume less fuel than slower moving and congested traffic.

Response

The NSW OEH collates and reports on emissions estimates for NSW as part of the Australia's National Greenhouse Accounts. This includes transport emissions associated with passenger and freight vehicles.

The emissions produced by passenger vehicles and trucks on the New M5 are known as scope three emissions are unable to be directly measured by the project. The modelling used by the project to estimate the greenhouse gas emissions from road users was prepared in accordance with the Austroads Guide to Project Evaluation Part 4: Project Evaluation Data, Part 6 which is an accepted methodology for the estimation of emissions from vehicles.

Roads and Maritime would develop and implement the Sustainability Management Plan during detailed design. The Sustainability Management Plan would include processes and systems for monitoring and reporting during the detailed design and construction phases of the project.

Principles in the Sustainability Management Plan would extend across the whole project. Sustainability initiatives incorporated in the design and construction phases would drive decision making to consider whole-of-life, environmental, social and economic costs and benefits over the life of the project.

As outlined in the Updated Strategic Business Case, a vision to guide the sustainability goals for the project has been established:

"WestConnex will be a sustainable, high quality and transformational project for the people of Sydney and NSW. Exhibiting innovative design excellence, it will be sensitively integrated into the natural and built environment, help build communities and contribute to the future liveability of Sydney."

In order to deliver on this vision, there is a commitment to:

- Demonstrating sustainability leadership and continual improvement
- Protecting and enhancing the natural environment and local heritage
- Contributing to liveable communities (by easing congestion, connecting communities, integrating land use and transport planning, and facilitating urban revitalisation)
- Optimising resource efficiency (materials, energy, water, land) and waste management
- Increasing resilience to future climate changes
- Allowing for future transport needs (transport modes, extensions, access points)
- Implementing sustainable procurement considering whole-of-life environmental, social and economic factors
- Maximising equitable training and employment opportunities.

A standalone Sustainability Strategy, which describes how sustainability considerations are integrated into the planning, construction and operation of the WestConnex full program of works, was released in September 2015 and is available at www.westconnex.com.au. The strategy includes clear commitments and targets across each of the objectives outlined above.

The WestConnex sustainability objectives and targets would be met through the implementation of the project's Sustainability Management Plan and sustainability initiatives as described in Section 28.3 of the EIS.

Issue description – renewable energy target

The EIS's target of six per cent of energy from renewable sources should be increased.

Response

The project will seek to maximise the use of renewable energy during construction. The six per cent renewable energy commitment for construction energy is a minimum target as set within the WestConnex Sustainability Strategy and opportunities to increase this target would be investigated as part of detailed design.

In addition, about two per cent of construction phase power requirements would be offset in accordance with the Commonwealth Government's National Carbon Offset Standard. This would be reviewed during detailed design to refine the approach to offsetting energy requirements and to identify whether additional power consumption can be offset.

The project's renewable energy commitment is part of a suite of sustainability objectives and targets. Other measures outlined in Chapter 28 of the EIS are proposed to optimise energy efficiency for the project, including operation of motorway infrastructure and energy used by vehicles utilising the motorway.

An Energy Efficiency and Greenhouse Gas Emissions Strategy would be prepared as part of the project's Sustainability Management Plan to identify initiatives to be implemented during construction of the project to reduce carbon emissions, energy use and embodied life cycle impacts.

4.12.9 Construction work, resource use and waste minimisation

Issue description – spoil disposal

It is noted from the EIS that the project will generate 3.2 million cubic metres of spoil. The EIS assumes that most of the excavated spoil would be uncontaminated crushed sandstone and shale, classified as virgin excavated natural material. Council is concerned that no assessment has been undertaken to determine if there is sufficient capacity to receive this spoil at receiving locations.

The EIS states that a formal spoil management plan will be developed and documented for the project before tunnelling works begin. It should be stated who will review the spoil management plan. Such a plan should be developed in consultation with relevant councils and the community, and approval for the plan received prior to project approval.

Spoil handling and haulage activities are planned to occur up to 24 hours per day, 7 days per week. According to information in the EIS, residents around the Canal Road construction compound and along the Princes Highway will be unduly affected by vehicle movements outside of standard construction hours. This includes concrete and shotcrete deliveries to these construction compounds. In the interests of residential amenity, 24/7 operation is not considered acceptable.

Response

About 80 per cent of usable (eg uncontaminated) construction and demolition waste is anticipated to be reused or recycled as part of the project. A Waste Management Plan would be prepared as part of the Construction Environmental Management Plan for the project, detailing the appropriate procedures for waste management. Residual waste which cannot be reused or recycled would be disposed of to a suitably licenced landfill or waste management facility.

Five potential spoil management sites have been identified to receive excess spoil from the project. These sites have been identified as preferred based on an analysis of commercial viability, traffic considerations and community impacts through the various construction phases of the project. Further consultation would take place with those facilities to confirm they are able to accept the required materials within the necessary timeframe, with consideration also given to other projects being developed in the area at the same time.

Where environmental and planning approvals already exist for the receipt of spoil, no further action would be required. Where new or amended environmental or planning approvals are required for a particular disposal location, an appropriate environmental impact assessment, including community consultation, would be carried out in accordance with the requirements of the EP&A Act and other relevant environmental legislation.

Haulage routes to and from construction sites were developed with the aim of minimising impacts on local residential streets and maximising the use of state and regional routes. An assessment of the impact of construction traffic associated with the spoil management sites is discussed in Section 9.3 of the EIS.

Potential traffic and transport impacts to receivers around the Canal Road construction compound and the Princes Highway have been assessed in Section 9.3.1 and Appendix G (Technical working paper: Traffic and transport) of the EIS. The assessment concluded that when compared with background traffic volumes in 2016, total construction traffic during peak construction along roads around the St Peters interchange and local road upgrades would comprise a small proportion of total existing traffic on Canal Road, the Princes Highway, Burrows Road and Campbell Road.

As a result, construction of the project would have a minor, temporary impact on the mid-block performance of the road network around the St Peters interchange and local road upgrades.

In most instances, increases in traffic noise as a result of project construction traffic would be less than 2 dB(A), which would meet the applicable target criterion in accordance with the NSW Road Noise Policy (RNP) (DECCW, 2011). Situations where traffic noise increases are anticipated to exceed this 2 dB(A) criterion as a result of the project include:

- For existing residential receivers during the AM off-peak periods along construction haulage routes in the Kingsgrove and St Peters areas
- During the quietest periods of the night-time around all of the construction compounds where 24 hour construction activities would occur.

As far as feasible and reasonable, spoil haulage from construction compounds during the evening and night-time periods would be confined to arterial roads. However, some construction compounds would be accessed via local roads.

Where noise impacts are greater than one year then consideration should also be given to at-receiver noise management where feasible and reasonable:

Feasible and reasonable considerations should also include:

- Time of day of the noise increase and exceedance of criteria
- time of use of affected receivers
- How many decibels the noise levels are to increase
- How long the management will provide benefit to the receiver during the project.

Specific feasible and reasonable management measures would be investigated during detailed design. This may include using management measures proposed for the operational noise assessment.

Undertaking tunnelling 24 hours per day assists in minimising the overall length of construction and the duration of any associated amenity impacts on the local community. Spoil haulage is therefore required 24 hours per day, seven days per week.

Further, stockpiling of spoil with no spoil haulage outside of standard hours would result in a greater number of spoil haulage vehicle movements during standard hours. This would have an adverse effect on the performance of the road network, particularly in peak hours. In addition, spoil stockpiles would have required that the tunnelling sites be significantly larger so as to accommodate the anticipated quantities of spoil material. This would have resulted in an increase in the number of properties acquired for the project.

At all tunnelling support sites, stockpiling and spoil handling would occur within acoustic or non-acoustic sheds, reducing potential noise impacts. Doors of these sheds would be kept closed during the night-time to minimise potential noise impacts. Further, the layouts of the sites would be designed so as to maximise distance and shielding to nearby receivers as far as practicable.

Because the Interim Construction Noise Guideline (ICNG) (DECCW 2009) does not provide specific guidance in relation to acceptable noise levels associated with construction traffic, the noise increase criterion described in the RNP (ie 2 dB(A)) has been adopted for assessment of the project. Under the RNP, an increase of up to 2 dB(A) is a minor impact that is considered barely perceptible to the average person. Where the road traffic noise levels are predicted to exceed 2 dB(A) as a result of construction traffic noise from traffic associated with the project, feasible and reasonable noise management measures would be considered to reduce potential noise impacts and preserve acoustic amenity.

The management of spoil haulage and spoil management sites would be detailed a Spoil Management Strategy to be prepared and implemented prior to the commencement of tunnelling activities. Consultation will be ongoing with key stakeholders throughout detailed design.

Issue description – asbestos disposal

Aside from the Alexandra Landfill closure plan, there is no detail about the management of asbestos and asbestos disposal sites. Asbestos, along with heavy metals and other hazardous materials may be mixed in with spoil. The EIS should include criteria for what will be tested, how and when it will be tested and where, eg residential and commercial areas, historic landfill sites.

A further concern is absence of information in the EIS about the method of demolition of homes and commercial buildings. Relocation and/or 'deconstruction' are the best options to maximise material recovery and minimise the potential impacts of asbestos and toxic materials.

Response

As stated in section 24.1.1 of the EIS, management and disposal of asbestos containing material would be undertaken in accordance with the following legislation, guidelines and standards:

- Work Health and Safety Act 2011 (NSW)
- Code of Practice for the Safe Removal of Asbestos 2nd Edition (National Occupational Health and Safety Commission (NOHSC) 2005a)
- Code of Practice for the Management and Control of Asbestos in Workplaces (NOHSC 2005b)
- Protection of the Environment Operations (Waste) Regulation 2005 – clause 42 special requirements relating to asbestos waste
- *National Environment Protection (Assessment of Site Contamination) Measure 1999*
- *AS2601:2001 Demolition of Structures.*

Other wastes identified within the Alexandria Landfill site as hazardous or potentially hazardous waste in accordance with the Waste Classification Guidelines (NSW EPA, 2014) would be stored, treated and transported in accordance with the *Protection of the Environment Operations (Waste) Regulation 2005*.

An unexpected finds and hazardous materials procedure would be implemented to manage potentially contaminated materials that may be encountered during site preparation and / or construction works (environmental management measure CM03).

In the event of encountering unexpected finds of contamination (i.e. the observation of offensive odours, soil discoloration, buried waste or potential asbestos containing materials) during construction, work in the area would cease until an appropriately qualified environmental consultant can advise on the need for further assessment, remediation or other action, as deemed appropriate. Further assessment and management of contamination, if required, would be undertaken in accordance with section 105 of the *Contaminated Lands Management Act 1997* (environmental management measure CM10).

Ongoing management of sites with contamination managed or emplaced in-situ would be managed in accordance with site specific Site Management Plans. Where required, a Site Management Plan (SMP) would be developed and implemented to manage risks associated with the presence of residual contamination that in situ. The requirement for an SMP would be evaluated based on the nature, concentration and extent of contamination as well as the current and proposed land use. An additional environmental management measure has been included to reflect this requirement (environmental management measure OpCM4).

Resource recovery would be applied to the management of construction waste and would include:

- Recovery of resources for reuse-reusable materials generated by the project would be segregated for reuse either on-site or off-site where possible, including the reuse of the major waste streams (VENM and ENM)
- Recovery of resources for recycling - recyclable resources (such as metals, plastics and other recyclable materials) generated during construction and demolition resources would be segregated for recycling. These materials would then be sent to an appropriate recycling facility for processing.

Demolition waste generated by the project has the potential to contain hazardous materials, in particular asbestos containing material. Management and disposal of asbestos containing material would be undertaken in accordance with the procedure and protocols identified above.

Issue description – preferential procurement from local suppliers and recycled material

Very large volumes of materials are involved, and the EIS suggests a weighting for local supply and sustainability outcomes, such as recycled content over raw material, in tendering for resources. These should be required as part of the project.

Response

The WestConnex Sustainability Strategy (the Sustainability Strategy) (WestConnex Delivery Authority, 2015) describes how sustainability initiatives will be integrated into the design, construction and operation of projects across the WestConnex program of works. The Sustainability Strategy outlines a sustainability vision, commitments, guiding principles, objectives and overarching targets across a range of sustainability themes, and was prepared to align with the Transport for NSW Sustainability Framework as well as other relevant Government sustainability instruments.

Recycled products would be used during construction of the project to reduce the demand on resources, in instances where the use of such materials is cost and performance competitive. This may include the use of fly ash and slag within concrete mixes. Resource recovery principles would be applied to the construction of the project, including recovery of resources for reuse, recycling and reprocessing, where possible.

It is anticipated that up to 10 per cent of the pavement would comprise reclaimed asphalt, sourced from existing road pavements to be removed / replaced as part of the project and up to 10 per cent of virgin materials may be able to be substituted with recycled materials during construction. Additionally, geopolymer concrete (a low calcium, fly-ash based concrete product) would be considered for use in structural elements of the project, such as pre-cast, high-strength box culverts.

A number of sustainability-specific criteria were used as part of the evaluation of tender designs during the competitive design and construct tender process for the project. Specifically, tenderers were required to:

- Demonstrate how the project would meet an 'Excellent' rating for the design and As-built components of the project under the Infrastructure Sustainability Council of Australia's rating scheme.
- Detail how sustainability initiatives would be implemented throughout the project.
- Explain how sustainability targets would be achieved or improved on throughout the project.
- Provide a Sustainability Management Plan, describing how the overarching sustainability objectives for the WestConnex program of works would be achieved.

An Australian Industry Participation Plan would be developed for the overall WestConnex program of works.

Issue description – construction water use and disposal

The EIS states that construction water requirements for the project will be 2,500 ML. This is a very large quantity, equivalent to 2.5 days of potable water demand for the whole of Sydney. Most of this water would be used for tunnelling, which would generate considerable amount of wastewater that would require appropriate treatment before disposal.

The EIS states that 80 per cent of construction water will be sourced from potable water mains, with other water sources considered, including 20 per cent from rainwater and treated groundwater. Opportunities to include harvested/treated stormwater to further reduce potable water use must be investigated.

Response

The extent to which non-potable water can be used during the project would be reviewed and refined during detailed design. Construction water would either be re-used on site wherever feasible, or discharged into the local stormwater system in accordance with the requirements of an Environment Protection Licence. Preference would be given to reusing as much water as is practicable before discharging. Quantity and quality of water to be stored would be determined at this time.

Issue description – construction water storage

Council would like more information on the amount and quality of water to be stored in the proposed water storage basins required for construction. Council is concerned about contaminated water entering the catchment and possibility that these basins may breed mosquitoes.

Response

The detention, testing (and treating if required) and reuse or discharge of water generated by construction would be subject to site specific arrangements, depending on the quality of water generated. This would target compliance with the Water Quality Reference Criteria. At the St Peters interchange site this would include transfer of some water to the leachate treatment plant. Varying levels of groundwater quality would also require a variation to treatment approaches.

The location and volume of detention ponds would be confirmed during detailed design having regard to the site specific requirements at each construction location.

During construction detention ponds would be located away from residents where feasible and reasonable, reducing the risk of mosquitos. The settlement ponds would also be dewatered regularly to ensure adequate capacity for large rainfall events. This would also reduce the duration and of any standing water in which mosquitos could breed. Other pest control measures would include engaging a pest control company (where required).

The control and management of potential surface water quality impacts during construction would be defined in a Soil and Water Management Plan prepared as part of the overall Construction Environmental Management Plan.

Issue description – management plans

Council has provided a number of additional provisions to be included in the management plans for the various construction activities.

Response

Council would be consulted during detailed design during preparation of the Construction Environmental Management Plan and associated sub plans. Issues raised by Council during consultation would be considered in full.

Issue description – recommendations (general)

Council makes the following general comments concerning construction activities:

- A permit for heavy vehicles to access Council roads must be obtained via Council's permit process;
- Street lighting levels must not be reduced in any circumstances due to the proposed construction work;
- A risk assessment of increased traffic and pedestrians movements due construction works must be undertaken prior to the commencement of works;
- All temporary or permanent traffic diversions are to be assessed in detail by Council;
- Electricity used for the proposed works should be separated from any street lighting, so if there is an outage caused by WestConnex works it does not impact on street lighting.

Response

Road occupancy licence(s) would be obtained from the relevant road authority for activities that could or may impact upon a classified or local road.

Street lighting levels would be maintained for the duration of construction. Where works would impact temporarily on existing street lighting, temporary street lighting would be provided which would at a minimum serve the same function.

The nature and extent of utility changes would be confirmed during the detailed design of the project, with appropriate relocation or replacement alternatives identified in consultation with the relevant utility provider.

Permanent surface road lighting including at interchanges, ramps, intersections, roundabouts, bus stops and along local roads upgraded as part of the project have been designed to meet the requirements of Australian Standard AS / NZS 1158: Lighting for roads and public spaces.

The EIS has assessed the potential for pedestrian and cyclist safety to be impacted on by the construction of the project. Where impacts have been determined as possibly occurring, management measures have been designed to minimise these.

Pedestrian and cyclist access and connectivity would be maintained where possible throughout construction. Where not feasible using existing access, alternate routes would be provided and communicated to the community. Pedestrian and cyclist movements around construction ancillary facilities would be managed in accordance with a Construction Traffic Management and Safety Plan to be prepared in consultation with the relevant road authority, local councils, emergency services, road user groups, and pedestrian and bicycle groups.

The Construction Traffic Management and Safety Plan would include measures to ensure pedestrian safety is maintained during construction. This includes selecting site compound access and egress points which avoid school children pedestrian access routes.

Temporary and/ or permanent traffic diversions would be developed in consultation with Council as a component of the development of the Construction Traffic Management and Safety Plan, which would be completed prior to the commencement of construction. The plan would be informed by the outcomes of the traffic and transport assessment presented in Chapter 9 and Appendix G (Technical working paper: Traffic and transport) of the EIS.

Electricity supply would be required for the construction and operation of the project. High voltage power would be required for construction compounds which are acting as tunnel support sites and other compounds would require electricity by connecting to the mains infrastructure. Safeguards would be designed during detailed design and would be implemented having regard to the staging of construction works to ensure that outages resulting from the construction of the program would not impact on street lighting. Foreseen impacts on existing street lighting would be offset via the provision of appropriate temporary street lighting.

The nature and extent of utility changes would be confirmed during the detailed design of the project, with appropriate relocation or replacement alternatives identified in consultation with the relevant utility provider.

Consultation will be ongoing with key stakeholders throughout detailed design in accordance with any Conditions of Approval.

Issue description – construction strategy principles

Regarding Construction strategy, Council would like the following principles to be added:

- Minimise loss of on-street parking
- Replace any existing facility that is removed during construction, eg provide temporary walk/cycle paths
- Avoid vehicle movements along local roads
- Protect existing nearby infrastructure from construction impacts such as excessive vibration, ground water movements due to tunnelling and buildings damage due to heavy vehicle movements
- Minimise night-time work to reduce disruptions from noise and vibration – particularly blasting, which may not be appropriate in areas within close proximity to dwellings
- Bus stop infrastructure works to include any signage, line marking, bus pads and footpath connection(s), and to comply with Disability Discrimination Act (DDA) requirements
- Council to be notified of the need for the erection of any hoarding, fencing, cranes and road occupancies that may be required during construction. The applicant will be required to make application for such activities and comply with Council's conditions to undertake such construction activities
- Council to be notified at least 10 weeks in advance of proposals to erect work zones, or to temporarily or fully close Council-managed roads, requiring consideration by Council's Traffic Committee and approval by Council. The applicant is to adhere to processes and practises for the regulation of traffic as required under RMS technical directions and the Roads Act, 1993. All costs associated with erection, maintenance and removal of this signage are to be met by the applicant
- Construction truck delivery and spoil removal routes are to be limited to the State Road network
- Applicant to provide details on the loss of on-street parking as a result of construction activities. Construction worker parking is not to occur on-street and the applicant is to provide and implement solutions to minimise the use (and loss) of on-street within the Construction Management Plan through the use of an off-street parking facility and a method of transfer between this facility and the work site. Solutions should be discussed with Council representatives prior to the commencement of the works
- Applicant to liaise with other government agencies in relation to other projects occurring within the vicinity of the works, particularly the Sydney Metro Rail project to avoid overlapping activities which will impact on the flow of traffic.

Response

Minimising impacts to car parking during construction

Parking spaces around some of the works areas for the project, including in St Peters and Mascot, would be temporarily reduced to allow safe access to construction compounds and to accommodate construction of the local road upgrades. The indicative temporary changes to on-street parking availability is summarised in Table 9-37 of the EIS.

As described in Section 6.6.1 of the EIS, parking provisions for light vehicles within the construction compounds have been provided which would minimise the impacts on on-street parking. Parking restrictions for construction workers would be considered where feasible and reasonable and would be reinforced through project inductions and toolbox talks. Construction personnel would be encouraged to use public transport where possible and consider other modes of transport such as carpooling.

If the project is approved, the Construction Traffic Management and Safety Plan would form a sub-plan of the Construction Environmental Management Plan and would be prepared in accordance with the relevant conditions of approval. The plan would be developed in consultation with relevant councils, emergency services, road user groups and pedestrian and cyclist user groups.

A car parking strategy for all sites would be developed as part of the Construction Traffic Management and Safety Plan to limit impacts on the surrounding communities, in consultation with local councils and stakeholders.

Temporary diversions of cycling and walking paths

Pedestrian and cyclist access and connectivity would be maintained where possible throughout construction. Where not feasible using existing access, alternate routes would be provided and communicated to the community. Pedestrian and cyclist movements around construction ancillary facilities would be managed in accordance with a Construction Traffic Management and Safety Plan to be prepared in consultation with the relevant road authority, local councils, emergency services, road user groups, and pedestrian and bicycle groups.

The Construction Traffic Management and Safety Plan would include measures to ensure pedestrian safety is maintained during construction. This includes selecting site compound access and egress points which avoid school children pedestrian access routes.

Temporary and/ or permanent traffic diversions would be developed in consultation with Council as a component of the development of the Construction Traffic Management and Safety Plan, which would be completed prior to the commencement of construction. The plan would be informed by the outcomes of the traffic and transport assessment presented in Chapter 9 and Appendix G (Technical working paper: Traffic and transport) of the EIS.

Avoiding construction vehicle movements along local roads

Construction traffic routes for the project would use the existing motorway and arterial road network as much as possible, reducing traffic related impacts on local roads.

Spoil would be transported from construction compounds to spoil management locations, generally along the M5 East Motorway and M5 South West Motorway.

If the project is approved, the Construction Traffic Management and Safety Plan would form a sub-plan of the Construction Environmental Management Plan and would be prepared in accordance with the relevant conditions of approval. The plan would be developed in consultation with relevant councils, emergency services, road user groups and pedestrian and cyclist user groups.

Protecting existing nearby infrastructure from vibration and settlement damage

Receivers at the surface would generally experience vibration for up to five days at each affected receiver with exceedances occurring for up to two days. As the tunnelling progresses, vibration impacts to receivers at the surface would lessen.

Vibration impacts on properties due to tunnelling activities are discussed further in Section 5.10.3 of this EIS.

Vibration-based safe working distances from certain plant and equipment are in Table 12-11 of the EIS. Safe working distances for vibration intensive plant could be encroached in proximity to residential receivers. The greatest potential for encroachment into safe working distances relates to vibration impacts on human comfort, in situations where vibration intensive equipment is used in proximity to residential receivers.

The primary form of mitigating vibration would be ensuring vibration intensive works do not occur within identified safe working distances. Where work within these safe working distances cannot be avoided, opportunities to use alternative equipment would be identified where feasible and reasonable and vibration monitoring would be implemented.

For works which would be required within the safe working distance for cosmetic damage the following would occur as a minimum:

- Notification of the works to the affected receivers
- Works would not proceed until attended vibration measurements are undertaken
- If ongoing works are required a permanent vibration monitoring system would be installed, to warn operators (via flashing light, audible alarm, short message service (SMS) etc) when vibration levels are approaching the cosmetic damage limits.

In developing construction methodologies and a construction program for the project, the aim has been to minimise the duration of the construction period while maintaining an acceptable and manageable amenity outcome for surrounding receivers. This has required a balance between the speed of construction activities and the ability to reasonably and feasibly manage potential impacts within acceptable limits. Opportunities to further reduce construction timeframes while protecting local amenity would be considered during detailed design and construction planning.

Before the start of tunnelling or other vibration intensive works at each site, condition surveys would be undertaken on properties and structures within the preferred project corridor (the zone on the surface equal to 50 metres from the outer edge of the tunnels) and within 50 metres of surface works.

Where damage is shown to have occurred due to the project, consultation would be undertaken with the affected landowner to determine the rehabilitation requirements in order restore the property to its pre-construction condition. All works would be undertaken at no cost to the affected property owner.

Settlement along the tunnel route may occur in some areas as a result of volume loss during tunnel excavation, groundwater drawdown and subsequent ground consolidation. Areas most likely to be affected by settlement are usually where tunnelling is closest to the ground surface, around the main alignment tunnel portals and on and off ramps.

It is expected that settlement would stabilise within about two months of tunnel excavation occurring under a structure. A building condition survey would be undertaken within the preferred project corridor (the zone on the surface equal to 50 metres from the outer edge of the tunnels) and within 50 metres of surface works.

Building condition surveys of potentially affected structures would be completed both before and after the works to identify existing damage and any damage due to the works. Where project induced settlement is deemed the cause of cracking, cracks would be filled, new external masonry cracks would be repointed for weather tightness, and depressions created by depressions would be rectified. A monitoring program would also be undertaken to ensure that settlement has stabilised before monitoring is completed.

Minimising noise and vibration impacts of night time work (particularly blasting)

Table 6-26 in the EIS summarised construction hours, including anticipated construction activities that would need to be conducted outside standard construction hours. Construction hours for each construction compound are also presented in Table 6-27.

Some construction activities outside standard construction hours are unavoidable based on:

- Public and construction worker safety
- Design and quality considerations
- Minimisation of the length of construction and the duration of associated impacts on the local community
- Avoidance of significant traffic interruptions along the M5 East Motorway and the surrounding arterial and local road network.

Within these broad requirements, construction activities conducted outside standard construction hours have been minimised. In developing construction methodologies and a construction program for the project, the aim has been to minimise the duration of the construction period while maintaining an acceptable and manageable amenity outcome for surrounding receivers. This has required a balance between the speed of construction activities and the ability to reasonably and feasibly manage potential impacts within acceptable limits. Opportunities to further reduce construction timeframes while protecting local amenity would be considered during detailed design and construction planning.

Where exceedances of construction noise management levels are anticipated both within and outside standard construction work hours, the ICNG recommends strategies for noise management and control. A Construction Noise and Vibration Management Plan would be developed and implemented and would identify the receiver specific management measures to be implemented. In selecting specific management measures, the Construction Noise and Vibration Management Plan would take into account the number and sensitivity of potentially affected receivers, the nature and duration of relevant construction activities, and the availability of additional feasible and reasonable management measures.

Vibration impacts resulting from blasting would be dependent on the blast methodology, the size of the charges, spaces between charges, and timing between charges. A specialist blast consultant would be used to design blasts to ensure the lowest necessary maximum instantaneous charge (MIC) to achieve tunnel construction in a safe manner, while minimising potential impacts at the surface. This would include undertaking test blasts in new areas of tunnel construction activity.

Blasting would only occur between 9:00am and 5:00pm, up to five days per week (Monday to Friday) and on Saturdays (9:00 am to 1:00pm). 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 Construction Noise and Vibration Management Plan

Bus stop infrastructure works to include any signage, line marking, bus pads and footpath connection(s), and to comply with Disability Discrimination Act (DDA) requirements

Bus stop infrastructure would be developed in accordance with the following guidelines and standards:

- Austroads Guide to Road Design (Austroads 2009) and Roads and Maritime supplements to the Austroads Guides
- Austroads Guide to Road Safety (Part 6: Road Safety Audit) (Austroads 2002)
- Roads and Maritime Road Design Guide (Roads and Maritime undated)
- Roads and Maritime Delineation Guidelines (Roads and Maritime undated)

Where bus stops are permanently relocated, disabled access would be maintained.

Local residents, business owners and bus passengers would be notified of traffic management procedures, and alternative bus stop locations and access would be provided. Where feasible and reasonable, this would include provision of disabled facilities at temporary bus stops.

Ongoing consultation would be undertaken to provide information on any bus stops or access arrangements.

Road occupancy licence(s) and other permits and approvals (as relevant) would be obtained from the relevant road authority for activities that could or may impact upon a classified or local road

Construction traffic routes for the project would use the existing motorway and arterial road network as much as possible, reducing traffic related impacts on local roads.

Consultation would occur between relevant projects in relation to construction staging and haulage routes in order to minimise the potential for cumulative impacts.

Consultation would be ongoing with key stakeholders throughout detailed design in accordance with any Conditions of Approval.

Issue description – construction work

- Regarding EIS Section 6.2 Construction programme, Council would like more information on the proposed construction of local roads. Regarding EIS Section 6.3 Construction footprint, Table 6.3 should provide summary information for each LGA separately.

- Regarding EIS Section 6.4 Construction methodology, Council seeks a commitment that should there be any damage to Council assets due to construction work, Council will be notified immediately and the damage will be immediately repaired by the contractor to Council standards at no cost to Council. A commitment is also sought regarding any permanent facilities, such as street furniture, built on Council land being to a standard consistent with Council's Public Domain Strategy.
- In EIS Table 6.5 Construction hardstands, Council would like a provision included about retaining permeable surfaces wherever possible. In Section 6.5.1 Site establishment and establishment of construction compounds, a provision should be included that all ancillary structures such as fencing and hoardings adjacent to Council land must not increase risks to the public, such as reducing street lighting levels or provide 'hiding spots', and must not reduce accessibility along public footpaths.
- Regarding EIS Section 6.5.2 Construction traffic works, any temporary change to traffic movements must be approved by Council. Should a temporary relocation of any Council asset during the construction be required, Council must be notified with a view to agreed management measures.
- Regarding EIS Section 6.5.3 Temporary construction compounds, provision should be added that any obstructions, increased traffic congestion and/or damage to nearby local roads must be avoided, and residents near construction compounds are to be consulted about any proposed night-time noise and/or vibration impacts. For the Canal Road construction compound (C8), a provision should be added that any impacts on traffic, pedestrians and cyclists along Canal Road resulting from the compound's construction is to be reviewed by Council. The linking of proposed temporary roads to the existing road network is also to be reviewed by Council. Further, heavy vehicle movements in and out of all local industrial areas are to be maintained at all the time and adequate dust protection for demolition works must be provided.
- Regarding EIS Section 6.5.5 Other bulk earthworks, it is not clear in the EIS what the impact on Council's assets will be from the construction of the structure beneath Campbell Road – clarification is requested.
- Regarding EIS Section 6.6.1 Changes to local roads, Council considers the proposed road closures for a two-year period will significantly affect residents' regular movements – a detailed assessment of this issue is requested. Similarly, Council requests a detailed assessment of the impact of proposed reduced street parking as a result of the temporary or permanent road closures. Council can assist with these assessments.
- Regarding EIS Section 6.6.3 Changes to bus stops, the following EIS proposal is noted: "The bus stop on the southbound side of Canal Road along route 418 (Burwood to Bondi Junction) near the intersection of the Princes Highway would be permanently relocated further south along Canal Road to accommodate construction vehicles entering and exiting the Canal Road construction compound throughout construction of the project (refer to Section 6.9 for further details). The final location of this bus stop would be determined during detailed design and in consultation with Transport for NSW."
- The location of this shelter has not been finalised, and any proposed relocation should involve consultation with Council as well as contractors engaged to install and maintain shelters, a not just TfNSW. Relocating the shelter too far south on Canal Road may result in the shelter being within the City of Sydney local government area, resulting in loss of bus shelter advertising revenue for Council. All costs associated with the relocation and restoration works should be borne by WestConnex. The new location is to be agreed upon by both Marrickville Council as well as contractors engaged to install and maintain shelters (Adshell)
- Regarding EIS Section 6.7 Construction workforce and work hours, Council would like provisions added to provide workforce parking within the construction compound areas so the on street parking is not affected, and tunnel drilling spoil is to be transported during daytime hours following the night-time excavation - to minimise noise impacts on local residents.
- Regarding EIS Section 6.8 Plant and equipment, Council would like a provision added to avoid using and transporting heavy vehicles on local roads. Regarding EIS Section 6.9 Construction noise attenuation, Council would like a provision added that adequate noise barriers be provided to a certified thickness and suitable barrier type.

- Regarding EIS Section 6.10 Construction waste management, Council would like a provision added to avoid transport of excess spoil via the local roads. Regarding EIS Section
- Regarding EIS Section 6.11 Construction resource use, Council would like the following provisions added:
 - Ensure no water pressure drop and electrical power shortages affect the residents living near the compound area;
 - Use locally-sourced materials and purchase materials from local businesses where possible;
 - Employment of local labour force where possible;
 - Using recycled materials where possible;
 - Solar power to be used for on-site offices where possible.
 - Water from the Sydney water detention tank to be used for construction purposes.

Response

Councils would be consulted with during detailed regarding potential impacts to roads for which Council are the relevant authority or those works which could impact on the operation of Council's road network. Road occupancy licence(s) and other permits and approvals (as relevant) would be obtained from the relevant road authority for activities that could or may impact upon a classified or local road

In the unlikely event that damage to Council property occurs outside, damage would be assessed and rectified in a timely manner.

Permanent facilities, such as street furniture, would be provided in accordance with relevant guidelines and consistent with Council's Public Domain Strategy.

Fencing and hoarding would be designed having regard to potential risks to the public such that these risks are minimised as far as feasible and reasonable. With respect to privacy and lighting impacts, all construction works would be planned and executed to minimise potential issues with adjacent and surrounding receivers where feasible and reasonable.

The lighting design for shared paths located within the M5 Linear Park impacted by the project or located adjacent to compounds would be designed to minimise light spill to adjoining residential properties while maintaining a safe night time environment for path users (eg lighting position below the height of the fence line). A signage strategy would be developed during detailed design for temporary wayfinding and safety. Potentially affected receivers would be consulted on the final signage in relation to the location and associated impacts.

Refer to earlier response in this section regarding retention of pedestrian accessibility during construction.

If the project is approved, the Construction Traffic Management and Safety Plan would form a sub-plan of the Construction Environmental Management Plan (CEMP) and would be prepared in accordance with the relevant conditions of approval. The plan would be developed in consultation with relevant councils, emergency services, road user groups and pedestrian and cyclist user groups.

Temporary lane closures may be required to roads around the St Peters and local road upgrades to accommodate:

- The installation of traffic signals, new barriers and road realignments
- Temporary and / or permanent traffic switches.

These lane closures would be temporary and would be undertaken at night within approved times in accordance with a Road Occupancy Licence under the Roads Act 1993. Roads temporarily affected by temporary lane closures are summarised in Section 9.3.1 of the EIS.

A Construction Traffic Management and Safety Plan would be prepared for the project, detailing temporary lane closures and including traffic control procedures, signage requirements, construction

traffic management requirements of the relevant Roads and Maritime manuals and procedures and Australian Standards.

Construction of the project is not expected to affect access to existing properties along construction traffic routes. However, motorists entering or exiting properties from roads along construction traffic routes may experience minor delays due to the increase in traffic volumes.

Potential impacts on Council's assets from the construction of the Campbell Road cut and cover structure would be confirmed during detailed design. Consultation would occur with Council regarding any potential impacts prior to the start of construction.

Bus stop relocations (where required) would be agreed with Transport for NSW and all affected bus operators.

A response to the issue of the management of construction workforce parking is provided in the 'construction strategy principles' issue in this section. A response to the issue of construction haulage outside of standard construction hours is provided in the 'construction strategy principles' issue in this section. A response to the issue of reducing construction vehicle impacts on local roads is provided in the 'construction strategy principles' issue in this section. A Construction Noise and Vibration Management Plan would include details regarding the provision and design of temporary noise barriers.

The Construction Noise and Vibration Management Plan would be developed and implemented and would identify the management measures to be implemented. In selecting specific management measures, the Construction Noise and Vibration Management Plan would take into account the number and sensitivity of potentially affected receivers, the nature and duration of relevant construction activities, and the availability of additional feasible and reasonable management measures. The commitment to develop this plan is reflected in NV1 in **Chapter 8** (Revised environmental management measures) in this report.

The nature and extent of any utility changes would be confirmed during the detailed design of the project, with appropriate relocation or replacement alternatives identified in consultation with the relevant utility provider.

The WestConnex Sustainability Strategy (the Sustainability Strategy) (WestConnex Delivery Authority, 2015) describes how sustainability initiatives will be integrated into the design, construction and operation of projects across the WestConnex program of works. The Sustainability Strategy outlines a sustainability vision, commitments, guiding principles, objectives and overarching targets across a range of sustainability themes, and was prepared to align with the Transport for NSW Sustainability Framework as well as other relevant Government sustainability instruments.

Recycled products would be used during construction of the project to reduce the demand on resources, in instances where the use of such materials is cost and performance competitive. This may include the use of fly ash and slag within concrete mixes. Resource recovery principles would be applied to the construction of the project, including recovery of resources for reuse, recycling and reprocessing, where possible. The commitment to undertake resource recovery is reflected in WM04, WM06, WM07 and WM08 in **Chapter 8** (Revised environmental management measures) in this report.

It is anticipated that up to 10 per cent of the pavement would comprise reclaimed asphalt, sourced from existing road pavements to be removed / replaced as part of the project and up to 10 per cent of virgin materials may be able to be substituted with recycled materials during construction. Additionally, geopolymers concrete (a low calcium, fly-ash based concrete product) would be considered for use in structural elements of the project, such as pre-cast, high-strength box culverts.

A number of sustainability-specific criteria were used as part of the evaluation of tender designs during the competitive design and construct tender process for the project. Specifically, tenderers were required to:

- Demonstrate how the project would meet an 'Excellent' rating for the design and As-built components of the project under the Infrastructure Sustainability Council of Australia's rating scheme

- Detail how sustainability initiatives would be implemented throughout the project.
- Explain how sustainability targets would be achieved or improved on throughout the project
- Provide a Sustainability Management Plan, describing how the overarching sustainability objectives for the WestConnex program of works would be achieved.

An Australian Industry Participation Plan would be developed for the overall WestConnex program of works.

A CEMP will be prepared to outline the environmental management measures which are proposed during the construction phase of the project to minimise impacts on the environment and the local community. Monitoring of potential amenity impacts would occur during the construction period and complaints would be recorded, investigated and actioned promptly.

The use of solar power for powering onsite offices during construction would be considered during detailed design.

Feasible and reasonable opportunities for wastewater reuse on-site or for construction purposes would be pursued (such as dust suppression both in the tunnels and for surface works).

Consultation would be ongoing with key stakeholders throughout detailed design in accordance with any Conditions of Approval. Conditions of approval are a matter for DP&E to consider during its assessment of the critical State significant infrastructure application.

4.13 City of Botany Bay Council

City of Botany Bay Council provided a submission on the EIS that included a summary letter and an attachment referred to as *WestConnex New M5 EIS – Review of Traffic, Transport and Modelling* (TTM Consulting, 2016). The responses provided in this section have been based on the order of issues raised in the summary letter. Issues raised in the TTM Consulting Report are responded to separately in Section 4.17.

4.13.1 Social and economic, property and land use, and visual impact and urban design

Issue description – permanent pedestrian corridor/cycle path

The City of Botany Bay intends to establish a permanent pedestrian corridor / cycle path along the eastern side of the Alexandra Canal. A cross section should be provided to demonstrate that sufficient space/head room is provided beneath the Gardeners Road Bridge for the establishment of the pedestrian corridor / cycle path. All works along the canal should take into account the planned pedestrian corridor / cycle path.

Response

Cross sections of Campbell Road and Gardeners Road bridges are provided in Section 5.7.7 of the Urban Design Report (Appendix L of the EIS). Both would have a minimum 2.7 metre clearance along the eastern bank of Alexandra Canal which would not preclude the future provision of a shared path at the bridge crossings and would not preclude integration with Council's planned network.

The design of the bridges would be confirmed during detailed design, during which Roads and Maritime would consult with the City of Sydney and Botany Bay Council.

Issue description – acquisition of 697 Gardeners Road

According to Figure 5-36 of the EIS, the construction of the Gardeners Road Bridge would require the acquisition of 697 Gardeners Road. As part of the property is located within the Botany Bay local government area, the City of Botany Bay is seeking confirmation on whether the residual building located on the southern side of the Gardeners Road is likely to be retained or demolished. If the residual building is to be demolished, the land should be provided as public open space and as a passive recreation area for local residents and workers.

Response

The section of building located within the construction footprint at this location would be demolished as part of the project. The residual land located on the southern side of Gardeners Road Bridge would be made available for permissible land uses, which does not preclude passive recreational area.

Issue description – landscape character diagram

Figure 14-5 (Landscape character diagram) of the EIS is incorrect. The Mascot Town Centre Precinct is primarily residential development. Please ensure the diagram accurately reflects the existing landscape character of the precinct.

Response

The existing landscape character zones of the Mascot Town Centre have been identified as a mix of commercial, industrial and residential, and reflect the landscape as seen at the time of site inspections in mid-July, 2015. These landscape character zones broadly share similar spatial qualities that predominantly reflect large lots, including a variety of industrial and commercial buildings of similar bulk and scale, located close to the street boundary, on tree lined streets.

The town centre precinct is centred on Mascot railway station and defined by Gardeners Road, Coward Street, Kent Road, O'Riordan Street, Miles Street and Botany Road. The precinct is at varying stages of development. With respect to areas of the project footprint, there are a number of medium to high density residential developments, centrally located between Bourke Street and O'Riordan Street which are not specifically indicated on the landscape character zone map, with the taller residential development set well back from the project. The low rise residential block facing onto

that part of Gardiners Road impacted by the project (i.e. the four storey residential development mid-block west of Bourke Street) shares the above listed key attributes with the commercial and industrial development as observed at the time of inspection, i.e. large lots of significant bulk and scale, located on tree lined streets.

The impact assessment of a separate town centre landscape character type would be expected to be in the order of a low rating for landscape character impact given the minimal incursion of the project into this character type. Visual impact would also be expected to be in the order of a low rating given that taller residential blocks with the town centre are set back from the project, and where they had views across key elements of the project, comprising an extensive landscape response, in association with well-considered architectural detailing of the hard elements.

Issue description – sensitive receivers and community infrastructure

Figure 15-5 (Sensitive receivers and community infrastructure) of the EIS does not accurately reflect existing community infrastructure in the Mascot precinct. There is an existing child care centre located at 243-249 Coward Street and 14-16 Bourke Street. Council is also assessing two development applications for the operation of two additional child care centres at 19-33 Kent Road. A 6,915 square metres new public park would be constructed at 19-33 Kent Road as part of the determination of DA13/200. The EIS must consider the impact WestConnex would have on these sensitive and public uses.

Response

Noted. A construction noise and vibration management plan(s) would be prepared and implemented consistent with the requirements of the *Interim Construction Noise Guideline* (DECC, 2009), and would include the following:

- Identification of nearby residences and other sensitive land uses
- Description of approved hours of work
- Description and identification of construction activities, including work areas, equipment and duration
- Description of what work practices (generic and specific) would be applied to minimise noise and vibration
- A complaints handling process
- Noise and vibration monitoring procedures.

This commitment is reflected in environmental management measure NV1 in **Chapter 8** (Revised environmental management measures) of this report.

Issue description – impacts on proposed rezoning at Mascot

A planning proposal (PP-2015-BOTAN-003-00) has been submitted to NSW Department of Planning and Environment for land located north of Sydney (Kingsford Smith) Airport. The proposal relates to properties covering an area of around 70 ha immediately north of the Airport. The subject precinct is bounded by Gardeners Road and Coward Street (via Kent Road) to the north, Alexandra Canal to the west, O'Riordan Street to the east and Joyce Drive/Qantas Drive to the south. The planning proposal seeks to add additional permitted uses relating to the airport on land located to the north of the Airport in Mascot. The Environmental Impact Statement should consider the likely impacts the proposed development would have on this planning proposal. Note: This Planning Proposal is different to the Qantas Planning Proposal as referenced in the EIS

Response

As Council is yet to exhibit the planning proposal or LEP amendment or determine what demands the proposal would have on the road network, the EIS cannot consider the likely impacts of the New M5 on this potential future development. Roads and Maritime would continue to consult with Council with respect to the design development of the Sydney Gateway, which would have greater relevance to this planning proposal.

Issue description – Sydney Gateway

The Sydney Gateway link to Port Botany and Sydney Airport is a critical component of the entire WestConnex project and Council consider that this element must be delivered to ensure the success of the project. Failure to deliver the Sydney Gateway would have significant and detrimental implications for the Mascot precinct and Botany Bay local government area, in particular for the community living and working in the Mascot Precinct.

Response

Roads and Maritime is presently developing Sydney Gateway with the aim of delivering the project concurrently with WestConnex M4-M5 Link.

The NSW Government is committed to the delivery of the Sydney Gateway as an important part of the WestConnex program. In the event that future stages of WestConnex are not built, Roads and Maritime would consider what upgrades would be required to address the specific traffic issues and would implement them as part of a future state-wide prioritised capital works program.

Issue description – cumulative impact assessment does not include all approved developments

Chapter 27 of the EIS has considered the potential cumulative impacts of WestConnex with nearby developments including the Mascot Station Town Centre Precinct. However, it is unclear whether the EIS has taken into account additional approved residential and commercial developments in this precinct. A list of developments has been provided in the submission.

Chapter 9 (Traffic and Transport), Chapter 10 (Air Quality), Chapter 11 (Human Health) and Chapter 12 (Noise and Vibration) in the EIS must account for these developments in the Mascot Precinct given the additional population and traffic movements generated which would impact on the finding of these areas. This includes the accuracy of traffic modelling and performance of existing and future road networks and the performance of the air quality, noise and vibration of WestConnex.

Response

Traffic modelling for the project has relied on population and employment data from the Bureau of Transport Statistics, which is the best information currently available. The current WestConnex Road Traffic Model (WRTM) version 2.1 is based on 2014 land use projections, but does not specifically model individual developments such as those provided in the Council's submission.

This traffic modelling was used to inform the assessment of Air Quality (Chapter 10), Chapter 11 (Human Health) and Chapter 12 (Noise and Vibration) of the EIS. The cumulative impacts from traffic and transport, from developments, including the Mascot Station Town Centre, are discussed in Section 27.5.1 of the EIS. Amenity is also considered in the assessment of cumulative impacts (Section 27.5.2 of the EIS).

Issue description – off-street parking and access to 655 Gardeners Road

Page 13-67 of the EIS stated that the property adjustment on Gardeners Road would result in the "loss of existing parking areas on the property... may restrict access to the rear of the property and may require access off Bourke Street to be provided" at 655 Gardeners Road. Council is unclear whether the reduction in existing parking at 655 Gardeners Road would result in non-compliance with Council parking requirements and the appropriateness/suitability in providing a vehicular access off Bourke Street. This is a significant issue.

Response

Changes to property access that are affected as a result of the project would be reinstated in consultation with affected landowners. This commitment is reflected in environmental management measure OpLP02 in Table 13-12 of the EIS and in **Chapter 8** (Revised environmental management measures) of this report.

Issue description – confirmation of residual lot

Table 13-11 of the EIS identifies Lot 1 DP 397364 as a residual lot. According to Council's records, this lot does not exist.

Response

This is an error in Table 13-11 of the EIS. The correct reference to this parcel of residual land is Lot 100 DP 1191017.

Issue description – social and economic impacts on Gardeners Road, Botany Road and Mascot Town Centre

A robust business case should be provided to illustrate the potential impact on commercial and business properties located on Gardeners Road and Botany Road. Any additional traffic movements must not adversely impact the commercial and business environment and conditions on Gardeners Road and Botany Road. Similarly, additional traffic must not unduly impact on the function and amenity of the thriving Mascot Town Centre Precinct.

Response

The social and economic impacts on commercial and business properties in Gardeners Road include:

- Loss of on street parking and changes to accessibility as discussed in Section 13.3.2 of the EIS and Sections 6.1.3 and 15.3.2 Technical working paper: social and economic (Appendix M) of the EIS.
- Changes to traffic volumes as discussed in the Technical working paper: Traffic and transport (Appendix G of the EIS).

Changes to property access that are affected as a result of the project would be reinstated in consultation with affected landowners. This commitment is reflected in environmental management measure OpLP02 in Table 13-12 of the EIS and in **Chapter 8** (Revised environmental management measures) of this report.

4.13.2 Flooding and drainage

Issue description – potential flooding concerns

The City of Botany Bay Council experiences flooding impacts in Gardeners Road, Ricketty Street, Bourke Street, Ossary Street, Kent Road and Coward Street, in the vicinity of the WestConnex project. This project is likely to increase adverse flooding impacts and levels if significant and effective flood mitigation and protection measures are not integrated in the design and construction.

Response

New pipe connections would be installed where the existing transverse drainage is affected by local road upgrades or requires relocation. Indicative details of new and upgraded trunk and transverse drainage infrastructure upgrades would be confirmed during detailed design.

During detailed design, the existing drainage network would be subject to additional survey and assessment. The extent of potential impacts would be confirmed during detailed design with the benefit of detailed survey information relating to existing stormwater infrastructure, ground levels and existing development. This would be used to ensure that any pits or pipes receiving flow would have sufficient capacity and be of adequate condition to receive design flows.

Further detail is provided in Section 7.2 of the Technical working paper: Surface water (Appendix N of the EIS). A Flood Management Strategy would be prepared by a suitable qualified and experienced person in consultation with directly affected landowners, DPI-Water, OEH and the relevant local councils. It would include but not be limited to:

- Identification of flood risks to the project and adjoining areas, including consideration of local drainage catchment assessments and climate change implications on rainfall, drainage and tidal characteristics
- Design and mitigation measures to protect proposed operations and not worsen existing flooding characteristics during construction and operation, including soil erosion and scouring
- Drainage system upgrades.

The Flood Management Strategy would be peer reviewed by a suitably qualified and experienced independent hydrological engineer. It would be submitted to the Secretary of DP&E and the relevant local councils prior to construction works commencing in the vicinity of flood prone land and overland flow paths for the waterways and catchments in the vicinity of the project area, or as otherwise agreed by the Secretary of DP&E.

These commitments are reflected in environmental management measure FD01 and FD02 in **Chapter 8** (Revised environmental management measures) of this report.

Issue description – stormwater drainage network

The project indicated that it would use the existing stormwater drainage network. Council's existing stormwater network is insufficient to cope with significant and additional flow. The WestConnex project requires investment to upgrade the existing stormwater and drainage system to manage additional capacity. In addition, the issue of ongoing additional maintenance of the stormwater assets as a result of the WestConnex project requires agreement.

Response

Drainage structures would be assessed and upgraded as required to ensure that no conveyance is lost as a result of the project. These assessments would be undertaken during detailed design. Revised design and maintenance requirements would be discussed with Council during detailed design.

Issue description – drainage design

Conceptual and detailed drainage design needs to be provided to Council for further review. Current information is insufficient.

Response

If the project is approved, Botany Bay Council would be consulted during detailed design in relation to affected council assets or where drainage connections would be made or modified.

4.13.3 Traffic and transport

Issue description – proposed road widening at Gardeners Road and Kent Road

The City of Botany Bay has received representations from property owners at 2 Kent Road and 685-689 Gardeners Road raising concerns regarding the proposed road widening at Gardeners Road and Kent Road associated with WestConnex. The owners indicated that the road widening would result in the removal of on-street car parking on Gardeners Road and the proposed median strip on Gardeners Road would prevent trucks from turning right when entering or leaving properties on Gardeners Road. This creates access issues for these property owners.

Response

The proposed median strip on Gardeners Road would restrict the right turn movements out from these properties. However, a left slip into Venice Street would allow vehicles to turn left out, use the left slip into Venice Street and then turn left into Ricketty Street to then travel east along Kent Road and Gardeners Road providing adequate property access. This would result in a minor impact on travel times for vehicles accessing these businesses.

With regard to the restriction on the right turn movements into these properties, entry from the west would be facilitated through existing roads, including Campbell Road/Campbell Street and Gardeners Road or Princes Highway, Canal Road, Ricketty Street and Kent Road.

On-street car parking would be removed along the section of Gardeners Road between the cul-de-sac and the intersection of Kent Road as a result of the project. The impacts of this were considered in Section 6.2 of the Technical working paper: Social and Economic (Appendix M of the EIS).

Issue description – property access

Final works must ensure that road widening for the project does not prevent or restrict vehicles, and in particular trucks, from entering and exiting properties in a safe manner.

Response

The project would be designed to ensure that vehicles can enter and exit properties in a safe manner and these provisions would be confirmed as part of the detailed design process. The detailed design would be verified by an Independent Verifier to ensure that the design meets all relevant codes and standards. A Road Safety Audit would also be undertaken to assess the safe operation of the road in the context of the speed environment, road geometry and traffic volumes.

4.14 City of Sydney Council

4.14.1 Project benefits

Issue description – provision of direct and efficient access between south western Sydney and the Sydney Airport / Port Botany precinct

The City of Sydney questioned the benefits of the project in providing quicker, more reliable trips between western Sydney and the Sydney Airport / Port Botany precinct. These concerns were raised several times in the submission and appendices and have been collated here for a response.

p. 7 City of Sydney submission on WestConnex Stage 2 – New M5

City of Sydney notes that the EIS states a key benefit of the project as:

“The New M5 will offer quicker, more reliable trips between Western Sydney and the Sydney Airport / Port Botany precinct... by providing additional motorway capacity within the M5 corridor”.

City of Sydney is of the opinion that this benefit is questionable. The New M5 does not provide direct and efficient access between south western Sydney and the Sydney Airport / Port Botany precinct as the Sydney Gateway connection is not provided (and is still subject to design, costing and approvals). Even assuming the Sydney Gateway is delivered, the M5 East provides for much more direct access between Western Sydney and the Port and Airport. The original intention of the WestConnex project was to develop this connection from the M5 East to the Airport/Port rather than to build an entirely new motorway.

p. 15 City of Sydney submission on WestConnex Stage 2 – New M5

City of Sydney notes that even though the proposed project states it will connect people to the Port or Airport, it really does neither. The project does not offer people travelling from the south west direct access to either the Port or the Airport. Instead, people are required to exit at the proposed St Peters interchange onto Gardeners Road then approach the Airport and Port on local roads. The cynical view of this is that the proponent is seeking to force people to travel further and as a result, pay higher tolls given they will be charged on a per kilometre basis.

An example of this is how people in the Mascot and Waterloo/Beaconsfield areas will access the Airport and Port via Sydney Gateway. As the location of key employment lands (including freight logistics companies), it would seem logical that infrastructure at the scale and with the stated importance of WestConnex would improve access to these destinations. This shows the intention that traffic in these areas, which already experiences significant traffic congestion at key intersections, will continue to access the Port and Airport via local roads, in particular through Mascot Town Centre. This will worsen congestion on these streets, particularly given the local traffic increases that result directly from the construction of the New M5, including through induced demand and toll avoidance on the combined M5 corridor.

Similarly, early designs indicate vehicles travelling on the proposed Southern Extension will only be able to head eastbound on the New M5, there will be no ability to head west. There is no rationale why this is the case or what alternate path people travelling west from the south, or south from the west, would need to take.

The EIS demonstrates that the Project does not actually service key destinations such as the Port and Airport. The project is pushing larger volumes of traffic onto already congested local roads (for example, Gardeners Road where the intersections with Botany Road and O’Riordan Street are already exceeding capacity) without comprehensive traffic modelling to understand the impact. The existing M5 East provides a more direct connection between south west Sydney and both the Port and Airport, and it is unlikely that freight vehicles will choose a circuitous route such as the New M5 over a more direct route; especially given capacity is released on the M5 East as a result of tolls being introduced.

The project objectives state that the project will “cater for diverse travel demands... best met by road infrastructure” however; there has been no assessment of whether the needs of western and south western Sydney are actually best met by road infrastructure.

Response

Notwithstanding its more direct connection to Sydney Airport and Port Botany, the M5 East Motorway currently experiences heavy traffic congestion, slow speeds and unreliable travel times especially in the morning and afternoon peaks, and increasingly at other times of the day and on weekends.

The New M5 would provide for direct connectivity for commuters from south western Sydney with the employment zones to the north of the port/airport precinct, and access to Sydney Airport via upgraded local roads in the short term, as well as future connectivity to the future Sydney Gateway. The New M5 would also allow redistribution of vehicles from the existing M5 East Motorway, particularly those commuters connecting to the CBD and the inner west of Sydney, rather than proceeding through the port / airport precinct. This redistribution of traffic aligned with commuter destinations would contribute to easing congestion along the M5 East Motorway. By easing congestion along the M5 East Motorway, the New M5 would enhance connectivity for commuters using the M5 East Motorway to access employment centres along the M5 corridor, including the port / airport precinct.

The *State Infrastructure Strategy* (Infrastructure NSW, 2012) states that private road transport is – and would remain – the only viable option for most journeys in Sydney most of the time, even with the targeted growth in public transport and rail freight sought by the Government, and the expected increase in the population density of the city. This pattern is the consequence of established land use patterns in Sydney, including in western and south western Sydney, and there is no indication in the available data that the patterns of demand would change in the future.

The project would enhance connectivity to Sydney Airport, via the local road network to the north of the airport in the short term, and via a motorway connection following completion of the future Sydney Gateway project. Extending the New M5 to St Peters, north of Sydney Airport, better connectivity with the future M4–M5 Link and Sydney Gateway would be achieved. Furthermore a number of industries exist in and around the airport, Alexandria and Botany areas that would benefit significantly from improved access to motorway infrastructure.

Increasing capacity of the M5 East Motorway connection to Sydney Airport was considered as an alternative to the project (refer to Section 4.2.2 of the EIS). However, it was determined that this option would be undesirable because:

- Widening the M5 East Motorway between Marsh Street and General Holmes Drive would considerably encroach into the wetlands at Marsh Street and Eve Street, Arncliffe
- Any increase to the capacity of this section of the motorway would increase the demand on adjacent sections of the road network such as the airport tunnel which is already operating at or near capacity during peak periods and has limited capacity to cater for additional traffic
- Enhancing the capacity of the existing M5 East Motorway tunnels would make connection to the surrounding network difficult as the arrangement of the tunnel would be at a different vertical alignment from the existing established road network
- Increasing the capacity of the tunnels would be costly and highly disruptive to existing traffic during construction.

An interchange option in St Peters was therefore preferred to minimise pressure from additional traffic on Marsh Street, General Holmes Drive and the airport tunnel, as well as to avoid environmental impacts on Tempe and the Marsh Street wetlands.

Issue description – project is required to relieve congestion along M5 East Motorway

The argument that the New M5 is required to relieve the M5 East allowing for more efficient freight movement on the existing motorway falls away as tolls are applied to the M5 East. Tolling this currently free route is likely to result in toll avoidance and therefore reduced traffic on the M5 East to the extent that congestion is reduced with resultant improvements in the efficient movement of freight. The impact of the toll on the M5 East and resultant toll avoidance is referenced in the WestConnex Updated Strategic Business Case Technical Paper 1 Traffic Report, p52.

Using price mechanisms to manage motorway demand in preference to the costs of new road building would appear to be an equally valid and effective mechanism to improve freight access between south western Sydney and the Sydney Airport / Port Botany precinct.

Response

The project includes the installation of tolling points on both the New M5 and the M5 East motorways. Vehicles from all user groups would be subject to tolling on both the New M5 and the M5 East as part of the project.

The effect of tolling on road traffic demand was considered in Chapter 9 (Traffic and transport) and Appendix G (Technical working paper: Traffic and transport) of the EIS. Some diversion of traffic on to arterial roads is likely to occur outside of peak traffic periods to avoid the motorway tolls. This is not expected to have a significant impact from a traffic perspective in terms of congestion, as there is generally spare capacity across the network during off-peak periods. During peak periods these arterial roads are already at capacity and there is less incentive to divert from the motorway in order to avoid the toll. As such, heavy and light freight industries are unlikely to avoid using the motorway during peak periods given the time savings provided by the motorway connection when compared to the local road network.

Issue – the New M5 would serve dispersed trips

It is noted that one of the rationale for WestConnex is the need to meet dispersed trips, that is, non-centre based employment (WestConnex Updated Strategic Business Case, p27). This is at odds with the statement in the EIS that the New M5 will connect population and employment centres.

The City of Sydney acknowledges that trip types are diverse, and that not all trips can be serviced by public transport. However, the objective of the Government in creating a truly integrated transport network should be to release road capacity on existing roads through a mix of demand management (especially for short trips) and public transport. After all, if the trip types really were as diverse as is stated in the Environmental Impact Statement for the New M5, then there would not be a sufficient aggregation of demand to service the corridor. This would indicate that the proponent has not performed its Due Diligence by assessing alternative options within a truly integrated (and constrained) transport system.

Response

Sydney's motorway network should be recognised as sitting within a hierarchy of road infrastructure, which together services the needs of the dispersed trips that cannot be accommodated with rail infrastructure. Dispersed trips are collected and concentrated by the local and arterial road networks at a limited number of motorway interchange locations. The function of the motorway network is to transfer traffic between this limited number of centres (i.e. between motorway interchange locations). In this context, the WestConnex program of works, and its constituent project components (including the New M5) can by itself only function to convey traffic between interchange 'centres'. However, when considered as part of the broader road network system across Sydney, the motorway network plays a part in servicing a broader demand for dispersed trips.

The Government's strategy for the delivery of an integrated transport network is presented in detail in the *NSW Long Term Transport Master Plan* (Transport for NSW, December 2012) and the integrated modal delivery plans that sit under it. The New M5 project and the broader WestConnex program of works form just one part of the strategy to deliver a truly integrated transport system for Sydney as well as rural and regional New South Wales. It is important to recognise that the New M5 in isolation cannot deliver all of the outcomes presented in the Long Term Master Plan, and that the complete program of transport infrastructure and service initiatives needs to be considered holistically.

The *WestConnex Updated Strategic Business Case* (NSW Government, November 2015) (pages 25 to 31) presents the context for and background information that underpins the subsequent discussion of the WestConnex program of works. This section of the Updated Strategic Business case outlines information in relation to:

- Anticipated population growth across Sydney until 2031
- Current missing links in Sydney's motorway network
- The important role that roads play in servicing transport needs that cannot be serviced by public transport alternatives such as rail infrastructure
- The current cost of congestion in Sydney
- The importance of the Parramatta Road corridor
- The need to serve freight and international gateways, including Port Botany and Sydney Airport
- The role of transport infrastructure in supporting job creation.

Importantly, the discussion of the role of roads in servicing transport needs (page 27) relates to roads broadly and not just the WestConnex program of works or other motorway infrastructure. The Updated Strategic Business Case (page 27) explains that public transport is 'unable to provide a convenient alternative for a large proportion of travellers given the diffuse nature of employment and the diverse purposes of many trips'. To adequately service the diffuse nature of employment and the diverse purposes of many trips, an effective road network comprising local roads, an arterial road network and a central motorway 'spine' is required.

Issue – connectivity to Sydney's global economic corridor

City of Sydney raised a number of concerns regarding the role of the project in attracting additional traffic into the Sydney CBD. These concerns were raised in several sections of the City of Sydney submission and have been collated below for response.

p. 8 City of Sydney submission on WestConnex Stage 2 - New M5

Throughout the Sydney Motorway Corporation's (and previously with WestConnex Delivery Authority) engagement with the City of Sydney, assertions have been made that the intention of the New M5 is not to deliver traffic into the Sydney CBD. However, given this stated benefit of the project and the city centre being the centre of the Global Economic Corridor, it would seem false to make this claim. There are similar inconsistencies throughout the EIS.

p. 12 City of Sydney submission on WestConnex Stage 2 - New M5

The EIS suggests:

"WestConnex, including the project, would support the City Centre Access Strategy by:

- *Reducing the volume of extraneous (through) traffic using the CBD's surface road network*
- *Reducing congestion within the CBD, through encouraging motorists to use bypass routes and avoid the city centre road network."*

The EIS provides no evidence to support this assertion. It is difficult to comprehend how the New M5 will reduce the proportion of existing through-traffic using surface roads in the CBD. Perhaps with a different design this may have been possible. The Cross City Tunnel is underutilised and failed to reach its potential of reducing through-traffic choosing surface roads. Traffic on the existing M5 East would currently be expected to use the Eastern Distributor and Cross City Tunnel or Harbour Tunnel to effectively bypass the Sydney CBD. The tolls that would be applied to make this journey are likely unpalatable for many road users and would result in under-used infrastructure and further saturation of traffic on surface road networks.

It is noted that the New M5 EIS denies the New M5 is intended to be used to access the Sydney CBD. The City finds this contention questionable. Contrary to these assertions in the EIS, the New M5 and St Peters Interchange with widening of the Euston Road corridor, will increase traffic flowing into the Sydney CBD. The difference will be that traffic will use roads in the inner-south rather than the inner-west to make this journey, and travel through suburbs that are undergoing rapid residential intensification and accommodate multiple industrial and business land uses.

The NSW Government has articulated a view, through the Tomorrow's Sydney campaign, to reduce peak period traffic and bus numbers in the Sydney CBD recognising road capacity in the CBD is constrained and will become more so through the implementation of the Sydney CBD South East Light Rail project.

In the M4 East Submissions Report (page 4-290), it is stated: *"The project is not intended to enable more private vehicles to enter the Sydney CBD"*. Yet, the overall WestConnex objectives include:

"Relieve road congestion to improve the speed, reliability and safety of travel in the M4, M5 and Central Business District (CBD)/ airport/ port corridors, including parallel arterial corridors".

(WestConnex Updated Strategic Business Case, p23)

The Updated Strategic Business Case states that, "Improving the speed, reliability and safety of any travel mode will increase its attractiveness, and therefore use". It is difficult to reconcile the view that neither the M4 East nor New M5 are intended to increase traffic accessing the CBD given the project objectives. The design of each Stage of WestConnex delivers connections to the Sydney CBD via local roads, yet the impacts of these connections have been excluded from the impact assessments. If neither the M4 East nor New M5 will contribute to this overall WestConnex objective with respect to traffic travelling to/from the CBD, then the objective will not be met by the WestConnex project

There are multiple statements in the New M5 EIS which strongly imply or explicitly state the project is designed to improve access to the Sydney CBD, which will increase the attractiveness of vehicular travel to access the Sydney CBD. For example:

[In reference to demand on the M5 East] *"Congestion occurs mainly during the morning and evening peak hours when many people are commuting to and from work. This congestion is concentrated on the main arterial roads leading to employment centres"*. (Volume 1A, p 3-14)

and

"There is still a need to provide a link between Western Sydney and other centres in Sydney, such as the Sydney CBD, Sydney airport and Port Botany. These connections are required to allow not only for the flow of workers..." (Volume 1A, p3-15)

and

"...the Transport Master Plan indicates about 500,000 people access Sydney's CBD and 100,000 passengers travel through Sydney Airport each day. These statistics indicate a strong growth in demand for road travel..." (Volume 1A, p3-15)

p. 16 City of Sydney submission on WestConnex Stage 2 - New M5

The summary of this EIS chapter states that the project will "provide access to jobs in Sydney's east and CBD" (p. 3-21). This clearly demonstrates an objective of this project is to connect people to the Sydney CBD, despite this being actively denied during consultation with the City of Sydney and being denied through the modelling approach. The City of Sydney recognises that with growing congestion, there is decreasing road space for inefficient transport modes such as the private car. Building car-based infrastructure to the city centre is not consistent with supporting the government's own investments in active and public transport, nor its land use policies.

Section 4.4.1 states that an objective of choosing an interchange location was to “maximise connectivity with the local road network and nearby areas of urban growth including connections to areas of predicted population growth in inner south west Sydney, such as Green Square and Mascot”. If this is the case, then the traffic assessment methodology is inherently flawed as it omits these areas completely. This also demonstrates that the proponent is aware of the spatial and social relationship between the St Peters area and the urban renewal areas of Green Square and Mascot.

Similarly, section 4.4.4 gives a rationale as to why Euston Road was chosen, and again, it was to connect to places such as Green Square.

Response

The WestConnex program of works would not, by itself, significantly affect existing volumes of traffic with the Sydney CBD as an origin or destination. However, it would provide a closer and more efficient motorway entry point for traffic travelling to / from Sydney's west and south west. It would also provide opportunities for traffic that currently travels through the Sydney CBD unnecessarily to bypass the CBD.

In broad terms, traffic within the Sydney CBD is the result of one of two factors:

- Traffic associated with the Sydney CBD as an origin or destination
- Traffic passing through the Sydney CBD for other journeys without the Sydney CBD as an origin or a destination.

The role of the Sydney CBD as a trip origin or destination is directly related to demographics, population and the distribution of economic activity. While the New M5 and the broader WestConnex program of works may, over the longer term, contribute to enhanced desirability of the Sydney CBD for residential and commercial activity, the infrastructure by itself would not significantly affect existing volumes of traffic with the Sydney CBD as an origin or destination. Changes in population and economic activity within the CBD, or with a connection to the CBD, would have a more significant influence on this component of CBD traffic over time.

While Sydney CBD sits within the geographic centre of the global economic corridor, the growth in regional centres and employment hubs including Macquarie Park and Norwest Business Park are creating a shift in employment throughout Sydney. The ‘centre of gravity’ for Sydney (the location at which the ‘pull’ of residential, economic and employment forces are equidistant) lies at Concord, therefore diminishing the argument that Sydney CBD is the economic centre of Sydney (The Committee of Sydney, 2015). The WestConnex program of works would assist in addressing a key connection between Sydney's east and west, thus improving access to employment as well as the role of Parramatta as Sydney's second CBD.

For traffic that has the Sydney CBD as an origin or destination, the WestConnex program of works, and particularly the future M4–M5 Link would provide a closer and more efficient motorway entry point for traffic travelling to / from Sydney's west and south west.

With respect to traffic that currently passes through the Sydney CBD between different origins and destinations, the WestConnex program of works (including the New M5 as a component of those works) would provide an opportunity for this traffic to bypass the CBD. Specifically, the WestConnex program of works would provide alternatives to travelling through the CBD by:

- Providing additional capacity along the M5 Motorway corridor (as a result of the New M5), which would reduce congestion on the existing M5 East Motorway and enhance the desirability of that connection to the east of the CBD
- Providing additional capacity through the airport / port precinct with connection to the Eastern Distributor (as a result of future Sydney Gateway), which would reduce congestion through the airport / port precinct and enhance the desirability of that connection to the east of the CBD
- Providing a future northern connection (as a result of Western Harbour Tunnel), which would offer an alternative bypass route to the west of the Sydney CBD.

Issue – enabling long distance trips

The New M5 project appears to enable long distance trips between the south west and the east/Sydney CBD, yet the modelling does not support this; nor does the Updated Strategic Business Case. Investing billions of dollars to enable these types of trips is not consistent with the land use policy of the NSW Government's A Plan for Growing Sydney (specifically, Direction 1.7 Grow strategic centres – providing more jobs closer to home).

Response

The principal purpose of motorways, and Sydney's motorway network, is to service medium to long distance trips between centres (motorway interchange locations). The New M5 would provide:

- Additional capacity in the currently constrained M5 Motorway corridor for medium distance trips between the port / airport precinct and Sydney's east, and Sydney's south west
- Connection to the broader WestConnex program of works, which would fill an existing 'missing link' in Sydney's motorway network, and enable longer distance trips along motorway standard roads.

The New M5 and the WestConnex program of works are not intended to, and have not been designed for, short trips. Short trips are best serviced by the local and arterial road networks.

Consistency with the NSW Government's *A Plan for Growing Sydney* is discussed in **Section 4.14.3** of this report.

Issue – economic benefits and Cost Benefit Ratio of the project

City of Sydney raised several concerns regarding the economic benefits and Cost Benefit Ratio of the project and WestConnex. The concerns were raised in several sections of the submission and have been collated here for response.

p. 8 City of Sydney submission on WestConnex Stage 2 - New M5

The limited benefit of the New M5 as described in the EIS is supported by the economic analysis presented in the WestConnex Updated Strategic Business Case (November 2015) which clearly shows that there are no benefits accruing from Stages 1 and 2 of WestConnex (WestConnex Full Scheme: Economic Appraisal, KPMG, 19 November 2015, p43). If considered independently, the New M5 would not have a positive cost-benefit ratio; that is, the costs would outweigh the benefits of the project. More people will suffer a negative impact as a result of the project, than would benefit from it.

p. 14 City of Sydney submission on WestConnex Stage 2 - New M5

WestConnex will not deliver long-term benefits to the economic growth of NSW or Australia, rather it will consume valuable public resources, locking people into long car commutes on expensive toll roads.

p. 93 City of Sydney submission on WestConnex Stage 2 - New M5

The City of Sydney would argue that from an economic perspective, creating the New M5 and WestConnex is not the highest and best use for land, and the Government has not appropriately considered the opportunity costs of this project, nor the WestConnex program.

Response

The EIS acknowledges that other WestConnex projects are needed to deliver a number of project benefits. However, Section 1.4 of the EIS also identifies several project benefits that would be delivered by the New M5 project alone, and in combination with the King Georges Road Interchange Upgrade, which is currently under construction.

The New M5 project would:

- Provide additional motorway capacity along the main connection to Sydney Airport, Port Botany and south west Sydney which would provide reliability and savings in travel time for through traffic

- Provide improved access and connectivity between employment and population centres as well as for local vehicle trips and for active transport
- Enable future improvements to public transport including more frequent cross-regional bus services connecting to Sydney Airport
- Facilitate local road upgrades in St Peters and Mascot.

Further, it is estimated that construction expenditure would directly and indirectly contribute an estimated \$1.8 billion of output, \$400 million of household income, around 4,390 annual full-time equivalent jobs and \$670 million value added to the NSW economy per average year of construction. Operational expenditure was estimated to contribute a total of \$44 million in output, around \$10 million in household income, 116 full-time equivalent jobs and \$18 million in value added to the NSW economy per year of operation.

Together with the proposed Southern Connector, the New M5 would:

- Support the economic development of Sydney by providing a high quality and efficient road connection for motorists and freight vehicles between the Global Economic Corridor and Global Sydney (as defined in *A Plan for Growing Sydney* (NSW Government 2014))
- Provide additional capacity to address existing traffic congestion on the M5 East Motorway and local roads by separating longer distance through traffic from local traffic. Current traffic congestion is causing poor amenity along the M5 corridor and constraining the operation of existing businesses and efficient movement of freight
- Provide better connectivity between local centres adjacent along the M5 Motorway corridor.
- Facilitate urban renewal in precincts adjoining the M5 Motorway corridor by improving local amenity with less traffic noise and vehicle emissions from congested traffic.

Section 4.1.2 of the EIS acknowledges the potential to enhance the scope of WestConnex through northern and southern extensions to the scheme. The Southern Connector is proposed as a connection between the New M5 tunnels and President Avenue at Rockdale. The northern and southern extensions are also shown in Figure 1-1 of the EIS.

The southern extension was also considered in the traffic, air quality and noise modelling for the project.

Issue description – indirect benefits to other road users

Section 3.4 of the Environmental Impact Statement states that an indirect benefit of the New M5 motorway includes benefits to other transport users, which really means transferring people from public or active transport to car trips. This is contrary to the long-term outcomes sought by government to increase public transport use.

Response

Section 3.4 of the EIS lists the indirect benefits of the project as:

- Benefits derived by other transport users from an expansion of the road network
- Reductions in travel times and congestion costs on surrounding road links used by other users
- Benefits derived by neighbouring businesses from better access to their businesses.

Reference to benefits to other transport users does not imply or relate to a transfer of people from public or active transport to car trips. It specifically relates to reductions in congestion, reductions in travel times and improvements in road safety. These outcomes would contribute to improving travel efficiency, safety and amenity for bus commuters, pedestrians and cyclists, as well as other private car users and those travelling by road to public transport nodes, including train stations and light rail interchanges.

Issue description – reducing congestion on surrounding road links

Another indirect benefit is stated as reducing congestion on surrounding road links, but this has not been adequately modelled and the documentation in the EIS demonstrates that in many cases, is simply untrue (see section 10.3.2.2, Table 99). Although the modelling shows there is a significant reduction in traffic on some roads (for example, the Princes Highway), this is because this traffic is being deliberately funnelled elsewhere. The impacts of this diversion have not been adequately tested in the modelling, and there has not been adequate consideration of potential alternate routes as a result of higher traffic on local streets (for example, traffic using Mitchell Road rather than Euston Road – they currently function as a parallel set).

Response

The information presented in Table 99, Section 10.3.22 of Technical working paper: Traffic and transport (Appendix G of the EIS) relates to the level of service for a select list of key intersections around the St Peters interchange and local road upgrades during the AM peak period. This information does not present a complete picture of the changes in traffic performance along the complete corridor, or across the region in which the WestConnex program of works would be constructed.

It is recognised that in addition to providing additional road network capacity, the New M5 would lead to redistribution of traffic in some areas. Some elements of the project, such as changes to the Princes Highway, were considered as a result of consultation with City of Sydney. This redistribution would have different positive and negative implications for road performance at specific network locations. However, when these changes are considered holistically across the project corridor and throughout the surrounding road networks, the project would on balance have a net positive impact on congestion, travel times, road safety and road network performance.

4.14.2 Environmental impact statement

Issue description – assessment process

The EIS lacks rigour and sound analysis, despite the huge volume of documentation. This lack of rigour and analysis is consistent across all chapters and appendices.

Similarly, the work undertaken in the EIS is highly compliance driven, and fails to take into account opportunities or strategic impacts.

Response

The New M5 EIS has been prepared in accordance with the SEARs issued for the project and the relevant provisions of Schedule 2 of the *Environmental Planning and Assessment Regulation 2000* (NSW). Chapter 3 and 4 of the EIS provides the strategic justification and outlines the development of the project in response to strategic opportunities and constraints. The various assessments presented in the EIS conform to the requirements of applicable assessment policies, guidelines and good impact assessment practice.

Issue description – project objectives

City of Sydney raised several concerns regarding project objectives in different sections of its submission. These concerns have been collated here for response

p. 9 City of Sydney submission on WestConnex Stage 2 - New M5

The project objectives are biased towards a motorway solution, so that any proposed alternative falls short of the proposed solution.

p. 10 City of Sydney submission on WestConnex Stage 2 - New M5

The stated project objectives are not related to the broader WestConnex objectives, and as such, there is no assessment of the validity of the New M5 objectives. There is no information or statements in the EIS explaining the rationale for the project objectives

The New M5 EIS fails to demonstrate how the project objectives are met by the proposal. For example, traffic modelling is not provided to support objectives such as:

- Support Sydney's long term economic growth through improved motorway access and connections linking Sydney's international gateways and Western Sydney and places of business across the city
- Cater for the diverse travel demands along these corridors that are best met by road infrastructure

p. 28 *City of Sydney submission on WestConnex Stage 2 - New M5*

The project objectives as shown in Table 4-2 are intended to exclude non-motorway alternatives. A modally agnostic view would likely have delivered a more complex but useful and long-lasting solution than a motorway. The process and rationale for choosing these objectives is not explained. The objectives do not appear to be linked to Government's strategic planning goals [presented in City of Sydney's submission in appendix *WestConnex Stage 2 EIS – Review of Strategic Alternatives and Socio-economic Impacts*]. It would be useful to understand the methodology for assessment including weightings (if any) that were applied to the criteria, how it was assessed, and by whom. It is unlikely and it would be unusual that all these criteria are considered equal. If all criteria are equally weighted, then this is a poor methodology and therefore a poor outcome.

p. 13 *WestConnex Stage 2 EIS – Review of Strategic Alternatives and Socio-economic Impacts*

If the Strategic Alternatives had sufficient detail and were assessed against these broader transport and planning objectives, a road solution is unlikely to be the preferred solution. In fact, a road project may in fact compromise the realisation of some of these objectives such as growing a more competitive CBD or facilitating renewal in Green Square (discussed further in Chapter 3).

State transport objectives

Broader transport objectives for Sydney and New South Wales, however, are outlined in state transport and planning strategies. These are focused on reducing congestion and improving accessibility and include:

Premier's Priorities and State Priorities

There are 12 Premier's priorities including:

- Creating jobs with an aim of 150,000 new jobs by 2019
- Building infrastructure with an infrastructure program to support 40 percent more train trips, 30 percent more car trips and 31 percent more households

There are five State priorities including:

- Strong budget and economy, to be achieved partly through encouraging business investment and accelerating major project assessment
- Building infrastructure, to be achieved through improving road travel reliability and increasing housing supply
- Better services, to be partly achieved through ensuring on-time running for public transport

A Plan for Growing Sydney (2014)

The Plan sets out four goals and associated directions which include:

- Goal 1: A competitive economy with world-class services and transport
- Direction 1.1: Grow a more internationally competitive Sydney CBD
- Direction 1.4: Transform the productivity of Western Sydney through growth and investment
- Direction 1.5: Enhance capacity at Sydney's gateways and freight networks
- Direction 1.6: Expand the Global Economic Corridor
- Direction 1.7: Grow strategic centres - providing more jobs closer to home
- Direction 1.11: Deliver infrastructure

- Goal 2: A city of housing choice, with homes that meet our needs and lifestyles
- Direction 2.2: Accelerate urban renewal across Sydney – providing homes closer to jobs.

The Plan also identifies priorities for the Central Subregion which includes central Sydney, the eastern suburbs and the inner west. The priorities include:

- A competitive economy, to be achieved partly through preserving a corridor for Sydney Rapid Transit and enabling delivery of key transport projects to facilitate better connections to Global Sydney
- Accelerate housing supply, choice and affordability and build great places to live
- Facilitating the delivery of the UrbanGrowth NSW project for Green Square Town Centre.

NSW Long Term Transport Master Plan (2012)

The Master Plan identifies a number of transport challenges and proposes a range of objectives and actions to address these. Eight transport objectives have been identified:

- Improve quality of service
- Improve liveability
- Support economic growth and productivity
- Support regional development
- Improve safety and security
- Reduce social disadvantage
- Improve sustainability
- Strengthen transport planning processes

The Master Plan identifies four types of actions: integrating transport services, modernising the system, growing networks to meet future demand and maintaining road and public transport assets.

NSW State Infrastructure Strategy (2012)

The Strategy comprises recommendations for investment in specific major projects as well as wider policy and market reforms to improve how infrastructure is planned, procured and delivered. This Strategy is where the WestConnex program of works was first introduced, although with different alignments and staging to the current EIS scope of works. The Strategy is underpinned by three principles:

- Incremental improvement to address infrastructure problems more quickly and cost effectively than one-off major projects, and should be considered first to resolve problems
- Investing in NSW's strengths. The priority is the sectors of the economy with the highest growth potential, which are constrained by inadequate infrastructure capacity.
- Rigorous prioritisation of infrastructure investment to ensure projects and reforms recommended deliver strong positive economic return to NSW.

For Global Sydney, the Strategy identifies infrastructure priorities including:

- Infrastructure that supports growing the economy including improving public transport access to and through the CBD and adjoining centres
- Infrastructure that supports the growth of Global Sydney and its international gateways, particularly through ensuring efficient landside transportation; relieving congestion on the road network in the short term through targeted pinch point investment and greater use of public transport to Sydney Airport and, in the medium term, through upgrades to the capacity and connectivity of motorways that support the gateways; and investment in rail and intermodal infrastructure to shift rail freight more viable.

There is no consideration in the project objectives about maintaining Sydney's sense of place, particularly in areas that have significant cultural value such as Newtown.

Response

Perceived bias towards a motorway solution

In preparing the *NSW Long Term Transport Master Plan* (Transport for NSW, December 2012), transport infrastructure and service options were considered to identify an appropriate mix of initiatives to respond to Sydney's transport needs and to deliver an integrated transport and land use planning outcome. As part of that work, the need to complete Sydney's motorway network, including completion of the M4 Motorway, provision of additional capacity along the M5 Motorway corridor and connection of the M4 Motorway and M5 Motorway was identified. This need forms the basis of the WestConnex program of works.

The *NSW Long Term Transport Master Plan* acknowledges that a motorway solution would be required. This motorway solution is provided in the form of the WestConnex program of works, which includes the New M5 project.

Provision of motorway solution does not alter the Government's commitment to deliver the other, non-motorway projects detailed in the *NSW Long Term Transport Master Plan*.

Relation to the broader WestConnex objectives

There is strong correlation between the project objectives identified in Section 3.5 of the EIS and the WestConnex objectives. Six of the eight listed project objectives have been cascaded from the WestConnex objectives. The remaining two objectives recognise the integrated nature of the WestConnex program of works, reflect a desire to minimise construction impacts, and support commitments to a broad range of sustainability related outcomes.

How are the project objectives are met by the project

Table 31-2 in the EIS summarises how the project objectives would be met by the New M5 project. The project satisfies the project objectives as it would:

- Reduce traffic on the M5 East Motorway, improving travel times to and from the airport
- Improve traffic flow and intersection performance
- Reduce congestion, resulting in free-flowing traffic conditions and reduced vehicle emissions
- Reduce crash rates
- Improve road safety for pedestrians, cyclists and motorists
- Improve pedestrian and cyclist connectivity in and around St Peters by providing new and improved cycle, pedestrian and shared paths
- Improve the quality of cycle facilities in Kingsgrove
- Improve travel times and reliability for motorists
- Improve transport amenity along the M5 East
- Provide a net gain in new green space for the community
- Facilitate the closure of the Alexandria landfill.

The Technical working paper: Traffic and transport (Appendix G of the EIS) also provides a detailed assessment of the operational traffic impacts of the project, including on parallel routes.

Traffic switching to the New M5 and other parallel arterial roads would result in localised traffic changes under the 'with project' scenario in 2021 and 2031, and in 2031 under the full WestConnex program of works and Southern Connector scenario. Some traffic is expected to redistribute to parallel arterial roads, mainly Stoney Creek Road and Canterbury Road, in response to proposed tolling arrangements.

A screenline analysis was undertaken to examine how traffic patterns along the adjacent arterial road network may change under these scenarios. Two screenlines were assessed:

- The western screenline, which captures east-west traffic volumes on the M5 East Motorway corridor west of the New M5 tunnels and three parallel roads: Canterbury Road, Stoney Creek Road and Forest Road / Queens Road
- The eastern screenline which captures traffic on the New M5 (east of the future Southern Connector stub tunnels) and four parallel roads: the Princes Highway, Marsh Street, the M5 East Motorway and General Holmes Drive (all in the vicinity of the Cooks River).

Along the western screenline under the 'with project' scenario, the share of two-way daily traffic on the M5 East Motorway corridor would reduce by seven per cent in 2021 and three per cent in 2031. This traffic is expected to shift to parallel arterial roads, mainly Stoney Creek Road and Canterbury Road.

The increase in traffic on Stoney Creek Road with the project compared to without the project is less pronounced in the peak hours than over the course of the day as the peak hour spare capacity on Stoney Creek Road is limited. The M5 East Motorway corridor would continue to carry about 50 per cent of the total two-way traffic.

Under the 'with project' scenario along the eastern screenline, the M5 East Motorway share of two-way daily traffic would reduce by about six per cent with the project in 2021, and by about four per cent in 2031. Traffic shifting would include the shift of additional traffic to the New M5 and General Holmes Drive and a reduction in the share of traffic using the Princes Highway, and Marsh Street.

With the operation of the full WestConnex program of works and the future Southern Connector, traffic volumes and the share of total traffic along the western and eastern screenlines are expected to reduce due to the switching of traffic to the M4–M5 Link and the future Southern Connector, and to parallel arterial roads. Under this scenario, daily traffic on the M5 East Motorway corridor would reduce by about 24 per cent and the M5 East Motorway corridor share of two-way traffic is forecast to reduce by about eight per cent, with the majority of this traffic shifting on to Stoney Creek Road. The increase in traffic on Stoney Creek Road with the project compared to without the project is less pronounced in the peak hours than over the course of the day as the peak hour spare capacity on Stoney Creek Road is limited.

The total 2031 two-way daily volume on the New M5 at the screenline is forecast to be about 134 per cent more than in the 2031 'with project' scenario. This is due to traffic using the M4–M5 Link and the future Southern Connector. Once the full WestConnex program of works and the future Southern extension is operational, the total 2031 two-way daily volume at the screenline is forecast to be about two per cent more than in the 2031 'without project' scenario. These changes would be minimal and within daily traffic limits of traffic volume changes on the road network.

Some of the traffic forecast to use the New M5 would shift from General Holmes Drive (six per cent decrease) and the M5 East Motorway (nine per cent decrease). The total 2031 two-way daily volume on the Princes Highway is forecast to be about 69 per cent less than in the 2031 'without project', resulting in a significant reduction.

An operational traffic review would be conducted 12 months following the commencement of operation to confirm the operational traffic impacts of the project on surrounding arterial roads and major intersections. The operational traffic review would be undertaken by a suitably qualified traffic specialist that is independent of the design and traffic studies undertaken as part of the environmental impact statement. The operational traffic review would include (but would not be limited to) an assessment of the level of service at major intersections on local roads around the St Peters interchange, the King Georges Road interchange and changes in traffic levels on parallel arterial roads, such as Stoney Creek Road.

Consistency of project objectives with NSW Government policy

As described in Section 3.1 of the EIS, the need for the WestConnex project has been identified in a number of strategic planning documents including, *NSW 2021: A Plan to Make NSW Number One* (NSW Department of Premier and Cabinet 2011), *State Infrastructure Strategy 2012–2032* (Infrastructure NSW 2012) and the *NSW Long Term Transport Master Plan* (Transport for NSW, 2012). The need for the project in particular has been identified in the *NSW Long Term Transport Master Plan* as a critical link in Sydney's motorway network and the immediate priority for the NSW Government.

It is important to recognise that individual projects and initiatives, when considered in isolation, rarely bring about or contribute to every Government policy outcome. The New M5 project and the broader WestConnex program of works, for example do not deliver – nor are they claimed to deliver – every outcome identified in the *NSW Long Term Transport Master Plan*. It is only when the New M5 and the WestConnex program of works are considered holistically with other transport and land use planning projects and initiatives that the outcomes identified in the *NSW Long Term Transport Master Plan* would be fully and successfully realised.

Consideration in the project objectives about maintaining Sydney's sense of place

The objectives for the project include the need to 'protect natural and cultural resources and enhance the environment'. As part of achieving this objective, the 'creation and preservation of the intrinsic cultural qualities of locations' has been included as a guiding value of the WestConnex Urban Design Framework (RMS Centre for Urban Design and the Sydney Motorway Corporation, 2013) and its application on the project is identified in Section 14.1.3 of the EIS. An operational landscape character assessment was used to evaluate the potential impacts on the built, natural and cultural aspects which form the sense of place of the project area and are presented in Appendix K of the EIS.

Issue description – cumulative assessment

City of Sydney raised concerns with respect to the depth of assessment of cumulative impacts in the EIS.

Response

The New M5 EIS has been prepared in accordance with the SEARs issued for the project and the relevant provisions of Schedule 2 of the Environmental Planning and Assessment Regulation 2000 (NSW). The various assessments presented in the EIS conform to the requirements of applicable assessment policies, guidelines and good impact assessment practice. There has been significant assessment of cumulative impacts in all areas of the EIS, in particular traffic, air quality and noise.

Issue description – assessment to 2031

The New M5 project has only been assessed to 2031, which does not take into account the 45 year concession period for the asset as stated in the WestConnex Updated Strategic Business Case. The assessment does not account for future events that may radically change travel demands or behaviours including major land use changes and opportunities such as the development of the new Western Sydney Airport at Badgerys Creek, and freight intermodal terminals.

Response

Assessment of potential impacts in the year of opening and ten years thereafter is common environmental impact assessment practice for major transport infrastructure projects, particularly roads, in New South Wales.

Assessment of impacts beyond 2031 is not considered appropriate because:

- There is significant uncertainty in the prediction of conditions beyond 2031, including traffic forecasts, vehicle efficiencies and fuel mixes (and as a consequence, there would be significant uncertainty in the associated air quality, noise and vibration etc. assessments which are based on traffic forecasts)
- Traffic forecasts beyond 2031 are not available.

Issue description – environmental assessment of the WestConnex program of works

The separate environmental approvals for each part of WestConnex makes assessment of the project, or of each individual stage difficult. The nexus between the three core stages is strong, so it is difficult to assess each individual stage separately. Although the proponent has attempted to show the impacts of the entire program in the traffic modelling, there are dangers in its limitations and assumptions. First, the study area and time horizons are not appropriate to understand the spatial or temporal impact of the project; second, the assumption that all stages will be built, including the extensions of the Sydney Gateway, Western Harbour Tunnel and Southern Extension [now Southern Connector] is aspirational at this stage, given funding has not been secured and investigations are still underway. Thirdly, attempting to de-couple each stage from the program means it is difficult to assess each project on its merits alone, which is what is being asked. Fourthly, the project does not assess the cumulative operational impacts in any meaningful way to understand how each stage or the whole of WestConnex will affect the transport system, including strategic bus corridors.

Response

The EISs prepared for each component of the WestConnex program of works has to date, have included and would continue to include, a cumulative impact assessment that takes into account the full program of works.

The EISs for the New M5, and other WestConnex projects, have been based on a traffic forecast model that includes the full WestConnex program of works. Traffic forecast data has been extracted from this model to inform the preparation of the New M5 EIS. Similarly, the air quality impact assessment for the New M5 has been based on a subset of data extracted from a much broader air quality modelling which covers the airshed over the full WestConnex program of works.

Issue description – program governance and assurance

Sydney Motorway Corporation has followed a process that engages the market early to develop the solution in order to reduce cost uncertainty, and as a result has identified a preferred tenderer. This is a questionable approach in terms of delivering an outcome that is in the best public interest, given that the preferred tenderer now has a significant financial interest in the project proceeding. This creates a conflict of interest and indicates a level of market and government certainty for the project to proceed. It also raises significant concerns regarding the treatment of legitimate project scope changes that may be required as an outcome of the community consultation and assessment through the EIS process.

It is difficult to have confidence in the assessment of a project that, through its procurement strategy and announcement of a preferred tenderer, has been implicit that approval from the Department of Planning and Environment will be forthcoming. The fact that the EIS and all community updates state that construction will begin in mid-2016 indicates that there is no intention to refuse the project, and delivery will proceed.

The NSW Auditor-General's report to the NSW Government on WestConnex, WestConnex Assurance to Government (18 December 2014), raised significant concerns about embedded deficiencies in the WestConnex program development and the lack of independent assurance. Independent assurance is critical to the development of a program, especially of this scale, and best practice should be followed. Currently, the program sits in the final stages of Government assurance processes without the actual intervention of those processes taking place.

The intention of the Government-approved Gateway Review is to ensure that the Government is given assurance to proceed with its investment at key stages. This process seeks to ensure investment decisions are based on sound and comprehensive information. A project should not proceed if it cannot clear through each Gate.

It should be noted, with concern, that in 2013 the first independent Gateway review of WestConnex was conducted of a Preliminary Business Case. A Preliminary Business Case aligns with Gate 2 of both Transport for NSW's Assurance System, and the Government's own Framework.

In its report, the review panel stated 'due to lack of key information presented for the review, the Gateway Review Panel was not able to form a view on whether the project is a worthwhile and prudent investment (both economically and financially viable) for the NSW Government' (NSW AO 2013). There was no option to place WestConnex on hold and work carried on to develop a Final Business Case.

In November 2015, the Sydney Motorway Corporation released the Updated Strategic Business Case for WestConnex. It is unclear why the proponent has delivered a Strategic Business Case (Gate 1), despite already having delivered a Preliminary and Final business case, and the project currently sitting at Gate 4. Based on information in the EIS, the project is ready to proceed to Gate 5 – Build/Pre-Commissioning within six months, despite no detailed design being released for public consideration. This raises concerns about the strategic merit of the program, and the lack of detailed design would indicate that WestConnex cannot proceed to Gate 3.

Response

Identification of a design and construct contractor

In developing the New M5 project, Roads and Maritime has endeavoured to identify and pursue reasonable opportunities to streamline project delivery in recognition of the project's strategic importance to the NSW economy and State productivity. This has included identifying a design and construct contractor. These activities would allow timely implementation of the project if it is approved by the Minister for Planning and would support delivery of the project's benefits as soon as possible. These activities do not undermine the EIS process and it is a matter for the Minister for Planning to determine whether the project should be approved and, if approved, the conditions of any such approval.

As the approval authority for the project, the Minister for Planning has the discretion under the *Environmental Planning and Assessment Act 1979* (EP&A Act) to refuse or approve the project, and to impose such conditions on an approval, including requirements for design changes, as the Minister may consider appropriate. In making a decision on the project, the Minister is not bound or constrained in any way by separate activities carried out to date, including selection of a design and construct contractor.

If the project receives planning approval, design updates may be required to meet conditions of approval applied by the Minister for Planning. Any such updates would be carried out during the detailed design phase, which is the typical approach for major infrastructure projects of this scale and nature.

The EIS states that, 'subject to approval, the project would proceed in mid-2016' rather than that it 'will proceed'.

NSW Auditor-General's report

Recommendations by both the NSW Auditor General and Infrastructure Australia on aspects of WestConnex have been considered and addressed in the Updated Strategic Business Case.

The Updated Strategic Business Case has been through an externally-managed Business Case Gateway Review, in accordance with the recommendation by the NSW Auditor-General that major projects be subject to the Infrastructure Investor Assurance Framework designed by Infrastructure NSW.

The full Updated Strategic Business Case was released in November 2015. It consolidated the work undertaken in the original business case in 2013, with significant modelling, analysis and scope enhancements completed in the subsequent two years. A number of technical papers were also released in support of the Updated Strategic Business Case; these included a traffic report, an economic appraisal (prepared independently by KPMG), an updated strategic environmental review and a communication and stakeholder engagement timeline.

Gateway review process

The Updated Strategic Business Case consolidates the analysis to date, and confirms for the Government that WestConnex remains fit for purpose, economically viable, and financially deliverable. It brings together the work progressed since the 2013 Business Case into a single cohesive document. It was written to meet the requirements of the NSW Treasury Guidelines for Capital Business Cases (NSW Treasury Policy Paper 08-5), as well as Infrastructure NSW and Infrastructure Australia requirements.

In December 2014, the NSW Auditor-General released a performance audit that examined the assurance processes around WestConnex. The Auditor-General found that while there were a number of good practices already in place, the project should be subject to the Infrastructure Investor Assurance Framework, designed by Infrastructure NSW. In particular, the Auditor-General highlighted the need for externally managed reviews of major projects and key documents - such as the Updated Strategic Business Case.

The Updated Strategic Business Case responded to recommendations from the NSW Auditor-General. In particular, the Auditor-General recommended that: "... the business case ... be formally and thoroughly revisited for stages 2 and 3 of the project as well as any other major changes to the scope". It was subject to an externally managed Business Case Gateway Review, under the Infrastructure Investor Assurance Framework.

Each stage of WestConnex has also been subjected to separate detailed planning and assessment of the financial, optionality and deliverability aspects:

- For Stage 1, this detail is provided in the implementation plan considered by the Government with the 2013 Business Case.
- A Stage 2 Definition and Delivery Report was approved by the Government in August 2014.
- A Stage 3 Strategic Project Definition Plan was approved in 2014 and a Definition and Delivery Report was approved in 2015.

Infrastructure Australia also released an assessment of the 2013 WestConnex business case and subsequent project documents in early 2015. Infrastructure Australia recommended the project be moved forward to the 'Threshold' stage on the Priority List and further assessment was needed before declaring the project 'Ready to Proceed'.

Together with analysis already provided to Government over the past three years, the economic assessment in the Updated Strategic Business Case addressed the requirements necessary to receive a 'Ready to Proceed' assessment from Infrastructure Australia, including:

- Proposals identify a nationally significant problem
- Problem assessment and analysis is well developed
- A comprehensive list of reform and investment options is identified
- Considerable work has been undertaken to develop and analyse potential options
- Selection of the preferred option is justified, with analysis demonstrating that the solution would best address the identified nationally significant problem
- A robust cost benefit analysis has been undertaken to confirm benefits exceed costs
- Risk-based cost estimates have been used in cost benefit analysis and in the funding request
- A financial model has been developed demonstrating the viability gap and exploring options for, and impact of, different funding solutions
- A robust delivery plan is in place, including adequate cost and risk assessments to provide assurance that the initiative would be delivered within budget
- Where Government funding is likely to be sought, analysis of scope for private funding is completed

- The risk-based cost estimate, risk assessment, demand models and economic appraisal have been independently reviewed.

As recommended by Infrastructure Australia, the 2015 Updated Strategic Business Case includes an updated economic assessment using:

- Fully updated demand modelling incorporating induced demand and redistributed trips
- Updated cost estimates for the project, informed by tenderer information received and a risk-based estimating approach.

4.14.3 Strategic justification

Issue description – integrated transport solution

The EIS claims WestConnex is an integrated transport solution, yet this has not been demonstrated. The design of the project integrates a number of motorways, but does not integrate with multiple modes of transport to enable multi-modal trips.

Response

The WestConnex program of works involves the construction and operation of a ‘missing link’ in Sydney’s motorway network, as part of a broader program of projects and initiatives to deliver a modern, integrated transport system for Sydney. This broader program of projects and initiatives is detailed in the *NSW Long Term Transport Master Plan* (Transport for NSW, December 2012).

Issue description – general consistency with Government policy

The proposed New M5 project states that a key function is to carry people from the growing south west to jobs in the east, particularly the airport and port. This is not consistent with government policy to develop a polycentric city that creates jobs close to where people live. It is also not consistent with existing travel behaviour trends that show for these origin and destination pairs, the demand is for public transport (heavy rail in particular), not motorways. Continuing with the traditional approach of connecting people in the west with jobs in the east by car will not support the timely or appropriate development of jobs in the west across multiple industries. In this regard, WestConnex is an expensive and short-sighted program of works.

The identified key user groups in the EIS do not include people travelling to work from the west to the east, despite getting people to jobs in the east being a key driver for the project. This demonstrates an inconsistent narrative throughout the documentation which lessens the legitimacy of the proposal.

Response

While the public transport system supports a significant number of commuters travelling to and from Sydney’s major centres, around 70 per cent of all commuters across metropolitan Sydney travel by car. According to the Bureau of Transport Statistics’ September 2014 Release Employment Forecasts (Bureau of Transport Statistics, 2014), 60 per cent of jobs are outside of Sydney’s major centres. Given the diffuse nature of employment and the diverse purposes of many trips, public transport is not able to provide a convenient alternative for a large proportion of travellers.

While 70 per cent of commuters travel by car, commuters only make up around 20 per cent of trips across an average working day (Bureau of Transport Statistics, 2014a). The road network services a diverse array of transport purposes beyond transporting people to and from their place of employment, including:

- Commercial and freight users – large articulated trucks travel more than 25 billion tonne kilometres across the state per year, and rigid trucks around 10 billion kilometres per annum across the State (Transport for NSW, 2013d)
- Light commercial vehicles – smaller commercial vehicles like vans, which make four times as many trips as larger trucks, make over 1.1 million trips in an average weekday (Transport for NSW, 2013d).

In 2012/13, buses comprised six per cent of the mode share for trips on an average weekday. This was a proportional increase of 0.5 per cent from 2002/03, which equated to around 165,000 additional trips on average per weekday. Buses rely on the public road network to be able to transport commuters to a diverse array of destinations (Bureau of Transport Statistics, 2014a).

In assessing the need for new road infrastructure, the 2012 State Infrastructure Strategy found that public transport was the best option for journeys to dense employment centres (such as the Sydney CBD and Parramatta), where public transport is already the preferred choice for many employees. However, the dispersed nature of the majority of Sydney's journeys means that the flexibility provided by the private car makes it the dominant choice. This demand pattern is the consequence of established land use patterns in Sydney and there is no indication in the available data that the patterns of demand would change in the future.

The infrastructure strategy found that private road transport is – and would remain – the only viable option for most journeys in Sydney most of the time, even with the targeted growth in public transport and rail freight sought by the Government, and the expected increase in the population density of the city. With this in mind, the Government is making substantial investment in strategically important roads and public transport, including Sydney Metro City and Southwest, Southwest and CBD and South East Light Rail, enhancements to the suburban rail network, and upgrades to cyclist and pedestrian facilities.

Issue description – consistency with A Plan for Growing Sydney

City of Sydney raised concerns with respect to the project's consistency with *A Plan for Growing Sydney*, particularly regarding how the project would affect achieving Direction 1.7 Grow strategic centres – providing more jobs closer to home. These concerns were raised in several sections of the submission and have been collated for response

p. 7 City of Sydney submission on WestConnex Stage 2 - New M5

City of Sydney have noted that one of the rationale for WestConnex is the need to meet dispersed trips, that is, non-centre based employment (WestConnex Updated Strategic Business Case, p27). This is at odds with the statement in the EIS that the New M5 will connect population and employment centres.

p. 8 City of Sydney submission on WestConnex Stage 2 - New M5

The New M5 project appears to enable long distance trips between the south west and the east/Sydney CBD, yet the modelling does not support this; nor does the Updated Strategic Business Case. Investing billions of dollars to enable these types of trips is not consistent with the land use policy of the Government's A Plan for Growing Sydney (specifically, Direction 1.7 Grow strategic centres – providing more jobs closer to home).

p. 10 City of Sydney submission on WestConnex Stage 2 - New M5

Currently, the only real lever the government has to influence the location of jobs is to move government jobs into 'regions' such as western Sydney, but this does not send a signal to the broader private market that opportunities exist to make different choices. Despite the attractiveness of Sydney Harbour and Sydney CBD to multi-nationals, space for growth is limited and rents will always be at a premium. It is not until government transport infrastructure investment focuses on access to strategic growth areas in western Sydney that business will consider the government has made legitimate efforts to service those markets.

p. 11 *City of Sydney submission on WestConnex Stage 2 - New M5*

The EIS does not align with the Government's land use objectives in A Plan for Growing Sydney (DP&E 2014). The intention of that plan is to increase liveability by creating centres of economy to enable people to work close to where they live. Rather than supporting emerging land use changes such as the Western Sydney Employment Lands, the proposed delivery of WestConnex is contradictory to the Government's own policy objectives. Coupled with the future delivery of the Western Sydney Airport, it is unclear why the Government would invest in road infrastructure to take people to the east when the intention is to support and grow the Western Sydney economy. This is a deep contradiction in the Government's public message that WestConnex is for the west. Certainly the investment could be better used to support and grow the Western Sydney economy.

p. 15 *City of Sydney submission on WestConnex Stage 2 - New M5*

The proposed New M5 project states that a key function is to carry people from the growing south west to jobs in the east, particularly the Airport and Port. This is not consistent with government policy to develop a polycentric city that creates jobs close to where people live. It is also not consistent with existing travel behaviour trends that show for these origin and destination pairs, the demand is for public transport (heavy rail in particular), not motorways. Continuing with the traditional approach of connecting people in the west with jobs in the east by car will not support the timely or appropriate development of jobs in the west across multiple industries. In this regard, WestConnex is an expensive and short-sighted program of works.

Response

The WestConnex program of works would provide a high quality and efficient road network connection for commuters, businesses and the freight industry to and from, Sydney's west and south west. This would provide opportunities for new employment zones along the M4 and M5 corridor including in the outer western and south western suburbs.

As detailed in A Plan for Growing Sydney, Sydney is expected to have 689,000 additional jobs by 2031, many of which are expected to be located in Western Sydney in response to an expected population increase of 900,000 in the area. A large percentage of these jobs would be located in zoned employment areas or in areas still to be investigated, such as around the future Western Sydney Airport, which is expected to produce up to 19,900 jobs for Western Sydney (Western Sydney Airport Alliance, 2013).

A Plan for Growing Sydney and The *NSW Long Term Transport Master Plan* both identify the need to prioritise development of centres such as Parramatta, Penrith and Liverpool to bring jobs closer to homes and areas of increasing population. However, there would continue to be growth in jobs in eastern Sydney over the same time period, despite the higher rate of growth in population in Western Sydney during the next few decades, and the development of the employment hubs and the Western Sydney Airport. The Australian Government has indicated that the Western Sydney Airport at Badgerys Creek may be opened in the mid-2020s, but that Sydney Airport would continue to be the primary airport for both passengers and freight.

The *NSW Long Term Transport Master Plan* identified that Western Sydney is currently home to 47 per cent of Sydney's residents but only 37 per cent of Sydney's jobs (Transport for NSW, 2012a). Although jobs growth in Western Sydney is forecast to be strong, surpassing that of the eastern half of the city in the coming decades, it is not forecast to match the job numbers of the city's eastern half (Bureau of Transport Statistics, 2014). This disparity is due to a complex mix of factors including greater housing affordability in Sydney's west, and the existing employment zones and infrastructure that support stronger business investment and location decisions in the global economic corridor and in Sydney's eastern half more generally. As outlined in A Plan for Growing Sydney, 28 per cent of workers who live in Western Sydney, work in other areas of Sydney and therefore are required to travel to work by car or on public transport.

There is still a need to provide a link between Western Sydney and other centres in Sydney such as the Sydney CBD, Sydney Airport and Port Botany. These connections are required to allow not only for the flow of workers, but also for the effective flow of goods and freight which can only occur by road transport, as rail does not provide point-to-point access to individual homes, industrial warehouses or commercial premises. By improving connectivity and enhancing the flow of people and goods to Sydney's south west, the project would also encourage business and industry investment and, as a result, employment opportunities, in south west centres.

While rail and public transport do provide for efficient travel between major centres, there would continue to be a need for travel by road to jobs that are dispersed across the metropolitan area and not easily accessed by public transport. In addition, public transport alone cannot provide sufficient point-to-point access to the diverse range of employment and educational hubs, shopping centres or recreational centres, nor can it provide for the safe and efficient delivery of goods and services to Sydney's growing population.

The *WestConnex Updated Strategic Business Case* (NSW Government 2015) (Updated Business Case) clearly defines the importance of road infrastructure in the broader Sydney transport strategy. As in other major cities, public transport is the best option for journeys to dense employment centres, such as the Sydney CBD. In these areas, public transport is already the preferred choice for many employees and that would continue to be the case in future.

The New M5 would support the economic development of Sydney by providing a high quality and efficient road connection for business and freight vehicles in between the 'global economic corridor' including Port Botany and Sydney Airport to Global Sydney. This connectivity is identified in the priority actions to achieve the goals set out in *A Plan for Growing Sydney* (NSW Government 2014).

The Technical working paper: Traffic and transport (Appendix G of the EIS) provides a detailed assessment, based on traffic modelling, of the operational traffic impacts of the New M5 project as well as the full WestConnex program of works.

The assessment concluded that the project would significantly reduce vehicle travel time along the M5 East corridor between King Georges Road in the west and Foreshore Road in the east (refer to Section 10.4 of the Technical working paper: Traffic and transport in Appendix G of the EIS). This would ensure greater accessibility between Sydney's south western suburbs as well Sydney Airport and Port Botany. The New M5 would also operate at an improved Level of Service compared to the current road network and would ultimately provide connectivity to the M4–M5 Link, making it a desirable choice for motorists. As part of the full WestConnex project, the New M5 would help to complete Sydney's motorway network and therefore connectivity between the major centres.

Issue description – the WestConnex program will 'Complete the orbital motorway network'

Another consideration is that the EIS states that the WestConnex program will 'Complete the orbital motorway network'. This is a misnomer as the orbital network was completed when the M7 opened in 2005.

Response

Noted. The EIS should correctly describe the WestConnex program of works as completing a missing link in Sydney's motorway network.

Issue description – facilitation of urban renewal

The view that 'WestConnex would facilitate urban renewal and improve the ability of communities to utilise space more efficiently', is repeated in the EIS (Volume 1A, p3-10). The EIS goes on to state; "Reducing congestion and through traffic in a number of communities would enable road space to be reallocated to public transport and has the potential to improve air quality in these areas".

The EIS contains no proposals to reallocate road space to public transport or to protect local communities from increased traffic and resultant deteriorations in air quality. It fails to recognise that increased traffic flows will reduce air quality and increase community severance. Maintaining car dependency will, over time, increase the space required for parking and roads reducing the ability of communities to effectively and efficiently utilise scarce space in the future.

Response

Initiatives such as the reallocation of road space to public transport are beyond the scope of the New M5 and the WestConnex program of works. Where such opportunities arise in the future (including as a result of projects such as WestConnex), and where specific projects are identified as feasible, these would be progressed separately by the relevant infrastructure authority at the appropriate time. Upgrades to local roads as part of the project would facilitate opportunities for potential future public transport connections between the Princes Highway, St Peters and Mascot via the Campbell Road extension.

It is accepted that high traffic volumes can lead to the deterioration of local amenity, including air quality, and can contribute to community severance effects. The New M5 project and the broader WestConnex program of works would mitigate some of these effects by reducing congestion (thereby improving traffic flow) and providing more efficient, motorway grade transport connections across Sydney.

Issue description – assessment of the project against the Premier's Priorities and the State Priorities

The EIS makes multiple references throughout the documentation to the NSW 2021: A Plan to make NSW number one. This plan has been superseded by the Premier's Priorities and the State Priorities (<https://www.nsw.gov.au/making-it-happen>). There are two relevant priorities to note in relation to this project.

First, is the priority, *'Improving road travel reliability'*. This priority has the performance measure; *"90% of peak travel on key road routes is on time"*. There is a clear link between the objectives of the New M5 to meet this performance indicator. However, the focus on *"key road routes"* indicates roads under the control of the Roads and Maritime Services. Given the epithet *'what matters is what is measured'*, this would imply that the intention is to keep key motorways and state roads moving, potentially to the detriment of local roads.

The second key priority interface is, *'Ensure on-time running for public transport'* with the performance measure, *'Maintain or improve reliability of public transport services over the next four year'* being applied. Public transport relies on the local road network to provide an accessible service network to people. Given the EIS demonstrates an increase in local road traffic on streets that are already congested, it is difficult to see how the project contributes to this priority. The need for public transport in this area is growing, and any impedance to the running of services will be detrimental to the Government's aims. The EIS is silent on future public transport, and this is inconsistent with the growing demand for rail and bus services across Sydney.

The New M5 Environmental Impact Statement is silent on how buses will integrate and benefit from the New M5 construction except for mentioning that bus priority may be something to investigate. The EIS does not identify any dedicated public transport infrastructure or provide an assessment of needs and opportunities. This again indicates that the intention of the design is not for an integrated transport solution. There is no integration with heavy or light rail.

Response

In relation to the priority to improve travel time reliability, traffic analysis undertaken for the M5 project shows benefits to communities relying on local roads in south west Sydney and in St Peters. Without the project, forecast growth in traffic through the St Peters road network would result in significant congestion and corresponding reductions in average speed. With the project, travel time through the St Peters area at both the morning and afternoon peak is forecast to reduce for both 2021 and 2031.

In relation to the second priority, modest increases in traffic during non-peak periods are expected on a number of routes throughout the study area. However, it is anticipated that additional traffic management priority measures could be provided to these road corridors to maintain or improve the operational performance.

As noted in Section 5.2.1 of the EIS, the NSW Government is committed to investing in a range of public transport projects, as identified by the *NSW Long Term Transport Master Plan* (Transport for NSW, 2012), the *State Infrastructure Strategy 2012–2032* (Infrastructure NSW, 2012), *A Plan for Growing Sydney* (NSW Government, 2014) and the *NSW State Priorities* (NSW Government 2015).

The project offers a flexible design which does not preclude bus priority measures being included in the future Roads and Maritime Services and Transport for NSW would continue to work together to deliver *Sydney's Bus Future* (Transport for NSW, 2013), which may be extended to this area in due course, at which point the surface road network can be adapted to include measures identified at a future date.

Upgrades to local roads would facilitate opportunities for potential future public transport connections between the Princes Highway, St Peters and Mascot via the Campbell Road extension.

Issue description – road safety

The EIS suggests that;

'By relieving road congestion (and thereby improving the speed, reliability and safety of travel along the M5 Motorway corridor), the delivery of the project is consistent with the overarching road safety directions identified in the Road Safety Strategy'.

It is difficult to understand how increasing traffic speeds will improve safety. The Roads and Maritime Service in the factsheet, *How does speeding increase the chances and severity of a crash?* states:

'As a vehicle's speed increases so does the distance travelled during the driver's reaction time (reaction distance) and the distance needed to stop (braking distance). Also the higher the speed, the greater the amount of kinetic (moving) energy that must be absorbed by the impact in the crash'

and

'Speed is a major contributory factor to the severity of a crash'.

The factsheet presents evidence that lowering speed limits helps decrease the risk and severity of crashes.

When considering the injury risk based on vehicle impact, the factsheet makes it clear that:

'In addition to speed greatly increasing the risk of severe or fatal injury, a number of studies show that side impact or 't-bone' crashes are only survivable by passengers at much lower speeds than frontal crashes. This means that controlling speed at intersections is critical, to reducing crashes and casualties in areas where this type of conflict may occur'.

This supports the request by the City of Sydney for design changes to proposed intersections associated with road widening in the St Peters area and the removal of slip lanes, facilitating increased speeds of turning vehicles at intersections.

Reduced vehicle speeds on local roads and at intersections will also protect pedestrians. As the factsheet makes clear; "reductions in vehicle speed will significantly reduce the severity of outcomes for pedestrians in the event of a crash".

Response

Reference in the EIS to improving the speed of traffic along the M5 Motorway corridor relates to improvements in average travel speeds relative to the signposted, safe travel speeds along this corridor. By contrast, discussion of risks associated with speeding in the *How does speeding increase the chances and severity of a crash?* factsheet principally relates to travel speeds in excess of signposted, safe travel speeds.

Roads, including motorways, operating under free flowing traffic conditions within signposted, safe travel speeds are inherently lower risk than congested roads, operating stop-start conditions at lower speeds.

Issue description – predict and provide model

The EIS is clear that the rationale for WestConnex is based on a 'predict and provide' approach to road building:

"Sydney's population is expected to increase by more than 1.6 million people by 2031 and without major investment in the road network infrastructure this growth would result in worsening road congestion. This congestion would in turn affect Sydney's economic competitiveness as a global city. To meet these challenges, the NSW Government is proposing to provide additional traffic capacity..."

(Volume 1A, p3-13)

To suggest that urban road building will resolve current and future traffic congestion is disingenuous. Sydney will continue to grow beyond 2031. The 'predict and provide' approach suggests that the Government is prepared to continue adding additional road infrastructure to meet current and future demand while also striving to attain a 'congestion free' urban road network. The natural conclusion is a city overtaken with the land consumption demands of roads, interchanges and parking to the extent that economically productive activities and residential neighbourhoods can no longer be accommodated.

Response

The EIS does not suggest that the current and future transport needs of Sydney will be satisfied by the provision of road infrastructure alone. The need to include other solutions is reflected in, and forms the basis for, the diverse suite of transport projects and initiatives presented in the *NSW Long Term Transport Master Plan* (Transport for NSW, 2012). These projects and initiatives, coupled with sensible strategic land use planning, would be fundamental to addressing Sydney's longer term transport needs.

Issue description – relationship of the project to the future Western Sydney Airport

The City of Sydney raises concerns, both in the main body of its submission and an appendix, regarding assessment of the project in relation to the future Western Sydney Airport. These issues have been collated here for response.

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Section 3.3.5 considers freight, commercial and business services. The EIS makes assertions regarding the proposed Western Sydney Airport and its potential implications for the movement of freight around Sydney, concluding that:

"Overall, the movement of freight around Sydney is not considered to be significantly altered by the introduction of the new airport, for the following reasons:

- The operation of the of the proposed Western Sydney Airport would be staged, ramping up over time, with initial operations only commencing in themid-2020s (a minimum of five years after the completion of the project)*
- Freight arriving at the new airport would still have destinations across wider Sydney*
- Port Botany and Sydney Airport would still be key freight entry and exit points, with the new airport to complement the existing airport". (Volume 1,page 3-16)*

The City considers these justifications to be weak. The recently released Western Sydney Airport Environmental Impact Statement indicates: 'Sydney Airport has limited ability to handle further passenger growth due to the physical constraints at the existing site. The limitations of existing infrastructure are becoming apparent at peak times and are expected to become more pronounced over the coming decades.' (Western Sydney Airport EIS, Executive Summary, page 7)

The existing M5 East provides a direct link between Western Sydney and the Port/Airport precinct. With the implementation of a toll on this corridor traffic will reduce, increasing the available capacity for economically important freight. Further the M4–M5 Link and Sydney Gateway connect the M4 East with Port Botany and Sydney Airport and will be completed much later than the M4 East and St Peters Interchange. Until these connections are in place the existing M5 East offers the most direct and viable connection between Western Sydney and Port Botany and Sydney Airport.

The reference to a minimum of five years between the completion of WestConnex and the commencement of operations at Western Sydney Airport is incorrect; the actual gap is much less and may not exist at all.

Freight arriving at the new airport will have very different movement patterns from the freight arriving at Sydney Airport, given the considerable difference in origin/destination locations. Freight travelling to and from the Western Sydney Airport will mostly be concentrated on the roads serving the new airport. The EIS states: “heavy freight activity precincts are concentrated in Western Sydney”. (Volume 1A, p3-16).

Given the very recent release of a draft EIS for the Western Sydney Airport and recognising the airport will operate without a curfew, the assumption that the role of the new airport will be limited appears premature.

p. 14 WestConnex Stage 2 EIS – Review of Strategic Alternatives and Socio-economic Impacts

One of the project objectives for Stage 2 of WestConnex is to support Sydney’s long-term economic growth through improved motorway access and connections linking Sydney’s international gateways. However, the assessment only considers access to Sydney Airport and Port Botany and the demand these locations generate. The impact of a second airport at Badgerys Creek has not been adequately considered.

The opening of a second airport in approximately ten years would likely have significant implications for the movement of people, particularly in western Sydney, and for the distribution of employment.

Between 2026 and 2041, operation at the Western Sydney Airport will ramp up (see Table 2). This will likely impact the use of arterial roads servicing Sydney Airport.

TABLE 2 AIRPORT PASSENGERS PER YEAR

Airport	2021	2026	2041
Sydney Airport	43,000,000	52,000,000	78,000,000
Future Western Sydney Airport	-	1,000,000	12,709,000

Deloitte, 2012

Considering the EIS identifies Sydney Airport as one of the main generators of traffic for WestConnex Stage 2 the impact the second airport needs to be considered.

The fact that the New M5 does not connect with Sydney Airport has also not been adequately considered in the assessment of options. From the information available, it appears that without the Southern Gateway there is no direct connection between WestConnex Stage 2 and Sydney Airport. Vehicles travelling from western Sydney will need to travel past the airport and exit at the St Peters Interchange and then double back to the airport. The existing M5 East has a more direct connection and therefore may continue to be the preferred route for journeys from western Sydney to the airport.

Response

Traffic modelling for the New M5 has relied on population and employment data from the Bureau of Transport Statistics, which is the best information currently available. The current WestConnex Road Traffic Model (WRTM) version 2.1 is based on 2014 land use projections and includes induced traffic demands as well as the traffic associated with the proposed Western Sydney Airport at Badgerys Creek.

A large proportion of Australia's goods are imported and exported via Port Botany, NSW's primary container port. Port Botany is located in the same precinct as Sydney Airport, Australia's primary international airport. In the short to medium term, it is likely that the freight capacity of the Western Sydney Airport would comprise only a relatively small fraction of the current combined freight throughput of the established Sydney Airport and Port Botany. This likelihood is further supported by the medium term development plans for the Port of Newcastle and Port Kembla. The movement of freight around Sydney would therefore not be significantly altered by the introduction of a second airport at Badgerys Creek.

By 2031, the freight task in NSW is projected to reach 794 million tonnes – nearly double the task in 2011. Even with new intermodal terminals boosting freight rail capacity substantially, truck movements from Port Botany are still forecast to almost triple. Road freight is also increasingly subject to capacity constraints and peak hour congestion throughout Sydney. The M4 and M5 motorways in particular have limited available capacity in peak periods.

Therefore there is a need to provide a link between Western Sydney and work and freight centres such as the Sydney Airport and Port Botany, which generate about \$10.5 billion of economic activity for Sydney each year and both locations are heavily dependent on road vehicles for the movement of people and freight. Investment in additional road infrastructure such as the New M5 and other WestConnex projects would increase connections to Sydney's west, where the majority of airport and port freight traffic originates or ends.

The *Sydney Airport Master Plan 2033* (Sydney Airport Corporation Limited, 2014) notes that Sydney Airport handles about half of Australia's international air freight. The total amount of freight handled at Sydney Airport is 76 per cent more than any other Australian airport. The volume of freight handled by Sydney Airport is projected to increase from 615,378 tonnes in 2012 to 1,011,312 tonnes in 2033 (Sydney Airport Corporation Limited, 2014), an increase of 164 per cent.

Freight volumes through Sydney Airport and Port Botany are forecast to increase (Transport for NSW, 2013e). Light vehicle traffic is also forecast to increase as a result of changing land use patterns, including development of the north and south west growth centres and proposed intermodal terminals at Moorebank and in Western Sydney near the Western Sydney Employment Area. As such, the reliance on a well-connected motorway network that facilitates the major east-west movements of the global economic corridor would increase as freight volumes increase.

The proposed Western Sydney Airport is currently in the planning approval phase, and the EIS for the Western Sydney Airport was released on 19 October 2015. The Western Sydney Airport EIS indicates that operations could commence in around 2025. As indicated above, the WRTM included traffic changes and demands resulting from the operation of the proposed Western Sydney Airport. Commuters travelling between population centres in Sydney's south west would continue to be able to use the M5 East to access international gateway precinct.

While the development of the proposed Western Sydney Airport has the potential to change the way some freight is moved around Sydney, by providing an alternative entry or exit point for freight, The overall, however, the movement of freight around Sydney is unlikely to be significantly altered in the short to medium term by the introduction of the new airport.

The WestConnex program of works, including the project, would expand capacity on NSW roads and support connections to Sydney Airport and Port Botany which would assist with growth in air travel and freight movements.

Issue description – regional impacts

The Secretary's Environmental Assessment Requirements mandate the proponent to, "[take] into account infrastructure and services within the adjoining subregions". This has not been adequately completed.

To fulfil this requirement, the proponent would need to broaden the scope of its impact assessment to include impacts of traffic on major renewal sites such as Mascot (which is not adequately considered), Green Square (which is not considered at all), and the Ashmore precinct (not considered, and is in close proximity to Euston Road/ Sydney park Road intersection) particularly from an urban amenity perspective. The City also has significant concerns on the impact of the project on access to employment lands in Rosebery and Mascot in particular.

Response

The requirement in the SEARs to '[take] into account infrastructure and services within the adjoining subregions' relates to infrastructure and services – including transport infrastructure, utilities, social infrastructure and community facilities. Impacts of the project on these matters have been assessed where relevant in the EIS.

Although major renewal sites do not fall within the definition of 'infrastructure and services', the various impact assessments presented in the EIS, including but not limited to traffic, air quality, human health risks and noise and vibration, include sufficient detail for the reader to understand potential impacts on the listed major renewal areas. Cumulative issues are discussed further in this section of the report.

Issue description – provision of road space for alternative transport users

Where traffic flows are reduced, such as along the Princes Highway, the roadspace must be reallocated to alternative transport users (public transport and active transport) and to improve local amenity (widened footpaths) as an integral part of the WestConnex project. This will avoid future additional traffic being induced to use the road network as increased capacity becomes available.

Response

Initiatives such as the reallocation of road space to public transport are beyond the scope of the New M5 and the WestConnex program of works. Where such opportunities arise in the future (including as a result of projects such as WestConnex), and where specific projects are identified as feasible, these would be progressed separately by the relevant infrastructure authority at the appropriate time.

Issue description – potential for rat-run to King Street

There is potential for a rat-run to King Street that will emerge as a result of the changes to local roads. These potential rat runs have not been adequately identified due to the limitations of the traffic model study area, and the trip assignment that has been built into the model (for example, Mitchell Road is showing a decrease in traffic but in the view of our independent reviewers, the trip assignment has not taken into consideration that people will use Mitchell Road to avoid Euston Road). These two roads already function as a pair.

Response

Traffic forecasts on which the EIS has been based have been developed using the WestConnex Road Traffic Model (WRTM), which relies on forecasts of car driver demand sourced from the Sydney Strategic Travel Model (STM) operated by the Transport for NSW Bureau of Statistics and Analytics. The STM uses projections of population and employment for the Sydney and forecasts mode choice between car, rail, bus, light rail and ferry modes for future infrastructure scenarios. The STM modelling for the EIS incorporated currently planned public transport schemes including Sydney Metro and CBD and South East Light Rail. The forecast car driver demand, allowing for mode share with these public transport projects under congested road conditions, was subsequently used to forecast WestConnex toll choice in WRTM.

Based on traffic forecasts, significant redistribution of traffic along King Street as a result of the project is not anticipated to create rat-runs.

Issue description – toll avoidance

City of Sydney have raised a number of concerns regarding tolling of the M5 East Motorway and New M5. Issues raised throughout the submission have been collated here for response.

p. 7 City of Sydney submission on WestConnex Stage 2 - New M5

The argument that the New M5 is required to relieve the M5 East allowing for more efficient freight movement on the existing motorway falls away as tolls are applied to the M5 East

p. 10 City of Sydney submission on WestConnex Stage 2 - New M5

The primary intention of this motorway is to carry private vehicles and this user group accounts for ~90% of the traffic. As a toll road, private cars are the desirable users of this facility. Without them, there is insufficient revenue generation to support the viability of the project.

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The New M5 EIS is clear that toll avoidance will occur. This is consistent with the M4 Widening and M4 East EIS documents, and consistent with Sydney experience with the Cross City Tunnel, the Lane Cove Tunnel and removal of the toll on the M4. Toll avoidance, particularly where traffic is forecast to leave the M5 East and use local roads, is of considerable concern to the City.

The Government's current policy of maintaining free surface alternatives despite huge investment in new roads is not acceptable. Local roads through local residential and business communities must not be expected to take additional traffic that results from toll avoidance. In adopting this policy, the most significant potential benefit of any new road building is lost, that is the opportunity to significantly reduce traffic in local residential and business precincts.

The New M5 EIS recognises that with the introduction of a toll, some drivers using the M5 East will choose alternate routes, as is shown by the large forecast traffic increases on Stoney Creek Road and King Georges Road amongst others. While these roads are not within the boundaries of the City of Sydney, it highlights a broader concern about the merits of the project and its justification in the EIS and Updated Strategic Business Case.

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Transporting freight to the Airport and Port is stated as a primary objective of the project, yet the project does not deliver this outcome. Instead, freight is required to join the (already congested) road network at St Peters Interchange to navigate its way to the Airport/Port. There is no evidence in the Environmental Impact Statement to suggest that freight will be the primary user or will obtain the most benefit. The primary users of the New M5 will need to be private car users, accounting for ~90% of traffic, and generating the required toll income to make the project feasible. The EIS appears to have grossly underestimated the willingness or capacity of Sydneysiders to pay for additional tolls and the effect that this will have in terms of pushing traffic from motorways onto local roads.

Response

The primary intention of the project is to increase capacity and alleviate congestion along the M5 corridor, leading to a more efficient motorway connection between south west Sydney and Sydney Airport/ Port Botany for key user groups. By achieving this intent, the project would increase connectivity between south west Sydney and Sydney's global economic corridor. The Updated Strategic Business Case identified key user groups of the motorway network and key requirements for freight customers. Key user groups include:

- International gateway users, travelling to and from Sydney Airport and Port Botany
- Heavy and light freight industries
- Dispersed and longer distance travellers
- Commercial services and business users.

The project would include the installation of tolling points on both the New M5 and the M5 East Motorways. Vehicles from all user groups would be subject to tolling on the New M5 and the M5 East Motorway.

The effect of tolling on road traffic demand was considered in Chapter 9 (Traffic and transport) and Appendix G (Technical working paper: Traffic and transport). Some diversion of traffic onto arterial roads to avoid the toll is most likely to occur outside peak traffic periods, when there is generally spare capacity across the network. During peak periods these arterial roads are already at capacity and there is less incentive to divert from the motorway in order to avoid the toll. Heavy and light freight industries are unlikely to avoid using the motorway during peak periods due to the time savings provided by the motorway connection when compared to the local road network.

Roads and Maritime conducted preference surveys to understand the value people in Sydney place on travel time savings associated with major infrastructure improvements. The WRTM includes tolling and general cost parameters that reflect the findings from these surveys.

In addition, SMC liaised with Professor David Hensher (Professor of Management, and Founding Director of the University of Sydney Institute of Transport and Logistics Studies) to further enhance the parameters for induced demand estimation based on academic research. The WRTM also considers that different motorists place different values on paying tolls to make time savings, including heavy vehicle motorists.

Issue description – enabler or disabler?

The assertion that WestConnex will enable the Bays Precinct and Parramatta Road revitalisation is tenuous, and no evidence is provided how this proposal contributes to the realisation of those outcomes. Rather, the proposal as it stands, with no allocated funding for Stage 3 or any extension, including the Western Harbour Tunnel, further diminishes this assertion.

Response

The potential to revitalise the Bays Precinct and Parramatta Road are opportunities generated by the WestConnex 1B (M4 East) and WestConnex Stage 3 (M4–M5 Link) projects, and are beyond the scope of the New M5 project.

4.14.4 Project development and alternatives

Issue description – level and quality of assessment of the project against strategic alternatives

The City of Sydney raises concerns regarding the assessment of strategic alternatives to the project in the main body of its submission and in an appendix to the submission, *WestConnex Stage 2 EIS – Review of Strategic Alternatives and Socioeconomic Impacts*. Issues related to the assessment of strategic alternatives have been collated here for response.

p. 20 of City of Sydney submission on WestConnex Stage 2 - New M5

The Strategic Alternatives fail to fully canvas and explore the potential of strategic alternatives in terms of an integrated approach. Each alternative is treated in isolation from the others when in reality a holistic future strategy would encompass elements of each 'alternative'. As stated in the independent SGS Economics and Planning review, "Strategic Alternatives 2, 3 and 4 present mechanisms which have the potential to reduce demand for road usage. However, these have been scoped in a way which makes it difficult to assess them as being legitimate alternatives to the New M5. Strategic Alternatives which 'bundle' different elements of the alternatives are not presented" (SGS Economics and Planning, 2016).

The identified Strategic Alternatives are assessed against the stated project objectives, including, "Support Sydney's long-term economic growth through improved motorway access and connections..." (page 4-19). This objective is specific in its outcome and excludes consideration of non-motorway transport alternatives that may also support Sydney's long-term economic growth.

The analysis of the alternatives against the stated objectives appears flawed and subjective. For example; investment in public transport and rail freight improvements will relieve road congestion, improving the speed, reliability and safety of travel in the M5 corridor. It will do this through providing alternative options for those passenger and freight trips that can utilise public transport and rail freight, thus reducing competition for valuable road space and freeing up capacity for those trips which need to use the road. This is essentially demand management across modal options. Demand management is considered to meet this particular objective.

It is also unclear why no alternative other than construction of the New M5 meets the objective, “Optimise user pays contributions to support funding in an affordable and equitable way”. Tolls can be introduced on to the existing M5 East, public transport fares can be applied to new rail infrastructure and services. This can be done in an affordable and equitable manner and avoids considerable Government expense through the more efficient use of road infrastructure and the construction of high capacity rail integrated with a high quality bus network. Moreover, as demonstrated through recent Government announcements, Metro Rail has the capacity to support increased residential and commercial development in a way motorways cannot.

p. 11 of WestConnex Stage 2 EIS – Review of Strategic Alternatives and Socio-economic Impacts

Notwithstanding the lack of detail around Strategic Alternatives presented and the manner in which these have been developed, the approach to assessment lacks rigour. The Strategic Alternatives are assessed, in text, against the New M5's strategic objectives in Table 4-2 of the EIS.

The SEARs require that ‘environmental costs and benefits of the proposal relative to alternatives’ are assessed. However, the method by which this assessment of alternatives occurs is not prescribed.

The project objectives are biased towards the construction of a motorway. This is discussed in the following section. Also some of the outcomes seem to be counter intuitive. Under the assessment, Alternative 4 Demand Management fails to meet the project objective of ‘*cater for the diverse travel demands along these corridors*’ and ‘*optimise user pays contributions*’, which given international experience (as described in the previous section), appears an unjustified assessment.

A ‘checklist’ approach against project objectives does not take into account any broader benefits or costs generated by the Strategic Alternatives, and does not consider the environmental costs and benefits of the proposal relative to alternatives or the fact that some aspects of the Project Objectives may be more important than others.

NSW Government Guidelines for Economic Appraisal provide NSW Treasury’s established requirements for the evaluation of capital works. Whilst these guidelines are adhered to in business cases, they are not only for this purpose. The preface of the *Guidelines* notes: “*In general, an economic appraisal is required for all individual projects with a total cost in excess of \$1 million*”.

Further to this, the *Guidelines* state: “*The purpose of an economic appraisal is not to validate a specific proposal, but to help choose the best means to satisfy a specified objective, and to rank competing proposals when resources are limited. All capital works and programs are provided as a means to an end*”.

The *Guidelines* describe major economic appraisal techniques. Cost Benefit Analysis is the most commonly applied evaluation technique for transport projects. It considers benefits and costs of alternatives, translating outcomes of options into comparable terms (such as Net Present Value and Cost Benefit Ratio) to enable evaluation and decision making. Assessments of transport projects typically consider:

- Capital costs
- Operational costs
- Environmental externalities (e.g. CO₂ emissions)
- Road safety improvements (e.g. number of accidents), and
- Travel time improvements.

The EIS does not consider any of these parameters when assessing the Strategic Alternatives to Stage 2 of WestConnex. As a Cost Benefit Analysis of Strategic Alternatives is not prescribed by SEARs, a less onerous yet useful assessment approach may be a multi-criteria analysis. The assessment of Strategic Alternatives against project objectives does this in some part, but the project objectives themselves effectively prevent any non-road based solution from being assessed positively.

Response

As identified by the City of Sydney, the New M5 EIS has been prepared in accordance with the SEARs issued for the project and the relevant provisions of Schedule 2 of the *Environmental Planning and Assessment Regulation 2000* (NSW). This includes the need to present and consider project alternatives.

An assessment of a number of strategic alternatives to the project was included in Section 4.2 of the EIS, although this assessment did not extend to macro-economic modelling or comparative cost benefit analysis. These types of comparative assessments are not typically undertaken in EISs for major infrastructure projects in NSW.

WestConnex is part of an extensive plan to meet Sydney's growing transport and infrastructure needs and is fully integrated into the State's Infrastructure transport and planning strategies, including the *State Infrastructure Strategy* and the *NSW Long Term Transport Master Plan*. While WestConnex plays a role in easing congestion, the WestConnex program of works is not designed to solve all of Sydney's transport problems.

The NSW Government is committed to investing in a range of public transport projects, as identified by the *Transport Master Plan*, the *State Infrastructure Strategy 2012–2032*, *A Plan for Growing Sydney* and the *NSW State Priorities*. The Transport Master Plan provides the framework for delivering an integrated, modern and multi-modal transport system by identifying NSW's transport actions and investment priorities for the next 20 years.

During the development of the *NSW Long Term Transport Master Plan*, all modes and their benefits were considered. The construction of new and upgraded roads in Sydney is necessary to meet the continued demand for the movement of people, goods and services across Sydney. As mentioned in section 4.2.3 of the EIS, investment in public transport and freight facilities is one of a number of options available to improve congestion on Sydney's roads. The NSW Government is already directing funding towards a number of public transport (eg buses, trains and ferries) and freight projects (eg Northern Sydney Freight Corridor projects), which, coupled with investment in roads would improve congestion on Sydney's roads.

Continued demand for the movement of people, goods and services across the Sydney metropolitan region requires that new roads be constructed and existing roads be upgraded. Section 4.2 of the EIS considered the strategic alternatives to the project based on the extent to which those alternatives could meet the objectives of the project and their comparative performance across transport, environmental, engineering, social and economic factors.

WestConnex was a recommendation of Infrastructure NSW in October 2012, with Government adopting the concept in the 2012 *State Infrastructure Strategy* and the *NSW Long Term Transport Master Plan*. This was followed by the development of a business case, which was approved by Government in August 2013. An Executive Summary of that business case was publicly released. In November 2015, the Updated Business Case was released, which consolidates the work undertaken in the original business case, with the significant modelling, analysis and scope enhancements completed in the past 24 months.

The Updated Business Case includes:

- A strategic justification for WestConnex in the context of key strategies and plans
- An updated reference design, including details of the options development process that lead to key alignment changes
- Budget and cost estimates for the whole of WestConnex
- Details of the proposed tolling regime
- Traffic demand and operational traffic modelling results, including details of travel time savings and interchange performance
- An economic appraisal, including cost benefit analysis
- A financial appraisal, including project cashflows based on the reference tolling scenario

- Details of staging, procurement and financing
- A description of the project governance model
- Details of environmental and sustainability principles
- A communications and stakeholder strategy.

The Updated Business Case includes technical papers providing additional detail in relation to traffic modelling, economic appraisal, updated strategic environmental review, and timeline of consultation activities.

The Updated Business Case can be found on the WestConnex website site at www.westconnex.com.au/documents/updated_strategic_business_case.pdf

Issue description – objectives-led assessment of strategic alternatives

The basis of this project's justification is meeting its own objectives. This is unfortunate, given the project objectives are openly biased towards a motorway solution. The project claims that it will “deliver significant long-term benefits to the economic growth and development of NSW and Australia” (section 31.1.1 of the EIS). This, and the statement that the New M5 and WestConnex will support growing Sydney are tenuous, and the EIS does not support these statements with compelling evidence.

The objectives-led assessment of Strategic Alternatives prevents a non-road based solution from being preferred. These objectives explicitly refer to achieving economic growth through improved motorway access and meeting travel demand through road infrastructure. All Strategic Alternatives assessed, except for the New M5, would therefore fall short.

Response

In preparing the *NSW Long Term Transport Master Plan* (Transport for NSW, December 2012), transport infrastructure and service options were considered to identify an appropriate mix of initiatives to respond to Sydney's transport needs and to deliver an integrated transport and land use planning outcome. As part of that work, the need to complete Sydney's motorway network, including completion of the M4 Motorway, provision of additional capacity along the M5 Motorway corridor and connection of the M4 Motorway and M5 Motorway was identified. This need forms the basis of the WestConnex program of works.

Within the context of the *NSW Long Term Transport Master Plan*, it is acknowledged that a motorway solution would be required. This motorway solution is provided in the form of the WestConnex program of works, including the New M5 project.

Provision of motorway solution does not alter the Government's commitment to deliver the other, non-motorway projects detailed in the *NSW Long Term Transport Master Plan*.

Issue description – assessment of the project against Alternative 1 – Base case or ‘do nothing’/ ‘do minimum’

There is no detail on the scope of the works that constitute the ‘minor improvements’ such as:

- The nature of the works proposed;
- The location of the works;
- The timeframe or trigger points for undertaking the upgrades;
- How much capacity these works would add to the corridor; and
- There is also no information on the cost of undertaking these improvements.

Response

The do nothing/do minimum scenario is the base case (that is, without the project) assumes that the King Georges Road Interchange upgrade and future M4 Widening projects under construction are complete, but the remainder of the WestConnex program of works has not been built.

This scenario assumes that on-going improvements would be made to the broader transport network including some new infrastructure and intersection improvements to improve capacity and to cater for traffic growth.

Issue description – assessment of the project against Alternative 2 – optimising the performance of existing infrastructure

p. 25 of *City of Sydney submission on WestConnex Stage 2 - New M5*

Alternative 2 also has very limited detail, but more than Alternative 1. Despite this, there are significant gaps that make a comparable assessment of the alternatives obsolete.

p. 9 *WestConnex Stage 2 EIS – Review of Strategic Alternatives and Socio-economic Impacts*

The description states that improvements to the surrounding arterial road network would potentially relieve road congestion in the short term but provides no detail on the type of work proposed, the location of these improvements and by how much these works would reduce congestion and over what time period.

There is more detail on the scope of works involved to improve the existing M5 East Motorway. Surface road works involve widening the road way but this would have limited impact on the speed and reliability of the M5 Motorway. Tunnel works could include either widening the outer sides of the tunnels to provide an additional lane or excavating the existing tunnel ceilings to provide a double decker arrangement. The EIS concludes that this would increase the capacity of the tunnels and reduce congestion in the tunnels and provide some capacity within the tunnels to cater for the future growth in transport demand. These works, however, “would be costly and highly disruptive to existing traffic during construction” (p. 4-10). Despite this description significant gaps still remain in the information provided including:

- By how much the existing M5 East Motorway would be widened and the impact this would have on capacity
- The extent to which tunnel works would reduce congestion and whether this reduction would meet the project requirements
- The cost of surface road and tunnel works, the timeframe of the construction period and what this means for the surrounding road network.

Response

The alternative to the project involving improvements to the surrounding arterial network would generally involve providing additional traffic capacity along routes parallel to the existing M5 Motorway corridor. The provision of additional capacity to parallel arterial routes would generally involve removal of bottlenecks, where they may occur, and construction of additional lanes. In the case of the latter, the relatively narrow width of most parallel arterial roads would mean that additional lane capacity would require extensive land acquisition and impacts on development currently along those routes. This alternative was assessed as not providing a viable or longer term solution to the need to provide additional capacity along the M5 Motorway corridor.

In broad terms, the capacity of the existing M5 Motorway could be achieved through the construction of new surface lanes and the expansion of the M5 East Motorway tunnels to accommodate additional lanes. For additional surface lanes, land acquisition and impacts on surrounding land uses would be likely to occur in some areas. In the case of expanding the M5 East Motorway tunnels, the cost of such works and the impacts on the continued operation of the tunnels during the works make this alternative unviable. Further, expansion of the capacity of the existing M5 Motorway, and particular the M5 East Motorway, would have flow-on implications to other infrastructure, including the Eastern Distributor, with the potential to require further capacity works on these related parts of the road network to maintain acceptable performance outcomes.

Issue description – assessment of the project against Alternative 3 – Investment only in public transport and freight rail improvements

City of Sydney raised several concerns regarding the assessment of the project against Alternative 3 – Investment only in public transport and freight rail improvements. The concerns were raised in several sections of the submission and have been collated here for response.

p. 20 of *City of Sydney submission on WestConnex Stage 2 - New M5*

The opportunities to expand rail freight do not appear to be fully considered given the development of the Moorebank Intermodal Terminal and the recently announced Asciano plan to build a \$100 million terminal at St Marys. There is excess rail capacity to move containerised freight to and from Port Botany and the viability of doing so will be enhanced by these new intermodal facilities in the future.

p. 25 of *City of Sydney submission on WestConnex Stage 2 - New M5*

Alternative 3 considers investment in public transport and rail freight. This alternative option has been poorly considered, although its inclusion is supported. Yet, the confusing issue here is that consideration of this alternative is not consistent with the objectives of the project itself.

This option does not consider what is possible from the transport network, but rather what exists. Alternative 3 is not a strategic alternative as it just identifies initiatives already detailed in existing planning documents. No new projects, or changes to timing are identified to address the issues seeking to be solved. This lacks strategic insight from the government for such a long-term project.

It would be better use of a constrained urban environment to make improved use of existing road infrastructure by enhancing priority for more economically productive trips (i.e. freight through tolling out other road users, or having dedicated capacity) and high-demand modes (i.e. public transport). The counter-argument to this approach is likely to be that a significant proportion of trips on the corridor are all-day, business trips that are best met through private car use. However, this is limited by current thinking and does not look to the future or the potential to incentivise businesses' corporate sustainability agendas and incentivise behaviour change through demand management.

The \$16.8 billion currently estimated to fund the WestConnex project (these are strategic, not detailed costs) could deliver significant public transport – both capital and operational. Alternative 3 discusses the existing congestion on the rail and bus networks, yet the funding allocated for WestConnex could deliver new infrastructure for public transport modes, or delivering priority public transport measures. There is also no consideration in this alternative of what modes could potentially service the demand apart from a motorway. The level of capital funding that is being allocated to this project could be invested in new rail infrastructure and contribute significantly towards operating costs for many years. Rail is used as an example in this submission as it is the most capital intensive and expensive mode to operate.

Similarly, there is no consideration of what priority measures could be investigated or implemented for freight. It is not feasible to transfer all goods to rail freight, as it is not suitable and the market is unlikely to respond favourably; especially for time-sensitive or perishable goods.

The summary for Alternative 3 discusses active and public transport being viable only in terms of the commute task. This is not correct and is a narrow view. Transport planning is generally built around the commute task as this defines the required assets, however the majority of trips are not for commuting purposes which means networks need to be developed to meet multiple needs. As work practices change, travel demand is likely to change too. Similarly, the transport network can change work practices, such as spreading the traditional peak as services reach capacity (both public transport and road transport) which influences mode choice and time of day for travel.

There are opportunities with the introduction of the Passenger Transport Act in 2014 to leverage more flexible and demand-responsive service types within the transport mix to service dispersed origins and destinations to feed into a trunk routes. Technology is a significant enabler of this type of travel and behaviour. Flexible service planning is not usual in Sydney, but has the ability to maximise utility on existing services and create opportunities for meaningful public transport in western and south west Sydney.

Alternative 3 is not a strategic alternative as it just identifies initiatives already detailed in existing planning documents. No new projects, or changes to timing are identified to address the issues seeking to be solved. What is provided is a list of initiatives that constitute Stage 2 of *Sydney's Rail Future* and a statement that this alternative also includes the opportunity to progress the planning and development of the Sydney bus rapid transit network. Beyond these statements, detail is limited. For example there is no information on:

- The scope and location of works:
 - For the rail network this includes for which rail routes simpler timetables would be introduced, which stations would be upgraded and the scope of other work that constitutes the Rail Clearways Program
 - For the bus network this includes where rapid service routes will be provided and which centres they will connect, the changes to suburban and local service routes, or the scope and location of infrastructure and traffic management works
 - For the rail freight network this includes detail on what constitutes “road upgrades and improved rail operations” at Port Botany, what the development of intermodal terminals at Enfield and Moorebank and the completion of the Southern Sydney Freight Line means for both shifting freight to rail and what the resulting demand for road transport from Port Botany and therefore the impact on surrounding roads
 - The timeframe of works
 - How these works would affect mode shares of different transport options and therefore what this alternative means for capacity and congestion on the road network
 - The cost of undertaking this work.

Response

Chapter 4 of the EIS describes the alternatives that were considered during development of the project, and explains how and why the project was selected as the preferred option. Investment in public transport and rail freight improvements, as well as demand management, were considered in the Strategic Alternatives 3 and 4 respectively.

Section 4.2 of the EIS considered the merits of the project in the context of a range of strategic alternatives, having regard to:

- The manner in which they could achieve the project objectives
- Their performance against other transport, environmental, engineering, social and economic factors.

As identified in Section 4.2.3 of the EIS, public transport alternatives would only partially address the project objectives and no feasible strategic transport alternatives would meet the diverse array of customer needs for travel in the M5 East Motorway corridor.

The NSW Government is committed to investing in a range of public transport projects, as identified by the *NSW Long Term Transport Master Plan* (Transport for NSW, 2012) and the *State Infrastructure Strategy 2012–2032* (Infrastructure NSW, 2012).

The *NSW Long Term Transport Master Plan* provides the framework for delivering an integrated, modern and multimodal transport system by identifying NSW's transport actions and investment priorities for the next 20 years.

The *NSW Long Term Transport Master Plan* identifies the need for progressive delivery of the WestConnex program of works. It recognises the upgrade of the M5 Motorway corridor as a key component of the WestConnex program of works, as it would increase the corridor's capacity to accommodate commercial vehicles and freight demand. The project would help to deliver these benefits by improving the performance of the existing M5 Motorway corridor.

The 2013 *NSW Freight and Ports Strategy* (Transport for NSW, 2013) examined whether the shift from road to rail freight would address demand for the motorway network. Given the predicted population growth and increase in total freight volumes, even if a significant percentage mode shift from road to rail was achieved, there would still be increases in road freight volumes. Specifically, it found that: 'even with the targeted increase in rail mode share, early modelling results indicate the M4 and M5 would not be able to accommodate the additional container traffic when combined with background growth from employment and population by 2031'.

In assessing the need for new road infrastructure, the *State Infrastructure Strategy* (Infrastructure NSW, 2012) stated:

'As in other major cities, public transport is the best option for journeys to dense employment centres – such as the Sydney CBD and Parramatta. In these areas, public transport is already the preferred choice for many employees and that would continue to be the case in the future.'

However, the overwhelming majority of Sydney's journeys are dispersed in nature. For such trips the flexibility of the private car makes it the dominant choice. This pattern is the consequence of established land use patterns in Sydney and there is no indication in the available data that the patterns of demand would change in the future.'

In the context of the *NSW Long Term Transport Master Plan* and the *State Infrastructure Strategy*, the Government is making significant investment in both roads and public transport. These include:

- Sydney Metro City and Southwest, which would extend the Sydney Metro Northwest via St Leonards and North Sydney, across the Harbour and into the Sydney CBD. From Sydney CBD, the Metro would connect to an upgraded Bankstown Rail Line
- Sydney Light Rail, including construction of a new CBD and South East Light Rail Line along the corridor between Sydney CBD and Randwick/Kingsford
- Upgrades and enhancements to the suburban rail network.

Despite this investment in public transport infrastructure, the construction of new roads and the upgrade of existing roads in Sydney would continue to be required due to the continued demand for the diverse movements of people, goods and services across Sydney.

Public transport is complementary to the project and WestConnex as a whole. Strategies to deliver an integrated package of transport improvements in parallel with the construction of WestConnex are recognised in the Transport Master Plan.

Demand management can be defined as policy, planning and operational approach to the movement of goods or people. Section 4.2.4 of the EIS considered demand management as an alternative to the project (alternative 4). Demand management encompasses policies intended to reduce individual trips and make various mode options more viable. This includes transport pricing to reduce travel demand, including demand based, tolling or transport pricing to discourage discretionary travel by private vehicle for trips that can be served by public transport. While demand management would help to spread the demand for peak travel to less congested time periods, its effectiveness would be limited by other constraints, such as availability of other travel modes at the user's origin and destination, and flexibility of working arrangements to take advantage of 'time of day' tolling or transport pricing benefits. To have a major impact on road traffic, demand management would also require major changes in social attitudes, travel behaviour and government policy.

Section 4.2 of the EIS acknowledged that investment in public transport, rail freight and demand management (Alternatives 3 and 4 respectively) are considered to be viable strategic alternatives that would be additional to the preferred strategic alternative. A number of public transport and rail freight projects are being investigated and implemented in conjunction with the preferred strategic alternative.

Issue description – assessment of the project against Alternative 4 – Demand Management

City of Sydney raised several concerns regarding consideration of demand management as an alternative to the project. The concerns were raised in several sections of the submission and have been collated here for response.

p. 4 of *City of Sydney submission on WestConnex Stage 2 - New M5*

Traffic on the existing M5 East exceeded capacity “within months” of opening (New M5 Project Overview, November 2015), including recent road widening. This lack of capacity is, in part, the rationale for the construction of the New M5. The City contends that managing demand on the M5 East and providing high quality public transport alternatives for those who can change mode would be a more effective long term solution than simply a ‘predict and provide’ approach.

p. 7 of *City of Sydney submission on WestConnex Stage 2 - New M5*

Using price mechanisms to manage motorway demand in preference to the costs of new road building would appear to be an equally valid and effective mechanism to improve freight access between south western Sydney and the Sydney Airport / Port Botany precinct.

p. 20 of *City of Sydney submission on WestConnex Stage 2 - New M5*

Demand management combined with investment in public transport could be particularly effective in reducing peak period commuter road use, freeing up road capacity for delivery and service vehicles. This improved use of existing road infrastructure by economically important traffic should be fully explored prior to pursuing a major program of road building at a high cost to taxpayers in NSW and across Australia

p. 27 of *City of Sydney submission on WestConnex Stage 2 - New M5*

This alternative has been very poorly considered. This alternative also lacks detail about what aspects of demand management have been considered, where they might be implemented, what they might cost or what the impact/outcome of the intervention might be.

Page vii in the EIS Executive Summary states, “Traffic would either choose to travel at different times of the day, if possible, seek alternative routes or modes to their destinations or choose not to travel at all”. Peak spreading, modal shift and working from home are all efficient forms of demand management. They are not disincentives. The congestion on the existing motorways could be viewed as an opportunity to change Sydney’s travel patterns for the better, especially if different choices are positioned and made more attractive to potential users.

The literature on demand management tells us that behaviour change needs a catalyst, which is why disruption is often the best time to affect behaviour change. If road capacity is constrained, people will make other choices. The EIS states, “a network and corridor optimisation approach to manage delay and queuing impacts at critical intersections” (Executive Summary, px). If this approach can be adopted to manage traffic demand post-WestConnex, then if the project is approved, it should be a condition of consent to be implemented as part of the detailed design and project delivery.

Similarly, the Executive Summary also states, “In the St Peters road network, forecast growth in traffic would cause further congestion, with the network unable to accommodate the future traffic demands”. Given modelling indicates that 1,000 vehicles during the AM peak-hour are unreleased even with the full WestConnex, Sydney Gateway and the Southern Extension, it is clear that the future demands estimated in the model will either never materialise or there will be a need for demand management even after investing at least \$16.8 billion in WestConnex.

p. 10 of appendix *WestConnex Stage 2 EIS – Review of Strategic Alternatives and Socio-economic Impacts*

The EIS lists measures including land use planning policies, parking restrictions in new development, intelligent transport systems and pricing transport options. Again, detail is limited with no information provided on:

- Where these measures would be implemented
- When these measures would be implemented
- What the impact on road use or congestion would be
- Whether each measure was assessed in isolation or in combination
- The cost of implementing these measures.

Response

'Demand management' can be defined as a combined policy, planning and operational approach to the movement of goods or people. Section 4.2.4 of the EIS considered demand management as an alternative to the project (Alternative 4). Demand management encompasses policies intended to reduce individual trips and make various mode options more viable. This includes transport pricing to reduce travel demand, including demand based, tolling or transport pricing to discourage discretionary travel by private vehicle for trips that can be served by public transport. While demand management would help to spread the demand for peak travel to less congested time periods, its effectiveness would be limited by other constraints, such as availability of other travel modes at the user's origin and destination, and flexibility of working arrangements to take advantage of 'time of day' tolling or transport pricing benefits. To have a major impact on road traffic, demand management would also require major changes in social attitudes, travel behaviour and government policy.

Section 4.2 of the EIS acknowledged that investment in demand management (Alternative 4) is considered to be a viable strategic alternative in addition to additional strategic alternatives but the implementation of only demand management initiatives alone would not satisfy the project objectives.

The New M5 is being designed to accommodate smart motorways (intelligent transport system) technology. The roll-out of the smart motorways scheme is the subject of an ongoing Roads and Maritime project.

Issue description – assessment of Alternative 5 – Construction of the New M5 as part of the WestConnex program of works

Alternative 5 is the preferred alternative which is assessed in the EIS. Chapter 4.2, which details the Strategic Alternatives, has no information on the scope of works that make up the New M5. This chapter discusses this alternative only as a key component of strategic planning and transport documents and as forming part of a broader integrated transport solution. Subsequent sections of Chapter 4 detail the motorway options considered including duplication of the M5 East, a Southern alignment option, Central alignment option, and a Northern alignment option.

Response

The scope of works for Alternative 5 (the New M5) are described in Section 1.3 of the EIS. A detailed description of the project is provided in Chapter 5 of the EIS. To avoid repetition, this information was not duplicated in Chapter 4.2 of the EIS.

Issue description – consistency with the State's planning and policy documents

p. 93 *City of Sydney submission on WestConnex Stage 2 - New M5*

The statement that the New M5 is consistent with the state's planning and policy documents (section 31.1.2 of the EIS) is untrue. The clear disassociation of this project with the objectives of the Government's land use policy (notwithstanding its inclusion in that document's mapping) is clear, and has potentially damaging legacy implications on a Greater Sydney scale.

Response

Section 3.1 of the EIS describes the compatibility of the project with various State and national strategic planning and policy documents.

As described in Section 3.1 of the EIS, the need for the WestConnex project has been identified in a number of strategic planning documents including, *NSW 2021: A Plan to Make NSW Number One* (NSW Department of Premier and Cabinet 2011), *State Infrastructure Strategy 2012–2032* (Infrastructure NSW 2012) and the *NSW Long Term Transport Master Plan* (Transport for NSW, 2012). The *NSW Long Term Transport Master Plan* in particular has identified the project as a critical link in Sydney's motorway network and the immediate priority for the NSW Government.

During the development of the *NSW Long Term Transport Master Plan* (Transport for NSW, 2012), all travel modes and their benefits were considered simultaneously, and land use and transport were examined together. Integrated packages of transport projects, regulations, pricing and other policy initiatives were then developed, and rigorous modelling and assessment was used to prioritise actions against objectives. The *NSW Long Term Transport Master Plan* identifies WestConnex as a project that would support Sydney's economic and population growth into the future. A number of other public transport priorities are also identified in the *NSW Long Term Transport Master Plan*.

Issue description - provision of an integrated approach as a strategic alternative to the project

The City of Sydney raised concerns that an integrated approach was not assessed as a strategic alternative to the project. These concerns were raised several times in the submission and appendices and have been collated here for a response.

p. 25 City of Sydney submission on WestConnex Stage 2 - New M5

The key rationale in the EIS to dismiss this alternative is that trips from the south west to the east are dispersed. However, dispersed trips types can be met by non-car modes. As stated earlier, there is deemed sufficient aggregated demand to create consideration of the New M5 corridor, therefore there is potential to meet this demand through a modern, integrated transport approach. The government has been developing its transport system to require greater interchange as a means to achieve greater frequency, and there is no reason why this approach could not be taken here to service the demands along the corridor.

p. 10 WestConnex Stage 2 EIS – Review of Strategic Alternatives and Socio-economic Impacts

The process for how Strategic Alternatives were formulated is not explained in the EIS. History around WestConnex's inception and evolution as a project is detailed prior to the presentation of the Alternatives. An objectives-led, first principles approach to development of options is absent. This contributes to existing uncertainty that WestConnex is the best transport solution to meet the needs of a growing Sydney.

At the same time, it is noted that the focus of an EIS is on managing the impact of a project, rather than questioning its merits. To this extent, the purpose of the SEARs including an assessment of the Strategic Alternatives is redundant. Notwithstanding this issue, the approach to developing the Strategic Alternatives presented appears to be a missed opportunity to consider an integrated solution, which combines road, public transport, land use management and demand management projects.

Strategic Alternatives 2, 3 and 4 present mechanisms which have the potential to reduce demand for road usage. However, these have been scoped in a way which makes it difficult to assess them as being legitimate alternatives to the New M5. Strategic Alternatives which 'bundle' different elements of the alternatives are not presented.

For example, a Strategic Alternative which looks to improve public transport and rail freight, optimising existing road infrastructure and introduce demand management mechanisms has not been explored. A holistic, integrated transport solution is not presented. The EIS does point to the potential value of doing so, but stops short of describing and assessing such options:

Although the introduction of demand management measures would contribute to relieving congestion and would create opportunities for improved public transport initiatives, the implementation of these measures alone would not satisfy the project objectives. (EIS, p. 4-17).

Response

The New M5 and the WestConnex program of works are just one part of the Government's integrated, strategic approach to delivering a modern, efficient transport system for Sydney. This integrated, strategic approach is detailed in the *NSW Long Term Transport Master Plan* (Transport for NSW, December 2012).

In preparing the *NSW Long Term Transport Master Plan*, transport infrastructure and service options were considered to identify an appropriate mix of initiatives to respond to Sydney's transport needs and to deliver an integrated transport and land use planning outcome. As part of that work, the need to complete Sydney's motorway network, including completion of the M4 Motorway, provision of additional capacity along the M5 Motorway corridor and connection of the M4 Motorway and M5 Motorway was identified. This need forms the basis of the WestConnex program of works.

Issue description – lack of consideration on affected communities and strategic direction

The nature of the assessments in the EIS is consistently compliance focused and lacks any real consideration of the communities that it will affect. The Government, through supporting WestConnex in its current iteration is actively working against itself by continuing to link the west and the east rather than develop the west through appropriate transport infrastructure.

Response

Each of the assessments presented in the EIS makes clear reference to the receivers and communities that may be affected by the project, provides details of the anticipated level of impact, and the level of acceptability relative to established, applicable assessment criteria and presents appropriate mitigation and management measures for the identified impacts (refer to **Chapter 8** (Revised environmental management measures) in this report).

It is incorrect to suggest that the Government is continuing to link the west and the east at the expense of development appropriate transport infrastructure in the west. Some examples of transport projects being progressed in Western Sydney include:

- The Western Sydney Infrastructure Plan – a 10 year, \$3.6 billion commitment by the Australian and NSW Governments to deliver new and upgraded roads in Western Sydney. For more information, refer to <http://www.rms.nsw.gov.au/projects/sydney-west/infrastructure-plan/>
- Planning for an extension to the South West Rail Link. For more information, refer to <http://www.transport.nsw.gov.au/projects-swrl-extension-corridor>
- Early corridor investigations and reservation activities for the Outer Sydney Orbital, including motorway, freight rail and passenger rail infrastructure. For more information, refer to <http://www.transport.nsw.gov.au/projects-oso-corridor>.

4.14.5 Project description

Issue description – Euston Road

Section 5.7.1 of the EIS discusses the parking arrangements on Euston Road following construction. The documentation states that Euston Road will become a clearway during peak periods. However, this does not take into account a couple of key features; first, that Euston Road is particularly congested on the weekend, with the area frequented by shopping tour buses and other vehicles as well as through traffic. Secondly, that there has not been consideration of the impact of the New M5 project on Euston Road and McEvoy Street north of Maddox Street when the road returns to its existing configuration. The modelling in Appendix G shows (Table 108) that there is unreleased demand of an additional 114 per cent northbound in the AM peak on Euston Road with full WestConnex in 2031 compared to without WestConnex. This is unacceptable to the City.

Response

As stated in the project description, parking in the kerbside lanes of Euston Road (between Campbell Road and Sydney Park Road) would be permitted during off-peak periods. Roads and Maritime would be responsible for any changes to clearway conditions in the future. An operational traffic review would be undertaken to confirm the operational traffic impacts of the project on the surrounding arterial roads and major intersections 12 months after the commencement of operation of the project. The results and recommendations of the review would assist the development of Roads and Maritime's network operations and infrastructure provision plans.

The traffic and transport assessment study area was identified based on the SEARs, and following initial consultations with Roads and Maritime based on forecast wider traffic impacts. Ultimately, the study area includes roadway and intersections that would be primarily impacted by the New M5 project.

The objective of the operational traffic modelling is to determine the impact of New M5 traffic at the interchanges with the surface roads and therefore the associated roadworks required to achieve acceptable operational performance for the surrounding road network. This modelling takes into account “background” traffic, which is expected to use the road network regardless of whether New M5 is constructed, plus the incremental additional traffic related specifically to New M5. The footprint of the operational model therefore needs to be sufficient to determine the configuration of any project-related roadworks. The footprint adopted for the St Peters interchange was specified by determining at what point on connecting roads the percentage of New M5 traffic was low (so that the majority of traffic on the road is “background” traffic, rather than “additional” traffic at that location). This means that any roadworks required to accommodate project-related traffic would be within the modelled area.

Table 108 in Appendix G shows the increase in traffic volume on Euston Road, north of Sydney Park Road, when comparing the ‘without project’ scenario to the 2031 ‘with full WestConnex and Southern Connector’ scenario, not unreleased demand. The increase in traffic would be accommodated on the additional lanes on Euston Road.

Issue description – design of footpaths and cycleways

The project description and the diagrams do not adequately state the width of footpaths and cycleways. It is necessary to design adequately for bike and foot traffic as per Austroads requirements. At present, the road infrastructure is provided at above minimum levels, whereas the pedestrian and cycle infrastructure is at minimums or less. It would be wise for the Government to consider and engage with its own policy to adequately provide for these growing road user groups.

The Government’s cycling policy, Sydney’s Cycling Future, promises “bicycles will be incorporated into the delivery of transport projects” and “Bicycle facilities will be identified and delivered parallel to major transport corridors”, yet this project has only included bicycle facilities at each end, not along the length of the corridor. The project should be required to fulfil Government policy to deliver a parallel active transport corridor, just as previous projects, such as the M7 and the Lane Cove Tunnel, did.

Response

Pedestrian and cycle infrastructure would be designed and constructed in line with applicable standards and guidelines, including Austroad design guidelines.

The local surface road upgrades associated with the project would provide improved access and travel for active transport modes, including cycling. The new and upgraded pedestrian and cycling infrastructure would improve the safety and connectivity by providing a regional cycle connection between Mascot and Marrickville. Existing dedicated cycleways are provided either side of the M5 East Motorway from beyond King Georges Road through to Kingsgrove Avenue. Cyclists can also access a combination of dedicated cycling lanes and bicycle friendly roads as identified by Sydney Cycleways, parallel to the New M5, between Beverley Hills and the Sydney CBD.

The project does not propose to construct surface infrastructure between the western and eastern tunnel portals. Existing cycle links are provided along the local street network in this area. Extending the existing cycleway along Wolli Creek Valley to connect the western and eastern cycle infrastructure would be constrained, as a cycleway through this area would require additional land acquisition.

Issue description – use of slip lanes at intersections

The use of slip lanes at intersections throughout the project is pervasive. The City is not supportive of slip lanes at intersections as they generally encourage traffic to travel through intersections at faster speeds. Slip lanes require pedestrians and bicycle riders to cross the road in at least two crossing movements, which is undesirable and can leave people vulnerable where traffic volumes and/or speeds are high. Slip lanes also increase the land take for upgraded intersections and this is significant at the Campbell Road / Euston Road and the Euston Road / Sydney Park Road intersections where additional areas of Sydney Park are taken for the intersections.

Response

As part of development of the project design carried out to date, careful consideration has been given to the potentially competing needs of vehicular traffic (including network performance and a desire to maintain free flowing traffic conditions) and those of pedestrians and cyclists (particularly with respect to safety). These factors, in addition to others, have been taken into account through the design process. In some locations, slip lanes were identified as the most appropriate design outcome to strike an appropriate balance between the needs of different road users. Changes to the Euston Road / Sydney Park Road / Huntley Street intersection have been made, as detailed in **Chapter 7** (Preferred Infrastructure Report) of this report.

If the project is approved, a Traffic Management and Safety Plan would be prepared in addition to the Construction Environmental Management Plan. The plan would be developed in consultation with relevant councils, emergency services, road user groups and pedestrian and cyclist user groups. Should the project be approved, the Construction Environmental Management Plan and all related sub-plans would require the approval of DP&E.

Issue description – cycleway connections

The documentation states that the “existing on-road cycleway will be retained”. While this is supported, the description as an “on-road cycleway” could imply a shoulder lane or in-lane cycleway; it is a separated cycleway and needs to be described as such.

With the reconfigured Bourke Road/ Gardeners Road intersection, there is no continuity of the separated cycleway with the project design. It is not clear how bike riders are meant to transfer from Bourke Street (south) to Bourke Road (north) without needing to complete a turning movement on Gardeners Road, or move onto the footpath (which is illegal unless the area becomes a shared path); in which case the “on-road” continuity of the cycleway is not maintained. Should the project proceed to detailed design phase, the proponent will need to resolve this matter and maintain a dedicated, separated cycleway along Bourke Street/Road from Mascot to its terminus at Woolloomooloo. It is recommended that the proponent complete this design in collaboration with the City of Sydney, Botany Bay Council and the Transport cluster’s active transport teams.

The cycleway along the extension of Campbell Road over the Alexandra Canal must have a safe ramp connection to the cycleway along the eastern side of the canal and have provision for connection to the future cycleway on the western side of the canal.

Response

The Council's position is noted.

The dedicated Bourke Road cycleway currently terminates at a point north of Gardeners Road. Botany Bay Council is currently constructing the dedicated Bourke Street cycleway through Mascot Town centre. This will terminate on the south side of Church Street.

The missing dedicated cycle link between these two cycleways would be provided as part of the New M5 including the provision of bicycle signals on Gardeners Road and at the new Bourke Road / Campbell Road intersection.

The City of Sydney is a key stakeholder and would continue to be consulted on proposed temporary and permanent changes to active transport facilities and routes during planning and construction.

Issue description – road configuration

The diagrams at Figure 5-34 and 5-37 do not match in terms of road configuration, and do not give details regarding intended widths for traffic lanes and the pedestrian and cycling facilities. The proponent must advise which is the correct diagram and the widths of traffic lanes and the walking and cycling facilities and state how the design complies with Austroads. As with road design pedestrian and cycle facilities should be designed for growth and functionality rather than to the minimum requirement.

Response

The Council's position is noted.

The Campbell Road bridge over the Alexandra Canal provides for two lanes of traffic in each direction divided with a raised median, and footpaths would be provided on each side of the bridge to provide at-grade pedestrian connectivity between Bourke and Burrows Roads. The cross section of Campbell Road would increase in width on the bridge approaches to develop turning lanes for the intersections either side. The traffic lanes would generally be three metres wide with kerbside lanes at 3.5 metres.

A separate and dedicated pedestrian and cycle bridge would also be provided over Alexandra Canal at this location. This bridge would have a separated cycle and pedestrian paths with widths of 2.5 metres and 1.5 metres respectively plus clearances.

All pathways would be designed with reference to Austroads, the NSW Bicycle Guidelines and existing pedestrian and cycle paths within the precinct, and path widths would be confirmed during detailed design.

The City of Sydney, Marrickville Council and Botany Council are key stakeholders and would be consulted on active transport facilities and routes during planning and construction.

Issue description – design speed

Table 5-7 indicates that in some locations, the design speed is higher than the sign posted speed. No rationale is provided for this. Areas of concern for the City are Bourke Road between Gardeners Road and Campbell Road due to the high volume of bike riders and other vulnerable road user groups, which are likely to increase over time with the ongoing development of Mascot Town Centre.

Response

The project has been designed generally in accordance with Australian Standards, the Austroads Guides and Roads and Maritime design guides and supplements. The selected design speed should be high enough so that an appropriate regulatory speed limit would be less than or equal to it.

If the project is approved, a Traffic Management and Safety Plan would be prepared in addition to the Construction Environmental Management Plan. The plan would be developed in consultation with relevant councils, emergency services, road user groups and pedestrian and cyclist user groups.

Issue description – signage

In section 5.8.6 it is stated that all signage will be clear and unambiguous for motorists. Not all road users are contained within a vehicle, and road signage must cater for all road users, including pedestrians and bike riders. Signage will be especially important in helping riders to navigate regional cycling routes, especially as new routes are introduced.

This section also states that directional signage will send traffic heading to the City and Randwick via Euston Road. However, it is not clear what the intended paths of travel are on Euston Road toward the city centre. It should be expected, given desire lines, that city-bound traffic would head along Euston Road/McEvoy Street then north on Wyndham Street or Botany Road. Roads and Maritime Services is already aware of the significant congestion along this route in the AM and PM peaks. This confirms the City's concerns that the New M5 is intended to service the city and the east, and inadequate traffic modelling has been done to fully understand the impacts of the New M5. For traffic heading towards Randwick, the two paths are either via Lachlan Street (which is already congested, particularly on weekends) or O'Dea Avenue via Bourke Road (also significantly congested, particularly at weekends).

There is also a lack of clarity about what other paths of travel the unreleased demand as identified in the traffic model output will take. It is highly likely that this traffic will disperse onto local streets such as Mitchell Road or potentially Bourke Road via Huntley Street.

Response

A signage strategy would be developed during the detailed design of the project.

In relation to desire lines and paths of travel to be adopted by unreleased demand, the route choices within the EIS network model are subject to the normal limitations inherent in strategic models of this nature. These models are more accurate on major roads than on local roads and are a necessary approximation to allow coverage of the entire Sydney road network. The model has been calibrated to 2012 traffic volumes to take account of anticipated travel patterns across Sydney using a wide range of route choice behaviour. Although it may have some difficulty in representing traffic distribution in local street systems, it is considered suitable for use in this EIS.

4.14.5 Construction work

Issue description – active transport during construction

The proponent would need to work with Councils and the Transport cluster's active transport teams to identify how bike riders would be serviced during construction, particularly along the Bourke Road cycleway.

The City's position is that bicycles are human-powered and more vulnerable road users, therefore they need to retain their existing path of travel during construction. This usually takes the form of dedicating the traffic lane that would otherwise be used by motorised traffic to bike riders. Vehicles that are motorised are to be diverted instead as the impact of a detour is less significant. The City has followed this approach during construction projects for many years.

This cycle route has built strong ridership and use continues to grow, particularly as Mascot Town Centre is built; and this ridership needs to be maintained safely, throughout the construction period.

Response

Cyclists are recognised as an important group of stakeholders, and their specific needs would be considered during detailed design and implementation of the project. Particular attention would be given to areas where existing cycling facilities would be directly affected by construction works, such as along Bourke Road.

Any changes to existing cycling infrastructure, including mechanisms to communicate these changes to affected stakeholders would be documented in the Construction Traffic and Access Management Plan for the project.

Temporary diversions from existing active transport routes would be minimised wherever reasonable and feasible, however some diversions would be required over the course of the project to maintain the safety of all road users including motorists, active transport and the public.

4.14.6 Consultation

Issue description – future consultation

Should project approval be forthcoming, there must be a requirement placed on the proponent and SMC to maintain an effective and meaningful dialogue with local councils with the aim of reducing local traffic capacity and vehicle access to levels commensurate with the needs of the local community.

Response

Roads and Maritime would maintain meaningful engagement with stakeholders during detailed design and construction of the project. This would include consultation with relevant local councils in relation to the design and implementation of project infrastructure such as pedestrian and cyclist facilities, urban design and landscaping, and the productive reuse of residual land.

Roads and Maritime plans to establish regular forums to engage with local councils on these issues. To establish a suitable framework for these forums, Roads and Maritime would prepare terms of reference in consultation with City of Sydney and other relevant councils. Roads and Maritime would seek to establish these regular forums with councils in the second quarter of 2016.

The Council Reference Group (CRG) established in January 2015 positively contributed to the development of the New M5 in St Peters.

A key contribution of the CRG, adopted in the New M5 design, was ensuring the local road upgrade design would not result in Sydney Park being surrounded by busy roads. As such, the Euston Road and Campbell Road widenings are designed to provide a priority route around the mainly industrial fringes of Sydney Park as an alternative to the mainly residential and commercial fringes at the Princes Highway and Sydney Park Road.

Some other contributions and suggestions made by council participants in the CRG and out of session meetings are still being actively considered by Roads and Maritime including the development and implementation of the King Street Gateway.

Roads and Maritime is committed to development and implementation of the King Street Gateway in consultation with relevant councils, which may include re-design of the intersection of King Street and Sydney Park Road.

Any future proposal to reduce the capacity of King Street would be undertaken as a separate project, assessed on its own merits, including undertaking traffic modelling and a full analysis of access and parking implications, as well as liaison with all relevant stakeholders and a detailed cost benefit analysis.

Issue description – exhibition timeframe

A core issue in terms of consultation is the timeframe given by the government to respond to this EIS. The government, in deciding to seek submissions over the Christmas/New Year period, has not acted in good faith.

Response

The EIS was placed on public display for a period of 64 days, longer than the minimum statutory exhibition period to account for the Christmas/New Year period. This extended public exhibition period was set by the Secretary of the Department of Planning and Environment in recognition of the holiday period, to allow sufficient additional time for interested stakeholders to consider the EIS and to make a submission.

4.14.7 Traffic and transport

City of Sydney commissioned a report by TTM Consulting, which was submitted as an appendix to Council's submission on the EIS. The councils for City of Botany Bay and Marrickville also commissioned reports by TTM Consulting. A consolidated response to the issues raised in the three versions of the TTM Consulting Report is provided in **Section 4.17** of this report.

4.14.8 Air quality

Issue description – high PM₁₀ and PM_{2.5} levels – adoption of near-future AAQ standards not considered

This EIS is based on the current Air NEPM standards. In 2012 the Council of Australian Governments (COAG) decided to review the National Ambient Air Quality particle standards.

The charts on page 178 and page 196 respectively (Volume 2C) indicate the PM₁₀ and PM_{2.5} levels at all receptor locations are very close to the existing Air NEPM standard limits. Both PM₁₀ and PM_{2.5} levels would very well exceed allowable levels if the new AAQ standards are adopted by the Council of Australian Governments.

Response

The potential new Ambient Air Quality Standards are mentioned in section 4.6.1 of the Technical working paper: Air quality (Appendix H of the EIS), and would be applicable to the National Environment Protection (Ambient Air Quality) Measure and the draft National Plan for Clean Air and National Clean Air Agreement. These standards would be used for the strategic management of background air quality and would not necessarily be adopted by each state or territory jurisdiction as project-level assessment criteria. The air quality criteria used for the assessment of projects in NSW are determined by the EPA and have been applied to the assessment of the New M5.

A review of international health-related ambient air quality standards (Table C-4 in Appendix C of the air quality impact assessment) shows that the annual mean PM_{2.5} advisory reporting standard of 8 µg/m³, which has been applied to the assessment of the New M5, is the most stringent standard in the world (including the World Health Organization standard). The 24-hour mean PM_{2.5} advisory reporting standard of 25 µg/m³, which has been applied to the assessment of the New M5, is equal to the lowest international standards.

The only particulate matter standard that is not equal to or lower than any other standard in the world is the current NSW assessment criterion for annual mean PM₁₀ of 30 µg/m³. Although the European Union and the United Kingdom have a higher criterion of 40 µg/m³, the lowest or most stringent standard for annual mean in the world is Scotland with a criterion of 18 µg/m³.

The contour maps provided in Figure 9-69 and Figure 9-80 in Appendix H of the EIS show the change in maximum 24 hour PM₁₀ and maximum 24-hour PM_{2.5} concentrations, respectively, with the project in 2021 compared to the 'do nothing' scenario.

Figure 9-64 in Appendix H of the EIS shows the change in 24-hour mean PM₁₀ concentrations at the 35 community receivers. The changes in concentration with the project were generally in the range of plus or minus 1.0 µg/m³.

Figure 9-86 in Appendix H of the EIS shows the change in 24-hour mean PM_{2.5} concentrations at the 35 community receivers. The changes in concentration with the project were generally in the range of plus or minus 0.5 µg/m³, although there were changes of up to plus or minus 2 to 3 µg/m³ at four receptors.

Issue description – portal emissions

There is no mention of portal emission management in the EIS. This EIS claims "The assessment has been conducted assuming zero emissions from the tunnel portals" (Volume 2C, p216, Table 9-34 Summary of key assumptions and implications for conservatism), but with estimated increases in traffic along Princes Highway over the next decade, congestion at the portals, especially at peak traffic hours, would most likely form concentrated zones of vehicular exhaust emissions.

Response

The ventilation system for the tunnel is designed to draw fresh air in through the entry portals, and to exhaust air through the elevated ventilation outlets, not through the portals. Monitoring at the portals would be undertaken to demonstrate that, as far as practicable, emissions do not occur through the portals. The exception to this would be in the case of a fire occurring inside the tunnel close to a portal, where smoke would be forced from the portal to protect people inside the tunnel.

The air quality modelling domain included locations near the tunnel entrance and exit portals. In other words, emissions from traffic using surface roads leading up to or departing from tunnel portals have been taken into account in the air quality modelling carried out for the project.

The modelling also took into account the operation of traffic on each surface road by time of day, including low-speed, 'stop-start' operation where this occurred. Figure 9-38 is the contour plot showing the change in maximum one-hour NO₂ on surface roads in 2021 as a result of the project and does not indicate increases at the tunnel portals.

Issue description – facilities included in the assessment

A number of specific facilities, 'community receivers' (schools, child care, aged care, hospitals) and aggregate 'Residential, workplace and recreational' (RWR) receivers are assessed. This second category includes a few 'receivers' in Sydney Park. However, there is no consideration of individual parks, specifically Sydney Park and the St Peters Interchange in the 'community receivers' section. The combination of different users (including children), forms of activity (physical exercise, farming) in the parkland and resulting exposure which is likely to occur, appear not to have been considered.

There is no mention of whether the generic air quality standards cover the diversity of use types associated with a multi-functional regional park. While this may not typically be included in a standardised methodology/guidelines for this type of assessment, given the close proximity of the interchange and associated road widening to such a significant open space, its inclusion would be reasonable.

The EIS should include a specific assessment of the impact on different uses and users within the park, noting:

- For most pollutants, the levels resulting from the project are well below the recommended standards – with the exception of fine particles
- The existing community receivers may be able to stand as proxies, but no assessment is given as to whether this method is appropriate for assessing the unique impacts relating to parkland as noted above.

Response

The ambient air quality standards are designed to protect human health, including sensitive populations such as children, the elderly and individuals whose health is compromised by, for example, respiratory disease. As such, all users of Sydney Park are inherently included in the assessment of air quality impacts relative to the air quality assessment criteria.

Issue description – concerns about air quality limiting the use of the parkland

Providing a clear assessment of the impact of air quality on parkland is important, as the risk of high exposure may act as a disincentive for some people (for example, parents and children) to use the park, or to use it for certain activities (such as intensive physical activity). This would have a negative impact on the parkland's value and accessibility.

One possible mitigation measure for this impact may be posting air quality monitoring results in prominent places; for example, signage on the footbridge or in the park, which show the level of pollutants relative to standards. If pollutant levels are below these standards, as the EIS predicts, this could allay fears of adverse health impacts of using the park.

Response

An air quality monitoring scheme would be developed and implemented in consultation with key stakeholders to confirm the EIS predictions that there would be no detectable change in air quality due to emissions from the ventilation outlets. Monitoring results would be reviewed after an appropriate period to determine if there is a need to continue monitoring.

All relevant monitoring results would be made publicly available.

Issue description – Alexandria Landfill Closure Management Plan

A site specific landfill closure Environmental Management Plan should be prepared to manage the excavation of parts of the landfill during construction to address the identified environmental impacts outlined in Chapter 30 – Summary of Environmental Impacts (Table 30-1) which forms part of the New M5 EIS.

The management plan should include, but not be limited to mitigation measures to:

- Contain and treat landfill gas emissions from excavations
- Treat offensive odours produced by leachate and landfill gas

- Contain, extract and treat leachate within excavations
- Protect workers and off-site receptors from exposure to potential biological, chemical and physical hazards encountered during the exhumation of landfill waste
- Manage asbestos contaminated wastes
- Unexpected finds and hazardous materials procedure
- Dust and odour management from demolition, excavation and construction activities
- Proactive dust monitoring
- Tracking of material on roads
- Management of stockpiles and earthworks
- Emissions management of construction plant and machinery
- Cumulative impacts from dust generating activities conducted on site
- Community complaints handling, response and management
- Community liaison.

Response

Appendix F of the EIS provides a site specific Landfill Closure Environmental Management Plan that has been prepared in consultation with the EPA. The plan would be updated as required and finalised during detailed design.

4.14.9 Human health

Issue description – level and quality of assessment (Human health risk)

The human health risk assessment includes a number of guidelines it has referred to in its assessment methodology, however some basic steps in those Guidelines appear not to have been followed.

Response

The SEARs required the preparation of a human health risk assessment for the project in line with the approaches outlined in the Environmental Health Risk Assessment Guidelines from enHealth and the report by NHMRC titled *Air Quality In and Around Traffic Tunnels*. Consequently, these were the principal guidance documents used in the development of the project Human Health Risk Assessment (Appendix I of the EIS).

These guidance documents require that such an assessment include the following steps:

- Issue Identification (covered in Section 2 (project description) Section 5 (community concerns) of the human health risk assessment in Appendix I of the EIS)
- Toxicity Assessment (Section 4 and parts of 6, 7, 8 and 9 of the human health risk assessment in Appendix I of the EIS)
- Exposure Assessment (Section 6, 7, 8, 9 of the human health risk assessment in Appendix I of the EIS)
- Risk Characterisation (Section 10 of the human health risk assessment in Appendix I of the EIS).

Depending on the area being addressed, the above process involved either a quantitative or qualitative approach. Where a qualitative approach was used, guidance from other documents (some of which relate to health impact assessment) were used rather than rote following of all aspects of guidelines for a full health impact assessment which was not a requirement of the SEARs.

Issue description – scoping and screening of the human health risk assessment

This aspect is envisaged as a participatory multi-stakeholders process using multiple methods, however the EIS's human health risk assessment appears to have been limited to a technical assessment against regulatory standards. There is no justification as to why this less participatory and narrow approach has been taken, particularly relative to the scale of the proposal.

Importantly, the national health impact assessment guidelines (NHIAG) include an 'equity assessment' as part of this phase, where impacts on various groups are assessed. While the human health risk assessment does include a range of population groups (primarily based on age) in the assessment of risk, for example, for particulate pollution; no other affected groups or uses have been defined. The EIS should also include various groups of users of Sydney Park and types of activities.

Response

The SEARs required a human health risk assessment (HHRA) for the project rather than a health impact assessment. Where relevant, some of the principles covered in the nation health impact assessment guidelines (NHIAG) were considered and added into the risk assessment to address specific areas required to be addressed. However, the primary guidance for the HHRA came from the enHealth risk assessment guidance document. This guidance notes that engagement with stakeholders is part of a risk assessment but not to the level required as part of a health impact assessment.

In preparing the project HHRA extensive consultation was carried out with NSW Health, NSW EPA and Roads and Maritime including discussion of community concerns raised throughout the development of the EIS.

Issue description – assessment of human health risk impacts

The section 11.2.2 "Assessment of social impacts on health" does not include a systematic assessment of the impacts as the NHIAG suggest. In many cases simply stating the proposed works without any assessment or a very general statement about what the concerns may be – rather than a systematic assessment against defined criteria.

For example, for traffic impact (page 11-33) no description of impact or assessment is provided. There also appears to be no assessment of the potential for altered risk of road accidents as a result of increased traffic on local roads in the City of Sydney. This is of particular importance for children and families, and older people.

Response

As noted above, the SEARs required the preparation of a human health risk assessment (HHRA) not a health impact assessment. Some consideration of the potential for health risks from social impacts was included in the HHRA in response to consultation with stakeholders.

Section 9 of the HHRA is conducted as a qualitative assessment. The NHIAG approach was considered as much as possible in preparing this section of the HHRA. While the NHIAG recommends a systematic/quantitative approach be adopted, it has been the experience of the HHRA author and NSW Health that there is a lack of information in Australia preventing more detailed assessment in relation to risks to health associated with social impacts.

There are no defined criteria for the assessment health risks related to social impacts. Most of the social impact issues relate to changes in levels of stress and anxiety. Health authorities in Australia do not collect statistics on health effects related to stress so it is not possible to undertake investigations to determine if an increase or decrease in stress can be seen to cause a significant change in relevant health effects. As such it is not possible to conduct epidemiological investigations that would allow health effects from social impacts to be better predicted. This means a qualitative discussion is all that is possible and NSW Health has accepted this approach. The input for this section of the HHRA report came from the Technical working paper: Social and economic and details of all aspects of the social impacts are presented here.

4.14.10 Noise and vibration

Issue description – effectiveness of mitigation measures

Mitigation measures are suggested, but are not binding and this reduces their efficacy. A metric that binds the proponent and allows meaningful measurement and performance standards should be applied. For example, rewording: “If the traffic noise levels are above the predicted levels and above applicable criteria, ~~consideration of additional feasible and~~ reasonable mitigation measures would be undertaken such as...”.

Given the scale of this proposal and the fact that noise is predicted to be substantially above the applicable criteria, a clearer assessment of the costs and benefits of this mitigation measure need to be provided.

Response

The operational noise assessment for the project has been carried out in accordance with the *Noise Criteria Guideline* (RMS, 2015) and *Noise Mitigation Guideline* (RMS, 2015) to meet the intention of the *NSW Road Noise Policy* (DECCW, 2011). The guidance given in these guidelines requires consideration of all feasible and reasonable noise mitigation measures where traffic noise assessment criteria are predicted to be exceeded.

Feasible and reasonable noise mitigation measures have been identified and applied to the project where traffic noise assessment criteria have been predicted to be exceeded. Options for noise mitigation measures are given in the following order of preference:

- Quieter pavement surfaces
- Noise mounds
- Noise walls
- At-property treatments.

Quieter pavement surfaces would be applied across the project (OGA for the New M5 and DGA for the St Peters Interchange and surrounding roads) to provide wider community benefits. Noise walls are not considered feasible due to a number of issues including but not limited to driveway access from residences to a noisy road, space limitations, shadowing, visual impact, etc. Residual exceedances above the criteria would be minimised through at-property noise mitigation measures, subject to a reasonable and feasible assessment. The anticipated operational noise performance of the project, and feasible and reasonable noise mitigation, would be reviewed and confirmed during detailed design.

Traffic noise would be monitored at sensitive receivers between six months and one year after the opening of the project, to confirm and demonstrate that the project is performing as predicted in the EIS (refer to environmental mitigation measure OpNV02). If traffic noise impacts are identified above the predictions made in the EIS, further consideration of reasonable and feasible mitigation measures would be conducted.

Issue description – construction noise management levels

Given the noise monitoring is by the roadside which may unduly influence road traffic noise levels, it would be important when verifying noise levels that spot background checks are completed to vet that the noise management levels are representative of the receiver as they may not account for barrier shielding which may permit lower background noise levels.

Offices and retail outlets noise allowances given are 70 dB(A) $L_{Aeq(15 \text{ minute})}$. In the City's view, though these noise levels reflect section 4.1.3 of the NSW EPA *Interim Construction Noise Guideline*, office environments are typically more sensitive to noise than this degree of amenity affords.

Response

The construction noise impact assessment for the project has applied the noise assessment criteria included in the *Interim Construction Noise Guideline* (DECC, 2009). The Interim Construction Noise Guideline has been published by the EPA as the adopted construction noise assessment policy in New South Wales.

In the development of the Construction Noise and vibration Management Plan the contractor would undertake further work to determine the validity of background noise levels and construction noise criteria.

Office spaces within Sydney are typically air-conditioned and it is therefore likely that construction noise levels would be attenuated by more than 20 dB(A) through the office building façade. This is because office building windows commonly comprise fixed glazing and where openable windows exist these would typically be kept closed when the air conditioning system is in operation.

Where very high noise levels are predicted to affect commercial businesses consultation would be undertaken before these 'noisy works' would begin. The consultation would seek to minimise the impact of the 'noisy works' by scheduling them to occur at times which would cause least disruption or by the provision of respite periods.

Issue description – sleep disturbance (construction)

In applying a reduction to account for façade noise shielding, the City of Sydney is aware that it is best practice in to allow for a 10 decibel reduction through a partly open window. The City of Sydney empirically understands that the 15 decibel reduction was not determined on the basis of Australian conditions, and that it is normal industry practice by Australian consultants to assume 10 decibels as is the case with the report.

However it must be kept in mind that this is for a partly open window. Notwithstanding whatever uptake of reverse cycle air conditioning systems has occurred within the local population, it has historically been common place in Sydney for buildings to be built with natural ventilation in mind. Within Sydney's temperate climate, a partly open window may not suffice for the majority of people. Given the criteria is based on 10 dB year round, the threshold may under protect residents' health from a sleep disturbance perspective in the spring and summer months.

A stricter interpretation of section 5.4 (sleep disturbance) of the NSW EPA *Road Noise Policy* should be used which stipulates maximum internal $L_{A(night)}$ noise levels of 50 to 55 dB max be achieved. It is noted that the policy does not provide for a methodology to reduce external noise levels to inside. It is considered that this may only reflect winter and autumn conditions where people are likely to have windows partly open or closed.

The sleep disturbance assessment methodology prescribed by the Road Noise Policy is recommended in the other EPA noise policy guidelines/documentation.

City of Sydney request that this be more thoroughly reviewed and further consideration be given to an engineering justification of the position of a 10 dB reduction as above in all cases at all times or that the thresholds are revised.

Response

A reduction of 10 dB(A) in noise levels through an open window is commonly achieved in NSW for residences and has been used in the noise impact assessments of other recent, similar major infrastructure projects in NSW.

Further consideration would be given to the impact of noise on residential receivers during night-time works, and appropriate noise mitigation measures identified during preparation of the Construction Noise and Vibration Management Plan.

Issue description – construction noise and vibration assessment (weather influences)

The computational modelling of construction noise impacts only takes into account neutral weather conditions. Over medium to long distances, weather conditions can influence how noise is yielded at a location (i.e. amplify, attenuate or have neutral affect). Typically, stable night atmospheric weather conditions are most cohesive towards noise propagation, with Sydney experiencing at least some amplification. The technical working paper has modelled the operational noise impact this way, and it is recommended that, given the construction period; the proponent should use the model to predict the real world noise impact.

Response

The construction noise assessment for the project has focused on ensuring that mitigation is recommended for the most affected receivers. These receivers are typically no more than 50 metres to 100 metres from the noise source. The most commonly used algorithms to calculate weather effects only include consideration of weather effects for distances greater than 100 metres. Weather effects are only appreciable for distance greater than 500 metres. The inclusion of weather effects would not change the noise levels for those sensitive receivers most affected by the project nor would it change the recommended noise mitigation.

There is no requirement in the *Interim Construction Noise Guideline* (DECC, 2009) to assess construction noise under adverse weather conditions.

Issue description – ground borne noise (construction)

For the ground-borne noise, Roads and Maritime must:

- Provide size and type and number of road headers considered in the noise (e.g.. drum rotor). Smaller units than those used in the predictions available would lessen impacts noting evening and night ground borne noise criteria predictions exceed criteria.
- Provide the actual degree of noise criteria exceedances. Given these are to occur in the evening and night period, the magnitude of the predictions must be presented and dissected in greater detail in the public interest.

Response

The selection and number of road headers would be finalised during the detailed design stage and consideration would be given to the use of smaller capacity road headers where feasible and reasonable to do so. However, it should be noted that even if smaller capacity road headers were used, the ground-borne noise and vibration impact may not be reduced significantly. In contrast, smaller roadheaders may extend the period of tunnelling activities as a result of reduced throughput.

Predicted ground-borne noise levels and the properties potentially affected can be readily identified from the contours in Appendix J of the Technical working paper: Noise and vibration (Appendix J of the EIS). This shows that the maximum ground-borne L_{Aeq} noise level would be up to 45dB(A) which is 5 dB(A) above the evening criterion and 10 dB(A) above the night-time criterion.

The prediction of ground-borne noise is widely accepted as being approximate. The actual ground-borne noise experienced within a room is the result a number of factors:

- Force of the road header.
- Specific soil and rock formations that the vibration passes through.
- Coupling between building and ground.
- Building construction.
- Size and reverberation time of the room.

Given that the magnitude of these factors cannot be accurately determined for each receiver the use of contours to present prediction results is appropriate.

Issue description – blasting impacts (construction)

Test blasts should be conducted to determine real objective noise and vibration impacts due to variability.

Response

Section 5.5.3 of the Technical working paper: Noise and vibration (Appendix J of the EIS) recommended that test blasts be undertaken. This requirement would be included in the Construction Noise and Vibration Management Plan.

Issue description – operational noise impacts beyond the study area

The technical working paper notes that the study is limited to 600 metres from the furthest point of any road affected by “the works” associated with the project. No analytical consideration was found in the technical working paper of the environment effect of additional traffic brought to the parts of the following roads outside the study area:

- Euston Road;
- McEvoy Street;
- Bourke Road;
- Botany Road;
- O’Riordan Street;
- Gardeners Road;
- Sydney Park Road;
- Mitchell Road; and
- Fountain Street.

Under relevant aspects of the EPA criteria, this was however done for parts of Euston Road, Campbell Road /Street that were affected by the project works to a 600 metre maximum radius from the St Peters interchange.

One of the unknowns associated with this project is the greater operational noise impact of this project across the wider area north east of the project beyond the assessment area, but within the City of Sydney local government area (LGA). For instance, the St Peters interchange would facilitate large volumes of traffic to the southern boundary of the City of Sydney’s LGA. While some of this traffic may go to the airport and other destinations, to the road upgrades and connections to the local road network indicates traffic is expected to disperse into the City of Sydney’s LGA; e.g.. Euston Road.

While the technical working paper has been completed in accordance with the Secretary’s requirements, the technical working paper demonstrates that existing levels are liable to change with the impact of additional traffic on Euston Road. The road traffic noise effect of high daily vehicle volumes carried up Euston Park to Sydney Park Road, and then Mitchell Road, and across Huntley Street to Bourke Road would not necessarily be represented by existing noise levels. The noise impact of this aspect associated with the project is a known unknown. It is recommended that this be evaluated and dismissed or the impact dealt through reasonable and feasible mitigation treatments to any affected properties.

Response

The operational traffic noise assessment study area for the project has been established in accordance with the *Roads and Maritime’s Noise Criteria Guideline (NCG)*. As described in Section 6.1.2 of Technical working paper: Noise and vibration (Appendix J in the EIS), this generally involves identifying areas within 600 metres of the outside traffic lane of the roads forming part of the project. In some cases, this area may be reduced where other significant road noise sources dominate noise levels at nearby receivers.

Euston Road, and the receivers along, fall within the operational traffic noise assessment study area and have been included in the road traffic noise assessment.

It is recognised that the project would lead to some redistribution of traffic beyond those roads directly affected by project works. Traffic forecasts were reviewed to identify roads in the surrounding road network that may be significantly affected by redistributed traffic, and those roads were also included in the operational traffic noise assessment.

Because the roads listed in Council's submission would not be directly affected by the project, and would not be subject to significant traffic redistribution effects, these roads were not included in the operational road traffic noise assessment. However, based on the level of interest in traffic noise along these roads, including through Council's submission and submissions made by members of the public community, additional road traffic noise modelling has been carried out. For a selection of additional roads, the following tables present:

- Anticipated changes in traffic volumes with and without the project in 2021 (refer to **Table 4-14**) and how this would affect traffic noise levels (refer to **Table 4-15**)
- Anticipated changes in traffic volumes with and without the project in 2031 (refer to **Table 4-16**) and how this would affect traffic noise levels (refer to **Table 4-17**).

The tables show that along the roads that have been assessed, the project would not lead to an increase in road traffic noise levels by more than 2 dB(A) and therefore no further consideration of noise mitigation measures is required. In many cases, the tables show that the project would lead to a decrease in traffic noise levels.

Table 4-14 Year 2021 parallel routes traffic volumes

Location	Build				No Build			
	Daytime (7am – 10pm)		Night-time (10pm – 7am)		Daytime (7am – 10pm)		Night-time (10pm – 7am)	
	Light	Heavy	Light	Heavy	Light	Heavy	Light	Heavy
Euston Road	28531	1210	6839	243	24906	1463	5024	227
Bourke Road	9130	1558	1818	262	11534	1222	2696	209
O’Riordan Street	33040	2482	6442	507	33959	2492	6768	490
Gardeners Road	34030	3378	4909	430	32236	3350	5712	417
Sydney Park Road	14821	382	3382	48	51115	1875	11502	260
Mitchell Road	15888	242	2511	12	24320	159	5800	20
Fountain Street	21565	530	3881	52	16851	625	3126	51
Maddox Street	7458	836	2188	146	11465	519	2882	70

Table 4-15 Year 2021 parallel routes noise impact, 10 metres from the kerb, dB(A)

Location	Build		No Build		Increase in noise	
	Daytime	Night-time	Daytime	Night-time	Daytime	Night-time
Euston Road	71	67	72	66	-0.2	0.8
Bourke Road	71	66	70	65	1.0	0.7
O’Riordan Street	74	69	74	69	0.0	0.1
Gardeners Road	75	68	75	68	0.1	0.0
Sydney Park Road	68	63	74	69	-6.0	-5.9
Mitchell Road	67	61	68	64	-1.2	-3.5
Fountain Street	69	63	69	62	0.3	0.7

Table 4-16 Year 2031 parallel routes traffic flows

Location	Build Daytime (7am – 10pm)		Night-time (10pm – 7am)		No Build Daytime (7am – 10pm)		Night-time (10pm – 7am)	
	Light	Heavy	Light	Heavy	Light	Heavy	Light	Heavy
Euston Road	26422	1615	5693	321	21529	1454	4738	219
Bourke Road	6638	1197	1257	83	9930	1085	2160	194
O’Riordan Street	33079	2143	6796	403	32103	2642	6619	477
Gardeners Road	28945	3237	4749	400	28911	2744	5262	318
Sydney Park Road	14247	596	3277	89	45517	1461	9206	207
Mitchell Road	11872	211	1955	7	21996	147	4630	18
Fountain Street	19013	688	3273	67	13378	592	2790	61
Maddox Street	1724	64	2951	212	1604	67	4109	479

Table 4-17 Year 2031 parallel routes noise impact, 10 metres from the kerb, dB(A)

Location	Build		No Build		Increase in noise	
	Daytime	Night-time	Daytime	Night-time	Daytime	Night-time
Euston Road	72	67	71	66	0.6	1.3
Bourke Road	70	61	70	65	0.4	-3.4
O’Riordan Street	73	68	74	69	-0.6	-0.5
Gardeners Road	74	68	74	67	0.6	0.6
Sydney Park Road	68	63	73	68	-4.5	-4.2
Mitchell Road	66	60	68	63	-1.9	-3.8
Fountain Street	69	63	68	62	1.1	0.6
Maddox Street	59	65	59	68	0.1	-3.2

Issue description – maximum operational noise level assessment

With further reference to Figure 4, page 163 and Table 95, the technical working paper presents an average maximum noise level of 97 dB(A) following implementation of the project with up to 126 events causing noise impact with a range of 65 to 126 dB(A).

The technical working paper provides that the logger was positioned only six metres from the road which has contributed to the magnitude of the exceedances. It is suggested that if the logger was to be moved back, and that the vehicle causing the event is to be considered as a point source, there is only a 6 dB(A) loss given per doubling of distance. That is, moving the logger back 12 metres or even 24 metres from the road lane would only reduce the magnitude of exceedance reported to approximately 6 to 12 dB(A) considering all other assumptions and contributing factors remain the same. It is further considered that in an urban environment, achieving bulging façade setback distances of greater than six metres from a road is not always achievable, the reported results may be more realistic an interpretation than that afforded in the technical working paper.

The City of Sydney is in possession of independently obtained road traffic noise monitoring data from Gardeners Road during 2013, of which noise emissions affect both residents of the City of Sydney and Botany LGAs. The technical working paper associated with this data provides that on average, approximately 1750 noise levels exceed the EPA sleep disturbance screening criteria, up to 104 dB(A) but ranging from 53 to 86 dB(A) in magnitude occur during a given night time period.

As traffic flow conditions are not expected to have meaningfully declined from 2013 to present, the City of Sydney recommends the study area to be expanded to meaningfully assess the impact on the existing road network that additional traffic flow would bring.

Response

It should be noted that Figure 4 and Table 95 in the Technical working paper: Noise and vibration (Appendix J of the EIS) present the current number of maximum noise events occurring.

Gardeners Road is currently used by significantly more heavy vehicles than Campbell Street. As such the change in noise environment is significantly less on Gardeners Road. Campbell Street was chosen for the assessment to ensure those most affected by the project would be considered by the maximum noise level assessment.

As noted in Section 6.1.12 of the Technical working paper: Noise and vibration, noise mitigation is not offered based on the outcomes of an assessment of maximum noise levels. Rather, maximum noise levels can be used to prioritise the application of noise mitigation measures. Extending the study would not change any results provided in the technical assessment, nor would it influence any noise mitigation that has been recommended. As such there is little value in extending this study any further.

4.14.11 Land use and property

Issue description – Impacts to Sydney Park

Recently, the City of Sydney has received applications for permanent land acquisitions for the construction compound at Sydney Park. This property is marked for temporary acquisition on Figure 13-9. The City of Sydney would not release this parcel of land permanently. Prior to the exhibition of the EIS, the Sydney Motorway Corporation (SMC) gave the City of Sydney a clear and explicit commitment that, other than the strip of land along Euston Road, there would be no net loss of land from Sydney Park.

If the project is approved, Roads and Maritime must be required to make good on this undertaking, minimising the impact on the parklands. The City of Sydney is of the view that any attempt to offset impacts on Sydney Park through the creation of additional open space at St Peters interchange is unacceptable. The interchange would not provide equivalent open space.

Response

Road infrastructure along Campbell Road would not encroach into Sydney Park, except for a small parcel near the intersection of Euston Road to enable development of the intersection.

The network of paths from the end of Campbell Road pedestrian and cycle bridge connecting with the existing paths in Sydney Park and proposed pedestrian and cycle paths commencing at the corner of Barwon Park Road and Campbell Road would all be returned to Sydney Park at the end of construction.

Further, the temporary land used for construction purposes would be re-instated at completion to a standard at least equivalent to that existing at the time of access. The only area of land required for permanent acquisition is that necessary for active transport infrastructure, being land required for the northern bridge abutment and airspace for the Campbell Road pedestrian and cycle bridge.

Issue description – Alexandra Canal cycleway

A permanent acquisition request has been lodged for lands along the Alexandra Canal for the purpose of constructing the Campbell Road bridge. These lands were acquired by the City of Sydney for the purpose of building the Alexandra Canal cycleway and which is partially constructed. This cycle corridor must be preserved, and the City of Sydney would not release this land permanently. The City of Sydney would consider arrangements to provide access to the land to enable the bridge to be constructed and maintained and the cycleway to be built.

Response

Roads and Maritime is acquiring the Alexandra Canal foreshore land to allow the construction of the Campbell Road bridge such that the land may contain permanent works associated with the bridges. Both bridge crossings proposed at Alexandra Canal have been designed to not preclude the construction of the City of Sydney's Alexandra Canal cycleway.

The land is required not only for construction purposes but also for the location of bridge abutments and/or bridge piers and associated bridge and approach works depending on final bridge design requirements. The land would also be required for drainage provisions subject to detail design.

Notwithstanding this, the bridge would be designed such that future active transport links including cycleways can be constructed by Council along both sides of the canal and under both the pedestrian/cycle and road bridges in the future. Furthermore, paths connecting the proposed active transport routes on the Campbell Road corridor would be constructed to link with Council's future active transport routes along the east side of the canal, and future links to pedestrian pathways on the western side would not be precluded should council proceed with a pathway on the western side of the canal in the future.

Issue description – land use impacts on Alexandria, Erskineville and Waterloo

The widening of Euston Road north of Sydney Park Road using an existing road reservation is likely to result in the widening of Euston Road through to McEvoy Street. This is likely to have a detrimental impact on the growing suburbs of Alexandria, Erskineville and Waterloo. This would exacerbate as the land use changes resulting from Waterloo Metro come on board. This is not consistent with the intended renewal of these areas.

Response

Figure 5-30 in the EIS shows the extent of upgrade works along Euston Road included as part of the project. These works only extend as far north as Maddox Street, and do not extend to McEvoy Street.

The project, including road works along Euston Road, would not adversely affect urban renewal outcomes planned for Alexandria, Erskineville or Waterloo.

4.14.12 Visual impacts and urban design

Issue description – opportunity cost of St Peters Interchange

This intersection occupies around 27 hectares of land. This represents an enormous opportunity cost to the City of Sydney's productivity.

At similar densities to those achieved at Green Square Town Centre, this would accommodate more than 13,000 people and workplaces for a similar number of jobs. If the density proposed by UrbanGrowth at Waterloo were used as a comparator, this would be more than twice the population and less provision for jobs.

It could also represent another Sydney Park providing much needed recreation space for nearby residents. The open space to be created around the interchange is not considered to be comparable to Sydney Park and the potential of open space not blighted by major road infrastructure.

City of Sydney note that these opportunity costs are not accounted for in the business case for WestConnex.

Given these lost opportunities, it is important that if the project were to go ahead, the space made available around the intersection is used to its maximum potential.

Response

The St Peters interchange would be located on the site of the former Alexandria Landfill. If not for the New M5 project, it is likely that this site would have continued as a waste management facility into the foreseeable future. Parts of the site not required for the interchange would be rehabilitated and landscaped to provide additional open space and public recreation areas. Development of the site for the St Peters interchange and public open space, including pedestrian and cyclist infrastructure, represents a beneficial re-development of land historically used as a landfill.

The use of the former Alexandria Landfill site for any future alternative development is significantly influenced by the history of the site. The site is contaminated as a result of its historical use, including as:

- A brickworks quarry between 1908 and 1962
- A solid waste landfill owned and operated by the City of Sydney Council from 1988 to 2002
- A solid waste landfill and resource recovery facility run by Dial a Dump Industries from 2002 until its acquisition by the NSW Government in December 2014.

Based on identified contamination levels on the site, and the need for ongoing leachate and landfill gas management, establishment of more sensitive land uses such as residential development would be difficult to achieve. The cost of remediating the site to a standard suitable for residential or other sensitive developments would also likely be prohibitive. Further, the location of the site (surrounded by existing industrial development) would make significant intensification of residential development in the area undesirable from a strategic land use planning perspective.

It is possible that the St Peters interchange site could be viably developed for industrial land uses in the future. However, this would require the interchange to be located elsewhere in the immediate vicinity, with loss of existing industrial and/or open space land. As detailed in Section 4.4.2 of the EIS, a significant factor in the selection of the Alexandria landfill site as the preferred location for the St Peters interchange was the avoidance of impacts on established industrial development and open space areas. In this context, redevelopment of the Alexandria landfill site for the St Peters interchange and additional open space areas is more desirable than use of the site for industrial development.

The New M5 team is already engaging with the City of Sydney and Marrickville Councils regarding opportunities for the development of the new public open space areas within the St Peters Interchange.

Formal engagement with City of Sydney would include seeking their involvement in an Urban Design Review Panel for the New M5. City of Sydney Council would also be consulted during the preparation of the New M5 Urban Design and Landscape Plan.

St Peters interchange would not blight surrounding new public open space. Around Sydney there are many examples of highly used public open space in close proximity to high-capacity road infrastructure including:

- Tumbalong Park, Darling Harbour
- Bradfield Park, Milsons Point
- Moore Park
- Royal Botanic Gardens.

Issue description – best use for the new park areas

The use of land left over by the interchange must be designed to positively contribute to the City of Sydney's open space and sports facilities network. To ensure the best outcome for these spaces, it is strongly recommended that a working group consisting of Sydney Motorway Corporation, City of Sydney and Marrickville Council be established to oversee the design and implementation of the area around the interchange.

The City of Sydney also requires indoor recreation courts and may face a shortfall in these facilities during the implementation period of this project. Large indoor recreation facilities are difficult to locate. The land around the interchange could potentially be used for this purpose. It is likely that indoor recreation facility with up to 16 multipurpose courts could be positioned on this land.

Response

Roads and Maritime would maintain meaningful engagement with stakeholders during detailed design and construction of the project. This would include consultation with relevant local councils in relation to the design and implementation of project infrastructure such as pedestrian and cyclist facilities, urban design and landscaping, and the productive reuse of residual land.

Roads and Maritime plans to establish regular forums to engage with local councils on these issues. To establish a suitable framework for these forums, Roads and Maritime would prepare terms of reference in consultation with City of Sydney and other relevant councils. Roads and Maritime would seek to establish these regular forums with councils in the second quarter of 2016.

Issue description – air quality

If air quality does not meet safe standards once the motorway is fully operational, accessible open space should be given over to biodiverse bushland and habitat, in support of the City's Urban Ecology Strategic Action Plan, and urban canopy targets defined by the Greening Sydney Plan. A minimum of 50% canopy coverage should be achieved at 10 years after completion, in all areas not covered by buildings.

Response

The project has been designed to meet strict air quality standards. The air quality impact assessment (Appendix H of the EIS) has demonstrated that even at the regulatory worst case, any changes in ambient air quality due to emissions from the ventilation outlets would be small and unlikely to result in adverse impacts on local air quality. Nevertheless, ambient air quality monitoring would be conducted to validate the EIS predictions and would be made publically available.

Issue description – Canal Road and Burrows Road motorway operation complexes

The design and siting of the buildings at the Canal Road and Burrows Road motorway operational complexes aim to minimise their presence through setbacks and landscaping. In suburban areas of Sydney this may be an appropriate response. In inner Sydney, this is out of context and extraneous. Buildings should be located within the interchange site in such a way that functional, contiguous areas of accessible open space are maximised.

City of Sydney recommends:

- 1) The two complexes should be consolidated to fit the urban context and to maximise usable landscape area, and to more closely respond to the Secretary's Environmental Assessment Requirements, "Identification of opportunities to utilise surplus or residual land, and utilise key structures (such as stacks) for multiple uses i.e. integration with other structures".
- 2) The most appropriate placement of the combined building would be on the Princes Highway and above the New M5 tunnel portal.
- 3) The buildings should address the highway with minimal setback and appropriate height. This aligns with the Roads and Maritime's Beyond the Pavement guideline, particularly section 3.2.5 (Design road boundaries in response to local character).
- 4) The design of the building should incorporate the conserved 'Dynamo' building. This aligns with the Roads and Maritime's Beyond the Pavement guideline, section 3.6.2 (Adaptively re-use heritage infrastructure in projects).
- 5) The need or amount of car parking at the site should be reconsidered as this location is the closest place to a rail station, with Sydenham Station around one kilometre from the site (about a 15 minute walk away), providing public transport access for employees and visitors to these buildings.

- 6) The proposed landscape in this area fronting the Princes Highway is inappropriate in character. The noise and air pollution, and its isolation from residential areas render it unsuitable for recreational use. Open space in this location does not fit with the existing or desired future character of the area. The Princes Highway has continuous frontage commercial uses with zero setback in this area. This would continue to be the desired character into the future. The proposed motorway buildings would be complimentary in this part of the highway, if built continuously to the street alignment with concealed car parking.
- 7) Combining the motorway operation complexes would create additional usable open space on the corner of Burrows and Campbell Roads which could be put to better use as an indoor recreation facility.

Response

- 1) Consolidation of the WestConnex Motorway Control Centre (MCC) and the St Peters interchange ventilation facility above the New M5 tunnel portals would be considered during the detailed design phase. A key consideration for the location of the MCC is to facilitate quick maintenance and incident response to all stages of WestConnex (New M5, M4 East, and the future M4-M5 link).
- 2) As above
- 3) The design of the buildings would be further developed during the detailed design phase. The height of the ventilation facility would be governed by air quality and airspace hazard requirements.
- 4) The concept design includes retention of the Dynamo building to operate as a gateway to the parklands. Should the design of the motorway operations buildings evolve during detailed design, the incorporation of the Dynamo building could be considered.
- 5) The MCC would be a 24/7 365 day/year facility, critical to the safe operation of motorway. Staff would be working in the MCC in shift patterns and as required by incidents and as such use of public transport would not always be practical. However, the car parking requirement would be reviewed during design development.
- 6) The Princes Highway at this location does not have a characteristic built form, but is characterised by a disparate array of set-backs and street frontage typologies (e.g. McDonalds, St Peters Anglican Church and residential housing) with areas of green that face the Highway (St Peters Anglican Church, Kendrick Park and Tempe recreational lands). Roads and Maritime do not agree with the conclusions in this statement.
- 7) As noted above, the consolidation of the motorway operations complexes would be examined during detailed design. If achievable, the additional useable open space created by the consolidation could made available for parkland/ open space.

Issue description – future M4–M5 Link facilities

The built form for the future M4–M5 Link facilities should be a cut and cover structure over an extended portal like the Canal Road Complex rather than be placed within the open space area.

This would release a significant amount of land for purposes that are useful to the community, such as an indoor recreation centre. This is particularly important given the lack of these in the City of Sydney and Marrickville local government areas. The availability of this land provides an enormous opportunity, and also provides opportunities to integrate sustainable water management features that have otherwise not been considered.

Response

The location and design of structures associated with the future M4–M5 Link would be subject to further design development as part of that project and the matters raised by City of Sydney would be considered as part of this process. Only indicative locations and uses have been included in the New M5 EIS to provide a transparent view of the full WestConnex program of works and to inform the cumulative impact assessment.

Issue description – landform

It is unclear how the St Peters interchange landform would work on the site without a contour plan. The overshadowing studies in the Technical working paper: Landscape and visual assessment show a 3D model with shadows that indicates proposed landform. However, this is not clearly linked with some of the other information. For example, a building within the northern open space is missing and some batters seem much steeper than indicated on the plans.

A request by City of Sydney to obtain a CAD plan of the area was not forthcoming during the EIS exhibition period to enable the City of Sydney to undertake a robust assessment of these factors.

Edges to open spaces should be formed to balance:

- Provision of sight lines into publicly accessible spaces;
- Minimise views of road infrastructure; and
- Manage noise.

Response

The design of the St Peters interchange infrastructure and the landscaping strategy for the site have been developed with the aim of minimising visual and landscape impacts where feasible and reasonable, and to provide screening and softening of impacts through effective landscape treatments. The project design and landscaping strategy would continue to be developed during the detailed design phase in consultation with the New M5 Urban Design Review Panel, local councils along the project corridor and affected local communities. The outcomes of this process would be included in a final urban design and landscape plan for the project.

To achieve a lasting and cohesive urban design strategy for the overall St Peters interchange, the focus would be on unifying and shaping the different stages of the project, including the M5 East Motorway, the future Sydney Gateway, and the M4-M5 Link. The following objectives would allow design strategy to be implemented at the St Peters interchange:

- Close the former Alexandria Landfill
- Return surplus lands to the community as public open space, and to allow separate future redevelopment and other permissible land uses
- Provide an extensive green volume of vegetation to compete with and soften the scale of the proposed multi-level interchange, creating an urban forest
- Promote the use of a tall, established tree canopy cover to not only soften the scale of the proposed infrastructure, but also provide a counterpoint and extension of the green open space from Sydney Park
- Design the St Peters motorway operations complex to enhance the existing street character whilst treated as a cohesive set of architectural buildings.

Such a design would allow for future stages of the St Peters interchange to adopt similar approaches to materials and detailing to achieve overall project cohesion and an integrated 'whole of project outcome'. The landscape approach in this area would focus on the creation of green volume and remediation of the former Alexandria landfill by creating an urban forest capable of competing with the scale of the St Peters interchange.

Overall, it is noted that the quality of the change to the St Peters interchange site is a positive visual impact. The integration of public open space within the interchange site provides beneficial views from surrounding receivers, and considered architectural finishes to buildings are also a positive outcome to the visual amenity of the site.

Issue description – safety

The proposed arrangement of the interchange site includes many hidden spaces than may attract anti-social behaviour and/or become attractive places for crime.

Safety in publicly accessible areas must be supported by open sight lines from public roads. Most if not all of any publicly accessible open space areas must be visible from a public road. All publicly accessible open spaces should be well surveyed from adjoining buildings or streets.

There are a number of places of concern, including:

- Hidden spaces between large, raised mounds and the roadways
- Undercroft spaces resulting from elevated roadways
- Immediately north 'behind' the deluge tanks
- Immediately south of the Gardeners Road bridge connection
- The large strip of land west of the motorway and east 'behind' a group of industrial buildings that face the Princes Highway.

Further work, including a CPTED report, should be completed as part of the EIS process. This may require reconfiguring of these areas, the introduction of new uses, restriction of public access or additional land purchase.

Response

All publicly-accessible parts of the project would be designed and implemented with the aim of ensuring safety and security. Design of publicly-accessible parts of the project would take into account the guidance provided by the Safer By Design program managed by the NSW Police Force and *Crime Prevention and the Assessment of Development Applications* (DUAP, 2001), and the four principles of Crime Prevention Through Environmental Design (CPTED), being:

- Surveillance
- Access control
- Territorial reinforcement
- Space management.

Issue description – open space to the south of Campbell Road

The documentation shows that the largest portion of new public open space, to the south of Campbell Road, is not a part of this application and would be deferred to Stage 3. While its use as a construction yard for Stage 3 is justified, there is not sufficient certainty around the timing of Stage 3. This is a key concern, as the area may remain unused and residual for some time if Stage 3 is delayed – representing a significant opportunity cost for open space, recreational and community space.

Project documentation which has been used as the basis for public consultation (New M5 St Peters Interchange – Community Update (p5)) shows that all this area would be dedicated for public open space (with a small portion being used as an exhaust stack). A rough measurement of this deferred area (as per on p81) shows that it is 3.5-4 hectares, however the 'New M5 - Project Overview' (p10) notes that the area to be dedicated to parkland is only 2.4 hectares.

More detail is required on the size and timings of the use of this section of the interchange area, and if possible bringing forward its use as parkland or temporary community accessible space until Stage 3 commences. Following stage 3 this area should be used for an indoor recreation centre.

Response

As discussed in Chapter 1 of the EIS, the future M4-M5 Link is expected to commence construction in 2019 (subject to planning approval). The NSW Government is committed to the delivery of WestConnex program of works and Roads and Maritime has commenced the formal statutory approvals process for the M4-M5 Link following the lodgement of a project application with the Department of Planning and Environment.

The staging of construction for the future M4-M5 Link would be determined as part of the concept design process that is currently underway.

It is not anticipated that there would be a sufficient transition between the two projects (if approved) to enable a temporary use of this space based on the staging strategy for the WestConnex program of works (refer to section 6.1 of the Updated Business Case).

The future M4-M5 Link is subject to further concept design development and the suggested uses identified by City of Sydney would be considered as part of this process.

About six hectares of new open space would be delivered as part of the New M5 with a further 2.5 hectares to be delivered upon completion of the future M4-M5 Link subject to detailed design.

Issue description – Campbell Road pedestrian and cycle bridge to Sydney Park (design)

It is appreciated that this cycleway is intended to provide a fully separated path connecting Sydney Park to the Bourke Road cycleway and Mascot Town Centre. However, an elevated shared facility on a regional cycle route may not be the optimal design.

As stated in the EIS, the bridge would become one of the longest pedestrian bridges in NSW. The bridge would be just four metres wide between the integrated pedestrian handrails and throw screen, allowing for a 1.5 metres footpath and 2.5 metre separated bi-directional cycleway, and not allowing for clearances to vertical structures (hand rails, throw screens) or a separator between cyclists and pedestrians. There is no indication in the EIS that any shade, weather protection, rest areas, seating or intermediate access/egress would be provided.

A 4m wide separated pedestrian and cycle facility does not meet the requirements in Austroads: Cycling Aspects of Austroads Guides (2011) which indicates a separated two-way path should not be less than 4.5m in width (Austroads: Cycling Aspects of Austroads Guides (2011) Table 7.7, p89). The document also states: "It is important for safe operation that adequate clearance is provided between the cyclist operating spaces and potential hazards beside paths..." The City of Sydney considers there is a need to provide additional clearance adjacent to vertical structures such as pedestrian handrails and throw screens, and passing pedestrians, including a separator between the pedestrian and cycle paths.

A pedestrian path of just 1.5m width does not allow two wheelchairs or a wheelchair and a double pushchair to pass comfortably. Where pedestrian volumes are expected to be high, Austroads recommends a footpath width of at least 2.4m (Austroads Part 13 Pedestrians, Table 2.1, p18). If the proponent considers the bridge design to meet the prevailing Australian requirements then references should be provided.

In summary, the City of Sydney requests that:

- The bridge should include wider areas to allow for resting, including seating and weather protection.
- Consideration should be given the inclusion of intermediate access/egress points given the length of the bridge and personal safety issues. At over 500 metres long the City of Sydney has significant concerns for personal safety of bridge users.
- The bridge structure and associated access/egress paths must be designed to Crime Prevention through Environmental Design (CPTED) principles.
- Clarify / detail how emergency services would be able to access the bridge deck in the event of an incident or accident.
- Roads and Maritime demonstrates that the design satisfies the prevailing Australian requirements for pedestrians and cyclists.

Should the project be approved, requirements should be placed on Roads and Maritime to address all concerns prior to further acceptance of bridge design and commencement of construction.

Response

The series of bridges proposed provides for the physical and safe separation of the east-west active transport routes from motorway traffic entering and exiting the St Peters interchange and heavy vehicle and B-double movements on Burrows and Campbell Roads. By providing easily accessible and high quality grade separated facilities, interaction of active transport groups and traffic is avoided and in-turn improves intersection performance, eases traffic congestion and improves road safety.

The cycle and pedestrian bridges together with the proposed interconnecting cycle and pedestrian paths in Mascot and St Peters would provide a high quality and safe grade-separated access for recreational and commuter user groups linking Mascot, Alexandria and St Peters with dedicated active transport facilities for the first time. These dedicated facilities would also provide a safe and convenient connection for families in St Peters and those residing in the rapidly expanding Mascot town centre wishing to enjoy the benefits of Sydney Park. The network of proposed active transport facilities would conveniently link with the existing Bourke Road cycleway and the Bourke Street cycleway currently under construction through Mascot town centre. The missing link between the Bourke Street and Bourke Road cycleways would link Mascot town centre directly to the Bourke Street cycleway.

The proposed layout of the bridge would provide a 2.5 metre bi-directional cycleway beside a 1.5 metre wide pedestrian path which would be suitable for two wheelchairs to pass. Adequate clearances would be provided to kerbs, handrails, screens and other obstructions giving an overall bridge that would be at least 4.0 metres wide plus clearances.

Safety in design is an integral part of the detailed design process and issues associated with amenity, safety, crime and security would be addressed at this stage. All publicly-accessible parts of the project would be designed and implemented with the aim of ensuring safety and security. Design of publicly-accessible parts of the project would take into account the guidance provided by the Safer By Design program managed by the NSW Police Force and *Crime Prevention and the Assessment of Development Applications* (DUAP, 2001), and the four principles of Crime Prevention Through Environmental Design (CPTED), being:

- Surveillance
- Access control
- Territorial reinforcement
- Space management.

The City of Sydney, Marrickville Council and Botany Council are key stakeholders and would continue to be consulted on all proposed active transport facilities and routes during design and construction.

Issue description – Campbell Road pedestrian and cycle bridge to Sydney Park (function)

City of Sydney understands that there is the intent to provide a regional cycle route catering for longer distance recreational riders and commuters groups. Regional cycle routes enjoy strong patronage in the morning and afternoon peaks, with commuter riders often travelling at speed. This type of functionality for bike riders needs to be designed into the design (as a road design would for vehicle drivers) (such as clearways in the peaks).

City of Sydney considers that the bridge, as designed, would not encourage use and it is likely a large proportion of cyclists and pedestrians would look to walk/ride at grade as:

- There appears to have been little consideration of how experienced longer distance recreational riders and commuters groups would interact with people walking or biking between the high density residential development at Mascot Town Centre and Sydney Park.
- It is unclear how these various user groups would be able to use the narrow paths safely, even in the short term. This would impact the attractiveness of the bridge to users and undermine its purpose.
- There is no consideration as to how the bridge, apparently built to minimum standards, would cater for future growth as Sydney's population increases by a further 1.6 million people.

If the bridge is retained full provision for pedestrians and cyclists must be made at grade including separated cycle paths, pedestrian and cycle crossings of all arms at intersections with the provision of adequate crossing time and the ability to cross each arm in one movement.

Regional cycle routes should be designed as separated to enable their functionality. For safety purposes, they should be separated on highly trafficked roads. A shared facility designed to minimum widths is not the appropriate design or starting point. The design should be revisited prior to any approvals in collaboration with the Government's transport cluster's active transport teams, Marrickville Council, Botany Bay Council and the City of Sydney.

Should the project be approved, requirements should be placed on Roads and Maritime to address all concerns prior to further acceptance of bridge design and commencement of construction.

Response

The series of bridges proposed provides for the physical and safe separation of the east-west active transport routes from motorway traffic entering and exiting the St Peters interchange and heavy vehicle and B-double movements on Burrows and Campbell Roads. By providing easily accessible and high quality grade separated facilities, interaction of active transport groups and traffic is avoided and in-turn improves intersection performance, eases traffic congestion and improves road safety.

The cycle and pedestrian bridges together with the proposed interconnecting cycle and pedestrian paths in Mascot and St Peters would provide a high quality and safe grade-separated access for recreational and commuter user groups linking Mascot, Alexandria and St Peters with dedicated active transport facilities for the first time. These dedicated facilities would also provide a safe and convenient connection for families in St Peters and those residing in the rapidly expanding Mascot town centre wishing to enjoy the benefits of Sydney Park. The network of proposed active transport facilities would conveniently link with the existing Bourke Road cycleway and the Bourke Street cycleway currently under construction through Mascot town centre. The missing link between the Bourke Street and Bourke Road cycleways would link Mascot town centre directly to the Bourke Street cycleway.

The bridges would incorporate a 2.5 metre wide cycleway plus adequate clearances and the bridge would be designed with appropriate vertical and horizontal geometry to provide safe and comfortable sight distance provisions. Unlike the existing on-road Bourke Road cycleway, users of the bridges would not need to contend with and be distracted by vehicles and traffic, driveways, pedestrian crossing, signalised intersections, detours around bus shelters, power and streetlight poles, raised sections of cycleway and other obstructions and inconveniences typical of on-road cycleways. The cycle and pedestrian paths would be appropriately delineated including the provision of raised pavement markers if required.

At 2.5 metres wide plus clearances, the cycleway would be consistently wider than the existing Bourke Road cycleway which is less than 2.4 metres wide in places, and effectively less than this again, taking clearances into account. The cycleway is also considerably wider than the Bourke Street cycleway that is currently being constructed through Mascot town centre which is less than 2.0 metres wide and less again with clearances.

Safety in design is an integral part of the detailed design process and issues associated with amenity, safety, crime and security would be addressed at this stage.

The City of Sydney, Marrickville Council and Botany Council are key stakeholders and would continue to be consulted on all proposed active transport facilities and routes during detailed design and construction.

Issue description – Campbell Road pedestrian and cycle bridge to Sydney Park (maintenance)

The EIS does not address issues of future ownership, maintenance and management of the bridge. For example, given the span and width, there appears to be no consideration of cleaning and maintaining the bridge deck. This should be addressed prior to further acceptance of bridge design and commencement of construction.

Response

Operations and maintenance is a key aspect considered in the Safety in Design (SiD) process which is included in the detailed design phase. Key stakeholders (including local councils) would be invited to the relevant SiD workshops to contribute and comment on the design as it relates to their operations and maintenance activities.

Issue description – pedestrian and cycle paths (design)

The EIS does not provide path widths and/or references to Austroads (or similar) standards applied in determining these widths. The EIS should be revised to include this information.

It appears that all pedestrian and cycle paths have been sized to minimum standards. This does not necessarily respond to expected levels of use or recognise future growth in use. All vehicle lane widths are designed to exceed minimum standards and indeed the New M5, as part of the WestConnex program of works, is apparently required to respond to population growth. A similar approach must be taken to the design and provision of pedestrian and cycle infrastructure.

Pedestrian comfort should be considered in line with a pedestrian comfort tool like Transport for London's Pedestrian Comfort Guidance appropriately adjusted for Australian conditions. The path widths should allow clearance on each side for obstructions as poles and the like are commonplace in verges and near paths, in line with Australian design standards. Separated cycle facilities should be provided where the functionality is provided, and appropriate connectivity between cycle routes at other times. The City of Sydney's Street Design Manual provides guidance for these elements and should be a reference document for the project.

Response

The width of pathways would vary depending on the location and expected usage and would be determined during detailed design, but typically footpaths would be 1.8 metres to two metres wide where space permits, shared paths would be three metres and separated paths would have a cycle path width of 2.5 metres with an adjacent pedestrian path width of 1.5 metres on structure and 1.8 metres to two metres on ground.

Pathways would be designed with reference to Austroads and the NSW Bicycle Guidelines and in most cases the standard and width of pathways would where reasonable and feasible be of a standard and width that is equal to or better than existing and comparable facilities in the precinct.

Issue description – streets beyond the motorway

New street works including Euston Road, Campbell Road, Sydney Park Road have been designed with higher traffic speeds and wider lanes than required. There is no rationale given for these choices. These should be revised to a 50 kilometres per hour design speed. As discussed above, vehicle speed is a major determinant in injury severity in the incident of a collision. Speed limits are an important contributor to road safety and must be self-enforcing through roadway design as far as is possible.

Reductions in lane widths would reduce the land take for these roads which would reduce pedestrian crossing distances (with associated benefits in reducing vehicle delay at intersections) and decrease the loss of area to Sydney Park. This aligns with the Roads and Maritime's Beyond the Pavement guideline (Section 3.2.1 - Keep the road footprint to the minimum possible to achieve a good design outcome).

Response

The design speed requirement of Euston Road, Campbell Road and Sydney Park Road is the outcome of the strategic network traffic modelling undertaken by the Roads and Maritime Service. The analysis took into account the hierarchy of the roads, the estimated traffic volume on these roads, the anticipated traffic growth, potential changes in land use in the surrounding area and the network capacity of the area.

The option to further reduce the width of the upgraded Euston Road through lane width reductions and/ or the removal or reduction of the central turning lane would be investigated during detailed design. The investigation would consider road safety, network performance and implications on property access.

The investigations would also consider:

- Benefits of reduced impacts to Sydney Park including loss of park space and vegetation
- Improvements to pedestrian crossing distances and times improving pedestrian connectivity across Euston Road
- Potential to shift the proposed shared path on the western side of Euston Road away from the kerb improving the safety and amenity of active transport users
- Potential for additional landscape treatments to increased verge spaces as a result of reduction in road space.

Issue description – intersection design for local road upgrades

The intersections beyond the motorway appear to be designed to a higher speed design than is preferred. Consideration of all users is required at all intersections, including pedestrians, bike riders and vehicle drivers. This would ensure that pedestrian crossing can be undertaken in a single motion, not three; and, slip lanes would be eliminated where they are not essential.

Response

The design of the intersection is not based on a “preferred speed” at the intersection. The design speed requirements of the road approaches are outcomes of the Roads and Maritime strategic network modelling. The intersections design takes into account the traffic volume of the approaching arms, the required turning movements, geometric requirements and the associated clearance requirements. These would be in accordance with Part 4 of the Austroads Guide for Road Design which covers different types of vehicles and other intersection users such as pedestrians and cyclists.

Issue description – Campbell Road extension and Campbell Road bridge

Differing versions of the Campbell Road Bridge (over the Alexandra Canal) are shown in the EIS. This connection does not seem to be required by WestConnex as its function for WestConnex is duplicated further south with a second new bridge across Alexandra Canal and directly connecting to Gardeners Road.

The Campbell Road Bridge should be removed from the project. Further, access to the proposed Campbell Road Bridge (eastbound) from the St Peters Interchange is prohibited, with no right turn allowed. This indicates that the purpose of the Campbell Road Bridge is to create an east-west connection from the suburbs of Stanmore, Enmore and Petersham through to the Port/Airport, or to enhance resilience or capacity in the RMS network; or potentially all of these combined.

If the bridge is removed, then the proponent would need to resolve the issue of an active transport crossing over the Alexandra Canal to link into the regional cycleway network.

If the bridge remains and the elevated cycleway is reconsidered, a separated cycleway should be integrated with the bridge, preferably on the north side to provide an easier connection to the Bourke Road cycleway, Sydney Park and residential land uses. Pedestrian footpaths should be provided on both sides.

If retained, the bridge must include adequate clearance, horizontally and vertically, over the proposed Alexandra Canal shared paths (both east and west sides of the canal). The bridge paths must also provide (included as part of the project) direct connections to the Alexandra Canal path on the eastern side and allow for future connections on the western side.

Response

As part of the EIS, the following scenarios for the provision of the Campbell Road Bridge were investigated for 2021 and 2031 traffic:

- No bridge on Campbell Road

- A two lane bridge on Campbell Road (one lane each way)
- A four lane bridge on Campbell Road (two lanes each way).

The investigation considered the impact to the local road network in terms of queueing, flow capacity and performance of the nearby intersections. It was found that with a two lane bridge:

- The traffic would reroute via Gardeners Road and causes the level of service of the intersections along this route (Campbell Rd/Bourke Rd and Gardeners Rd/Bourke Rd) to reduce below the acceptable level
- There would be an increase in queue lengths on the eastern and western approaches of Gardeners Rd/Bourke Rd and the northern and western arm of the Campbell Rd/Bourke Rd intersection

For the “no bridge” scenario all local traffic would need to use Ricketty Road Bridge as there would be no access to St Peters interchange via the Gardeners Road ramps. The traffic on the roads along this link (Burrows Road, Kent Road and Gardeners West) would significantly increase as a result.

The project therefore proposes a four lane bridge on Campbell Road.

In terms of pedestrian connectivity, the road bridge would be designed with a footpath on both sides of the bridge to provide at-grade pedestrian connectivity over Alexandra Canal between Bourke Road and Burrows Rd. This is in addition to the dedicated cycle and pedestrian bridge described in the previous response.

The Campbell Road bridge would be designed to provide both horizontal and vertical clearances for the future provision of the Alexandra canal combined pedestrian/ cycle path by others.

The Campbell road bridge cycle and pedestrian paths would be provided with direct connections to the future Alexandra canal path on the eastern side and safeguarded for future connection on the western side.

Issue description – King Street Gateway

The NSW Government has made clear public statements that there is no intention to increase traffic or extend clearway hours through King Street. The City of Sydney believes the only way to ensure this commitment is guaranteed is to permanently remove capacity from King Street through intersection redesign and physical measures limiting the extent to which kerbside lanes can be used for through traffic in the future.

It is necessary to include the redesign of the intersection of King Street and Sydney Park Road and implement the intersection changes as an integral part of the New M5 project. Not doing so risks increasing congestion in King Street and would not be in line with Ministerial public statements in relation to this issue.

Response

As noted in the submission, the NSW Government has made clear public statements that there is no intention to extend clearway hours through King Street. The NSW Government position remains unchanged. Modifications to King Street do not form part of the project.

RMS is committed to development and implementation of the King Street Gateway in consultation with relevant Councils, which may include re-design of the intersection of King Street and Sydney Park Road.

Any future proposal to reduce the capacity of King Street would be a separate project which would need to be assessed on its own merits, including undertaking traffic modelling and a full analysis of access and parking implications, as well as liaison with all relevant stakeholders and a detailed cost benefit analysis.

Issue description – loss of parking spaces

The EIS states that during construction of the St Peters Interchange, between 617 and 671 parking spaces would be lost. This loss would mostly affect businesses. The EIS tries to justify this by saying that the businesses along Euston Road have sufficient off-street parking, however, it is unclear whether the proponent has undertaken any consultation with these local businesses to determine the level of hardship (if any) that would be experienced.

With operation of the St Peters Interchange, there would be a loss of 322 parking spaces permanently. This is a net sum and does not include the 60 new spaces, of which 24 would be off-street at St Peters primary school and are assumed to be inaccessible to the general public.

Response

Section 5.7.2 of the EIS describes the provision of parking as part of the road widening design. A parallel parking lane would be provided in both directions along Campbell Street between Hutchinson Street and St Peters Street. Additional on-street and off street car parking spaces would be provided between St Peters Street and Church Street. Parking in the kerbside lanes of Euston Road would be permitted during off-peak periods. Table 5.9 describes parking provisions for each motorway upgrade.

The final number of on-street parking spaces to be affected by construction of the project would be finalised during detailed design.

4.14.13 Social and economic

Issue description – study area does not capture the full extent of the impact

The Social and Economic Impact Assessment is focused on localised effects.

To this end, the Study Area meets the SEARs directive of focusing on the vicinity of the proposal. However, this approach fails to account for the city shaping impact of WestConnex Stage 2. This mismatch in the study areas means an understanding of how the operation of WestConnex Stage 2 would affect traffic volumes on many of the local roads in each LGA has not informed the assessment of social and economic impacts.

The Strategic Review and Transport Modelling of WestConnex undertaken by SGS and Veitch Lister Consulting (VLC) shows there are risks that WestConnex Stage 2 would generate additional traffic that would only be addressed by other sections of WestConnex (see Figure 5). This shows WestConnex Stage 2 would likely make congestion worse on many local roads in the City of Sydney which has the potential to cause significant social and economic impacts.

Response

The study area for the social and economic impact assessment in Appendix M of the EIS was focused on the six LGAs within which the New M5 project is located, as well as the wider catchment that relates to the use of the New M5 Motorway, including the Greater Sydney region and Sydney CBD.

As the majority of the project would be in tunnels, direct socio-economic impacts would be limited to areas close to the western (e.g. Kingsgrove and Beverly Hills) and eastern (e.g. St Peters) extents of the project and at other locations where temporary (construction) and permanent (operational) surface infrastructure facilities are proposed for the project.

While social impacts generally occur at a community level, business impacts such as changes to turnover or employment generally occur at the location of the business activity. Technical working paper: Social and economic (Appendix M of the EIS) recognises that economic impacts associated with the movement of freight and commercial vehicles, as well as the indirect social impacts that occur as a result of these, occur on a broader regional, state and national scale. Technical working paper: Social and economic (Appendix M of the EIS) assesses a wider area of influence than the Technical working paper: Traffic and transport Assessment and is based on geographical statistical areas in the context of the broader Greater Sydney area.

City-shaping as a result of major infrastructure is typically assessed on a strategic planning level prior to the proposed development and approval of a project. The NSW Long Term Transport Master Plan (2012) identifies that the WestConnex program of works would provide a change in Sydney's connectivity, as a step towards creating a connected motorway network, providing improvements in freight efficiency and productivity, as well as alleviating congestion and improving access to areas such as the Port Botany and Sydney Airport precinct.

City-shaping elements have been considered as part of Chapter 14 (Visual impacts and urban design). In particular, Table 14-13 of the EIS provides an assessment of the project elements against the WestConnex Urban Design Framework which includes objectives on place-making, urban renewal and liveability.

Chapter 15 (Social and economic) and Appendix M (Technical working paper: Social and economic) of the EIS assess the potential impacts of the project's construction and operation, including the socio-economic impacts of increased traffic on local roads. Forecast traffic volumes indicate that King Georges Road, Stoney Creek Road and the Princes Highway would experience increases in traffic after the opening of the project due to some drivers diverting through these roads to avoid motorway tolls on the M5 East Motorway and New M5. The increase in traffic on local roads, the indirect amenity impacts and the resultant impacts to socio-economics are assessed in Chapter 15 (Social and Economic) and Appendix M (Technical Working Paper: Social and Economic) of the EIS.

Issue description – timeframe of analysis does not reflect long-term nature of project

The absence of long term modelling (for example to 2041) in the WestConnex Stage 2 EIS means that any longer term traffic or socio-economic impacts from the operation of WestConnex Stage 2 are not being identified, mitigated or monitored. The VLC Strategic Review shows that traffic volumes would continue to increase up to and beyond 2041.

Response

As outlined in Section 9.1.4 of the EIS, traffic modelling for the project has relied on population and employment data from the Bureau of Transport Statistics, which is the best information currently available. The current WRTM is based on 2014 land use projections and includes induced traffic demands.

Issue description – WestConnex Stage 2 does not connect people to high value jobs

The Sydney CBD is anticipated to be the fastest growing centre between 2016 and 2041 with an additional 105,200 jobs anticipated. The EIS also identifies that, of the 527,700 people who worked in the study area in 2011, 75 per cent were employed in Sydney LGA. Sydney CBD is the location of the majority of high value financial and insurance and professional, scientific and technical service jobs. At present, very few people travel by car from the South West to the CBD for work. Port Botany and Sydney Airport are only anticipated to account for 0.3 per cent and 0.8 per cent of growth respectively.

Analysis by SGS and VLC shows the termination of WestConnex Stage 2 at St Peters is anticipated to increase congestion on local roads in the south of the City of Sydney. This increased local congestion would make it harder for people living in these areas to access the employment, services, recreation and education on offer across the Sydney CBD by bus, private vehicle or by cycling.

Figure 8 shows that WestConnex Stages 1 and 2 would create two distinct areas of impact on the local network:

- The first area (in red) is where the traffic volumes generally decrease by a small amount;
- The second area (in light blue), between Haberfield and St Peters precincts, traffic volumes generally increase. Most of this area is outside of the traffic and transport study area.

Response

The project has the ability to connect residential communities with locations of employment, due to reduced congestion and decreased travel times. The project provides greater accessibility for residents of south and southwest Sydney to access Sydney Airport and Sydney CBD.

Observations on regional traffic behaviour are provided in Appendix G (Technical working paper: Traffic and transport) of the EIS and an overview of travel patterns is provided in Appendix M (Technical working paper: Social and economic) of the EIS.

Chapter 15 (Social and economic) and Appendix M (Technical working paper: Social and economic) of the EIS assess the potential impacts of the project's construction and operation, including the socio-economic impacts of increased traffic on local roads. Forecast traffic volumes indicate that King Georges Road, Stoney Creek Road and the Princes Highway would experience increases in traffic after the opening of the project due to some drivers diverting through these roads to avoid motorway tolls on the M5 East Motorway and the New M5. The increase in traffic on local roads, the indirect amenity impacts and the resultant impacts to socio-economics are assessed in Chapter 15 (Social and economic) and Appendix M (Technical working paper: Social and economic) of the EIS.

In addition, local road upgrades proposed as part of the project would include provision of new and upgraded pedestrian and cycle infrastructure, which is valued by the local community in terms of connectivity and access and in supporting an active lifestyle. This infrastructure has been designed to maintain and enhance pedestrian and cyclist accessibility and connectivity, particularly around the St Peters interchange and Sydney Park.

Issue description – impact on Sydney Park is not fully addressed

Based on the EIS, during construction approximately 0.2 hectares of Sydney Park, would be temporarily acquired to accommodate a construction compound. A small area would also be permanently acquired for road widening. The southern boundary of the Park also abuts a significant construction site with works continuing along Euston Road at the Park's eastern boundary and part of Sydney Park Road along the northern boundary.

Concern that impacts on the character of the park, visual amenity, sense of place and perceived identity have not been fully assessed particularly in relation to the City Farm development which includes the growing of food. Increases in population and therefore use of the park as a recreational resource is not fully addressed.

Response

Strip acquisition would be required along Euston Road and areas in the vicinity of the Campbell Road and Sydney Park Road intersections with Euston Road. The Preferred Infrastructure Report, included in **Chapter 7** of this report, outlines the revised layout for the project, including the removal of the left turn slip lane from Sydney Park Road to Euston Road.

During development of the EIS, the location and size of the Sydney Park construction compound was amended to accommodate the City Farm project in accordance with the City Farm Master Plan. The City Farm project would be located on a half-hectare site in the south west corner of Sydney Park. A pop up farmers market was held at the site on 22 January, 29 January and 5 February 2016 as a trial. Construction of the City Farm is planned for early 2016 with farm activities expected to begin around late 2016.

The Sydney Park construction compound would be located on an area designated as "lawn" on the masterplan and would be screened by existing vegetation and a proposed area of "revegetation/habitat planting". The construction compound would be used to service the construction of pedestrian and cycling facilities associated with the local road upgrades, including the Campbell Road pedestrian and cycle bridge over Campbell Road. The land required for the Sydney Park construction compound would be used temporarily throughout construction, for a duration of around 12 months from early 2018 to early 2019 (refer Chapter 6 of the EIS). The construction compound site would be reinstated at the completion of construction, with the exception of the areas of land required permanently for the bridge. Once operational, the bridge and pedestrian and cycle paths would allow greater access and connectivity to the City Farm project and Sydney Park more broadly for the local community.

Issue description - impact on urban renewal in Ashmore and Green Square not adequately addressed

Sustainable Sydney 2030 identifies that Green Square would have close to 40,000 residents and 22,000 workers by 2030 and that Ashmore would be revitalised as a new residential neighbourhood. As a result, these locations are expected to see significant increases in transport demand and needs. The EIS shows that, as a result of WestConnex Stage 2, the Green Square urban renewal area would see an increase in traffic in some areas. The increase is especially pronounced prior to the construction of Stage 3. The impact from the decline in the level of service on these local roads would decrease the amenity in this area and may have the impact of reducing the yield or delaying development. As Green Square is now an established apartment market, developers are more likely to be able to deal (in terms of gaining finance and marketing the product to buyers) with the adverse impact than Ashmore which is yet to mature as an apartment market.

Response

An assessment of the impact of the project on residential and commercial property prices has not been included in the preparation of the EIS given the large number of factors that influence the value of a property. However, Appendix M (Technical Working Paper: Social and Economic) of the EIS recognises that impacts on property values prior to and during construction would be of a temporary nature, and are likely to include uncertainty amongst property owners about property acquisition and the magnitude of potential amenity, accessibility and construction traffic impacts, as well as potential impacts to the perceived value of properties during the construction period.

The long term impact of the project on property values would be influenced by the long term benefits of the project as perceived in the land and property markets, arising from general overall improvements in amenity, including improved air quality, reduced traffic noise and improved road safety on local surface roads as traffic is diverted from them to the new tunnel.

It is very difficult to anticipate market perceptions, particularly as these in turn are influenced by broader macroeconomic considerations (e.g. strength of the economy, outlook for economic growth, interest rate levels and availability of finance, unemployment levels). As such, a reliable assessment of the interaction between the project and the property market cannot be made with any certainty.

Issue description – congestion in King Street, Newtown is not addressed

King Street is located in Newtown towards the south-west of the City of Sydney LGA, and spans the suburbs of Newtown, Camperdown, Erskineville and Alexandria. Its economy is driven by small businesses with food and drink, retail and personal services, and higher education and research as the top three employing industries (City of Sydney, 2015).

Transport modelling undertaken by VLC found that King Street, Newtown is at capacity under the base case. As the road is already at capacity, the introduction of WestConnex Stage 2 does not significantly impact on congestion levels and therefore does not have an adverse impact, however, it does not resolve the congestion issue either.

Forecast growth in traffic volumes for Sydney would occur regardless of the development of the project. Existing and future congestion on King Street are not within the scope of the assessment for the project.

The project does not propose to modify King Street, including speed limits or on-street parking arrangements or clearways along King Street.

As discussed in Chapter 9 and Appendix G of the EIS, in future years, traffic modelling indicates that King Street is expected in most cases to experience reduced or similar peak hour volumes under the 2021 'with project' scenario and 2031 cumulative scenario when compared to the without project scenario. The exception to this would occur in the 2031 cumulative case, where AM peak hour volumes southbound would increase by around 280 vehicles per hour when compared to the 'without project' scenario. However, this is in the opposing direction to the dominant AM peak hour (which would experience a reduction) and is within the design carrying capacity of the road. As there would not be any significant changes to traffic volumes and no modifications to King Street are proposed as part of this project, the project would not have a significant impact on businesses or amenity along King Street.

As noted in the submission, the NSW Government has made clear public statements that there is no intention to extend clearway hours through King Street. The NSW Government position remains unchanged. Modifications to King Street do not form part of the project.

RMS is committed to development and implementation of the King Street Gateway in consultation with relevant Councils, which may include re-design of the intersection of King Street and Sydney Park Road.

Any future proposal to reduce the capacity of King Street would be a separate project which would need to be assessed on its own merits, including undertaking traffic modelling and a full analysis of access and parking implications, as well as liaison with all relevant stakeholders and a detailed cost benefit analysis.

Issue description – impacts on surrounding streets

On the streets surrounding the motorway, the additional traffic induced by WestConnex would add to congestion, cause noise and air pollution, and decrease pedestrian comfort and safety.

Noise and air pollution are population health risks. Studies have shown that people living near noise caused by busy roads have increased incidence of cardio-vascular disease and lower life expectancy.

The presence of busy roads discourages development and lowers development yield. In addition further road works, for example the widening of McEvoy Street, are considered to be brought forward. These factors undermine the productivity of the area or add to infrastructure costs diverting funds from other areas of need. Taken together these are significant costs that have not been considered as part of this EIS (in the socio-economic section), or the Updated Strategic Business Case.

Response

A detailed assessment into the potential noise and air pollution as a result of the project has been provided in the Technical working paper: Air Quality (Appendix H of the EIS) and the Technical working paper: Noise and vibration (Appendix J of the EIS). Modelling indicated that the differences in pollutant concentrations between the 'do-nothing' scenario (i.e. no project) and the 'do-something' scenario (i.e. with the project) were not considered to be significant and would therefore result in a low risk of potential increased health effects on the community.

Issue description – residential amenity impacts (Campbell Road)

The City of Sydney has significant concerns for the amenity of residents in the retained properties on Campbell Road. These properties would be adjacent to a six lane arterial road, a major motorway interchange and would be overlooked by a pedestrian and cycle overpass. There would be significant amenity, noise and air quality impacts on these properties and their residents. These properties would be surrounded by construction on three frontages for a period of around two years.

Response

During operation of the project, traffic volumes would increase around the St Peters interchange. The increase in traffic volumes would result in increased noise levels for residents located adjacent to these roads.

A total of 133 day time receiver locations and 145 night time receiver locations have been identified as likely to experience road traffic noise above applicable assessment criteria in 2031 with the operation of the project. These receiver locations are mainly located around the St Peters interchange, including on Euston Road. In addition, two buildings within St Peters Public School have been identified as likely to experience noise levels that exceed the internal noise criteria with windows open. None of the receivers are located on King Street in Newtown.

Consistent with the *Road Noise Policy* (EPA, 2011), all feasible and reasonable management measures would be considered to reduce the extent to which road traffic noise exceeds applicable assessment criteria at these 145 receiver locations and two school buildings. The identification and evaluation of feasible and reasonable management measures for these locations is included in section 12.5.2 of the EIS and includes a combination of at-source treatments (such as low noise pavement selection), noise barriers and potential at-property acoustic treatments. These management measures would be confirmed during detailed design of the project, including confirmation of receiver locations that would be eligible for consideration of at-property acoustic treatments.

In relation to air quality, the project is expected to result in lower total pollutant levels across the project corridor. Specifically, the project is anticipated to redistribute the impacts associated with emissions derived from vehicles using surface roads. For much of the community this would result in no change or a small improvement (i.e. reduced concentrations and fewer health impacts). However, for some areas located near key surface roads a small increase in pollutant concentrations may occur. Potential health risks associated with changes in air quality (specifically nitrogen dioxide and particulate matter) within the local community have been assessed in the EIS and are within acceptable limits.

4.14.13 Soil and water quality

Issue description – non potable water supply potential

The project has identified that the collected groundwater from the tunnels (during standard operations) is to be drained to the water treatment plant at the Arncliffe motorway operations complex. The operational water treatment plant would discharge into the Cooks River at the Marsh Street Bridge. It is proposed to reuse the water in the motorway and landscaping where possible.

Response

Noted. Wastewater collected within the tunnels, which includes other sources in addition to groundwater, would be treated and re-used where appropriate.

For example, in order to reduce demand on local water supplies, options would be investigated for providing water required for operation of the deluge system from wastewater produced through the tunnel drainage system where it meets appropriate quality parameters (environmental management measure OpWM03, amended in **Chapter 8** (Revised environmental management measures) in this report).

Issue description – non potable water supply from the treated stormwater from the St Peters interchange

The St Peters interchange would produce polluted stormwater and this would need to be treated on site. There is minimal detail on how the operator intends to do this. There is the opportunity to get the treated water pumped to the Sydney Park Stormwater Harvesting Scheme. This would improve the water supply security and received additional treatment through our treatment system.

The non-potable water can then be used through an expanded non potable water network.

Response

Treatment of surface water runoff from the St Peters interchange would include hydrodynamic oil and grit separators, and water quality (bioretention) basins. This infrastructure and other surface water and drainage works for the project are summarised in Table 18-4 of the EIS and shown in Figure 5-25 and Figure 5-26.

Surface water management infrastructure for surface road components of the project, including the St Peters interchange has been designed to address the anticipated pollutants common to surface road run off, including suspended solids, oil and grease. The principal treatment focus for this infrastructure has been physical separation, with additional biological capacity for larger project catchments allowing further polishing to achieve higher water quality requirements where necessary.

Opportunities for reuse of wastewater would be considered in preference to discharge to the stormwater system (environmental management measure OpWM02, amended in **Chapter 8** (Revised environmental management measures) in this report). Surplus run-off water would be used for operational requirements where possible, and would primarily be used for irrigation uses within landscaped areas.

An updated water balance would be prepared during detailed design, which would be used to further improve water efficiency during the operation of the project including rainwater harvesting measures. Connection to or supply of excess stormwater to Council's Sydney Park Stormwater Harvesting Scheme does not form part of the project. Roads and Maritime would liaise with Council during detailed design to determine if such a connection is feasible, should Council wish to make such a connection.

Issue description – quality of the water in the Alexandra Canal

The EIS aims to demonstrate the water quality in the Cooks River and Alexandra Canal is very poor. Roads and Maritime is using this to reduce the quality of the water that discharged into the river. This is not an appropriate outcome, and Roads and Maritime should be taking the initiative to show leadership and work to improve the quality of the water in the canal, rather than maintain the status quo.

Response

The stormwater treatment provided by the project is expected to result in a net reduction in pollutants being discharged to the Alexandra Canal and the Cooks River, and subsequently Botany Bay. Therefore, an overall improvement the ecosystem's health should result from the implementation of the project (refer to Table 40 in Appendix N Technical working paper: Surface water).

The project has adopted the water quality targets of the Botany Bay and Catchment Water Quality Improvement Plan (SMCMA, 2010). The targets set by this plan typically require mitigation in the form of stormwater treatment devices for urban runoff from new urban developments.

Technical working paper: Surface water (Appendix N of the EIS) includes Appendix A: Water Quality Reference Criteria, which discusses the relevant water quality objectives and environmental values for each of the receiving waters relevant to the project. Water quality trigger values have been selected to accord with the management goal of improving the condition of the waterways. These water quality trigger values are also discussed in Chapter 2 of the Technical working paper: Surface water.

Issue description – water quality improvement standards

The proponent has proposed to apply the Botany Bay and Catchment Water Quality Improvement Plans (BBWQIP) water quality targets to the project. On page 16-54, the proposed pollution reduction targets are applied to the additional impervious areas. The targets need to be applied to the whole site so the pollution generated from the sites is less than the original sites. This would mean the quoted pollution removal volumes would need to increase.

Response

Impervious areas forming part of the project, in particular surface roads, are the key potential source of pollution for surface water runoff. Non-impervious project areas, such as landscaping, are unlikely to provide a significant source of surface water runoff pollution. On this basis, it is appropriate to apply the water quality targets from the Botany Bay and Catchment Water Quality Improvement Plan (SMCMA, 2010) to only the impervious surfaces forming part of the project.

Issue description – no details of WSUD on upgraded roads and intersections

There are no details of how the upgraded roads and intersections would comply with the BBWQIP targets. There is no Water Sustainability Urban Design (WSUD) details.

These details would need to be included in the detailed design should the project proceed, and it is recommended that this is worked through in collaboration with the City and Marrickville Council staff to ensure fine-grained local knowledge is incorporated into the design.

Response

The project has taken account of Water Sensitive Urban Design (WSUD) principles for the identification and design of surface water treatment measures, as articulated in the BBWQIP, including:

- The area available to place WSUD devices and the relative area of land that needs to be treated to achieve targeted load reductions
- Physical constraints of the site that limit the treatment trains that can be applied
- The total cost of options and balance between upfront and ongoing maintenance costs, and consideration of how these are to be funded
- The reductions over and above targeted load reductions that could be achieved through application of different treatment train options
- Community acceptance and compatibility.

These principles would continue to be considered through the detailed design phase for the project, and throughout the construction and operation of surface water quality management infrastructure. This commitment is reflected in environmental management measure OpSW01 in Table 30-1 in the EIS and in **Chapter 8** (Revised environmental management measures) of this report.

Roads and Maritime would consult with City of Sydney and Marrickville Council concerning the final drainage design during detailed design.

Issue description – new pipelines drain to Alexandra Canal

On page 16-50 it is proposed in Alexandra Canal, to have two new discharge outlets that would convey stormwater into the Canal as follows:

- A 3300 x 2400 millimetre open channel discharging immediately to the south west of Gardeners Road Bridge
- A 525 millimetre reinforced concrete pipe discharging immediately to the south east of Gardeners Road Bridge.

The detail of these outlets, including discharge velocities and scour protection measures, would need to be confirmed during detailed design.

The large culvert has the potential to cause scour of the canal sediments and resuspend the highly polluted sediment.

Response

New discharge outlets into Alexandra Canal would be designed with scour protection measures to minimise the potential for sediment disturbance caused by the operation of new outlets. The design of the outlets, including discharge velocities and scour protection measures, would be confirmed during detailed design, and informed by appropriate drainage modelling. The design the outlets would also have consideration to approaches to avoid and/or minimise impacts to the heritage values of this State heritage listed item. Further detail on heritage considerations can be found in **Section 4.6.1** (Heritage Council of NSW) of this report.

4.14.14 Contamination

Issue description – potential contaminating activities

Works and activities associated with the St Peters interchange development have the potential to cause localised contamination. These include earthworks, demolition of buildings containing hazardous building materials and chemical / fuel spills from plant and machinery. These should be assessed and relevant mitigation measures outlined in a Construction Environmental Management Plan to be prepared for the development.

Response

Localised contamination would be managed to prevent impacts during project construction. A Construction Environmental Management Plan would be prepared for the project that would include controls relating to earthworks, demolition of buildings containing hazardous building materials and chemical / fuel spills from plant and machinery. Local councils would be consulted during the preparation of the Construction Environmental Management Plan, which would be subject to approval by the Department of Planning and Environment (DP&E).

Issue description – acid sulfate soils

The risk of acid sulfate soils occurring within the project areas have been assessed and identified in Chapter 5.0 of the EIS Contamination Report and which would require Acid Sulfate Soil Management Plans (ASSMPs).

These documents must be prepared in accordance with the Acid Sulfate Soils Management Advisory Committee (ASSMAC) (1998) *Acid Sulfate Soils Assessment Guidelines*. The ASSMPs should include protocols for the offsite disposal of acid sulfate soils and potential acid sulfate soils in accordance with the NSW EPA (2014) *Waste Classification Guidelines: Part 4; Acid sulfate soils*.

Response

The protocols for identifying, managing, monitoring and disposing of acid sulfate soils would be detailed in Acid Sulfate Soil Management Plan (environmental , amended in **Chapter 8** (Revised environmental management measures) in this report GW01), which would form part of the Construction Environment Management Plan.

As detailed in Section 9.6.8 of Appendix O (Technical working paper: Contamination) of the EIS, the Acid Sulfate Soil Management Plan would be prepared in accordance with Acid Sulfate Soils Management Advisory Committee's (ASSMAC) (1998) *Acid Sulfate Soils Assessment Guidelines* and *Waste Classification Guidelines: Part 4: Acid Sulfate Soils* (2014). It would also be managed in accordance with Roads and Maritime's *Guideline for the Management of Acid Sulfate Materials* (RTA, 2005), which was prepared with reference to Acid Sulfate Soils Management Advisory Committee's (ASSMAC) (1998) *Acid Sulfate Soils Assessment Guidelines*.

Local councils would be consulted during the preparation of the Construction Environmental Management Plan, which would be subject to approval by DP&E.

Issue description – site investigations

Prior to any intrusive ground works commencing, a Phase 2 Detailed Environmental Site Investigations (DESI) should be undertaken on sites subject to historic contaminating activities and those specifically referred to in the Phase 1 Preliminary Environmental Site Investigation previously carried out by AECOM. Detailed site investigations should also occur on any land where a more sensitive land use is proposed such as open landscaped areas where direct exposure pathways would exist to any potential existing contamination such as contaminated fill materials by the public accessing these areas or personnel engaged in maintenance.

The DESI should confirm that the site is suitable for the proposed land use or requires remediation/ongoing environmental management in order to make it suitable.

Response

Potentially contaminated sites identified in Table 17-6 of the EIS would be subject to further investigation, remediation and / or management in accordance with the measures described in Section 17.3.3 and those outlined in Section 17.4 of the EIS. These measures would be implemented so that all land used as part of the project is suitable for the proposed land use. This includes, where relevant, the use as open space.

Where necessary, Remedial Action Plans (RAPs) would be prepared for sites that require remediation to make it suitable for the intended land use. RAPs would be prepared in accordance with relevant NSW EPA approved guidelines at the time of preparation. RAPs would be reviewed and approved by the appointed NSW Site Auditor. RAPs would consider the intended land use, and potential exposure pathways.

Chapter 9 of Appendix O (Technical working paper: Contamination) of the EIS provides for further information concerning contamination assessment.

Issue description – site investigation compliance

A NSW EPA Accredited Site Auditor should be engaged to ensure that these additional site investigations and any required remediation action plans/environmental management plans have been conducted in accordance with relevant NSW EPA *Guidelines and the National Environmental Protection (Assessment of Site Contamination) Measure 1999 (Revised 2013)*. The Auditor should confirm either by a letter of interim advice or a Site Audit Statement that these sites are suitable or would be made suitable following implementation of the proposed remediation strategy for the intended use.

On completion of any site specific remediation, site validation reports must be prepared, submitted to, reviewed and approved by the Site Auditor and a Site Audit Statement issued by the Auditor confirming the specific site is suitable for the proposed use.

Where future site suitability is dependent upon an ongoing Environmental Management Plan to manage any residual contamination that may exist and remain on site, this must be discussed and approved by the relevant authority that would be responsible for owning and/or maintaining those areas.

Any new information which comes to light during remediation, demolition or construction works which has the potential to alter previous conclusions about site contamination should immediately be notified to the appointed Site Auditor in accordance with procedures set out in the Construction Environmental Management Plan to be developed for the project.

Excavated materials requiring off-site disposal must be classified in accordance with the NSW EPA (2014) *Waste Classification Guidelines*; or as an applicable resource recovery exemption and order under the *Protection of the Environment Operation (Waste) Regulation 2014*.

Response

Potentially contaminated areas directly affected by the project would be investigated and managed in accordance with the requirements of guidelines endorsed under section 105 of the *Contaminated Land Management Act 1997*. This includes further investigations in areas of potential contamination identified in the construction footprint. A NSW EPA-accredited Site Auditor would be engaged as required under the *Contaminated Land Management Act 1997*.

Further, all site investigation works have and would be undertaken in accordance with the NSW EPA contaminated land framework and guidelines, particularly the *National Environmental Protection (Assessment of Site Contamination) Measure 2013* (National Environment Protection Council, 2013) and the *Contaminated Sites: Guidelines for Consultants Reporting on Contaminated Sites* (Office of Environment and Heritage, 2011).

Roads and Maritime would adhere to all statutory requirements under the *Waste Classification Guidelines* (EPA, 2014) and the *Protection of the Environment Operation (Waste) Regulation 2014*, where relevant.

Waste management plans, as part of the Construction Environmental Management Plan, would include procedures for handling and storing potentially contaminated spoil and, should off-site disposal be required, undertaking waste assessment and classification for off-site disposal to appropriately licenced waste facilities (environmental , amended in **Chapter 8** (Revised environmental management measures) in this report CM05).

An unexpected finds and hazardous materials procedure would be implemented to manage any potentially contaminated materials that may be encountered during site preparation and / or construction works (environmental management measure CM03, amended in **Chapter 8** (Revised environmental management measures) in this report).

In the event of encountering unexpected finds of contamination (i.e. the observation of offensive odours, soil discoloration, buried waste or potential asbestos containing materials) during construction, work in the area would cease until an appropriately qualified environmental consultant can advise on the need for further assessment, remediation or other action, as deemed appropriate. Further assessment and management of contamination, if required, would be undertaken in accordance with section 105 of the CLM Act (environmental management measure CM10, amended in **Chapter 8** (Revised environmental management measures) in this report).

Ongoing management of sites with contamination managed or emplaced in-situ would be managed in accordance with site specific Site Management Plans. Where required, a Site Management Plan (SMP) would be developed and implemented to manage risks associated with the presence of residual contamination that in situ. The requirement for an SMP would be evaluated based on the nature, concentration and extent of contamination as well as the current and proposed land use. An additional environmental management measure has been included to reflect this requirement (environmental management measure OpCM4, amended in **Chapter 8** (Revised environmental management measures) in this report).

4.14.15 Flooding and drainage

Issue description – water discharge criteria

Discharge of water into Alexandra Canal during construction, operation, or as a result of overflow in a major storm event has a major potential environmental impact. Both the quality and quantity of water entering Alexandra Canal as a result of this project should be considered when assessing the impact.

Any water discharged into Alexandra Canal must meet Botany Bay catchment water quality standards. These water quality standards should also be met during construction.

Response

The quality of surface water runoff during the construction phase is largely determined by sediment and erosion control measures. The Managing Urban Stormwater (MUS) handbooks were produced to provide guidelines, principles, and recommended minimum design standards for good management practice in erosion and sediment control specifically for the construction of roads. Of particular relevance to the project are Volume 1, 4th Edition (Landcom, 2004) (commonly known as The Blue Book 1) and Volume 2D, Main Road Construction (DECC, 2008) (commonly known as The Blue Book 2). These guidelines would be applied to the project during construction.

Water quality management during the operational phase of the project would be managed in accordance with the targets of the Botany Bay Water and Catchment Quality Improvement Plan (SMCMA, 2010). The stormwater treatment provided by the project is expected to result in a net reduction in pollutants that would be discharged to the Alexandra Canal and the Cooks River, and subsequently Botany Bay (refer to Table 40 in Appendix N Technical working paper: Surface water).

Water quality monitoring of the receiving environment would be undertaken during construction and operation phases to ensure that the environment is not adversely impacted by the project.

The water quantity impacts of the project on Alexandra Canal were considered and found unlikely to impact the canal. Water quantity impacts are possible where a channel has been formed in response to catchment runoff. In such cases, as catchment runoff increases, the conveyance capacity of the channel must increase or it would be subject to erosion. Alexandra Canal is a constructed canal and consequently it is much wider and deeper than required to convey catchment runoff. Therefore, increases in flow resulting from increases in impervious surfaces would not affect the conveyance capacity of the canal. Localised impacts would be addressed at new discharge outlets into Alexandra Canal. These would be designed with scour protection measures to minimise the potential for sediment disturbance caused by the operation of new outlets. The design of the outlets, including discharge velocities and scour protection measures, would be confirmed during detailed design, informed by appropriate drainage modelling.

Water quantity impacts are also possible where catchment runoff determines the hydrology of the receiving environment (for example, wetlands). Alexandra Canal is tidally dominated through its connection to the Cooks River. The tidal influence from the Cooks River extends to the head of the canal. Consequently, any changes to catchment hydrology would not impact the strong influence of the tides in determining the tidal hydrology of the canal.

Issue description – water Sustainable Urban Design (WSUD)

Roadside bioswales should be considered along the edges of the road where space allows to reduce impact of increased stormwater run-off into Alexandra Canal.

Relocation of the bio-retention pond on the Euston Road edge of the St Peters Interchange site should be considered to free up that land for active recreation uses, should air quality considerations allow.

Surface water from the site, and tunnel water, should be reused on site for construction and operational demands. Water that is collected on site and surplus to the capacity of the water detention pond, or the operational demand of the motorway, should be pumped into the Sydney Park reticulation system or distributed locally for use by other parties, to prevent unnecessary discharge into Alexandra Canal.

Response

Design of surface water quality management measures for the project have taken into account anticipated surface water runoff quality, identified water quality treatment objectives and the principles of Water Sensitive Urban Design (WSUD), as included in the Botany Bay and Catchment Water Quality Improvement Plan (SMCMA, 2010).

A key factor in determining the suite of surface water quality management measures has been the availability of space, noting the stated project objective to minimise the need for land acquisition. There is limited potential for relocation of the bioretention ponds to be constructed as part of the St Peters interchange, given the required capacity of these ponds and the availability of residual land within the site in which to locate the ponds.

An updated water balance would be prepared during detailed design, which would be used to further improve water efficiency during the operation of the project including rainwater harvesting measures. Connection to or supply of excess stormwater to Council's Sydney Park Stormwater Harvesting Scheme does not form part of the project. Roads and Maritime would liaise with Council during detailed design to determine if such a connection is feasible, should Council wish to make such a connection.

The design of surface water quality management measures would continue to be refined through the detailed design phase for the project. This commitment is reflected in environmental management measure OpSW01 in Table 30-1 in the EIS and in **Chapter 8** (revised environmental management measures) of this report.

4.14.16 Groundwater

Issue description – discharge of groundwater from the project site

Groundwater (page 70)

The information provided within the assessment [of groundwater] is satisfactory with exception of the proposed discharge of groundwater emanating from this site to the Alexandra Canal and Cooks River during construction and long term operations.

The EIS recommends for groundwater to be collected, treated and discharged in accordance with the Australian and New Zealand *Guidelines for Fresh and Marine Water Quality 2000* (ANZECC 2000) for a highly disturbed ecosystem.

The project involves long term discharge of ground water during both construction and operational stages for which a reduced level of protection as a short term goal does not appear to be appropriate.

Further clarification should be obtained on the proposed level of treatment in relation to ANZECC 2000 and protection of the Alexandria Canal and Cooks River over the long term.

Response

As detailed in Appendix A of Technical working paper: Surface water (Appendix N of the EIS), project specific trigger levels have been generated by forming a reference data set (the Water Quality Reference Criteria). Trigger values were selected to accord with objective to improve the condition of the waterways, which is consistent with the Botany Bay and Catchment Water Quality Improvement Plan.

As discussed in Chapter 2 of Technical working paper: Surface water, ANZECC (2000) states that 95 per cent species protection is appropriate for ecosystems that are slightly to moderately disturbed. However, for ecosystems such as those relevant to the project that can be classified as highly disturbed ecosystems, it can be appropriate to apply a less stringent guideline trigger value of 90 per cent or 80 per cent species protection (ANZECC 2000, Section 3.4.2.4).

The trigger values selected for the project apply the 20th and 80th percentiles of measures values using available water quality data (referred to as reference data set under ANZECC (2000)). For toxicants (such as heavy metals or organic compounds), a reference data set is not required (see Table 3.4.1 in ANZECC (2000)). In these instances, the water quality requirement is consistent with the 80 per cent level for freshwater ecosystems.

The water treatment plants used during construction and operation would be designed to ensure that discharge water quality would meet the Water Quality Reference Criteria (See Technical working paper: Surface water). Further, surface water monitoring would be undertaken in accordance with the water quality program for during construction and 12 months post-construction or as otherwise required by the conditions of approval to ensure that discharges are meeting these criteria.

Issue description – conditions of approval (construction)

To mitigate and manage the potential impacts of the project, the following measures must form part of the consent conditions, should the project be approved:

- A tunnelling waterproofing procedure that outlines the methodology to determine when and what type of waterproofing is required to be installed during construction
- Appropriate waterproofing measures shall be implemented to permanently reduce the inflow to an acceptable quantity where the project alignment passes close to watercourses and/or where higher than expected inflows are experienced
- Pre-excavation pressure grouting shall be used in locations that could produce substantial inflows to reduce groundwater inflows to an acceptable level. Post-excavation grouting may also be required to further reduce groundwater inflows, and would occur shortly following the excavation of that area
- Additional rock support shall be installed where saturated faults and fractures are intersected by the project to ensure tunnel stability
- A Construction Soil and Water Quality Management Plan shall be implemented during construction, which would also manage groundwater impacts during construction due to disturbances at the surface. This is to include:
 - An acid sulfate soil management plan, which shall be prepared prior to the commencement of bulk earth works where potential acid sulfate soils are expected. The plan should include the types of treatment required for acid sulfate soils, bunding and requirement for treatment ponds
 - Management measures for the storage and stockpiling of materials, fuel and wastes during construction.

Response

Conditions of approval are a matter for DP&E to consider during its assessment of the critical State significant infrastructure application.

The project has been designed and would be constructed to achieve a groundwater ingress rate of no more than one litre per second per kilometre. As detailed chapter 19 of the EIS and as provided in **Chapter 8** (Revised summary of environmental management measures), Roads and Maritime has already committed to the following during construction:

- A tunnelling procedure would be implemented that details a methodology to determine when and what type of waterproofing is required to be installed during construction (environmental management measure GW12, amended in **Chapter 8** (Revised environmental management measures) in this report).
- Pre-excavation pressure grouting may also be used in locations identified that could produce substantial inflows to reduce groundwater inflows to an acceptable level (environmental management measure GW12, amended in **Chapter 8** (Revised environmental management measures) in this report).
- Post grouting (i.e. grouting undertaken post excavation) may also be required to further reduce groundwater inflows. Post grouting would occur within one month post excavation (environmental management measure GW12, amended in **Chapter 8** (Revised environmental management measures) in this report).
- Where saturated faults and fractures are intersected, additional rock support would be installed in order to ensure tunnel stability (environmental management measure GW07). Appropriate waterproofing measure to reduce the inflow to an acceptable quantity would be applied as required. Measures can range from a spray- on membrane to grouting or installation of a sheet membrane.
- A Soil and Water Management Plan (SW02) and an Acid Sulfate Soil Management Plan (SW09) would be prepared and implemented.

Issue description – conditions of approval (spill prevention and response procedures)

The following should also be included as conditions of consent, should approval be granted:

- A protocol to address unexpected contaminated finds or unforeseen contamination issues during surface works and tunnelling shall be devised prior to commencement of the works. This would include approaches to remove the source of contamination by excavation, or an engineering solution to prevent the migration of contaminated groundwater into the tunnels.
- Shallow perched groundwater within Alexandria Landfill or Botany Sands shall be directed to the leachate treatment plant or the construction water treatment plant prior to discharge, depending on the characteristics of this groundwater. Elsewhere, collection and treatment options should be considered and releases made under relevant discharge criteria.
- Treated waste water should be stored and re-used for project purposes wherever possible. Groundwater reuse shall be in accordance with the policies of sustainable water use of the Department of Primary Industries (Water), such as dust suppression and earthworks.
- A groundwater soil and salinity report shall be prepared detailing the outcomes of geotechnical investigations to determine the presence, extent and severity of soil salinity along the alignment. The report is to be prepared in consultation with Office of Environment and Heritage and NSW Department of Primary Industries (Water). Measures would be outlined to minimise impacts on groundwater systems and other receiving environments.
- A groundwater monitoring program shall be prepared and implemented to monitor groundwater impacts during construction on groundwater quality. The program shall be developed in consultation with the Department of Primary Industries (Water) and relevant councils including the City of Sydney. If adverse impacts to groundwater quality are identified by the monitoring program due to construction activity, strategies would be developed and implemented to reduce the impacts.
- Contingency measures to address leachate management at the Alexandria Landfill during construction and prior to the commissioning of the leachate treatment plant shall be explored during detailed design. Identified measures should be detailed in the Construction Environmental Management Plan and implemented during construction.

- Contingency measures shall be implemented in the event that of interaction with contaminated groundwater during construction within the Alexandria Landfill.
- Building materials that are resistant to aggressive groundwater conditions should be selected.

Response

Conditions of approval are a matter for DP&E to consider during its assessment of the critical State significant infrastructure application.

However, the outcomes Council seeks to achieve through its suggested conditions of approval are already addressed through the design of the project and the environmental management measures detailed in **Chapter 8** (Revised environmental management measures) of this report. This includes:

- Environmental management measure GW04 (amended in **Chapter 8** (Revised environmental management measures) in this report), which includes the requirement to manage contaminated groundwater issues during tunnelling. This may include the removal of the source of the contamination by excavation and remediation of shallow impacted soils or engineering a solution to prevent the migration of contaminated groundwater into the tunnels.
- Environmental management measure CM04 (amended in **Chapter 8** (Revised environmental management measures) in this report), which requires the implementation of an unexpected finds procedure to manage any potential contamination materials that may be encountered during construction.
- Environmental management measure GW05 (amended in **Chapter 8** (Revised environmental management measures) in this report), which required shallow perched contaminated groundwater within the Alexandria Landfill or Botany Sands to be directed to the water treatment plants prior to discharge. Elsewhere, collection and treatment options would be considered and releases made under relevant discharge criteria
- Environmental management measure GW02 (amended in **Chapter 8** (Revised environmental management measures) in this report), which requires the preparation of a groundwater and salinity report
- Environmental management measure GW13 (amended in **Chapter 8** (Revised environmental management measures) in this report), which requires the implementation of a groundwater monitoring program which would be developed in consultation with EPA, DPI (Fisheries), DPI (Water) and relevant councils
- Environmental management measure GW03 (amended in **Chapter 8** (Revised environmental management measures) in this report), which requires the identification of contingency measures to address leachate management at Alexandria Landfill
- Environmental management measure CM02 (amended in **Chapter 8** (Revised environmental management measures) in this report), which requires a site specific management plan would be prepared for Alexandria Landfill to manage the excavation of parts of the landfill during construction. This would detail contingency measures for potentially contaminated groundwater inflow
- Environmental management measure GW10, which requires the selection of building materials that are resistant to aggressive groundwater conditions (amended in **Chapter 8** (Revised environmental management measures) in this report).

Issue description – groundwater user impacts

City of Sydney recommends the following condition of approval: In the event that the drawdown in a water supply bore or irrigation bore exceeds two metres (in accordance with the Aquifer Interference Policy) measures shall be taken to 'make good' the impact by restoring the water supply to pre-development levels. The measures taken would be dependent upon the location of the impacted bore but could include, deepening the bore, providing a new bore or providing an alternative water supply.

Response

In the event that the drawdown in a water supply bore or irrigation bore exceeds two metres (in accordance with the Aquifer Interference Policy) or that impacts to groundwater quality alter the beneficial use of the water, measures would be taken to 'make good' the impact by restoring the water supply to pre-development levels. The measures taken would be dependent upon the location of the impacted bore and would be determined in consultation with the affected licence holder but could include, deepening the bore, providing a new bore or providing an alternative water supply.

This measure (GW15) is reflected in Table 30-1 in the EIS and **Chapter 8** (Revised environmental management measures) of this report already.

Issue description – operational mitigation measures

Following construction and implementation of mitigation strategies, there could be residual impacts to groundwater throughout the long term operational phase. Operational environmental measures should be prepared as part of the Operational Environmental Management Plan (OEMP), which contain response plans to manage on-going monitoring and reporting requirements, spillages or incidents.

Response

Table 30-1 in the EIS and **Chapter 8** (Revised environmental management measures) of this report already include an equivalent environmental management measure (OpGW01).

4.14.17 Non-Aboriginal heritage

Issue description – Rudder's Bond Store

It [the Rudder's Bond Store (NAH 07)] would result in loss of significant fabric and, in particular, the Ralph Symonds laminated timber structural system and is not supported.

The environmental management measures (page 20-53 of the EIS and amended in **Chapter 8** (Revised environmental management measures) in this report), require that consideration be given to reusing the laminated timber structures elsewhere within the St Peters interchange or the local area. This is very open ended and, based on other precedents, may result in the salvaged fabric being stored and then lost, or used in a perfunctory or piecemeal fashion. If the building is to be demolished, the salvage and reuse of the significant laminated timber fabric must be actively built into the St Peters interchange project.

If the City of Sydney's objection to the demolition of this heritage item is not sustained the following comments apply.

- In addition to environmental management measures proposed in the EIS (amended in **Chapter 8** (Revised environmental management measures) in this report), an effective way of conserving the significant laminated timber structure of this building would be to incorporate them into new buildings required for the project. A number of buildings required for the St Peters interchange appear to require long span structures and the long term conservation of the trusses would be guaranteed if they served a functional purpose in a working building. This would provide a certain conservation outcome, allow interpretation of the structures and deliver a better ESD outcome by re-using structures and lowering the embodied energy of the project.
- Another potential use for the trusses would be the incorporation into a large span recreation facility such as a gymnasium. This would allow public access and heritage interpretation of the structures.

There are very good precedents for the reuse of trusses in conservation projects in Sydney and elsewhere (for example, the Gantry project in Camperdown by Bates Smart).

Response

The significance of the Rudders Bond Store is recognised. As concluded in the EIS, the store has been deemed to hold State historical, aesthetic, technical and rarity significance. However, it is not possible to retain the store and office in situ given its location and the design requirements for the St Peters interchange.

Based on the aesthetic significance and rarity of the store, consideration would be given to the salvage of selected laminated timber columns, subject to a structural assessment, for use elsewhere within the St Peters interchange or the local area (to be determined during detailed design). Salvage of these elements and adaptive reuse through either structural frameworks for public amenities or interpretative items would enable the public to gain a better appreciation of Ralph Symonds and his important contribution to Australian architecture. It is acknowledged that some of the significance would be lost by relocating the features of the item from its current context, however, it is preferable to losing these values altogether.

In consultation with the Heritage Council and the Heritage Division of Office of Environment and Heritage, and with advice from a suitably qualified heritage specialist, Roads and Maritime would identify the level of fabric salvage required, identify an appropriate methodology for salvage and investigate appropriate adaptive reuse and locations for reuse of these elements. This would be undertaken during detailed design/pre-construction. Environmental management measure NAH07 has been amended to reflect this revised commitment (refer to **Chapter 8** (Revised environmental management measures) in this report).

Chapter 8 (Revised environmental management measures) of this report also includes additional environmental management measures would be implemented with respect to this item, including archival recording, a comparative analysis and documentation of the history of the Ralph Symonds company in associated with stakeholders such as the City of Sydney.

Issue description – Alexandra Canal

New bridges over the Alexandra Canal (NAH 16) have a potentially acceptable heritage impact provided the amelioration measures recommended in the EIS, together with the additional measures recommended by City of Sydney, are followed.

Recommended conditions in addition to those proposed in the EIS are:

- The areas of the canal embankments subject to direct physical disturbance and/or vibration impacts should be accurately surveyed prior to the commencement of works.
- A 3D scan of the site should be carried out in addition to the suggested archival photography. This would facilitate the conservation of the site, including the incorporation of sandstone blocks disturbed by the work into the repair and restoration of affected areas of the embankment.
- The engineering and architectural design of the new bridges must ensure that they provide good amenity to users passing beneath them on land or water. It is crucial that these major works are carried out to a high standard of engineering, architectural aesthetics and built quality as, in the long term, they would be passed under by pedestrians, cyclists and waterway users of the Alexandra Canal corridor.

Response

Roads and Maritime has committed to preparing the final urban design and landscape plan in consultation with the New M5 Design Review Panel, local councils and the community (environmental management measure OpV06, amended in **Chapter 8** (Revised environmental management measures) in this report). This would include the detailed design and integration of the bridges over the Alexandra Canal, which would consider the heritage sensitivity of the setting as set out in the Alexandra Canal Heritage Conservation Plan. Roads and Maritime would consult with the Heritage Council and City of Sydney as part of this detailed design process as it relates to the bridges over Alexandra Canal. This environmental management measure has been amended to reflect this consultation.

An archival recording of the canal would occur, involving both scale drawings and photography, prior to the removal of any sandstone blocks required for the construction of the project, as well as a condition report for areas surrounding the construction areas in the vicinity of the canal. Measures to manage the instatement or re-use of any sandstone blocks would also be implemented (environmental management measure NAH16, (amended in **Chapter 8** (Revised environmental management measures) in this report).

Furthermore, as stated in Appendix R (Technical working paper: Non-Aboriginal heritage) of the EIS, stabilisation of the canal walls in the vicinity of the crossings and stormwater outlets would be required. Any rehabilitation or conservation works in the vicinity of these areas would be determined in consultation with Sydney Water, as the asset owner. Environmental management measure NAH16 has been amended to reflect the requirement for this consultation (refer to **Chapter 8** (Revised environmental management measures) in this report).

As stated in Table 63 of Appendix R (Technical working paper: Non-Aboriginal heritage) of the EIS, skilled trades people would be used for the works along Alexandra Canal that involve direct interaction with the heritage item, who would take advice from heritage professionals as and when necessary. This is outlined in the amended environmental management measures (**Chapter 8** of this report).

Mitigation and management measures would be developed for Alexandra Canal to manage the potential risks to the item due to construction vibration. These mitigation and management measures would be included in the construction environmental management plans for the project (NAH03 and NAH09 (amended in **Chapter 8** (Revised environmental management measures) in this report)).

As stated in Table 63 of Appendix R (Technical working paper: Non-Aboriginal heritage) of the EIS, skilled trades people would be used for the proposed works along Alexandra Canal that involve direct interaction with the heritage item, who would take advice from heritage professionals as and when necessary.

Issue description – acoustic treatment at 2 – 34 Campbell Road terraces

In addition to the Campbell Road Terrace House group (I12), the EIS identifies that up to 57 heritage items may be eligible for at-property acoustic upgrades due to the widening of local roads in connection with the project and the resulting increase in traffic intensity.

Poorly conceived and designed acoustic treatment of heritage buildings can cause serious damage to heritage fabric and significance including the loss of original external joinery and internal lining and finishes.

Response

Any at-property acoustic treatments for the Campbell Road Terrace House group would be designed in collaboration with an appropriately qualified and experienced heritage architect to avoid the loss of original fabric and to minimise impacts to the group's heritage significance. Upgrades would meet relevant building standards and industry best practices.

Issue description – Campbell Road pedestrian/cycle bridge impacts on the Campbell Road terraces

In addition to the measures included in the EIS, the negative impacts of the proposed Campbell Road pedestrian/cycle bridge on the Campbell Road Terrace House group (I12) could be ameliorated by moving the bridge further west (depending on connectivity outcomes) and reducing the width of the bridge without reducing the functionality or width required for its pedestrian/bike rider connectivity. This would also reduce the risk of damage from construction vibration.

Response

The location of the pedestrian / cycle bridge is constrained to its proposed location by the presence of the Campbell Road Terrace House group to the east and the City of Sydney's initiative known as City Farm to the west.

The pedestrian / cycle bridge across Campbell Road would not directly affect the Campbell Road Terrace House group, and has been designed to minimise the potential indirect visual and overshadowing impacts on this heritage item. However, residual impacts would remain. As stated in Appendix K (Technical working paper: Landscape character and visual impacts) of the EIS, opportunities to further minimise these impacts would be explored during detailed design. An environmental management measure has been recommended to reflect this undertaking.

Issue description – loss of access to St Peters Brickpit Geological Site

The loss of this important and readily accessible, geological teaching resource is unfortunate. The current design of the project appears to remove or bury the salient geological features, and it is unlikely to retain any scientific or teaching value. Even if the geological elements survive the construction process, they are likely to be within the operational area of the St Peters interchange and would not be readily accessible.

Response

The St Peters Brickpit Geological Site is currently located within the former Alexandria landfill site with restricted access based on the safety requirements of an active landfill site.

The cut and fill balance required to construct the St Peters interchange means that part of the St Peters Brickpit Geological Site would be concealed with fill. This impact on the heritage item is unavoidable but would deny ready access to, rather than destroy its geological heritage value. The heritage impact assessment presented in the EIS concludes that this concealment represents a minor impact only.

Development of the St Peters interchange site with the proposed interpretation strategy for the item would provide an opportunity to improve public access to those parts of the heritage item that remain exposed, if feasible (refer to environmental management measure NAH17, amended in **Chapter 8** (Revised environmental management measures) in this report). This would allow for greater public knowledge of the site, and improved interpretation contributing to a greater understanding of the geological and palaeontological history of the Sydney Basin.

Issue description – vibration and subsidence impacts to properties

Vibration, settlement and groundwater drawdown have the potential to affect both heritage and non-heritage properties in the City of Sydney LGA and is a major construction risk issue. There are precedents in Sydney for the damage and loss of buildings due to subsidence and or vibration from road tunnel projects and these must be anticipated and prevented.

In addition to the measures included in the EIS (refer to page 20-54), it is recommended that detailed dilapidation surveys, including the installation of structural 'tell tales,' be carried at all properties listed under NAH10.

Response

Building condition surveys would be undertaken on properties and structures (including heritage and non-heritage items) located:

- Within the preferred project corridor (the zone on the surface equal to 50 metres from the outer edge of the tunnels)
- Where the potential for exceedances of the blasting criteria is identified.

Building condition surveys of potentially affected structures would be completed both before the start of tunnelling or other vibration intensive works and after completion of works, to identify existing damage and any damage due to the works. Where project induced settlement or noise and vibration impacts are deemed the cause of cracking, cracks would be filled, new external masonry cracks would be repointed for weather tightness, and depressions created by settlement would be rectified. A monitoring program would also be undertaken to ensure that settlement has stabilised before monitoring is completed.

Issue description – heritage interpretation

In addition to the environmental management measures listed on page 20-56 of the EIS (amended in **Chapter 8** (Revised environmental management measures) in this report), the brief for the public art, and the design of conspicuous built elements of the project should be informed by the heritage of the places affected or adjacent to the route (NAH 17). This approach has been successfully applied to other major road projects in NSW (for example, the Gore Hill Freeway incorporates interpretation of Aboriginal rock carvings in its sound walls and retaining walls).

Interpretation of the St Peters Brickpit Geological Site into both the interpretation plan and the public art brief is recommended.

Response

The urban design and landscaping strategy would continue to be developed during detailed design in consultation with the New M5 Urban Design Review Panel, local councils along the project corridor and local communities (OpV06). As part of this process, opportunities to reflect the heritage of the local area and the St Peters Brickpit Geological Site would be considered and would form part of the interpretation plan for the item (environmental management measure NAH17, amended in **Chapter 8** (Revised environmental management measures) in this report). The outcomes of this process would be included in a final Urban Design and Landscape Plan for the project. As stated in both environmental management measures, City of Sydney would be consulted.

Issue description – excavation of St Peters Brickpit Geological site

Given that the project entails the substantial removal of this geological resource, the project budget and program must include provision for a scientifically supervised excavation of the site if palaeontologists believe that the site has potential to yield further specimens of scientific interest.

Response

The cut and fill balance required to construct the St Peters interchange means that part of the St Peters Brickpit Geological Site would be concealed with fill. This impact on the heritage item is unavoidable but would deny ready access to, rather than destroy its geological heritage value.

In accordance with environmental management measure NAH04 (amended in **Chapter 8** (Revised environmental management measures) in this report), an archival recording of the St Peters Brickpit Geological Site would be completed before and during the construction. Management of construction activities in and around heritage sites would be subject to measures to be developed and detailed in a Construction Heritage Management Plan for the project.

The interpretation strategy would also be prepared and implemented for the site, as discussed earlier in this section.

Issue description – other environmental management measures

Heritage impacts numbered in Table 20-7 of the EIS but not discussed in the City of Sydney's submission are regarded as acceptable if the environmental management measures recommended to ameliorate their impacts are carried out in full.

Response

Noted.

4.14.18 Biodiversity

This section responds to the comments raised in the *Review of Biodiversity Assessment* (the review) prepared by the City of Sydney and Marrickville Councils in response to the Technical working paper: Biodiversity Assessment Report (Appendix S of the EIS). The responses are targeted at the comments made in Section 3 of the Review of Biodiversity Assessment and in some cases comments have been amalgamated so that a consolidated response can be provided to a particular issue.

Issue description – biodiversity assessment inconsistencies

Validity of the Biodiversity Assessment Report (page 7)

The City of Sydney is concerned that the assessment is not adequate or complete, specifically in regards to the biodiversity values at the St Peters interchange.

The BAR [Technical working paper: Biodiversity Assessment Report] focuses on threatened species, populations and ecological communities, as does the FBA. More consideration should have been given to biodiversity more generally. There are species and sites that are considered to be of local conservation significance within the City of Sydney and Marrickville Council areas, and numerous initiatives have been implemented to conserve and enhance habitat for/at them, but these have not been identified in the BAR.

No consideration was given to local data held by the City of Sydney or Marrickville Councils. It is not clear why this was the case. Threatened species records held by both Councils are discussed in Section 3.2 of this report, as well as records of migratory species listed under the Commonwealth *Environment Protection & Biodiversity Conservation Act 1999* (EPBC Act).

Response

The Technical working paper: Biodiversity Assessment Report for the project has been prepared in accordance with the Framework for Biodiversity Assessment (FBA) and in accordance with the SEARs.

To inform the list of species and communities that could potentially be affected by the project, the FBA credit calculator was used to identify ecosystem credit and species credit species. The credit calculator is a decision support tool provided by NSW OEH. In accordance with the FBA, an accredited assessor has used the credit calculator to undertake the assessment on biodiversity values by the project and has prepared the Technical working paper: Biodiversity Assessment Report.

The credit calculator is informed by a number of databases which are periodically updated to reflect updated information relevant to biodiversity values and data. Databases considered in the credit calculator include:

- NSW Vegetation Information System Classification Database (VIS Classification Database)
- Threatened Species Profile Database
- Vegetation Benchmarks Database
- Over-cleared landscapes database (Mitchell landscapes).

In addition to these databases, the Technical working paper: Biodiversity Assessment Report has used the following databases to inform the assessment of the project:

- Sydney Metropolitan Catchment Management Authority Vegetation Mapping (OEH 2013).
- Native Vegetation Maps of the Cumberland Plain, Western Sydney (NPWS 2002).
- OEH Atlas of NSW Wildlife (10 kilometre radius search), accessed 13 Nov 2014.
- EPBC Act Protected Matters Search Tool (10 kilometre radius search), accessed 1 Dec 2014.
- NSW DPI Fisheries threatened and protected species records viewer (FM Act), accessed 4 June 2015.
- NSW DPI Fisheries Key Fish Habitat Map, accessed 4 June 2015.
- NSW Fisheries Marine Vegetation Map (Botany Bay and Cooks River).
- Bureau of Meteorology Groundwater Dependent Ecosystems Atlas, accessed 3 June 2015.

The use of the abovementioned databases meets the requirements of the FBA and is considered appropriate and sufficient to identify threatened species and / or communities that could potentially be impacted by the project. Given this, the calculated offsets are also deemed appropriate.

There is no requirement to utilise threatened species records held by local councils.

The biodiversity values of non-threatened species and ecological communities was addressed in the Technical working paper: Biodiversity Assessment Report by identifying the amount of urban and native vegetation present, the distribution and number of hollow bearing trees within the development footprint, the likely impacts on groundwater dependant ecosystems along with aquatic and riparian habitats and by reporting survey results for all bird species surveyed in Eve Wetlands. The Technical working paper: Biodiversity Assessment Report represents a comprehensive assessment of likely biodiversity impacts that has been endorsed by OEH as meeting the requirements of the FBA

Section 7.6.2 of the Technical working paper: Biodiversity Assessment Report identifies the management of native vegetation and states that landscaping should reflect native vegetation in the local area as well as providing for foraging habitat for native fauna.

Issue description – wetlands not indicated on location maps

Validity of the Biodiversity Assessment Report (page 7)

The wetlands and the majority of fringing native vegetation in Sydney Park, and scattered plants of the endangered Coastal Saltmarsh community along Alexandra Canal are not indicated on these or any other maps in the BAR. Similarly, native vegetation including Coastal Saltmarsh and Grey Mangroves at Tempe Reserve are not indicated on any maps, despite being within the outer assessment circle. Finally, the wetlands and native vegetation at Tempe Lands are not indicated on any other maps. Although this site is outside of the outer assessment circle, it is close to the tunnel alignment, suggesting it could be impacted and therefore should have been included.

Also, local wetlands in Sydney Park, immediately adjacent to the development site, and Tempe Lands are not shown on any maps.

Response

Under the FBA, local wetlands within the development area must be mapped. All such wetlands have been mapped within the development area, noting that mapping at the scale of scattered plants which may be of a species associated with wetlands is not practical.

Groundwater dependent ecosystems were considered in the Technical working paper: Biodiversity Assessment Report and Technical working paper: Groundwater. As detailed in Section 7.6 of Technical working paper: Groundwater, groundwater modelling predicted that drawdown at Tempe Wetlands would be negligible.

Issue description – biodiversity assessment report mapping inconsistencies

Validity of the Biodiversity Assessment Report (page 7)

It is not clear whether the vegetation at Sydney Park, Tempe Reserve and Tempe Lands should have been identified as PCTs, despite having been planted (with the exception of Grey Mangroves). It appears this vegetation was dismissed as 'urban exotic and native', without being carefully considered, as illustrated by the fact that no vegetation at all was mapped in Sydney Park on Figure 9 of the BAR, or in Tempe Reserve on Figure 8. It is understood this vegetation is not within the development footprint, but in the case of Sydney Park it is immediately adjacent to it, and as mentioned above, Tempe Reserve is within the outer assessment circle and Tempe Lands, although outside of the outer assessment circle, could be impacted. It is considered that identifying the vegetation at these sites through mapping would assist in identifying impacts and ensuring they are mitigated.

Response

Under the FBA, there is no requirement to identify plant community types (PCTs) outside the development area.

The assessment is required to identify PCTs in the development area only. Notwithstanding, vegetation in Sydney Park does not meet the description of any known PCT. The Sydney Park Plan of Management (City of Sydney 2014) does not map any native vegetation types across the Park, but refers to extensive planted vegetation in the park. Given this, no PCT could be reliably assigned to any of this vegetation. The plan also does not identify any native vegetation communities in the park.

Section 3.5 of the Technical working paper: Biodiversity Assessment Report identifies and assesses potential impacts on groundwater dependent ecosystems (GDEs) within the assessment 'circle' established consistent with the requirements of the FBA.

Issue description – council biodiversity strategies not reviewed

Validity of the Biodiversity Assessment Report (page 8)

Both the City of Sydney and Marrickville Council have prepared biodiversity strategies including vegetation mapping relevant to the study area, as discussed further in Section 3.3, but neither these or associated reports or data were reviewed for or otherwise referenced in the BAR.

Relationship to council initiatives (page 9)

Both the City of Sydney and Marrickville Councils and their respective community members have implemented numerous initiatives in recent years to conserve and enhance habitats to promote biodiversity to the extent possible in these highly urbanised areas. These initiatives are guided by:

- The City of Sydney's Urban Ecology Strategic Action Plan (UESAP);
- Marrickville Council's Biodiversity Strategy 2011-2021 (BS); and
- Marrickville Council's Biodiversity Action Plan 2011-2015 (BAP).

These documents outline the 'priority' or 'target' species for conservation in each LGA, along with 'priority' sites for biodiversity conservation and actual or potential habitat linkages/connectivity between them, as well as between sites in adjoining LGAs. As mentioned in Section 3.1, these and other ecological reports and data held by both Councils were not reviewed or otherwise considered in preparation of the BAR.

Response

The Technical working paper: Biodiversity Assessment Report for the project has been prepared in accordance with the Framework for Biodiversity Assessment (FBA). To inform the list of species and communities that could potentially be affected by the project, the FBA credit calculator was used to identify ecosystem credit and species credit species. The credit calculator is a decision support tool provided by NSW OEH. In accordance with the FBA, an accredited assessor has used the credit calculator to undertake the assessment on biodiversity values by the project and has prepared the Technical working paper: Biodiversity Assessment Report.

The credit calculator is informed by a number of databases which are periodically updated to reflect updated information relevant to biodiversity values and data. Databases considered in the credit calculator include:

- NSW Vegetation Information System Classification Database (VIS Classification Database)
- Threatened Species Profile Database
- Vegetation Benchmarks Database
- Over-cleared landscapes database (Mitchell landscapes).

In addition to these databases, the Technical working paper: Biodiversity Assessment Report has used the following databases to inform the assessment of the project:

- Sydney Metropolitan Catchment Management Authority Vegetation Mapping (OEH 2013)
- Native Vegetation Maps of the Cumberland Plain, Western Sydney (NPWS 2002)
- OEH Atlas of NSW Wildlife (10 kilometre radius search), accessed 13 Nov 2014
- EPBC Act Protected Matters Search Tool (10 kilometre radius search), accessed 1 Dec 2014
- NSW DPI Fisheries threatened and protected species records viewer (FM Act), accessed 4 June 2015
- NSW DPI Fisheries Key Fish Habitat Map, accessed 4 June 2015
- NSW Fisheries Marine Vegetation Map (Botany Bay and Cooks River)

- Bureau of Meteorology Groundwater Dependent Ecosystems Atlas, accessed 3 June 2015.

The use of the abovementioned databases meets the requirements of the FBA and is considered appropriate and sufficient to identify threatened species and / or communities that could potentially be impacted by the project.

The strategies mentioned provide general information on ecological matters in the relevant local government area. The City of Sydney's Urban Ecology Strategic Action Plan, for example, provides lists of threatened fauna in the local government area, none of which occur in the project area. The information contained in these documents would not be able to satisfy 'more appropriate local data' given the general nature of the data and the lack of records that relate to the project corridor. To consider local data for vegetation benchmarks, the vegetation to which the local data applies must be derived from measurements taken on reference sites that measure the same PCT in a relatively unmodified condition or from published sources

Issue description – validity of species credit species

Validity of the Biodiversity Assessment Report (page 8)

As mentioned previously, no local data held by the City of Sydney or Marrickville Councils was sourced or otherwise considered in preparation of the BAR. Recent records of threatened species held by both Councils that are relevant to the development are discussed further in Section 3.2 of this report.

It is unclear how the list of candidate species credit species (Table 15 of the BAR) was generated. The list does not include several species credit species (as identified on the TSPD) that have been recorded in the vicinity of the development site in recent surveys, and/or for which suitable habitat (as described on the TSPD) is present on the development site. These include the Eastern Bent-wing Bat and (possibly) Southern Myotis, and the endangered inner west population of the Long-nosed Bandicoot (refer Section 3.2 for more detail). All of these species are listed in Appendix A of the BAR as having been identified for consideration in relation to the development from database searches, along with statements that there is no suitable habitat present within the development site. This is incorrect as, according to the information provided on the TSPD, there is suitable habitat for all of them, particularly at the Alexandria Landfill and adjoining industrial sites, where clearing has already commenced. The TSPD states that the Long-nosed Bandicoot population occurs within 'highly disturbed areas with no or limited native vegetation', and that the Southern Myotis is also associated with this type of habitat. Furthermore, the Southern Myotis and other microbats are known to roost in buildings, under bridges, and/or in stormwater drains. It appears that these species have been incorrectly excluded from further consideration in application of the FBA, and that they should have been addressed further in the BAR in accordance with the requirements of Sections 6-12 of the FBA. The Long-nosed Bandicoot population was also identified by the OEH as requiring further consideration in accordance with Section 9.2 of the FBA, but no further consideration was given, despite the SEARs stating that specific surveys were required for the species that OEH identified. Table 25 of the BAR states that the Long-nosed Bandicoot population does not occur within the development site, but this cannot be known since no surveys were undertaken.

Response

The assessment was completed in accordance with the FBA, which specifies which matters are to be addressed. There is no requirement to utilise threatened species records held by local councils.

The list of candidate credit species is generated by the credit calculator. The exclusion of some species would be on the basis of the habitat attributes associated with those species compared with the attributes present at the site.

Only native vegetation affected by the development is required to be mapped and identified in the Technical working paper: Biodiversity Assessment Report.

Field validation of vegetation was carried and used to inform the preparation of the Technical working paper: Biodiversity Assessment Report. Where remnant native vegetation was encountered, it was mapped and ascribed to a PCT. This is shown in the Technical working paper: Biodiversity Assessment Report.

A likelihood of occurrence assessment was undertaken for a number of listed micro-bat species as part of the Technical working paper: Biodiversity Assessment Report, including the Large-eared Pied Bat (*Chalinolobus dwyeri*), Little Bent-wing Bat (*Miniopterus australis*), Eastern Bent-wing Bat (*Miniopterus schreibersii oceanensis*) and the Eastern Freetail Bat (*Mormopterus norfolkensis*). With the exception of the Large-eared Pied Bat, there are records of the listed micro-bat species being present within 10 kilometres of the project, but not within the project footprint. In addition, no suitable habitat for these four micro-bat species was recorded as being present within the project footprint. As such, no further assessment of the impacts on these micro-bats was required as part of the Technical working paper: Biodiversity Assessment Report.

The Eastern Bentwing Bat, the Southern Myotis and Long-nosed Bandicoot were not filtered into the calculator. This is likely because of the habitat attributes present. Species are filtered in based on their habitat requirements.

The migratory birds listed are matters of national significance and are therefore not filtered into the tool, which considers State matters. Any relevant EPBC Act listed species were assessed and considered as part of the Technical working paper: Biodiversity Assessment Report. Not all threatened species in the local government area would be filtered into the assessment tool.

Issue description – quality of assessment

It is felt that the discussion of impacts to biodiversity values and proposed mitigation in the BAR is insufficiently detailed, and cumulative impacts to biodiversity are not discussed at all. It is felt that more detail should be provided, including site-specific information relating to Sydney Park, Alexandra Canal, Tempe Reserve, Tempe Lands and the Cooks River (as discussed further in Sections 3.4, 3.5, 3.6 and 3.7 of this report), including of course in relation to any further assessment undertaken for the threatened species and population mentioned above.

Response

The Technical working paper: Biodiversity Assessment Report has been completed to address the requirements of the FBA and the SEARs issued for the project.

Potential cumulative biodiversity impacts are considered in Section 27.4.7 of the EIS and discussed in Table 16 of the Technical working paper: Biodiversity Assessment Report.

Issue description – threatened and priority species and habitats

Threatened species, populations and communities in the City of Sydney and Marrickville LGAs (p9)

The BAR discusses impacts to the threatened Green and Golden Bell Frog and Grey-headed Flying-fox, but as mentioned in Section 3.1, threatened microbats, the endangered population of the Long-nosed Bandicoot in inner western Sydney, the endangered Coastal Saltmarsh community, and a number of migratory species listed under the EPBC Act, were not identified or adequately considered in the BAR. The review goes on to state confirmed recent records of such species and habitats.

Relationship to council initiatives (pages 9-11)

Along with the threatened species stated in section 3.2, the review states a number of species and habitats identified by the local governments to be priority. The review then goes on to state it was disappointing to note the lack of recognition of the threatened and priority species and habitats in the BAR.

'While not necessarily required by the FBA, it is nevertheless disappointing to note that there is no recognition of any of the above in the BAR, despite the development footprint for the St Peters interchange and local road upgrades extending from Alexandra Canal across the Alexandria Landfill and into Sydney Park, with a construction compound and other works immediately adjacent to two of the park's wetlands and bush restoration sites, and the location of Tempe Lands, Tempe Reserve and the Cooks River along the alignment of the proposed M5 tunnel.

Although not directly referred to in the BAR, these priority sites have apparently been dismissed as 'urban native and exotic' vegetation, but the reality is that despite being modified environments they provide important habitat for fauna species in this highly urbanised context, as demonstrated by the priority/targeted species that have been recorded at them. The project should not detract from efforts to conserve and enhance their habitat values.'

Response

The desktop assessment of the Technical working paper: Biodiversity Assessment Report included a review of reports relating to reserves that are within the study area and which are potentially impacted (directly or indirectly) by the project. The Atlas of NSW Wildlife was accessed to gain data on threatened biota that have been recorded in the locality in the last 20 years.

Not all threatened species in the local government area would be filtered into the FBA assessment tool. Many of the species mentioned above are not threatened. The aim of the FBA is to describe biodiversity and the offsets required at the higher levels of legislative protection. The FBA does not aim to describe and calculate offsets of widespread and common biota. While the presence of common flora and fauna may be locally significant, this is not considered at the level at which major projects are assessed.

The biodiversity values of non-threatened species and ecological communities was addressed in the Technical working paper: Biodiversity Assessment Report by identifying the amount of urban and native vegetation present, the distribution and number of hollow bearing trees within the development footprint, the likely impacts on groundwater dependant ecosystems along with aquatic and riparian habitats and by reporting survey results for all bird species surveyed in Eve Wetlands. The BAR represents a comprehensive assessment of likely biodiversity impacts that has been endorsed by OEH as meeting the requirements of the FBA.

Further, Section 7.6.2 of the Technical working paper: Biodiversity Assessment Report identifies the management of native vegetation and states that landscaping should reflect native vegetation in the local area as well as providing for foraging habitat for native fauna.

Issue description – impacts on biodiversity values not sufficiently detailed

Impacts on threatened and priority/target species and priority sites (page 11)

'While the potential impacts of the project are discussed in general terms in the BAR, it does not describe or address in detail all of the potential impacts of the project on the above species and each site during construction and operation.'

The review states a number of potential impacts, and then goes on to say the following:

'It is considered that the nature and extent of a number of the above potential impacts, particularly those with potential to affect threatened microbats and the endangered Long-nosed Bandicoot population, are unknown due to the perceived shortcomings in application of the FBA outlined in Section 3.1'.

Response

The list of candidate credit species is generated by the credit calculator. The exclusion of some species would be on the basis of the habitat attributes associated with those species compared with the attributes present at the site.

The FBA specifies which matters are to be addressed and the Technical working paper: Biodiversity Assessment Report has been completed in accordance with FBA requirements.

A likelihood of occurrence assessment was undertaken for a number of listed micro-bat species as part of the Technical working paper: Biodiversity Assessment Report, including the Large-eared Pied Bat (*Chalinolobus dwyeri*), Little Bent-wing Bat (*Miniopterus australis*), Eastern Bent-wing Bat (*Miniopterus schreibersii oceanensis*) and the Eastern Freetail Bat (*Mormopterus norfolkensis*). With the exception of the Large-eared Pied Bat, there are records of the listed micro-bat species being present within 10 kilometres of the project, but not within the project footprint. In addition, no suitable habitat for these four micro-bat species was recorded as being present within the project footprint. As such, no further assessment of the impacts to these micro-bats was required as part of the BAR.

The Eastern Bentwing Bat, the Southern Myotis and Long-nosed Bandicoot were not filtered into the calculator. This is likely because of the habitat attributes present. Species are filtered in based on their habitat requirements.

The migratory birds listed are matters of national significance and these are not filtered into the tool, which considers State matters. Any relevant EPBC Act listed species were assessed and considered separately as part of the Technical working paper: Biodiversity Assessment Report. Not all threatened species in the local government area would be filtered into the assessment tool.

Issue description – cumulative impacts on biodiversity values not sufficiently detailed

Cumulative impacts of the project on biodiversity (page 12)

This project is likely to exacerbate the reductions in biodiversity values discussed in Section 3.3 of this report that have resulted from past developments in the City of Sydney, Marrickville and surrounding LGAs, and there are likely to be further cumulative impacts from current and proposed future developments in the area. Potential cumulative impacts to biodiversity are not identified or discussed in the BAR, although they are very briefly, but not comprehensively, addressed in Chapter 27 of the EIS.

It is noted that the project would also directly impact on the endangered GGBF. Although impacts to this species would occur outside of the City of Sydney and Marrickville LGAs, and are addressed in detail in the BAR, both Councils are nevertheless concerned, particularly given the cumulative impact of this project in relation to past developments that have also adversely affected the habitats of this species, including not just the existing M5 but a development that resulted in destruction of habitat at Rosebery in the City of Sydney LGA, where the population is consequently restricted to a small residential backyard on private property and is at high risk of extinction.

It is further noted that the project would directly impact the vulnerable GHFF, through removal of approximately 10.8 hectares of potential foraging habitat, including an estimated 200 GHFF feed trees in or adjacent to Sydney Park, in addition to the removal of a substantial number of trees for other stages of the WestConnex project, and for the many other developments in this and other parts of Sydney. Both the City of Sydney and Marrickville Councils are concerned about the cumulative impacts of these developments on the GHFF, which are not acknowledged in the BAR.

Conversely to the potential for cumulative adverse impacts to biodiversity, if appropriate, site-specific mitigation measures are applied and opportunities for habitat creation/restoration are realised through site landscaping and other measures (such as those outlined in Section 3.6), there is potential for impacts associated with this project to be reduced, and for it to over time to contribute somewhat to biodiversity values through enhancement of habitats and connectivity in the area.

Response

Cumulative biodiversity impacts are discussed in Table 16 of the Technical working paper: Biodiversity Assessment Report. Section 7.6.2 of the Technical working paper: Biodiversity Assessment Report identifies the management of native vegetation and states that landscaping should reflect native vegetation in the local area as well as providing for foraging habitat for native fauna.

The project would not directly affect the Grey-headed Flying-Fox. Rather, the project would remove a relatively small area of potential foraging habitat. These impacts were considered in Section 6.3.3 of the Technical working paper: Biodiversity Assessment Report and in the application of the significant impact criteria in Appendix G of the Technical working paper: Biodiversity Assessment Report.

Issue description – recommendations for further assessment to reduce impacts to biodiversity

Section 3.6.1 (page 13)

As mentioned in Section 3.4, the nature of actual or potential impacts to threatened species, populations and communities that would result from the development are unknown due to the perceived shortcomings in application of the FBA outlined in Section 3.1. Further assessment is therefore considered necessary in accordance with Sections 6-12 of the FBA, with the BAR updated based on the results.

As also outlined in Section 3.4, impacts to other priority/target species and priority sites in both LGAs have not been specifically identified or assessed; the BAR should be updated with this information as well.

Further assessment is also recommended in relation to similar species/sites that may be impacted in other LGAs.

Further assessment should also be undertaken in relation to any changes to the project that arise during the detailed design phase.

Response

The Technical working paper: Biodiversity Assessment Report was completed in accordance with the FBA, which specifies which matters are to be addressed. Section 7.6 of the Technical working paper: Biodiversity Assessment Report outlines the mitigation measures for impacts on relevant threatened species and communities.

Issue description – recommendations for mitigation measures to reduce impacts to biodiversity

Section 3.6.2 (Page 13)

The mitigation measures outlined in the BAR are quite general and are not considered adequate in terms of ensuring minimisation of impacts to the biodiversity values of the City of Sydney and Marrickville LGAs that have been highlighted in this report, along with similar biodiversity values that may occur in other affected LGAs.

The BAR states that ecological impacts would be mitigated through adherence to the RMS Biodiversity Guidelines, and that it is anticipated that requirements would be incorporated into a Flora and Fauna Management Plan (FFMP), to be implemented during construction and operation. However, the fact that many of the impacts described in Section 3.4 were not identified in the BAR suggests they may be overlooked in the FFMP, particularly since the RMS Guidelines specify that the environmental assessment documents should be referred to as a guide when applying them, but also because the RMS Guidelines appear to focus mainly on bushland areas and naturally-occurring habitat features, which presents a risk that habitats in highly urbanised areas may be overlooked.

It is also of concern that clearance has commenced at the Alexandria Landfill, as previously mentioned, and it is not clear whether an FFMP is being implemented in relation to the works that are currently taking place.

Recommended detailed measures for the addition to the BAR and FFMP are outlined in section 3.6.2 (Page 13) of the review.

Response

The Technical working paper: Biodiversity Assessment Report assesses impacts on all relevant threatened species and communities, and outlines the mitigation measures for these impacts in Section 7.6 of the Technical working paper: Biodiversity Assessment Report. The Technical working paper: Biodiversity Assessment Report also provides an assessment of the effectiveness of the identified mitigation measures, many of which are well established and are highly effective in minimising impacts on biodiversity.

The Technical working paper: Biodiversity Assessment Report assesses impacts to all relevant threatened species and communities. These are outlined in length in Section 7.6 of the Technical working paper: Biodiversity Assessment Report outlines the mitigation measures for these impacts.

The biodiversity related environmental management measures detailed in **Chapter 8** (revised environmental management measures) of this report, including the proposed Flora and Fauna Management Plan (FFMP) for the project, are considered appropriate and sufficient to mitigate and manage the potential biodiversity impacts of the project.

Issue description – recommendations for opportunities for habitat creation / restoration to reduce impacts on biodiversity

Section 3.6.3 (Page 15)

The BAR does not recognise or discuss any of the opportunities presented by the development to create substantial new habitats through landscaping etc. in and around the proposed open space adjoining the St Peters interchange and along Alexandra Canal. While this might not be considered a particular requirement of the FBA, such opportunities would compensate for some of the adverse impacts of the project to biodiversity and should therefore be explored.

The Urban Design report and Landscape and Visual Impact Assessment focus mainly on establishing heavily treed areas which are unlikely to support many of the priority/target species, but rather to encourage the species that are well-adapted to urban environments and that are very common as a result. Bioretention plantings should also consist of a diversity of locally native grasses, sedges and reeds and not the species identified for mass plantings in the concept.

Section 3.6.3 (Page 15) of the review provides possibilities that should be considered and incorporated into the BAR and or/ the Urban Design report and Landscape Visual Assessment.

Response

Section 7.6.2 of the Technical working paper: Biodiversity Assessment Report describes the management of native vegetation. Locally indigenous species would be included as part of landscaping and rehabilitation works to promote native fauna habitat (environmental management measure B07, amended in **Chapter 8** (Revised environmental management measures) in this report).

Further, the urban design and landscaping strategy would continue to be developed during detailed design in consultation with Council (OpV06).

4.14.19 Greenhouse gas

Issue description – operational emissions

A key concern is that operational omissions have only been extrapolated to 2031. This is due to the traffic modelling timeframe which was the primary data input, but in the same vein is totally inadequate for an asset with a concession life of 45 years. Whilst it is likely that the margin of error would increase if a longer period were to be modelled, to only consider emissions for a 18 year period for such an extensive and heavily polluting piece of infrastructure is at odds with the globally recognised and nationally endorsed need to reduce the emission of greenhouse gases. Any other major emitting infrastructure would model well beyond 18 years – for the term of the assets life ideally, so to limit to this timeframe is poor.

The EIS notes that emission savings would reduce over time “as traffic volumes” increase. This recognition is welcome as it is well known around the world that when cities build more road it eventually results in more car usage. A question this raises is whether this is an appropriate strategy for Australia’s global city.

Considering the concession period of this road, it is disingenuous to claim the project’s modelled short-term emission savings as a project benefit especially when it fails to model beyond this timeframe. It is recommended that prior to any approvals, the proponent extrapolates operational emissions as long as the concession period of 45 years to understand the longer term impact.

Response

The assessment identified that greenhouse gas emissions generated during the construction, operation and maintenance of the project would be less than those for the ‘do minimum’ (without project) scenario of the existing roads under future conditions.

The greenhouse gas assessment interpolates emissions between 2021 and 2031, based on average emissions over the ten year period, as traffic modelling data is provided for these years (i.e. for 2021 and 2031). Extrapolation of greenhouse gas emissions data beyond 2031 is not considered appropriate because:

- Traffic forecasts beyond 2031 are not available
- There is significant uncertainty in the prediction of conditions beyond 2031, including traffic forecasts, vehicle efficiencies and fuel mixes
- To extrapolate data using the average emissions interpolated between 2021 and 2031 would not provide a credible estimate of emissions.

Discussion provided in Section 22.3.1 (Combined greenhouse gas emissions) of the EIS is included to acknowledge that savings in emissions would reduce over time as traffic volumes increase in line with population growth.

Responses to issues relating to the strategic justification for the project are provided in **Section 4.14.2** of this report.

Responses to issues relating to the operational emissions of the project are provided in **Section 4.14.6** of this report.

Issue description – flooding

Although recorded as one of the most significant climate change risks, it is very poor that the project team did not involve each council in the flood studies considering the local knowledge available. Involving councils would have greatly improved the assessment outcomes.

To assert that as there is no new hardstand that the motorway would not impact on localised flooding fails to address that localised flooding would impact the motorway. If its exit ramps back up because local streets near the canal are flooded (which they often are in times of heavy rain) then the impact would be very real.

Response

New or upgraded drainage would be constructed where the project impacts or requires the relocation of existing drainage as part of the local road upgrades. As detailed in Section 7.2.2 and Section 8.2.1 of Appendix N (Surface water) of the EIS, a number of overland flow paths would be impacted by the local road upgrades around the St Peters interchange. The relatively flat topography and limited capacity in existing drainage systems mean that roadworks have the potential to redirect flows. The extent of potential impacts would be confirmed during detailed design with the benefit of detailed survey information relating to existing stormwater infrastructure, ground levels and existing development. Detailed design of the roadworks would minimise impacts as far as possible.

Council would be consulted during the preparation of the Flood Management Strategy and during the finalisation of the local roads drainage design. The scope of the project does not extend to consideration of existing flooding/drainage issues across the wider road network.

Issue description – emissions associated with the Alexandria Landfill

Flaring should not be considered an appropriate modern solution to manage collected gas from the Alexandria Landfill. If the volume of methane is likely to be too small of on-site polishing and reuse, it should be stored for treatment and re-use elsewhere.

Response

A number of options for the management of landfill gas were explored and the flaring of gas at the former Alexandria landfill site was identified as the preferred approach to landfill gas management. The selection of the preferred option was based on the volume of landfilled waste, waste composition, geometry of the site and site location. The Alexandria Landfill is a non-putrescible solid waste landfill, containing a high proportion of non-organic waste. It also generates around 250 cubic metres per hour, and the concentrations of Hydrogen sulphide means that the site is unlikely to be suitable for power generation.

The final selected landfill gas treatment system would be determined following calculation of the projected landfill gas generation rate during detailed design. In the event that flaring remains the preferred option, the landfill gas treatment system would be designed to comply with the requirements of the *Protection of the Environment Operations (Clean Air) Regulation 2010*, which prescribe performance criteria for landfill gas flaring systems.

The collection, storage, transport and off-site treatment of landfill gases is not considered to be an economically feasible management option. Considering that the collected landfill gases are unlikely to be suitable for energy generation based on the gas composition, treatment of the collected landfill gases would have the same performance criteria whether it is undertaken on or off-site, resulting in the same environmental outcome.

Issue description – use of renewable energy

Impact no. OpGHG 3 – ‘At least six per cent of energy required for the project would be sourced from an accredited GreenPower energy supplier, where possible.’

Although in line with the Transport Environment and Sustainability Policy Framework, this is an inadequate target in a post-Paris COP21 context and should be revised by the proponent. Page 3 of the same policy framework references NSW 2021: A Plan to Make NSW Number One and its target of 20% renewable by 2020. So the project target should at least aim at this higher percentage of renewable energy.

The City of Sydney procures 100 per cent accredited Green Power for its operations and strongly encourages other government entities to match this standard. Other NSW Government transport projects have set the target for 100 per cent GreenPower, such as the North West Rail Link.

It would be prudent for the proponents of the largest motorway project in Australia to demonstrate leadership by procuring 100% GreenPower; particularly when other Transport cluster project is doing so.

Response

The project would seek to maximise the use of renewable energy during construction. The six per cent renewable energy commitment for construction energy is a minimum target as set within the WestConnex Sustainability Strategy and opportunities to increase this target would be investigated as part of detailed design.

In addition, about two per cent of construction phase power requirements would be offset in accordance with the Commonwealth Government's National Carbon Offset Standard. This would be reviewed during detailed design to refine the approach to offsetting energy requirements and to identify whether additional power consumption can be offset.

The project's renewable energy commitment is part of a suite of sustainability objectives and targets. Other measures outlined in Chapter 28 of the EIS are proposed to optimise energy efficiency for the project, including operation of motorway infrastructure and energy used by vehicles utilising the motorway.

An Energy Efficiency and Greenhouse Gas Emissions Strategy would be prepared as part of the project's Sustainability Management Plan to identify initiatives to be implemented during construction of the project to reduce carbon emissions, energy use and embodied life cycle impacts.

4.14.20 Resource use and waste minimisation

Issue description – recycled materials

Use of recycled materials to off-set use of virgin materials is a big opportunity to reduce the environmental impact of major construction works, but it is not addressed in Chapter 24 of the EIS.

However, Chapter 28 (Table 28-3) refers to Chapter 24 to gain details on plans on resource use and waste minimisation. Table 28-3 sets a target to 'optimise the amount of cement replacement material (Measured by mass) used in concrete'. This is more an aspiration than a target as there is no measurable quantity set. A metric needs to be attached to make the approach meaningful and applicable. The 'optimal' outcome must balance engineering, cost and environmental outcomes (not just cost) and has been successfully achieved on other major infrastructure projects. For instance, the Anzac Bridge pylons used 65 per cent waste industrial product to offset use of Portland cement.

Roads and Maritime should also commit to using recycled content in steel where available and assuming that it does not compromise structural requirements.

Response

Use of recycled materials would be encouraged where reasonable and feasible to do so. Targets for recycled materials are provided in the WestConnex Sustainability Strategy, and would be provided in the future project-specific Sustainability Management Plan and supported by the project-specific Construction Waste Reuse Recycling and Energy plan (environmental management measure WM07, amended in **Chapter 8** (Revised environmental management measures) in this report). Quantities of materials would be determined during the detailed design.

Issue description – water re-use

The aspiration to collect and re-use water on site for operational needs is to be commended. However the detail is lacking and this is not worded as a commitment. Again, a metric needs to be applied to make the aspiration meaningful and achievable.

Response

The collection and re-use of water on site for operational needs would be refined during detailed design. Quantitative targets for the collection and re-use of water on site for operational needs would be developed during the detailed design and documented in the project-specific Sustainability Management Plan.

Issue description – operation resource consumption

A circular reference is found when addressing 'Operation resource consumption' on page 24-17 of the EIS, where sustainability initiatives to reduce water consumption are discussed in Chapter 28 (Sustainability), but the targets on page 28-10 of the EIS are qualitative rather than setting a measurable quantity.

Response

The sustainability targets on page 28-10 of the EIS provide the measures to be implemented with a focus on achieving water savings and targeting water recycling and re-use. Quantitative targets for the collection and re-use of water on site for operational needs would be developed during the detailed design and documented in the project-specific Sustainability Management Plan.

4.14.21 Climate change risk and adaptation

Issue description – methodology

The methodology outlined is overly simplistic and the scope too narrow. By not involving stakeholders in the risk identification process there is a significant likelihood that risks would have been overlooked. By not undertaking any interdependency analysis the study would, by definition, have failed to identify knock-on impacts to and from the new road infrastructure and surrounding assets and infrastructure such as; energy, water, ICT, other roads and so on. A more holistic view should be taken of the impacts of climate change on infrastructure.

Response

As part of the risk assessment process a workshop was undertaken to engage with various members of the project team to identify risks from the perspective of other technical disciplines, including flood risks identified by the project's flood modelling specialists. Feedback collated as part of the workshop was used to inform the identification of risks, the rating of risks and appropriate adaptation actions to manage risks to the project.

A detailed analysis of interdependencies at this stage of the project would not add significant value to the assessment of potential project impacts as presented in the EIS.

The focus of the assessment was on the asset and its immediate services, not municipal scenarios involving all services, and adjacent infrastructure. This is outside the scope of the assessment. The climate change risk assessment has been undertaken in line with the following relevant standards and current guidelines:

- The risk assessment approach set out in AS/NZS ISO 31000:2009 Risk Management – Principles and Guidelines and ISO/IEC 31010 Risk Management – Risk assessment techniques

- AS 5334-2013 Climate change adaptation for settlements and infrastructure – A risk based approach, which follows ISO 31000:2009 Risk Management – Principles and guidelines
- Australian Green Infrastructure Council's Guideline for Climate Change Adaptation, Revision 2.1 (2011)
- Draft Climate Change Adaptation Practice Note (unpublished) (Roads and Maritime 2015).

Issue description – extreme sea level

It is encouraging to see that a NSW Government project recognises Sea Level Rise (SLR) for Representative Concentration Pathways (RCP) 8.5 of up to 0.89 metres. The City encourages the Government to re-instate its policy position (as set out in 2009 NSW Sea Level Rise Policy Statement that was rescinded in 2012) recognising a consistent SLR framework for the entire NSW coastline.

Following on from this, and in recognition that RCP 8.5 approximates the world's current emissions trajectory, the need for Government to lead in the adoption of 100 per cent renewable energy usage targets is clear.

Section 25.3.2 of the EIS refers to a “subsequent detailed risk assessment to be undertaken during detailed design”. The City of Sydney recommends that Roads and Maritime incorporates stakeholder participation and an interdependency analysis as part of this detailed assessment to ensure local expert knowledge is incorporated in detailed design, should the project be approved.

Response

Support for use of Sea Level Rise projections under RCP 8.5 is noted.

The project would seek to maximise the use of renewable energy during construction. The six per cent renewable energy commitment for construction energy is a minimum target and opportunities to increase this target would be investigated as part of detailed design.

During detailed design, a detailed climate change risk assessment would be undertaken in accordance with relevant standards and guidelines, including Australian Standard 5334-2013 *Climate change adaptation for settlements and infrastructure - A risk based approach*. AS 5334-2013 includes processes for communication and consultation with stakeholders, as well as monitoring and review to ensure the implementation of appropriate adaptation strategies.

The assessment would identify and implement adaptation measures to comprehensively address high and extreme risks. The decision to implement adaptation measures for medium risks would also be considered during detailed design.

Issue description – adaptation omission

There is no measure to coordinate adaptation planning or response within Table 25-6 of the EIS with other infrastructure operators and assets.

Other NSW Government agencies are developing the Adapt Infrastructure tool (lead by the Office of Environment and Heritage and Sydney Water) to coordinate the cross-agency management of climate adaptation. Such an adaptation tool would help the proponent move beyond the current siloed approach that treats the tollway as a standalone piece of infrastructure, which it is not. WestConnex does not operate in isolation from other roads, other modes of transport, power sources, information communication technology (ICT), and water infrastructure and so on. The interdependency with these other infrastructure types and operating organisations should be factored into adaptation planning.

Response

The Adapt Infrastructure tool is specific to the water sector and focuses on adaptation for existing assets as part of an ongoing asset maintenance program.

For the development of new infrastructure, such as the New M5, a climate change risk assessment identifying potential risks and recommending adaptation measures is considered the appropriate approach to managing climate risks at this stage of the project. The climate change risk assessment has been undertaken in line with the following relevant standards and current guidelines:

- The risk assessment approach set out in AS/NZS ISO 31000:2009 Risk Management – Principles and Guidelines and ISO/IEC 31010 Risk Management – Risk assessment techniques
- AS 5334-2013 Climate change adaptation for settlements and infrastructure – A risk based approach, which follows ISO 31000:2009 Risk Management – Principles and guidelines
- Australian Green Infrastructure Council's Guideline for Climate Change Adaptation, Revision 2.1 (2011)
- Draft Climate Change Adaptation Practice Note (unpublished) (Roads and Maritime 2015).

4.14.22 Cumulative impacts

Issue description – quality of assessment

This chapter is very weak and of significant concern to the City of Sydney. The assessment fails to include considerable land use changes such as the Ashmore Estate and the Central to Eveleigh corridor including the significant redevelopment at Waterloo. The assessment also fails to consider the operational impacts of the project in any depth or detail. The focus is primarily on the construction impacts.

Response

The identification of other developments that could occur in the vicinity of the project included those developments with potential to generate significant, certain cumulative impacts with the project and includes 'major projects' listed on the Department of Planning and Environment's public register of applications for State significant development and State significant infrastructure.

Consideration was also given to other 'strategic' projects being considered by Government. This cumulative impact assessment considered developments located within the suburbs of Narwee, Beverly Hills, Kingsgrove, Bexley North, Earlwood, Bardwell Park, Bardwell Valley, Arncliffe, Turrella, Wolli Creek, Tempe, Sydenham, St Peters, Alexandria and Mascot.

The Ashmore Precinct has been undergoing urban renewal since 2006, and a Stage 1 development application is currently being assessed by the City of Sydney for the 'Ashmore Estate', a mixed use development on Mitchell Road.

The DP&E publishes projections for changes in population and employment arising from land development. The WRTM used the latest available data from the DP&E at that time as the basis for forecasting traffic demand, and included known urban renewal areas at that point in time such as Green Square, the Ashmore Precinct (which contains the Ashmore Estate) and the Central to Eveleigh corridor. Chapters 5 of the Technical working paper: Traffic and transport (Appendix G of the EIS) describes the travel demand and population assumptions used in the assessment. As such, traffic generated by the known urban renewal projects has been accounted for in the traffic impact assessment (and associated air quality, human health risk and noise impact assessments within the EIS study area).

It is recognised that a number of existing or proposed urban renewal areas already surround the project. It is considered that provision of open space as part of the New M5 project would support such current and future urban renewal opportunities. The design of the project considers, and integrates with, local movement networks, places and land uses to support existing urban renewal and enable future opportunities for urban renewal by:

- Improving access to public and active transport
- Creation of new dedicated cycle paths, shared paths, footpaths and crossings to improve active transport connections
- Removing surface traffic creating long term improvements in air quality and noise on surface roads and streets that support pedestrian activity

Should construction activities within urban areas in the immediate vicinity overlap with the construction of the project, there is the potential for cumulative impacts and construction fatigue as stated in Section 27.5.2 of the EIS. This would equally apply to the Ashmore Estate, which is within proximity to the construction footprint.

Issue description – lack of consideration relating to additional traffic

The considerable additional traffic that would be delivered onto the local road network has essentially been dismissed. There is no consideration of this in terms of the growth in population and the demand for road space which would require a more efficient allocation; not necessarily more capacity. This is unacceptable.

Response

The contribution of the New M5 traffic volumes on local streets is relatively minor. The analysis demonstrates that the overall impact of the New M5 project is a six per cent increase in traffic volumes in the area surrounding the St Peters interchange. This is based on a 2021 year and only includes the New M5 project. Future WestConnex projects such as M4-M5 Link as well as the Sydney Gateway could improve traffic volumes within the local area by diverting through traffic into the completely connected WestConnex program of works.

The traffic and transport assessment is based on traffic modelling using the WRTM, which relies on forecasts of car driver demand sourced from the Sydney Strategic Travel Model (STM) operated by the Transport of NSW Bureau of Statistics and Analytics. The STM uses projections of population and employment for Sydney and forecasts mode choice between car, rail, bus, light rail and ferry modes for future infrastructure scenarios. The modelling with STM for the New M5 EIS incorporated land use projections and currently planned road and public transport schemes, including Sydney Metro and CBD and South East Light Rail. Thus, the car demand forecast from STM took into account the growth in population and the demand for road space, after allowing for mode share change due to these public transport projects under congested road conditions.

Issue description – lack of assessment of the entire WestConnex program of works

The cumulative impacts of the entire WestConnex program of works must be considered and assessed, including the M4-M5 Link (including the traffic to/from the Camperdown portals and impacts on Parramatta Road) and the Southern connector (including utilisation of the additional capacity of the New M5 between St Peters interchange and Arncliffe). These projects would have impacts on the southern Sydney road network.

Response

While approval for the New M5 as a standalone project is being sought, the impacts associated with the WestConnex program of works within the EIS study area have been assessed within the cumulative assessments within the EIS, in particular traffic, air quality, human health and noise impact assessments which apply the outputs of the WRTM (refer to Section 27.3.1 of the EIS for discussion and Section 27.4 of the EIS).

Further detailed assessment of potential impacts resulting from these future projects, such as traffic impacts in the vicinity of future proposed interchanges of the M4-M5 Link and Southern connector in areas not approximate to the New M5 would be undertaken in future environmental impact assessments.

4.14.23 Sustainability

Issue description – WestConnex sustainability strategy

It is encouraging that the sustainability strategy is seen as a “framework to implement sustainability objectives and targets through the project’s contract requirements...” Holding Roads and Maritime and the successful tenderers to these contractual requirements or conditions of consent would be crucial to see good intent converted into delivered actions.

Seeking an ‘excellent’ rating under the ISCA framework is also a worthy goal which Roads and Maritime must be held to account.

Response

Noted. The project has committed to achieving an ISCA rating of ‘excellent’ as presented in Section 28.2.4 of the EIS.

Issue description – materials

The sustainability targets set out in Table 28-3 of the EIS are worthy goals but the wording is brief and does not make strong commitments, for instance in the second bullet; “Maximise the use of all timber products from either recycled timber products from either reused/recycled timber or from sustainably managed forests that have obtained Forest Management Certification” – although this has merit, there is no indication as to what basis “maximise” should be measured. There needs to be a metric attached to this to give some assurance about the level applied. For example, the London Olympic Games committed to 100 per cent recycled or FSC timbers in construction up to 2012. Roads and Maritime would again do well to show environmental leadership in such a major infrastructure project.

The comment that alternative concrete “would be considered” uses wording that does not imply any market research or sounding (despite a preferred contractor being named) has occurred, or that there is any commitment to using this material. Similar to other elements of this EIS, it demonstrates a compliance-driven approach with little innovation or consideration of the needs of future generations.

Energy and carbon: as mentioned above, the six per cent renewable energy target for construction and operations is too low and weak. The North West Rail Link project has set a target of 100 per cent renewable energy (or offset) and the Sydney Light Rail project is currently working towards a similar commitment. The City of Sydney also has a 100 per cent renewable energy commitment and off sets all other emissions to meet our carbon neutral status.

Response

The SEARs for the project require the EIS to show how the principles of ecologically sustainable development would be incorporated in the design, construction and ongoing operational phases of the project. This is provided in Section 28.3.2 of the EIS. The requirement for quantities and commitments on the use of recycled materials would be defined during the detailed design and based on the principles set out in the WestConnex Sustainability Strategy.

The project would seek to maximise the use of renewable energy during construction. The six per cent renewable energy commitment for construction energy is a minimum target and opportunities to increase this target would be investigated as part of detailed design.

In addition, about two per cent of construction phase power requirements would be offset in accordance with the Commonwealth Government’s National Carbon Offset Standard. This would be reviewed during detailed design to refine the approach to offsetting energy requirements and to identify whether additional power consumption can be offset.

The project’s renewable energy commitment is part of a suite of sustainability objectives and targets. Other measures outlined in Chapter 28 of the EIS are proposed to optimise energy efficiency for the project, including operation of motorway infrastructure and energy used by vehicles utilising the motorway.

Issue description – maximise equitable training and employment opportunities

These aspirations are admirable and is a long-held practice of the Roads and Maritime.

Roads and Maritime may wish to engage with the City of Sydney’s economic strategy team with reference to the Aboriginal Economic Development Plan which addresses much common material.

Response

Noted. Roads and Maritime’s commitment to equitable training and employment opportunities would be progressed separately to the statutory environmental impact assessment and approval processes under the *Environmental Planning and Assessment Act 1979*.

Issue description – project-specific sustainability initiatives

All listed initiatives are admirable, with the exception of the six per cent (6%) GreenPower target as discussed above. This is very poor and does not demonstrate an adequate commitment from the Government to support or invest in renewable energy.

Response

The project would seek to maximise the use of renewable energy during construction. The six per cent renewable energy commitment for construction energy is a minimum target and opportunities to increase this target would be investigated as part of detailed design.

In addition, about two per cent of construction phase power requirements would be offset in accordance with the Commonwealth Government's National Carbon Offset Standard. This would be reviewed during detailed design to refine the approach to offsetting energy requirements and to identify whether additional power consumption can be offset.

The project's renewable energy commitment is part of a suite of sustainability objectives and targets. Other measures outlined in Chapter 28 of the EIS are proposed to optimise energy efficiency for the project, including operation of motorway infrastructure and energy used by vehicles utilising the motorway.

Issue description – intergenerational equity

The document states that intergeneration equity has been considered in terms of emissions, among other areas, however; the emissions modelling only runs until 2031. This 16-year period represents half of one future generation only. This does not address the meaning or intent of the concept to provide equity for future generations.

Response

Inter-generational equity refers to the premise that the present generation should ensure that the health, diversity and productivity of the environment are maintained or enhanced for the benefit or future generations. The project has been considered in terms of intergenerational equity, with the management of potential environmental impacts discussed throughout the EIS.

In terms of emissions, the EIS demonstrates that the project would benefit current and future generations by improved air quality within the existing M5 East Motorway tunnel and a reduction in greenhouse gas emissions compared to the 'do-nothing' and 'do-minimum' scenarios.

Issue description – peak oil

The focus on peak oil rather than emissions is rapidly becoming out of date. In a post-Paris COP 21 policy environment, developed economies would have to leave oil in the ground rather than worry about reserves running out. Roads and Maritime should be considering how peak carbon would impact its asset rather than peak oil.

Response

The overarching sustainability objectives for the project would be met through the implementation of a project-specific Sustainability Management Plan and sustainability initiatives. The Sustainability Management Plan would form part of the project's integrated management system to be implemented on the project. The plan would be a live document that would be revised and updated regularly to reflect changing designs and sustainability initiatives driven by policy updates where required. This includes the consideration of peak carbon.

Issue description – improved valuation and pricing of environmental resources

The toll mechanism discussed in this section [of the submission] could be used to more effectively implement a "polluter pays" mechanism. The proponent should consider a toll structure based on environmental impact rather than by vehicle classifications. That is, using vehicle emission classification akin to the London congestion charge as the basis for setting the toll. The number of vehicle occupants should also be a factor, to encourage efficient use of emission-efficient vehicles.

Response

As detailed in the Updated Business Case, the tolling regime for WestConnex applies a 'user-pays' mechanism that was based generally on the WestLink M7 Motorway. The tolling regime for WestConnex is consistent with the NSW Government's principles for tolling and has been endorsed by the NSW Government as the basis for the traffic, financial and economic modelling analysis for the full program of works.

The policies associated with environmental management, including pricing pollution and the application of 'polluter pays' principles are beyond the scope of the New M5, the EIS for the project and this report.

4.14.24 Environmental risk analysis

Issue description – quality of assessment

The EIS does not include any type of risk rating or how risks were assessed.

Response

The environmental risk analysis process carried out for the project included:

- A preliminary environmental assessment, carried out as part of the State significant infrastructure application report (AECOM, 2015), to allow early identification of the key environmental issues and to inform the State significant infrastructure application
- An assessment of the key issues identified in the SEARs for the project (Appendix A of the EIS)
- An environmental risk review undertaken to confirm the key environmental issues based on the results of the detailed investigations presented in this EIS.

As required by the SEARs, the process of environmental risk analysis continued during the course of preparing the EIS. Emphasis was placed on using the detailed information gathered for the project to review the environmental aspects of the project. More specifically, the analysis:

- Identified environmental issues, including key issues in the SEARs, and any other issues
- Examined potential impacts and proposed mitigation measures in relation to the identified issues
- Identified the nature and extent of impacts likely to remain after mitigation measures are applied.

Based on this analysis, an environmental risk category was assigned to each potential impact. This enabled the identification of any matters that might be considered as additional key issues, and provided a basis for an appropriately detailed assessment of these additional key issues in the EIS.

The environmental risk categories are described as either a 'key issue' (i.e.. a high or moderate impact (actual and perceived) requiring further investigation to identify specific management and mitigation measures), or 'other' (i.e.. moderate or low impact that can be managed effectively with standard and best practice management and mitigation measures).

This approach is explained in Section 29.1 of the EIS.

4.14.25 Summary of environmental management measures

Issue description – compliance with City of Sydney policies

If the project is approved, a condition of consent must be that all relevant City of Sydney policies must be complied with during the construction and operation phases.

Response

Conditions of approval are a matter for DP&E to consider during its assessment of the critical State significant infrastructure application.

However, the environmental management measures detailed in **Chapter 8** (Revised environmental management measures) of this report are considered appropriate and sufficient to mitigate and manage the potential impacts of the project during construction and operation.

4.15 Leichhardt Council

4.15.1 General

Issue description – future stages of WestConnex

Leichhardt Council requests additional detailed information about Stage 3 of the WestConnex program of works.

Response

Stage 3 of WestConnex program of works is the M4–M5 Link. The M4–M5 Link is undergoing concept development and is subject to the planning approval process. An indicative concept for the future M4–M5 Link was included in the *WestConnex Updated Strategic Business Case* (November 2015) (Updated Strategic Business Case), which was publicly released on 19 November 2015. A State Significant Infrastructure (SSI) application, lodged with the NSW Department of Planning & Environment (DP&E) on 2 February 2016, provides further detail on the future project.

The future M4–M5 Link would also include works to enable connections to the potential Western Harbour Tunnel and BeachesLink, in the vicinity of the Rozelle Rail Yard. This connection has previously been referred to as the 'northern extension' and 'HarbourLink'.

Key components of the M4-M5 Link project include:

- Twin motorway tunnels between the M4 East at Haberfield and the New M5 at St Peters. Each tunnel would be around 9.2 kilometres in length and would be built to accommodate three lanes of traffic. Each tunnel would integrate with tunnel stubs constructed underground as part of the proposed M4 East at the Wattle Street interchange and proposed New M5.
- A new road interchange at Rozelle at the disused Rozelle Rail Yard, to provide connections to and from the M4-M5 Link with City West Link, Victoria Road and the Anzac Bridge intersection.
- Tunnel stubs to allow for a potential future connection to the Western Harbour Tunnel and BeachesLink (an additional Sydney Harbour Tunnel road crossing) in the vicinity of the Rozelle interchange.
- A new road interchange at Camperdown to provide north and south-bound on and off ramps connecting to Parramatta Road.
- Connections to the St Peters interchange (constructed as part of the proposed New M5), including the construction of the M4-M5 Link southern portal and integration works within the interchange.
- Ancillary infrastructure and operational facilities for electronic tolling, signage (including electronic signage), ventilation structures and systems, fire and life safety systems, and emergency evacuation and smoke extraction infrastructure.
- A motorway control centre that would include operation and maintenance facilities.
- New service utilities and modifications to existing service utilities.
- Modifications to the surface road network to integrate the new interchanges, including but not limited to the City West Link, Victoria Road, and Parramatta Road.
- Temporary construction ancillary facilities and temporary works to facilitate the construction of the project

Further details of the M4-M5 Link project are publicly available in the State Significant Infrastructure application on the Department of Planning & Environment's public register (https://majorprojects.affinitylive.com/public/726566c16c9b970fe155a31fb0ab3501/20160120_WCX_M4-M5_Link_SSIA_FINAL.pdf)

Issue description – consideration of related urban projects

Leichhardt Council requested further information and consideration by the NSW Government to ensure that the WestConnex program of works is considered in light of the numerous related urban projects that are currently in planning or development phases.

Response

WestConnex is part of an extensive plan to meet Sydney's growing transport and infrastructure needs. It is fully integrated into the State's infrastructure, transport and planning strategies, including:

- *State Infrastructure Strategy* (2012, updated 2014)
- *NSW Long Term Transport Master Plan* (2012)
- *NSW Freight and Ports Strategy* (2013)
- Other mode specific plans, including *Sydney's Bus Future* (2013), *Sydney's Light Rail Future* (2012), *Sydney's Cycling Future* (2013), and *Sydney's Walking Future* (2013), *Sydney's Rail Future*, *Sydney's Ferry Future* and *City Centre Access Strategy*
- *Sydney CBD to Parramatta – Strategic Transport Plan* (2015)
- NSW State Priorities
- *A Plan for Growing Sydney* (2014) (see below)
- *Draft Parramatta Road Urban Transformation Strategy* (2015)
- *Transformation Plan: The Bays Precinct, Sydney* (2015)

WestConnex is a central element to support the urban planning goals articulated in *A Plan for Growing Sydney* (DP&E 2014), the NSW Government's urban planning strategy for Greater Sydney.

The plan outlines the benefits of WestConnex as follows:

- Providing improvements in connectivity between western and south western Sydney and the Sydney CBD
- Enhancing the freight networks that serve Sydney's global gateways at Port Botany and Sydney Airport, making the export of goods more cost effective
- Facilitating a stronger economy, by providing better connections to Global Sydney.

It also identifies that: "...WestConnex would allow for significant improvements to local amenity [on Parramatta Road] by reducing through-traffic on surface roads, and allowing for enhanced north-south local connectivity."

In this context, WestConnex is a key enabler for urban transformation and development across Sydney.

The EIS has considered the potential for cumulative impacts associated with the project, including impacts associated with other major projects in the vicinity that are not related to the WestConnex program of works. This assessment is presented in Chapter 27 of the EIS. Further detail is provided in **Section 5.26** of this report.

The identification of other developments that could occur in the vicinity of the project included 'major' projects, as identified by the NSW Department of Planning & Environment, and included in its public register of applications for State significant development and State significant infrastructure.

The cumulative impact assessment concluded that the potential for cumulative impacts of WestConnex and other projects was generally limited. Roads and Maritime Services and SMC would continue to consult with proponents of surrounding projects to minimise cumulative impacts.

The cumulative impacts from key developments identified in the area, including the Green Square Development, Mascot Station Town Centre Precinct Masterplan and Wolli Creek redevelopment area were considered in Section 27.3.2 of the EIS. The assessment concluded that there would be some overlap of construction activities with the current project, but that these projects would all be developed progressively (ie staged), and are generally located away from areas affected by the project.

Traffic and parking impacts from these developments are therefore unlikely to contribute substantially to cumulative impacts in the vicinity of the project during the construction phase. Consideration of potential cumulative construction and operation traffic impacts and modelling for projects outside the scope of the WestConnex program of works are discussed further in **Section 5.8.1** (Level and quality of traffic assessment for the construction period), **Section 5.8.9** (Level and quality of operational traffic assessment) and **Section 5.8.16** (Parking during operation) of this report.

If the project is approved, the Construction Traffic Management and Safety Plan would form a sub-plan of the Construction Environmental Management Plan and would be prepared in accordance with the relevant conditions of approval. The plan would be developed in consultation with relevant councils, emergency services, road user groups and pedestrian and cyclist user groups.

The WestConnex Road Traffic Model uses the Sydney Strategic Travel Model (STM) to derive base demand, including trip generation, trip distribution and mode choice modules, and incorporates demographic data related to land uses including population, employment and education enrolment projections. Projections were based on the Department of Planning and Environment's future population and employment forecasts (dated September 2014) data release from the Bureau of Transport Statistics, which has been derived from the 2011 Census data and incorporates known major urban renewal and developments, including those around Green Square, Mascot and Wollri Creek.

The forecast growth in background traffic volumes were then used as the basis for the modelling and assessment of traffic impacts of the project during construction and operation.

Further details regarding the incorporation of predicted background traffic growth as a result of urban and residential development are provided in the Section 9.1.3 and Section 9.1.4 of the EIS.

Cumulative noise impacts have been assessed for the construction and operation stages of the project. During construction, the potential for cumulative noise impacts would be managed through the preparation and implementation of a Construction Noise and Vibration Plan, which would take into account the need for scheduling activities to minimise or avoid cumulative noise impacts, where feasible and reasonable. The plans would also detail site and receiver specific noise management measures consistent with the *Interim Construction Noise Guideline* (ICNG) (DECCW 2009). The operational noise assessment undertaken as part of the project included an assessment of 2031 traffic volumes, which included the cumulative noise impacts of vehicles using WestConnex when all projects are completed.

During construction, ongoing consultation would be undertaken with local communities potentially affected by concurrent construction of other nearby projects to increase the overall awareness of project timeframes and impacts.

Issue description – evidence-based assessment of impacts on Sydney's inner west

Leichhardt Council requests a fully co-ordinated, evidence based assessment on how the WestConnex project would contribute to the liveability and social, economic and environmental sustainability of Sydney, particularly Sydney's inner west.

Response

The M5 East Motorway is heavily congested for large parts of the day. It carries over 100,000 vehicles per day, including about 10,000 heavy vehicles; well in excess of its design capacity, the M5 East Motorway currently experiences heavy traffic congestion, slow speeds and unreliable travel times especially in the morning and afternoon peaks, and increasingly at other times of the day and on weekends.

Sydney's population is expected to increase by more than 1.6 million people by 2031 and without major investment in road network infrastructure this growth would result in worsening road congestion. This congestion would in turn affect Sydney's economic competitiveness as a global city.

The New M5 would deliver additional capacity for the M5 Motorway corridor, resulting in:

- A reduction of up to 60,000 vehicles on the M5 East on an average weekday, relieving congestion and improving travel reliability

- Between 2021 and 2031, average travel times on the M5 East Motorway would generally be halved and average travel speeds would double during the morning and afternoon peak, improving the efficiencies of intrastate and interstate freight movements through travel time saving and reduced operating costs
- An alternative to the M5 East, providing network resilience in the event of incidents or planned maintenance.

Without the New M5, conditions on the M5 East would continue to deteriorate.

Local benefits would also be realised as a result of the project, helping to build on Sydney's reputation as a liveable and connected urban centre. The project would support the important work done to date in Sydney's inner suburbs to grow multi-modal connectivity through:

- Upgraded local connections which would provide safe and efficient movements to areas such as Marrickville, Mascot and Green Square
- More than 14 kilometres of new and upgraded cycling and pedestrian paths would link residents of St Peters, Alexandria and Mascot, much of which would be separated from the road network
- Two new road crossings over Alexandra Canal that would address existing bottlenecks on the Ricketty Street Bridge.

The New M5 and the future M4-M5 Link would also provide an underground bypass alternative to a number of parallel surface routes, resulting in reduced traffic volumes along Princes Highway, including past residential properties and businesses.

WestConnex is part of an extensive plan to meet Sydney's growing transport and infrastructure needs and is fully integrated into the State's Infrastructure transport and planning strategies, including the *State Infrastructure Strategy* and the *NSW Long Term Transport Master Plan*. While WestConnex plays a role in easing congestion, the WestConnex program of works is not designed to solve all of Sydney's transport problems.

The NSW Government is committed to investing in a range of public transport projects, as identified by the *NSW Long Term Transport Master Plan*, the *State Infrastructure Strategy 2012–2032*, *A Plan for Growing Sydney* and the *NSW State Priorities*. The *NSW Long Term Transport Master Plan* provides the framework for delivering an integrated, modern and multi-modal transport system by identifying NSW's transport actions and investment priorities for the next 20 years.

The EIS acknowledges that due to its size and complexity, construction and operation of the project would involve management of many different environmental issues, including social and community impacts such as impacts on culture, local character, liveability, quality of life and lifestyle. The EIS assessed the potential for the project to create social and community impacts and concluded that impacts can be avoided, mitigated or offset by the benefits of the project, as summarised below for construction and operation.

Construction of the project has the potential to result in temporary and permanent impacts to the local community including impacts to culture, local character, liveability, quality of life and lifestyle. Construction impacts would be mainly contained to St Peters, including around Sydney Park and Euston Road, and Alexandria. Areas further afield such as Sydney, the inner west, Erskineville, Rosebery and King Street are unlikely to be significantly impacted during construction of the project. Many of these areas would benefit from the improved connections provided by the local road upgrades around St Peters and – on completion of the M4-M5 Link - the diversion of through traffic from roads such as King Street into the tunnels.

The environmental issues associated with impacts on culture, local character, liveability, quality of life and lifestyle are identified and assessed within the relevant sections of the EIS, including traffic and transport (Section 9.3.1) air quality (Section 10.6), noise and vibration (Section 12.4.1), land use and property impacts (Section 13.3.1) and visual impacts (Section 14.3.1). The EIS demonstrates that the impacts of construction on traffic, air quality, noise and vibration, and visual amenity would be temporary and can be managed with the implementation of environmental management measures (refer to **Chapter 8** of this document for revised environmental management measures).

The introduction of new project infrastructure in St Peters would result in a number of positive impacts on local character and liveability. The project would enhance active transport connectivity around St Peters through the inclusion of new and upgraded pedestrian and bicycle infrastructure. Additionally, the project would provide new areas of public open space through conversion of the former landfill site in Alexandria into both transport infrastructure and parkland, significantly increasing vegetation coverage with new passive recreation areas for the local community.

A key part of the planning and development of the WestConnex program of works has been a consideration of potential environmental constraints and preparation of a Strategic Environmental Review (SER). The SER is a high-level strategic document that identifies the major environmental benefits as well as the key challenges associated with WestConnex.

It considers how the project could be successfully developed and delivered in a sustainable way that would avoid, manage or mitigate impacts on the environment.

The SER is a strategic document that does not have a formal statutory role under the NSW planning system.

Rather, it is designed to provide an overarching discussion of the key issues and to set the scene for subsequent project -specific environmental impact assessment and approvals documents. The SER provides a foundation for early engagement with the community on key environmental considerations for the project.

The original SER was prepared in 2013. Since then, the original reference scheme has undergone several key changes including:

- Enhancements to Stage 3 (the future M4–M5 Link) to accommodate a potential northern extension and connection to the planned Western Harbour Tunnel and BeachesLink. The alignment of this section of WestConnex has been revised so it follows the general alignment of the City West Link to Rozelle, before heading south via Camperdown to St Peters.
- Enhancements to Stage 2 (the New M5) to provide 'tunnel stubs' for a future connection to the Southern Connector (part of Gateway to the South project, being led by Transport for NSW)
- An enhanced Sydney Gateway to connect WestConnex to the Sydney Airport and Port Botany precinct is actively being explored.

There have also been developments in NSW Government policy, notably the release of *A Plan for Growing Sydney* by DP&E in December 2014.

Accordingly, the 2013 SER has been updated to ensure appropriate consideration is given to all relevant environmental issues associated with delivery of the enhanced program of works.

The updated SER considers social, economic and environmental issues associated with the WestConnex program of works. Six strategic priority issues were identified as important for WestConnex to consider and effectively manage:

- Traffic and transport
- Air quality and tunnel ventilation
- Energy efficiency
- Noise and vibration
- Socio-economic considerations
- Construction impacts on communities.

The updated SER (Roads and Maritime Services, 2015) is a key input to the Updated Strategic Business Case, and is presented as Technical Paper 3 to the Updated Strategic Business Case.

Issue description – benchmarking of the project against alternatives

Leichhardt Council submitted that the WestConnex program of works, including the New M5, is not in keeping with world's best practice urban development, particularly in terms of its encouragement of private vehicle use over public transport. Leichhardt Council requested that the New M5 be benchmarked against other high quality international land use/transport solutions to deem its relevance and appropriateness or otherwise.

Response

The New M5 EIS has been prepared in accordance with the SEARs issued for the project and the relevant provisions of Schedule 2 of the *Environmental Planning and Assessment Regulation 2000* (NSW). This includes the need to present and consider project alternatives.

An assessment of a number of strategic alternatives to the project was included in Section 4.2 of the EIS, although this assessment did not extend to macro-economic modelling or comparative (benchmarking) cost/benefit analysis. These types of comparative assessments are not typically undertaken in EISs for major infrastructure projects in NSW.

WestConnex is part of an extensive plan to meet Sydney's growing transport and infrastructure needs and is fully integrated into the State's Infrastructure transport and planning strategies, including the *State Infrastructure Strategy* and the *NSW Long Term Transport Master Plan*. While WestConnex plays a role in easing congestion, the WestConnex program of works is not designed to solve all of Sydney's transport problems.

The NSW Government is committed to investing in a range of public transport projects, as identified by the *NSW Long Term Transport Master Plan*, the *State Infrastructure Strategy 2012–2032*, *A Plan for Growing Sydney* and the *NSW State Priorities*. The *NSW Long Term Transport Master Plan* provides the framework for delivering an integrated, modern and multi-modal transport system by identifying NSW's transport actions and investment priorities for the next 20 years.

During the development of the *NSW Long Term Transport Master Plan*, all modes and their benefits were considered. The construction of new roads and the upgrade of existing roads in Sydney is required due to the continued demand for the movement of people, goods and services across Sydney. As mentioned in section 4.2.3 of the EIS, investment in public transport and freight facilities are only a number of options available to improve congestion on Sydney's Roads. The NSW Government is already directing funding towards a number of public transport (eg buses, trains and ferries) and freight projects (eg Northern Sydney Freight Corridor projects), which, coupled with investment in roads would improve congestion on Sydney's roads. Investment in public transport is the responsibility of Transport for NSW who is currently implementing a number of public transport projects in Sydney.

The *NSW Long Term Master Plan* also considers initiatives being employed by other cities around the world with respect to public transport and road pricing mechanisms, while acknowledging the unique geographical constraints of a CBD that is confined by water on two sides and needs to provide good access to jobs for people living in Greater Sydney and inter-city locations.

The *NSW Long Term Transport Master Plan* identifies WestConnex as just one of a number of major transport projects for Sydney. Other major projects included are:

- CBD and South East Light Rail
- The North West Rail Link (now Sydney Metro Northwest).
- A second Harbour rail crossing (Sydney Metro CBD & Southwest)

Continued demand for the movement of people, goods and services across the Sydney metropolitan region requires that new roads be constructed and existing roads be upgraded. Section 4.2 of the EIS considered the strategic alternatives to the project based on the extent to which the alternatives could meet the objectives of the project and their comparative performance across transport, environmental, engineering, social and economic factors.

WestConnex was a recommendation of Infrastructure NSW in October 2012, with Government adopting the concept in the 2012 *State Infrastructure Strategy* and the *NSW Long Term Transport Master Plan*. This was followed by the development of a business case, which was approved by Government in August 2013. An Executive Summary of that business case was publicly released. In November 2015, the Updated Strategic Business Case was released, which consolidates the work undertaken in the original business case, with the significant modelling, analysis and scope enhancements completed in the past 24 months.

The Updated Strategic Business Case includes:

- A strategic justification for WestConnex in the context of key strategies and plans
- An updated reference design, including details of the options development process that lead to key alignment changes
- Budget and cost estimates for the whole of WestConnex
- Details of the proposed tolling regime
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The Updated Strategic Business Case includes technical papers providing additional detail in relation to traffic modelling, economic appraisal, updated strategic environmental review, and timeline of consultation activities.

The Updated Strategic Business Case can be found on the WestConnex website site at www.westconnex.com.au/documents/updated_strategic_business_case.pdf

Issue description – cumulative assessment

The New M5 is a key component of the WestConnex program of works and should be considered in relation to the total project, including its proposed northern and southern extensions.

Response

Environmental impacts of the whole of the WestConnex program of works were identified in the Strategic Environmental Review (Sydney Motorways Project Office, 2013).

As described in Chapter 1 of the EIS, the New M5 project is a component of the WestConnex program of works. The size and scale of WestConnex requires the program of work to be delivered in a series of projects.

Separate planning applications would be lodged for each individual component project of WestConnex. Each project would be assessed separately, but the impacts of each project would also be considered in the context of the wider WestConnex. The EIS considered other WestConnex projects where relevant and in accordance with industry standards and guidelines.

Chapter 27 of the EIS assesses potential cumulative impacts associated with the construction and operation of all components of the WestConnex program of works, based on information about the component projects that was publicly available at the time the EIS was prepared. Cumulative impacts have also been assessed in the EIS documents prepared for the M4 Widening, M4 East and King Georges Road Interchange upgrade projects.

Any future motorway projects, including the M4-M5 Link, Western Harbour Tunnel and BeachesLink and the Southern Connector (part of Gateway to the South) would be subject to separate planning approval and assessment.

Impacts associated with the full WestConnex program of works and Southern Connector for the year 2031 have been considered in relation to:

- Traffic and transport (Chapter 9 and Appendix G of the EIS)
- Air quality (Chapter 10 and Appendix H of the EIS)
- Human health (Chapter 11 and Appendix I of the EIS)
- Noise and vibration (Chapter 12 and Appendix J of the EIS)
- Social and economic (Chapter 15 and section 6.3 of Appendix M of the EIS)
- Cumulative impacts (Chapter 27, in particular Section 27.3.1 of the EIS)

The EIS acknowledges that other WestConnex projects are needed to deliver a number of project benefits. However, Section 1.4 of the EIS also identifies several project benefits that would be delivered by the New M5 project alone, and in combination with the King Georges Road Interchange Upgrade, which is currently under construction.

The New M5 project would:

- Provide additional motorway capacity along the main connection to Sydney Airport, Port Botany and south west Sydney which would provide reliability and savings in travel time for through traffic
- Provide improved access and connectivity between employment and population centres as well as for local vehicle trips and for active transport
- Enable improvements to public transport including more frequent cross-regional bus services connecting to Sydney Airport
- Facilitate local road upgrades in St Peters and Mascot.

Together with the Southern Connector, the project would:

- Support the economic development of Sydney by providing a high quality and efficient road connection for motorists and freight vehicles between the Global Economic Corridor and Global Sydney (as defined in *A Plan for Growing Sydney* (NSW Government 2014))
- Provide additional capacity to address existing traffic congestion on the M5 East Motorway and local roads by separating longer distance through traffic from local traffic. Current traffic congestion is causing poor amenity along the M5 corridor and constraining the operation of existing businesses and efficient movement of freight
- Provide better connectivity between local centres adjacent along the M5 Motorway corridor.
- Facilitate urban renewal in precincts adjoining the M5 Motorway corridor by improving local amenity with less traffic noise and vehicle emissions from congested traffic.

Section 4.1.2 of the EIS acknowledges the potential to enhance the scope of WestConnex through northern and southern extensions to the scheme. The Southern Connector is proposed as a connection between the New M5 tunnels and President Avenue at Rockdale. At the time of preparing the EIS, a business case was being developed for the northern and southern extensions. The northern and southern extensions are also shown in Figure 1-1 of the EIS.

Issue description – project alternatives

Leichhardt Council requested that an alternative project, which combines strategic, site specific road improvements with public transport improvements, be examined and compared to the tunnelled motorway option currently being pursued.

Response

Section 4.2 of the EIS considered the merits of the project in the context of a range of strategic alternatives, having regard to:

- The manner in which they could achieve the project objectives

- Their performance against other transport, environmental, engineering, social and economic factors.

As identified in Section 4.2.3 of the EIS, public transport alternatives would only partially address these requirements and no feasible strategic transport alternatives would meet the diverse array of customer needs for travel in the M5 East Motorway corridor.

The NSW Government is committed to investing in a range of public transport projects, as identified by the *NSW Long Term Transport Master Plan* (Transport for NSW, 2012) and the *State Infrastructure Strategy 2012–2032* (Infrastructure NSW, 2012).

The *NSW Long Term Transport Master Plan* provides the framework for delivering an integrated, modern and multimodal transport system by identifying NSW's transport actions and investment priorities for the next 20 years. During the development of the *NSW Long Term Transport Master Plan*, all travel modes and their benefits were considered simultaneously, and land use and transport were examined together. Integrated packages of transport projects, regulations, pricing and other policy initiatives were then developed, and rigorous modelling and assessment was used to prioritise actions against objectives.

The *NSW Long Term Transport Master Plan* identifies the need for progressive delivery of the WestConnex program of works. It recognises the upgrade of the M5 Motorway corridor as a key component of the WestConnex program of works, as it would increase the corridor's capacity to accommodate commercial vehicles and freight demand. The project would help to deliver these benefits by improving the performance of the existing M5 Motorway corridor.

The 2013 *NSW Freight and Ports Strategy* (Transport for NSW, 2013) examined whether the shift from road to rail freight would address this issue for the motorway network. Given the predicted population growth and increase in total freight volumes, even if a significant percentage mode shift from road to rail was achieved, there would still be increases in road freight volumes. Specifically, it found that: 'even with the targeted increase in rail mode share, early modelling results indicate the M4 and M5 would not be able to accommodate the additional container traffic when combined with background growth from employment and population by 2031'.

In assessing the need for new road infrastructure, the *State Infrastructure Strategy* (Infrastructure NSW, 2012) stated:

'As in other major cities, public transport is the best option for journeys to dense employment centres – such as the Sydney CBD and Parramatta. In these areas, public transport is already the preferred choice for many employees and that will continue to be the case in the future.'

However, the overwhelming majority of Sydney's journeys are dispersed in nature. For such trips the flexibility of the private car makes it the dominant choice. This pattern is the consequence of established land use patterns in Sydney and there is no indication in the available data that the patterns of demand would change in the future.'

It is unfortunate that roads and public transport have often been positioned as opposing alternatives competing for scarce public funding. In reality, these modes are complementary to each other, each having a valuable, but different role. The evidence is clear that private road transport is – and would remain – the only viable option for most journeys in Sydney most of the time, even with the targeted growth in public transport and rail freight sought by Government, and the expected increase in the population density of the city.'

In the context of the *NSW Long Term Transport Master Plan* and the *State Infrastructure Strategy*, the Government is making significant investment in both roads and public transport. These include:

- Sydney Metro City and Southwest, which would extend the Sydney Metro Northwest via St Leonards and North Sydney, across the Harbour and into the Sydney CBD. From Sydney CBD, the Metro will connect to an upgraded Bankstown Rail Line
- Sydney Light Rail, including construction of a new CBD and South East Light Rail Line along the corridor between Sydney CBD and Randwick/Kingsford
- Upgrades and enhancements to the suburban rail network.

Although investment is being made in public transport infrastructure, the construction of new roads and the upgrade of existing roads in Sydney will continue to be required due to the continued demand for the diverse movements of people, goods and services across Sydney.

The NSW Government is committed to investing in a range of public transport projects, as identified by the *NSW Long Term Transport Master Plan*, the *State Infrastructure Strategy 2012–2032*, *A Plan for Growing Sydney* and the NSW State Priorities. The *NSW Long Term Transport Master Plan* provides a framework for delivering an integrated, modern and multi-modal transport system, identifying NSW's transport actions and investment priorities for the next 20 years. Public transport is complementary to the project and WestConnex as a whole. Strategies to deliver an integrated package of transport improvements in parallel with the construction of WestConnex are recognised in the *NSW Long Term Transport Master Plan*.

During the development of the *NSW Long Term Transport Master Plan*, all travel modes and their benefits were considered simultaneously, and land use and transport were examined together. Integrated packages of transport projects, regulations, pricing and other policy initiatives were then developed, and rigorous modelling and assessment was used to prioritise actions against objectives. The *NSW Long Term Transport Master Plan* identifies WestConnex as a project that will support Sydney's economic and population growth into the future. A number of other public transport priorities are also identified in the *NSW Long Term Transport Master Plan*.

Chapter 4 of the EIS describes the alternatives that were considered during development of the project, and explains how and why the project was selected as the preferred option. Investment in public transport and rail freight improvements as well as demand management were considered in the strategic alternatives to the project considered as Alternatives 3 and 4 respectively.

As detailed in Section 4.2.3 of the EIS, investment in public transport and demand management is currently occurring, however such investment is only considered successful with continued investment in roads due to the importance of roads to some industries and for people where public transport is not readily available.

Issue description – environmental assessment

Leichhardt Council stated that a broader base of environmental consideration be used to assess the project. This should include a larger scale analysis of the implications of encouraging private car use ahead of public transport.

Response

The WestConnex program of works involves the construction and operation of a 'missing link' in Sydney's motorway network, as part of a broader program of projects and initiatives to deliver a modern, integrated transport system for Sydney. This broader program of projects and initiatives is detailed in the *NSW Long Term Transport Master Plan* (Transport for NSW, December 2012).

In assessing the need for new road infrastructure, the 2012 State Infrastructure Strategy found that public transport was the best option for journeys to dense employment centres (such as the Sydney CBD and Parramatta), where public transport is already the preferred choice for many employees. However, the dispersed nature of the majority of Sydney's journeys means that the flexibility provided by the private car makes it the dominant choice. This pattern is the consequence of established land use patterns in Sydney and there is no indication in the available data that the patterns of demand will change in the future.

The infrastructure strategy found that private road transport is – and will remain – the only viable option for most journeys in Sydney most of the time, even with the targeted growth in public transport and rail freight sought by the Government, and the expected increase in the population density of the city. With this in mind, the Government is making substantial investment in strategically important roads and public transport, including Sydney Metro City and Southwest, Southwest and CBD and South East Light Rail, enhancements to the suburban rail network, and upgrades to cyclist and pedestrian facilities.

Secondary vehicle travel is usually generated from new transport infrastructure such as road projects. The Updated Strategic Business Case acknowledges that the construction of new roads can induce more people to travel on the road network. This is predicted to increase 2031 future year traffic volumes using WestConnex by between two per cent and seven per cent. The predicted induced travel demand was incorporated into the WestConnex Road Traffic Model (see Section 9.1.4 of the EIS).

The traffic and transport assessment shows that in both 2021 and 2031, the forecast reduction in traffic along the M5 East would result in improved speed, journey reliability and safety in this corridor. In the St Peters area, reductions in average delay and congestion are anticipated during both future years (2021 and 2031) compared to the 'do minimum' scenarios. The operational performance of the network, including predicted traffic volumes under the 'with project' scenarios which have incorporated induced demand forecasts, is discussed in detail in Chapter 9 and Appendix G of the EIS.

The combined number of new road trips and trips redeployed from public transport as a result of the full WestConnex program of works is anticipated to be around 0.4 per cent of the total number of daily car trips on the WRTM Sydney-wide network in 2031.

WestConnex was a recommendation of Infrastructure NSW in October 2012, with Government adopting the concept in the 2012 *State Infrastructure Strategy* and the *NSW Long Term Transport Master Plan*. This was followed by the development of a business case, which was approved by Government in August 2013. An Executive Summary of that business case was publicly released. In November 2015, the Updated Strategic Business Case was released, which consolidates the work undertaken in the original business case, with the significant modelling, analysis and scope enhancements completed in the past 24 months.

The Updated Strategic Business Case includes:

- A strategic justification for WestConnex in the context of key strategies and plans
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The Updated Strategic Business Case includes technical papers providing additional detail in relation to traffic modelling, economic appraisal, updated strategic environmental review, and timeline of consultation activities.

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Issue description – traffic modelling

It is essential that, as the motorway tunnels are being constructed to accommodate three-five lanes in each direction, the EIS should assess the impacts of the project's ultimate capacity rather than:

- Examining an artificially constrained capacity of two lanes in each direction
- Addressing the project's ultimate capacity in subsequent assessments.

Council expressed particular concern where the currently proposed, incremental approach would diminish the rate of growth of traffic by comparing the ultimate volumes with increased traffic that would result from the two by two lane configuration rather than the existing baseline traffic volumes.

Leichhardt Council noted that such an approach is likely to have far reaching implications in relation to the surface road network (both parallel routes and feeder roads).

Response

As part of this application, RMS is seeking approval for two lanes in each direction, but the project would be designed to accommodate additional lanes if necessary. Any additional lanes would be subject to a future, separate planning approval. Traffic modelling as part of the EIS included the additional lanes under the full WestConnex program of works as described below.

The strategic traffic modelling undertaken for the project modelled the following lane configuration under the 2031 'full WestConnex and Southern Connector (formerly Southern extension)' scenario:

- Two (2) lanes in each direction between the western portals (east of King Georges Rd) and the Southern Extension interchange
- Four (4) lanes northbound between the Southern Extension interchange and St Peters interchange
- Three (3) lanes southbound between St Peters interchange and the Southern Extension interchange.

This scenario accounted for forecast traffic volumes as a result of the full WestConnex program of works being completed (M4 Widening, M4 East, New M5 and the M4-M5 Link as well as the Sydney Gateway), plus the Southern Connector. Operational impacts on the surrounding roads, including the surface roads at the western and eastern ends of the project, were subsequently evaluated using the strategic-level demand forecasts derived from the WestConnex Road Traffic Model (the strategic model used for the WestConnex project). Specifically, the additional analysis involved the use of a micro-simulation road network model using Paramics software to assess localised road network effects, including effects around the St Peters interchange and effects as a result of local road upgrades (refer to Figure 9-4 of the EIS for the extent of the microsimulation model used for the traffic and transport impact assessment).

Further information on the strategic modelling and the operational modelling employed to assess the traffic and transport impacts of the project on the M5 East Motorway corridor, surface roads at each end of the project and parallel arterial routes is provided in Section 9.1.4 and Section 9.1.5 of the EIS.

To confirm the operational traffic impacts of the project on surrounding arterial roads and major intersections, an operational traffic review would be undertaken about 12 months after the commencement of operation of the project. The assessment would be based on actual traffic counts and the methodology used would be comparable with that used in this assessment. The results and recommendations of the review would assist the development of Roads and Maritime's network operations and infrastructure provision plans.

Roads and Maritime would continue to monitor traffic conditions to identify any further road network and intersection upgrades that may be needed and this would include appropriate consultation with local councils and communities.

Issue description – potential reduction in public transport patronage

Leichhardt Council stated that assessment of the project should consider the implications of leaching patrons from existing (or likely future) public transport services and how that reduction in patronage may impact on Sydney's public transport systems in the longer term.

Response

Sydney's population is expected to increase by more than 1.6 million people by 2031 and without major investment in road network infrastructure this growth would result in worsening road congestion. This congestion would in turn affect Sydney's economic competitiveness as a global city. The forecast reduction in traffic on the M5 East Motorway is unlikely to affect public transport services, as there are no regular bus services on the M5 East Motorway or the M5 South Western Motorway.

Secondary vehicle travel is usually generated from new transport infrastructure such as road projects. The Updated Strategic Business Case acknowledges that the construction of new roads can induce more people to travel on the road network. This is predicted to increase 2031 future year traffic volumes using WestConnex by between two and seven per cent. The predicted induced travel demand was incorporated into the WRTM (see Section 9.1.4 of the EIS).

The combined number of new road trips and trips redeployed from public transport as a result of the full WestConnex program of works is anticipated to be around 0.4 per cent of the total number of daily car trips on the WestConnex Road Traffic Model (WRTM) Sydney-wide network in 2031 (Updated Strategic Business Case, 2014). This mode shift has been included in the WRTM and considered in the traffic modelling discussed in Chapter 9 and Appendix G of the EIS.

Issue description – costs or benefits of various project alternatives

Leichhardt Council expressed concern that the analysis did not include any consideration of the overall environmental costs or benefits of the various project alternatives. Additionally, the alternatives considered did not include a hybrid version which combined public transport and rail freight investment in combination with limited strategic road improvements.

Response

An assessment of a number of strategic alternatives to the project was included in Section 4.2 of the EIS, although this assessment did not extend to macro-economic modelling or comparative cost/benefit analysis. These types of comparative assessments are not typically undertaken in EISs for major infrastructure projects in NSW.

WestConnex is part of an extensive plan to meet Sydney's growing transport and infrastructure needs and is fully integrated into the State's Infrastructure transport and planning strategies, including the *State Infrastructure Strategy* and the *NSW Long Term Transport Master Plan*. While WestConnex plays a role in easing congestion, the WestConnex program of works is not designed to solve all of Sydney's transport problems.

The NSW Government is committed to investing in a range of public transport projects, as identified by the *NSW Long Term Transport Master Plan*, the *State Infrastructure Strategy 2012–2032*, *A Plan for Growing Sydney* and the *NSW State Priorities*. The Transport Master Plan provides the framework for delivering an integrated, modern and multi-modal transport system by identifying NSW's transport actions and investment priorities for the next 20 years.

During the development of the *NSW Long Term Transport Master Plan*, all modes and their benefits were considered. The construction of new and upgrade of roads in Sydney is required due to the continued demand for the movement of people, goods and services across Sydney. As mentioned in section 4.2.3 of the EIS, investment in public transport and freight facilities are only a number of options available to improve congestion on Sydney's Roads. The NSW Government is already directing funding towards a number of public transport (eg buses, trains and ferries) and freight projects (eg Northern Sydney Freight Corridor projects), which, coupled with investment in roads would improve congestion on Sydney's roads. Investment in public transport is the responsibility of Transport for NSW who is currently implementing a number of public transport projects in Sydney.

Continued demand for the movement of people, goods and services across the Sydney metropolitan region requires that new roads be constructed and existing roads be upgraded. Section 4.2 of the EIS considered the strategic alternatives to the project based on the extent to which the alternatives could meet the objectives of the project and their comparative performance across transport, environmental, engineering, social and economic factors.

WestConnex was a recommendation of Infrastructure NSW in October 2012, with Government adopting the concept in the 2012 *State Infrastructure Strategy* and the *NSW Long Term Transport Master Plan*. This was followed by the development of a business case, which was approved by Government in August 2013. An Executive Summary of that business case was publicly released. In November 2015, the Updated Strategic Business Case was released, which consolidates the work undertaken in the original business case, with the significant modelling, analysis and scope enhancements completed in the past 24 months.

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Issue description – broader impacts of the project

The EIS generally focusses on a narrow corridor of influence with little consideration being given to the broader impacts of such a major shift in the approach to catering for travel demand across the Sydney Region. The impacts of a motorway project of this magnitude, particularly in terms of the overall WestConnex program of works (including its potential northern and southern extensions) are far reaching and the assessment should include large scale impacts including broader environmental, sustainability, public health and wellbeing, and land use/transport integration issues

Response

As discussed in Chapter 3 of the EIS objectives have been developed for the project to respond to key issues that underlie the strategic need for the project. The project objectives are consistent with the broader objectives of the WestConnex project and the strategic objectives of national and NSW planning and policy documents. **Section 5.3.1** of this report provides a summary of how the project would meet these objectives.

The objectives of WestConnex were first outlined in WestConnex – Sydney's next motorway priority (Infrastructure NSW, 2012b). These objectives were developed following consideration of problems that are routinely experienced by road users, businesses and the community who live and work in Sydney, and future anticipated problems.

The project objectives have subsequently been refined and are provided in the Updated Strategic Business Case. The EIS considers the objectives specific to the New M5 project which have evolved following refinement of the project and WestConnex.

The WestConnex program of works involves the construction and operation of a 'missing link' in Sydney's motorway network, as part of a broader program of projects and initiatives to deliver a modern, integrated transport system for Sydney. This broader program of projects and initiatives is detailed in the NSW Long Term Transport Master Plan (Transport for NSW, December 2012).

The M5 East Motorway is heavily congested for large parts of the day. It carries over 100,000 vehicles per day, including about 10,000 heavy vehicles; well in excess of its design capacity, the M5 East Motorway currently experiences heavy traffic congestion, slow speeds and unreliable travel times especially in the morning and afternoon peaks, and increasingly at other times of the day and on weekends.

Sydney's population is expected to increase by more than 1.6 million people by 2031 and without major investment in road network infrastructure this growth would result in worsening road congestion. This congestion would in turn affect Sydney's economic competitiveness as a global city.

The New M5 would deliver additional capacity for the M5 Motorway corridor, resulting in:

- A reduction of up to 60,000 vehicles on the M5 East on an average weekday, relieving congestion and improving travel reliability
- Between 2021 and 2031, average travel times on the M5 East Motorway would generally be halved and average travel speeds would double during the morning and afternoon peak, improving the efficiencies of intrastate and interstate freight movements through travel time saving and reduced operating costs
- An alternative to the M5 East, providing network resilience in the event of incidents or planned maintenance.

Without the New M5, conditions on the M5 East would continue to deteriorate.

Local benefits would also be realised as a result of the project, helping to build on Sydney's reputation as a liveable and connected urban centre. The project would support the important work done to date in Sydney's inner suburbs to grow multi-modal connectivity through:

- Upgraded local connections which would provide safe and efficient movements to areas such as Marrickville, Mascot and Green Square
- More than 14 kilometres of new and upgraded cycling and pedestrian paths would link residents of St Peters, Alexandria and Mascot, much of which would be separated from the road network
- Two new road crossings over Alexandra Canal that would address existing bottlenecks on the Ricketty Street Bridge.

The New M5 and the future M4-M5 Link would also provide an underground bypass alternative to a number of parallel surface routes, resulting in reduced traffic volumes along Princes Highway, including past residential properties and businesses.

The project would also increase network resilience along the M5 East Motorway corridor through providing alternative route options. Along some parallel routes, travel times and average speeds would improve, with some increases in volumes along other parallel routes.

WestConnex is part of an extensive plan to meet Sydney's growing transport and infrastructure needs and is fully integrated into the State's Infrastructure transport and planning strategies, including the *State Infrastructure Strategy* and the *NSW Long Term Transport Master Plan*. While WestConnex plays a role in easing congestion, the WestConnex program of works is not designed to solve all of Sydney's transport problems.

As described in Chapter 1 of the EIS, the New M5 project is a component of WestConnex. The size and scale of WestConnex requires the program of work to be delivered in stages.

Separate planning applications would be lodged for each individual component project of WestConnex. Each project would be assessed separately, but the impacts of each project would also be considered in the context of the wider WestConnex. The EIS considered other WestConnex projects where relevant and in accordance with industry standards and guidelines.

Chapter 27 of the EIS assesses potential cumulative impacts associated with the construction and operation of all components of the WestConnex program of works, based on information about the component projects that was publicly available at the time the EIS was prepared.

The EIS has considered the potential for cumulative impacts associated with the project, including impacts associated with other major projects in the vicinity that are not related to the WestConnex program of works. This assessment is presented in Chapter 27 of the EIS. Further detail is provided in **Section 5.26** of this report and in an earlier response in this section.

The environmental issues associated with impacts on culture, local character, liveability, quality of life and lifestyle are identified and assessed within the relevant sections of the EIS, including traffic and transport (Section 9.3.1) air quality (Section 10.6), noise and vibration (Section 12.4.1), land use and property impacts (Section 13.3.1) and visual impacts (Section 14.3.1). The EIS demonstrates that the impacts of construction on traffic, air quality, noise and vibration, and visual amenity would be temporary and can be managed with the implementation of environmental management measures (refer to **Chapter 8** of this document for revised environmental management measures).

The introduction of new project infrastructure in St Peters would result in a number of positive impacts on local character and liveability. The project would enhance active transport connectivity around St Peters through the inclusion of new and upgraded pedestrian and bicycle infrastructure. Additionally, the project would provide new areas of public open space through conversion of the former landfill site in Alexandria into both transport infrastructure and parkland, significantly increasing vegetation coverage with new passive recreation areas for the local community.

Issue description – limited traffic modelling

Leichhardt Council considered the traffic modelling in the EIS to be limited and may significantly underestimate future traffic volumes and congestion that would be experienced both in the 2021 and 2031 scenarios. The significant investment of public and private funds which would be required to deliver the projects justify a fully co-ordinated, evidence based assessment of the how the WestConnex program of works would contribute to the liveability and social, economic and environmental sustainability of the city.

Response

The WestConnex Road Traffic Model (the strategic traffic model used for the project) was developed and calibrated to current observed survey data (traffic counts collected in 2012), then validated against 2012 Sydney-wide travel behaviour link flows and travel time comparisons. A key input into the model also includes Value of Travel Time Surveys (VTTS) which has been adjusted to reflect driver behaviour and their willingness to pay on toll roads. Future demand was forecast by applying the model with future year traffic growth assumptions from the Sydney Transport Model.

This strategic traffic model used for the project has been carried out by the motorway operator and has been developed, progressively updated and enhanced. The forecasting approach comprises:

- A strategic highway network model of the Sydney metropolitan area including Sydney's motorway network and all major state roads within the network
- Anticipated future land use as a basis for estimating future travel demand for cars and trucks
- Anticipated changes and updates to the road network up until 2031
- Representation of future vehicle travel demand to model varying travel patterns and behaviours
- Explicit modelling of all tolls, existing and future, on the network
- Accommodation of different motorist behaviours including willingness to pay a toll to save travel time.

Further details regarding the traffic projections used for the strategic and operational modelling are provided in the Technical working paper: Traffic and transport (Appendix G of the EIS).

An integral part of the modelling process was the involvement of independent expert peer reviewers to examine model development, methodologies for the production of traffic forecasts and the traffic forecasts. The independent review committee included independent experts from the Sydney University Institute of Transport and Logistics Studies who are recognised experts in the field of toll road patronage forecasting and transport behavioural choice modelling.

As stated in Section 9.1.4 of the EIS, the WRTM is not an operational model. Further analysis to assess detailed impacts of the project on the road network, including local roads around the project interchanges, was undertaken using operational modelling software (traffic network performance modelling) and is described in Section 9.1.5 of the EIS. Specifically, the additional analysis involved the use of a micro-simulation road network model using Paramics software to assess localised road network effects, including effects around the St Peters interchange and effects as a result of local road upgrades (refer to Figure 9-4 of the EIS for the extent of the microsimulation model used for the traffic and transport impact assessment).

The traffic and transport assessment undertaken for the EIS provides detailed information on network effects of the New M5, intersection performance and impacts on the local roads around the St Peters interchange, as well as parallel arterial routes which could see increases in traffic volumes due to traffic switching from the M5 East Motorway corridor. The roads and intersections assessed for the EIS were selected as being representative of the impacts on the localities in their immediate vicinity.

The WestConnex program of works involves the construction and operation of a 'missing link' in Sydney's motorway network, as part of a broader program of projects and initiatives to deliver a modern, integrated transport system for Sydney. This broader program of projects and initiatives is detailed in the NSW Long Term Transport Master Plan (Transport for NSW, December 2012).

The New M5 would deliver additional capacity for the M5 Motorway corridor, resulting in:

- A reduction of up to 60,000 vehicles on the M5 East on an average weekday, relieving congestion and improving travel reliability
- Between 2021 and 2031, average travel times on the M5 East Motorway would generally be halved and average travel speeds would double during the morning and afternoon peak, improving the efficiencies of intrastate and interstate freight movements through travel time saving and reduced operating costs
- An alternative to the M5 East, providing network resilience in the event of incidents or planned maintenance.

Without the New M5, conditions on the M5 East would continue to deteriorate.

Chapter 9 and the Technical working paper: Traffic and transport (Appendix G of the EIS) provides a detailed description of the strategic and operational modelling methodology and the forecast traffic and transport impacts resulting from the project.

Issue description – timing of WestConnex

Leichhardt Council expressed concern that the timing of the WestConnex program of works (including Stages 1b, 2 and 3) is such that the traffic model could not effectively include the specific demographic information that is likely to result from numerous urban revitalisation projects currently proposed for the Sydney region.

Response

WestConnex is part of an extensive plan to meet Sydney's growing transport and infrastructure needs. It is fully integrated into the State's infrastructure, transport and planning strategies, including:

- State Infrastructure Strategy (2012, updated 2014)
- NSW Long Term Transport Master Plan (2012)
- NSW Freight and Ports Strategy (2013)

- Other mode specific plans, including Sydney's Bus Future (2013), Sydney's Light Rail Future (2012), Sydney's Cycling Future (2013), and Sydney's Walking Future (2013), Sydney's Rail Future, Sydney's Ferry Future and City Centre Access Strategy
- Sydney CBD to Parramatta – Strategic Transport Plan (2015)
- NSW State Priorities
- A Plan for Growing Sydney (2014) (see below)
- Draft Parramatta Road Urban Transformation Strategy (2015)
- Transformation Plan: The Bays Precinct, Sydney (2015).

WestConnex is a central element to support the urban planning goals articulated in A Plan for Growing Sydney (DP&E 2014), the NSW Government's urban planning strategy for Greater Sydney.

The plan outlines the benefits of WestConnex as follows:

- Providing improvements in connectivity between western and south western Sydney and the Sydney CBD
- Enhancing the freight networks that serve Sydney's global gateways at Port Botany and Sydney Airport, making the export of goods more cost effective
- Facilitating a stronger economy, by providing better connections to Global Sydney.

It also identifies that: "...WestConnex will allow for significant improvements to local amenity [on Parramatta Road] by reducing through-traffic on surface roads, and allowing for enhanced north-south local connectivity."

In this context, WestConnex is a key enabler for urban transformation and development across Sydney.

Assumptions relating to future urban development and future population growth in Sydney have been incorporated into the WestConnex Road Traffic Model (the strategic traffic model for the project), including assumptions relating to developments at Green Square, Mascot, Wolli Creek and surrounding suburbs.

The WestConnex Road Traffic Model uses the Sydney Strategic Travel Model (STM) to derive base demand, including trip generation, trip distribution and mode choice modules, and incorporates demographic data related to land uses including population, employment and education enrolment projections. These projections were based on the Department of Planning and Environment's future population and employment forecasts (dated September 2014) data release from the Bureau of Transport Statistics, which has been derived from the 2011 Census data and incorporates known major urban renewal and developments, including those around Green Square, Mascot and Wolli Creek as well as those outside the project area, including Parramatta Road and the Bays Precinct.

The forecast growth in background traffic volumes were then used as the basis for the modelling and assessment of traffic impacts of the project during construction and operation.

Further details regarding the incorporation of predicted background traffic growth as a result of urban and residential development are provided in Section 9.1.3 and Section 9.1.4 of the EIS.

Issue description – level of detail in traffic and transport assessment

Specifically in relation to the traffic and transport modelling conducted by the proponent, Leichhardt Council raised the following concerns:

- Insufficient detail provided to determine the accuracy of the various land use assumptions that have been made particularly in relation to:
 - the future demand of Sydney Airport once the Western Sydney Airport has become operational
 - implications of the Moorebank Intermodal Freight Terminal

- major land use initiatives across the Sydney Region including those currently associated with the Parramatta Road Urban Transformation Project, Bays Precinct, Waterloo Rejuvenation, as well as Urban Growth NSW various Western Sydney portfolio, such as Oran Park Town, Newbrook and Macarthur Heights
- Insufficient detail provided to determine the accuracy of various social assumptions including:
 - the value of time to different classifications of traveller
 - toll sensitivity for freight vehicles in contrast to private drivers
 - whether potentially reduced travel times would encourage residents of western Sydney to remain in existing areas, or travel for the same amount of time and move further afield to more affordable areas (thus travelling greater distances in the same time as they currently travel)
- Existing and likely future mix of heavy vehicles (particularly in relation to the proportion of dangerous goods vehicle, which are unlikely to be permitted to use the tunnels).

Response

Traffic modelling for the project has relied on population and employment data from the Bureau of Transport Statistics, which is the best information currently available. The current WestConnex Road Traffic Model (WRTM) version 2.1 is based on 2014 land use projections and includes induced traffic demands as well as the proposed airport at Badgerys Creek and the proposed Moorebank Intermodal Freight Terminal.

The EIS acknowledges that other WestConnex projects are needed to deliver a number of project benefits. However, Section 1.4 of the EIS also identifies a number of project benefits that would be delivered by the project alone, and in combination with the King Georges Road intersection upgrade, which are currently under construction.

A large proportion of Australia's goods are imported and exported via Port Botany, NSW's primary container port. Port Botany is located in the same precinct as Sydney Airport, Australia's primary international airport. In the short to medium term, it is unlikely that the freight capacity of the Badgerys Creek airport would comprise more than a relatively small fraction of the current combined freight throughput of the established Sydney Airport and Port Botany. This observation is further strengthened noting the medium term development plans for the Port of Newcastle and Port Kembla.

By 2031, the freight task in NSW is projected to nearly double to 794 million tonnes compared to 2011. Even with new intermodal terminals, including at Moorebank, boosting freight rail capacity substantially, truck movements from Port Botany are still forecast to almost triple. Road freight is also increasingly subject to capacity constraints and peak hour congestion throughout Sydney. The M4 and M5 motorways in particular have limited available capacity in peak periods.

Therefore there is a need to provide a link between Western Sydney and work and freight centres such as the Sydney Airport and Port Botany, which generate about \$10.5 billion of economic activity for Sydney each year and both locations are heavily dependent on road vehicles for the movement of people and freight. Investment in additional road infrastructure such as the New M5 and other WestConnex projects would increase connections to Sydney's west, where the majority of airport and port freight traffic originates or ends.

The *Sydney Airport Master Plan 2033* (Sydney Airport Corporation Limited, 2014) notes that Sydney Airport handles about half of Australia's international air freight. The total amount of freight handled at Sydney Airport is 76 per cent more than any other Australian airport. The volume of freight handled by Sydney Airport is projected to increase from 615,378 tonnes in 2012 to 1,011,312 tonnes in 2033 (Sydney Airport Corporation Limited, 2014), an increase of 164 per cent.

Freight volumes through Sydney Airport and Port Botany are forecast to increase (Transport for NSW, 2013e). Light vehicle traffic is also forecast to increase as a result of changing land use patterns, including development of the north and south west growth centres and proposed intermodal terminals at Moorebank and in Western Sydney near the Western Sydney Employment Area. As such, the reliance on a well-connected motorway network that facilitates the major east-west movements of the global economic corridor would increase as freight volumes increase.

The proposed Western Sydney Airport is currently in the planning approval phase, and the EIS for the Western Sydney Airport was released on 19 October 2015. The Western Sydney Airport EIS indicates that operations could commence in around 2025. As indicated above, the WRTM included traffic changes and demands resulting from the operation of the proposed Western Sydney Airport. Commuters travelling between population centres in Sydney's south west would continue to be able to use the M5 East to access international gateway precinct.

The development of the proposed Western Sydney Airport has the potential to change the way some freight is moved around Sydney, by providing an alternative entry or exit point for freight. Overall, however, the movement of freight around Sydney is unlikely to be significantly altered in the short to medium term by the introduction of the new airport, for the following reasons:

- The operation of the proposed Western Sydney Airport would be staged, ramping up over time, with initial operations commencing in the mid-2020s (a minimum of five years after the completion of the project)
- Freight arriving at the new airport would still have destinations across wider Sydney
- Port Botany and Sydney Airport would still be key freight entry and exit points, with the new airport to complement the existing airport.

The WestConnex program of works, including the project, would expand capacity on NSW roads and support connections to Sydney Airport and Port Botany which would assist with growth in air travel and freight movements.

Assumptions relating to future urban development and future population growth in Sydney have been incorporated into the WestConnex Road Traffic Model (the strategic traffic model for the project), including assumptions relating to developments at Green Square, Mascot, Wolli Creek and surrounding suburbs.

The WestConnex Road Traffic Model uses the Sydney Strategic Travel Model (STM) to derive base demand, including trip generation, trip distribution and mode choice modules, and incorporates demographic data related to land uses including population, employment and education enrolment projections. These projections were based on the Department of Planning and Environment's future population and employment forecasts (dated September 2014) data release from the Bureau of Transport Statistics, which has been derived from the 2011 Census data and incorporates known major urban renewal and developments, including those around Green Square, Mascot and Wolli Creek.

The forecast growth in background traffic volumes were then used as the basis for the modelling and assessment of traffic impacts of the project during construction and operation.

Further details regarding the incorporation of predicted background traffic growth as a result of urban and residential development are provided in Section 9.1.3 and Section 9.1.4 of the EIS.

Roads and Maritime has responsibility for ensuring that road traffic does not cause unsafe conditions on and surrounding State roads. It is best placed to manage the impacts of the complex interactions between the nature of driver behaviour, responses to tolling, the use of the necessary wide range of underlying data (such as changes in population / employment and future Government policy on tolling) and the associated uncertainties in forecasting traffic volumes for over a medium to long term horizon. The processes used to date and further means to manage these traffic risks with the assessment of the New M5 and toll avoidance are described below.

The WestConnex Road Traffic Model (WRTM) uses current best practice methods for representing drivers' behaviour with respect to their willingness to pay tolls for road travel time savings for multiple toll roads and routes through the Sydney metropolitan network. The toll choice model was developed for the WestConnex project as an augmentation of standard traffic route modelling procedures that are normally used in planning and assessment of un-tolled roads. The toll choice model addresses private vehicle and commercial (truck) traffic behaviour, representing the different willingness of these vehicle users to pay for travel time savings in the context of total journey costs including tolls, travel times and distances available on competing routes.

To assess the values that differing vehicle users place on travel time savings, a project specific survey was designed and conducted in Sydney in 2013 asking road users questions about their willingness to pay tolls. Independent specialist peer reviewers provided oversight throughout the design and analysis of the survey. The survey yielded a distribution of estimates of the value that Sydney drivers are willing to pay in terms of tolls to reduce their travel time. These values were benchmarked against values from other studies in Australia and internationally.

The current tolls on all tolled roads in the Sydney metropolitan area are incorporated into the model. The model also considers future changes in perceived value of tolls taking into account escalation of tolls, effects of inflation and average weekly earnings projections.

Developing upper and lower bounds of forecast traffic volumes as suggested in the submission would be speculation on a range of potential errors for a number of WRTM inputs. Given the robust approach in developing the toll choice model, a more practical way to manage the risk of over or under estimation of the traffic impacts is through the use of observed data.

To do this it is proposed that on select routes deemed likely to be subject to toll avoidance (ie alternative un-tolled parallel routes to the New M5), a number of locations along the length of the routes would have additional traffic data collected both prior to opening, 12 months after opening and five years after opening of the New M5. This observed traffic flow data would reflect actual driver route choice associated with the New M5 and tolls. The collected data would identify both light and heavy vehicles and enable comparison with forecast traffic flows. The new observed data would be used to monitor the impacts on the parallel routes relative to that predicted in the EIS.

Should this data reveal changes associated with actual driver route choice to be sufficient to explore management measures, Roads and Maritime would develop such interventions as are necessary and that these measures would themselves be subject to the necessary approvals processes.

As with all other road tunnels in Sydney (including the M5 East tunnel), vehicles carrying dangerous goods and hazardous substances would not be permitted to use the New M5 tunnel.

It is not considered that the prohibition of these vehicles would lead to an increase in their proportion on other roads beyond that attributable to general traffic growth. Vehicles carrying dangerous goods would likely continue to use existing surface freight routes.

The transport of dangerous goods is regulated by the Dangerous Goods (Road and Rail Transport) Act 2008 (NSW), Dangerous Goods (Road and Rail Transport) Regulation 2014 (NSW) and the *Australian Code for the Transport of Dangerous Goods by Road and Rail* supported by relevant Australian Standards.

Issue description – implications of induced traffic on public transport

While the SEARs specifically include reference to consideration of the implications of induced traffic on both existing public transport and future public transport opportunities there does not appear to be any quantification of:

- The total amount of additional traffic induced by the creation of the motorway (ie car trips that would not have been made if the motorway was not constructed);
- The total amount of public transport patrons who would move from public transport to private vehicles as a result of the increased road capacity (on both the motorway and the surface road network), and the impact this migration of patrons would have on the viability of public transport;

Response

Secondary vehicle travel is usually generated from new transport infrastructure such as road projects. The Updated Strategic Business Case acknowledges that the construction of new roads can induce more people to travel on the road network. This is predicted to increase 2031 future year traffic volumes using WestConnex by between two per cent and seven per cent. The predicted induced travel demand was incorporated into the WestConnex Road Traffic Model (see Section 9.1.4 of the EIS).

The traffic and transport assessment shows that in both 2021 and 2031, the forecast reduction in traffic along the M5 East would result in improved speed, journey reliability and safety in this corridor. In the St Peters area, reductions in average delay and congestion are anticipated during both future years (2021 and 2031) compared to the 'do minimum' scenarios. The operational performance of the network, including predicted traffic volumes under the 'with project' scenarios which have incorporated induced demand forecasts, is discussed in detail in Chapter 9 and Appendix G of the EIS.

The combined number of new road trips and trips redeployed from public transport as a result of the full WestConnex program of works is anticipated to be around 0.4 per cent of the total number of daily car trips on the WRTM Sydney-wide network in 2031.

Issue description – public transport alternatives

Leichhardt Council requested a thorough investigation of public transport alternatives, including consideration of the greenhouse gas savings compared to the New M5 project and WestConnex, as a whole. This information should be placed on public exhibition for community consideration prior to decision making about the project.

Response

Sydney's population is expected to increase by more than 1.6 million people by 2031 and without major investment in road network infrastructure this growth would result in worsening road congestion. This congestion would in turn affect Sydney's economic competitiveness as a global city.

The New M5 would deliver additional capacity for the M5 Motorway corridor, resulting in:

- A reduction of up to 60,000 vehicles on the M5 East on an average weekday, relieving congestion and improving travel reliability
- Between 2021 and 2031, average travel times on the M5 East Motorway would generally be halved and average travel speeds would double during the morning and afternoon peak, improving the efficiencies of intrastate and interstate freight movements through travel time saving and reduced operating costs
- An alternative to the M5 East, providing network resilience in the event of incidents or planned maintenance.

Without the New M5, conditions on the M5 East would continue to deteriorate.

WestConnex is part of an extensive plan to meet Sydney's growing transport and infrastructure needs and is fully integrated into the State's Infrastructure transport and planning strategies, including the *State Infrastructure Strategy* and the *NSW Long Term Transport Master Plan*. While WestConnex plays a role in easing congestion, the WestConnex program of works is not designed to solve all of Sydney's transport problems.

The NSW Government is committed to investing in a range of public transport projects, as identified by the *NSW Long Term Transport Master Plan*, the *State Infrastructure Strategy 2012–2032*, *A Plan for Growing Sydney* and the *NSW State Priorities*. The *NSW Long Term Transport Master Plan* provides the framework for delivering an integrated, modern and multi-modal transport system by identifying NSW's transport actions and investment priorities for the next 20 years.

The NSW Government is investing \$68 billion in infrastructure, including:

- Sydney Metro City and Southwest, which would extend the Sydney Metro Northwest via St Leonards and North Sydney, across the Harbour and into the Sydney CBD. From Sydney CBD, the Metro would connect to an upgraded Bankstown Rail Line
- Sydney Light Rail, including construction of a new CBD and South East Light Rail Line along the corridor between Sydney CBD and Randwick / Kingsford
- Upgrades and enhancements to the suburban rail network.

Although investment is being made in public transport infrastructure, the construction of new roads and the upgrade of existing roads in Sydney would continue to be required due to the continued demand for the diverse movements of people, goods and services across Sydney. Specifically, within the M5 Motorway corridor (comprising the M5 East Motorway and the M5 South West Motorway) public transport initiatives alone would not considerably enhance the productivity of commercial and freight generating land uses or resolve the current congestion issues along the M5 East Motorway.

For these reasons, a purely public transport alternative would not achieve the objectives of the project. The GHG assessment therefore does not compare car and public transport GHG emissions, since these modes are intended to be complementary, rather than exclusive.

4.15.2 Air quality

Issue description – Air quality assessment methodology

Leichhardt Council requested confirmation that the NSW EPA has approved the alternative assessment methodology used in the EIS, as the approach does not satisfy all of the requirements of the 'Approved Methods for the Modelling and Assessment of Air Pollutants in NSW' (the Approved Methods). If the approach adopted in the EIS is not consistent with the relevant EPA requirements for modelling and assessment further studies should be undertaken and publically exhibited to ensure that the assessment is undertaken in a manner consistent with the requirements of the EPA.

Response

The NSW EPA, NSW Health and the Advisory Committee on Tunnel Air Quality (ACTAQ) were consulted during the development and production of the methodology and the air quality impact assessment provided in Appendix H (Technical working paper: Air quality) of the EIS. The methodology used for this project is consistent with the NSW Approved Methods and the recently approved M4 East project. The following comment has been made by NSW Health in its submission on the New M5 EIS (**Section 4.5** of this report):

“Information provided within the EIS does not demonstrate that the model used to estimate air pollution has been adequately validated. However, I do note that the model used in the EIS is the same model that was used to assess the external air quality for the proposed M4 East and that subsequently substantial additional work (mainly sensitivity studies) has been undertaken to validate the modelling work for the proposed M4 East development. As such, NSW Health is happy to accept that the model is appropriate for this EIS.”

The NSW EPA raised some concerns about the evaluation of the GRAL model in its submission on the M4 East EIS and these were based on the EPA's lack of familiarity with the GRAL model:

“There are certain inputs to the air quality assessment (for example, traffic modelling and the Graz Mesoscale Model/Graz Lagrangian model (sic) air dispersion model) where the EPA does not have relevant technical expertise to provide a meaningful review.”

The EPA submission further stated that:

“The air quality assessment (WDA 2015) has generally been conducted in accordance with the Approved Methods for the Modelling and Assessment of Air Pollutants in NSW”.

The intention of the GRAL evaluation was to test the performance of the whole model chain, rather than GRAL per se. In this respect, and given the limited number of roadside monitoring sites in Sydney, it is considered that the model chain performs as well as could be expected, allowing for probable inherent conservatism in the approach (e.g. background concentrations, emissions).

An addendum to the NSW Chief Scientists' submission to the M4 East EIS by the peer reviewer appointed by the Advisory Committee on Tunnel Air Quality was received on 30 November 2015, and is reproduced following.

"Evaluation of GRAL performance

- *Upon further inspection of the data provided to me, I would like to withdraw my previous observation that "We independently find that GRAL, as used in this assessment, is slightly (~10%) under-representing the spatial variation in concentrations related to different proximities to major roads."*
- *Model evaluation is particularly difficult when using data that was not explicitly designed to be captured for this purpose. Through closer inspection of the data I have gained a deeper appreciation of the complexity involved in attempting to evaluate both GRAL and the background estimates, and that this is not the purpose of the EIS.*
- *I now believe that GRAL is generally performing well but cannot be so specific as to quantify under or over estimation.*
- *The roadside site data available is far from ideal for model evaluation. Site F1 is affected by features (barriers, trees) which are not easily included in the model and thus F1 should ideally not be included in an evaluation (or this limitation noted). Site M1 is also very complex and challenging for the model (and not representative of the great majority of receptors where good model performance is required). The M4E:04 site ("Concord Oval") is better but only a short period of data was available which may be insufficient to cover a typical range of meteorological conditions.*
- *However, through this extended analysis I have become more confident that the GRAMM/GRAL modelling suite are appropriate for this assessment, have been used correctly and that their performance is good.*
- *In my original review I stated:*
 - *"On a long-term basis, GRAL (as used) appears to slightly under-estimate the higher concentrations at roadside locations. This effect counter-acts the night-time over-prediction to give apparently improved performance overall."*

Upon further analysis I would like to withdraw this statement as I no longer believe it to be true."

The model selection reflects the complexity of the project. There was a need to assess both surface roads (with complex changes to road network over a large area) and tunnel ventilation outlets (point sources). In addition, large numbers of real-world receiver locations were affected, to a greater or lesser extent, by the project. In a number of previous assessments separate models have been used for different types of source (eg CALINE for roadways and CALPUFF for ventilation outlets). This approach makes the interpretation of results more difficult, as each model involves different treatments, inputs and assumptions (e.g. meteorology, terrain, buildings). In addition, Gaussian models for roadways, such as CALINE, do not allow the effects of terrain and buildings to be taken into account. An alternative approach is to use a single model which includes different types of source. Examples of such models include ADMS in the UK and, the model used in the M4 East assessment, GRAL from Austria.

GRAL has the following advantages:

- It is an established model for regulatory applications.
- It is flexible:
 - Sources (area, line, point, portal) defined using source groups
 - Scales (streets to whole cities)
- High resolution possible (e.g. 5 metres for a large domain)
- Special algorithms for dispersion in low wind speed conditions

- Consideration of terrain and topography
- Better performance than Gaussian models (e.g. no terrain in CALINE)
- Roadway-specific (e.g. vehicle wake effects)
- Validated in a wide range of studies (see later).

Issue description – worst case air quality assessment

Leichhardt Council requested additional information regarding the 'worst case' assessment of air quality which considers the maximum emission rates (in grams per second) and a peak congested scenario should be provided;

Response

For a tunnel ventilation outlet, the ambient impact is proportional to the concentration at the point of emission, which in turn is dependent on the in-outlet air flow and the emission rate from the traffic in the tunnel.

The worst-case ambient impact is defined by the regulatory worst case, which relates to the highest in-outlet concentrations that would be permitted should the allowable in-tunnel limits apply 24 hours a day, seven days a week, 365 days a year.

The results of the air quality assessment determined that the regulatory worst-case scenarios would result in outlet concentrations that are higher than those that can be attained for all in-tunnel traffic situations modelled for the New M5. This includes congested scenarios (the worst-case traffic scenario condition) with the tunnel at capacity and speeds down to 20 kilometres per hour. The results of the assessment of maximum in-tunnel concentrations across all time periods for the expected traffic scenarios, the capacity traffic scenarios and the worst case regulatory assessment are presented in Table 10-20 of the EIS.

Issue description – quantitative construction air quality assessment

There is a need for the completion of a quantitative construction air quality assessment, focusing on the risk of particulate impacts and including the potential for release of crystalline silica.

Response

It is acknowledged there is potential for crystalline silica to occur during tunnel excavation. The likelihood of public exposure would be extremely limited, as the risk of crystalline silica would be limited to tunnelling areas which would not be accessible to the public.

The potential for crystalline silica to be released is primarily relevant to occupational exposure, and would be managed in accordance with relevant NSW and Australian guidelines. A Construction Air Quality Management Plan would be prepared in consultation with the NSW EPA and would detail the specific management measures to minimise potential exposure to crystalline silica to operational personnel during the construction of the tunnels.

This would include the preparation and implementation of Safe Work Method Statements as part of the Project Safety Management System.

Dust control on site and from haulage is addressed in the Technical working paper: Air quality (Appendix H of the EIS) and would be managed during construction in accordance with the Construction Air Quality Management Plan and the Project Management Safety System. This would include implementing wheel washes as relevant at exit points and ensuring that truck loads are covered.

Issue description – conditions of approval

In the event of approval of the project the following conditions should be applied:

- Portal emission monitoring
- Dampers should be provided in the western ventilation outlet to allow for varying outlet diameters.

Response

As detailed in Section 5.8.1 of the EIS, single point air quality monitors would be installed within the main alignment tunnels, including inside the entry and exit portals. Ambient air quality monitoring would also be undertaken at specific locations to assess compliance with the EPA's ambient air quality criteria.

Individual dampers would be provided on all ventilation outlet fans for the purpose of variable control.

The project ventilation system is designed to draw fresh air in through the portals with an additional air intake at the Arncliffe Motorway Operations Complex, rather than forcing air out. The design incorporates jet fans to provide air flow against the direction of traffic flow where required. This is illustrated in Figure 5.43 of the EIS, which provides an indicative tunnel ventilation system, as described in Section 5.8.1 of the EIS.

The exception to this would be in the unlikely event of a fire inside the tunnel close to the portal. In the unlikely event that a major incident was to occur, the ventilation system would be operated to provide a safe environment for tunnel occupants (eg smoke may be ventilated from the tunnel portals in the case of a fire).

As detailed in Section 5.8.1 of the EIS, single point air quality monitors would be installed within the main alignment tunnels, including inside the entry and exit portals. Ambient air quality monitoring would also be undertaken at specific locations to assess compliance with the EPA's ambient air quality criteria.

Individual dampers would be provided on all ventilation outlet fans for the purpose of variable control.

4.15.3 Biodiversity

Issue description – consultation with councils on biodiversity

Leichhardt Council submitted that relevant councils and State bodies should be consulted with regards to local biodiversity plans, objectives, actions and data. Some species considered common through NSW and not protected by threatened species legislation, such as the superb fairy wren, are locally vulnerable and Councils and the local community are working to preserve these species. By focusing on the minimum requirement to protect threatened species, populations and ecological community only, the importance of biodiversity within the local urban context is over-looked.

Response

Council's views on common species are noted. The aim of the FBA is to describe biodiversity and the offsets required at the higher levels of legislative protection. The FBA does not aim to describe and calculate offsets of widespread and common biota. While the presence of common flora and fauna may be locally significant, this is not considered at the level at which major projects are assessed.

The biodiversity values of non-threatened species and ecological communities was addressed in the Technical working paper: Biodiversity Assessment Report by identifying the amount of urban and native vegetation present, the distribution and number of hollow bearing trees within the development footprint, the likely impacts on groundwater dependant ecosystems along with aquatic and riparian habitats and by reporting survey results for all bird species surveyed in Eve Wetlands. The BAR represents a comprehensive assessment of likely biodiversity impacts that has been endorsed by OEH as meeting the requirements of the FBA.

Further, Section 7.6.2 of the Technical working paper: Biodiversity Assessment Report identifies the management of native vegetation and states that landscaping should reflect native vegetation in the local area as well as providing for foraging habitat for native fauna.

To inform the list of species and communities that could potentially be affected by the project, the FBA credit calculator was used to identify ecosystem credit and species credit species. The credit calculator is a decision support tool provided by NSW OEH. In accordance with the FBA, an accredited assessor has used the credit calculator to undertake the assessment of potential impact on biodiversity values by the project and has prepared the Technical working paper: Biodiversity Assessment Report.

The credit calculator is informed by a number of databases which are periodically updated to reflect updated information relevant to biodiversity values and data. Databases considered in the credit calculator include:

- NSW Vegetation Information System Classification Database (VIS Classification Database)
- Threatened Species Profile Database
- Vegetation Benchmarks Database
- Over-cleared landscapes database (Mitchell landscapes).

In addition to these databases, the Technical working paper: Biodiversity Assessment Report has used the following databases to inform the assessment of the project:

- Sydney Metropolitan Catchment Management Authority Vegetation Mapping (OEH 2013).
- Native Vegetation Maps of the Cumberland Plain, Western Sydney (NPWS 2002).
- OEH Atlas of NSW Wildlife (10 kilometre radius search), accessed 13 Nov 2014.
- EPBC Act Protected Matters Search Tool (10 kilometre radius search), accessed 1 Dec 2014.
- NSW DPI Fisheries threatened and protected species records viewer (FM Act), accessed 4 June 2015.
- NSW DPI Fisheries Key Fish Habitat Map, accessed 4 June 2015.
- NSW Fisheries Marine Vegetation Map (Botany Bay and Cooks River).
- Bureau of Meteorology Groundwater Dependent Ecosystems Atlas, accessed 3 June 2015.

The use of the abovementioned databases meets the requirements of the FBA and is considered appropriate and sufficient to identify threatened species and / or communities that could potentially be impacted by the project. Given this, the calculated offsets are also deemed appropriate.

There is no requirement to utilise threatened species records held by local councils as they are assumed to be part of the curated and managed state datasets such as the Atlas of NSW Wildlife, unless the consent authority, in consultation with OEH, forms the opinion that those records more accurately reflect local environmental conditions than the data held within the databases. In the case of the latter, DP&E has not provided this direction.

Issue description – management measures for vegetation

Leichhardt Council requested further detail needs to be provided regarding how the loss of established vegetation is to be mitigated.

Response

An assessment of the direct impacts on native vegetation is outlined in the Technical working paper: Biodiversity Assessment Report in Appendix S of the EIS. In particular:

- Section 6.1 describes the direct impacts on vegetation
- Section 7.2 describes the management measures
- Chapter 8 outlines the offset requirements.

The Biodiversity Offset Strategy (Appendix T of the EIS) identifies the quantity of credits required, the efforts undertaken to date to secure the required offsets prior to the exhibition of the EIS, and the approximate quantity of credits the landowners have (if known).

Appendix L of the Biodiversity Assessment Report (Appendix S of the EIS) provided a copy of the Biodiversity credit report for the credits required.

Investigation and identification of potential sources of credits has been discussed in Section 3 of Appendix T (Biodiversity Offset Strategy) of the EIS.

Issue description – method of biodiversity assessment

Further justification needs to be provided regarding the selection of the boundary study areas and exclusion of key biodiversity spaces.

Response

The justification for the biodiversity study area is provided in Section 1.4 of Technical working paper: Biodiversity Assessment Report (Appendix S of the EIS). The study areas were selected with due consideration of potential direct and indirect impacts, such as groundwater drawdown.

For matters not assessed under the FBA, the entire project corridor was assessed. Matters not assessed under the FBA include MNES, aquatic and groundwater dependent ecosystems. MNES were considered for the project corridor plus a ten kilometre buffer. The project corridor assessed is shown in Figure 1 of the Technical working paper: Biodiversity Assessment Report (Appendix S of the EIS).

For the purposes of the assessment of impacts to biodiversity according to the FBA, the study area is the 550 metre buffer area where ecological survey investigation was conducted for this technical working paper. The study area can be seen in Figure 3 of the Technical working paper: Biodiversity Assessment Report (Appendix S of the EIS).

Issue description – limited scope of the surveys

Concern is expressed that the limited scope of the surveys and proposed management measures may mean that the flora and fauna impacts are greater than those suggested by the EIS.

Response

The project site is located within a highly modified, urban landscape. Vegetation is limited to small stands of planted roadside vegetation, and within parks and gardens which provide habitat for mobile, common fauna typical of urban environments. The surveys undertaken for the project are considered to be appropriate for the nature and context of the habitats that would be affected (planted vegetation, cleared and grassed parks and gardens).

Details of the surveys undertaken for the project are provided in Section 2.2 of the Technical working paper: Biodiversity Assessment Report (Appendix S of the EIS). Surveys were conducted in November, December, April, May and June 2015. The season of survey is not a limiting factor in this assessment.

Issue description – biodiversity offsets

As the EIS details that no like-for-like credits were available for purchase, in relation to its biodiversity off-set strategy it is considered that the biodiversity proposed to be cleared would not be adequately substituted.

Response

The required offsets for the project have been determined using the FBA methodology in accordance with the biodiversity offsets policy (OEH, 2014c). The offsets have been calculated based on a worst case disturbance footprint and a worst case biodiversity assessment which assumes that all vegetation within the construction footprint would require clearance. The construction footprint may be refined during detailed design. In this instance, biodiversity offset calculations and requirements would be revised to reflect the revised footprint.

In accordance with the FBA, there are two options, or a combination of the two for fulfilling offset requirements that are relevant to road projects:

- Securing like for like offsets to retire credits
- Contributing to supplementary measures.

The development of the Biodiversity Offset Strategy is ongoing, however works undertaken to date suggest that the Biodiversity Offset Strategy is likely to include both the retirement of relevant ecosystem and species credits through BioBanking agreements, and where credits cannot be obtained, the provision of supplementary measures. Supplementary measures would not be sought beyond ten per cent of the total cost for matters of national environmental significance. Like for like credits and measures would be sought for matters of national environmental significance.

The securing of biodiversity offsets for the project has been considered in accordance with the process described in Table 21-14 of the EIS. A summary of the steps undertaken to identify and secure offsets for the threatened ecological communities and threatened fauna identified is provided in Table 21-15 of the EIS.

As noted earlier, the development of the Biodiversity Offset Strategy is ongoing, and efforts to secure credits would continue throughout the detailed design of the project.

4.15.4 Greenhouse gas

Issue description – greenhouse gas abatement

Leichhardt Council stated that the construction of motorways is not considered to be consistent with best practice greenhouse gas abatement projects related to transportation and the EIS itself acknowledges that greenhouse gas savings would decrease over time as traffic volumes increase.

Response

The assessment of greenhouse gas emissions undertaken for the EIS (refer to Chapter 22 of the EIS and the detailed greenhouse gas calculations in Appendix U of the EIS) is based on the WestConnex Road Traffic Model, which provides a way to understand changes in future year travel patterns under different land use, transport infrastructure and pricing assumptions.

It was principally developed and enhanced to assess infrastructure improvements associated with the WestConnex projects, both in isolation and combination, for five future year scenarios. Importantly, the WestConnex Road Traffic Model also includes committed or planned road network and intersection improvements that are internal and external to the study area.

The results of the greenhouse gas assessment for 2021 (which is around a year into operation of the project) indicate that the project would generate an additional 109,600 t CO₂-e of Scope 3 emissions associated with fuel use of light and heavy vehicles using roads within the study area, compared with the 2021 'without project' scenario.

Over the longer term, the assessment results indicate the project would reduce annual greenhouse gas emissions by around 229,200 t CO₂-e in the 2031 'with project' scenario, and by around 1,874,000 t CO₂-e in the 2031 'cumulative' scenario' (including the full WestConnex program of works), within the study area.

The Updated Strategic Business Case released in November 2015 included an economic assessment which found that the broader WestConnex program of work will produce a greenhouse gas emission saving of \$3.58 billion (undiscounted). This means that in 2021, WestConnex will contribute to a reduction in CO₂ emissions of 610,719 tonnes. By 2031 this rises to 1,417,420 tonnes.

Issue description – greenhouse gas evaluation of a public transport alternative

It is necessary to carry out a comprehensive evaluation of a public transport alternative and compare this to the project in terms of greenhouse gas emissions in the EIS.

Response

While rail and public transport do provide for efficient travel between major centres, there would continue to be a need for travel by road to jobs that are dispersed across the metropolitan area and not easily accessed by public transport. In addition, public transport alone cannot provide sufficient point-to-point access to the diverse range of employment and educational hubs, shopping centres or recreational centres, nor can it provide for the safe and efficient delivery of goods and services to Sydney's growing population. For these reasons, a purely public transport alternative would not achieve the objectives of the project, and the GHG assessment therefore does not compare car and public transport GHG emissions, since these modes are intended to be complementary, rather than exclusive.

An assessment of a number of strategic alternatives to the project was included in Section 4.2 of the EIS. This assessment did not extend to greenhouse gas emissions modelling during operation as that is not typically undertaken for comparative assessments in EISs for major infrastructure projects in NSW.

The results of the greenhouse gas assessment for 2021 (which is around a year into operation of the project) indicate that the project would generate an additional 109,600 t CO₂-e of Scope 3 emissions associated with fuel use of light and heavy vehicles using roads within the study area, compared with the 2021 'without project' scenario.

Over the longer term, the assessment results indicate the project would reduce annual greenhouse gas emissions by around 229,200 t CO₂-e in the 2031 'with project' scenario, and by around 1,874,000 t CO₂-e in the 2031 'cumulative' scenario' (including the full WestConnex program of works), within the study area.

Issue description – impact of the project on future of climate change

It is important to note that this assessment considers the impact of future climate change on the project, rather than the impact of the project on future of climate change. It would be beneficial to assess the impact of the project on climate change.

Response

While the effects of climate change vary based on local context, anthropogenic climate change (the increased generation and concentration of greenhouse gas emissions in the atmosphere associated with human activity) occurs on a global scale. The global nature and long lag times associated with climate processes mean that local changes in climate cannot be attributed to the contribution of greenhouse gas emissions from one project. As a result, the estimate of greenhouse gas emissions generated by the project is considered as a contribution to global climate change.

Chapter 22 and Appendix U (Greenhouse gas calculations) of the EIS provide an estimate of the project's contribution to global climate change through an assessment of greenhouse gas emissions attributed to the project's construction, operation and use.

Section 22.3 of the EIS includes a comparison of the project's emissions with the most recent Australian and NSW greenhouse gas inventories (at the time of publication of the EIS). This comparison is used to demonstrate the scale of the project's emissions in this context.

Chapter 8 of this report (Revised environmental management measures) provides a list of measures to reduce greenhouse gas emissions generated by the project.

The Updated Strategic Business Case released in November 2015 included an economic assessment which found that the broader WestConnex program of work will produce a greenhouse gas emission saving of \$3.58 billion (undiscounted). This means that in 2021, WestConnex will contribute to a reduction in CO₂ emissions of 610,719 tonnes. By 2031 this rises to 1,417,420 tonnes.

Issue description – regular reporting on sustainability objectives and targets

It is important that regular reporting is conducted on the sustainability objectives and targets throughout the construction and later phases of the project.

Response

Roads and Maritime would be required to develop and implement the Sustainability Management Plan during detailed design. The Sustainability Management Plan would include processes and systems for monitoring and reporting during the detailed design and construction phases of the project.

Principles in the Sustainability Management Plan would extend across the whole project. Sustainability initiatives incorporated in the design and construction phases would be driven by decision making which considers the whole-of-life, environmental, social and economic costs and benefits of the project.

As outlined in the Updated Strategic Business Case, a vision to guide the sustainability goals for the project has been established:

“WestConnex will be a sustainable, high quality and transformational project for the people of Sydney and NSW. Exhibiting innovative design excellence, it will be sensitively integrated into the natural and built environment, help build communities and contribute to the future liveability of Sydney.”

In order to deliver on this vision, there is a commitment to:

- Demonstrating sustainability leadership and continual improvement
- Protecting and enhancing the natural environment and local heritage
- Contributing to liveable communities (by easing congestion, connecting communities, integrating land use and transport planning, and facilitating urban revitalisation)
- Optimising resource efficiency (materials, energy, water, land) and waste management
- Increasing resilience to future climate changes
- Allowing for future transport needs (transport modes, extensions, access points)
- Implementing sustainable procurement considering whole-of-life environmental, social and economic factors
- Maximising equitable training and employment opportunities.

A standalone Sustainability Strategy, which describes how sustainability considerations are integrated into the planning, construction and operation of the WestConnex full program of works, was released in September 2015 and is available at www.westconnex.com.au. The strategy includes clear commitments and targets across each of the objectives outlined above.

The WestConnex sustainability objectives and targets would be passed through by the implementation of the project's Sustainability Management Plan and the sustainability initiatives as described in Section 28.3 of the EIS.

Issue description – WestConnex Updated Strategic Business Case

As the overall premise of the WestConnex Motorway Project is based on the Updated Strategic Business Case Leichhardt Council commissioned an independent review of the business case. Based on the key concerns highlighted in this review (and included below) Council considers that the overall WestConnex Motorway project and the assessment processes associated with it are flawed. Consequently, Council requests that no further action be taken to progress any stage of WestConnex until the issues raised in the (attached) review of the project's Updated Strategic Business Case have been addressed.

Of particular concern in relation to the Updated Strategic Business Case are the following:

- a) The Updated Strategic Business Case does not consider any strategic alternatives to WestConnex
- b) The description of the transport modelling applied to WestConnex is opaque and confusing, and the toll regime that is used in traffic forecasts is not fully explained
- c) Once the Western Harbour Tunnel and BeachesLink are in operation (by 2031), the Updated Strategic Business Case suggests that WestConnex would be close to capacity. If wholly completed by 2021, this would result in \$16.8 billion being spent for around ten years of marginally improved travel times
- d) Establishing a motorway through The Bays Precinct appears counterintuitive to the aims of the urban renewal project
- e) The costs of WestConnex are high and have the potential to increase
- f) The traffic modelling has a range of issues which are concerning for a project of this scale. These issues include the treatment of induced demand and its impact on the project benefits, a lack of sensitivity testing and the lack of modelling for a more distant future year (e.g.2046)
- g) The benefit cost ratio (BCR) of 1.71 seems questionable based on information provided in the document. Dividing the present value of benefits against the present value of costs results in a benefit cost ratio of 1.64
- h) If travel time savings of less than five minutes are excluded, the travel time benefits are reduced from \$12.9 billion to \$5.9 billion, consequently reducing the BCR from the recalculated 1.64 to 1.12
- i) The rationale for the large proportion of business trips is unclear. 33 per cent of travel time benefits are attributed to cars - privately registered for business use. However, justification on why there are so many business car users is not provided in the Updated Strategic Business Case
- j) Land acquisition costs or the opportunity cost of land being used for the project do not appear to be included in the WestConnex project costs or in the broader benefit cost analysis
- k) The health impacts, local amenity impacts and related land use implications are not discussed by the Updated Strategic Business Case.

Response

WestConnex has been assessed as a program of work and a motorway network in the Updated Strategic Business Case released in November 2015. The economic appraisal completed as part of this Updated Strategic Business Case concluded that WestConnex would deliver \$1.71 in benefits for every dollar spent.

As explained in Chapter 3 of the EIS, the existing M5 East is heavily congested for large parts of the day. It carries over 100,000 vehicles per day, including about 10,000 heavy vehicles; well in excess of its design capacity. The M5 East Motorway currently experiences heavy traffic congestion, slow speeds and unreliable travel times especially in the morning and afternoon peaks, and increasingly at other times of the day and on weekends.

Sydney's population is expected to increase by more than 1.6 million people by 2031 and without major investment in road network infrastructure this growth would result in worsening road congestion. This congestion would in turn affect Sydney's economic competitiveness as a global city.

The New M5 would deliver additional capacity for the M5 Motorway corridor, resulting in:

- A reduction of up to 60,000 vehicles on the M5 East on an average weekday, relieving congestion and improving travel reliability
- Between 2021 and 2031, average travel times on the M5 East Motorway would generally be halved and average travel speeds would double during the morning and afternoon peak, improving the efficiencies of intrastate and interstate freight movements through travel time saving and reduced operating costs
- An alternative to the M5 East, providing network resilience in the event of incidents or planned maintenance.

Without the New M5, conditions on the M5 East would continue to deteriorate.

The WestConnex Updated Strategic Business Case has been written in accordance with the requirements of the NSW Treasury Guidelines for Capital Business Cases, as well as Infrastructure NSW and Infrastructure Australia requirements. These include recommendations by both the NSW Auditor General and Infrastructure Australia resulting from reports prepared by these bodies on aspects of WestConnex, which have been considered and incorporated into the Updated Strategic Business Case.

In accordance with the recommendation by the NSW Auditor-General that major projects and key documents, such as the Updated Strategic Business Case, be subject to the Infrastructure Investor Assurance Framework designed by Infrastructure NSW, the Updated Strategic Business Case has been through an externally managed Business Case Gateway Review.

The Updated Strategic Business Case includes:

- A strategic justification for WestConnex in the context of key strategies and plans
- An updated reference design, including details of the options development process that lead to key alignment changes
- Budget and cost estimates for the whole of WestConnex
- Details of the proposed tolling regime
- Traffic demand and operational traffic modelling results, including details of travel time savings and interchange performance
- An economic appraisal, including cost benefit analysis
- A financial appraisal, including project cashflows based on the reference tolling scenario
- Details of staging, procurement and financing
- A description of the project governance model
- Details of environmental and sustainability principles
- A communications and stakeholder strategy.

The Updated Strategic Business Case includes Technical Papers providing additional detail in relation to traffic modelling, economic appraisal, updated strategic environmental review, and timeline of consultation activities.

The Updated Strategic Business Case can be found on the WestConnex website site at www.westconnex.com.au/documents/updated_strategic_business_case.pdf.

The council's concerns with regards to the specific issues raised are noted, but are beyond the scope of this EIS.

4.16 Molino Stewart

Molino Stewart has undertaken a review of the biodiversity, air quality, water quality and hydrology components of the New M5 EIS on behalf of Rockdale City Council, Canterbury City Council and Hurstville City Council. Where relevant, responses to issues raised in the Rockdale City Council, Canterbury City Council and Hurstville City Council covering submission have been cross referenced to this section.

4.16.1 Air Quality

Issue description – general issues and approach

The general approach to the EIS, including the description of the project; the identification of relevant air quality issues; the identification of regulatory requirements; the definition of the existing environment, and the outline of methodology used in the working paper and the EIS are considered to be generally adequate and appropriate.

Response

Noted.

Issue description – construction impacts on air quality

The approach adopted to the assessment of the impacts of construction activities associated with the New M5 Project on local air quality appears to have been reasonable and appropriate, and the conclusion reached in both the working paper and the EIS that “standard management measures would be sufficient to mitigate the effects of construction works on local air quality at the nearest receptors” also appears to be reasonably based.

It is recommended that appropriate and specific Construction Phase Air Quality Management Plans (or sub-plans) are developed and implemented for individual components of the overall construction task. It is also recommended that local government bodies at immediate interest arrange for and apply an appropriate watching brief to the Construction Management Plan process, to ensure that the various plans (or sub-plans) are applied and work effectively, and that air quality outcomes are consistent with relevant guideline levels adopted in the plans (or sub-plans).

Response

Air quality impacts on site and from haulage is addressed in the Technical Working Paper: Air Quality in Appendix H of the EIS and would be managed during construction in accordance with the Construction Air Quality Management Plan, prepared as part of the Construction Environmental Management Plan. The Plan would detail management measures to minimise impacts to local air quality, including key performance indicators for local air quality during construction and monitoring requirements.

Roads and Maritime would comply with all consultation requirements that may be included in the conditions of approval for the project.

Issue Description – Alexandria Landfill closure and remediation

The assessment and proposed management of odour and particulates associated with the closure, remediation and redevelopment of the Alexandria Landfill appear to have been appropriately and thoroughly carried out. Subject to the application of the proposed Landfill Closure Management Plan, impacts can be expected to be acceptable, and within relevant guideline levels.

It is recommended that local government bodies at immediate interest arrange for and apply an appropriate watching brief to the process, to ensure that the Landfill Closure Management Plan is applied and works effectively, and that odour and dust outcomes are indeed within relevant guideline levels, as predicted.

Response

Noted. The Landfill Closure Management Plan (LCMP) has been developed having regard to relevant guidance and legislation, including the *Draft Environmental Guidelines Solid Waste Landfills. Second Edition* (EPA, 2015) and has been developed in accordance with the requirements of the *Protection of the Environment Operations Act 1997*.

The LCMP was prepared following a thorough consultation and review process with inputs from landfill specialists, the Waste Assets Management Corporation (WAMC), the NSW EPA and a Site Auditor accredited under the *Contaminated Land Management Act 1997* (CLM Act). Based on the outcome of the review and consultation process, the document is considered adequate and appropriate for its intended purpose.

The LCMP has been reviewed and endorsed by both a NSW EPA-accredited Site Auditor (contaminated land) and EPA (waste) as an appropriate approach to mitigate long-term risks posed by the landfilled wastes and rehabilitate the land to a condition suitable for the proposed motorway interchange.

Consultation would be ongoing with key stakeholders throughout detailed design in accordance with any Conditions of Approval for the project.

Issue description - assessment of operational impacts (surface air quality)

The findings of both the working paper and the EIS in terms of general surface air quality impacts appear to be reasonable.

Response

Noted.

Issue description – assessment of tunnel ventilation design options

For reasons fully detailed in this review, it is considered that the longitudinal ventilation system currently proposed for the two New M5 tunnels may not be adequate or appropriate to ensure safe and compliant air quality within the tunnels at all times.

In general terms, the proposed management of operational air quality impacts presented in the working paper and the EIS is considered to be reasonable and adequate. However, in relation to the management of in-tunnel air quality, and as a consequence air quality in the immediate vicinity of the proposed tunnel emission outlets, it is considered that the proposed tunnel ventilation system may be neither adequate nor appropriate to ensure safe and compliant air quality at all times.

In relation to in-tunnel air quality it is recommended that alternative approaches to the ventilation and management of in-tunnel air, as proposed in this report, are included in the project proposal, and modelled and assessed in the working paper and EIS.

Response

The project includes a well-designed tunnel ventilation system that would ensure that applicable in-tunnel, ventilation outlet and ambient air quality criteria are met.

Alternative ventilation schemes and the reasons for the selection of the longitudinal ventilation system and the location of the ventilation facilities are detailed in Section 4.6.1 of the EIS. A detailed description of the ventilation system and the in-tunnel air quality design criteria is provided in Section 5.8.2 of the EIS. A review of tunnel ventilation design and control approaches, and their effectiveness is provided in Technical working paper: Air quality (Appendix H of the EIS).

The tunnel ventilation system has been designed to achieve the in-tunnel, ventilation outlet and ambient air quality criteria described in Section 4.6 of Technical working paper: Air quality (Appendix H of the EIS). The tunnel ventilation design includes intermediate air exchange facilities at Arncliffe and Bexley in addition to the western and eastern ventilation outlets at Kingsgrove and at the St Peters interchange. The reductions in in-tunnel pollutant levels as a result of the operation of these facilities are clearly demonstrated in Figures 11-36 to 11-38 in Technical working paper: Air quality (Appendix H of the EIS).

Technical working paper: Air quality (Appendix H of the EIS) demonstrates that in-tunnel air quality would be within operational limits for all scenarios including capacity traffic with speeds down to 20 kilometres per hour. The simulations of in-tunnel air quality performance take into account the carriageway grades within the project tunnels, anticipated vehicle and fuel mix and traffic speeds between 20 and 80 kilometres per hour. The results of these simulations of in-tunnel air quality performance are shown in Figures 11-15 to 11-40 of Technical working paper: Air quality (Appendix H of the EIS).

Longitudinal ventilation has historically not been suitable for long tunnels due to the need to supply large volumes of fresh air to dilute vehicle emissions. However, the development of cleaner vehicles in response to cleaner fuels and more stringent emission standards means that a significant reduction in vehicle emissions has occurred over the past 20 years. A well-designed longitudinal ventilation system can now easily maintain acceptable air quality in long tunnels and is considered the most efficient and effective tunnel ventilation system (Roads and Maritime, 2014a).

Although all three broad types of ventilation systems (transverse, semi-transverse and longitudinal) described in Section 4.6.1 could be designed to ensure that in-tunnel air quality criteria would be met, a longitudinal system has been selected for the project. Longitudinal ventilation is considered the most appropriate as it is more effective for the management of smoke in the main alignment tunnels, and is more affordable to construct and operate than transverse ventilation systems.

The proposed tunnel cross sections for the New M5 are roughly double the existing tunnel cross-sections for the M5 East and hence the design flows are very much higher, and as such the new tunnel would perform to a higher standard than older tunnels. Further development of the ventilation system and management of in-tunnel air quality would be undertaken during the detailed design phase. Continuous monitoring of both in-tunnel and ambient air quality would be undertaken during operation of the project to demonstrate that acceptable air quality outcomes are being achieved.

Issue description - assessment of operational impacts (Emission Outlets)

Any inadequacy in the control of air pollutant levels within the tunnels would have an impact on the quality of discharges from the associated exhaust outlets, and any assumptions made regarding surface air quality near those outlets.

In relation to surface air quality near emission outlets, it is recommended that alternative approaches to the management of emission outlets discharges, as proposed in this report, are included in the project proposal, and modelled and assessed in the working paper and EIS.

Response

Sections 9.5, 9.6 and 9.7 of Technical working paper: Air quality (Appendix H of the EIS) show the results of the dispersion modelling, including contour plots for pollutant concentrations from ventilation outlets only for the different modelling scenarios. In all cases the contribution from the ventilation outlets is very small to negligible for all criteria and any potential change in in-tunnel emissions would need to be of sufficient magnitude to require alternative management strategies for management of the outlet emissions.

The ground level concentrations are dominated by emissions from surface road traffic. An air quality monitoring scheme would be developed and implemented in consultation with key stakeholders to confirm the EIS predictions that there would be no detectable change in air quality due to emissions from the ventilation outlets. Monitoring results would be reviewed after an appropriate period to determine if there is a need to continue monitoring.

All relevant monitoring results would be made publicly available.

Issue description – cumulative impacts

The methodology and approach adopted in relation to the assessment of cumulative air quality impacts is adequate and appropriate in relation to current project assumptions. It is also considered to be adequate and appropriate to model and assess any revised cumulative impact that might apply as a consequence of any increase in in-tunnel pollutant loads that might be considered, and any associated changes to air quality impacts near exhaust emission outlets that might follow as a consequence.

It is recommended that the cumulative impacts applicable as a consequence of any increase in in-tunnel pollutant loads that might be considered, and any associated changes to air quality impacts near exhaust emission outlets that might follow as a consequence, are assessed and presented in both the working paper and the EIS.

Response

Noted.

The peak in-tunnel concentrations for the expected traffic cumulative scenario (2031-DSC) were assessed in Section 9.3 of Technical working paper: Air quality (Appendix H of the EIS)

The results of this assessment (Section 10.8.2 of the EIS) shows that the peak concentrations for all traffic scenarios, including worst-case conditions, were well within the concentrations associated with the regulatory worst case (Table 9.22 of Technical working paper: Air quality (Appendix H of the EIS).

Issue description – construction air quality impacts

The management of construction impacts on air quality as presented and proposed in both the working paper and the EIS is considered to be generally sound. Subject to the development and application of the management procedures and protocols proposed, it is considered that construction activities associated with the New M5 Project would have minimal and acceptable impacts on surrounding individuals, operations and activities.

Response

Noted.

Issue description –construction air quality impacts (management)

It is recommended that local government bodies at immediate interest arrange for and apply an appropriate watching brief to the Construction Management Plan process, to ensure that the various plans (or sub-plans) are applied and work effectively, and that air quality outcomes are consistent with relevant guidelines levels adopted in the plans (or sub-plans).

Response

Air quality impacts at the site and from haulage are addressed in the Technical working paper: Air quality in Appendix H of the EIS and would be managed during construction in accordance with the Construction Air Quality Management Plan, which would be prepared as part of the Construction Environmental Management Plan (CEMP). This would include management measures at exit points and ensuring that truck loads are covered.

Roads and Maritime would comply with all consultation requirements included in the project's conditions of approval and copies of the CEMP and sub-plans would be provided to relevant councils and published on the WestConnex website.

4.16.2 Surface water and groundwater

Issue description – management of surface water

There is little detail around how surface water would be managed and therefore only high level consideration of impacts.

Response

The management of surface water during construction would be subject to standard management measures. Across all sites, management of potential surface water and soil impacts during construction would be guided by a Soil and Water Management Plan(s). The Soil and Water Management Plan(s) would be prepared consistent with the guidance included in *Managing Urban Stormwater: Soils and Construction* Volume 2D: Main Road Construction (4th Edition) (Landcom, 2004), and in consultation with the EPA and DPI (Water).

Potential surface water and soil related issues at the former Alexandria Landfill site are recognised as posing a higher environmental risk than at other project construction sites. For this area, a Landfill Closure Management Plan has been developed following a thorough consultation and review process with landfill specialists, the WAMC, the NSW EPA and a Site Auditor accredited under the CLM Act and is provided as Appendix F of the EIS, including detailed management measures for landfill closure works. The LCMP has been reviewed and endorsed by both a NSW EPA-accredited Site Auditor (contaminated land) and EPA (waste) as an appropriate approach to mitigate long-term risks posed by the landfilled wastes and rehabilitate the land to a condition suitable for the proposed motorway interchange.

Issue description – surface water discharges

The discharges that have been calculated for the surface water discharges during construction do not provide the detail for what the contributions are from the surface water and what contributions would be derived from groundwater. The groundwater model only assesses a steady state condition, and as such, there is no assessment of what would happen during construction period and the model can provide no input for the calculations. The values that are provided for the surface water discharges appear to underestimate the likely flows during this period.

Response

Tunnel inflows during construction are discussed qualitatively throughout the modelling report and have not been specifically modelled. In principle it would be possible to predict groundwater inflows during construction, but would be extremely difficult as the short term tunnel inflows are influenced by local fracturing and storage of water in nearby fracture networks.

The groundwater model presents the impacts as a steady state and hence the results present a worst case scenario. During construction when high flow geological features are intersected the process would be to grout these fractures to minimise groundwater inflows and maintain the maximum inflow criteria of 1 L/sec per kilometre of tunnel. It is proposed to pre-drill ahead of the tunnel excavation to fore warn for geological features that may produce high groundwater inflows such as fractured bedrock or palaeochannels.

Although the surface water and groundwater interaction has not been specifically modelled it is recognised that there would be some losses to these creeks due to the lowering of the water table, particularly during periods of low flow. These impacts are expected to be of more significance higher in the catchments of Wolli Creek and Bardwell Creeks rather than Cooks River which is tidal and any dependence on groundwater is extremely limited. Assessment of the impacts to vegetation in the upper reaches of Wolli and Bardwell Creeks was undertaken as part of the Technical Working Paper: Biodiversity (Appendix S) which assessed the significance of the impacts to riparian vegetation as low.

In Wolli Creek the potential loss of groundwater inflow would be in part balanced by the discharge of treated water from the Arncliffe treatment plant. Subsequent to the submission of the EIS, an addendum to the groundwater modelling report was completed that contains a capture zone analysis and a discussion of water balance. Particle flow modelling has been used to simulate groundwater inflow or surface water inflow to the tunnels. At Cooks River, saline water would inflow to the tunnel through the alluvium and sandstone. Similarly, west of the Cooks River some inflows from the upper reaches of Wolli Creek would inflow to the tunnel, but inflow from the tidal lower reaches are less likely to the tunnel. It should be noted that the rate at which particles move along the flow path is slow. Particles in excess of 1 km from the alignment could take more than 500 years to enter the tunnel.

Characterising groundwater and assessing potential impacts in the EIS was based on hydrogeological data derived from the monitoring wells constructed during the pre-tender investigations and any other available monitoring wells. At the time of the investigation the final alignment was unknown and monitoring wells were located within a buffer zone. Consequently, these monitoring wells could be located up to 500 m from the alignment. This monitoring network is being upgraded with the construction of an additional 33 monitoring wells located at key locations and within different hydrostratigraphic units. Groundwater monitoring would be undertaken in this upgraded network during and post construction to monitor any groundwater impacts.

Issue description – geomorphology impacts

There is a lack of proper assessment for what the geomorphological impact would be on sensitive receiving environments (such as creeks and riparian zones) that water is proposed to be discharged to and not all sensitive receiving environments were considered by the EIS.

Response

The project has been designed to avoid direct impacts on natural riparian areas.

Geomorphological impacts on the Cooks River at Arncliffe is discussed in Section 6.4 and Alexandra Canal in Section 6.5.2, where it was identified that the discharges would be insignificant in comparison to the existing flows. Where outlet scour protection and energy dissipation prior to discharge into local waterways is required, localised management measures would be included as part of the detailed design.

Tunnelling activities can cause settlement or subsidence of creek beds as a result of groundwater drawdown. The tunnel cover varies between about 12 and 33 metres below surface level at the various watercourses and surface settlements due to groundwater drawdown are estimated at around 17 to 20 millimetres at these locations. Grouting or an impermeable membrane would be used at the tunnel lining where inflows are elevated beneath the watercourses to minimise these impacts. Bed settlement of this magnitude would not have a measureable impact on the creeks.

Further assessment on the potential impacts of ground settlement would be undertaken during detailed design.

Issue description – contaminated groundwater inflow

The EIS has assumed non-contaminated groundwater would be arriving from the western section of the project. There has not been sufficient investigation or monitoring to conclude this.

Response

Groundwater from the eastern and western sections of the project would be treated at the proposed Water Treatment Plant (WTP) which would form part of the Arncliffe Motorway Operations Complex (MOC 3). Section 19.3.2 of the EIS (p19-45) states that the groundwater from the eastern part of the alignment around St Peters, Alexandria and Tempe is more likely to be contaminated than groundwater west of the Arncliffe water treatment plant (WTP) due to the historical industrial land uses in this section. The groundwater captured from the western part of the catchment is therefore unlikely to require as much treatment as groundwater east of Arncliffe WTP.

Issue description –spill containment

The management measures do not require spill containment for spills on the Motorway as a matter of course. Rather, it is to be provided only 'if warranted'. This would not seem an appropriate management of environmental risk.

Response

During detailed design, Roads and Maritime Services would use its significant experience from managing Sydney's existing motorways to prepare a risk assessment and identify appropriate management measures and response plans in the event of a spill on the New M5. As with all tunnels in Sydney, dangerous goods vehicles would be prohibited from using the New M5 tunnel. The project tunnels have been designed with a drainage system with sufficient capacity to accommodate potential spills. For surface components of the project that do not otherwise drain into the project tunnels, surface drainage infrastructure has been designed to include first flush capacity to capture potentially polluted releases for disposal in a licensed facility in the event of an incident on the motorway.

For most construction sites, potential surface water pollutants include sediment from bulk excavation and soil disturbing works, and potential leaks and spills of fuels or other materials used during construction activities. Management of potential surface water pollutants during construction would be guided by a Soil and Water Management Plan(s) prepared as part of the Construction Environmental Management Plan (CEMP) for the project. The Soil and Water Management Plan(s) would be prepared consistent with the guidance included in *Managing Urban Stormwater: Soils and Construction (4th Edition)* (Landcom, 2004), and in consultation with the EPA and DPI (Water).

Potential surface water pollution issues at the former Alexandria Landfill site are recognised as posing a higher environmental risk than at other project construction sites. For this area, a Landfill Closure Management Plan has been developed and is provided as Appendix F of the EIS, including detailed management measures for landfill closure works

Issue description – duration of baseline surface and groundwater water quality data

The EIS seeks to paint a picture of poor water quality within highly disturbed ecosystems. This is not the case across all catchments within the project area nor does this recognise there have been significant efforts made to improve the water quality within some of the catchments. The data used to set the targets is in some cases old and there is no discussion of trends.

Up-to-date water quality data for both surface water and ground water needs to be collected across the entire area of potential impact. This should be for a sufficient duration (longer than 12 months at a minimum) and used to inform the impact assessment.

Response

The groundwater and surface water impact assessments are presented in Chapters 19 and 16 of the EIS respectively and were undertaken in accordance with the SEARs issued for the project by the Department of Planning and Environment (DP&E).

A groundwater monitoring network was established as part of the WestConnex hydrogeological investigations (refer WestConnex Stage 2: M5 Geotechnical Investigation – Report of Completed Work, AECOM, 2015). A total of 28 monitoring wells were constructed at selected locations along the project alignment between October 2014 and March 2015. The monitoring well locations were chosen to provide a representative spread of groundwater conditions along the project tunnel alignment at representative lithologies.

Groundwater quality investigations were conducted at 14 of the 28 groundwater bores, representing each of the main hydrogeological units along the alignment within the Hawkesbury Sandstone and Ashfield Shale. The locations wells where groundwater quality monitoring was undertaken are identified in Figure 19-1 of the EIS. These investigations included hydrogeochemical sampling and analysis and were conducted between September 2014 and March 2015. These were supplemented by data from previous groundwater investigations as outlined in Technical working paper: Groundwater (Appendix Q of the EIS).

Section 19.4 of the EIS identifies the need for a groundwater monitoring program to be prepared and implemented for monitor groundwater impacts during construction. The program would be developed in consultation with the EPA, NSW DPI Water and relevant councils.

Baseline surface water quality data from previous studies including the *City of Rockdale Water Quality Monitoring Study* (Equatica, 2014) was used to characterise the water quality in the project area. The comprehensive nature of these studies in terms of timing, frequency and spatial extent as shown in Figure 16-2 of the EIS, provided sufficient data to characterise the existing environment.

The compiled Water Quality Reference Criteria and the baseline Surface Water Quality Monitoring that is being undertaken are for the purposes of providing a reference data set that can be used to set criteria for discharges from the groundwater treatment plants, and for the purposes of determining water quality compliance, both during construction and operation.

Project specific surface water monitoring, as detailed in Section 16.3 of the EIS commenced in June 2015 and is ongoing. This monitoring would continue throughout the construction and for a period of 12 months post construction, or as determined by the conditions of approval.

During detailed design, additional monitoring data currently being collected for surface and ground would be used to re-conceptualise and recalibrate the model with subsequent re-output of more refined results.

Issue description – treatment of groundwater during construction

There is little detail of what the levels of water contaminants would be during construction and no clear criteria for the treatment of the groundwater during construction. The criteria set for water quality treatment should be cognisant of where in the catchment water is being released from and where it is being discharged to.

Response

The water treatment plants used during the project, in both the construction and operation phases, would be designed to ensure that discharge water quality would meet the Water Quality Reference Criteria (refer Appendix A of the Technical working paper: Surface Water). Further, monitoring of the Cooks River would be undertaken in accordance with the water quality program for 12 months post-construction or as otherwise required by the conditions of approval to ensure that discharge is meeting these criteria.

Water quality trigger values have been developed based on existing data for specific reaches where construction works and discharges would occur. Within each reach, the catchment and environmental conditions are considered to be sufficiently homogenous such that the water quality data set for each reach would be representative. Trigger values have been developed for the following reaches:

- Cooks River: Lower catchment
- Cooks River: Lower-middle catchment
- Cooks River: Upper-middle catchment
- Wolli Creek: Upstream
- Wolli Creek: Downstream
- Alexandra Canal.

These trigger values would be updated with new water quality data as it becomes available, and are applicable for both the construction and operation phases of the project.

Issue Description – Wolli Creek riparian management and rehabilitation

There is little discussion of the impacts on the Wolli Creek riparian corridor, no consideration of the Wolli Creek Riparian Corridor Management Plan, no detail provided on what rehabilitation there would be subsequent to works being undertaken.

The EIS needs to have full consideration of the Wolli Creek Riparian Corridor Management Plan.

Response

There would be no direct impacts to any riparian vegetation along the Wolli Creek corridor. The Biodiversity Assessment Report (BAR, Appendix S of the EIS) described the aquatic and riparian values present and likely to be impacted. The BAR concluded that there was no riparian vegetation that would be impacted and therefore, there would be no requirement for rehabilitation. Much of the focus of the Technical working paper: Surface water (Appendix N of the EIS) is on the condition and potential for impacts to Wolli Creek, which would also be applicable to impacts on Bardwell Creek.

During construction, all works within the riparian areas would be managed in accordance with Guide 10 – Aquatic habitats and riparian zones of Roads and Maritime's *Biodiversity Guidelines* (RTA, 2011) and would be undertaken to limit impacts on riparian areas.

Issue description – operational water quality reduction targets

The operational water quality reduction targets have not been met on the western side for the TSS. This means that 36 percent or approximately 10 tonnes/year of the TSS generated by the additional impervious areas would be discharged into the Wolli Creek catchment. There is no management measure compensating this.

Response

The pollutant reduction target for total suspended solids (TSS) is 85 per cent. Although the preliminary assessment undertaken in the EIS indicates a pollution reduction of 64 per cent for operational phase stormwater runoff discharges into Wolli Creek, the treatment performances are indicative only. Opportunities to increase the stormwater treatment provided in this catchment would be considered as part of detailed design.

Issue description – impacts on riparian environment

The cumulative impacts of clearing of riparian vegetation, and increase in discharges to waterways have not been considered.

Response

There would be no direct impacts to any riparian vegetation along the Wolli Creek corridor. The Biodiversity Assessment Report (BAR, Appendix S of the EIS) described the aquatic and riparian values present and likely to be impacted.

The extent of clearing would be confirmed following detailed design of the project and any potential impacts on water quality would be controlled using standard management measures as outlined in Section 16.4 of the EIS. The design of stabilisation and revegetation works for disturbed areas would be site specific and dependent on site context. Stabilisation and revegetation works within riparian corridors would be documented in a Vegetation Management Plan as part of the CEMP.

A Soil and Water Management Plan would be prepared by Roads and Maritime to incorporate controls and measures in accordance with the guidance included in *Managing Urban Stormwater: Soils and Construction* Volume 2D: Main Road Construction (4th Edition) (Landcom, 2004). The plan would be continually updated to suit the changing needs as the project works progress. The plan would be developed in consultation with the Environment Protection Authority and DPI - Water and document the types of measures that would be put in place to minimise the risk of soil erosion or polluted discharges reaching the receiving environments.

Issue description – groundwater modelling

CDM Smith (2015) used water table measurements from the existing M5 East Motorway project to calibrate the groundwater model developed for this project. However, it was noted there was a paucity of the water table data, and that it was not measured over either of the tunnels. As such, the calibration was problematic and it is unlikely the model has been properly calibrated. CDM Smith reported that the model predicted water table elevations that were higher than those observed. This would indicate the model is not fully assessing the impacts of the groundwater drawdown. Some of the assumptions made within the modelling and subsequent analysis could further underestimate impacts.

Data on the full extent of the impacts on the water table from the M5 East needs to be collected and inform the groundwater modelling.

Response

It is acknowledged that not all standing water level data was representative of the water table (piezometric surface) as the deeper measured water levels were likely to represent partially confined or confined conditions. Hence, these data represented a potentiometric surface. However, the potentiometric surface was considered to be adequate for calibration purposes due to the minor differences between the measured potentiometric surface and the piezometric surface.

The shallow standing water level measured in the alluvium, Botany Sands, Ashfield Shale and Hawkesbury Sandstone where the aquifers are unconfined is representative of the water table. However, it is acknowledged that where the measured groundwater levels are deeper, generally where the well screens are located in excess of 20 metres below ground level (mbgl), there may be partially confining layers present that cause the piezometric heads to be partially confined or confined and thus differ from the water table. At Tempe Railway Station two separate monitoring wells have been constructed intersecting the alluvium (screened at 18-21 m) and the Hawkesbury sandstone screened at a depth of 48-51 m. The shallow well within the alluvium is considered to be representative of the water table whereas the deeper Hawkesbury Sandstone is likely to be confined or partially confined. Reduced groundwater levels measured in April 2015 were 0.63 m AHD (alluvium) and 1.36 m AHD (Hawkesbury Sandstone) suggesting a piezometric head difference of 0.73m at this location.

In this case the pressure head difference of 0.73 m is known and the head difference is considered within the uncertainties of the model. Elsewhere across the model the head difference between the water table and measured piezometric heads could be larger or smaller. It was not feasible to install additional shallow monitoring bores at all locations and without shallow monitoring wells at each location this head difference remains unknown. However, the head differences would be within the uncertainty limits of the model and recalibration of the model is not considered to be warranted.

Note that Figure 3-5 in Appendix Q (Technical working paper: Groundwater) of the EIS representing a geological cross section has been amended (refer **Figure4-4** in **Section 4.2** of this report). The representation of groundwater levels has been altered to reflect the water table in unconfined conditions and the potentiometric head in partially confined and confined conditions.

Issue description – groundwater drawdown impacts on surface water systems

The model does not model or predict what would happen to the connected surface water systems. As such, the impact has not been able to be considered or quantified and therefore has not been assessed as part of this EIS. This is a deficiency in the assessment, as, at present the Cooks River tributaries are gaining systems. With the predicted drawdowns in the water table, this would reverse and surface water from these tributaries would be lost. This impact would be greatest during periods of low flow, which is when it is most critical for the riparian corridors and surrounding vegetation to have the groundwater supply available.

The EIS needs to assess the impacts on the surface water bodies that would arise due to the drawdown of the water table.

Response

Potential impacts to surface water bodies as a result of groundwater drawdown are provided in Section 7.2 of the Technical working paper: Groundwater. Potential impacts to riparian corridors and surrounding vegetation is provided in Section 7.6 of the Technical working paper: Groundwater. Drawdown beneath sensitive wetlands is considered negligible due to hydraulic connectivity with the Cooks River and lower Wolli Creek and continual recharge or tidal flushing.

Dive structures and ventilation shafts would be constructed through the Botany Sands aquifer. These structures are to be waterproofed during construction to minimise groundwater inflows and drawdown around the tunnel on a permanent basis. The waterproofing method would be confirmed during detailed design.

In areas where the shafts and tunnels are to be constructed within alluvial sediments and Botany Sands, such as Kogarah Golf Course, the structures would be required to be lined to minimise inflows and groundwater drawdown. Groundwater inflows into ventilation shafts and tunnels constructed within sandstone are expected to be minimal unless large water bearing fractures are intersected. Grouting would be undertaken during construction to reduce the inflows as required. Where water bearing fractures are encountered during construction of the tunnels and ventilation shafts, waterproofing measures such as installation of a sheet membrane would be implemented as needed to achieve the maximum tunnel inflow criteria of 1L/sec/km. Where the ventilation shafts were close to the tunnel alignment it was not possible to simulate these separately in the groundwater model due to their small diameter in comparison to the road tunnels. As a result, the predicted inflows are not expected.

Based on the available site investigation data, the tunnel alignment extending beneath the Cooks River and Wolli Creek is not expected to intersect the palaeochannels. In the event that the palaeochannel(s) is intercepted by the tunnel alignment, appropriate waterproofing measures, such as installation of a sheet membrane and/or grouting, would be implemented as needed to achieve the maximum tunnel inflow criteria of 1L/sec/km.

The potential impacts of groundwater inflow and groundwater drawdown are discussed in the Technical working paper: Groundwater. Surface water and groundwater management measures to be implemented during the construction and operation phase of the project are outlined in (Section 16.4 and Section 19.4 of the EIS). Management measures have been outlined during the construction and operation phases. Minimal impact considerations and responses have also been provided in response to the NSW Aquifer Interference Policy.

Issue description – impact of saline intrusion to groundwater

Groundwater quality has not been modelled nor have any predictions been made. However, it is stated that since the M5 East Motorway and the main alignment tunnels of the project are mostly below sea level, water would flow from permanent tidal water bodies towards the tunnels. Some tunnel inflows would ultimately be saline, at a salinity approaching that of seawater. Such an outcome means there is a migration of seawater from river boundaries towards the regions underlying tunnels. This seawater intrusion would extend across a significant area, affected all areas between the tidal water bodies and the tunnel alignment, caused by the tunnels acting as sinks for groundwater.

The EIS needs to assess the impacts on salt water intrusion to the groundwater.

Response

After the EIS was submitted for review, an addendum to the groundwater modelling was completed which addressed the issue of salt water intrusion due to drawdown beneath Cooks River and associated tributaries. Particle tracking modules were used to predict the movement of groundwater and salt water derived from the creeks. Along the tunnel alignment the capture zone was narrowest near Cooks River suggesting there is good hydraulic connection between the tunnels and the alluvium connected to the river. In this region it is predicted that about 10% per cent of inflows to the tunnels would have seawater salinity. To the west of Cooks River the tidal part of Wolli Creek further to the east appears less likely to supply seawater to the tunnels. To the north-east of Cooks River there is some indication that the tunnels may receive a small component of inflow from Alexandra Canal. In this part of the tunnel the bulk of the inflows are likely to be fresh, so the combination is likely to only slightly increase groundwater salinity by up to a few thousand mg/L.

Issue description – impact on groundwater users and vegetation

The EIS has only considered bore users within one kilometre of the tunnel alignment and no consideration of the change in water quality on ground water users or the vegetation within the full area of impact has been undertaken.

Response

Groundwater quality impacts are discussed in Sections 6.4, 6.5, 6.6, 7.4, 7.5 and 7.6 of the Technical working paper: Groundwater (Appendix Q of the EIS). Groundwater quality impacts have been considered for bores within a one kilometre radius of the tunnel alignment to allow for potential impacts arising from accidents and spills, existing contaminated groundwater drawn into bores due to altered flow conditions or changing salinity conditions due to an increased interaction with tidal surface waters. A one kilometre threshold was used to evaluate the potential impacts as the predicted extent of lateral drawdown varies from around 500 metres from the western part of the alignment to approximately one kilometre elsewhere.

Figure 7-1 in the Technical working paper: Groundwater shows predicted groundwater level elevations at steady state conditions and Figure 7-2 in the Technical working paper: Groundwater shows predicted drawdown contours under steady state conditions. These figures have been re-drafted to provide more clarity. Instead of representing the drawdown and water table contours as coloured lines, the contour intervals are now represented as coloured intervals at 10 m intervals (Refer **Figure 4-5** and **Figure 4-6 in Section 4.2** of this report).

After the EIS was submitted for review an Addendum to the groundwater modelling was completed which addressed the potential impacts to groundwater salinity due to drawdown beneath Cooks River and associated tributaries. Particle tracking modules were used to predict the movement of groundwater and salt water derived from the creeks. Along the tunnel alignment the capture zone was narrowest near Cooks River suggesting there is good hydraulic connection between the tunnels and the alluvium connected to the river. In this region it is predicted that once steady state conditions are reached groundwater along the narrow one kilometre capture zone along the Cooks River is likely to be saline. To the west of Cooks River the tidal part of Wolli Creek further to the east appears less likely to supply seawater to the tunnels. To the north-east of Cooks River there is some indication that the tunnels may receive a small component of inflow from Alexandra Canal. In this part of the tunnel the bulk of the inflows are likely to be fresh, so the combination is likely to only slightly increase groundwater salinity by up to a few thousand mg/L.

In the event that the drawdown in a water supply bore or irrigation bore exceeds two metres (in accordance with the Aquifer Interference Policy) or that impacts to groundwater quality alter the beneficial use of the water, measures would be taken to 'make good' the impact by restoring the water supply to pre-development levels. The measures taken would be dependent upon the location of the impacted bore and would be determined in consultation with the affected licence holder but could include, deepening the bore, providing a new bore or providing an alternative water supply. This commitment is reflected as GW15 in **Chapter 8** (Revised environmental management measures) in this report.

Section 7.6 Appendix Q (Technical working paper: Groundwater) of the EIS considered the impacts on vegetation within the project area. It noted that for wetlands in the alluvium, where there may be water table decline once the steady state has been reached, the predicted drawdown may be less than calculated due to the presence of a low permeability organic layer preventing groundwater leakage, localised recharge rates higher than the 40 millimetre per year set in the regional model and as a result of induced recharge.

For the remaining vegetation within the Cooks River / Castlereagh Ironbark Forest at Kingsgrove would be unlikely to stress the community as the groundwater drawdown would be less than two metres, within the natural seasonal variation. Vegetation in Stotts Reserve includes trees which are partially groundwater dependent and these could show signs of stress during drought conditions, but should recover following sufficient rainfall. Drawdown of less than one metre is predicted beneath the estuarine fringe forest and mangrove forest between Wolli Creek and the Wolli Creek Railway Station as well as in the upper reaches of Wolli Creek and Bardwell Creek. A drawdown of this size is unlikely to impact on any groundwater dependent species which may be present. There is also limited potential for groundwater drawdown to impact trees near watercourses and the majority of the alignment has a water table below the growth zone of trees.

The potential for impacts to GDEs is provided in the Technical working paper: Biodiversity Assessment Report (Appendix S of the EIS).

Issue description – groundwater flow predictions

The EIS states the project would be constructed to limit groundwater inflow along the tunnel length to no greater than one litre per second across any given kilometre of tunnel. The EIS does not set timeframes around when does the criteria become applicable, little information on what measures are to be used and where, how is it understood at the time of construction what type of lining is needed to achieve the criteria. There is not sufficient detail to assess this as a commitment or a measurable management measure.

Response

The assessment of groundwater inflow into existing Sydney tunnels identified that rates of water inflow observed from unlined tunnels with similar geology, hydrogeology and construction to that proposed for the New M5 range from 0.6 to 1.7 litres per second per kilometre as noted in Section 3.10 of Technical working paper: Groundwater (Appendix Q of the EIS).

The New M5 tunnel inflow design criterion is one litre per second per kilometre averaged over every kilometre of tunnel. This criterion is more stringent than other Sydney tunnels where the inflow criterion is typically one litre per second per kilometre averaged over the length of tunnel.

The approach to the control of water ingress into the tunnels consists of a suite of options, ranging from areas where no waterproofing would be required, to areas where a membrane may need to be applied.

The majority of the tunnel alignment would be located within Hawkesbury Sandstone. There would be some smaller areas in shale and underneath geological secondary structural features such as faults, joint sets, dykes and shear zones, which would likely include a higher water inflow and more fractured rock. In areas of high local hydraulic conductivity zones, the natural rock mass permeability may have to be reduced, such as the use of shotcrete and grout, to achieve one litre per second across any given kilometre of tunnel.

The modelling has not predicted specific inflow rates during construction, but rather has predicted long term steady state inflows that would only apply once equilibrium has been reached (that is the long term operational inflow rates). It is difficult to predict the evolution of inflows during construction, mainly because the short term tunnel inflows are influenced by local fracturing and storage of water in nearby fracture networks (CDM Smith, 2015).

To limit groundwater inflow during construction, tunnel lining would be installed progressively as the roadheaders advance. Two types of lining would be used for the project, depending on the local geology. Different types of waterproofing would be applied depending on the inflow type and rate. The potential for higher inflow rates has been considered and management measures discussed in Appendix Q of the EIS.

Should the inflow be expected to exceed the inflow criteria set in the long term, grouting would be carried out to reduce the inflow to an acceptable inflow rate. This approach is to limit groundwater extraction during construction by maintaining groundwater inflow to below the project criterion of one litre per second per kilometre.

These commitments are reflected in the environmental management measures Chapter 30 of the EIS (as amended in **Chapter 8** (Revised environmental management measures) in this report).

Issue description – groundwater monitoring timeframe

The EIS has undertaken some monitoring for groundwater for the proposed works. However, this has only been undertaken for a relatively short time and would normally have been considered only preliminary investigation for the purposes of assessing opportunities and constraints for the project. As there are normally significant variations in groundwater levels over time and within the period over which monitoring has been undertaken would not be expected to allow this variation to be understood or accommodated for within this assessment.

The EIS states that groundwater monitoring would commence prior to the commencement of construction (baseline monitoring) and would continue during construction. Monitoring would continue post the completion of construction. Six monthly groundwater monitoring should occur for three years after the tunnel becomes operational after which the requirement for on-going monitoring would be assessed. Given there is numerous references to the long timeframes for steady state conditions to be met, and that the timeframes are not known, it is entirely inadequate to set three years as the starting point for the monitoring timeframe.

Further, unknown M5 East/New M5 then additional tunnels proposed for WestConnex. There should be an imperative being placed on gathering as much information about groundwater and potential impacts as possible, rather than finding out in many years to come what impacts there have been done only when those impacts have occurred. To propose that groundwater monitoring should occur for three years after the tunnel becomes operational after which the requirement for on-going monitoring would be assessed is entirely inadequate.

The timeframe applicable for when the inflow criteria set for the proposed project needs to be clearly stated to allow clear compliance.

Response

The assessment of groundwater impacts in Chapter 19 and Technical working paper: Groundwater (Appendix Q of the EIS) included a review of existing hydrogeological data, including identification of data and information on groundwater levels and quality from a number of databases and from major developments near the New M5 corridor as outlined in Section 19.1.2 and Section 2.1 of Technical working paper: Groundwater (Appendix Q of the EIS). Field characterisation of the groundwater was conducted between September 2014 and March 2015.

Groundwater inflow would be measured during the construction of the project tunnels as part of the tunnelling procedure. Measured groundwater inflow rates would be used to inform the installation of waterproofing to satisfy the design criterion for groundwater inflow into the tunnels and would provide a basis for the groundwater monitoring program during construction and operation. Environmental management measures GW13 and OpGW03 (construction and operational groundwater monitoring respectively) have been amended to include this requirement and are included in **Chapter 8** (Revised environmental management measures) of this report. Grouting would be undertaken during construction to reduce the inflows as required. Where water bearing fractures are encountered during construction of the tunnels and ventilation shafts, waterproofing measures such as installation of a sheet membrane would be implemented as needed to achieve the maximum tunnel inflow criteria of 1L/sec/km.

The modelling has not predicted inflow rates during construction, but rather has predicted long term steady state inflows that would only apply once equilibrium has been reached (that is the long term operational inflow rates). It is difficult to predict the evolution of inflows during construction, mainly because the short term tunnel inflows are influenced by local fracturing and storage of water in nearby fracture networks (CDM Smith, 2015). As noted in Section 5.1.1 of Appendix A of Appendix Q (Technical working paper: Groundwater) it is possible that a steady state would be achieved relatively quickly, within years or tens of years.

A groundwater monitoring program has been prepared for pre-construction, construction and post construction (refer environmental management measures GW13 and OpGW03 in Chapter 19 (Groundwater) of the EIS). The program includes three years of groundwater monitoring post construction, after which the requirement for further monitoring would be assessed.

The environmental management measures in **Chapter 8** (Revised environmental management measures) of this report have been updated to reflect the revised monitoring program.

Issue description – fracturing or cracking of creek beds

There is little discussion within the EIS of the risks relating to the fracturing or cracking of creek beds, beyond the EIS noting that appropriate waterproofing measures would be used if inflows are elevated.

Further investigation is necessary to understand and minimise the risks relating to the fracturing or cracking of creek beds.

Response

Tunnelling activities can cause settlement or subsidence of creek beds as a result of groundwater drawdown. The tunnel cover varies between about 12 and 33 metres at the various watercourses and surface settlements due to groundwater drawdown are estimated at around 17 to 20 millimetres at these locations. Grouting or an impermeable membrane would be used at the tunnel lining where inflows are elevated beneath the watercourses to minimise these impacts. Bed settlement of this magnitude would not have a measureable impact on the creeks and would be unlikely to cause fracturing or cracking of creek beds.

Further assessment on the potential impacts of ground settlement would be undertaken during detailed design.

Issue description – cumulative impacts on groundwater

The cumulative impacts on the groundwater have not and cannot be fully assessment. Transient observations for the groundwater impacts of the M5 East Motorway were only made in 2015, 17 years after the construction of the commenced. As such, no conclusion can be drawn as to whether or not the water table has reached equilibrium. Further, none of the observations were made over the centreline of any tunnel and, as such, have not assessed the greatest impact of this tunnel.

Given that there are already significant impacts on the groundwater due to the existing tunnels, but that the full extent of these are not yet properly understood, and that the construction of the New M5 Motorway would start a new additional process of groundwater leaking into the tunnel system, it would not seem to be aligned with the precautionary principal to subject the same area and the same surface water and groundwater systems to further development. This would seem to be an unacceptable risk for those people and ecosystems reliant on these systems.

Response

The EIS includes detailed assessments of the potential impacts of the project on groundwater, surface water and water quality. These assessments have been prepared in accordance with the SEARs for the project, and relevant guidelines and policies relating to the assessment of surface water, flooding and groundwater impacts.

Chapter 19 and Appendix Q (Technical working paper: Groundwater) include a detailed assessment of potential groundwater impacts, including groundwater modelling to demonstrate the potential extent of aquifer drawdown as a result of the project. The assessment presents existing groundwater quality data, the potential for cumulative impacts to the water table and includes consideration of potentially affected groundwater users. The assessment determined that there is only one registered bore that intersects the Hawkesbury Sandstone within a one kilometre radius of the project. The registered bore is 186 metres deep and the predicted drawdown is 5.7 metres. It is considered that this impact could be adequately mitigated by lowering the pump in the borehole by five to 10 metres.

Chapter 18 and Appendix P (Technical working paper: Flooding) assess the implications of the project on flooding and drainage on a local and catchment scale. The modelling considered annual recurrence interval (ARI) flooding events, the Probable Maximum Flood (PMF), events such as a partial blockage of a bridge structure, and impacts predicted due to climate change. The assessment determined that the application of standard management measures and refinements during detailed design would be sufficient to mitigate potential mainstream flooding impacts during construction. During operation, flooding and drainage impacts could occur due to localised and mainstream flooding. To mitigate this, additional drainage infrastructure would be installed to manage localised flooding impacts.

Chapter 16 and Appendix N (Technical working paper: Surface water) provide a detailed assessment of the potential surface water impacts of the project during construction and operation. The assessment includes consideration of the volume and quality of anticipated surface water discharges, and evaluates the surface water performance of the project against the water quality and volume objectives for affected catchments and watercourses. During construction, temporary water treatment plants would be established at five locations to treat water used during construction and groundwater encountered during tunnelling. With these controls in place, the project would not significantly impact on surface water during its construction. During operation, a permanent water treatment plant and stormwater treatment wetland would be located at Arncliffe which would control groundwater, stormwater, wash down, fire testing, hydrant and deluge water before discharging treated water to the Cooks River. Water would be treated before being returned to the receiving environment to ensure it meets the project's water quality reference criteria, as well as the stormwater pollution reduction targets from the Botany Bay and Catchment Water Quality Improvement Plan, and the project-specific Environment Protection Licence.

Issue description – monitoring programs for surface water and groundwater

All surface water and ground water monitoring proposed for monitoring the impacts of the proposed project should be sufficient in both extent and duration to allow full monitoring and interpretation of the project impacts. The monitoring programs should be developed in consultation with all relevant government agencies, including the local councils.

Response

Baseline surface water quality monitoring commenced in June 2015 and is ongoing for the purposes of providing a reference data set that can be used to set criteria for discharges from the groundwater treatment plants, and for the purposes of determining water quality compliance during construction and operation. It is anticipated that 12 months of baseline surface water and groundwater monitoring data would be obtained prior to commencement of construction. The analytes assessed as part of this monitoring program include a broader range than the pollutants listed in the proposed discharge criteria.

The program requires three years of monitoring post construction, after which the requirement for further monitoring would be assessed. The management measures in **Chapter 8** (Revised environmental management measures) of this report have been updated to reflect the revised monitoring program.

Section 19.4 and Section 16.4 of the EIS also identify the need for groundwater and surface water monitoring programs to be prepared and implemented during construction. The monitoring would be developed in consultation with the EPA, NSW DPI Water and relevant councils.

4.16.3 Biodiversity

Issue description – management of biodiversity impacts

Rockdale, Hurstville and Canterbury City Council wish to work with the NSW government and agencies to minimise the impacts on their natural environment. The range of impacts is significant. It is unclear from the BAR whether the management measures are adequate to address the direct and indirect impacts of the proposal.

Response

Chapter 6 of the Biodiversity Assessment Report (Appendix S of the EIS) discusses avoidance and minimisation of direct and indirect impacts. Section 6.6.3 and Table 22 assess the expected or predicted effectiveness of the proposed avoidance and management measures.

The measures proposed for avoiding indirect impacts during construction have been reviewed by OEH and found to be appropriate. Furthermore, prior to construction, a Flora and Fauna Management Plan which would detail measures to minimise and mitigate potential impacts on flora and fauna that may result from construction activities would be prepared in consultation with OEH.

Issue description – species and communities not included

There are a number of species and vegetation communities that were not considered in the BAR including the Powerful Owl, Micro-bats and indirect impacts to Swamp Oak, Freshwater Wetlands and Coastal Saltmarsh vegetation near the Marsh Street / Eve Street wetlands. There is also potential impact to STIF EEC within Beverly Park, Tallawalla Road, Kingsgrove and potentially other vegetation due to temporary changes to groundwater levels during construction. These need further quantification to be fully assessed.

Response

The biodiversity impacts of the project have been assessed in accordance with the requirements of the FBA, Biodiversity Offsets Policy for Major Projects and the SEARs issued for the project.

A likelihood of occurrence assessment was undertaken for threatened species listed under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) and / or *Threatened Species Conservation Act 1995* (TSC Act) and *Fisheries Management Act 1994* (FM Act), including for the Powerful Owl and micro-bats. The likelihood of occurrence assessments are included in the Biodiversity Assessment Report included as Appendix S to the EIS.

The Powerful Owl (*Ninox strenua*) is associated with a wide range of wet and dry forest types with a high density of prey, such as arboreal mammals, large birds and flying foxes (Environment Australia 2000, Debus & Chafer 1994). Large trees with hollows at least 0.5 metres deep are required for shelter and breeding (Environment Australia 2000). There are 71 records of Powerful Owls within 10 kilometres of the project; however, given the lack of large hollow bearing trees within the areas of vegetation to be directly impacted by the project, it is unlikely that Powerful Owls would be present. As such, no further assessment of the impacts to this species was required. Furthermore, Powerful Owls are considered as ecosystem credit species, which do not require targeted survey under the FBA methodology. This species was not filtered into the calculator, regardless of the habitat assessment that was undertaken in the Biodiversity Assessment Report.

Advice from OEH as part of the SEARs was to examine the potential habitat first and then survey. The initial assessment indicated a lack of suitable habitat and no further assessment was required.

A likelihood of occurrence assessment was undertaken for a number of listed micro-bat species as part of the Biodiversity Assessment Report, including the Large-eared Pied Bat (*Chalinolobus dwyeri*), Little Bent-wing Bat (*Miniopterus australis*), Eastern Bent-wing Bat (*Miniopterus schreibersii oceanensis*) and the Eastern Freetail Bat (*Mormopterus norfolkensis*). With the exception of the Large-eared Pied Bat, there are records of the listed micro-bat species being present within 10 kilometres of the project, but not within the project footprint. In addition, no suitable habitat for these four micro-bat species was recorded as being present within the project footprint. As such, no further assessment of the impacts to these micro-bats was required as part of the Biodiversity Assessment Report.

Vegetation mapping (OEH, 2013) and field surveys did not identify Swamp Oak Floodplain Forest within or near the project footprint. No indirect impacts are expected to this vegetation community.

Freshwater wetlands on Coastal Floodplains and Freshwater wetlands on the Sydney Basin Bioregion are known to occur within 10 kilometres of the project footprint. However, no suitable habitat is present within or near the project footprint. No indirect impacts are expected to this vegetation community. It should be noted that artificial wetland and ponds are not included in the TSC Act listing for Freshwater wetlands on Coastal Floodplains.

Coastal Saltmarsh in the New South Wales North Coast, Sydney Basin and South East Corner Bioregions are known to occur within 10 Kilometres of the project footprint. However no suitable habitat is present within the project footprint. This community occurs in the intertidal zone on the shores of estuaries and lagoons along the NSW coast. While there may be saltmarsh present near the confluence of the Cooks River and Wolli Creek, no direct or indirect impacts are expected to this vegetation community.

Issue description – impacts on the Green and Golden Bell Frog population

The identified impacts to the Green and Golden Bell Frog population on the Kogarah Golf Course are significant and permanent. The BAR does not fully consider these impacts on the potential extinction of a local population of this species. In the absence of a detailed amphibian survey being conducted as part of the BAR, and if the required biodiversity offsets cannot be acquired within the Arncliffe area then a species impact statement (SIS) should be developed to provide further information. The SIS should guide the additional management measures proposed for this species, and be developed in consultation with local Councils.

Response

The biodiversity impacts of the project have been assessed in accordance with the requirements of the FBA, Biodiversity Offsets Policy for Major Projects and the SEARs issued for the project.

The assessment of the potential impacts on the Green and Golden Bell Frog is provided in Appendix G of the Technical working paper: Biodiversity Assessment Report (Appendix S of the EIS).

The EIS for the project has demonstrated that reasonable measures have been taken to avoid and minimise the direct and indirect impacts of the project on biodiversity values. This has resulted in:

- Avoidance of the RTA breeding ponds

- Management including minimising the footprint of foraging land affected by minimising the footprint of the construction compound, frog proof fencing of the compound, construction management measures to minimise risk of construction stage impacts to Green and Golden Bell Frog population, enhancing the corridor between the ponds and the remaining foraging land on the golf course and construction and providing additional habitat by constructing purpose-designed frog ponds at Marsh Street
- Committing to purchasing offsets for the lost foraging area. The Green and Golden Bell Frog Plan of Management prepared for the project (Appendix K of the technical working paper) documents the management measures, including the creation of enhanced and additional habitat and the proposal to establish a captive breeding colony.

The current population is considered to have poor long term viability, irrespective of the construction of the New M5, without active intervention to manipulate water levels, to manage vegetation, predator control (Plague Minnow) and salt water flushing to manage chytrid fungus.

The commitment to finalise the Green and Golden Bell Frog Plan of Management, includes:

- Management measures to be implemented at the Arncliffe construction compound (C7) and RTA Ponds to minimise and manage impacts to the Green and Golden Bell Frog habitat and key population during construction.
- Management measures relating to the enhancement of existing habitat at the Marsh Street Wetland
- Supplementary management measures for consideration to mitigate and minimise impacts to the Green and Golden Bell Frog
- Monitoring of the water quality of the breeding ponds near Marsh Street, Arncliffe during construction by a suitably qualified scientist

These commitments are reflected in SW07 and B10 of the revised environmental management measures outlined in **Chapter 8** (Revised environmental management measures) of this report. The additional habitat created at Marsh Street, is detailed further in **Chapter 7** (Preferred Infrastructure report) of this report.

The measures proposed for avoiding indirect impacts during construction have been reviewed by OEH and found to be appropriate. The development of the Green and Golden Bell Frog Management Plan, and the Green and Golden Bell Frog habitat creation and captive breeding plan (**Appendix B** of this report) also takes into consideration lessons learnt from other projects. The Plan of Management has been independently reviewed by a Green and Golden Bell Frog specialist. In addition, habitat creation and captive breeding plans would be independently reviewed by two experts, not associated with the project.

All offset calculations were conducted in accordance with the credit calculator and policy and are considered reasonable. Roads and Maritime notes that the Biodiversity Offset Strategy (Appendix T of the EIS) includes a commitment to consider a BioBanking agreement or other similar mechanism for new habitat at Marsh Street. This would resolve the long-term management for the land. It is also agreed to offset any future unforeseen loss of habitat values at the RTA ponds using the FBA

The requirement to prepare a species impact statement does not apply for State Significant Infrastructure projects. The SEARs set out the requirements that the project must satisfy to assess the potential impacts on biodiversity.

Issue description –recommended management for the Green and Golden Bell Frog population

The following actions are recommended:

- Redesign the layout of the MOC3. At present, the southern extension of this compound creates a significant barrier to movement through Kogarah Golf Course towards the constructed RTA ponds and Marsh Street / Eve Street wetlands. Preference would be for a wider compound aligned along the northern boundary of the golf course next to Marsh Street to maintain connection between the waterways on the golf course and the cycleway under the M5 East motorway.
- Commence the establishment of any artificial wetland that is designed to supplement the existing RTA ponds at the earliest possible time to provide suitable habitat prior to removal of existing habitat from Kogarah golf course.
- Develop a fauna relocation plan to populate other potential breeding sites.
- Develop a management plan for the waterways on the golf course to provide additional breeding opportunities. This may involve the dewatering of these areas and removal of exotic fish.
- Include local government in review process of subsequent Flora and Fauna management plans for the New M5.

Response

The location of the construction compound has also been sited so as not to restrict movement of frogs from the RTA ponds to Eve Street or Marsh Street habitat areas even though these areas do not currently provide suitable habitat. The Eve Street wetland is hypersaline and does not generally support frogs. The Marsh Street wetland is generally too overgrown and frogs have not been observed there for many years. The cycle underpass is considered to be a hostile environment for this species and while frogs were observed in a stormwater basin, they do not generally move from the RTA ponds and golf course.

Roads and Maritime is proposing to establish additional breeding and foraging habitat at a vacant site adjacent to the Marsh Street wetland. It is also establishing a captive breeding program which would assist in the population of this habitat. Further detail on the Marsh Street ponds is provided in **Chapter 7** (Preferred infrastructure report) of this report. The Green and Golden Bell Frog habitat creation and captive breeding plan is provided in **Appendix B** of this report.

Roads and Maritime is not responsible for the management of foraging habitat outside its ownership or lease boundaries.

In addition to the measures adopted as part of the Green and Golden Bell Frog Plan of Management and Habitat Creation and Captive Breeding Plan (HCCBP), the project would also comply with all requirements stipulated in the conditions of approval.

Issue description – assessment of impacts on Grey-headed Flying-fox

Undertake survey of Turrella colony to assess population dynamics, potential outward flight paths, foraging resources.

Determine the local abundance of seasonally-available foraging resources and assess significance of removal of Swamp Sclerophyll Forest EEC.

Consider Rockdale Council management plan for Grey-headed Flying-fox.

Response

The Grey-headed Flying Fox camp at Turrella would not be directly impacted by the project as it occurs outside the project footprint. The camp is close to the project footprint but further than 550 metres, which is the buffer from the development boundary considered as part of the Framework for Biodiversity Assessment (FBA) calculations. The species cannot withstand loss of vegetation for foraging within 200 metres of a camp, according to the OEH Threatened Species Profile Database. Given that the camp is beyond 550 metres from any vegetation clearance associated with the project, the project is likely to have a negligible impact on the camp and the Grey-headed Flying Fox population. The Grey-headed Flying Fox was also not considered to be at increased risk of vehicle strike or any other indirect impacts that may result from the project.

The Draft National Recovery Plan for the Grey-headed Flying Fox (DECC, 2009) identifies foraging habitat within a 50 kilometre radius of a roost site with more than 30,000 individuals as being critical to survival. The Grey-headed Flying Fox camp at Gordon about 20 kilometres north of the project extent varies in the number of individuals between zero and 80,000 (Ku-ring-gai Council, 2013) and data for this camp suggests that between 20,000 and 40,000 individuals use this camp during the breeding seasons (summer). As a result, there is some critical foraging habitat located within the biodiversity study area for the project which represents critical foraging habitat. The Grey-headed Flying Fox camp at Turrella, about 500 metres north of the biodiversity study area does not meet this definition due to the smaller number of individuals present.

Analysis of available native vegetation mapping (OEH, 2013) as part of the preparation of the BAR identified more than 77,000 hectares of native vegetation as being present within 50 kilometres of the Gordon camp site. The OEH mapping analysed is limited to vegetation within the Sydney Metropolitan Catchment Management Authority area, and is considered to include only about 50 percent of native vegetation within 50 kilometres of the Gordon camp site. Further, this analysis also only included native foraging habitat and does not include non-native street trees or urban vegetation that may be used for foraging by this species.

Around ten hectares of potential foraging habitat would be removed or modified as part of the project and this is estimated to be around 0.012 per cent of the available foraging habitat for the Gordon camp. While habitat critical to the survival of the species would be removed, the impacts are not expected to be significant in the context of the area of habitat available.

Application of the EPBC Act significant impact criteria concluded that there would not be any significant impacts to this species as a result of the project. The Grey-headed Flying Fox was not filtered in to the credit calculator by the background calculations. If it had been filtered in, it would have been as an ecosystem credit species as only foraging habitat would have been impacted. Given this, any impacts to native vegetation (ecosystem credits) account for impacts to ecosystem credit species. So while the Grey-headed Flying Fox was not filtered in, its foraging habitat is actually accounted for in the credit calculations.

Issue description – Cooks River Castlereagh Ironbark Forest EEC

Consider that the removal of part of this vegetation would result in the local extinction of this entire patch of vegetation and therefore provide biodiversity offset for removal of the 1.82 ha.

Undertake surveys to assess whether threatened fauna utilise this patch of vegetation, in combination with other areas of similar vegetation within the Canterbury Golf Course and Beverly Park to the south as part of a large range such as the Powerful Owl, micro-bats.

Response

The project would result in the removal of 1.4 hectares of a 1.82 hectare patch of Cooks River Castlereagh Ironbark Forest EEC (CRCIF). As a result of this development there would be a section of forest remaining at Kingsgrove. An offset package has been developed for the project in accordance with the requirements of the Framework for Biodiversity Assessment (FBA).

The long term viability of the remaining 0.42 hectares of this patch of this vegetation community is questionable and the removal of the 1.4 hectares would inhibit the recovery of the community. However, the Cooks River Castlereagh Ironbark Forest within the project footprint is not considered important to the recovery of the EEC across its entire extent given that it is highly modified in structure and composition, has a high perimeter to area ratio and has no prospect of expanding into adjacent areas.

Without substantial effort and continuing management, this patch is unlikely to be viable in the long term. An offset package has been developed for the project, in accordance with the requirements of the FBA. This would include measures to compensate for the loss of Cooks River Castlereagh Ironbark Forest from construction of the project. This would require that all identified significant residual impacts on CRCIF are offset in accordance with the principles of the NSW Offset Policy for Major Projects.

The recommendation to undertake additional surveys is addressed earlier in this section.

Issue description – Marsh Street / Eve Street wetlands

Marsh Street / Eve Street Wetlands – develop a vegetation management plan to enhance the existing habitat of the Swamp Oak and Freshwater Wetlands EEC identified in this area, and potentially areas of Coastal Saltmarsh to support migratory birds and frog species.

Response

Survey of the Marsh Street / Eve Street Wetlands was conducted and mapped vegetation was validated. None of these areas would be directly impacted by the project. These vegetation types have been considered as part of the Groundwater Dependent Ecosystem (GDE) assessment and none of these communities were considered to be groundwater dependent.

The Marsh Street and Eve Street wetlands are located in alluvium and would not be affected by groundwater drawdown. Furthermore, neither wetland was identified as being freshwater. The Eve Street wetland is considered to be hypersaline according to a local specialist familiar with this area. The Marsh Street wetland is overgrown with a range of noxious weeds including *Lantana camara* and *Cestrum parqui*. It is highly unlikely that any freshwater wetland remains extant in this location.

On this basis, there would be no requirement to develop a vegetation management plan for these areas.

Issue description – further surveys

Undertake surveys to assess whether threatened fauna utilise this patch of vegetation, in combination with other areas of similar vegetation within the Canterbury Golf Course and Beverly Park to the south as part of a large range study to include the Powerful Owl, micro-bats.

Response

Under the biodiversity assessment methodology, undertaken in accordance with the SEARS and relevant guidelines, targeted survey is not required for ecosystem credit species. The Powerful Owl is an ecosystem credit species, as is the Little Bentwing Bat and the Eastern Freetail Bat. This means that they are considered to be offset as part of any ecosystem credits that may be required. Furthermore, neither the Powerful Owl nor the Little Bentwing Bat were filtered into the calculator. This was most likely based on habitat attributes that were absent from the project footprint.

The Large-eared Pied Bat is a species credit species, but was not considered based on the lack of suitable breeding and roosting habitat within areas likely to be disturbed by the project. According to the OEH Threatened Species Profile Database, this species requires between 31 and 70 per cent habitat cover. The assessment of native vegetation cover before development was calculated to be eight per cent cover and seven per cent after development. Based on this, it was considered that this species would be highly unlikely to occur in the project footprint. No breeding habitat would be affected as part of the project. There are no cliffs, mine shafts or substantial rocky overhangs in the project footprint.

4.17 TTM Consulting Report

The councils for Botany, City of Sydney and Marrickville each commissioned TTM Consulting to prepare a report commenting on the traffic related components of the EIS. A version of the TTM Consulting Report has been submitted with each council submission as an appendix. Although essentially the same report, each of the three versions raise some issues that are specific to each council area.

This section provides a consolidated response to the issues raised in the three versions of the TTM Consulting Report. Issues are presented in the order in which they appear in the TTM Consulting Report.

4.17.1 Traffic forecasts

Issue description – Traffic forecasts

It is our advice to the City of Sydney, Marrickville and City of Botany Bay Councils that the traffic forecasts for the New M5 do not support completion of the project at this stage. Whilst the reasons are multitude they can be summarised as:

- The proposed tolling regime results in traffic avoiding the motorway system and diverting to local roads
- The forecast traffic volumes for the New M5 are very low. By comparison, they are lower than for the Sydney Cross City Tunnel.

Response

A response to the issue of tolling has been provided in **Section 4.17.4**.

A response to the issue of forecast traffic volumes has been provided in **Section 4.17.5**.

4.17.2 Induced demand

We advise that the implications of induced demand have not been adequately assessed and that the forecasts in turn are not reliable for economic or financial assessment.

Response

A response has been provided in **Section 4.17.5**.

4.17.3 Key issues for each Council

Should the project proceed in its current form there remain a number of construction and operational issues which need to be addressed.

City of Sydney

The modelling indicates that there would be significant diversions from Euston Road to surrounding local streets with just the New M5 and also with the fully completed WestConnex. Traffic management measures would be required to address this intrusion into local residential precincts. Regardless, residents of this area would experience significant impacts on their local amenity both with the New M5 and with the completion of the full WestConnex.

City of Botany Bay

The traffic forecasts indicate significant peak period traffic increases on Bourke Street, south of Gardeners Road. This is primarily due to the construction of the new Campbell Road Bridge and not due to traffic to and from the New M5 itself. New M5 traffic accesses the area via Gardeners Road.

The longer term forecasts with the completion of the full WestConnex project and the Southern extension show significant increases in peak period traffic flows on Bourke Street. However, other streets including O'Riordan Street and Kent Road experience reductions due to traffic utilising the Sydney Gateway.

The implications for Bourke Street south of Gardeners Road have not been addressed in the EIS. This road services Mascot Station and the surrounding residential commercial precinct which is expected to expand significantly in the near future. This additional traffic as a result of the Campbell Street Bridge would be detrimental to the local residential amenity and may result in severance if not adequately addressed.

It is clear that measures would need to be examined to improve safety in the vicinity of the station. One measure that should be considered is upgrading the existing pedestrian crossing on Bourke Street outside Mascot Station to a signalised pedestrian crossing.

Marrickville

The traffic forecasts do not indicate significant traffic impacts on streets within the Marrickville Local Government Area with the addition of the New M5 only. An allowance would need to be made for the increase in traffic on Edgeware Road which would in addition to that forecast for the expansion of the Marrickville Metro shopping centre.

The longer term forecasts with the completion of the full WestConnex project and the Southern extension show a major increase in peak period traffic flows on Edgeware Road and King Street. The implications of this have not been addressed in the EIS.

Response

City of Sydney

The strategic modelling (select link plots) shows that there may be diversions onto surrounding roads, such as Mitchell and Maddox Streets. Traffic management measures have been proposed at the Sydney Park Road / Mitchell Road intersection and these have been included in the operational modelling. An operational traffic review would be undertaken to confirm the operational traffic impacts of the project on surrounding arterial roads and major intersections about 12 months after the commencement of operation of the project. The results and recommendations of the review would assist the development of the Roads and Maritime's network operations and infrastructure provision plans. If required, and subject to the successful outcome of further consultation with local councils, stakeholders and community, localised schemes would be implemented.

City of Botany Bay

While the increase on Bourke Street, south of Gardeners Road is high in percentage terms, the actual volume of traffic is relatively low compared to other parallel roads in the area. The urban design and road environment in the Mascot Town Centre would play a significant role in the amenity and safe interaction of pedestrians and vehicles through the town centre. As part of the Mascot Town Centre Precinct Masterplan (City of Botany Bay Council, 2012), Bourke Street and Church Street are proposed as traffic-calmed streets, with good pedestrian amenity and serving a range of transport modes. The upgrading of the existing pedestrian crossing on Bourke Street outside Mascot Station to a signalised pedestrian crossing is already planned by Council as referenced in the Mascot Town Centre Precinct Masterplan (City of Botany Bay Council, 2012).

Marrickville

Intersections surrounding the Marrickville Metro are predicted to operate at a satisfactory level provided the Marrickville Metro Shopping Centre incorporates the recommended improvements to Unwins Bridge Road, Bedwin Road, May and Campbell Street intersection, as well as providing a new roundabout to Edinburgh and Sydney Steel Road, as stated in the Environmental Assessment Report (July 2010) for the Marrickville Metro Shopping Centre Concept Plan Application (Ref: MP 09_0191).

The forecast peak hour traffic changes on Edgeware Road and King Street, adjacent to the study area, fluctuate depending on direction and time of day. The assessment was based on strategic model outputs and consequently, may be affected by the limitations of the modelling process, as described in the EIS. An operational traffic review would be undertaken to confirm the operational traffic impacts of the project on surrounding arterial roads and major intersections about 12 months after the commencement of operation of the project. The results and recommendations of the review would assist the development of the Roads and Maritime's network operations and infrastructure provision plans.

4.17.4 Compliance with the Secretary's Environmental Assessment Requirements

Issue description – strategic traffic modelling

The strategic traffic modelling is inconsistent. In particular, the traffic forecasts for average weekday traffic in the New M5 are excessively high when compared to the morning peak period flows. These overly high daily forecasts adversely affect the economic and financial assessment of the project.

Response

In relation to the comparisons of flows in City of Sydney it would appear that traffic counts undertaken in 2014/15 have been compared to model flows for 2021. Some care is required when doing this comparison as the model may not replicate flows accurately for specific locations and growths calculated using this comparison may be misleading.

Model results for the 2021 scenario with Stages 1 and 2 of WestConnex give peak to daily factors (daily two way flows divided by two-way am peak your flows) of 13.9 for the new M5 tunnel and 16.3 for the existing M5 tunnel. Count data available in 2014 for several inner toll roads in Sydney give a range of 10.7 to 15.6 while the current M5 East counts indicate peak to a daily factor of 20.3. With the introduction of tolls and the additional capacity of the New M5 tunnel, this figure is expected to drop. The model peak to daily values is therefore considered feasible.

Issue description – M5 East Motorway toll

The traffic forecasts appear to include the assumption that the M5 East is tolled. This is an un-tolled road and is not part of the project presented to the government. The toll assumed for the M5 East has not been stated in the EIS report.

Response

Chapter 5 of the EIS describes the project for which approval is being sought. The project includes the installation of infrastructure to introduce a toll on the existing M5 East Motorway. The introduction of the toll is assumed within the strategic model, and the impacts of the toll are assessed in the EIS. As tolls would be applied to both the New M5 and the existing M5 East Motorway when the New M5 is opened, it is appropriate for the New M5 EIS to assess the impact this may have on traffic across the network.

In October 2014, the NSW Government agreed to a broad set of principles for tolling for Sydney's motorways. The principles identified would be applied to WestConnex, NorthConnex, the Western Harbour Tunnel and Beaches Link and Gateway to the South motorways.

Detail on the tolling regime planned for WestConnex motorways and how it aligns with the NSW Government's tolling principles is provided in Chapter 9 of the *Updated Strategic Business Case*, (NSW Government 2015).

Issue description – traffic diversions

The upgrade of Campbell Road/Street and Euston Road results in significant increases in traffic volumes utilising Bourke Street and diversions of traffic from the Princes Highway to Euston Road. The implications of this have not been addressed in the EIS.

Response

It is recognised that the project would lead to a redistribution of traffic beyond those roads directly affected by project works.

To ensure that this redistribution does not lead to unacceptable outcomes for the surrounding road network, an independent operational traffic review would be commissioned and carried out 12 months following the commencement of operation of the project (refer to environmental management measure OpTT02, amended in **Chapter 8** (Revised environmental management measures) in this report). This review would include an assessment of the level of service at major intersections on local roads around the St Peters interchange (among other things). In the event that unacceptable outcomes are identified from this review, consideration would be given to additional feasible and reasonable measures to address these outcomes.

4.17.5 Traffic Forecasts

Issue description – traffic modelling inconsistencies

There are inconsistencies within the forecasts which should be addressed. In relation to the assessment of impacts, examples of these inconsistencies are:

- City of Sydney
 - Morning peak hour traffic on King Street is forecast to fall between 2014/15 and 2021 without the New M5 (**Table 4-18**)
 - Northbound morning peak hour traffic across the northern screenline is forecast to fall between 2014/15 and 2021 without the New M5 (**Table 4-18**)
- City of Botany Bay
 - Morning peak hour traffic on Bourke Street in 2021 are forecast to rise by 107% yet they are forecast to fall by 16% in the evening
- City of Marrickville
 - Morning peak hour traffic on King Street is forecast to fall between 2014/15 and 2021 without the New M5 (**Table 4-18**).

The peak to daily conversion factors for the screenlines in Table 4-7 in the EIS range from 12.2 to 16.1. By way of comparison, the Roads and Maritime counts conducted in 2006 are presented in **Table 4-18** (reproduced from Table 5.1 of the TTM Consulting Report). The 2006 counts are presented as they include traffic flows on the M4 Motorway when it was tolled.

Table 4-18 Historical peak to daily factors

Location	Peak (8am-9am)	Daily	Daily/peak
City Road, South of Cleveland Street	2,995	41,486	13.9
Princess Highway, South of Yelverton Street	4,673	58,043	12.4
Princess Highway at Cooks River	10,619	66,929	6.3
King Street, South of Enmore Road	1,592	23,029	14.5
General Holmes Drive, Northern end of Tunnel	11,867	155,708	13.1
Marsh Street at Cooks River	4,219	55,448	13.1
M4 Motorway at Salesyard Channel Bridge	6,542	89,115	13.6

From the above table it can be seen that peak to average weekday traffic factors are around 12 to 14. The factors from Table 4-7 of the EIS range from around eight to 20. This indicates that the model forecasts for daily traffic are not stable.

Of particular concern is the factor for the New M5 which is 16.5 in 2021. This is well in excess of what is experienced on other motorways. The M4 at its peak had a factor of 13.6 as seen in the table above. The implications of this are that the daily forecasts for the New M5 are likely to be excessively high. This in turn would affect the financial assessment of the motorway.

It is not made clear in the EIS but it appears that the modelling includes tolling of the existing M5 East Motorway. If this is the case the EIS needs to assess the effects of this new toll separate to the New M5.

The above (and other illogical changes in traffic flows) brings into question the validity of the forecasts in relation to route choice and how growth is handled in the models. Nevertheless, it is accepted that there can be discrepancies in models that do not affect the overall picture when planning for major roads.

Response

Forecast traffic volumes in 2021, assuming the operation of both the M4 East and New M5 projects, give peak to daily factors (i.e. daily two-way traffic volumes divided by two-way AM peak hour traffic volumes), as follows:

- 13.9 for the New M5 tunnels
- 16.3 for the existing M5 East tunnels.

Traffic count data available in 2014 for several inner toll roads in Sydney gives a range of peak to daily factors from 10.7 to 15.6, while the existing M5 East Motorway traffic counts indicate a peak to daily factor of 20.3. With the introduction of tolls on the New M5 and existing M5 East Motorway, and taking into account the additional capacity provided along the corridor by the New M5, a peak to daily factor less than 20.3 (as currently experienced on the M5 East Motorway) is considered reasonable.

As tolls would be applied to both the New M5 and the existing M5 East Motorway at the time the New M5 is opened, it is appropriate to assess the impact this may have on traffic across the network as part of the New M5 EIS.

In relation to the comparisons of flows in this response, traffic counts undertaken in 2014/15 have been compared to model flows for 2021. It is acknowledged that the model may not replicate flows accurately for specific locations and growths calculated using this comparison may be misleading.

As is noted in the comment, it is possible for models to contain discrepancies although in this instance the model is considered suitable and robust for its overall planning function.

Issue description – traffic model forecasts (2021 with and without the New M5)

The forecasts indicate changes in daily traffic flows for the:

- Sydney screenline
- Botany screenline
- Marrickville screenline

Sydney screenline

The forecasts indicate the following changes in daily traffic flows:

- The total daily traffic travelling between the north and south across the northern screenline increases by 12 per cent (11,170 vehicles)
- The total daily traffic travelling between the north and south across the eastern screenline decreases by an insignificant amount.

In relation to the eastern screenline:

- Daily traffic flows on Marsh Street fall by 12%(9,256 vehicles)
- Daily traffic flows on The Princes Highway fall by 6% (4,027 vehicles)
- Daily traffic flows on the existing M5 East fall by 20 % (20,779 vehicles)
- Daily traffic flows on General Holmes Drive rise by 5% (4,688 vehicles).

The reduction in traffic flows on Marsh Street, the Princes Highway, and the existing M5 East Motorway amounts to around 34,000 vehicles of which around 29,500 are now using the New M5 and being directed to and from Euston Road and other nearby streets.

The increase in traffic on General Holmes Drive is difficult to understand. It may simply be a modelling discrepancy over-compensating for congestion somewhere further south.

In relation to the northern screenline the New M5:

- Daily traffic flows on King Street increase by 3% (610 vehicles)
- Daily traffic flows on Mitchell Road fall by 43% (11,480 vehicles)
- Daily traffic flows on Euston Road increase by 74% (21,410 vehicles).

Morning and evening traffic flows on Euston Road north of Sydney Park Road are forecast to increase significantly in the peak directions. An additional 900 vehicles per hour northbound in the morning and 600 southbound in the evening are forecast. Mitchell Road is forecast to have an additional 93 vehicles northbound in the morning but a reduction of 25 vehicles in the evening. Peak direction traffic flows on King Street are forecast to fall slightly.

The traffic demands forecast for Euston Road would disperse to other streets. Whilst Euston Road is proposed to be upgraded, this upgrade is only to just north of Sydney Park Road. Traffic would have to disperse prior to and shortly after this point. The main alternative routes are Mitchell Road and King Street. It is our opinion that the modelled route choices have not accurately split the traffic between Euston Road, Mitchell Road, and King Street.

The select link plots for Euston Road (Figure 4-6 and Figure 4-7 of the submission) indicate that the main demand for Euston Road is traffic to and from Campbell Road east of the Princes Highway (76 % AM, 62 % PM) with most of the remainder being to and from the New M5 (20 % AM, 25 % PM). Some of this traffic may already be accessing Euston Road via Canal Road and Burrows Road or Sydney Park Road. It appears that the upgrade of Campbell Road and Euston Road are effectively providing a new route into the CBD. Traffic on King Street reduces as a result. However, as seen in Figure 4-6 and Figure 4-7 of the submission, local streets carry significant increase in traffic. Maddox, Fountain, and Bowden Streets are particular examples (shown in blue). This distribution of additional traffic is of concern. Maddox Street feeds to Mitchell Street and Bourke Road. Fountain Street feeds to Swanson Street and Erskineville Road onto King Street and Enmore Rd. Bowden Street is a feeder to Bourke Road and also to Mandible Street.

It is our advice that the EIS for the New M5 does not address these issues. It is clear that local area traffic management measures would be required in the streets surrounding Euston Road should the New M5 project proceed.

The select link plots for the New M5 (Figure 4-8 and Figure 4-9 of the submission) indicate that around 60% of the New M5 traffic uses Euston Road. Whilst this is a high proportion the amount of traffic associated with the New M5 is dwarfed by the diversions that occur from other roads to Euston Road.

Botany screenline

The forecasts indicate the total daily traffic travelling across the Botany screenline increases by 13% in the morning peak and decreases by 5% in the evening peak. The most significant increase is on Bourke Street, south of Gardeners Road where traffic in the morning peak is forecast to double. This traffic would affect the amenity and safety for people in the vicinity of Mascot Station.

The select link analysis shows that 29% of morning peak hour and 27% of evening peak hour traffic is via the New M5 link to Gardeners Road. This is not unexpected as the New M5 would service the airport precinct until such as direct connections are made.

Marrickville screenline

The forecasts indicate the total daily traffic travelling across the Marrickville screenline increases by 4% (1,240 vehicles). The increase on Edgeware Road is 4%. Upgrades are currently proposed for Edgeware Road as part of the development approval for the expansion of the Marrickville Metro shopping centre. The additional 4% needs to be incorporated into the upgrade design. The EIS does not appear to address this issue.

The select link plots for Edgeware Road indicate that traffic on Edgeware Road to and from the New M5 amounts to 7% of the morning flows and 2% of the evening flows. It appears that the remainder of any growth comes from the upgrade of Campbell Street / Road and the new Bourke Road Bridge.

Response

The modelled traffic volumes presented in the EIS are subject to the normal limitations inherent in strategic models of this nature. The model has been calibrated to 2012 traffic volumes and takes account of anticipated future travel patterns across Sydney. It is considered suitable for use in this EIS. The strategic model incorporates route choice accounting for tolls paid on relevant roads in forecasting future traffic volumes.

Separate operational modelling has been developed to assess local area impacts in greater detail. This is described in Chapter 9 of the EIS. The local road network has been modified following consultation with Councils for a preference to direct flows on Campbell and Euston roads – the industrial edge of Sydney Park. The model accounts for this change and demonstrates the impact of the forecast traffic.

Issue description – traffic model forecasts (2031 with project)

The forecasts for 2031 with the New M5 only (without M4-M5 Link, Sydney Gateway or Southern connector) show:

- The total daily traffic travelling across the northern screenline increases by 14 per cent between 2021 and 2031 without the New M5
- An additional 13 per cent increase (compared to 2021 with no New M5) is forecast across the screenline with the New M5
- The total daily traffic across the eastern screenline increases by 12 per cent without the New M5 and 16 per cent with only the New M5. The differences are not significant.

Traffic forecast for King Street increases by 26 per cent without the New M5 and by 23 per cent with the New M5. The differences are not significant. However, they do indicate that the New M5 does not provide significant relief to traffic growth on King Street.

Traffic flows on Mitchell Road increase by 13 per cent without the New M5 and by 26 per cent with the New M5. This indicates that traffic congestion on Euston Road is resulting in diversions to Mitchell Road via Sydney Park Road. This highlights the need for a comprehensive traffic management program should the New M5 proceed.

Response

The Proponent has committed to progress the concept for a King Street Gateway with Councils. The objective of this Gateway is to complement the upgrade of Campbell and Euston Roads, and provide protection of the current amenity of King Street. Traffic forecasts indicate that the New M5 would provide some benefit for King Street, as recognised in Council's submission.

An independent operational traffic review would be commissioned and carried out 12 months following the commencement of operation of the project (refer to environmental management measure OpTT02, amended in **Chapter 8** (Revised environmental management measures) in this report). This review would include an assessment of the level of service at major intersections on local roads around the St Peters interchange (among other things). In the event that unacceptable outcomes are identified from this review, consideration would be given to additional feasible and reasonable measures to address these outcomes.

Issue description – traffic model forecasts (2031 with full WestConnex program of works)

City of Sydney

The addition of the WestConnex Stage 3, Sydney Gateway and Southern Extension to the New M5 results in a major change in traffic flows. We refer to this combination of projects below as "WestConnex-Plus". It results in significant changes in traffic flows. **Table 4-19** (reproduced from Table 5.2 of the TTM Consulting Report) presents the relative changes in traffic flows that are forecasts to occur in 2031 with the New M5 and with WestConnex-Plus.

Table 4-19 Year 2031 WestConnex Impacts (Changes in daily traffic flows vs. no New M5)

Screenline / Road Location	With New M5 Only	With WestConnex - Plus
Northern Screenline		
Edgware Road, west of Edinburgh Road	4%	3%
King Street, south of Alice Street	1%	-2%
Mitchell Road, north of Sydney Park Road	-37%	-33%
Euston Road, north of Sydney Park Road	69%	80%
Total	12%	16%
Eastern Screenline		
Princes Highway, south of the Cooks River	-4%	-68%
New M5, at the Cooks River	n.a.	n.a.
Marsh Street, at the Cooks River	-7%	5%
M5 East, at the Cooks River	-13%	-21%
General Holmes Drive, at the Cooks River	3%	-3%
Total	4%	2%

Some items to note:

- The total daily traffic travelling between the north and south across the northern screenline increases by 16% (16,010 vehicles) compared to the no New M5 scenario
- The total daily traffic travelling between the north and south across the eastern screenline compared to the no New M5 scenario increases but by an insignificant amount.

In relation to the eastern screenline (compared to the no New M5 scenario):

- Daily traffic flows on Marsh Street rise by 5% (4,758 vehicles).
- Daily traffic flows on The Princes Highway fall by 68% (54,135 vehicles)
- Daily traffic flows on the existing M5 fall by 21% (22,871 vehicles)
- Daily traffic flows on General Holmes Drive fall by 3% (3,082 vehicles)

In relation to the northern screenline WestConnex-Plus (compared to the no New M5 scenario):

- Daily traffic flows on King Street decrease by 2% (500 vehicles)
- Daily traffic flows on Mitchell Road decrease by 33% (9,870 vehicles)
- Daily traffic flows on Euston Road increase by 80% (26,010 vehicles). This is greater than the scenario with just the New M5.

Changes across the eastern screenline in total are not significant. However, there is a major shift of traffic from the Princes Highway to the Southern Extension and the New M5. Traffic flows for the Princes Highway are forecast to fall to around 25,000 vehicles on weekdays. This is similar to what King Street is currently accommodating. It indicates that the Princes Highway could “in theory” be downgraded to 4 lanes with peak period clearways.

On the eastern screenline average weekday traffic on the New M5 is predicted to increase by 47,000 vehicles with the completion of WestConnex program of works and the future Southern connector. It is apparent that the Southern connector is required if the New M5 is to attract significant traffic flows. The New M5 EIS reports that weekday volumes on the Princes Highway are currently 75,500 vehicles and that this would rise to 79,085 vehicles by 2031 without the New M5. The increase is relatively low. It is difficult to see the logic that justifies the Southern connector given that it simply takes traffic away from a route designed to accommodate this demand.

Overall, it is our opinion that the creation of the WestConnex program of works and Southern connector needs more investigation. In particular, justification of the New M5, the future role of the Princes Highway, and traffic impacts on Euston Road and the surrounding streets needs to be clearly established.

City of Botany Bay

The addition of the WestConnex Stage 3, Sydney Gateway and Southern Extension to the New M5 results in peak period flows on Bourke Street increasing by 39% in the morning peak and 23% in the evening peak. It is clear that measures would need to be examined to improve safety in the vicinity of the station. One measure that should be considered is upgrading the existing pedestrian crossing on Bourke Street outside Mascot Station to a signalised pedestrian crossing.

Marrickville City Council

The addition of the WestConnex Stage 3, Sydney Gateway and Southern Extension to the New M5 results in peak period flows increasing substantially with a 22% increase on Edgeware Road and a 15% increase on King Street. These increases would have a detrimental effect on the local road system and residential amenity. Further planning is required to address this should the full WestConnex project proceed.

Response

Princes Highway, between Campbell Street and King Street, and Euston Road would be subject to the operational traffic review to be commissioned and carried out 12 months following the commencement of operation of the project. Furthermore, the King Street Gateway may take advantage of opportunities for reductions in the role of Princes Highway with the increase in role of Campbell and Euston Roads.

While the increase on Bourke Street, south of Gardeners Road is high in percentage terms, the actual volume of traffic is relatively low compared to other parallel roads in the area. The urban design and road environment in the Mascot Town Centre would play a significant role in the amenity and safe interaction of pedestrians and vehicles through the town centre. As part of the Mascot Town Centre Precinct Masterplan (City of Botany Bay Council, 2012), Bourke Street and Church Street are proposed as traffic-calmed street, with good pedestrian amenity and serving a range of transport modes. The upgrading of the existing pedestrian crossing on Bourke Street outside Mascot Station to a signalised pedestrian crossing is already planned by Council as referenced in the Mascot Town Centre Precinct Masterplan (City of Botany Bay Council, 2012).

A Road Safety Audit would be undertaken which would assess the safe operation of the road with the given speed environment, road geometry and traffic volumes.

Issue description – induced demand

The New M5 EIS makes reference to induced demand in relation to public transport. However, it does not quantify induced demand. We have drawn on information from the EIS for the M4 East EIS in order to advise on the effects of induced demand. This report contained the following statement for that project:

To calculate this induced travel demand, an elasticity approach was used to determine the number of new users and the number of public transport users who shift to car. The methodology used has been based on the New Zealand Transport Agency Economic Evaluation Manual (EEM) which contains a clear summary of the methods for applying an elasticity method for induced demand on a fixed matrix.

Induced travel demand increases 2031 future year traffic volumes using WestConnex between two per cent and seven per cent, with the specific value varying across different sections of the project.

This indicates that the majority of the induced travel demand is related to changes in trip distribution (the pattern of origin-destination combinations) within the assigned trip matrices.

Similar information does not appear to be included in the New M5 EIS report. Nevertheless, it is apparent that the same procedure has been applied in the assessment of the New M5. The New Zealand Transport Agency Economic Evaluation Manual referred to above applies elasticities originally published in the *UK Design Manual for Roads and Bridges* (1997). It is our understanding that these elasticities are outdated and not representative of conditions applicable to the proposed New M5.

It is our understanding that the forecasts used in the economic assessment incorporate the above assumptions in relation to induced demand. We advise that the implications of induced demand have not been adequately assessed and that the forecasts in turn are not reliable for economic or financial assessment.

Response

The Technical working paper: Traffic and transport (Appendix G to the EIS) is based on traffic modelling using the WestConnex Road Traffic Model (WRTM), which relies on forecasts of car driver demand sourced from the Sydney Strategic Travel Model (STM) operated by the Transport for NSW Bureau of Statistics and Analytics. The STM uses projections of population and employment for the Sydney and forecasts mode choice between car, rail, bus, light rail and ferry modes for future infrastructure scenarios. The modelling with STM for the EIS incorporated currently planned public transport schemes including Sydney Metro and CBD and South East Light Rail. The car driver demands forecast using STM after allowing for mode share due to these public transport projects under congested road conditions was subsequently used for forecasting WestConnex toll choice in WRTM. As such, the assessment incorporates the effects of future demands for public transport.

Secondary vehicle travel is usually generated from new transport infrastructure such as road projects. The Updated WestConnex Strategic Business Case acknowledges that the construction of new roads can induce more people to travel on the road network. This is predicted to increase 2031 future year traffic volumes using WestConnex by between two per cent and seven per cent. The predicted induced travel demand was incorporated into the WestConnex Road Traffic Model (see Section 9.1.4 of the EIS).

The traffic and transport assessment shows that in both 2021 and 2031, the forecast reduction in traffic along the M5 East would result in improved speed, journey reliability and safety in this corridor. In the St Peters area, reductions in average delay and congestion are anticipated during both future years (2021 and 2031) compared to the 'do minimum' scenarios. The operational performance of the network, including predicted traffic volumes under the 'with project' scenarios which have incorporated induced demand forecasts, is discussed in detail in Chapter 9 and Appendix G of the EIS.

On an average weekday in 2031, the combined number of new road trips and trips redeployed from public transport as a result of improved traffic conditions from the full WestConnex program of works is estimated to be around 0.4 per cent of the total number of daily car trips on the WRTM Sydney-wide network at that time.

The method used for the induced demand analysis for the WestConnex project was independently reviewed by Professor David Hensher, Director of the Institute of Transport and Logistics Studies at the University of Sydney. Through independent analysis, Professor Hensher verified that the method was sound and specifically calculated that the parameters proposed by the New Zealand Transport Agency Economic Evaluation Manual were appropriate for use in Sydney.

4.17.6 Strategic issues

Issue description – low traffic flows on the New M5

A good indicator of the viability of the New M5 is by comparison with other motorways. **Figure 4-62** presents a comparison of the traffic flows forecast for the New M5 in 2021 against published average daily traffic using the Sydney Cross City Tunnel over the first two years after opening (note the Cross City Tunnel average includes weekend traffic). It shows that the New M5 is forecast to operate with similar if not lower traffic volumes.

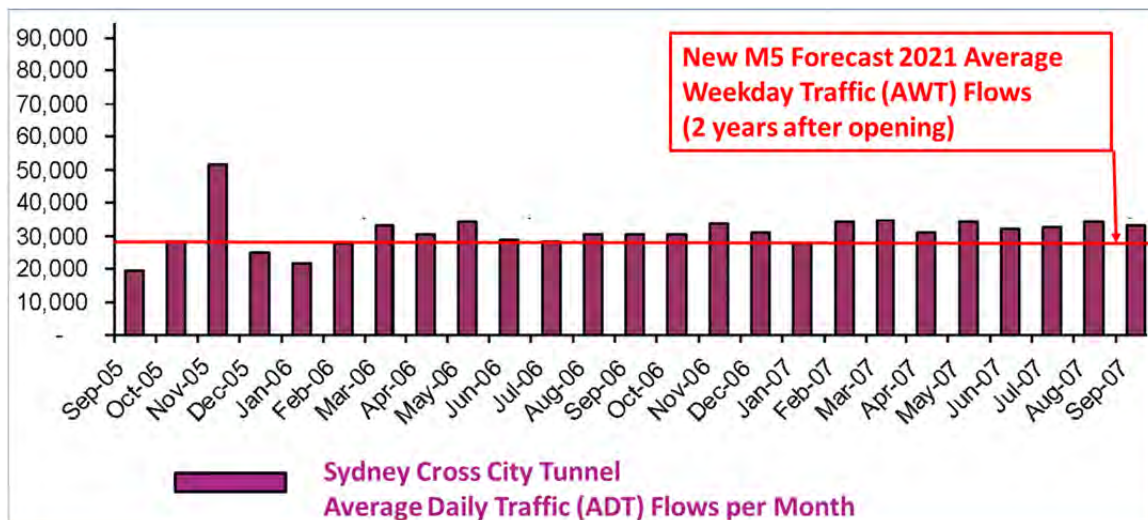


Figure 4-62 Comparison of 2021 AWT forecasts vs. Sydney Cross City Tunnel ADT

Transurban purchased the Cross City Tunnel in June 2014 for around \$475 million. The Cross City Tunnel is a 2.1km motorway. Car toll charges effective 1 October 2015 were \$5.27 for the main tunnel and \$2.49 for the Sir John Young Crescent exit. Heavy vehicle tolls are double the car toll.

The New M5 is 11 km long. At \$0.42/km the toll for cars using just the New M5 would be \$4.62. The Updated Strategic Business Case states that the cost of constructing the New M5 is estimated to be \$4,335 million. This is considerably more than the valuation of the Cross City Tunnel and brings into doubt the value of the New M5.

With WestConnex fully completed weekday traffic flows on the New M5 are forecast to rise to 37,200 vehicles by 2031. With the addition of a new cross harbour tunnel the weekday flows are forecast to rise to 43,600 vehicles. These flows are still very low when compared to the comparative cost of constructing the New M5.

It can be seen from the forecasts that the New M5 is the weak link in the proposed WestConnex program of works. It is also apparent from the EIS and other documentation that there is little prospect for this link to be justified. Having considered the relevant information, the WestConnex concept should be re-visited.

Response

Direct comparison of traffic volumes using different motorways, without taking into account the design, capacity, context and operational factors applicable to those motorways, is not a robust approach to evaluation of anticipated motorway performance. The Cross City Tunnel and the New M5 are fundamentally different road network connections, such that direct comparison of traffic volumes through these two projects would not yield meaningful observations. Further, it is not appropriate to compare traffic volumes from two road projects at two very different points in time (2006/2007 in the case of the Cross City Tunnel and 2021 for the New M5).

WestConnex has been assessed as a program of work and a motorway network in the Updated Strategic Business Case released in November 2015. The economic appraisal completed as part of this updated business case concluded that WestConnex would deliver \$1.71 in benefits for every dollar spent.

As explained in Chapter 3 of the EIS, the existing M5 East is heavily congested for large parts of the day. It carries over 100,000 vehicles per day, including about 10,000 heavy vehicles; well in excess of its design capacity. The M5 East Motorway currently experiences heavy traffic congestion, slow speeds and unreliable travel times especially in the morning and afternoon peaks, and increasingly at other times of the day and on weekends.

Sydney's population is expected to increase by more than 1.6 million people by 2031 and without major investment in road network infrastructure this growth would result in worsening road congestion. This congestion would in turn affect Sydney's economic competitiveness as a global city.

The New M5 would deliver additional capacity for the M5 Motorway corridor, resulting in:

- A reduction of up to 60,000 vehicles on the M5 East on an average weekday, relieving congestion and improving travel reliability.
- Between 2021 and 2031, average travel times on the M5 East Motorway would generally be halved and average travel speeds would double during the morning and afternoon peak, improving the efficiencies of intrastate and interstate freight movements through travel time saving and reduced operating costs
- An alternative to the M5 East, providing network resilience in the event of incidents or planned maintenance.

Without the New M5, conditions on the M5 East would continue to deteriorate.

4.17.7 Construction phase

Issue description – inconsistency in Canal Road Construction Compound

It is noted that there are inconsistencies in the diagrams of Canal Road Construction Compound (C8) of the New M5 EIS. A mechanic workshop currently located at the corner of Canal Road and the Princes Highway is included in the area of the construction compound in some figures and not in others. It is understood that the mechanic workshop is to be resumed as part of the project.

Response

The Dynamo Workshop would be included within the Canal Road Construction Compound (C8), but would not be demolished as part of the project. The concept design includes retention of the Dynamo Workshop building to operate as a gateway to the parklands. Should the design of the motorway operations buildings evolve during detailed design, the incorporation of the Dynamo building could be considered.

Issue description - upgrade of Campbell Street and Princes Highway intersection

The project includes an upgrade of the intersection of Campbell Street and the Princes Highway. It is essential that this occurs prior to major works as this intersection would be used by trucks. Current turn restrictions prevent the proposed compound access routes from being viable.

Response

The timing of intersection upgrades would be determined by the local roads construction staging program. Upgrade of the intersection at Campbell Street and Princes Highway is likely to occur as early works before and during early stages of the construction of major civil works.

The intersection as currently configured and signposted, prevents a number of vehicle movements including some left and right turns. It also prevents long vehicles (eight metres or more in length) travelling westbound on Campbell Road from turning left onto Princes Highway southbound, and prohibits trucks over three tonnes from travelling on Campbell Street west of the Princes Highway.

Heavy and light construction vehicles would be required to adhere to any restrictions placed on motorists and construction vehicle movements during the various stages of construction. Staged upgrades to the intersection would balance the needs of all road users (including motorists, active transport and the public) and construction works and construction traffic. Accordingly, it is anticipated that movement prevention measures would be implemented as required during the various stages to maintain the safety of all road users during construction.

Changes to the configuration and operation of the intersection as varied from time to time would be documented and communicated in accordance with the Construction Traffic and Access Management Plan.

Issue description –site parking

Table 4-20 (reproduced from Table 7-1 of the TTM Consulting Report) presents the estimates of the peak construction workforce and associated parking as published in the New M5 EIS.

Table 4-20 Indicative construction compound light vehicle parking provisions⁶

Construction compound	Indicative number of parking spaces	Peak construction workforce
St Peters Interchange ¹	290	3202
Campbell Road bridge	10	15
Gardeners Road bridge	10	10

⁶ Source: New M5 EIS Vol 1A – Table 6-23

¹ St Peters interchange includes the Canal Road (C8), Campbell Road (C9), Landfill Closure (C10), Burrows Road (C11) and Sydney Park (C14) construction compounds

² Includes shift work

The figures above do not correlate with figures elsewhere in the EIS. **Table 4-21** (reproduced from Table 7-2 of the TTM Consulting Report) presents the forecast peak construction workforce and the number of parking spaces proposed at each of the construction compounds (as opposed to the aggregated figures above). The breakdown of the number of parking spaces for most of the compounds has been determined from the published diagrams in the EIS.

Table 4-21 Peak construction workforce estimates and indicative number of parking spaces

Construction compound	Estimated peak construction workforce	Parking	Source of parking numbers
Canal Road (C8)	193	13	From Diagrams
Campbell Road (C9)	215	271	From Diagrams
Landfill Closure (C10)	30	12	From Diagrams
Burrows Road (C11)	40	77	From Diagrams
Campbell Road bridge (C12)	35	15	From Report Table
Gardeners Road bridge (C13)	45	10	From Report Table
Sydney Park (C14)	25	10	From Diagrams

From **Table 4-21** (Table 7-2 in the TTM Consulting Report) it can be seen that there are significant differences in parking supply and peak workforces estimates for the various compounds.

The above indicates the need for a shuttle service between compounds if parking is to be accessible for workers. There is also a need to provide adequate accessibility between the compounds and public transport services in general. In this regard it is recommended that any shuttle service also link to the local railway stations.

Response

The peak construction workforce anticipated at each construction compound, including the peak construction workforce for each shift, is summarised in Table 6-25 of the EIS. Peak construction workforce numbers for each construction compound should not be added to calculate a total peak construction workforce, or to determine the total construction workforce for the project because:

- The peak construction period for each construction compound would occur at different times during the construction program for the project. The peak construction periods for most of the construction compounds would not occur at the same time
- Some of the construction workforce would work at more than one construction compound site during the construction program for the project.

It is also relevant to recognise that the peak construction workforce numbers for each construction compound are not always the sum of the peak workforce for each shift. This difference is the result of the spread of the construction workforce across each shift, and the nature of construction activities occurring at each construction compound.

Based on the peak workforce for each shift, the nature of construction works at each compound and evaluation of the timing of each shift peak, an estimate of the maximum employee numbers at each construction compound during shift changeover times has been determined. This 'likely employee peak', as presented in Table 6-23 of the EIS and in Table 64 of the Technical working paper: Traffic and transport represents the maximum number of employees anticipated to be on each construction compound site at any time. This is distinct from the anticipated 'peak' construction workforce that may be employed at a particular compound site, but spread over three separate shifts.

This 'likely employee peak' has been used to determine the likely onsite parking requirements for each construction compound site. These parking numbers are indicative and would be confirmed during detailed design of the project.

A total of 503 positions would be created across the life of the project as a result of the project for works associated with construction of St Peters Interchange associated with construction compounds C8, C9, C10, C11, & C14. As noted in Section 6.7.1 of the EIS, the peak construction workforce does not necessarily occur at the same time due to the use of day, afternoon and night shifts for the construction workforce. The likely employee peak of 320 employees is the anticipated maximum number of personnel expected during shift change periods as identified as Note 3 accompanying Table 64 of Appendix G (Technical working paper: Traffic and transport) of the EIS.

As noted in Section 7.6 of Appendix G, construction personnel would be encouraged to use public or active transport where possible, and consider other modes of transport such as carpooling.

Issue description – spoil removal

The removal of the spoil would generally occur along state roads to the south and west. It would not affect the amenity of residents of the City of Sydney or City of Botany Bay.

Response

Noted.

Issue description – active and public transport during construction

The impacts on cyclist and pedestrian facilities around the St Peters interchange as proposed in the New M5 EIS are as follows:

- The Bourke Road cycleway would be temporarily diverted around the construction works due to space constraints.
- Pedestrian facilities within areas subject to local roads upgrades would be relocated or temporary access paths would be constructed to maintain access throughout construction.
- Concrete barriers would be installed to separate construction equipment from members of the public where a haul road is close to a pedestrian access.
- Along Campbell Road / Campbell Street, Euston Road, Bourke Road, Bourke Street, Gardeners Road and the Princes Highway (where it intersects with Campbell Street), the footpath would be affected due to varied and periodic footpath closures and deviations for road widening. Pedestrians would be diverted to an alternative route or alignment.

A strategy for the maintenance of pedestrian and cyclist access throughout construction would be provided as part of the Construction Traffic Management Plan for the project which would be prepared during the detailed design phase of the project. The city's position is that bicycles are human powered and more vulnerable road users; therefore they need to retain their existing path of travel during construction.

It is our advice that the proposed arrangements for active transport are not reasonable. In particular:

- The Bourke Road cycleway diversion is not acceptable. Whilst one can divert traffic, bike riders would continue to use the same route.

- TTM supports the City's position that bicycles are human-powered and more vulnerable road users. Therefore, they need to retain their existing path of travel during construction of the New M5. This usually takes the form of dedicating the traffic lane that would otherwise be used by motorised traffic to bike riders. Vehicles that are motorised are to be diverted instead as the impact of a detour is not as significant. The City has followed this approach during construction projects for many years.
- In relation to pedestrian facilities, the proponent would need to follow all City policies including appropriate, accessible paths of travel during construction.

Any intent to relocate existing routes during construction would require consultation with the affected Councils.

It is essential that Council is involved in the management of pedestrians and cycling infrastructure during the construction phase. Significant changes to regulation of traffic should be referred to Council's Local Traffic Committee.

It is recommended that Council is consulted in relation to significant changes to the pedestrian and cycling infrastructure during the construction phase.

Response

Cyclists are recognised as an important group of stakeholders, and their specific needs would be considered during detailed design and implementation of the project. Particular attention would be given to areas where existing cycling facilities would be directly affected by construction works, such as along Bourke Road.

Any changes to existing cycling infrastructure, including mechanisms to communicate these changes to affected stakeholders would be documented in the Construction Traffic and Access Management Plan for the project.

Temporary diversions to active transport routes would be minimised wherever reasonable and feasible, however some diversions would be required over the course of the project to maintain the safety of all road users including motorists, cyclists and pedestrians.

The City of Sydney, Marrickville Council and Botany Council are key stakeholders and would be consulted on all proposed temporary and permanent changes to active transport facilities and routes during planning and construction.

Issue description – impacts to bus routes (construction)

The EIS contains proposals for temporary removal of a bus stop on The Princes Highway south of Campbell Street during construction and the permanent relocation of a bus stop on the eastern side of Canal Road further along the road to the south. Both of these measures are not in the interest of public transport users and indeed should be considered to be representative of poor planning.

In relation to the bus stop on the Princes Highway:

- It provides an important connection to local businesses and local residences
- There appears no reason why it could not be relocated to the southern side of Albert Street during construction and still perform its function. Given the current upgraded intersection design it appears that this may be required anyway.

In relation to the proposed permanent relocation of the bus stop on Canal Road:

- This new location would be 130 metres from another bus stop. The bus stops service a major regional limited stops route (418 – Burwood to Bondi Junction). Placing them so close to each other serves no purpose.
- Relocation of the bus stop to the Princes Highway could have been considered. However, the bus stop would have to be set back from The Princes Highway / Canal Road intersection enough distance to allow the bus driver to re-enter the traffic stream and enter the traffic turning right from the Princes Highway into Canal Road. This would place the bus stop back near another existing bus stop used for the route.

- Ultimately, the only appropriate place for the bus stop is where it is currently located. It is recommended that the bus stop is retained at this location and that the design reflects this.

It is recommended that the treatment of bus stops is reconsidered in the interests of maintaining at least the current level of service provided to the community. In particular:

- The southbound bus stop on the Princes Highway south of Campbell Street should remain open to public transport users during the construction phase. It is noted that this may require it being located south of Albert Street.
- The southbound bus stop on Canal Road south of the Princes Highway should be retained in its current location.

Response

The temporary removal of the southbound bus stop on the Princes Highway south of Campbell Street during construction has been proposed following consultation with Transport for NSW and given:

- The close proximity of bus stops to complex construction activities managed through high levels of safety and safety systems
- Due to site boundary limits, people waiting at bus stops would flow into pedestrian and cyclist access paths
- The impact of construction activities on pedestrian and public transport user desire lines
- The close proximity of alternative bus stops operating in lieu of the affected bus stops.

The bus stop on Princes Highway south of Campbell Street must be removed or replaced due to the civil works associated with upgrades to Albert Street, Campbell Street and Princes Highway. Further consideration of the impacts on bus stop locations during construction would be undertaken during detailed design in consultation with key stakeholders including Transport for NSW. The bus stop on Canal Road can be retained in its existing position without change.

Issue description – Green Travel Plan (construction)

The EIS does not include a Green Travel Plan.

Given the size of the project and the significant workforce it is recommended that one is required for the project. The green travel plan should give workers an opportunity to travel to and from work by means other than car. Provision should be made on site for workers who travel by bicycle.

Response

As noted in Section 7.6 of Appendix G (Technical working paper: Traffic and transport), construction personnel would be encouraged to use public or active transport where possible, and consider other modes of transport such as carpooling.

A number of public transport options are available for workers across the construction areas:

- Kingsgrove South and North: near the Beverly Hills station, bus connection to Wirega Avenue and a short walk into site
- Bexley Road North, South and East: a six minute walk from Bexley North station
- Canal Road and Campbell Street: a 15 minute walk from St Peters station. Several bus services travel along Princes Highway providing links to nearby train stations and the city
- Burrows Road and Burrows Road Bridge: a 15 minute walk from St Peters station. Several bus services travel along the Princes Highway providing links to alternative train stations or the city
- Bourke Road: a nine minute walk from Mascot station. Several bus services travel along Gardeners Road providing links to alternative train stations or the city
- Euston Road: a 10 minute walk from St Peters station. Several bus services travel along the Princes Highway providing links to alternative train stations or the city.

Issue description – cumulative effects (construction)

Construction of the Sydney Metro is planned to commence in 2017. A southern dive site is proposed for Marrickville and would be located north of Sydenham Station and south of Bedwin Road. This site would provide support for tunnelling operations and spoil removal. The impacts of truck movements associated with this activity in addition to the New M5 construction have not been assessed in the EIS. This additional truck traffic is most likely to remove spoil via Campbell Street east of the Princes Highway.

It is essential that planned road upgrades for Campbell Street as well as the upgrade of the intersection of Campbell Street with the Princes Highway are completed prior to this additional traffic entering the system.

Response

Transport for NSW is currently preparing an EIS for the proposed Sydney Metro (Chatswood to Sydenham), which would provide its assessment of construction impacts on the road network during construction. This would need to consider the cumulative impacts of WestConnex. At present, there is no publicly available information about Sydney Metro to enable a cumulative assessment to be undertaken for the purposes of this report. However, should both projects be approved, it is acknowledged that there would be a cumulative impact which would require coordination between Roads and Maritime, Transport for NSW and the contractors for each project (environmental management measure CI02, amended in **Chapter 8** (Revised environmental management measures) in this report), and consultation with the affected community (environmental management measure CI01, amended in **Chapter 8** (Revised environmental management measures) in this report).

4.17.8 Operational phase

Issue description – pedestrian and cyclist impacts Campbell Street/Unwins Bridge Road/May Street intersection

The EIS plans (Volume 1A Figure 5-31) show a turn bay for traffic westbound on Campbell Street to turn right into May Street. This movement is currently banned and should remain so as it could result in diversions to King Street.

The EIS shows a turn bay for traffic westbound on Campbell Street to turn right into the Princes Highway. This movement is currently banned and should remain so as it could result in diversions to King Street.

Whilst not explicit in the EIS, the right turn from the New M5 to the new Campbell Road Bridge link to Bourke Road would be banned. This effectively makes the new Campbell Road Bridge link a through route replacing the current route via Campbell Road / Burrows Road / Ricketty Street. We advise that this is a positive outcome.

Response

The Council's position is noted. However, the right turn into May Street from Campbell Street has been proposed as part of the modification works for this intersection identified in Table 5-5 of the EIS. The assessment presented in Chapter 9 and Appendix G (Technical working paper: Traffic and transport) in the EIS demonstrates that the project, including changes to the intersection of Campbell Street and May Street would not have a significant impact on King Street. It is also relevant to note that a right turn movement from Campbell Street into May Street is unlikely to be any more desirable than the same movement into Princes Highway for westbound traffic on Campbell Street.

The westbound right turn bay from Campbell Street into Princes Highway is an additional option for drivers heading from the south / east along Campbell Street (the others being at Euston Road and Unwins Bridge Road / May Street intersections). This increases resilience, connectivity and reduces travel time through the network for those drivers with a destination along King Street or along the western side of Princes Highway, north of Campbell Street. An assessment of the traffic impacts associated with this change is provided in Chapter 9 and Appendix G (Technical working paper: Traffic and Transport) of the EIS. Traffic is not forecast to cause capacity issues along King Street in the peak periods in the future scenarios.

Issue description – pedestrian and cyclist impacts - Campbell Street / Princes Highway

There are inconsistencies in the figures of this intersection. A triangle pedestrian island is included on the north bound exit in some and in others it is not. The inclusion of a triangle pedestrian island is not appropriate in high density urban areas. It is recommended that the alternative layout without the island is adopted to ensure pedestrian safety.

What appears to be raised and separated cycle ways and footpaths are provided on the southern side of Campbell Street. Concern is raised about their narrow design, lack of rest areas and lack of access points to and from these facilities. Further consideration should be given to the design of these features to ensure amenity and encourage usage.

Provision is made for a bridge connecting the raised cyclist and pedestrian bridge from the southern of Campbell Road and Sydney Park. North of the bridge is an at grade pedestrian crossing at the signalised intersection proposed at Albert Street. This provides both separated and at grade access to and from Sydney Park.

It is our view that benefits of grade separation are likely to be offset by severance due to limited access points. An at grade solution on the northern side of Campbell Street would appear to be a more logical solution in developing the regional cycle network.

The EIS plans (Figure 5-32 of the EIS) show a turn bay for traffic westbound on Campbell Street to turn right into the Princes Highway. This movement is currently banned and should remain so as it could result in diversions to King Street.

Response

As part of development of the project design carried out to date, careful consideration has been given to the potentially competing needs of vehicular traffic (including network performance and a desire to maintain free flowing traffic conditions) and those of pedestrians and cyclists (particularly with respect to safety). These factors have been taken into account through the design process. In some locations, slip lanes have been identified as the most appropriate design outcome to strike an appropriate balance between the needs of different road users.

Figure 5-32 of the EIS shows the configuration of the Campbell Street/ Princes Highway intersection for which approval is being sought. The figure shows a triangular pedestrian island. The pedestrian island is the consequence of providing a slip lane for westbound traffic on Campbell Street to turn left onto the Princes Highway southbound.

The detailed design would be reviewed by Roads and Maritime Services and verified by an Independent Verifier to ensure that the design meets all relevant Code and Standard requirements. A Road Safety Audit would also be undertaken which assesses the safe operation of the road with the given speed environment, road geometry and traffic volumes.

The Council's concerns and position are noted. Further consultation with City of Sydney Council would occur during the detailed design phase. The modification of turning provisions, such that all turning movements would be permitted has been proposed as part of the modification works for this intersection identified in Table 5-5 of the EIS.

The series of bridges proposed provides for the physical and safe separation of the east-west active transport routes from motorway traffic entering and exiting the St Peters Interchange and heavy vehicle and B-double movements on Burrows and Campbell Roads. By providing easily accessible and high quality grade separated facilities, interaction of active transport groups and traffic is avoided and in-turn improves intersection performance, eases traffic congestion and improves road safety.

The cycle and pedestrian bridges together with the proposed interconnecting cycle and pedestrian paths in Mascot and St Peters provide a high quality and safe grade-separated access for recreational and commuter user groups linking Mascot, Alexandria and St Peters with dedicated active transport facilities for the first time. These dedicated facilities would also provide a safe and convenient connection for families in St Peters and those residing in the rapidly expanding Mascot town centre wishing to enjoy the benefits of Sydney Park. The network of proposed active transport facilities would conveniently link with the existing Bourke Road cycleway and the Bourke Street cycleway currently under construction through Mascot town centre. The missing link between the Bourke Street and Bourke Road cycleways would link Mascot town centre directly to the Bourke Street cycleway.

Visual and privacy impacts to the existing terrace houses on the corner of Campbell Road and Harber Street has been minimised by locating the long pedestrian and cycle bridge on the southern side of Campbell Road. The interconnecting pedestrian and cycle bridge across Campbell Road is located to take advantage of the existing rise in topography in Sydney Park on the northern side of Campbell Road to minimise impacts to the Park for the placement of the northern bridge abutment. This provides a gentle and direct active transport link into the existing network of paths in Sydney Park and a convenient and gentle grade connection for active transport to the corner of Barwon Park Road and Campbell Road and onto the pedestrian and cycle paths planned for the northern side and for the full length of Campbell Street linking Camdenville and Simpson parks with Sydney Park as well as providing a link to the proposed network of paths and public open spaces in and around the St Peters Interchange. Impacts to the growing City Farm are avoided and the extent of earthworks and abutment structures has been minimised and in turn any impacts to the existing trees along Campbell Road and within Sydney Park have been minimised.

Safety in design (SiD) is an integral part of the detailed design process and issues associated with amenity, safety, crime and security would be addressed at this stage. The City of Sydney, Marrickville Council and Botany Council are key stakeholders and would continue to be consulted on all proposed active transport facilities and routes during detailed design and construction.

The westbound right turn bay from Campbell Street into Princes Highway is an additional option for drivers heading from the south / east along Campbell Street (the others being at Euston Road and Unwins Bridge Road / May Street intersections). This increases resilience, connectivity and reduces travel time through the network for those drivers with a destination along King Street or along the western side of Princes Highway, north of Campbell Street. An assessment of the traffic impacts associated with this change is provided in Chapter 9 and Appendix G (Technical working paper: Traffic and Transport) of the EIS. Traffic is not forecast to cause capacity issues along King Street in the peak periods in the future scenarios.

Issue description – pedestrian and cyclist impacts – New M5 / Campbell Road

The inclusion of a triangle pedestrian island at traffic signals is not appropriate in high density urban areas. It is recommended that the alternative layout without the island is adopted to ensure pedestrian safety.

Response

The pedestrian island is the consequence of providing a slip lane for eastbound traffic on Campbell Road to turn left onto Euston Road northbound.

As part of development of the project design carried out to date, careful consideration has been given to the potentially competing needs of vehicular traffic (including network performance and a desire to maintain free flowing traffic conditions) and those of pedestrians and cyclists (particularly with respect to safety). These factors, in addition to others, have been taken into account through the design process with slip lanes in some locations identified as the most appropriate design outcome that strikes an appropriate balance between the needs of different road users. Grade separated cycle and pedestrian facilities are included on the southern leg of this intersection with a dedicated active transport bridge over the northern ramps and Burrows Road, thereby separating pedestrians and cyclist using the east-west corridor from motorway and B-double traffic.

The detailed design would be reviewed by Roads and Maritime Services and verified by an Independent Verifier to ensure that the design meets all relevant Code and Standard requirements. A Road Safety Audit would also be undertaken which assesses the safe operation of the road with the given speed environment, road geometry and traffic volumes.

Issue description – pedestrian and cyclist impacts – Burrows Road to Bourke Road

The intersection of Bourke Road and Campbell Road is proposed to be signalised with the provision of three pedestrian crossings. Cyclists have the choice of using a shared path on the northern side of the new Campbell Road Bridge or a pedestrian/cyclist bridge on the southern side.

As noted earlier in Section 8.1.2 (of the TTM Consulting Report) it is our view that benefits of grade separation are likely to be offset by severance due to limited access points. An at grade solution on the northern side of the new Campbell Road Bridge would appear to be a more logical solution in developing the regional cycle network.

Response

The new Campbell Road Bridge over Alexandra Canal would be designed with a footpath on both sides of the bridge to provide at-grade pedestrian connectivity between Bourke Road and Burrows Road.

Cyclists using the Bourke Road and Bourke Street cycleways in Alexandria and Mascot would be able to use the dedicated active transport bridges described in a previous response to connect with the network of paths in Sydney Park and the St Peters Interchange, and to St Peters including Simpson and Camdenville parks via the at-grade dedicated cycle way along Campbell St.

The City of Sydney, Marrickville Council and Botany Council are key stakeholders and would continue to be consulted on all proposed active transport facilities and routes during detailed design and construction.

Issue description – pedestrian and cyclist impacts – Euston Road

As highlighted in Section 5.2 (of the TTM report, Year 2021 with and without the project forecasts) the main source of the high increase in traffic on Euston Road is not related to the New M5. It is traffic diverting onto the upgraded Campbell Road and Euston Road from the Princess Highway and Campbell Street/Edgeware Road. This traffic then disperses onto the local street system. Streets that are known to be adversely affected include Maddox, Fountain, and Bowden are particular examples.

Local area traffic management measures would be required in the streets surrounding Euston Road should the New M5 project proceed.

Response

Noted. The Councils area key stakeholders and would be consulted on proposed temporary and permanent changes to active transport facilities and routes during planning and construction.

It is recognised that the project would lead to some redistribution of traffic beyond those roads directly affected by project works.

To verify that this redistribution does not lead to unintended or unacceptable outcomes for the surrounding road network, an independent operational traffic review would be commissioned and carried out 12 months after the commencement of operation of the project (refer to environmental management measure OpTT02, amended in **Chapter 8** (Revised environmental management measures) in this report). This review would include an assessment of the level of service at major intersections on local roads around the St Peters interchange. In the event that unintended or unacceptable outcomes are identified from this review, consideration would be given to additional feasible and reasonable measures to address these outcomes.

Issue description – local road upgrades (Sydney Park Road/Euston Road intersection)

TTM has been advised that the modelling for the New M5 has assumed banning of the right turn from Mitchell Road into Sydney Park Road, and a bus only right turn from Euston into Sydney Park Road. This measure requires further consultation with the City of Sydney.

Response

The turning movements have been modelled as described above. The movement restrictions at the intersections of Sydney Park Road / Mitchell Road intersection have been included in the modelling to minimise vehicles taking short cuts through the network. Allowing a right turn movement from Euston Road into Sydney Park Road for all traffic would result in an unsatisfactory level of service at the intersection during peak periods. The right turn lane has been designed to accommodate general traffic should the traffic volumes allow the reintroduction of the right turn at a later date or during off-peak periods. The City of Sydney is a key stakeholder and would be consulted on proposed temporary and permanent changes during planning and construction.

As part of its ongoing responsibilities to manage the performance of the road network, Roads and Maritime is still separately considering upgrades at some locations near the New M5 local road upgrade works. When considering these intersections, Roads and Maritime would undertake modelling and consultation to inform a final decision.

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